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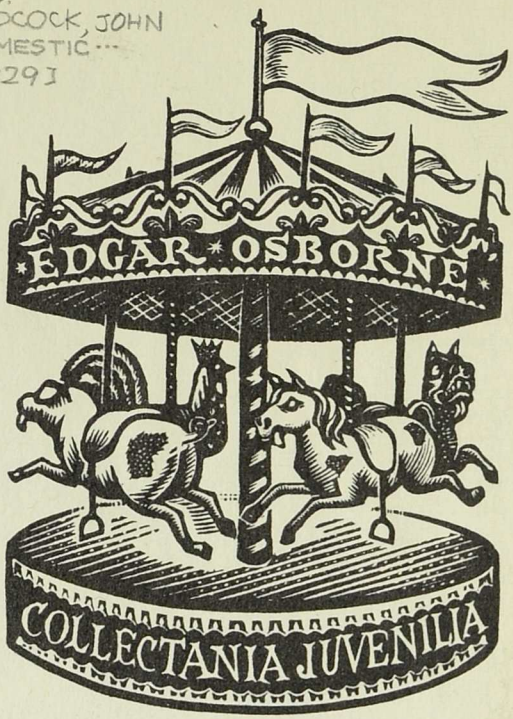

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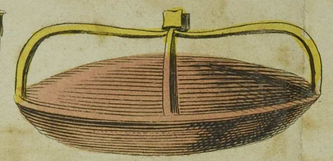

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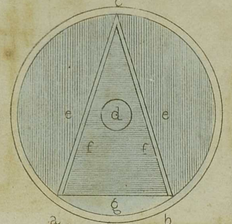

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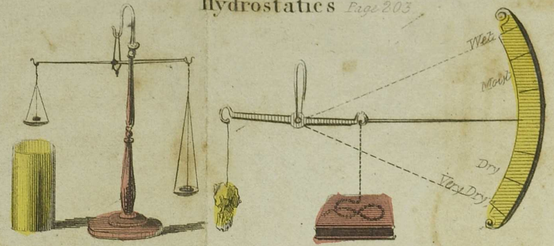

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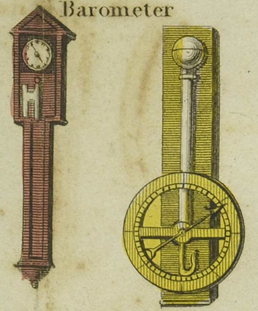

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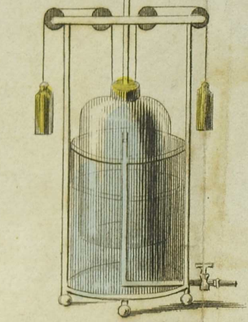

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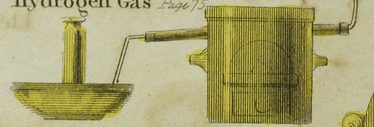

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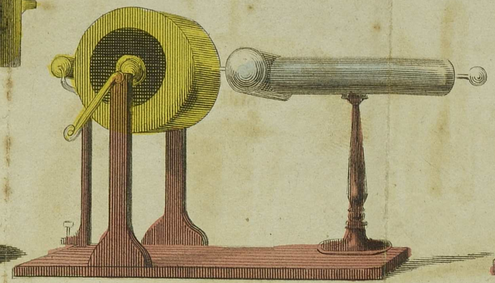

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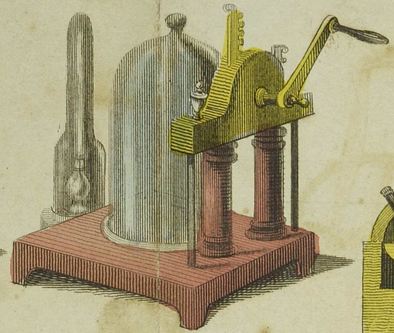
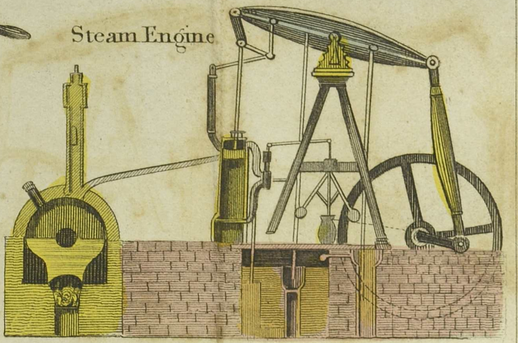


Steam Engine



London Pub by T Hughes Broadway Ludgate Hill Oct 1829

DOMESTIC
AMUSEMENTS,
OR
Philosophical Recreations;
CONTAINING THE RESULTS OF VARIOUS
EXPERIMENTS
IN
Practical Science and the Useful Arts,
APPLICABLE TO
THE BUSINESS OF REAL LIFE,
TO CURIOUS RESEARCH AND ELEGANT RECREATION,
INCLUDING NUMEROUS USEFUL
TESTS OF ADULTERATIONS
IN THE MATERIALS THAT CONDUCE TO HEALTH;
And an Account of
NEW AND IMPORTANT DISCOVERIES IN
Natural Philosophy,
Being a Sequel Volume to Philosophical Recreations, or Winter Amusements.

BY JOHN BADCOCK.

LONDON:
PRINTED FOR T. HUGHES, 3, BROADWAY,
Ludgate Hill.

PREFACE.

THE former volume of PHILOSOPHICAL RECREATIONS had for its basis the experiments, the amusements, and tricks, many of which have been, for the best part of a century, before the Public, in various large works, or copied, incorrectly enough, into small Collections, similar to that volume; and Hooper, Salmon, Boyle, Lupton, Smith, and Imison furnished these with the most valuable part of their contents. But fruitless is the inquiry, whether it arose from the fashion, from a perverse adherence to old modes of explanation, in those who undertook to hand down those ancient authors to us, or that these times have refined upon written language as well as upon manners;—they were frequently found unintelligible, always insipid, and sometimes trifling. "Provide a,"—"You take a,"—"Take your—in your hand," formed the boundaries of their

refinement and choice of words ; and if, in avoiding such vulgarisms, we may thereby have added nothing to *elegance of teaching*, it is not to be denied much was done towards clothing old ideas in a newer and clearer style. All wonder-raising epithets were in like manner struck out, and rationality sought in the exposure of false notions respecting supernatural agency and witchcraft, that are too prevalent among young folks, and last some to old age.

More could have been done upon that occasion, and newer and better subjects introduced; but the duty of rapid revision was imposed upon the Editor with so much earnestness by the *undertakers*, that the first intelligence which reached him of the sheets being in hand, was the announcement that they were also " off the press ;" and he had to lament the presence of typographical error in the most vulnerable part—*the new articles*, which having been " thrown off at *a heat*," stood particularly in want of re-revision. Even the Title was before the public eye too soon for the Editor's optics ; and if he really breathed the first lines of it, it is a fact, he is rather inclined to believe than to assert.

No apology, however, ought to be received for actual carelessness, but that which includes promised amendment, at least: performance is much better. The mere trifles which were intended to attract juvenility in the former volume, in this give place to scientific research, worthy a more advanced period of life; and although Recreation and Amusement are always kept in view, the attention due to the developement of new and important inventions, improvements, and discoveries, is as unremitting as these are useful, ingenious, and honourable to the national character. Davey and Brewster, Faraday, Phillips, Paris, Thomson, and Leslie, who all contribute by their labours to sustain that character at the present epoch of Science, and to carry it triumphantly above the boasted pretensions of the French *savans*, constantly excite our patient regard; whilst the experiments of Messrs. Oersted, Ampere, Monge, Arago, Hansteen, and other foreigners are richly entitled to attentive consideration; and they have here received that attention duly (as will be seen) with frequent acknowledgments of the benefits derived from their learned labours.

To every one of those philosophers do these pages owe more or less of value; but if one fact

brought forth by them, or either of them, has lost a particle of its interest, by the state of compression in which it now appears, insomuch is the Editor's design frustrated,—a misfortune, he apprehends, which has not attended the articles on Galvanism (page 125, &c.) nor those on the Acid of Woods (page 15, &c.); but on the contrary, in these and most others, *discussion* having subsided, the reader will here find the results presented in a condensed and lucid form. Regarding the two discoveries adverted to, it is worthy of remark, that on the first mentioned, which originated in the experiments of Professor Oersted, the other *four foreigners*, and seven out of the eight English writers just named, have all ably written something, more or less; whilst those persons who have favoured the world with their inquiries concerning Pyrolignous Acid, amount to twice that number! No very agreeable labyrinth for him to wade through who has no time to cast away upon controversy.

Of nearly three hundred articles which the volume comprises, a good proportion have been *proved;* the remainder rest on respectable authorities, for the most part, or as regards a few, the

shades of doubt have been cast over them. Should more remain under the same predicament, and *so seem* to any *inquiring reader*, the cause of science will be served by friendly suggestions, by letters addressed to the Editor, under cover, at the Publisher's, in Ludgate-street. [Such letters, however, should not be *put into the post-office*, unless *paid*.] Many of those articles, the domestic remedies particularly, have been already laid before the Public in various fugitive publications of the day, where some underwent the discussion usual to *such prints*, which seek for controversy; but in this respect also results only are here detailed.

Numerous are the friends from whom hints have been received; but mostly from Mr. Hinds, of Moorfields, whose valuable assistance has been acknowledged in several instances, though not in all. The papers of his indefatigable father too, "*on Horses*," and the corresponding arts, have afforded the means of adding an ingenious article or two on this neglected subject.

Much more might be added by a writer of retiring modesty—a pretence that need not be set up

on the present occasion; but after the volume has been *at press* upwards of a year, he still has to acknowledge more *Errata* than would have escaped him, if he had been nearer the press at the time these were committed.

JOHN BADCOCK.

Hoxton,
February, 1823.

*** If another volume, similar to the present, should appear at the end of the next year, it may be considered as realizing present hopes, rather than the fulfilment.

ERRATA.

Page 59, the figure *not inserted* should consist of two parallel lines only, thus ||, within a circle.
Where figures are referred to by their Number, as fig. 5, fig 8, &c. *read* annexed fig.
Page 100, line 21, *for* camphor, *read* snuff.
—— 103, —— 14, *after* article, *add* 19.
—— 105, —— 10, *after* a filtre, *add* (see page 101.)
—— 111, Note, *after* page, *add* 26.
—— 117, line 6, *after* membrane, *add* connected.

ANALYTICAL TABLE

OF

CONTENTS.

Philosophical Recreations,

OR,

DOMESTIC AMUSEMENTS.

1. *To preserve Animal Matter.*

The antiseptic qualities of smoke were known to remotest antiquity, but the exact principle by which this was effected, remained subject of controversy, when the means of obtaining the *acid of wood* in a liquid form, being invented, placed the dispute beyond doubt *. Pyrolignous acid,—so called from *lignum* (wood) and *pyro* for the *manner* in which it is obtained,—is now extensively used for the manufacture of white-lead, of vinegar, and other such purposes; and contains, in its concentrated state, a much superior power to that which had been immemorially employed, in the form of smoke, to preserve *animal matter* exposed to its influence.

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* The mode of making it will be described in a future article. It is a curious fact, that those who maintained the doctrine that the antiseptic principle of smoke resided in *the heat* of it, seemed to have the best of the argument, although, as every one knows, heat facilitates the decomposition of animal matter, after a certain time.

2. *First, or dry method.*

MEATS that require salt, are to receive the usual application thereof dry, but only for half or a third part of the usual time, according to the palate of the consumers. Then, having heated a sufficient quantity of the (liquid) acid, to be heated slowly in a shallow pan, expose the meats to be preserved to the vapour thereof, thus :—over the pan, or fish kettle, put a gridiron, or other hollow supporter, with the meat thereon, covered by another vessel, and cloths to detain the steam; and in a few minutes your meat will be salted enough to be boiled immediately, with an excellent flavour of the acid. It may, however, be hung up a long while.

Note.—Veal, chicken, lamb, and other delicate viands, which it is desirable should be preserved fresh, are most susceptible of this method of treatment—after being merely wiped dry,—and without salt, of course. But if fully *immersed*, or brushed over, according to the *third* process, they will of course imbibe more strongly the empyreumatic taste of the acid, and keep much longer.

3. *Second Method, for Brine-Salting.*

A STRONG brine having been made in the usual manner, *boil it well*, skim off the scum, and leave behind any animal matter that may subside after standing a short time; use it cold, and it shall keep good for many years; but if you add a table spoonful of the acid to every quart of brine, its antiseptic effects will be more sensible, nor will meats which remain covered therein become either rancid or sour for a great length of time, (say twelve months, or more), nor do they get hard.

Note.—No *fresh* salt should be added (as is usual), but that which comes from rubbing the meats should, before being added to the pickling tub, be also boiled, &c.

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4. *Third method, for hanging a long time.*

IMMERSE any meat so prepared, when drained, in pyrolignous acid, twice the strength of vinegar, (i. e. after one distillation), and according to the time it remains will be its duration in a potable state. The acid, however, usually comes abroad at five times the strength of vinegar; and a piece of beef salted by the second process, and immersed therein for half a minute, may be safely hung up for four months; one minute's immersion secures it for twelve months or upwards. Sides of bacon, hams and tongues, and large joints of beef or pork, are truly eligible articles of provender to be thus treated; so are the large fishes, as salmon, cod, ling, but requiring a different kind of preparation, as hereafter. A smoky taste accompanies all such provisions, precisely such as that we find in Wiltshire bacon; but if it be slightly washed over with a brush, like a painter's tool, this taste will be less than that arising from complete immersion, however transient.

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5. *Fourth method, for Fish.*

THOSE fish, and all others, are to be washed and merely wiped dry, before being heated with the acid; *the brush* being the most eligible mode of applying it, and no salt required. These may be hung up three, six, or more months, according to the strength of the acid, and the

cured salmon is particularly fine; but having observed that these and herrings, so celebrated among the Dutch exports, there undergo the first lavament in stale *chamber-lye*, previous to water, as being more detersive, and cheaper than potashes,—we could not suppress the fact; nor fail to suggest, that all other kinds of high-flavoured fish are susceptible of one or other of the like introductory preparation.

Note.—Not only do the articles thus cured bear the effects of a damp cellar or a West-India voyage, equally unaffected by either extreme, when they come to be *boiled*, (as they should be without previous soaking), but they possess a superior flavour to smoke-dried provisions, inasmuch as the *heat* of smoke dissolves the gelatine, and disposes the meat to rancidity. Meats so treated also last sweet and good to very long periods, resisting the attacks of flies and other winged insects: the saving of salt, too, is very great, amounting to one half at least on *meats*, and the entirety on *fish*.

6. *Pyrolignous Acid.*

To manufacture this useful article upon a tolerable scale, requires extensive premises, and it cannot therefore be considered strictly a domestic pursuit*. But as much affected secresy is attempted to be thrown around the art of extracting the acid which was long known to reside in wood, we deem a description of the apparatus,

* At Neath, in Pembrokeshire, Stratford in Essex, and Battersea, are situated those manufactories only of which we know in this country. Any account of the *manner of working* having been withheld from the public, must be our apology for the length of this article. See Mr. Hinds on this subject in Monthly Mag. April, 1821.

and some account of the process by which this is effected, most appropriate to the professed objects of this work; our readers may thence learn to adapt their views of the subject to each his own particular means of carrying it into execution, the *principle* remaining the same.

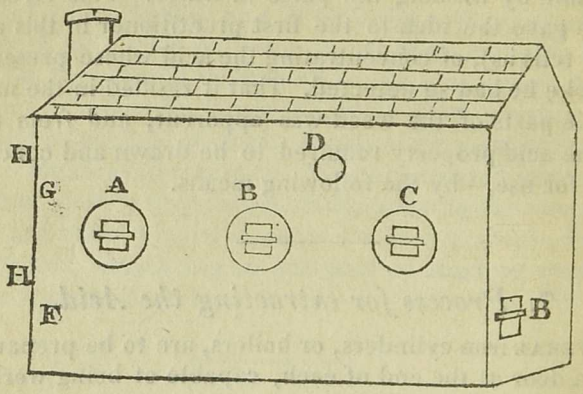
Every one who has been used to wood fires, and the smoke they occasionally emit, in apartments so warmed, must have been annoyed with a sharp pain in the eyes, producing an ichor more acid than the natural tear, but reducible by washing the parts in water. This circumstance gave the idea to the first practitioner in this art, (so he tells us), of concentrating the acid whose presence in smoke he had so detected. That it resided in the most volatile parts of the wood was apparent, and from this was the acid property required to be drawn and concentered for use,—by the following means.

7. *Process for extracting the Acid.*

Several iron cylinders, or boilers, are to be prepared, with a door at the end of each, capable of being worked at, while charging with the *wood* or discharging the charred coal. These doors may be made *double*, or with a *slider* inside the door, which is to be made fast with an iron bar. The *boilers* may be of any shape, but we prefer the cylindrical form. Fig. 1. represents a building for carrying on these operations on a tolerable scale; A B C being the working ends of three cylinders, two feet in diameter and nine feet long, which is the width of the building at E. But although much larger boilers may be used, and a greater number, as five or six, each twelve feet long, and in diameter two feet four inches, yet may the experiment be tried with a common kitchen boiler. At *i i i* are the doors, with their hinges and bars; the

two ends of each cylinder having a flange, or lip, to secure it firmly in the building; and on its upper side, a hole without a lip also, to which the tube that is to convey away the smoke is to be welded. All three tubes afterwards centre in one; and this being conducted out of the building at D, is to be disposed of as will shortly be described.

Fig. 1.



The *fire-place* is the whole bed of the building from E to F, E being the stoking hole in front, where the fire is to be replenished, the heat expending itself in a flue at G. Next comes the business of charging the cylinders with dry split wood, cut into lengths of two or three feet each: these pieces of wood being placed upon moveable cradles made of hammered iron, the whole length of the cylinders, and indeed occupying the entire bottom, may be shoved in as the wood is laid on. Or, a disk of strong plate iron, with two iron rods let in at each side, may be shoved to the bottom of each cylinder, and as soon as the combustion is completed, these rods being drawn forth,

the charcoal which is intended for chemical purposes may thus be lowered into vessels, and closed from the operation of atmospheric air.—(*See article* CHARCOAL.)

When this is done, the doors are to be made fast with a luting of clay and horse-dung, and the works set a-going by supplying fresh fire at the hole E; so that the wood in the cylinders soon throws out its volatile qualities, aquæous and acidulous, into the respective tubes. These pass out of the building by the grand tube at D, and enter a sinuous passage, or continuance of the same, (not a *worm*), which varies in size at (6) several places, so as to cause the vapour to condense and expand alternately—and to cool; until at length, after a course of 100 feet, it enters a tall vessel filled with 20 hogsheads of water, in which the tube makes a dip. So does the element it contains become strongly impregnated with the vapour, and may be then termed *pyrolignous liquor;* rest, however, is here necessary, in order to give time to the denser part, or tar-like sediment, to fall—the naphtha floating at top. In the vessel are placed two cocks—the one below large, for letting off the sediment, or tan, the other above for drawing the supernatant liquor into backs or cisterns, ready for distillation. This drawing off of the liquor may take place at any time, but never to such extent as to leave open the orifice of the tube, which would thereby discharge and lose its contents.

Subsequently, the liquor being distilled over, the product is pyrolignous acid, about *twice* the strength of vinegar; but by more care and re-distillation may be increased to *six* times. It possesses a dull, acidulous, offensive smack, and an empyreumatic smell, arising from the volatile oil it contains; and to get rid of this, further treatment is necessary—of which more anon.

Note.—Small iron vessels, within the measurement allowed by law, may be purchased at the ironmonger's in Foster-lane, and elsewhere.

8. *Acetate of Lime.*

Sometimes termed Pyrolignate of Lime. It possesses the same properties as the liquid just described; and in either case is misnomered: for, by the addition of lime to the *pyroligneous acid*—which is done in a large vessel by frequent rousings up—the oil is destroyed, with its offensive taste and smell, whilst the remaining tar-like carbon subsides with it. The acid, being incompatible with the lime, remains unaffected by it, and therefore, being a negation of lime, the name at the head, or the next, (its vulgar one), might give way to some other, say—Wood-acid, limed.

However this be, the liquid acid is now submitted to evaporation in shallow vessels, placed at the back of the building, *fig.* 1. at H H, and it thus becomes merchantable.

Note.—Chalk is by some substituted for lime; but in either case the acid retains its name, and a good deal of the disagreeable smell: to get rid of this smell, further means are necessary, when the article is to be used like vinegar for domestic purposes, as for the *table*, for preserving vegetables, &c.; and, indeed, unless reduced in strength, too, it would go near to decompose the hardest vegetable productions by a single immersion—so nearly connected are the means of preservation with those of dissolution.

9. *To cleanse Pyroligneous Acid.*

The Pyroligneous Acid has been deprived of its disagreeable flavour, by Mr. Stortze, apothecary, of Halle, by treating it with sulphuric acid, manganese, and com-

mon salt, and afterwards distilling it over. This may do very well as vinegar, used for domestic purposes; but the impregnation of sulphur on the acid, subtracts from its utility in other respects; and the ingenious gentleman omits to say whether he had so treated the acid which he used in some succeeding experiments: we should think not. He verified the efficacy of the acid in all the foregoing particulars, and followed the steps of Mr. Jorg, in converting several bodies to mummies.

Note.—See the next article, and that which follows, on employing charcoal as a cleanser. For the manufacture of liquid blacking, in white lead works, &c. this acid in its first state, perhaps, would be as pure as is desirable.

10. *Various uses and advantages of the new Acid of Wood.*

No modern discovery or chemical improvement, connected with the arts of life, ever promised so many advantages, demonstrably serviceable to mankind, as the procuring and application of the acid of wood, or pyrolignum, to the preservation of animal and vegetable substances; to say nothing of its being extensively employed in the manufacture of sugar of lead, &c. And here it may not be uninteresting to observe, regarding this discovery of M. Monge, that until the announcement thereof, the party who maintained that it was heat alone which arrested the progress of putrefaction in smoke-dried provisions, had the best of the argument.

This interesting and truly valuable discovery has been pushed tolerably far, by Dr. Jorg, a Prussian, but with only one modification in the manufacture, the remainder of his experiments being confined to various applications

of the *vinegar* and *oil* of wood, as he has it. Mummies have been converted by him for a long time past; but in this latter respect, the superior knowledge of the ancient Egyptians must raise a blush on the cheek of modern science, at its own tardy pace; for, according to a traveller of the present period, (Mr. G. Belzoni), he himself came in contact with hundreds of bodies, which had ceased to be human at least 3,000 years. This shows, that if they did not possess the means of obtaining this particular acid, they at least practised some other equally ingenious method of arresting the progress of decay in animal matter,—of which we know no more than we do of their language.

11. *Charcoal: of its manifold virtues, and improvements in the preparation.*

Charcoal has been long known as a good cleanser of impurities in vegetable liquids, which had acquired a bad taste or smell, getting rid of their viscidity at the same time; therefore is it profitably applicable to perform that office for the *acid of wood* in its original state, or the *acetate of lime*, which is its next modification; or, finally, for vinegar procured from malt, which after the termination of the *vinous* fermentation, is hurried into the *acetous*, by the addition of small proportions of acetate of lime in its dry or merchantable state. For those, as well as for medicinal purposes, charcoal which has been much exposed to the air, having been long made, loses some of its properties,—therefore did we a little higher up show how charcoal might be started at once from its charring place to close vessels, (see page 21), and now come to some recent improvements in the preparation.

M. Guibert, a confectioner of Paris, having noticed the success of Mr. Lowitz there, in attenuating the smell of bitumen, flowers of benzoin, bugs, empyreumatic oils, infusion of valerian, &c. by the sole use of wood charcoal,—made some experiments, whence resulted, that—charcoal which had been long moist, and during this state exposed to the rays of the sun, *clarifies* much better than what is pulverised dry and used immediately. Let charcoal intended for purifying lay some time in pure water; grind it therein, and there leave it, covered an inch deep, and exposed to the *light:* employ it after being drained, but still in a damp state.

The purposes to which wood coal, thus prepared, has been applied with ample success, are multifarious:—sugar, vinegar, gum, gum-arabic, water stinking at sea, beer, port wine, tincture of cochineal, honey, with meats, fish, &c. are mentioned as having already undergone the test of charcoal in its improved state of preparation. As a *tooth-powder*, nothing can exceed the virtues of *charcoal*, if it be made of cocoa-nut shell, ivory, or bones, particularly. It forms a most excellent poultice, with equal quantities of bread, for gangrenous sores, ulcers, and for the *grease* in horses we have long applied it with invariable success*. It is a capital good test for detecting arsenic in any liquid whatever; for, being itself insolvable in any known menstruum, and acting mechanically only, it neither destroys nor is destructible.

Other substances than wood are prepared for the same purposes, by being *charred* in cylinders or cucubits, and with manifold advantages on the side of these substitutes; that which forms the subject of the next article, (bones), being superior in every particular, except as a medicine

* See "Grease," in "Veterinary Surgery," by John Hinds, V.S.

for internal complaints. Of *ivory* shavings, sponge, and the vegetable æthiops, bladderwrack, is charcoal also made; whilst wood soot and Frankfort black may be reckoned among the kinds of charcoal; though the further consideration of these is unnecessary here, further than to observe that a bitter tincture is prepared and sold of the former, as a cure for spasmodic complaints.

12. *Animal Charcoal, Bone Black, or Ivory Black.*

Much superior to wood charcoal, and susceptible of the same improvements in preparation, is that made from bones; those from old and full-grown animals being better for the purpose than from young ones; and the coal made directly from the bones is also preferable to that which is made from them after they have lost their properties in the immense stills of our ammonia manufacturers. In fact, the component parts of animal charcoal being carbon (for the most part), phosphate of lime, and a small portion of quick lime, if either is destroyed the power of clarification is lost; so that its virtues being thus exhausted, the refiners, in order to restore them, mix some gelatinous substance, or soft animal matter, as guts, blood, &c.; or, the burning it over and over again with some of these, produces a better filtre than at first.

To make the article which bears indiscriminately the three names at the head of this article, you must pack bones into an iron pot, with a luting of clay earth; then placing those, one over the other, in a potter's or pipe-maker's kiln, or some such heat, covered down with earth; and when the fire has continued brisk for some time, it throws out the fat that remained in the bones,

hydrogen gas makes it way out at the fissures of each pot, and the kiln, and reaching the air, takes fire. This gas may be returned to heat the furnace, on the same principle as the modern invention for burning your own smoke; and at the manufactory of M. Barreul, *au Gros Caillou*, near Paris, such a contrivance is now at work. On the gas breaking forth, this stage of the process is complete: the charcoal is then to be broken, grinded in water, &c. as directed in the preceding article.

13. *Test of the Purity of Bone-black.*

THAT which contains the greatest proportion of carbon, is ever considered the best for any purpose to which it can be applied: to ascertain in what proportion it prevails, take 100 grains of the coal, pour on it muriatic acid, mix, and dry it well; as the carbon is not destructible by the acid, but the lime and phosphate are so, the quantity that is lost in weight, will show the amount per cent. of the two latter compounds. Indeed, the simple re-application of fire produces nearly the same result.

Note.—Distillers, confectioners, and sugar refiners, term this coal bone-black; whilst the makers of blacking, painters, printing-ink-makers, and others, give it the name of ivory black, and their works put on a foxy appearance when the carbon does not prevail greatly in the above test, say 70 per cent. These latter should therefore take especial heed to test its purity; as also to boil and skim the oil previously to mixing, or their work will never get properly dry. Neglect of this precaution is one reason why some printers' works "set off," as they term it, when the ink of one page leaves its impression

upon the opposite page, rendering it nearly illegible. The black which is made by sublimation of pitch in dark chambers, and termed lamp-black and Frankfort black, is very properly exploded, for any of the purposes just named, as being deficient in *colour* or opacity.

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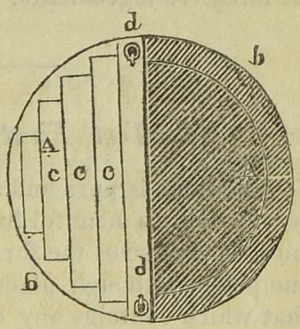
14. *The 'Staff of Life.' To preserve Wheat.*

In scarce and dear seasons we employ ourselves in devising the means of recurrence; whereas, the only proper time for the cool and proper consideration of such topics is, when we feel least pinched by the necessity for entertaining them: the *means of* attaining our purpose are then more securely within our power. Wheat is sometimes so very cheap, (*now* 1821,) that any capitalist who should lay out his entire fortune upon purchasing a *store*, would be certain of realising 10 per cent. with compound interest, which is more than he could probably hope to *make* by any transaction in the *Alley*. The question only is, how to preserve the article from deterioration, and the ravages of vermin? Good. Heat, *i. e.* kiln-drying, was long supposed to constitute those means, but this *alone* will not answer the end proposed: if the corn be not absolutely *dry*, decomposition, preceded by well known fermentation, takes place. The secret consists in keeping the air from acting upon corn so prepared. Then, into jars well-glazed and *aged*, let there be closely pressed as much corn as each will contain, *namely*, six or eight bushels: *sacks* retain too much moisture. Lids of the same material are to be prepared, and these being lined with a piece of coarse cloth, must be luted down with clay, earth, plaister of Paris, or any other such material. The place of deposit for these jars

(made of the cubical shape) should be under ground, as a cavern, on the side of a hill, or a capacious hole, covered in with earth upon planks; and according to its coolness, to the perfect dryness of the corn, and the exclusion of atmospheric air, will be the state of your corn at the end of the year, or probably more than three times that period. In the annexed (Fig. 5.) *a a* is the circumference of the *hole; b b*, being a spade-deep excision for the planks *c c c* to rest upon: these planks subsequently covered with the spine of earth *well kept*, may be removed by first lifting the plank in the middle, *d d* being two iron rings and holdfasts, by which it may be so lifted off, and the others with their integuments be also removed, when occasion requires it.



15. *Tests for detecting Adulterations of the 'Staff of Life.' Flour.*

Bleached bones, powdered, Derbyshire stone, whitening and plaister of Paris, are frequently employed in contaminating the 'Staff of Life.' They whiten the flour, and contribute to its adhesion in *making;* a consummation that could never be effected, without these and another powerful adjunct (alum), employed by the

bakers, on account of the *weakness* of the original material. A weakness which is occasioned by the millers' grinding their corn too much, particularly *white* samples, nearly the whole whereof is brought to market as *seconds* and *thirds;* and every one knows, that bran or pollard cannot be made into a loaf without the admixture of those offensive ingredients.

16. *Test First. By the Tact.*

Flour which is pure and unadulterated, may be known by your seizing a handful briskly, and squeezing it half a minute, it preserves the form of the cavity of the hand, in one piece, although placed rudely on the table. Not so that which contains any of the aforesaid substances; it breaks in pieces, more or less; that mixed with *whitening* being most adhesive, but still dividing and falling down in a little time.

That flour which is mixed with the fore-named adulterations, loses its form at once; and the more bran there may be contained in it, the sooner will it lie down flat upon the board. Let a person with a moist skin rub flour briskly between his palms: if there be whitening present, he will find resistance, but with pure flour none.

17. *Test Second. With Oil.*

Having dipped the fore-finger and thumb partially in oil of linseeds, take up a small portion of the flour; if it be pure, you may freely rub the fingers together for any length of time, it will not become sticky, and the sub-

stance will turn nearly *black;* but, if *whitening* be mixed with the flour, a few times rubbing converts it into a well-known sticky substance called *putty*, but its colour is thereby but very little changed.

18. *Test Third. With Acids.*

Drop good vinegar, or lemon juice, upon flour contaminated with other admixtures, and immediate commotion takes place; whereas, if the flour be pure it remains at rest.

19. *Adulterated Bread.*

Alum being employed by every baker in the London disctrict,* (potatoes by nearly all of them), without the introduction whereof the usual flours of this market could not be formed into loaves, its detection and amount in every case, must constitute a tolerably good *criteria* for making an estimate of the original purity of the material. This may be accomplished, first on the view; second by heat.

First. Loaves made of adulterated flour are always low and squalid; *i. e.* they appear small for their weight. The *crust* which breaks off from the adjoining loaf, is

* Precisely two years having passed away since we first published these charges, without contradiction, or doubt pronounced, we have here thought proper to increase the tone of confident assertion. Vide Monthly Mag. Jan. 1819, page 516, and in Monthly Mag. for March 1820. See Accum on this subject. Did he have recourse to the Monthly Mag.?

well marked at the point of division, and in colour also, it approaches a little towards a cherry-like redness, when *pure flour* is employed; not so with the adulterated. Alum throws up a flowery paleness upon the whole upper crust; while that or the bottom one never become crisp, or makes a rattle when hit with the knuckle, as good loaves ought; and, indeed, those loaves are invariably *slack-baked*, so that the thumb-nail may be readily impressed upon such crusts.

20. *Second. By Heat*

Heat a common table knife, *hot*, but not *burning* hot, thrust it into the suspected bread, and after a minute or two at farthest draw it forth; rub off the farina, should any adhere, with the ball of your finger, and, according to the quantity of alum employed, will be its adhesion to the knife; the coarsest bread ever bearing the most alum.

21. *Secret Correspondence,*

Is of various sorts, and is applicable, nay, has been applied to matters of much more importance than those of mere amusement and recreation. In fact, this is the way in which all science, every discovery and art, should rise in value, and become available to us, in those maturer years of our existence, which demand and excite all our strength of mind, of body, and every ingenious faculty. Warfare is peculiarly adapted to interest us deeply, and to call forth the latent sparks of our early

acquirements; because in it are involved not only our own existence, but that of those we hold most dear, our houses, and what with some is paramount to all these, the *cause* in which we may find ourselves engaged. The simultaneous co-action of different bodies of soldiery, demands that they should be apprised of every extended enterprise, that the whole force of an army may be brought by secret intelligence to act upon a given point at the same time; but as the opponent (the enemy) is aware of such intention, he is constantly upon the alert for its detection, or at least prevention; and if he can catch the bearer of such intelligence he deems himself happy, though he may not avail himself of the double *ruse* of decyphering the despatches, and then forwarding them by another hand, (a peasant), with the intention of entrapping the opponent in his own snare.

Egypt, famous for every art and invention that graced the antiquity of the ancient Greeks, as they themselves avow, (*vide* Rollin *passim*), first saw the art of *secret correspondence* carried into actual use; for the predatory nature of the aboriginals of that country, that rendered communications between distant stations insecure, made them necessary also. We are at a loss, however, for any direct knowledge of the means used by them, as we are of their language; but of the Greeks we do know, that secret intelligence was sent to their confederates, upon many occasions, through the enemy's quarters, particularly at the siege of Platæa; and this was most probably of the same simple kind as that *attributed* to the Lacedæmonians, who were confessedly the least inventive of the Greeks. That flinty-hearted nation are thus mistakenly said to have been the inventors of *cypher*; this word being used improperly for *secret writing*, which is the general term for that art, of which the former is a particular one. *Those Greeks* did not use *cypher*, but the

long language of the country, and it was thus contrived: a wooden stick being provided, of the same diameter throughout, it was cut into two parts, one being in the hand of each correspondent, and this stick, or *baton*, thus became the field insignia of a general, who was supposed to be alone in possession of so vital a counterpart. Round this stick the writer of secret despatches twined a long slip of parchment, spirally, from top to bottom; and holding the same lengthwise before him, wrote thereon his information, and dispatched it without the *stick*, called *scytala laconica*, from the briefness of the notices addressed by its means. It is clear, that no other person than he who should possess a stick, or roller, of precisely the same dimensions, could make out with certainty the sense or meaning of the writer, by rolling the parchment thereon.

22. *Secret Signs.*

THAT signs, or hieroglyphics, conveyed the meaning of the most ancient nations, there can be no doubt; whilst the Greeks, we know, established beacons, upon which fires being lighted, told the beholders of the situation of the operators; and to this day, the people of Candia apprise the neighbouring islands (to *Scios* or *Stanchio*) of the approach of pirates by the same means. Our venerable bishop Wilkins wrote a treatise on 'Secret and Swift Intelligence;' and Mr. Polwhele, much later, published a quarto volume on the beacons of Cornwall and Devonshire, as derived from the Phenicians, which were there used in our own time, and under our eyes. But rockets, of several colours, thrown high into the air, declared the motions of the parties with sufficient accu-

racy, in a neater manner than land-fires, and were applicable where these could not be used—as on board ship, at the top of a house, &c.

23. *Secret Writing.*

But the invention of writing, or rather the extended use of that art—by degrees superseded the adoption of those signs; at least, wherever the improved art could be rendered available, for it was not every general of an army, or indeed, many monarchs who could read at all, much less decypher intricate writings: they could not, for the most part, make a mark with the pen, and were content to put their *sign* to deeds of importance, by impressing the sealing-wax with their *teeth*, or perhaps biting quite through the parchment itself.

Besides those methods of conveying secret intelligence, and that of writing our meaning within *spaces*, that agree with similar spaces in the hands of our correspondents, as described in the first volume (article 70), that by cypher is very general, and mostly used *on land*, as the exhibition of party coloured flags and painted balls, with the firing of a gun or two, is *at sea*. Another method is, writing with an *invisible ink*, which requires heat, vapour, or some other *liquid* to be applied to it, to render visible what is so written; and this last, together with that by *cypher*, are those which require attention in this place.

24. *Cypher.*

This is the arbitrary application of certain figures, or shapes, to particular things, as I for a soldier, — for a regiment, and X for the army, and takes its name from the use that is made of the *cypher* or O; the division whereof serves also to denote four things, or letters, in most of those secret writings termed *short-hand*, thus C, D, (U,) O. Indeed, these and the foregoing, with the same marks compounded and modified, as \, /, V, Λ, and the simple dot . form the whole nearly of this kind of writing Separate treatises, by different authors, undertake to teach this useful qualification of the student, and it well deserves attention; our business here, however, being with the characters properly called 'arbitrary,' let us proceed to the devolopment of the means of detecting those adopted by others, which will show the reader how to fashion his own, should occasion arrive for his carrying on a secret correspondence, but which would cease to be *secret* if copied from any figures shapes, or 'cypher' of ours.

25. *How to read Letters written in Cypher.*

The methods of decyphering are somewhat different in different languages, though the *principle* is the same in all: but by observing the following rules, you may soon make out any common cypher, written in English.

For Example

1. Observe the letters or characters that most commonly occur, and set them down for the six vowels, in-

cluding *y;* and of these the most frequent will generally be *e*, and the least frequent *u*.

2. The vowels that most frequently come together are *e*, *a*, and *o*, *u*.

3. The consonant most common at the end of words is *s*, and the next frequent *r* and *t*.

4. When two similar characters come together, they are most likely to be the consonants *f*, *l*, or *s*, or the vowels *e*, or *o*.

5. The letter which precedes or follows two similar characters, is either a vowel, or one of these—*l*, *m*, *n*, *r*.

6. Begin *first* with the words that consist of a single letter each, which will be either *a*, *i*, or *o*.

7. Then take the words of *two* letters, one of which will be a vowel; and of these words the most frequent are *an*, *to*, *be*, *by*, *of*, *on*, *or*, *no*, *so*, *as*, *at*, *if*, *in*, *is*, *it*, *he*, *me*, *my*, *us*, *we*, *am*.

8. In words of *three* letters, there are most commonly two consonants; and of these the most frequent are, *the*, *and*, *not*, *but*, *yet*, *for*, *tho*, *now*, *why*, *all*, *you*, *she*, *his*, *her*, *our*, *who*, *may*, *can*, *did*, *was*, *are*, *has*, *had*, *let*, *one*, *two*, *six*, *ten*, &c.

9. The most common words of *four* letters are, *this*, *that*, *then*, *thus*, *with*, *when*, *from*, *here*, *some*, *most*, *none*, *they*, *them*, *whom*, *mine*, *your*, *self*, *must*, *will*, *have*, *been*, *were*, *four*, *five nine*, &c.

10. The most usual words of *five* letters are, *there*, *these*, *those*, *which*, *where*, *while*, *since*, *their*, *shall*, *might*, *could*, *would*, *ought*, *three*, *seven*, *eight*, &c.

11. Words of two or more syllables frequently begin with double consonants, or with a preposition, which consists of a vowel joined with one or two consonants. The most common double consonants are, *bl*, *br*, *dr*, *fl*, *fr*, *gl*, *gr*, *ph*, *pl*, *pr*, *sh*, *sp*, *st*, *th*, *tr*, *wh*, *wr*, &c. and the most

common prepositions are, *com*, *cor*, *de*, *dis*, *ex*, *im*, *in*, *int*, *mis*, *par*, *pre*, *pro*, *re*, *sub*, *sup*, *ur*, &c.

12. The double consonants most frequently at the ends of long words are, *ck*, *ld*, *lf*, *mn*, *nd*, *ng*, *rl*, *rm*, *rn*, *rp*, *rt*, *sm*, *st*, *xt*, &c.; and the most common terminations are, *ed*, *en*, *et*, *es*, *ex*, *ing*, *ly*, *son*, *sion*, *tion*, *able*, *ence*, *ent*, *ment*, *full*, *less*, *ness*, &c.

The following is an example of a letter of this kind, written in arbitrary characters, which may be easily decyphered by observing the foregoing rules.

Γ Δ X Π O X L Δ Γ Λ Γ Γ Δ + Δ N Ξ
— N = Π Π + Ω L + Λ Ω Ω N Ξ — =
— X + O Σ Π Π X Ω Ω Λ Π Π + V Υ
Ω + Υ + = N — + Γ Δ + S Λ Γ + N
= Γ Δ + X Γ Λ Σ + Ω Υ + I Ξ
O Φ Τ Ξ Λ Ω Τ N Τ Λ + Λ N Ξ
— Δ O Σ Φ N V + Π + Ω Ω I —
+ I Λ — + Σ Γ N — + L Λ X O
Ɔ N Ξ — Ω X Υ + — Γ Ɔ N —
Σ X + Υ — Λ Υ + Ω Ɔ Γ Δ X Ll
X Γ Γ Δ + O X L Φ Γ Γ Δ Δ Γ + X
Γ Δ + — V Λ V + Γ Ξ Γ N — Ξ O Σ N
Γ Ξ Γ P Ξ X Γ +

To decypher a writing of this sort, first look for those characters which most frequently occur, and set them down for the vowels, as before; then observe the similar characters which come together, but remember that two such characters *may* belong to two words. You are next to remark the combinations of two or three of the most frequent characters, which will be some of the words in the 7th and 8th of the foregoing rules; and by proceeding in this manner with the rest, you may infallibly dis-

cover, by time and proper attention, any cypher written upon this principle.

And the longer any letter of this kind is, the more easy it is to decypher, as the repetition of the characters and combinations will necessarily be more frequent.

The contents of the above letter are as follow: but, that those who are desirous of trying their talent at decyphering, may not read the explanation before the cypher, the words and letters are here placed in an inverted order, from right to left.

evlewt fo ruoh eht ta thgin siht ledatic
eht fo etag eht erofeb elbmessa lliw sdneirf
ruo lla. ruoh eht ot lautcnup eb: deraperp
llew emoc dna, ytrebil ruoy niager ot, ylevarb
eid ro, thgin eht si siht, su sekam rehtie taht,
etiuq su seodnu ro.

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26. *Sympathetic Inks of various kinds,*

Are used in secret correspondence with great success, on account of the difficulty that generally exists of the adverse party procuring the exact kind of *preparation* which is calculated to bring out the writing, even allowing that they are chemists good enough to know what is required. The advice given in the first Vol. article 147, should not be neglected, *viz.* to write with ordinary ink on common topics, and interline this with the important secret intelligence meant to be conveyed to the correspondent.

By *sympathetic inks*, is meant, those kinds of liquors with which if any characters be written, they remain invisible, until some method be used to give them colour, and may be divided into five classes. The *first*

class consists of such as become visible by passing another liquid over them, or by exposing them to the vapour of any liquor. Instructions for making those will be found in articles 137 and 138, of the first volume.

The *second* class includes all those which do not appear as long as they are kept close from atmospheric air, but soon become legible on being exposed. See this in articles 140, and 141, of that volume.

A *third* class are such as become apparent upon strewing or sifting over them some very fine powder, which is calculated to adhere to the writing.*

The *fourth* are those inks which do not become visible until they are exposed to the fire, or are otherwise heated.†

There is a *fifth* class, that, like the fourth, appear by exposure to a certain heat, but disappear again upon the absence of heat, or the paper has had time sufficient to re-imbibe the moisture of atmospheric air. Examples of these were given in the first volume, article 144.

27. *Thermometrical Ink.*

Turn to the volume quoted, pages 90—92, and see recipes for making ten different kinds of invisible inks; and to the invisible green ink, I wish to add one observation more. Seeing that it is the peculiar property of

* These may be composed of the colourless juice of any vegetable which may be glutinous, or even animal milk.

† These are made by a strong solution of vitrol in common water; also of the juice of lemons, or of onions. Of these the first mentioned requires more heat than the vegetable preparations, and keeps better than these.

this ink to disappear as soon as the paper becomes cold, this alternate appearance and disappearance of colour may be converted into a very pleasant kind of thermometer, that will change with the season, by colouring a picture of the *country*, as grass, trees, &c., that will cease to be *green* when the weather ceases to be warm, and so the *appearance* of the picture will be your thermometer.

28. *Acetate of Lead with Hydrogen.*

Super acetate of lead and sulphurated hydrogen in contact, produce a colour, more or less, according to the amount used of the former: if in water which has been impregnated with sulphurated hydrogen gas, a drop or two of the super acetate be added, clouds will ensue of a dark brown colour, floating in varied evolutions.

Secondly, dip your pen in a diluted solution of super acetate of lead, and write, nothing will be visible; but pass over the paper a sponge charged with water, impregnated as above, and the writing assumes a brilliant metallic appearance. The same effect may be produced by simply holding the writing over the vessel which contains the preparation of hydrogen gas.

29. *An Ink which appears upon being wetted with Water.*

Having mixed alum with a sufficient quantity of lemon juice, any letters or characters written with this mixture, will remain invisible until they are wetted with

water, which will make them appear of a greyish colour, and quite transparent.

Or, you may write with a strong solution of roch alum only, and when the writing is dry, pour a small quantity of water over it, and it will appear of a white colour, like that of the paper before it was wetted.

In like manner all saline liquors, such as vitriolic, nitrous, marine acids, diluted with water, and the liquor of fixed vegetable alkalies, and even vinegar, will produce the same effect.

N. B. If a little *aqua-fortis* be mixed with the water, the writing will dry well, and not run out of its form when the paper is wetted.

30. *The Book of Fate.*

MAKE a book, consisting of seventy or eighty leaves, and in the cover at the end of it, let there be *a case*, or pocket, which opens next to the binding, that it may not be perceived. At the top of each right hand page, write any question you please, and at the beginning of the book, let there be a table of those questions, with the number of the pages in which each are to be found. Then write with common ink on separate papers, each about half the size of the pages, the same questions that are in the book; and under each of them, write the answer with ink made with litharge, or solution of bismuth.

Soak a double paper in the vivifying ink, made of quick lime and orpiment, or the phlogiston of the liver of sulphur, and just before you make the experiment, place it in the case that is in the cover of the book.

Having done this, deliver some of the papers on which

the questions are written, to the company; and after they have chosen such as they wish to have answered, let them put them into those leaves where the same questions are contained; then, shutting the book for a few minutes, the sulphureous spirit, with which the paper in the cover of the book is impregnated, will penetrate the leaves, and make the answer visible, which will be of a brown colour, and more or less deep, in proportion to the time the book has been closed.

31. *The Transcolourated Writing.*

WRITE on paper with a violet coloured liquor, as many letters or words as you please, and ask any person whether he will choose to have the writing yellow, green or red. When he has made his choice, have a sponge ready, with three sides, which you can easily distinguish, and dip each of its sides in one of the three sympathetic inks; then draw the side of the sponge, which corresponds to the colour the person has chosen, over the writing, once only, and it will instantly change to the colour required.

32. *The Oracular Letters.*

WRITE on several slips of paper different questions, and such as may be answered by the name of some person;—for example.

Who is the merriest man in company? *Answer.* Mr. * *

To whom will Miss * * * be married? *Answer.* To Mr. * * *.

These questions are to be written with the sympathetic ink of this class, and exposed to the fire, and the answers are also to be written with the same ink, and left invisible. The papers are then to be folded in the form of letters, in such a manner, that the part where the name is written, shall be immediately under the seal; in order that the heat of the wax may render it visible. Then, if the letter be given to the person who requires the answer, he will find it plainly written.

A recreation similar to this, may be made with a number of blank cards, on each side of which, an ace of spades is drawn with invisible ink. Then let a person choose any one of them, and inclose it in a letter-case, so prepared, that the figure of the ace may be directly under the seal, and on opening the letter, it will be immediately visible.

33. *To write on Glass, by means of the Sun's Rays.*

Dissolve chalk in *aqua fortis* to the consistence of milk, and add to it a strong solution of silver. Keep this liquor in a glass decanter well stopped; then cutting out from a paper the letters you would have appear, paste it on the decanter, and lay it in the sun's rays, in such a manner that the rays may pass through the spaces cut out of the paper, and fall on the surface of the liquor: then will that part of the glass through which the rays pass, be turned black, whilst that under the paper will remain white; but particular care must be taken that the bottle be not moved during the operation.

34. *Different Colours produced by pouring colourless Liquor into a clean Glass.*

TAKE a strong solution of mercury, made with spirit of nitre; dilute it with water, and pour it into a hot glass, rinced in strong spirit of sea salt, and it will instantly become coloured. Or, if a solution of silver, in spirit of nitre, considerably diluted, be poured into a glass, prepared in the manner above described, it will produce the same effect. And if you pour hot water upon new made crocus metallorum, and put it into a clean glass, rinced with any acid, it will produce an orange colour.

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35. *To produce a Colour that appears and disappears by the Influence of the Atmosphere.*

PUT into a decanter some volatile spirit, in which you have dissolved copper filings, and you will have a fine blue tincture; if the bottle be stopped, the colour wil presently disappear; but when it is unstopped, the colour soon returns again; and this experiment may be repeated a considerable number of times.

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36. *To turn a colourless Liquor Black, by adding to it a White Powder.*

PUT a hot weak pellucid infusion of galls into a glass, and throw into it a grain of the vitriol of iron, calcined to whiteness, and considerably heated; then, as it falls

to the bottom, it will make a black cloud, which will diffuse itself uniformly through the transparent liquor, and gradually turn it black.

The same effect may also be produced by the addition of a little vitriol, calcined to a yellow colour, or by the *colcothar* of vitriol calcined to redness.

The black liquor, produced as above, may be rendered pellucid again, by pouring the liquor hot into a glass rinced with the pure oil of vitriol. And to make this transparent liquor black again, pour to it as much hot oil of tartar, *per deliquium*, as will saturate the acid, which has attracted the metallic matter.

37. *Early Fruit obtained by the excitability of Trees.*

Mr. Knight, the horticulturist, had long time noted the early appearance of fruit from such trees as came out of a colder country; and he accounted for the sudden appearance of vegetation and fruit, so observable after a protracted spring, to the excitability which had been accumulating in such trees. Upon this principle, he proceeded to augment that excitability by the following means:—Having trained the branches of an apple tree against a southern wall, he in winter loosened them to their utmost, and in spring, when the flower buds began to appear, the branches were again trained to the wall. The blossoms soon expanded, and produced fruit, which early attained perfect maturity;* and what is more, the seeds from their fruits afforded plants, which partaking

* But he does not tell us whether the wall was blackened, as advised in a preceding article.

of the quality of the parent, ripened their fruit *very considerably* earlier than other trees raised at the same time from seeds of *the same fruit*, which had grown in the orchard. Peaches, nectarines, and all the finer fruits, which seldom reach perfection here, may thus be inured to our climate.

It is worthy of observation, that it is from *seeds* alone such improvements, (or any other), can be made; for *cuttings* and *grafts* always partake of the nature of the original *stock* in every characteristic; vapid, old and worn out trees, producing vapid fruit, shrivelled, (at times), small, and the stems by their meagreness plainly proving to us, although we never saw the limbs or stock, to what kind of parent they owe their production.

38. *New Pippins, to render productive.*

The golden pippin has gradually become a shy grower in this country, owing no doubt to the average coldness of our summers, for they are palpably more productive when our warm weather comes on early, and does not too soon relax: it was too tender for us. The object then was, to render it more hardy; and to this end, the farina of the pippin was introduced to the flower of the Siberian crab, whereby a *mule* was produced, which would ripen in cold and exposed situations like the one, yet retained the rich flavour of the other parent. Of these hybrid, or mule productions, however, it is fair to acknowledge, that in a few generations they return to the character of the one or the other variety.

We are informed, that a most excellent variety of this apple, called the *Downton pippin*, (from the place of its propagation), has been obtained by introducing the

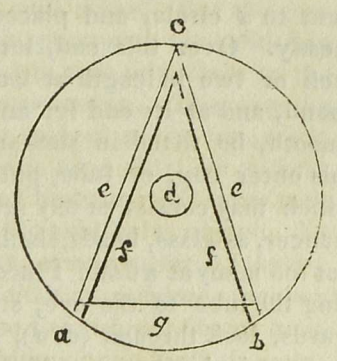
farina of the golden to the female flower of the orange pippin; and we learn without surprise, that the progeny is more hardy than either parent. But unlike mules of the *animal kingdom*, a new variety has been produced between this and the Grange apple: another variety that flourishes well, comes from the Foxley apple and the Siberian harvey. The pear admits of the same treatment.

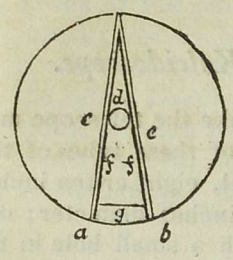
39. *The Kaleidoscope: origin and application.*

Originally invented for the purpose of assisting gardeners in laying out their grounds—this instrument may with equal advantage be applied to any other branch of the ornamental arts, as an assistant to pattern-drawers of every description. Carpet manufacturers, draughtsmen, as well as floor-cloth painters, will find in the fantastic oscillations of the kaleidoscope, endless varieties of colour and disposition; it might also be profitably adopted, as giving better ideas than the Oriental gothicism practised by the printers of silk and other handkerchiefs, which now disgrace the national taste. Although first announced (so far as we know), in a Treatise of Ornamental Gardening, published before the last century (4to.), yet the very ingenious and indefatigable Dr. Brewster, claims the merit of having *again discovered* the uses and application of the *double reflecting surfaces* to which he first gave the name of Kaleidoscope; though the principle on which it is found, was known to the earliest writers on optics.

34. *Construction of the Kaleidoscope.*

EXTERNALLY it is a tube, and like the telescope may be made of any size. Take one of these tubes of tin, brass, pasteboard, or other material, eight or ten inches long, and one and a half, or two inches diameter; one end to have a cap of the same, with a small hole in the centre, about the size of the dotted circle *d* in the annexed figure (2), which is a view of the sight end of the instrument, whence the cap has been removed. The circle *a b c*, is the edge of the tube, the lines *a c* and *b c*, are the edges of two *reflecting surfaces*, that are of the same length nearly as the tube: they may be made of polished steel, of plate-glass or crown-glass, which has been *blacked* on one side, at *e*, the surface *f* being polished with skill. This blacking may be effected with the smoke of a lamp simply, or upon varnish, or with any other black matter that effectually resists the rays of light, and the two reflectors must be kept apart, at *g*, by means of a piece of *cork*, or any other substance, placed at each end of the tube. At *c*, where the reflectors join, they should be straight, and adapted to each other; or they may be placed differently; even





parallel as fig. 2 or forming a more acute angle than in the foregoing sketch, as fig. or acuter still, as fig. 3 ; of which part of our subject more hereafter, as also concerning the *sight-hole d* fig. 2 which is still unfurnished with a glass of any sort.

At the other end of the tube (the *object* end), where the two reflecting surfaces *a c b c* terminate, a circular piece of ground-glass is to be fitted into the tube, and retained there by means of a piece of wire which is to be bent to a circle, and placed upon the glass to keep it steady. Over this end, let another tube be fitted, an inch or two in length at least, capable of being turned round, and at its end let another circular piece of glass smooth, be fitted in similarly to the preceding. Into this outer cap, or tube, put the objects to be viewed, which may consist of any semi-transparent coloured substances, as glass, beads, shells, or pearls, and the like, but not too many at a time. Place the cap on, and then advancing the tube to the eye, still keeping the side *a b* upwards, look through (at *d*), and you will have a brilliant symmetrical repetition of the objects which are placed between the two glasses, and visible through the angular aperture *c a b*. Turn round the cap, more or less, in which the objects are so placed, and you will perceive a change in the combinations of the images: new forms will present themselves perfectly different from the former, sometimes rising out of the centre, at others vanishing there, and occasionally playing round it, in double and opposite oscillations. Standing still, however, the draughtsman may copy off upon paper, the *shapes* that present themselves, if he cannot hope to equal the

varied tints that are developed in succession; each new one delighting the eye by the perfection of its forms and the brilliancy of its colouring, both of which depend upon your own previous management of the *objects* to be viewed, and of the angle at which you fix the two *reflectors a c* and *a b*, or as we term them—"reflecting surfaces."

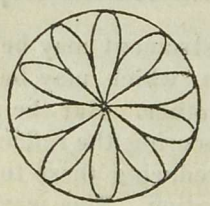
41. *Various modifications of the Kaleidoscope.*

INSTEAD of *two* reflectors, this instrument may be got up with three or more such planes, which may be arranged differently as regards each other. But the perfection thereof is to be found in procuring the reflection of distant natural objects, and in reducing these to the size proper for pictorial representation. This may be accomplished by fixing on the object end, a conex lens fastened to *the slider tube*, which must then be as long nearly as the inner one, in order that the right focus may be found, which is adapted to the particular object. So two or three lenses may be kept, of several focal lengths, which should be always less than its greatest distance from the sight-hole, and will be found generally at from one-fourth to a third of that distance. A farther variation, however, may be obtained by introducing two lenses, one fixed to the inner tube, the other to the slider, and approaching or receding these by means of the slider, the focus will be found.

As a matter of economy, it is suggested that the reader, who may have in his possession an old telescope, may adapt the size of his Kaleidoscope to the glasses he may so borrow out of that instrument to be employed occasionally in this one. A concave glass, placed at the

sight-hole (*d* fig. 2) will throw the objects off and reduce their size, by taking care that the focal length be equal to the length of your reflectors.

The *number of reflections* will be proportioned to the inclination of the reflectors towards each other; always depending upon the division of the 360 degrees of a circle, by an aliquot part, as the 16th, 18th, or 20th part thereof. See fig. 3 which describe those parts respectively. Or, take an orange, and having cut it across into two parts, the circle will present the marks of ten lobes or divisions (fig.7.), being one tenth of the 360 degrees before spoken of, and those tenths being further subdivided into two each, likewise gives the section as at fig. *Quere*, whether the natural influence of light and heat occasions this apparent coincidence between the lobes of the fruit, which owe their existence to heat, and the reflection and refraction of light?



42. *Monochromatic Painting.*

"FOREST Scenery," was most delightfully represented by Mr. Gilpin's mode of monochromatic painting and printing He carried this improvement so far as to give a fair idea of the state of the weather at the *time* of representation, and the hour of the day: at noon the refulgence of the summer's sun was shown by working the aquatinta of an orange-red; dawn of day by a cool tint, and sun set by a blue one.

If at the last mentioned point of a day that is cloudless, a body be placed either against a wall, a polished surface, or on a chalky plane, the shadow which previously reflected a dark or black colour, will become *blue;* a phenomenon which is accounted for by the blue tint observable always, to be reflected from the sky, fall, and are again driven back, or reflected on that part of the wall which the dying light of the sun can no longer strike.

43. *The Green colour of Vegetables.*

If vegetable seeds be sown in a dark place, though they produce their kind, it will be without colour; cover down closely any plants, they will be destitute of the beautiful green we so much admire, and which certainly enters at the tips, being imbibed from the atmospheric air. During the arctic winter spent by captain Parry and his crew, they grew small sallad by means of woollens, in which the seeds were sown, and placed near the fire-place; but the severity of the climate having compelled them to batten down and caulk their abiding place, these vegetables came up quite white. The season, however, permitting the removal of a board or two, the tips of the sallad were seen to bend that way, and their extremities turned green, which crept hourly towards the roots. And this experiment shews, that the colour, as well as the vigour, of vegetables, reside in the atmosphere; of which, more hereafter.

44. *The natural course of Plants incontrollable.*

That nature will not be forced in any of her ways by the arts of man, is proveable in almost every human science; medicine being that department of it in which this perverseness is most lamentably employed. The cutting off a limb, the excision of parts deemed vital, obstetrics, seem adapted to assist the accidents or diseases to which we are liable; so does the transplanting of trees, engrafting new limbs, or diversifying flowers, turn out to be congenial to those plants; but if we endeavour to controul their course forcibly, they show the futility of such attempts, by either recovering their position, or dying outright.

Hop plants, growing round a pole in the same course as the sun takes, from east to south, are of the latter *disposition;* for if you untwist any, and confine them in the contrary direction, they die; but leave one of them loose and it recovers its original position by sun rise the next day. So, if you twist the branch of a tree in such a manner that the leaves are inverted, it returns back until the leaves reach their natural situation, as regards the heavens and the earth; in this respect upbraiding and teaching a lesson to the perpetrator, what efforts he himself ought to use in adversity, to recover his former state.

When the root of a tree grows out of the earth, it alters its course, dips anew into the earth, goes round obstacles, and then continues at its appropriate depth. If you thrust a bean-stick into the ground at any short distance from a running plant, what is the consequence? the plant stretches towards and embraces the stick, rising up to its top, though that should be six or eight feet. The honeysuckle proceeds in its course to a good height, and

when too tall for its length, it strengthens itself by shooting spirally; but when it meets with one of its own kind, they coalesce for mutual support, the one screwing round the other to the right, the other to the left: if one of its twigs meets with a dead branch, it invariably turns from the right to the left. So do the claspers of briony shoot spirially, and lay hold of whatever comes in their way for support; but when they have completed a spiral of three turns, and meet with nothing, they change their course, and seem to try again.

45. *Potage.*

THE well known plant, manzel wurzel, once of so much rarity, as to receive the epithet "Root of Scarcity," from the late Dr. Lettsom, but which is now raised for its root only, would, if permitted to run up, grow to a great height, and afford a good plucking of potage vegetables twice a week in winter (only). It must be planted late, but may continue in the ground two or three years, when its root will be wasted, and the herbage dwarfish, and must be renewed from seed.

46. *Apricot Trees.*

GARDENERS and others, who may have apricot trees that do not bear fruit, should not therefore cut them down; because it is ascertained that they do not bear at all until very aged: a few years ago, several of these trees were cut down because they seemed barren, in or-

der to make room; but a few being left for shelter, are now found to produce largely, although ascertained to be upwards of forty years old.

47. *Tea.*

An inordinate use of tea always affects the persons *strongly* who may become martyrs to it; the kind of affection being usually lowness of spirits, with its train of evils. Strong tea excites the inner surface too much, and with the sedentary and the studious, brings on spasmodic contraction of the urinary and alimentary passages. A gentleman of this sort of habit, indulged for years in strong tea, until for the first time in his life, he was attacked with illness—' a suppression of urine :' it was a bad case, and lasting, but it invariably left him when he denied himself tea, and in proportion as he reduced its quantity or strength. Intervals of two or three days, a week or two, or a month, in the use of his favourite beverage, is uniformly followed by ease and rest for the ame precise periods. *Ex uno disce omnes.*

48. *Wasps.*

Those destructive insects feed greedily on the vegetation of the yew, hence we infer, that for the protection of fruit trees, a few of the yew trees should be planted round the garden. Of this destroying insect, it is worthy of remark, too, that they avoid the smoke of coal-fires ; but then, if this smoke should be employed in keep-

ing them off, it should be remembered that it is also inimical to vegetation—stunting or destroying the growth of hardy plants, flowers, and foliage in the metropolis.

49. *Eggs, to preserve.*

A SOLUTION of gum-arabic being applied with a brush to the shells, or the eggs being immersed therein, let them dry, and afterwards pack them in dry charcoal dust. This prevents their being affected by sudden (or indeed any) alterations of temperature, or as regards moisture; the first of which promotes incubation, the latter leads to decomposition.

50. *To hasten the ripening of Wall-fruit.*

PAINTING the wall with black paint, or laying a composition of the same colour, produces not only more in *quantity*, in the proportion of five to three, but the *quality* is also superior in size and flavour, to that which grows against walls of the natural colour. To Mr. H. Dawes, of Slough, are we indebted for having made public the success of this experiment upon a large scale, in this country; though the practice is tolerably common in Ireland: grapes were the article Mr. D. reported upon.

51. *Rays of Light converged by dark Colours.*

The reader will have perceived elsewhere, that the rays of light are those of heat also, and pervade all space, being drawn towards the centre upon coming out of a rarer into a denser medium or body—as, out of air into water. Upon this principle it is also, that dark colours draw together or converge those rays more than any other, and that the rarer mediums, or pale colours, have the power of throwing them off, as it were, or causing them to diverge. In the last article we saw a good practical proof of this truth, on grapes.

All the colours whose powers of attracting heat, it is desirable should be ascertained, may be procured, of the same size, weight, and material; say, woollen cloth *patterns*, of about three or four square inches each—red, black, blue, white and brown, respectively. When snow has fallen, place these pieces gently thereon, open to the air, and the sun (if it shines), and in a few hours thereafter, the different colours will be found to have made impressions more or less deep, according as they influence those rays; the *black* being deepest, white the shallowest; and the brighter (hotter) the day may be, the deeper will be the impression of every colour, compared to those made on a dull or cloudy day.

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52. *Black-dye.*

One of the secrets of the celebrated *dyers of blacks*, is, that the drying is performed in the dark—shutters being provided to keep out not only the sun, but the indirect rays of light

53. *White Paint, and Black.*

As a further proof of the same proposition, white paint was found to resist most effectually the destructive operation of the 'burning lens' (See that Art), and preserved the *wood* which was so covered from the effects of that powerful instrument. But when the lens is brought to reflect upon printed paper, the letters thereof catch fire, whilst the white part still resists the effect of the heat.

54. *Experiments on white and black Clothes.*

Put on a coat with one sleeve white and the other black—for which purpose the sleeve of an old worthless coat may be detached from the body, and walk up and down exposed to the sun, and you shall find the black sleeve much warmer than the white one. People who wear black stockings, in like manner, get scorched legs before the fire, while those not so covered escape the blistering effects of the heat.

55. *Analysis of Soils.*

Cultivators have recently applied themselves with some earnestness to analyze the component parts of the soils of which their lands may be formed; some being injurious, or retarding fructification, when found in too great proportions, as magnesian lime-stone, flint, clay, oxide of iron; others, as animal and vegetable earth, con-

taining much that is desirable, or if failing, such are to be supplied. The specific gravity of a soil, is of primary importance; and may be ascertained by half-filling a bottle with water, and adding thereto, soil that has been dried in the open air, as much as will raise the water to the neck of the bottle. Then in the proportion the weight of earth may be to the water, will be its specific gravity; and if rising to the proportion of two ounces of earth to one of water, it shows that the proportion of animal and vegetable matter is great and desirable.

Some allowances, however, must be made from this decision when the absorption of water in soils is very great, reaching to nearly 25 per cent. or one quarter, in poor cold soils, whilst the richer contains less perhaps than 5 per cent. of water. The soil is to be exposed to atmospheric air, and, when dry *to the touch*, weighed and exposed to a strong heat: the quantity of weight it thus loses, will be its amount of water, or degree of absorption.

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56. *Tests for discovering inimical Substances in Soils.*

SIMPLE agitation in water, shows the quantity of sand contained in any given sample of earth or soil—ten or twelve drams being fully sufficient for all purposes of experiment. In a vessel, having a plug-hole at bottom, put your soil, with a sufficient quantity of water; stir it well repeatedly, and mark its periods of subsiding, that which remains longest in suspension being the finer quality.—Sand soon subsides: it generally prevails to the amount of *one half* in light soils, and the qualities of the particles contained therein, must be ascertained afterwards.—

Meantime, having drawn up the plug, to let the water escape *from the bottom*, next to it will be found the heavier particles, as sand, &c.; and at the upper part the finely divided, loamy or fructiferous part of the soil—these must be parted, and the weight of *sand* and *loam* noted and compared. Totally unproductive, but capable of retaining much heat, the sand should not, of course, predominate over the loamy part.

Next take the water which you have so thrown off, place it in a shallow vessel, and at a heat somewhat short of boiling, evaporate it to dryness: the powder that remains will, in most cases, be more or less brown; the deeper its colour, the greater will be the quantity of vegetable extract contained in the substance whence it has been drawn; but if it be white, and nearly transparent, a good portion of *saline* matter may be considered to reside in the soil, and, in fact, this may be detected by the *taste*. The *colour*, however, most frequently lies in the medium between those two extremes, and then partakes of both qualities; unless combining a fatty substance, animal, mucilaginous or gelatinous, which leaves a brownish matter, and must increase the colour: whatever proportion there may be of this latter substance, may be ascertained by exposing a part thereof to a strong heat, and it will then send forth a stench more or less offensive according to the amount.

Now, the diligent cultivator will readily perceive, that although those qualities should all three be found in a *good soil*, yet that neither should prevail to the exclusion of another; or if it do so, there will be no propriety in augmenting that particular quality, by the *mode of dressing* he would have recourse to, but he would rather seek to correct such predominancy by adopting its opposite.—But he may detect the presence of particles of *nitrate of lime*, or of *nitre*, by casting a small portion of the dry

matter upon live coals, when small sparks will be thrown forth. *Sulphate of magnesia*, the presence whereof is equally to be avoided, may be detected by its bitter taste; the sulphate of potassium, sometimes found, is not of so much importance, nor so prevalent; because producing no alteration in solution of ammonia, but precipitate solution of muriate of barytes.

57. *Burglaries.*

In addition to the usual precautions of locks and bolts, alarum-bells and fire-arms, three things have been prescribed by us*, and found efficacious, in preserving houses from nightly depredators. 1st. A light in the upper part of the house; 2d. a *small* dog, in a room on the ground-floor, which offers the means of its running into a place of safety from its enemies: not to be fed too high, and allowed to sleep by day. 3d. The spreading some ashes fresh from the fire-place, before the door, underneath the window, or other vulnerable place; so that the thieves' shoes would creak, the dog be roused and bark, and the fear of detection by the approach of the light, would deter rogues of common feeling. At least, should they enter, the little dog could not be readily come at to be slain, and the scuffle occasioned by effecting this necessary prelude to robbery, would promote interruption from within or without.

Note.—Yard-dogs, and other such, are easily poisoned or slain, or otherwise coaxed from their duty, by means

* In the New Monthly Magazine for 1816 and 1817, a work devoted at one time to *useful* purposes; and in the "London Guide," 1819.

we cannot with regard to decency further explain in this place.

58. *Of fulminating Powders, and detonating substances generally.*

To the series of experiments on creating explosions, and fire, by the action of air on combined substances, the method devised by M. Dulong, (as described in the Philosophical Journal), for obtaining an *oil* from chlorine, deserves notice in this place. But this being a kind of amusement, to which unreflecting persons resort, to the annoyance of others, and causing much common danger, we feel ourselves called upon to offer a few remarks on such objects, generally, and other matters connected therewith.

By what is said occasionally of those substances, and the care necessary to be observed in their removal, the reflecting reader will have gleaned the information, that every operation connected with them is attended with considerable danger, not only to himself, but to the persons and property of others. This last we look upon as no small matter of consideration, forthe mind that is not so much absorbed in philosophical experiments as to leave no room for the common suavities of social life. In this view, we have no right, certainly, though possessing the means, of affrighting the weaker part of the creation, by exploding these formidable weapons of mischievous juvenility, for the purpose or with the chance of annoyance. Is it not noble to carry *arms* with the firm determination of never using them *offensively*, or dishonourably? And by the same rule, ought we not magnani-

mously to abstain from employing the superior intelligence we have acquired, in abridging the peace and happiness of others ?

Not so thought a chemist of Drury-lane, a few years ago, who being *brought up*, with others, to answer at Bow-street office, on a charge of having " vended fulminating powders, to the great danger (as set forth) and disquiet of ——, &c." He pleaded, that his " preparation would not ignite any substance whatever, even gunpowder ;" but, upon being put to the test, our chemist disproved his hasty assertion, by the explosion of that body, and the annoyance of the assembled justices ; a good popular proof that all detonation is in effect caused by the explosion of an ignitible substance, and therefore capable of communication to other substances, less apparently susceptible than gunpowder is known to be.

During the *process*, the operator is seldom safe; some powders being calculated for explosion solely, while the manufacture may yet be considered incomplete ; other of those preparations, again, are of such a ticklish nature, as not to suffer removal, by vehicles that class in every known respect, with others that are harmless in tact with other kinds of such treacherous substances, and some one or two are found not to survive even the *vicinity* of explosion. See the two following articles.

In all cases, danger is incurred by keeping such preparations in large quantities together; and if we do not adduce instances, it is not because the persons who have been found so offending are entitled to commiseration, or deserve delicate treatment at our hands : it is enough to state, that such cases have occurred.

59. *Chlorine.*

Fill a small jar with chlorine, or oxymuriatic acid gas, and transfer it into a basin, containing a solution of nitrate, or muriate of ammonia, a little warmed. The gas will slowly become condensed, the liquor rise up in the jar, and presently an *oily liquid* forms on its surface.

This increases and collects into small globules, and falls through the liquid, and forms the explosive compound of which we are in search; but when found, much danger exists in the means of gathering it together, many accidents having occurred of a frightful nature, substances most similar in their nature being affected very differently towards the oil: charcoal of wood seems uniformly innocent in *tact* with it, and therefore offers one of the safest vehicles for removing it. Mr. Kirk found it would not explode upon alcohol or ether, whilst fire-heat at 212° of Fahrenheit produced detonation, though not so loud, as when cold it were touched with inflammable bodies. In olive oil, for example, a quantity the size of a pin's head will explode violently and loud, knocking the vessel in which it takes place to atoms.

Seeing that so much danger and doubt is found with this curious substance, the precaution of wearing a viso with eye-glasses in it, and perhaps a pair of gloves, mus be evidently necessary.

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60. *Detonating Powder.*

To three grains of finely levigated chlorate, or hyperoxymuriate of potash, add two grains of sulphur: mix

them well, in a clean dry mortar. Collect them together at its bottom, and with the pestle press the powder hard, by bringing it down at the *sides* of the mortar, suddenly, whereby friction against its *bottom* takes place. A loud detonation ensues, with a vivid flash. But if the pestle be turned briskly round, as is usual with druggists, after some time pounding any substance, repeated small reports will take place, attended with vivid flashes, not unlike what we see and hear in the electric shock. It is here worthy of remark, that if less sulphur be used, less friction is necessary to produce the several reports. Like most others of its class (See vol. I. art. 31, 32), it may be conveyed about, when care is used, and be suddenly ignited; in this case, by being struck with a hammer, its noise is equal to that of a horse pistol.

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61. *Co-explosion of Fulminating Silver.*

If small parcels of this preparation be laid about upon the table, or a train of considerable length, and one parcel be touched with sulphuric acid, the whole detonate spontaneously; which must arise from the compression of the atmosphere.

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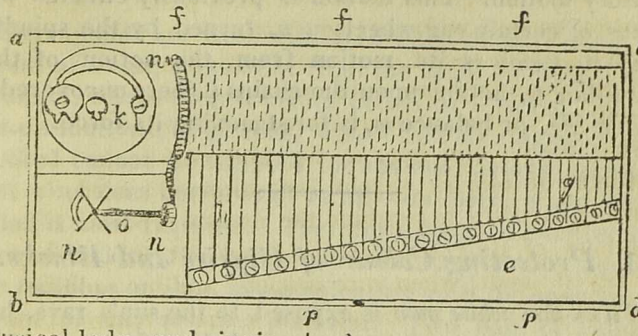
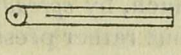
62. *Pocket Organ, or Musical Snuff-box.*

During the closing decade of the last century, a M. Merlin, tolerably ingenious himself, and the agent of procuring the means of encouraging the mechanical inventions of others, amused the town (London) with his several contrivances, of which the musical snuff-box,

Musical Snuff-box.



musical-lady, and singing bird, were not the least. All were formed upon the same principle, and for one of the latter, he is said, (upon his own authority), to have received the princely sum of two hundred guineas, from the '*first gentleman* in the nation.' The *novelty*, however, having ceased, pocket *spring-organs*, appearing like as many square snuff-boxes, in various mountings, are now commonly sold for six, eight, or ten guineas. The whole secret consists in procuring the means of sound, and graduating the same into certain tones (say 52); the first is accomplished by a metal sounding box, (*e*, fig. 15), being screwed at *p p*, to the case *a b c d*, from which the cover is removed off its hinges at *f f f*. The tunes are graduated from the treble *g*, to the bass notes *h*, inasmuch as

26 long bits of steel  called the keys of

the instrument, each divided into two, nearly so low down as the screws, where they are fastened to the sounding-box, afford a different tone, each according to its length. As either of these is lifted up, and let suddenly down again, so will it sound agreeably to the length: to perform this in a musical manner, the barrel

i i is furnished with pegs in the form usual to hand-organs, so as to lift up the keys, and effect a tune by its rotatory motion. This motion is previously effected by means of certain cog-wheels *n n*, turned by the spindle *o*, which receives its motion from the action of the spring-box *k*, acting upon the chains *l*, (here uncovered), and the *fly*, or balance *m*, is for steadying its force.

63. *Protecting Colour of Gipsies and Blacks.*

When the *white man* is exposed to the sun's rays, his skin becomes 'burnt,' as it is termed; but if he wear thin linen, the rays penetrate the skin, and, according to the known laws of reflection, they diverge, and now separate the cuticle into freckles, or irritated specks: should this linen, however, be black (as crape), though this colour converges the sun's rays, yet will not his skin be so affected, because the radiant heat is thus converted to sensible heat. In this way we may learn how it happens, that persons naturally with brown skins, are blistered or freckled less than those who are fairer, and *blacks* less than either; a circumstance which should teach our field labourers to adopt an artificial covering of dark colour upon or over their skin, as walnuts, berries, &c. like the gipsies. These facts are accounted for, in the conversion of the rays on black, while it creates more heat, does not *irritate* so much, by *spreading* the pores of the cuticle to abrasion, but rather pressing or drawing them together, so that the function of the cuticle is more diffusively performed: so are dark persons observed to have skin of a finer grain than fair persons; *i. e.* the pores are found to be more numerous in the same given space.

64. *Simple method of Ventilation.*

Ships holds are well ventilated when there is wind, by means of a sail, rigged out from the deck to below, like a funnel, whose largest orifice points to leeward. But in some situations, as prisons, where foul air stagnates, this method cannot be adopted for obvious reasons; besides, that wind does not prevail at all—on shore, when ventilation is most required. Therefore, have we adopted the plan of making two holes, (at a distance) in the sides of the building or ship, communicating with the open air by a tube of tin, or other material. Two pair of bellows are next to be fitted up, the nozzle of one being introduced air-tight to one of those tin tubes; and a leather pipe nailed on the wall, or timber, over the other tin tube, to which it may be fastened by waxed thread, and the other end of this pipe is to be made fast air-tight to the clicker-hole of the second pair of bellows: a luting of plaster of Paris, renders both ends air-tight. Small bellows would not, of course, be employed, but both being of the common blacksmith's-forge kind, four or five feet long, would empty a space containing thirty hogsheads of foul air, and supply its place with good fresh air, in a very few minutes.

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65. *Perpendicularity of Buildings.*

Some buildings are said '*to lean*,' and threaten to fall on the beholders; as 'the Monument of London,' the hanging towers of Pisa and Bologna, and others less noted, when, lo! after years of discussion, it sometimes happens they are found not to lean *at all*, or in a trivial degree

only, and so no fear of the *falling* ought to have been entertained. Dwelling-houses, sometimes, are found in this predicament; and who will undertake to ascend such a building, and looking over *the leaning side*, let fall a line and plummet, to see *how much* cause of dread exists? An easier mode of ascertaining the fact is, to construct a rude *plumb-line*, with the end of a rod or walking-stick; at which a piece of cord being fastened, with a weight at the end of it, let the operator get to some other building or tree, and resting his elbow there, bring the cord betwixt his eye and the outer edge of the building: if these be parallel, the building is upright, for the cord necessarily must be so, when at rest. If the extent of the cord be increased sufficiently, in how much this is the case, may be ascertained by taking two, three, or more observations from top to bottom, and adding together the apparent distances of the several bases.

We *noticed* this experiment being made by an ingenious Russian gentleman, our acquaintance, in 1814, upon the monument just named: vide "Napea's Letters on England," 8vo. p. 134.

66. *Well-digging: how to find Water.*

Take a green branch of hazle, thorn, or almost any kind of tree, with a fork at its upper end, like the letter *Y;* holding it by the fork with both hands in front of you, straight forward, walk over the ground where you would most desirably dig a well. When you come *over* the spot where water is to be found, the thick end of the stick will bend downwards to the ground, so forcibly that no mistake can arise from the indication.

Every one does not succeed invariably with this singularly excellent contrivance, but the cases are too well

attested to leave a doubt the thing is not visionary. Mr. Partridge, of Bath, considers the phenomenon a gift to himself, and afterwards endeavours to account for it, by ascribing to the influence of electric magnetic causes the accuracy with which he succeeds in all his experiments.

67. *How to ascertain what it is o'Clock (when the Sun shines), by one's Hand.*

BETWEEN the fore-finger and thumb, place a small stick, five or six inches long, A, A, projecting four inches. Then, turn your back towards the sun, nearly, so as that it may shine full upon the outside of the thumb when held upright, as in figure, and that the shadow thereof may reach so far as that arched mark in the *palm*, commonly termed *the line of life*—B B. At this time the stick will cast its shadow across the palm, to its *lowest* part, when the sun is at its highest meridian (or 12 o'clock); and, in fact, the true position of the stick may be best learned, by adjusting it by this rule, a few times, before you trust to your own expertness. Earlier in the day, before attaining this altitude, the sun will throw the shadow of the stick's point, higher up on the joints of the little finger, as marked 11, 10, 9, 8, in the morning; but at 1, 2, 3, &c, the shadow of the stick's point will reach *beyond* the joints of that finger, as marked, respectively; and so on of the others.

68. *Spontaneous Combustion.*

Woollen Cloth. In consequence of the oil used in working cloth, it is ever disposed to *heat*; and several instances are adduced, in which fires were produced from this very cause; the circumstance having been distinctly traced, in some cases, whilst in others, heaps of this article have been discovered partly burnt. Not only so, but lately a piece of heavy *linen* cloth, which had lain about in the warehouse of an oilman, was found behind some barrels, in contact with a wicker basket, so nearly ignited, as to have certainly set fire to the premises shortly, but for this timely discovery.

II. So a *barrel of oatmeal*, retaining a portion of dampness, is authentically reported to have taken fire spontaneously; it is apprehended, this must have arisen from a similar cause to the preceding, or upon the same principle as ricks of hay are consumed.

III. Sail-cloth, new, is frequently found to have rotted in the boie: this must arise from the *dressing* thereof, being a compound of *meal* and lime, which consume the fibre.

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69. *Preventive of firing Muslin, &c.*

A weak solution of phosphate of ammonia, and borate of soda, will prevent muslin dresses, &c. which have been rinced therein, from catching fire readily. To M. Gay-Lussac are we indebted for this simple process, which, as we have proved upon a small scale, no doubt may be extended to bed-curtains, and other furniture, with a stronger solution.

70. *Method of congealing Water in a Vacuum.*

Many methods have been already experimented for freezing water *in vacuo*, which some foreign philosophers and chemists have promised the pleasure of converting to objects of great utility. M. Grothus thinks more highly of it than the discoverer himself, (Professor Leslie, of Edinburgh), and informs us, "In a metal vase, half filled with water, I poured very gently an equal quantity of *ether*, so that no mixture might take place of the two liquids. The vase was placed under the receiver of an air-pump, which was so fixed upon its support, as to remain quite steady when the air was pumped out. At the first strokes of the piston, the *ether* became in a state of ebullition; it was evaporated in less than a minute, and the water remained converted into ice." Done at Mittau, in Germany, the temperature of the apartment being then at 16 degrees of Reaumur.

71. *Rosin Bubbles.*

I. Scarcely a person exists in this country who does not know, if he has not practised, the childish amusement of making evanescent balloons, or air bubbles, with *soapy water*, blown out at the end of a tobacco-pipe, or other tube. If rosin, melted to the temperature of boiling water—a heat it readily attains—be used instead of soapy-water, pleasing strings of bubbles will be produced, varying in size and transparency, as the operator may hold his pipe vertically, and adapt the strength of blowing to the viscidity of his material. Some bubbles

will be small, like beads, others larger; all transparent, and refracting the rays of light in all their varied hues. Kept out of the dust, they retain their original form a long time—half a year for certain, though they may be preserved twice or thrice that time, and if blown tolerably large, form very pretty chimney ornaments, resembling eggs or lemons.

72. *Another Method.*

II. It has been suggested, that hydrogen gas being substituted for atmospheric air, those bubbles would fly off, and, without being attached any where, would occupy the upper part of a sitting room: but it must be recollected, that a current of air passing through the room, would not simply change the position of your rosin bubbles, but carry them off entirely.

III. The gas with which our houses are lighted, forms a good substitute for this last, being easily obtained before lighting-up takes place, by placing a bladder over the orifice, and turning the cock of the burner.

73. *Exploding Gas Bubbles.*

If the common soap-sud bubbles of children, before adverted to, be made of hydrogen gas, instead of air from the lungs, they produce a pleasing recreation, by a candle being applied to them as they fly off, when explosions take place, proportioned to the quantity of gas ignited. The operator must take care of his eyes, as the dispersion of the soap-suds is very minute and forcible, and the

eyes being universally directed towards the effect produced, are most likely to be affected in a painful manner.

Gas may be procured and kept for this purpose in a bullock's bladder, to the neck whereof is attached the end of a piece of tobacco-pipe: this piece, or the bowl, being introduced at the neck of a bladder, a waxed thread (or cobler's end) is to be passed tightly round it, and made fast; and the outer part of the pipe being inserted into a cock, which fills the neck of a phial, the hydrogen, which is being liberated in the phial, will press into the bladder, according to the following process.

74. *Hydrogen Gas, to manufacture.*

LET a phial be provided, which has a cork-stoppel with a hole in its centre, capable of admittlng tightly the end of a tobacco-pipe. Into the phial drop a few bits of zinc, steel-filings, or scraps of iron. To this pour reduced oil of vitriol, prepared in another vessel by a simple admixture of water; and when the heat hereby occasioned, has subsided, introduce it to the metals in your phial, and cork it down with the stoppel before described. Immediately, the hydrogen contained in the liquid will begin to fly off, by reason of the attraction which resides in the metal, for the other component part of the liquid, (viz. oxygen). The gas thus liberated, ascends in a stream, and may be lighted with a candle, or conducted into the bladder fitted up with a tobacco pipe, as described in the last recreation.

For this purpose, the end of the tobacco pipe, which projects from the neck of the bladder, is to be quickly thrust into the hole of the cork of your phial, and the

bladder will be filled with the gas which arises from the decomposition that is going on in the phial.

75. *Another Method of obtaining Hydrogen Gas.*

Into a retort, put a bit of phosphorus, (See Art. 143) and some pot-ash, dissolved in water; apply a lamp to the bottom of the retort, and when the contents boil, the hydrogen will ascend. As it escapes, catch and detain it in glass jars, two or more, to be differently dealt with, as occasion may require; or it may be collected into bladders, (as before described), with the same motive, by means of a funnel. Or,

Over the retort's orifice, place a funnel with a bent tube, which may pass into the side, or over the edge of a vessel, so as to dip in water: and as the gas-bubbles ascend, and reach the air, they will go off, and successively explode. From these explosions, a pleasing ascent of cloudy smoke takes place, rising up, and forming a continuous mass, much resembling 'thunder clouds,' as they are termed, on a stormy day. If a pair of bellows be applied, a good idea of the theory of clouds and rain may be imparted to the youthful mind. When driven out of a warm room into the open air, they become agitated, and ascend, or are depressed. as the weather may happen to be hazy, cold, hot, or fair.

76. *Phosphorised Hydrogen Gas,*

To be employed in various experiments, may be procured by placing small pieces of phosphorus in the fore-

mentioned hydrogen gas. Pass some of this slowly into an inverted jar, filled with oxygenic gas, and a brilliant blueish flame will be produced.

77. *Coal-tar Gas, portable.*

This is the common gas, so much in use in all towns of any consequence in this empire, in manufactories, and the houses of many individuals. Bladders filled with a quantity of this gas, may be procured at the orifice of the burner, (before it is lighted); and the neck, or *fitting-up* of its end, made capable of being closed or opened, and lighted up at pleasure, may be carried about with as little inconvenience as some candles or lamps. A bladder, having a tobacco pipe at its neck, as before described, being filled with this gas, may be applied to the same kind of recreation as in the above articles, (Nos. 72, 73)—thus:—Dip the end of the tobacco pipe in soapy-water, or in melted rosin, and pressing the bladder, you shall soon perceive bubbles of the one or the other material, as long as any of either is found at that end, those of the former kind detaching themselves, and flying off incontinently, while the more tenacious rosin preserves a fine filament between each bubble, that you shall have a string of beads, or rather a string of eggs, artificially brought forth, but which, nevertheless, ascend upon being detached from each other.

When rosin is employed, it must be used quickly: and the pipe, at each dip, must remain half a minute, or so, to make it warm—as this material soon gets cool, and consequently sets. At each filling of the bladder, it should be wetted and brought into entire collapsion, in

order to expulse all atmospheric air, which would tend to spoil the experiment.

78. *Gas—Another method of obtaining it.*

NOTWITHSTANDING the affectation of making a *discovery*, set up by Mr. Winsor, and too often assumed in matters connected with natural philosophy, it is no less certain, that the uses to which the gas of coal-tar might be applied, were known to us, (the editor), at least a quarter of a century before the adoption of this mode of lighting up the city of London. A most common experiment in our juvenile years, was that of placing in a tobacco-pipe bowl, as much Newcastle coal, of a fine quality, as it would hold; and having followed this direction, cover the same with stiff clay, knead it well down, and put it into a fire where it is not too fierce, at first. Very shortly the gas will disengage itself from the coal, and ascend through the hole in the tobacco-pipe, where it may be set on fire, and it will burn a considerable time. It is clear, that, with a larger apparatus of the same simple construction, a quantity of gas may be produced sufficient to fill a bladder, at least.

A large iron kettle, or boiler, with a spout, may be made applicable to a kitchen fire, so as that the top be well fastened down, and the spout raised uppermost.—To this spout might be welded some feet or yards in length, of the pipe usually employed, or of that more pliable composition tube, employed by the makers of beer engines; and thus a domestic gas apparatus may be constructed for any common out-door purpose, at a trifling expence.

Note.—The application of a gassometer, or receptacle for a quantity of gas, to be stored up for future use, may be learned in the foregoing description of oil-gas.

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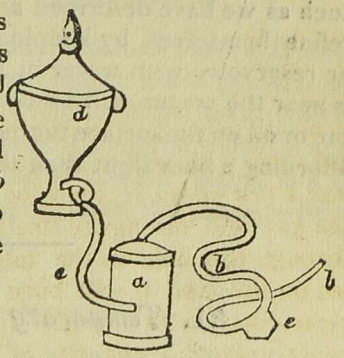
79. *Oil Gas, upon a small scale.*

COMPARED to coal-tar gas, that obtained from oil possesses innumerable advantages; it is easier made, the apparatus occupies less room, and the light it gives is much more brilliant. Prepare a close iron vessel, or retort, with a conical top, out of which proceeds a tube that is to take a dip, spirally, so as to leave the condensed oil (hereafter described) in the bulb of that dip. See annexed sketch: *a*, the iron vessel; *b b b*, the spiral tube; *c* the bulb or reservoir, through which the gas passes, and leaves the oil that comes off with the vapour without being decomposed. Let *e* be the feeder, which coming from an air-tight vessel, *d*, full of oil, it drops slowly into the centre of the iron vessel *a*; and underneath this, a fire being created, so as to heat it nearly to redness, the drops at their descent are converted into gas, and fly off by the tube *b b b*.



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80. *The Purification of Oil Gas.*

This may be effected by one of several different methods. 1st. The tube *bbb*, in the last figure, may be a worm passing through water, as in distillation, whereby the gas is cooled and condensed, and ultimately received into the bulb *c*. 2d. The same tube may be made to pass into, and terminate in water, through which the gas will bubble, leaving its oil on the surface: the whole water is to be covered by an inverted case (of iron), out of which the gas is suffered to escape, by a worm, or tube, such as we have described above. 3d. All gaseous bodies refine themselves, by keeping a few hours in a gasometer, or reservoir, with water in its bottom; then the gas that is near the water will be cooler, will have deposited its tar or oil on the surface thereof, and will be found cleaner; affording a finer light than that which floats above.

81. *Temporary Nautical Pump.*

Captain Leslie, of the George and Susan, in a voyage from North America to Stockholm, adopted an excellent mode of emptying water from a ship's hold, when the crew were insufficient to perform that duty. About 10 or 12 feet above the pump, he rigged out a *spar*, one end of which projected overboard, while the other was fastened as a lever to the machinery of the pump. To the end which projected overboard, was suspended a water-butt, half full, but corked down; so that when the coming wave raised the butt-end, the other end depressed the piston of the pump; but at the retiring of the wave,

the thing was reversed, for, by the weight of the butt, the piston came up again, and with it the water. Thus, without the aid of the crew, the ship's-hold was cleared of the water in a few hours.

This invention is far from *new*—it has another recommendation, it is most obviously practicable. But we have always thought, that practice a good one, which awards the merit of praise to those who publish confirmations of useful facts.

82. *To freeze Quicksilver.*

Prepare a mass of ice and muriate of lime, and throw into it some of the liquid metal, where it will quickly congeal in a few minutes. But when this experiment is to be performed in a room, the freezing material must be kept out of it until the congelation is to take place, and separately too, the vessel that contains the muriate being placed upon the ice or snow.

83. *Frozen Quicksilver, malleable.*

In the arctic regions, mercury froze in large masses, and it is only to the small degree of heat at which it will melt, that its deliquency is to be attributed; in other respects, it is as much a metal as gold, iron, or silver; for its malleability, tenaciousness, and ductile property, ranking between tin and lead. An experiment tried upon a piece the size of a walnut, which was dropped into a tumbler of warm water, caused instant congelation, accompanied by fracture of the glass. Vide "Parry's Voyage," 4to.

84. *Frozen Mercury, its effects.*

When the same effects are produced by two different causes, between which, as yet, no similarity is known to exist, we at least *conclude* there is such affinity, although not yet brought within human perception. An arctic winter, passed by Captain Parry and his crew, (of the Griper and Hecla), in 1820, taught us several facts hitherto unknown; some of which we have already brought to account, and applied to the present state of knowledge and the sciences. See vol. I. art. 275. In that expedition, the men were necessarily covered-in, during "the long night of a five months" winter; but when any of them went aloft, or on deck, they found some evil effects of an arctic frost, one of which was a certain affection of the uncovered parts, particularly the face, that shewed itself in livid spots, with symptoms of gangrene. "We knew of no other remedy for this frightful approach of mortification, than rubbing the parts well with snow," says one of the narrators.

What those regions contain within their impenetrable coasts, besides the loadstone, (See art. 275, vol. I.) perhaps we shall never know, nor what affinity exists between it and frozen quicksilver; but "the cold imparted by both, is so exactly alike in feeling and appearance, and both are to be cured by means so precisely similar," that we could not do otherwise than notice the important fact.

The writer tells us truly, concerning frozen quicksilver, or mercury, that great caution should be used in touching it, as an immediate sensation is thereby imparted, resembling that of a wound inflicted by a rough-edged instrument, or that the fingers had been rudely

pinched in a *vice*, followed by a pain like a burn or scald. The part touched becomes pale, numb, and lifeless; assumes the appearance of gangrene, and is to be cured only by an assiduous application of snow.

85. *Adulterations of Mercury.*

THE principal danger to be apprehended from the administering of mercury, will be found in the adulterations to which it is exposed *in transitu*, after being confided successively to the honour of Italian and Dutch traders.* Being usually adulterated with lead, it forms a poison that is recognized by the griping pains thereby occasioned to the patient, whose recovery mainly depends upon taking a course of mercury.† Nor will the long-practised mode of purifying crude mercury of its contaminations, by passing it through sheep-skin, (prepared as *buff*), get rid of the lead, though it receives much pressure. Bismuth, tin, or zinc, however, may be so detected by said leather, which we observe is commonly termed chamois, from the name of the mountain-goat of Swisserland. *Per* consequence, all preparations of mercury that do not destroy the lead in the process, are exposed to defeat.

Operation.—Dissolve your quicksilver in nitric acid; add thereto water which has been slightly impregnated with sulphuretted hydrogen—when the *lead* (if present) will be precipitated of a dark-brown colour. If on the

* Part of our quicksilver comes by way of *Trieste*, in Istria, the remainder is brought down the *Rhine*,

† The necessity for employing mercury in syphilis, has, however, been often controverted. See Dr. Cole's able exposition in the London Medical repository.

contrary, part of the nitric solution of mercury be poured into distilled water, bismuth, (if any) will appear as a white precipitate.

86. *Corrosive Sublimate—its powers.*

In the quantity of one grain, this mineral preparation would destroy the smallest animals in a short time; but mixed with wheaten flour, in the proportion of one to 500, or 600, it then forms *calomel*), and fourteen grains might be safely administered to a rabbit or a fowl. So with gluten—Dr. Taddie, in his experiments, found that this reduced the sublimate to the state of calomel, when mixed with 25 grains of the gluten, in its fresh state, or 13 dry o one of sublimate.

Rectified spirits, or muriatic acid, are the proper menstrua of this preparation; again, corrosive sublimate may be abstracted from its solution in water, by adding a fifth part of fluid ether, and shaking the bottle.

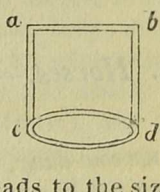
The presence (and amount) of mercury in those forms, may be ascertained by mixture with iron, copper, lead, or zinc, in their metallic state, cold: they will combine, however, with crude mercury, in the proportion of 20 to 25 per cent. when put together, heated up to 110°.

87. *Galvanic Test for discovering Corrosive Sublimate in Liquids.*

Mercury, in its metallic state, is to be brought to view by applying galvanic electricity, as follows, to

any compounded liquid, which holds corrosive sublimate in solution.

A piece of zinc, or iron wire, about three inches in length, is to be twice bent at right angles, *a b*, the annexed figure (8); the two legs, *c d*, must be of the width of a gold wedding ring, to which they are to be subsequently fastened. Let a plate of glass be laid on an exact plane: on it drop water, in which is one sixth of sulphuric acid, until it spreads to the size of a half-crown piece. At a small distance, drop, in like manner, some solution of the suspected article, until the edges of the two liquids touch each other. Then let the wire and ring, tied together, as before directed, be laid in such a manner that the wire may touch the acid, while the gold ring comes in contact with the suspected liquid. If any mercury whatever be present in this liquid, in a few minutes it will attach itself to the ring, covering that part which is in contact with the fluid.



88. *Horses—Contrivance to defend their Heels in snowy Weather.*

Labouring horses, whose heels are allowed (very properly) to retain their hair in cold weather, are most liable to get clogged with snow, as well on the fetlock as on the sole. To remedy this, upon going out in the morning, rub oil over the hair, and to the sole apply raw fat, or tallow, of ox or sheep, and the snow will fall off incontinently, till the preventive remedy be exhausted.

Note.—No fear need be entertained that 'grease,' so

called, might ensue this application; for there is no analogy between the two; besides, that in cold weather absorption is very slow, if it do not cease entirely.

89. *Horses.—Preventive Remedy for Corns, Founder, &c.*

TAKE *cow-dung*, and stuff the sole of the horse's feet full, but not too hard; it may be just thick enough to remain in its place, but if too much so, a solution of saltpetre may be employed: slips of thin wood, resembling *matches*, may be introduced to retain the stuffing in its proper place. Change twice a day, always clearing away the old, before the new stuffing is introduced.*

As an adjunct to this method, it is the practice to knead into the pavement, four pieces of clay, of 14 or 16 inches over, for him to stand upon, and the horse will shew his *sense* of the benefit he receives by his *manner*."† This ingenious veterinarian, forefends the practice of mixing clay in the stuffing; nor should the application be restricted to the foot affected.

* See a controversy on this most serviceable application, in the "Sporting Magazine," for November and December, 1820, and January, 1821, between Mr. F. Cherry, of Clapham, and Mr. Hinds, of Moorfields, in which, however, the disputants agree upon the main points.

† See Mr. Hinds, on the same subject, in the Monthly Magazine, Jan. 1, 1821.

90. *Insensible Perspiration in Horses, and the Sensible also.*

Every one knows, that perspiration, or sweat, is produced by heat, acting on the moisture of the body, which is thus thrown out upon the surface: it is an evacuation, which must neither be checked nor brought about by violent means. Weak persons, (and *animals*), and the weaker limbs of those that are lame, perspire most, in consequence of the pain causing heat; but the horse's blood being hotter than other animals,* the following experiment on the invisible perspiration had better be tried upon him, for you will thereby learn something of his constitutional qualities, and be able to account for, if you cannot amend, his defects. But previously it must be made known, that there are three *sorts* of moisture produced, or secreted, in the animal body, all having connection, or communication, as is ascertained by the evacuation *by urine*; the first of them thus increasing or decreasing, in an inverse ratio, as the *second, or* perspiration of watery particles be more or less; these particles coming from those parts of the animal system which secrete such, in order to prevent the parts from growing together; but which, notwithstanding, sometimes takes place. But the third kind of secretion is of a slimy nature, and is that which defends the throat, stomach, and bowels.† from the action of acrimonious substances;

* See Hinds' New System of Veterinary Surgery, 1821. chap. 2, sec. 4, where this matter is most fully explained, and we might say, without flattery, most ingeniously and intelligibly to the commonest capacity, but that to this laborious author we are indebted for several valuable communications in this and the preceding volume of Recreations.

† A German doctor (Pragge) "In Archiv-furdic Physiologie," 1820, has lately undertaken to prove, that the motion of the alimentary canal which

and which the reader must have observed, comes away after the horse has exhausted the stock of the watery; for the sweat that first comes away, is less clammy, or slimy, than that which is produced upon the skin after a while. It is the subtraction of this last, that occasions inordinate thirst, pain, and inflammation of the bowels, and its attendant consequences.

Bring your horse, after exercise, or at any time, with his side against a *white wall*, when the sun shines, and, although he may not have *turned a hair*, you will see against the wall the smoky representation of the insensible perspiration, that will be more or less opaque as the horse is more or less in health, as regards the *second* kind of secretion. Practice, and the comparison of the vapour from a well-known sound animal, with that from one whose hidden and incurable disease shows that his defect in secretion has permitted the parts to grow together,* and you will perceive that the latter throws up a *thicker* shadow, though not so *high* nor so lively as that from the healthy animal.

91. *A cure for Warts.*

THESE troublesome tumours may be cured by applying to them milk of spurge, a few days successively: they turn black with the first application, and die away gradually.

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we may still perceive in slaughtered animals, is no other than respiration. He is plausible enough; and the ingenious reader, may himself ascertain the nature of the *air*, so produced, by placing a candle to it, when a gaseous fire ensues.

* Very frequently the consequence of overdriving, and denying water to the animal: generally of the stomach to the skirt, or the liver to the same, the pleura to the ribs, &c.

92. *Camphor—its many Virtues.*

One of the best applications for alleviating spasmodic complaints, so common in this country, ought not to be overlooked in the domestic Materia Medica of our housekeepers; where it is known that cholic, arising from spasms of the digestive organs, are so prevalent, its virtues should be rightly appreciated; for the early adoption thereof never fails to soothe those pains, and thus pave the way for the introduction of more active medicines. Always serviceable, however, it never completes the cure alone. In fever, and inflammatory complaints, generally, it may be used externally, with manifest and immediate advantage; as well as in all cases of agitation, excitability of the passions, grief, and anger; this excellent gum, being carried in the pocket, in the form to be described shortly, (See "Camphor Stick,") never fails the promised relief. See articles on Rheumatism.

When compounded with soap and rectified spirit, it forms the excellent embrocation, termed "Opodeldoc," for the disorder just referred to, and several others; for all which, the stimulant and anodyne properties of the compound are tolerably well recognised. It acts upon and is absorbed by the lymphatic system; for, after camphor has been 24 hours exhibited upon the skin, the taste thereof is distinguishable upon the larynx, having been drawn thither by the salivary secretion. Dr. Thomson found that camphor melts at 288°, and boils at the temperature of 400; it is composed of 8½ carbon, 10 hydrogen, and 1 oxygen.

We never met with an adulterated specimen of this gum; but exposure, and moist hot weather, abridges its medicinal properties.

93. *Suppression of Urine,*

Occasioned by the free use of diuretics, and stricture of the neck of the bladder, which may be distinguished from inflammation of that organ, inasmuch as the kidneys are not then painful, may be removed by administering a pill, made without any, or no vehicles whatever, containing two grains, evening and morning; but the dose should never amount to double that quantity, since if too much be given at any one time, it operates directly the reverse.* In the quantity of a grain, taken every four hours, it acts upon the skin, and promotes sleep, after having exhilirated the spirits, without raising the patient's pulse. Although, thus resembling opium in several respects, it counteracts the evil effects of that dangerous morphium; whilst it is worthy of remark, that an *excessive dose* of camphor, which would produce anxiety, swimming in the head, and retchings, may be corrected by a dose of opium.

94. *Steer's Opodeldoc—Recipe.*

Hard mottled soap, one ounce, dissolved in rectified spirit, 8 ounces—add camphor, 3 ounces—oil of origanum, 1 drachm—oil of rosemary, half a drachm—solution of ammonia, 6 drachms— mix, and bottle for use.

* The French physicians know but little of the opposite qualities of one entire class of remedies, which in one proportion *excite*, and in another *depress*; and of the tendency which particular medicines have to (certain) particular organs of our frame, they appear to be altogether neglectful. *Vide Edinb. Rev. No.* 68.

Note.—Heat, age, and exposure, deteriorate this excellent family medicine.

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95. *Camphor-Stick—its form and application to Disorders of the Limbs.*

This is nothing more than a modification of the principle before laid down, for alleviating acute or chronic disorders of every kind, by simply wearing camphor wrapped up in coarse cloth. But the *lumps*, in which shape it is sold, are ill adapted to pains of the *limbs*, because, the muscles of those parts being of an oblong shape, they require that the effluvia from the gum should be derived from a source similarly formed; therefore, the *camphor-stick*, devised to meet this discovery, and to obviate the pointed intensity of a shapeless rhomboidal lump, is recommended in all such cases; whilst, for rheumatic pains, which may affect the head or trunk, (as the *deltoid* muscle) the camphor must assume a different shape —flat and lozenge wise. So, for pains in the muscles of the head, tooth-ache, &c.

For either purpose, let the camphor, two, three, or four drachms, be sliced up, and sewed in a piece of coarse cloth, doubled; and, being shaped according to the above principle, it may be placed, for pains in the leg or thigh, in the breeches pocket of that side; for those of the arms, or shoulder-blade, on the breast of that side, underneath the waistcoat; for tooth-ache, in the cravat, or hanging near the collar-bone, *always on the same side.*— If the sun shines, walk out, exposed to its rays, but turn the affected side *from* their immediate effects, as often as may be: if in winter, turn that side from the fire, but not in the draught of air. Hereby a sensible alleviation

of the pains will be felt; a moderation of the patient's irritability will lull him to repose, and he will seek quiet and inactivity; but he must be again roused to exertion, after rest, or one sleep; and indeed the greatest quantity of camphor used, should never produce more effects than these: to the amount of 6 drachms, it is found to *occasion pain;* so that if any excessive paroxysms do not immediately bend before it, they must be allowed to expend such virulence, before we can hope to attain complete success.

96. *Cutaneous Eruptions.*

Scabies—The itch, plainly speaking—a disorder so utterly repugnant to all delicacy of feeling, cannot be eradicated without the use of sulphur, which renders exposure certain, unless by seclusion of the patient or patients, for it generally runs through entire families. White hellebore, powdered with muriate of ammonia, and applied to the entire surface in the form of ointment, is found tolerably successful, under the advertised quackery —"Edinburgh Itch Ointment. But the following more elegant prescription comes to us with the recommendation of unimpaired success:—

Hog's lard	11 oz.
Flowers of sulphur	11 oz.
Subcarbonate of pot-ash	4 drachms.
Red precipitate powder	1 drachm.

Rose-water, and a few drops of oil of bergamot, agreeable to your taste.

Note.—See next article.

97. *Plummer's Pills.*

THEY are an excellent alterative, diaphoretic-purgative, and found most beneficial in cutaneous eruptions—remainder of 'scabies,' or of syphilitic symptoms. Take of calomel, *one part*—sulphate of antimony, the same—and of guaiac, twice as much; mix these assiduously with mucilage, and divide into any number of pills that contain from three to five grains of the calomel in each, according to the strength of the affected person; two pills forming the dose. To be taken at night.

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98. *Inebriation.*

WHEN men are reduced to this degraded state, by the inordinate use of fermented liquors, they may be restored by administering a tea-spoon full of spirits of hartshorn, in a glass of water. Smelling at the spirits, dissipates the fumes arising from the same beastly cause.

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99. *Chilblains.*

TAKE of Spermaceti ointment ..... 1 ounce.
Calomel ..... 1 drachm.
Oil of turpentine ..... 1 drachm.

Mix them; rub it into the part affected, and cover it with a piece of buff or shammy leather; twice or thrice, generally represses an ordinary degree of inflammation. In the event of ulceration, apply it on *lint*, and cover with leather, as before.

100. *Deafness—Remedy for.*

Two kinds of deafness are those arising from an *excess* of wax in the ear, or its total *default*, to say nothing of that which arises from extreme age. When adult persons suddenly cease to evacuate wax, and dullness of hearing comes on, the disease of the comminiferous glands requires the application of warm water, by means of a small syringe forced into the ear, two or three times each, of mornings and nights. On the contrary, should deafness arise from suppression of the secretory powers, a stimulant is necessary : take of oil of turpentine 10 drops — and mix with one fluid ounce of sweet oil; and having slightly charged a bit of *coarse* wool with the mixture, introduce it to both ears, though one only should be affected.

Note.—A mistaken notion prescribes fine wool, cotton-wool, &c. which are liable to become hard, to enlarge the orifice, and sink into the ear, and add irremediably to the complaint: the free use of the syringe, however, as above, will sometimes extract those plugs, by restoring the action of the glands. The mere effluvia of oil of turpentine communicates the odour of violets to our urine, as is the case of painters *in distemper;* and a case lies within our knowledge, of hearing having been restored to a person inhabiting a house so painted.

101. *Antidote against Poisons.*

Vegetable poisons are to be counteracted by the pertinacious administering of the *fenillea bordifolia* accord-

ing to the communication of M. Drapioz. At the same time, we may not omit to notice, that Dr. Chisholm mentioned, that the juice of the sugar cane is the best antidote against arsenical poisons.

102 *Cure for Scarlet Fever.*

The plant *Bella-donna* is reported, in the Berlin Physical Journal, to have cured great numbers of the Scarlet Fever.

103. *Another Cure for Fever.*

By accident, as we know many other great discoveries have taken place, we lately hear, some travellers afflicted with fever, had been cured, by being obliged to take up their lodgings in a warehouse containing a parcel of *Peruvian bark*, which has since been proved efficacious in a good number of other cases, so that now all persons in that neighbourhood, (in Spain), as soon as attacked, are regularly brought to the same warehouse, with invariable success.

104. *Worms—cure for.*

In a tea-spoonful of honey, or currant jelly, mix a drachm of powder of tin, and take it twice a day for six successive mornings and evenings, making altogether twelve drachms, or one ounce and half of the tin. A

little rhubarb, or any mild aperient medicine, may be taken each alternate night of the six.

This is the quantity for an adult person, but would not prove too much for a child, we apprehend, as the tin does not act upon the bowels, but upon the worm itself, and that sort which have received the name of '*ascarides*,' in particular

105. *Ching's Worm Lozenges.*

Most efficacious, as this domestic medicine certainly is, but very dangerous in unskilful hands, yet we may, with this precaution, state the *specified* quantities for composing the *masses* out of which these lozenges are made; for they consist of two kinds—1st. the *yellow*, and 2d. the *brown*.

The *yellow* lozenges.—Take of saffron, half an ounce; boil it in one gallon of water, and having strained it off, add what is called, *white panacea of mercury*, (which is calomel washed in spirits of wine), twelve ounces; white sugar, 28 pounds, (or 336 oz.); mucilage of *tragacanth*, sufficient to make the mass. Roll this out of a sufficient thickness, so that each lozenge may contain *one grain* of the panacea; but if you cut them of any other shape than square, as round, or oval, (with the *puncher*, a steel instrument,) much of the mass will require *making up* again, and again: it follows, that in the *square* form, the mass would make 5760 lozenges, whilst the *first cutting*, in the oval or round, would only produce two-thirds of that number. Dose, from one to six, according to age.

The *brown lozenges*.—Take of the panacea, (as above), 7 ounces; resin of jalap 3 pounds and half; sugar nine pounds; mucilage of tragacanth, as much as may be

found sufficient to form the mass, which must be cut out into 6,720 pills, or lozenges; thus, leaving in each *half c grain* of the panacea. The dose of these brown pills is from one to six, according to age and strength. The *yellow* lozenge is to be taken at night, the *brown* on the following morning.

Any person of discernment, must at once perceive the absolute necessity there is for using great precaution in mixing up properly the mercury, which the specification disguises under the softened term 'panacea;' and for want of which precaution, the former preparer of these lozenges, some years ago, sustained an action at law—Clayton *versus* Butler; and made the carelessness of his servant one chief ground of defence!—See corrosive sublimate, in the following pages.

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106. *Dr. Storey's Worm Cakes.*

THESE are not so celebrated as the last mentioned; but, like them, are composed of calomel and jalap, coloured with a little cinnabar; the dose is one grain of calomel.

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107. *A French Remedy for Worms.*

TAKE of crude mercury, and placing it in a vessel, pour on twenty times its weight of water: set it over a fire, and let it boil a short time: the water so impregnated is to be drank cold, and in large quantities. The virtues of the mineral remain unimpaired. We are sorry our opinion of this nostrum does not stand so high as that of most other folks; but, the universal good word of almost every one else seemed to demand this short notice.

108. *Cure for the stinging of Nettles.*

Juice of tobacco leaves, unmanufactured, is a good remedy for stinging of nettles: the skin, however, should not be broken, as in that case the effects would be the same as if the patient had swallowed the juice, *viz.* vertigo, fainting, and vomiting—the tobacco so absorbed by the lymphatics going immediately to the heart.

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109. *Tobacco and Snuff—Uses and Sophistications.*

Excessively stimulant, and in some respects poisonous, the tobacco of the shops is rendered still more pungent by the sophistications to which the heavy excise duties incite the cupidity of the manufacturers. *Cascarilla* is employed to give it flavour, *nitre* to make it kindle readily, and to afford a lively sensation on the edges of the tongue; but though the former be inoffensive, the vapour of the latter affects the trachea and lungs in no small degree. Dried *dock-leaves*, which have been treated with hellebore and allum, is sometimes introduced, and *lead*, to increase its weight; *Urine*, in preparing the sort termed shag, to colour the larger rolls, or to produce the more pungent errhines.

Tobacco applied to the mouth, acts upon the glands, and promotes the secretion of the saliva; it lulls the senses, and seems indispensible to seamen and others, who are exposed to hard weather, to gales, and imminent peril. In time it defeats its own purpose; but if the

saliva be swallowed, produces derangement of intellect; that taken in at the nose (in powder), generally sinking into the stomach, terminates in the same manner.—All insane persons crave for snuff.

110. *Macouba Snuff.*

THE varied flavour of snuffs of different denominations, arises less from the state of the original leaf, its stems, or its suckers, than the factitious additions of manufacturers. The snuff of Martinico, celebrated under the term "Macouba," is made from the best leaves, which being moistened with juice from their excellent sugar-canes, undergoes fermentation, and having thrown off the offensive *fetor* in scum and residuum, is evaporated, and ground in the usual manner.

111. *Strongest Snuff—called Nation's.*

Is prepared in a very simple manner, its excellency consisting, for the most part, in using none but the best material, and preventing the strength from flying off in the process. The whole tobacco plant of Maryland is used, nor are healthy *suckers** rejected.

Stale urine having been employed in producing a small

* These are that rampant stalk, which runs away with the strength of the plant frequently—and which in Virginia the crop-masters cut off by force of a law of that state:—formerly the military enforced obedience to it.

degree of heat in the mass of tobacco, it is submitted to a good fire, in a grate six or eight feet long, the material being exposed *before it*, upon a wooden stand, which has several ribs across to sustain the tobacco, and the whole lined with tin or lead ; and then placed aslant, so as to be worked from behind. An attendant from behind constantly turned over the tobacco, occasionally saturating it with a solution of muriate of ammonia in urine, in the proportion of one to thirty. Much of its strength depends upon drying it to the proper pitch for grinding, and no more. Black hellebore powdered, is afterwards to be added, agreeably to the *taste* of the consumer.

112. *Cephalic Snuff.*

Its basis is powdered *asarum* (vulgo Asarabacca), reduced by admixture with a small portion of powdered *dock-leaf*, or any other innoxious vegetable. The finely levigated snuff, known as "Scotch," may be added agreeable to the taste of the consumer ; and finally, a solution of spirits of wine and camphor, in the proportion of one drachm of the latter, in fifteen of spirit, is to be dropped upon the camphor, from five to ten drops to an ounce. Bottle your snuff immediately.

113. *Cephalic Snuff.*

May also be made of a very pleasant flavour, with the powder produced from sage, rosemary, lilies of the valley, and tops of sweet marjoram—of each one ounce, with a drachm of Asarabacca root, lavender-flowers, and nut-

meg; it should be very fine, and will be found to relieve the head vastly.

114. *Different Tests and Filter, fo detecting foreign Substances mixed with Tobacco, &c.*

I. YOUR filter may be made of any *shape* capable of sustaining a liquid: take a piece of flannel, and sewing it to a hoop, so as to leave a hollow in the middle, of a conical form; then cover the bottom with finely powdered charcoal, (See Art. 11 page 24), let it dry. Having poured boiling water on the suspected sample, rouse it well; then pour the solution gently into your filter, and set it aside to evaporate before the fire. According to the quantity of nitre, will be the crystals found in the residue; and according to the deflageration of the powder, when thrown upon live coals, will be the amount of the salt contained.

II. Take of this powder, a dozen or twenty grains, put it into a glass basin, and pour on it as many drops of sulphuric acid; stir the mixture with a glass rod, and having warmed it over the fire, a yellow vapour will ascend, which indicates the presence of nitric acid.

III. Use distilled water in making the above solution: take a slip of litmus paper, and on dipping it into the fluid, its blue colour will change to red, provided an acid be present; but lest the carbonic acid, or lime, which is frequently found in water, should colour the litmus paper, we have directed the employment of *distilled* water, because the carbonic acid flies off with heat, and the lime, which can remain no longer in solution without it, is precipitated in the form of white powder.

IV. Then, if such precipitate appear in the same kind of solution, after it has been again exposed to heat and semi-evaporation, we may conclude a carbonic acid has been present; but being volatilised by the heat, the neu-

tral carbonate of lime becomes precipitated—this precipitate may be known by its effervescing with sulphuric acid.

115. *Wine—to correct Acidity in it.*

Frontignac, Malmsey, (*Greek*) Vino Cetto,* and other sweet wines, contain a good portion of sugar, and but little ardent spirit, (10 to 13 per cent.); they are, therefore, liable to lose their mucilaginous quality, and turn sour, unless they have been well boiled in the making, as that practice arrests the progress of the acetous fermentation. Yet, we hear much of the great age at which they are drank, and of the accidents attending persons who use these, and sherry in particular—many horrible accounts are upon record.

Lead is the material which imparts or restores the desired sweetness; for which purpose the wine was anciently started into lead cisterns, or smaller vessels, and heated with a syrup made from a boiled solution of sugar. If a piece of lead, flat, weighing four, six, or eight pounds, suspended by a string, be lowered into a pipe of wine, a few hours will correct the acidity it may have acquired, without leaving dangerous qualities in the wine. This would be more pointedly certain, as regards those wines in the manufacture whereof *lime* has been added to the grapes; as is the case throughout the district of Xeres, (*vulgo sherris et sherri*) on the East coast of Spain, a mode of treatment which neutralises the tartar, upon which the lead would have acted, and produced a soluble tri-

* The *vinum cottum* of Pliny.

ple salt, termed by Fourcroy, "*acetotartrate of lead*," a product most deleterious to the animal viscera. But lead more subtly prepared, in larger proportions, and under other circumstances, has been introduced to their wines, by the dealers,* which it would be proper to detect and expose; and this public good is to be accomplished by means pointed out in the next article.

116. *To cleanse Wine, Spirits, and Water.*

In the proportion of one pound of alum to a tun of white wine, the Paris dealers obtain a fine clear wine, adapted to the taste of their customers. In the proportion of four to six grains to a bucket full, turbid water may be quickly cleansed without imparting the least disagreeable smack. (See Adulterations of Bread, article .) Spirit dealers, and *refiners*, use large quantities of alum, in rendering their material marketable.

117. *To 'fine down' Spirits.*

Our London dealers use no other fining for their gin, brandy, or rum, so far as we have seen, than mixing up a small quantity of wheat flour in water, as if for making paste; then pouring the same into the vessel, the whole is well roused up, and in a short time the contents become bright.

* Dealers, "called by courtesy *merchants*," but this honourable term belongs alone to those traders who correspond beyond seas—*per mare*, whence the word *mare-chand*." Vide "The London Tradesman," 8vo. a work which should be in the hands of every one who *buys and sells* for profit.

118. *Test for discovering Lead in Wine.*

Whatever quantity of lead resides in wine, may be precipitated by mixing with it a fluid, made by exposing powdered oyster-shells and sulphur, equal quantities, to a white heat for a quarter of an hour; and when the compost is cold, add as much cream of tartar thereto. Put the whole in a strong bottle with common water, and let the liquor boil an hour: pour off the solution into ounce phials, each of which will be sufficient for a cask of wine, and add to each twenty drops of *muriatic acid*. Every portion of lead it may contain, will be found at the bottom, in the form of a black cindery precipitate. Having collected a sufficient quantity of this precipitate, upon an iron plate, expose it to a heat, and the lead will run off.

119. *To discover Iron in Wine.*

If the suspected wine be again submitted to the action of the fluid, without the addition of muriatic acid, any *iron* contained therein will be next precipitated; sprinkle some particles of this second precipitate upon fine white *pearl-ash*, exposed to the atmosphere, and a rusty colour will be imparted to it; if the spots be reddish, approaching to pink, it shews only that the fruit has grown in land where a small quantity of manganese formed part of the soil.

120. *Ardent Spirits in Wine.*

All wines imported here, are mixed with brandy or other spirits, without which it is understood they would

turn sour upon the voyage. The proportion and quality hereof are desirable to be ascertained, but you will likewise obtain by this process that small quantity of spirit which pre-exists in all vinous liquors.

Take of suspected wine, and add one eighth by weight of strong Goulard's Extract, of the shops; mix it, and a thick precipitate will be found, composed of the extract itself, and the colouring, acid, and extractive matter of the wine. Then, shake the remaining fluid, pour it through a filtre ( ); and add, by little and little, as much pearl-ash, made warm, as it will take up, having previously dried your *ash* to the highest degree by the fire. As the water will be abstracted by the pearl-ash, the brandy, or spirit of wine, will be found floating at the top, a distinct stratum, that may be poured off; and the proportion this bears to the wine originally submitted to this treatment, may be measured (in bulk) by having at hand a glass tube, long and small, upon which are ground the measure, graduated like the eighths or tenths of inches upon a carpenter's rule.

121. *Cholic from drinking Wine.*

Spasmodic cholic, or the satumine, as it is termed, from the causation thereof, generally follows a debauch of wine, of the pale kinds particularly. Let the afflicted person take of *calomel ten grains*, mixed with crumbs of bread; if the pain lies low in the bowels, the pill may be made harder, and more bulky, or he may eat some bread or pudding* at the same time. This defends the stomach

* The attempt to poison the Turner family by *Eliza Fenning*, (1815), was defeated by the culprit having made use of this as the vehicle.

from the action of the mineral, which hereby passes into and expends its force upon the bowels. If the wine contained any of the preparations of lead, before noticed, ten to fifteen grains will prove a brisk cathartic to most constitutions, though to the amount of a scruple would be found safely more efficient; or three grains of *mercury*.

Under the name Pilulæ Hydrargyri, or *blue pill*, this useful preparation may be bought, ready made, at Apothecaries-hall, better *mixed* than any individual can pretend to. *Note*—A steam engine is there employed for all such purposes, whereby the ingredients are more minutely disseminated than can be performed by hand.

122. *To detect Lead, Corrosive Sublimate, and Antimony, in Liquids.*

Tobacco and snuff are frequently adulterated with one or the other of those pernicious minerals. When the *solution* has been prepared, sulphuric acid decomposes them with precipitate that is blackish, when *antimony* is present, but *white* with the two first mentioned: then, let the precipitate be washed with boiling water; if it change not, it is *lead;* if it acquires a yellow colour, it is *mercury*.

Note.—Those poisonous ingredients, as well as lead, are sometimes added to the article, as a cover for its rottenness; at others, to arrest the progress of fermentation, to give a sweetish *taste*, as well as to defraud the excise of its dues.

123. *Lead in Wine.*

Besides the test for discovering this deadly poison in wines, given a few pages above. (104), the preparation termed *Plumbi Oxydum Semivitreum (vulgo.* litharge) may be detected. First, evaporate the suspected sample to a thick fluid ; then, secondly, add powdered charcoal, and place the compost in a crucible ; calcine the same for one hour, and metallic points will be obtained, consisting of lead, surrounded by a quantity of yellow protoxide.

Super-acetate of lead, (or sugar of lead,) in which form it is sometimes exhibited to wine, is readily decomposed by the solution of acetate of ammonia.

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124. *Antimony—Tests of its Purity.*

In the crude state, this *ore* partakes much the appearance of that of *lead*, with which it is sometimes *found* mixed ; and in that state it sometimes reaches the London market, from Cornwall, and is commonly divested of its medicinal qualities, (by one immediate process, and then termed regulus of antimony), for making utensils. Usually, however, the antimony of commerce comes to us in shapeless masses, the crassaments of cones originally eighteen to twenty-four pounds weight in Hungary ; but the general suspicion entertained of the Italian or Istrian traders, occasions the breaking of these at Trieste and elsewhere, as the article may change hands. Almost black externally, the fissure presents a bright grey lead colour, of a striated structure, and considerable brilliancy ; this should be levigated with water, and kept in the state of powder, and forms the sulphuet of antimony, of which the

other numerous and valuable preparations are composed; but if *bought* in that state, is sometimes found adulterated with lead, or containing arsenic; the first is discovered, to *the view*, by the foliated structure it imparts, instead of the genuine striated texture of pure *sulphuret of antimony*. It ought to be entirely volatilized by a red heat; but lead not being vaporizable, remains behind. The presence of arsenic may be known by casting part of the suspected powder upon live coals, when an odour resembling garlic becomes sensible.

The dose is 10 drops to one fluid drachm in gruel or any suitable vehicle, every three hours, until it acts upon the skin. As an emetic merely, it may be given to infants in the dose of a tea-spoon-full in pap, every ten minutes, until it operates.

12. *Emetic Tartar*

One of the most useful preparations in the whole range of curatives ought to be employed pure; although its best form of exhibition be in solution, tartar emetic should never be purchased in that state, but in its crystalline form: if pure, the solution being heated with sulphuret of ammonia, sends down a copious gold coloured precipitate; with *acetate of lead*, a precipitate soluble in nitric acid; and with *lime water* (*aqua calcis*) a white precipitate is furnished, very thick, but capable of dissolving in pure nitric acid. In the dose of *one grain*, this salt acts upon the stomach first, next upon the bowels, and then induces perspiration. One-fourth of a grain is sufficient to procure perspiration, whilst half a grain gives a stool or two, and then sweats the patient.* Combined with opium, it

* Information like this breaks slowly upon the Parisian practitioners notwithstanding the *pretensions* set up by their chemists.

forms an excellent sleeping pill or bolus, for chronic patients; to whom perspiration also is desirable. Take

Emetic tartar .....1 grain
Opium, a a .....1 grain
Guaiac .....1 scruple.
Make it up with syrup.

126. *Antimonial Wine.*

The abandonment of this very useful and eligible mode of exhibiting the best of all domestic remedies is seriously advised, in utter despair at its many adulterations, and the disappointments to which the faculty have been thus subjected. Families, however, may still prepare their own, by attending to a few points in its preparation. In the last article it will be seen that lime precipitates the oxyde; and as sherry wine, which is its proper solvent, though it is manufactured with lime, (*See article on wine.*) so, should any portion thereof remain, the tartar of antimony will be found precipitated, and the liquor above contain not a particle of virtue; this is the case with most antimonial wine of the shops. Buy some; heat it with *sulphuret of potass*, and the antimony, if any, will be precipitated; but we never found more than one per cent., a proportion too trifling to effect any good, and thus a valuable medicine loses its reputation.

127. *To cleanse Lamp Oil.*

Charge a mug of water with the solution of quick lime; pour it off into four times as much whale oil, seal

oil, or blubber, which may have a very offensive smell, and stir the whole together, well; repeat this, and again, and after awhile that it has subsided, at the bottom will be found the offensive matter: at top floats the oil, in a state of comparative excellence; but if a more perfect state hereof is desirable, let it undergo the same process anew, with fresh lime-water.

128. *The rancidity of Oils removed by Lead.*

Lead, in almost any form of exhibition, cures the fetor oil acquires by exposure to the action of air. Salad oil, linseed oil, and others that are expressed cold, though not so liable to become rancid as those which are drawn by means of *heated* plates, nevertheless lie open to accidents and adulterations, which it is desirable to remove. Simply suspending a piece of lead, as recommended in the case of 'sour wine,' is often sufficient to remove the minor contaminations; the next degree is to procure filings of lead, and mixing the same well with your oil, let it subside, and the foreign substance will be precipitated. *Ceruss*, or white lead, being mixed with oil, will shortly subside, and leave the oil fine, clear, and tasteless. Some danger, however, attends this last experiment; for if any particles of the carbonate of potass get among the ceruss, just so much of it will be kept in solution, and become poison to whoever may swallow it. *Prevention*: weigh your lead before it is used and after it has been again cleansed with water, slightly tepid. See next article.

129. *White Lead Adulterations.*

THE material termed whitening is much used in contaminating ceruss, or white lead. Some is sold *so low* as to acquire a different name; and "clear cole," which is mixed up with weak glue ('size') instead of linseed oil, is employed in the first *washings* by house painters, and by them termed a first coat. Dissolve the suspected sample in pure potass, and assay the solution in cold acetic acid with oxalate of ammonia, and the amount lost by the operation is that of the foreign substance, whether it be whitening, chalk, the carbonate, or the sulphate of barytes.

130. *To Clarify Sugar.*

DISSOLVE coarse sugar in twice its weight of water, in an iron boiler, and keep the fire under it until very near boiling, when much of the water will have escaped, and the liquor assumed the appearance of syrup; then, to the quantity of sugar, pour on slowly about one-tenth of *bone black** as near as may be, in a damp or liquid state. Let the whole boil ten minutes (not more), and before it is too stiff, pass it into a woollen bag or bags, hung up for this purpose by hoops, the lower sides of the bags to be peaked, or conical. The first syrup that comes away will be blackish, but this must be thrown up again, and the remainder will run off fine and transparent.

* As described at page

131. *Rheumatic Pains.*

THESE have their origin in suddenly checking the animal warmth, and commonly begin in the lower extremities, usually advancing to the centre. Some constitutions are more liable than others to this kind of attack, and its recurrence, among which syphilitic patients—debilitated as much by medicine as by disease—may be reckoned the greatest sufferers; for the animal system of such persons having been reduced by the action of strong remedies (of which it is a *sequelæ*) in a constant state of feeble excitation, and, thus exposed, the pains affect the trunk and head as soon almost as it does the limbs. Persons so afflicted lead a life of misery, and *the stimulants* hereafter recommended but increase *their* sufferings; for with these the membrane, which is mostly affected, is that which closely encircles the bones (*Periostemu*); and this possessing but few nerves, when once affected, the pain flying from one to another occasions those shooting pains of which the patients complain with much anguish. Rising *nodes* on the shin, &c. is one cause hereof; and though the celebrated decoction of the woods (sarsaparilla, sassafras, &c.) may give ease, they do not cure. For these and the nervous, females, and the weak of our own sex, the milder remedies here mentioned are preferable.

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132. *First Remedy.*

LET the warm bath be tried, with plenty of rubbing. Take wine of the seeds of *colchinum autumnale*, in the quantity of a drachm and a half twice a day, in water. Persevere for two months at least.

133. *Second Remedy—Friction, Compression, and Percussion.*

Not only rheumatism, but the cramp and gout, which bear affinity to each other, have long been greatly relieved by friction, wherever it was *bearable*, but some cures were performed upon patients slightly attacked, by pertinaciously rubbing the parts day after day : to this method of obtaining relief, the indefatigable Dr. Balfour has recently added those of compression and percussion, with complete success ; indeed, all seem grounded upon the same principle, and there can be no reason why all the three should not be essayed in succession ;—we ourselves have alternated them in many cases, and one or the other never failed to effect some good. *Percussion* at the sole of the foot relieves pain there and higher up the limb, and we have already shewn that compression by the "bed-crutch" (Art.) affords a certain degree of ease; and the cramp, which thus begins in the foot, if suffered to continue its visits unrestrained, generally terminates with chronic rheumatism. *Compression* alone upon the tendon of the heel, (let it be grasped by a nurse's warm hand between the finger and thumb,) is sure to afford relief, as long as the pressure is continued, at least so far as the knee ; there, however, the aforementioned membrane terminating in the perichondrium, stops the effects of our remedy. A *bandage* round the thigh (*en tourniquette*) gives instant relief to that part of the member ; so has grasping it, or repeated pinchings, left the patient in comparative ease. *Percussion*, by the patient himself, with his crutch, upon the spot *most affected*, is incalculably most beneficial. Dr. Balfour "pummels" the same part daily, until the cure is effected. Tremor, caused by lifting up the limb, is always to be checked by

passing a bandage round the ancle; and the reason assigned for this whole series of remedies is the excitement of certain nerves to action, or arresting that of others. The *practice* is not by any means a novelty to us: we had long ago seen negroes employed in *percussion* upon their Barbadean masters, by whom it is termed "Champooing."

134. *Insanity cured by Compression.*

A case has come under our own view, of a young man having recovered from an attack of insanity by tying round his head a bandage, without any other treatment but the common regimen of *the house.*

135. *Gout cured by Treacle.*

We have also known an inveterate attack of gout removed completely, by the application of the treacle plaister. On leather, or close-woven cloth, spread treacle tolerably thick, apply it to the part affected, covering it entirely, and at the end of two or three days, or four at farthest, the swelling and inflammation is invariably reduced, and the pain entirely gone.

136. *Gout Cordial.*

For gout and spasms of the stomach, taking care that neither are mistaken for inflammation of the parts, take

Cardamom Seeds, husked and bruised, and
Carraway Seeds, bruised, of each 2 ounces
The best Hay Saffron .....half-an-ounce
Turkey Rhubarb, thinly sliced....1 oz. and half
Gentian Root .....6 drachms.

Mix and infuse the same in a quart of white brandy for a fortnight, giving it a warm corner in the fire-place during the first four days; shake it up, and when clear it is fit for use. A table-spoon-full, with an equal quantity of water, is the dose, about once in three days. For flatulencies and indigestion of elderly people, who have debilitated or leuco phlegmatic habits, this is an excellent medicine.

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137. *Cramp, with Rheumatism and Gout—Contrivance for procuring Ease in Bed.*

Continuous cramp, or repeated attacks of this excruciating disorder, at length devolves into rheumatism; the former arising from obstructed circulation, or stricture in the vessels that contain the blood, *the latter* lies mostly in the solids, or the membrane that encloses the same, and through which the blood passes in order to nourish the solids or muscles. In this disorder, the cramp, which generally attacks the lower extremities, the patient feels a sudden contraction of the muscles, from which he is usually relieved for the present by jumping out of bed, and pressing the hollow of the foot against some hard substance, but fears to lie down again, justly, lest he experience anew the same painful sensation. A simple contrivance for applying this pressure in bed is the following:—Procure two yards, more or less, of web, of broad tape, or cloth listing, and sew the two ends together: at one part of this circular fillet fasten a pad of stuffed leather, made the shape of the hollow of the foot; and, upon getting into bed, place the hollow of the foot

therein, holding the other extremity in your hand, or hooked over the arm. Several persons who have been long so afflicted find this contrivance of vast service, and one of them terms it his "sleeping crutch;" for the relief so obtained lulls the patient to rest, and "tired nature's sweet restorer, balmy sleep," comes in aid of the cure. It is evident, the 'sleeping crutch' may be advantageously employed in rheumatism and slight attacks of the gout, when the patient would seek for ease by turning in bed, but dreads the arduous task.

138. *Two Preventive Remedies for the Cramp.*

First.—Take a few sprigs of rosemary, (a penny-worth in the herb shops of London,) and wrap them in a piece of coarse cloth, or little bag: place this cloth at the patient's feet, under the bed clothes, and he will experience no return of his pain.

Second.—A piece of old rope-yarn, tied two or three times round the limb affected, has been found highly serviceable; but if any particular virtue exists beyond the *ligature*, we may attribute it to the tar which impregnates the yarn.

139. *Treatment and Cure of Rheumatism.*

When chronic, or of long standing, rheumatism in robust patients may be cured by the following prescription, which comes to us (by a kind of refraction) from the journals of North America, and is proved *here* to have been efficacious in a great number of instances,—a test which very few of the boasted receipts in pharmacy,

coming from the same quarter, are able to bear. But stimulants, and even rubefacients, were long known to give action to the *muscles*, or to excite the membrane which divides, encloses, or forms the several muscles externally; and it is now ascertained satisfactorily, how intimately the universal membrane is with the pains termed rheumatic. The patient himself may prove this *axiom* by every expulsion this medicine occasions: added hereto, the due observance of the calls of nature in the open state of the *primæ via*, a preference for *diuretic alteratives*—as aloes, gin and water, asparagus, &c. &c., according to season, to taste, to habit, or the necessities of the case; and we have given rules for the general domestic adjuncts to our remedy for this painful attack on the ease of its victims.

One remark more will not be deemed unnecessary by those who may be actually afflicted: this disorder of the limbs, by frequent recurrence, or *long continuance*, is then most likely to become chronic, and to extend to other parts of the muscular system, by means of the all-pervading membrane, when no art of man probably is equal to the cure; therefore *violent remedies* at any time, or the best employed too soon, as they superinduce a disposition to its return, or fail by overshooting the mark aimed at, are never to be employed in the extreme. When the attack *commences* is not the time to adopt this cure; but it probably lies between the *second* and *fifth* day, when the incipient virulence thereof may be supposed to have subsided, or, by extending itself, to offer a broader field for its attack and expulsion.

Take of Garlic 2 cloves, bruise them in a mortar, and Gum ammoniacum 1 drachm.

Make the compost into three pills, with liquorice powder, and take one night and morning.

Warm diluting drinks assist the cure in every case, though they need not be forced upon the patient; nor ought he to deny his appetite for the more solid repast, though he will generally find the paroxysms return more violently on the evenings he so indulges. Perspiration need not be *encouraged*, for then no fear can arise of its being suddenly *checked*, a measure which cruelly augments the disorder: nor is there that virtue in flannels, nor in the proximity of the affected parts to the fire, as is generally imagined, as both tend to increase the virulence of a first attack; and the direct contrary, or turning the affected part *from the fire*, will procure sensible alleviation of the pain. If the patient, on occupying the last mentioned position before the fire, has taken the precaution to wear the 'camphor stick,' long used by the editor,* he will find the pain pass through the system, as it were; and, with proper care, the cure may by these means be effected.

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140. *Rheumatism.—External Application.*

In some species of attack, a solution of camphor in spirits of wine, or of turpentine, rubbed well into the parts affected, is, in some constitutions, most effectual; but the patient should keep at home during the day that this remedy has been applied in the morning.

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141. *Rheumatic Gout.*

This is that state of the affected membrane which is given to swell, and inflame the cuticle, but the precise

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* Described at page

seat of either has been deemed conjectural; for medicine, though styled a positive science, has been deemed hypothetical; it is true, however, that medicine is a conjectural branch of knowledge deciding by precedents.*

Sulphur, in every combination, has been administered for those excruciating and tiresome disorders we now prescribe for; but the practice of mixing it with spirits is not, in every case, the best vehicle that can be employed for introducing this curative to the system. Take the flowers of brimstone, four ounces, mix it well in milk, a pint and half, and take a tea-cup full three mornings following; wait three days, and repeat the same course, when you shall presently find the symptoms abate. A repetition, after another such an interval, has generally succeeded in great numbers of cases.

142. *Bolognian Phosphorus.*

Was made of a heavy *spar*, or native sulphate of barytes found in the neighbouring mountains of the place whose name it bears; and, in fact, a very great number of such substances are now known to be phosphorescent; as also, sulphate of lime, Glauber's salts, some vegetables that are fibrous; likewise starch and sugar, after being rendered perfect'y dry, and exposed to the rays of the sun. We described the mode of forming phosphorus from the meal of vegetables, in the first volume, article 248, and now add the present notice to show, that extreme dryness, procured by a *double heat*, is the principle upon which most substances, like those just enumerated, are rendered capable of retaining and emitting the sun's rays, or of

*Edinburgh Review, No. 68.

being ignited by exposure and friction with sulphur. Pallas ascertained that the *striated green* perceptible in fluor spar, threw out a radiance greater than the violet, or any other colour; and Dr. Brewster ascertained, that a *veined phosphorescence* existed in the spar, whence we are led to expect soon to derive further discoveries.

143. *Solar Phosphorus—Canton's.*

The kind of phosphorus termed Canton's is thus manufactured:—Calcine oyster-shells, by keeping them in a good fire, in the open air, for half an hour. From these select the largest and whitest pieces, and having powdered these, mix them with flowers of sulphur, in the proportion of one-fourth part of the latter to three parts of the former. Pack the whole closely in a crucible, lute on a cover, and heat it pretty strongly for an hour; when it is cold, turn out the contents of your crucible, break them in pieces, and select the brightest parts for use. It must be kept from the air until used.

Note. Much greater brilliancy may be produced by burning without the crucible, provided the shells be well covered by coals; but the best of all is made with charcoal, formed into a kind of plates or flat pieces, so as to inclose the shells from air: iron plates are sometimes substituted, but not so successfully, steel ones being better than iron.

144. *Factitious Planets.*

With the solar phosphorus just described, a beautiful 'dark-chamber' experiment, to represent any one or more

of the planets, may be experimented. Having cut out in paper a half moon, Jupiter and his moons, Saturn and his ring, a congeries of stars, or any other heavenly luminary; cover the shapes well with strong gum-water, fasten them upon a board or wall, and strew over them some of the phosphorus, finely powdered, you have the brightness of the stars according to the purity of your preparation. Expose it to the *light*, but not to the *rays* of the sun; or, just before representation, to the light of a refracting lamp. Better than both these, is it to discharge the flash of an electrical jar or battery over its surface.

145. *Grim Visages and Ghastly Features.*

To one part of the phosphorus, add six parts of olive oil, and let them digest over a sand-heat, until the phosphorus is dissolved. Apply this to the skin, or other matter, it does no harm, but casts a smoaky light in the dark. Having shut the eyes, rub a little over your face, and look for yourself in a mirror, or dressing glass; *Non mi Ricordo.* You will be reminded of an occurrence in the life of King Saul and the woman of Endor; and the trick offers to any artist a good subject for *study*, (as it is called), the eyes, nostrils and mouth presenting the appearance of dark spots.

This recreation greatly surpasses a similar one given in our first volume, article 4, and may be profitably employed in exploding the foolish idea, too generally entertained, of the appearance of goblins, and other such ridiculous notions.

146. *Instantaneous Fire Bottle.*

A most useful application of phosphorus to the purposes of actual life, is the art of making the *fire bottle*, that affords immediate light, so as to supersede the necessity of tinder-box, steel and flint; which last, is at all times a tedious, uncertain, and rude mode of obtaining fire, or lighting a candle, very ill befitting the present improved state of the domestic arts, and agreeing but too well with the miserable poetry that announces, in our streets, the sale of the most consumable part of the barbarous paraphernalia:

> " For lighting your candle, or kindling your fire,
> " They are the best *matches* your heart can desire."

Into the required number of small phials put a bit of phosphorus, the size of a pea each, and fill up with lime. Set them in an iron frying-pan full of sand, and put it over the fire; then with a stick incorporate the ingredients together, by stirring them about, but be careful too much air does not enter, which would set fire to and inevitably cause the destruction of the whole contents. In order to prevent this, place round the wire a piece of buff or book-binder's leather, the upper part whereof may be tied with waxed thread, or cobbler's-end, whilst the lower part should spread so as to cover the neck of the bottle. When the mixture assumes a deep yellow colour, it is enough, and you must then hand off your phials, *seriatim*, as this appears to take place, and let them be corked.

When a light is required, uncork the bottle, and introduce a small brimstone match, twisting it about once or twice between the fingers and thumb; draw forth the match, and it will instantly catch fire. Remember always to cork down the bottle as soon as the match

comes out, or the contents will catch fire. The expense of such fire bottles would be about a guinea per hundred.

147. *Another Fire Bottle.*

A BETTER mode (as some think) is to employ *sulphur*, adding one part thereof to eight of phosphorus, to be incorporated together as before, but differing as to the manner of using it, which is this: having introduced a match, and brought forth upon it a small portion of the contents, rub it upon a bit of cork, and you shall presently obtain fire.

148. *The Frosted Branch.*

TAKE a large glass jar, and turn its mouth downwards upon a brick or tile; the jar to have fastened at its bottom (now its upper side), a branch or sprig of any shrub, as myrtle, or rosemary, quite fresh, and damped with water. Then, upon a piece of hot iron throw some bits of gum-benzoin, place the iron at the same moment underneath your jar, when the white fumes of the benzoin will ascend, and remain attached to the branch or sprig, beautifully covering it all over with white particles, like the hoar frost of winter: the access of atmospheric air, however, would soon decompose the acid, and must therefore be excluded.

149. *Arbor Martis, or Iron Tree.*

In strong aqua-fortis dissolve steel filings, till the acid is tolerably well saturated therewith. Add thereto gradually a solution of fixed alkali, or oil of tartar, *per deliquium*. An effervescence accompanies each admixture; in the latter the iron, instead of falling to the bottom of your vessel, will ascend, covering the sides thereof, and forming a great number of curious ramifications heaped one upon another, until they pass over the edge of the vessel, in the form of an over luxuriant plant.

150. *The Silver Tree, in a Glass Frame.*

Dissolve silver in aqua-fortis. Put a few drops thereof on a square of glass, and lay thereon small wire of copper or brass, previously formed into the shape of a tree with its branches. After lying an hour or two a beautiful white vegetation will be perceptible round the wire, which will be partly covered therewith. Then wash it carefully with water, put over another square of glass, apply a frame deep enough to take the thickness of both, and you will thus have a pleasing ornament for a sitting room.

151. *Artificial Cold.*

A mixture of ice and alcohol has been found to produce instant cold of forty degrees below Zero. Dr. Macculloch (the traveller) being on a high Scotch mountain, diluted his *whiskey* with hail which had just fallen.

Instantly the mixture was covered with ice, and it froze to the glass: on trial the quicksilver in the thermometer sank into the bulb.

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152. *Galvanic Discoveries and Experiments, showing the Connection that exists between Electricity and Magnetism.*

No doubt remained for a long time, on the minds of the most competent judges, of the connection that existed between electricity and magnetism. In our first volume, (article 275), we took occasion to show in how much this was the case: "Magnetism, like electricity, depends entirely on attraction," were the words by which the article was introduced; and (in section 6), the actual connection is plainly described. But proof was still wanting, *i. e.* experiments by titled persons, or professors. The galvanic electricity is found to be one medium of connection, and the experiments of Professor Oersted, of Copenhagen, supported by Sir Humphry Davy, 'the prince of chemists,' show distinctly this connection.*

A galvanic apparatus, consisting of twenty troughs, 12 inches by 2½ being provided, each trough was furnished with two plates of copper, so disposed as to support the rod of copper, which sustains the zinc plate in the fluid of the next trough. The conducting liquid consisted of pure water, containing a sixtieth of its

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* We have not yet heard of the Professor's work on "the Identity of Chemical and Electrical Forces," in which he is said to have "sought for proofs of the identity," though the Editor of the Philosophical Magazine (for Jan. 1821,) says "he has not therein established the fact."

weight of sulphuric acid, and the same of nitric acid. In all subsequent experiments, a single pair of large plates was found more efficacious than a number of small plates; but it was also found, when the wires from all the zinc plates were connected on one side, and those from all the copper plates on the other, the electro-magnetic influence always increased with the number of the plates. A zinc plate of ten inches was immersed in the liquid, and a wire united the extremities of the pile: the effect produced hereby, was termed the electric conflict, and the wire from its appplication receives the name of 'conjunctive wire.' This we adopt as simple, and clearly indicative of its use; and the effect produced being by the contrary motion of two electric currents, by means of the conjunctive wire, and therefore we shall so term them 'conflicting electrical currents.' How this conflicting current acted upon the needle will be subsequently shewn; meantime, some interesting facts which have been elicited by the indefatigable discoverer, assisted by the labours of Ampere, Davy, Hansteen, and others, may be here profitably set down, although resulting from the experiments which close this series.

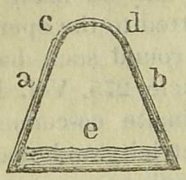
153. *Interesting Particulars arising from these Electro-Magnetic Experiments.*

It is a well ascertained fact, that the effects which take place in the electrical conflict, are absolutely different from those which belong to ordinary electrical attractions and repulsions. For these electro-magnetical effects do not depend upon the intensity thereof, but solely upon its quantity, as will be demonstrated presently. Moreover, two conjunctive wires of metals, not

magnetic, act upon the magnet by the intervention of positive electricity only; so that they may be made to communicate that quality to bars submitted to the operation of the fluid, by twisting spirally round such bars the right conjunctive wire. (See article 275, Vol. I.) and thus proves incontestibly the intimate co-connection that exists between galvanic electricity and magnetism. The relative quantities of galvanism, generated in different experiments, may be estimated with much accuracy, by using a graduated slide, carrying the connecting wire over a compass, with a standard direction; for, according to the *quantity*, (as said before,) will be the effect, and not according to its *intensity*. The connecting wire may be made of any metal; or several combined, without affecting the experiments, though *platina* was used by Mr. Oersted; nor do the substances which resist the ordinary galvanic and electrical influence, offer any obstructions in these cases: glass, wood, water, metals, rosin, earthen ware and stones, separately and combined, transmit without diminution the action of the connecting wire. Large plates of various sizes have been used by the different experimentalists, and, upon comparing the results of each, it is ascertained that a zinc plate of a hundred inches would have a strong influence at three yards distance, which is much more than forty troughs would produce, although containing in the aggregate a greater number of inches.

154. *The Galvanic Arc.*

The formation of the galvanic arc is very simple. Mr. Oersted describes the principle of that used by him,



as represented in the annexed fig. 3: *a* the piece of zinc, *b* the piece of copper, *c*, *d*, a metallic wire (platinum), *e* the fluid conductor. The connecting wire is to be attached between *c*, *d*. The zinc always communicates a portion of its positive electricity to the water, as the copper does of its negative electricity, which would naturally produce an accumulation of negative electricity in the upper end of the zinc, and of positive electricity in the copper, if the conjunctive communication by *c*, *d*, did not re-establish the equilibrium, by transferring a good portion of the negative electricity from the zinc *a*, to the copper *b*, and of the positive from *b* to *a*. The wire *c*, *d*, therefore, receives the negative electricity of the one, and the positive of the other, as described; whilst it is well known, that the *wire of communication* between the two poles of *a battery*, on the contrary, receives positive electricity from the zinc, and negative from the copper. A distinction, this, which should be kept in mind by the reader, while he is studying the following experiments with the arc.

155. *The Declination of the Needle affected by Galvanic Electricity.*

Above a magnetic needle, well suspended, and in equilibrio in the magnetic meridian, is placed a straight part of the conjunctive wire, so as to be horizontal and parallel with the needle; which may be accomplished by bending it near its efficacious part. When this is done, the needle will be found to deviate from its posi-

tion, and the pole which is nearest the negative end of the battery will move to the westward; and the whole declination thereof will be forty-five degrees, provided it be not more than three-fourths of an inch from the wire. At a greater distance, or with a smaller wire, or a weaker battery than will make a metallic wire red hot, the declination will be less than forty-five degrees, decreasing to thirty degrees with the smallest kind of wire. But a connecting wire which shall be one-fifteenth of an inch diameter, being placed horizontally, in the plane of the magnetic meridian, over the compass, the deviation of the needle will be eighty degrees and upwards.

But if, instead of placing the wire *above the needle*, it is now placed *below it*, the effect produced will be the direct contrary: the pole nearest the negative end of the battery then moving to the eastward, at the same degree as by the former experiments its deviations were westerly. Again, if the conjunctive wire is caused to turn in an horizontal plane, so as to deviate gradually from the magnetic meridian on either side, the declination of the needle will increase if the wire approaches the needle, and will diminish if it recedes from it.

Once more, change the conjunctive wire to a vertical position, opposite the pole of the needle, and upon receiving the negative electricity at its *upper end*, the declination will be eastward; but if this be communicated at its lower end, the declination will be to the westward of north. When, however, the conjunctive wire is brought opposite a point between the pole and the centre of the needle, the whole phenomena are then reversed.

156. *The Dip of the Needle affected by Negative Electricity.*

When the magnetic needle is rendered horizontal by a counterpoise, and you place the conjunctive wire in the same horizontal plane, and parallel with it, no *declination* then takes place either way, but *the needle dips.* So the pole where the negative electricity enters, is a good deal *depressed* when the wire is situated on the *west side* of the needle, but, on the contrary, when brought to its eastern side, the needle is *raised.*

On the other hand, if the conjunctive wire is placed at right angles with the magnetic meridian, the needle remains at rest, *whether above or below:* excepting always that the said wire should not be brought too near the pole of the needle; and then the pole will be *raised,* when the negative electricity enters from the west, but depressed when coming from the east.

157. *Bars or Needles rendered Magnetic by the Galvanic Arc.*

A new method of communicating the polar attraction to the needle, is that adverted to in the experiments of Mr. Oersted. Sir H. Davy found that the conjunctive wire of platina was magnetic, from its attracting iron filings; and it was found capable of communicating permanent magnetism to steel bars, placed transversely; whilst the same bars, when placed to the wire, had only temporary magnetism while in the vicinity of the apparatus. When the south pole of a magnetic bar received negative electricity, the power of attraction was destroyed in half a minute.

158. *Electro-Magnetic Experiments.*

Connected with the foregoing, are the following facts, which do not go to contradict, but rather to correct Mr. Oersted's statements; and, indeed, they are but a few of an entire series with which we are already furnished, all tending to the same point, *namely*, the effects produced by the *electric current* upon the magnet and chronometer.*

1. A weight being suspended from a small horse-shoe magnet, on connecting its north pole with the copper side of a pair of galvanic plates, the weight was more strongly attached, but on reversing the wires, it fell.

2. A magnetic bar being placed in the galvanic circuit, with its south pole in connection with the positive end of the battery, the magnetism thereof will be destroyed in half a minute. This experiment illustrates the fact, that electricity (and lightning), not only imparts the magnetic power, but is likewise capable of destroying it.

3. Bend the connecting wire from north to south, and then from south to north, the magnetic needle will be found to deviate to the westward of north in all the former bendings, and in all the latter it will be to the eastward of north.

4. Whenever the connecting wire is made to pass from north to south, *over the needle*, and from south to north, *under it*, the electro-magnetic influence will be doubled.

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* See Article 275, Section 6, of our first Volume. There the reader will note—"Electricity is known to communicate the magnetic power, and lightning of course; and, *when either prevails*, is most likely to *effect the degree of polarity in the compass.*" Vide "Philosophical Recreations," Vol. I. page 186; which was printed 10th Dec. 1820, and the first intimation of Mr. Professor Oersted's discoveries was published in the "Edinburgh Philosophical Journal," 1st Jan. 1821.

5. The same experimentalist adds, " I have also found, in like manner, that *every* perpendicular object, of whatever materials it may be formed, has a magnetic north pole at its base, and a south pole at its top ;"—the same of a tree, a pole, an iron rod, a wall, a house. A fact, however, which was anticipated in our first volume, article 275, sections 1, 2. This is very true, as regards the *northern* hemisphere, but the case is *reversed* in the *southern* hemisphere ; a fact which goes to confirm the opinion of Halley, Von Euler, and others, who maintain the doctrine of south polar attraction.

6. Not only the compass, but chronometers are found to receive magnetic influence upon being put a shipboard, being always then accelerated. Mr. Fisher ascribes this to the magnetic action exerted by the iron of the ship on the inner rim of the balance, which is made of steel; for if on land, you bring a magnet near a chronometer, this influence will be immediate and distinct The force of balance springs being also affected in the same way, they should be made of gold to traverse accurately.

Note. Some hopes are entertained that upon the appearance of Mr. Hansteen's second part on Magnetism, we shall be favoured with his considering the *optical phenomena* as connected with terrestrial magnetism.

159. *Oscillation of the Magnet.*

THE magnetic intensity of the earth is found to have a variation hourly, daily, and annually. Great changes are also found at the time of the equinoxes, on the days of the moon's quartering, and of her passing the equator. Mr. Humboldt noticed the influence of the *northern light*,

(Aurora Borealis) upon the polarity of the needle; and remarked, that it does not regain its former strength until after the lapse of an entire day. Professor Hansteen, of Christiana, observed the oscillations of a magnetical cylinder, suspended by a silk thread in a small box with glass openings, by means of a chronometer. From early in the morning, he finds the intensity is on the decrease, until between 10 and 11 o'clock in the forenoon, when it is at the lowest; but from this time it goes on to increase, at first slowly, afterwards more rapidly, until 4 o'clock in winter, or from 6 to 8 during summer, when it is at the highest. At times, however, it does not reach this maximum before 10 o'clock in the evening: so much for the general, daily, and hourly variation, from which must be subtracted the particular influences above named.

In winter this *intensity* is much greater than in summer time; the *greatest* happening in the month of January, annually, the *least* being observed this last year to be on the 13th July, 1820. Much greater *variations* take place in summer than in winter.

160. *Air Pump. Resistance of Arched Bodies.*

We have already shown several entertaining experiments of which this wonderful invention is capable of being applied to, in our first Volume, page 35, &c. There still remains one or two pleasing facts to add thereto; and first as to the resistance of the arch.

Let two phials, the one square the other a round one, be furnished with a valve stopper, and place in the receiver. Exhaust the air therefrom, and the valves opening will have their respective phials *in vacuum* also;

then turn the cock that re-admits the air, the valves being closed, the pressure of the air will press upon and burst the square phial, whilst the round one withstands the pressure entire, by reason of its shape; and this, although, as is usually the case, the round phial be a blown one, and very thin, whilst square phials are always cast, and of thick materials.

The receiver itself is a proof of the same doctrine: but for its arched top the surrounding atmosphere would shiver it to atoms whenever its inside should be exhausted. The same effect would be produced by corking down the phials, so that the air cannot escape; the pressure from without being withdrawn, that within forces the barrier and the stopper flies out, or the square phial bursts.

161. *The Air Bubble of Eggs.*

Every one who breaks an egg at the big end must have noticed a small bubble of air which is confined within the film at that part. If a puncture be made in the small end, and the egg placed under the receiver, the consequence of non-resistance at this orifice will be, that the air at the big end will drive out the yolk of the egg, with much force, and apparently inflated with air; but upon permitting the receiver to fill gradually, the yolk will return into the egg as completely as it was at first.

162. *Elasticity of Air.—The Bladder.*

INFLATE a bladder to one half of its capacity, or less, make fast the neck, place it under the receiver, and when the air is withdrawn, the bladder will distend as it originally filled to its utmost. Upon exposure again to the pressure of the atmosphere, the contents of the bladder are compressed by the external weight. This weight may be ascertained nearly by placing upon the bladder, (confined at its sides, within an uncovered box), weights sufficient to keep it down; and, according to the quantity of pressure required to effect this, will be the degree of elasticity.

163. *Steel capable of being Forged.*

MAY be made from *iron*, by the following process. Small pieces of this metal are to be placed in a crucible, and covered with a mixture of chalk or lime-stone, and the earth of Hessian crucibles, in the proportion of six of each to twenty of iron; taking care that the latter be completely covered from the atmosphere at the time of fusion. Heat your crucible, gently increasing it until it reaches the point of fusion; keep this up an hour at least, for an ordinary sized vessel full, and exceedingly hard steel will be produced.

164. *Test for proving Steel.*

TAKE weak aqua-fortis, and drop a little on the sampler in question. After a few minutes dip it in water, and if the spot be a pale grey, it is iron; a black spot denotes steel.

165. *Steel Engraved Bank Note Plates.*

BANK Notes are worked from plates obtained by the *original engraving* (on steel), being first impressed upon a cylinder of *soft steel;* and then this cylinder, being hardened, is made to re-produce the copper-plates in any number, for working on paper. Whatever *power* is required for thus transferring the impression, is obtainable upon the same old principle as wire drawing is performed, though the patentees have introduced some modifications adapted to a 4½ inch surface—the depth of Bank plates. Already have they furnished several provincial bankers, and one specimen plate also appeared of very masterly execution. The superior and *varied style* of engraving *each plate* exhibits, and the absolute sameness throughout, of every secret line and dot, promises to render imitation most difficult, and secures to the bankers themselves, though not to the public, the certain detection of forgeries.

Having engraved the design upon softened steel;* and subsequently hardened the same, it is next to be transferred into a relief cylinder of soft steel—(also to

* Four different methods of rendering steel as soft as *lead* were given in article 287, of our first Volume. The mode of hardening it again, so as to preserve the polished surface, and the engraving entire, follow in the next pages.

be hardened), whose circumference is at least equal to the original plate; from this cylinder, so impressed in relief, copper-plates in any number may be obtained, by transferring the design in the same manner as it was received.

166. *Printers of Books, and of Calicoes.*

Both those trades may avail themselves of the cylinders, or block, to which *the matter*, or pattern, has been transferred in relief; and the cylinder being of sufficient circumference for that purpose, entire patterns, and whole sheets of books may be rolled off with facility; having for the latter purpose two such cylinders which would be required for each sheet.

Note. Although the original engravings may be made on *copper*, yet steel possesses incalculable advantages over it, being capable of subsequently acquiring a much greater degree of hardness, and consequently of imparting a much sharper relief to the cylinders.

167. *To harden Steel Engravings, without injuring the impression or polish.*

This is one indispensible concomitant of the new method of obtaining Bank note plates, &c. as propounded by Mr. Jacob Perkins. For this part has Mr. Perkins obtained His Majesty's letters patent, (that uncertain tenure of exclusive right); but, the patentee having in his specification omitted to direct the workman how he is to guard against the access of atmospheric air, in hardening his plates,—which is alone the cause of the

roughness that ensues, and renders the plates unavailable, we here supply the deficiency.

Let the plate, block, or cylinder, of soft steel with a fine polish on its surface, and the requisite *impression* worked or *transferred* to it, be held over a crucible, in which is a sufficiency of melted copper to immerse it entirely. This steel graving should have a hole drilled in one of its corners, through which a wire of good strength is to be inserted, and by this wire is the plate to be suspended in the crucible, but completely covered by the copper, so far at least as the hole and wire. After receiving the fumes and its heat for some time, the plate is to be immersed in the melted copper, and the fusion is to be raised to the tempering height. When this has risen to the required pitch, the plate is to be cooled suddenly in water, without exposure to the air; for this purpose a butt of water is to be prepared, the bottom whereof may be shielded by iron plates, bars, or scraps, as may be at hand. Then the crucible with its whole contents is to be thrown therein, and with the copper descending to the bottom, the plate for the preservation whereof this process is undertaken having been suspended, by its wire being made fast across the mouth of the water butt, and thus hanging a few inches below the surface of the water, it is secluded from the air until its temper is restored.

Note. Such is the importance of this part of their process, that we observe the otherwise beautiful plate, which Messrs. Perkins, Fairman and Heath, have sent forth as a *specimen*, in No 7, of Edinburgh Philosophical Journal, has received an injury in the hardening, which must render it useless as such, if their pretensions to immaculacy mean any thing: a hair fissure is perceptible from the *ship*, in the upper hieroglyphic, across the corner of the entablature below, measuring two inches.

168. *To whiten Brass Ornaments, or Copper, by Boiling.*

ALUM, white tartar, and grain tin, proportioned to the articles to be *coloured*, being put into an earthen vessel with the articles, and the whole boiled together, the tin is soon found adhering to the articles, which when polished look like silver. By this process the clasps of account books, several sorts of buttons, and some small utensils, as snuff-boxes, are whitened.

169. *Moiré Metal, or Crystallised Tin.*

QUITE new and splendid as this art is, it yet depends entirely upon the action of acids and saline compounds, already well known, on tin, or tinned substances. M. Baget, a Frenchman, however, claims the honour of a discovery for this process, attributing the same to accident, and a description of his method shall follow that of the first with whom we became acquainted. After cleansing away every extraneous matter, as dirt or grease, with warm soapy water, rince your tins in clean water; then, after drying it, give it a heat to the temperature of bare sufferance to the hand, and expose it to the vapour of any acid that acts upon tin, or the acid itself may be poured on, or laid on with a brush, the granular crystallization varying according to the strength of the wash, and the heat of your plates. Hence, it must be perceived, whatever quantity is required for any particular job of work should be made all at one time; no two makings coming away alike, but depending entirely upon accident.

Wash 1. Take one part by measure of sulphuric acid, and dilute it with five times as much water. 2. Take of nitric acid and water, equal quantities, and keep the two mixtures separate.

Then, take of the *first* ten parts, and one part of the *second;* mix, and apply the same with a pencil or sponge to the surface of the heated tin, repeating the same several times, until the material acted upon loses its heat, or you may be satisfied with the appearance of your work. A transparent varnish is now to be laid on, much whereof will be absorbed, and will of course be affected by any colouring matters you may mix with it; these, however, should not be opaque colours; and a good polish being given to the work, produces that enviably brilliant covering we find lately so much in vogue for covering iron story posts, &c.

170. *Moiré Watering, by other Methods.*

THE fancy may be employed in using your acids in various degrees of dilution, whereby the cloudy reflections more or less resemble mother of pearl, or assume the deep shades of rude leaves, of stars, and other figures, or simply shapeless granulations. This is the process of M. Baget, and these his various mixtures. 1. Dissolve four ounces of muriate of soda in eight ounces of water, and add thereto two ounces of nitric acid. 2. To eight ounces of water put two ounces of nitric acid, and three of muriatic acid. 3. To eight ounces of water, add two ounces of muriatic acid, and one of sulphuric acid. One of those mixtures, at your pleasure, is to be poured upon the heated tin, while this rests upon a vessel of stone ware; the mixture is to be poured on by instalment, as

it were; the tin is then to be thrown into a slightly acidulated water, and afterwards washed in clean water. The subsequent treatment is to be the same as before detailed.

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171. *Lithography.—The Art of multiplying Copies of Drawings, &c. &c. by means of Stone.*

Perfectly applicable to the several branches of the arts, where accuracy of representation, combined with expedition, is necessary, or *fac simile* printing is sought for,* this art bids fair to rival several other methods of producing cheap pictorial representations of sensible objects. Stone is the only material upon which you can operate, because of its ready absorption and retention of water, and that of a close calcareous nature is reckoned the best, though all in some degree possess that quality. A good polish made with pummice stone is necessary, the size of your stone being adapted to that of your work. On this smooth surface the *drawing* is to be made with crayons, or with a liquid we would term delineating *ink*, to be described hereafter, and which being already adhesive, is rendered permanently so by a wash with water, in which *nitric acid*, in the proportion of one to fifty, has been dissolved. For this purpose, use a smooth sponge, softly dabbing the finer parts of the drawing, so as not to disturb the lines: all

* The mode of printing with types, (technically termed scrip), to resemble *hand-writing*, is set at nought by this invention; the *copy* can be composed in less time, is worked with the same facilities, and is correct to a trait.

the surface is to be thus wetted, and a short effervescence, which hereupon takes place, subsiding, rince the stone in clear water. It is now fit for printing.

172. *Lithographic Crayons.*

TAKE of soap three-parts, tallow two-parts, and one of wax; dissolve these in an earthen vessel, and having incorporated the mixture well, add of Frankfort black as much as it will imbibe. Then having prepared moulds of the size required, pour into them the mixture, and, when cold, they may be used as pencils upon the stone, as described in the last article.

Note. The effect of this composition, as well as of the delineating ink which follows, is, that the *printing ink*, laid on with the *balls* described hereafter, lies upon it, in the same manner as it does upon printers' types, and imparts the same to the *paper*, when pressed upon it.

173. *The Delineating Ink.*

IN principle the same as described in the preceding *note*. The ink for delineating upon stone, or of writing upon paper, whence it may be transferred to the stone by gentle pressure, is much better adapted than crayons for *fac simile writings* or *circular letters*. Heat a glazed earthen vessel over the fire, and having put in equal quantities of *mastic* in grains, and white Marseilles *soap*, melt and mix them carefully. Add thereto five times as much *shellac* as you have of mastic; incorporate the whole, and drop in by degrees a *ley* made by the solution of caustic alkali in five times its bulk of water.

Observe,—That caution is necessary in making this last addition to the map, as the alkaline if put in suddenly, the agitation it is calculated to raise, would cause the contents to run over the edge of your vessel.

As soon as the whole is rendered homogeneous, add Frankfort black (as *per* last article); and, lest it get too thick before this is properly incorporated, add water sufficient to keep it in a state of deliquency fit for writing

174. *Lithographic Printing*

As before described, the stone having been washed or wetted, and kept so, it rejects the printing-ink everywhere, except where the delineations with pen or crayon appear: to these, being of a resinous quality, the ink adheres, but the water will not do so, for the same reason. A common printer's ball,* upon which the printing ink has been well disseminated, is now to be dabbed on the whole surface. On this the paper in a damp state is to be laid; and, to keep it steady, is to be covered with any other similar sheet (as parchment or a cloth), pass over the same a heavy roller *once* only, lest you *mackle* the impression.

Such a mode of Lithographic Printing, however, is very rude, and little agreeable to the improved state of mechanics, or the expedition that is generally so essential to the cheap multiplication of copies. The common

* Instead of these balls, the rollers invented by Applegarth, and made by Harold, have been generally substituted by Letter-press Printers; but as these are too dear for Lithographers, a wooden *cylinder* covered with leather outside, but having a previous lining of coarse woollen blanket, is found to answer as well. The greatest caution is necessary with the *joining* of the two ends, and having it sufficiently large to pass over the stone at one turn of its axis.

type printing-press offers a tolerable model, where the stone employed is not much thicker than types.*

175. *Stereotype Printing.*

AROUND this part of the typographic art, like that which covered the first invention of printing, has been thrown the *halo* of secrecy. But the Cyclopædists and Ferrets of dame Science, seek eternally to open her doors to all enquirers.

THE object proposed to be accomplished in this, as in the preceding Art, is the production of speedy, cheap, and accurate copies. When the usual page of *letter* (fusil type) has been made ready *for press*, it is placed on a table and surrounded with a moveable square of wood, which rises nearly as high as the *beard* of the letter, and is accurately adjusted thereto. The edge may be tipped with brass, or a square of smooth brass-work laid on; then, having surrounded the whole with an outer case fitting closely to the wooden square, pour into the cavity a quantity of Plaister of Paris, and when this has *set*, and become hard, it forms the matrix in which your plate is to be hereafter cast. Much close observation is necessary in order to bring off the matrix entire, and with a plain surface, on account of the adhesion of the plaister to the letter, when this is old, battered, clogged with ink, or dirty.

A good preventative in this case is to wash over the face of the letter with oil, taking care that none remain to disfigure the *cast:* but new letter, or unused, is preferable, for obvious reasons besides this one. Again, if

* In winter, when frost may be expected, the stones are to be secured from its effects, or they will break with the return of a thaw. Let straw (unbroken) be laid over the stone every night, the ends whereof bend towards the earth, or a layer of horse-dung, well arranged round and over the stone is a good preventative; otherwise a good fire must be kept.

your *plaister* adhere from any cause, warm it gently in the kitchen oven, but not too long, and it will then come off. Into the cavity of the matrix pour your metal, which for a domestic experiment may be procured cheaply in the form of worn out types; but which upon a large scale is originally composed of a due admixture of regulus of antimony with lead, according to the views of the founder.

176. *Roller-balls for Printers.*

Names for manufacturers' tools do not always change with the improvements in the art of forming them; hence the rollers (proper) which have been substituted for the old method of using balls, retain the compound of both names. They are formed of a composition of glue and treacle, in the proportion of *two* glue to three treacle; for use in warm weather or hot climates, however, the former is increased in order to keep up its stiffness. Then the addition of a small quantity of solution of potash, which in the proportion of *one-sixtieth* is always necessary, must be increased to *one-thirtieth* to meet the augmentation in the proportion of the glue, to decompose part of its gelatine, and promote the incorporation of the compost. Let the treacle be boiled, after skimming its surface well, and add by little and little the glue and the ley of potash (as before mentioned): take care of the swell in the boiler, remove the skum, and with the composition fill your mould. The mould may be made of any substance that will keep its form properly, but steel is best, resembling much those used by candle-makers, but larger each way; two inches and a half diameter, and six feet long, seems to have been most generally adopted by the inventor, though larger ones are used for the machine-presses.

177. *Potash. Alkaline Ley.*

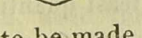
SCARCELY an article exists to which we could turn our attention more usefully than to the preparation of the alkaline, known under the general name of potash, potass or potassium; carbonated potash being the *pearl-ash* of the shops. Barilla, kelp, and soda, have the same qualities, but in a stronger degree; the latter being a mineral, the two former marine alkalies; a strange medley, however, that leads to errors innumerable, is made in medicine, commerce, and manufactures, when the one or the other is intended to be quoted.

Country folks who burn *wood* should be made aware, that the ashes produced from it are a very desirable and active article of commerce. They may avail themselves of them for several purposes of a domestic nature, as soap-making; though they might not choose to manufacture potash for sale. Having gathered the ashes into large heaps, wet them a little on the outside only, and keep the surface close flattened down. *Six or eight months old ashes produce better ley, than ashes newly made;* at the expiration of that time get your vats ready, and having filled them near to the top, but very hard at the corners and the sides, let in the water to the whole extent of its absorption. Each vat is to have a *false bottom*, made with cross bars, or stout wicker work, and covered with unbroken straw, as deep as your finger. After standing a few days, the lixivium may be run off slowly, and fresh water added; but as this last would not be strong enough, when off, for ordinary purposes, it may be started into fresh ashes. Lime being added in the making the ley increases its sharpness, and tolerable soap may be made from such a ley.

178. *The Potash of Commerce.*

When the lixivium has been procured as above, pour it into boilers, and boil and simmer it until the water having evaporated leaves the kali behind. Whatever quantity is produced by this manufacture, that is always the strongest which has had the least quantity of water to lose in this part of the process; because, that the water in flying off, carries away the fine particles of salt with it. In this state it is more commodiously transportable; and when it comes to be employed, water again has it in solution.—*Note.* The potash process may be supposed complete when it reaches the consistency of mortar.

179. *Pearl Ash.*

Has its vulgar name from its whiteness, potass having a dull bluish cast, which being got rid of by the action of fire, the article changes names, though its properties remain, refined from the earth. Let iron plates be prepared which have an inclination towards the middle  over this a kind of funnel-shaped supplier is to be made fast, with access for the workman to its upper orifice, and the plates being made *nearly red hot*, the feeding is to begin: the attendant is to draw from the furnace the pearl-ash as it turns white, taking care that the material does not *melt* with *too much heat*. Box up the refined potass carefully, free from air, for the action of the atmosphere ever goes to decompose it. When properly prepared it contains less than 10 per cent. of moisture, not one of earth, about 75 per cent. of alkali, of fixed air 15 per cent.—*Note.* The appearance of red spots denotes the existence of manganese, which Scheele

says is to be found in the ashes of almost every kind of vegetables.

180. *Brucine.*

THIS is the name by which a new alkali is distinguished, but procured in a different manner from the foregoing, as well as from the process with barilla or kelp. Its particular qualities or application remains to be developed; those of its *basis* being but imperfectly known. Take of the *brucea anti-dysenterica* (or false Angostura bark,) and cast into boiling alcohol as much as this will dissolve. Let the evaporation go on spontaneously, and it yields crystals nearly transparent of a lozenge form.

181. *Colonial Cultivation.*

NEW land that is over-grown with wood, but which it may be desirable to clear for cultivation, cannot be more beneficially brought to account, than by converting its incumbrance into *ashes;* that from *underwood* ever producing the best; but large trees, as oak and beech in particular, the more inferior,* or least quantity

* *Table of Products.*

Oak	1000 lbs.	13 lbs. of Ashes		1¼ lbs. of Salt.	
Ash	ditto	12	ditto	0¾	ditto
Elm	ditto	23	ditto	3	ditto
Beech	ditto	6	ditto	1¼	ditto

Old trees produce more salt than younger ones, though *rotten*. Fumetory produces 2-11ths its own weight of ashes, and 1-13th of salt: Wormwood 1-11th of ashes, and 1-14th of salt. Fern cut in August in Europe 1-27th of ashes, and 1-235th of salt; and Turkey wheat stalks (maize) 1-11th of ashes, and 1-53d of salt.

of salt. The ashes, after losing their alkaline quality, still contain enough of the fructifying power to prove highly serviceable to the land upon which they may be thrown, especially if this be of a rich, clayey, or marly nature. Upon this principle have some colonists received instructions from the Editor of this volume; and in Portuguese South America his mode of bringing the land into cultivation has been followed with the desired success. Early in 1819 he drew up, at the desire of a highly respectable mercantile house in London, an entire series of agricultural pursuits for that climate, which have been adopted with the requisite advantages. Tobacco, maize, rice, and cotton form the leading articles for cultivation there; whilst upon another antecedent occasion his attention was directed to the vine and the bee, for settlers on the coast of South Africa.

182. *Soap, how to make for a Family.*

Tallow, vegetable oils, or *kitchen grease*, being boiled sufficiently with a strong ley of kali, barilla or potash, becomes solid and fit for use, at an expence much inferior to the prices usually charged, but must not be *sold*, until the duties laid on by several acts of parliament are paid.

Of whale-oil is made that kind called *soft soap*, but which is nevertheless sufficiently detersive for common purposes. Some manufacturers procure their oily material from very offensive sources, the consequence whereof is a very disagreeable product; but the fat of every kind collected in our kitchens, being *rendered*, or melted down from day to day, and cast into a "save-all tub," will be found to produce very good soap. Your

potash should be of that kind termed *barilla*, from the name of the vegetable of which it is made; although all the other kinds produce the same effect, but in a weaker degree. This being dissolved in water, and kept in a vessel under cover, is to receive about one-fourth as much quick lime, by weight, in order to give it a proper degree of sharpness, and impart to the lixivium a smoothness to the touch; it must be strong enough to bear the weight of an egg.

Into an iron boiler pour equal quantities of the tallow or fat, and this ley, going on to increase your heat, and continuing to stir the compost with a wooden stick, until the whole begins to unite; then add as much more of the ley, still keeping up the fire to the boiling point, which will be found at a very high degree of heat, *viz.* 700°. Evaporation having ceased, the business is done. and the soap may be poured, or let off, or the boiler taken from the fire, but stirred till cool. Large shallow troughs are commonly used for receiving the same, previously dusted over with powdered chalk to prevent the soap from adhering to the troughs. After a few days have elapsed, with small musick-wire, cut your making into cakes, and when these are solid cross-cut them into bars.

Bristol Soap. When the soap assumes consistency, *pounded rosin* is cast into their boilers by some of the Bristol manufacturers; crude turpentine by others, both being considered by them as grand secrets, and the acme of perfection in their art, but is a stinking kind of addendum. It however gives the character to "Bristol soap," and by its hardness enables the good wives of those parts to perform the act of *soaping* more perseveringly.

183. *Almond Soap, Spanish Soap, Soft Soap.*

The first and second are recommended as the vehicles for administering some useful medicines; though the common hard soap (sapo duri) is now commonly substituted for Spanish; it is made from olive oil, as almond soap is from the oil extracted from this vegetable, and the caustic ley as above.

Soft Soap is made of train oil and a little tallow, and common potash dissolved in one-fourth of salt water.

184. *Starch from Wheat flour.*

Wheat itself, or the flour, being kneaded while exposed to the constant running of water, until it comes off colourless, the gluten will remain. The water appears milky, but a deposit of white powder soon takes place which is the substance called starch. A small quantity of fine powder-blue is sometimes added, at others the water, when much reduced in quantity, impregnated with indigo. Mixing a small quantity of alum with the water accelerates the subsiding of the starch; but if the articles on which it may be employed, have to undergo the action of heated iron (ironing), it is not desirable.

185. *Starch from Potatoes.*

For many purposes this cheap substitute for wheat may be employed to advantage. In this case, however, the water is to be thrown away, and the residuum is the starch. Let the best potatoes be peeled, and very well

grinded in water; after it has subsided, pour off the supernatant water, pick out and scrape off any discoloured bits, or dust; add fresh water, rouse up the whole, and pour off again, until due whiteness be obtained.

186. *Superior Mode of Bleaching.*

Successful competition in the show of cotton goods for many years reproached the British manufacturer; and the French *marchands des draps* constantly carried off the palm at the great marts of Germany, Frankfort, and Leipsic.* The French leys were always used in a more concentrated form than our own; but in following that example our bleachers destroyed the fabric of their goods; whereas they formerly left in their cloths so much *colouring matter* as to spoil the effects of the patterns subsequently printed thereon.† As a remedy for these evils, the boiler is to have ribs of wood, like small joists, fastened at half way from its bottom, about two inches thick, and three or four inches apart; upon these the articles to be bleached must be placed, the cover is to be fastened down, and the fire made up. It must be seen that the vapour from the ley in the bottom of the boiler will penetrate the goods, and operate so subtilely as to disengage the carbonic resin, which falling into the bleaching liquor never again ascends. Every

* See Half-yearly Report published in the Supplementary Numbers of the Monthly Magazines, at and about that period.

† Such was the case, when, in 1800, we introduced the present mode to this country, through the pages of an Annual publication, entitled Peacock's complete Pocket Book; and the fact is curious, that a patent was afterwards obtained by a Lancashire printer for a trifling modification of the above method. Upon this pretended invention the patentee brought an action for asserted infringement of his rights; when Mr. Garrow adverted to the prior existence of this method, and the plaintiff was non-suited.

other part of the process is to proceed in the usual manner, as to laying out on the grass, &c., and the fibre will be found uninjured; though repeated with muriatic acid also, it comes out of hand in a most enviable state of whiteness.

187. *Family Linen.*

On the same *principle*, family linen or home-made cloths may be bleached with much less trouble than by the ordinary mode of *hand-rubbing;* in a fifth part of the time that it takes to merely grass-bleach the same quantity, and loss, wear-and-tear, than is experienced in the use of the Yorkshire Peggy-tub.

188. *Candle and Rush-light Manufactory.*

Having procured a good quantity of rushes during the season, the boys and girls of some of our farm-houses are employed during winter nights in stripping off the skin from two sides thereof, leaving the pith bare. These, being quite dry, they then dip in melted grease repeatedly, and thereby obtain a good light for all the purposes of such a family.

If cotton yarn, without knots in it, be procured, and passed round a small stick, the ends being slightly twisted together, you will be able to make good candles by separating these, and dipping them in the same kind of grease repeatedly; but suffering each stick of candles to cool a little between dip and dip. You would not of course exhibit these home-made articles to the view of an exciseman, who might probably feel himself (conscientiously) called upon to question you respecting the *manufacturer's name.* No accused man in England, how-

ever, is bound to answer interrogatories, though put to him by a judge or other magistrate, and the case amount to felony.

189. *To restore the White of Old Paintings.*

WHITE lead forms the basis of this and several other pigments, and is very liable after a lapse of years to turn brown, or quite black, occasioned by the sulphureous or ammoniacal vapours that prevail, more or less, in all inhabited places. M. Thenard, of Paris, succeeded lately in restoring a picture of Raphael d'Urbino, which was found in this state, by means of oxygenated water applied to the *white* with a pencil. The fluid was so weak as to contain not more than one sixth of oxygen to five sixths of water, and was in fact nearly tasteless.

190. *A blue Colour obtained from Wheat-flour*

FROM the experiments of Dr. Taddei, an ingenious Italian, we learnt the effect produced by mixing wheat-flour with guaiacum. Take the flour as it is made into ordinary bread, and having powdered one-fourth its weight of guaiacum, mix and knead them together, when you shall have a fine blue colour come off, which no doubt is applicable to many useful purposes.

Note.—When the flour is too fine, the *colour* will be low· none whatever when starch is used.

191. *Transposition of Words and Letters.*

MANY people would be very happy, if, upon some great occasions of their lives, they could, *in one word*, call to their aid more

Red nuts and gin,

than they actually possessed at the time; but as the delicacy of some may be hurt at the bare allusion to such vulgar *amusement*, we shall not delay to inform them, the word meant to be conveyed is "undeRstanding.

192. *Trick in Reckoning.*

THE question is thus put—"Three young women went to market with eggs, the *first* having 50 to sell, the *second* 30, the *third* no more than 10. All three *sold out*, and at the same *rate*, and each made the same sum of money of her eggs—how were they sold?"

ANSWER.—Upon coming to market eggs were *doing*, at seven a penny, at which rate, the *first* woman sold 49, and received 7*d.*; the *second* sold 28, and of course received 4*d.*; whilst the *third* sold a single pennyworth, 1*d.*; but she had three eggs remaining, whilst her companions had but two and one, respectively. Therefore, did she, on finding the demand for her commodity on the increase, raise the price to three pence each! Thus, she obtained 9*d.* for those three, and went home with 10*d.* in her pocket; following her example the woman who brought 50, sold her odd one for three pence; while her with two remaining out of 30, sold those two also at three pence each, and this likewise made their sums 10*d.* each.

193. *Arithmetical Juggle.*

One chalks down nine figures, out of which he requires the other party to strike out six figures, and leave *twenty* on the board.

Those figures are, three *sevens*, three *nines*, and three *ones*, as *per* margin: accordingly the six figures to be erased are those marked across, leaving untouched a *nine* and two *ones*, which last being called eleven, say 11 and 9 are 20, which is the trick.

7	7	7
9	9	9
1	1	1

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194. *Dishonest Contrivance.*

Blind people are tolerably clever in some respects, the loss of one sense being generally made up by superior acuteness in the remainder; their hearing is invariably fine, so is their taste—hence their fine touches upon stringed instruments. The privation of light, however, renders those of the unfortunates who happen to be untaught, extremely suspicious: thus it was that a farmer, without education, having lost his eye-sight also, would needs visit his sheep-fold nightly, and *feel* if all was correct as regarded their number. He put four in each pen—laid out as *per margin;* four in each (the dog lying in the middle); and if, as he expected to find *twelve* on each side, he was satisfied, saying, "they are all right *I see,*" as he returned from his pens. But he had a cunning rogue—one John Voler, who stole thereout four of the

fig. 1.

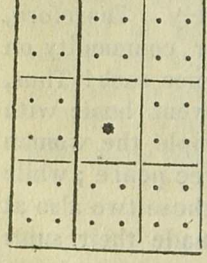
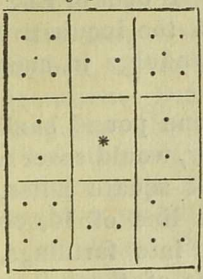


fig. 2

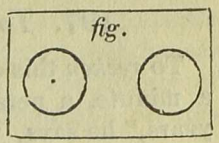


sheep; and that his master should still be satisfied, and he escape detection, he had recourse to a plan whereby the blind farmer should still upon going round his pens find twelve sheep on each side: this was his contrivance, he reduced the four middle pens to *two* sheep each, and adding one to every corner, they there counted double. See *fig.* 2.

195. *The Bridge.*

ALTHOUGH it is neither philosophical or just to practise deception, yet we cannot forget a school trick, whereby a *passage which could not be rendered* passable in one way, was made so by another. Let two *dots*, or points of departure, be encircled by a ring each, (as *fig.*); how are we to draw a chalked line from the one to the other, by one stroke, without crossing the line of either circle?—

fig.



Answer. Place the finger upon one spot, and the thumb on the other, and pass the chalk over the hand, in the form of a bridge.

196. *National Debt of Britain.*—

(FRENCH MODE OF MEASURING IT.)

A FRENCHMAN, M. Lafond Ladebat, writing on the subject of Annuities, has amused his readers with some

curious calculations respecting the national debt of England. Truly, it is a subject upon which the inquisitive of any country, except England, may indulge in such appalling speculations without a sigh.

The national debt, converted into one pound bank notes, and laid contiguous to each other, would cover a space of 4516 square leagues, (40,644 square miles, British); in guineas, it would form a line of 10,000 leagues, (30,000 miles); but reduced into farthings, were it possible to form seven columns of them, they would reach to the moon.

To *transport this debt* upon men's shoulders, at the rate of 40lb. per man, if in *gold*, 374,531 men would be required: if in *silver*, above five millions; but if in *copper*, above 262 millions (more than the male population of the globe) would be required to carry the debt.

197. *To reckon the National Debt.*

To *reckon* this debt, at the rate of one hundred guineas a minute, a person would be "employed twenty-seven years," he says, "*without intermission*," it is presumed he must have meant; for we find that if five clerks, with five *attendants*, (the number usual in the *Teller's Office* at the Bank) were employed at the same rate of telling, and for twelve hours a day, they would take nearly nine years to pay off the national debt of England; this is allowing for Sundays, but not a moment for meals, nor the well known *luncheon-time*.

198. *Process for separating Silver and Copper.*

Its cheapness is the chiefest recommendation of this method, which is also most effectual and complete in operation. Dissolve the substance in nitric acid, and evaporate the solution to dryness in a glass vessel. Place the salt in an iron spoon over a moderate fire, and keep the mixture in fusion until it entirely ceases to throw up bubbles, when it is to be poured off upon an oiled plate. To be certain that all the nitrate of copper is converted into the black oxyde of copper, dissolve a small portion thereof in water, and test it with ammonia. If the solution, which ought to be at first clear and limpid, does not acquire the slightest tint of blue, it may be considered, that the nitrate of silver obtained is quite free from copper. If not so, the fusion must be continned a few seconds longer.

The black product is to be dissolved in cold water, and the solution being filtered, the nitrate of silver passes through in a state of purity. By washing the oxyde which remains upon the filter, the small portion of nitrate of silver with which it may be impregnated will be removed: the oxyde is then to be dried. The nitrate of silver is to be subjected to a different treatment according to the use to which it is to be applied.

199. *French Varnish for Cabinet Work.*

This is the usual varnish of the shops, by the above title. Take shell-lac one ounce and a half, gum mastick and gum sanderach of each half an ounce, spirits of wine by weight 20 ounces. The gums to be first dissolved in the spirit, and lastly the shell-lac; this may be performed by putting the mixture into a bottle loosely

corked, and placing it in a vessel of warm water, which must not boil, or be heated beyond 1700 of Fahrenheit's thermometer, and keeping the bottle in the warm water until the gums are dissolved. Should evaporation take place, an equal quantity of spirits of wine so lost, must be replaced in the bottle; let the whole subside, and pour off the supernatant liquid for use, leaving the impurities behind, but do not filter it. Greater hardness may be given to the varnish by increasing the quantity of shell-lac, which may be done to the amount of one-twelfth of lac to eleven-twelfths of spirit; but in this latter proportion the varnish loses its transparency in some degree, and must be laid on in very small quantities at a time.

200. *Razor Strop.*

Accident, the love of experiment, or some higher cause, which contributes so largely to the comforts and conveniences of mankind, has furnished us with a new recipe for a most effectual razor-strop, that with a very few strokes of the instrument thereon produces a very fine edge, capable of reducing the most obstinate beard to its required nothingness. Like all other useful discoveries, the process and applicability is obvious, cheap, and easily performed, and we are indebted for its free promulgation to the inventor, Mr. Fawell, the very able surgeon, Britannia-street, City-road. He spreads the well-known *blue pill* of the shops upon buff leather, smoothing it with the razor back, and it is fit for use in the ordinary way. The blue pill, in mass, may be bought at Apothecary's Hall, and other druggists' shops.

Soap suds made strong, and rubbed over the hone or razor strop, is found to answer better than the usual dressing of sweet oil, and is much less expensive.

201. *To Preserve Fruits.*

Some fruits do best that are put away in a half ripe state, others again begin to decay the moment they leave the parent tree; but, certainly, with either a moment arrives when they can derive no further succulence from the stock, and then drop off, upon imparting the full amount of the distributable carbon to the oxygen of the atmosphere. This process, the first step to decomposition, may be arrested in its progress by depriving *the air* in which those fruits are to be preserved, of its oxygen as near as may be. Then, having *plucked* the fruit, as pears, apples, peaches, nectarines, plums, in dry weather, let them be stowed away in earthen jars, glazed and dry, where the mouth is just big enough to admit the hand to *work*, and not so deep as to occasion the fruit at bottom to be crushed by the superincumbent weight. *Cover* the mouth with a cabbage-net, or cord crossing at right angles, stoop the vessel sideways, and apply the following plaster along the cord slightly, so that none drop in upon the preserve; when this coat is tolerably dry, add more until the mouth is quite closed, and an inch or more in thickness all over.

Ripe apples, of the tenderest kinds, may thus be preserved four or five months; and indeed this treatment is best adapted to such, and the more delicate fruits above named; some of the most *gummy* and saccharine nature, however, enduring only about as many weeks, when put away *quite ripe*.

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202. *The Preserving Paste*

Is to be formed of *fresh lime*, having one-sixth of sulphate of iron, worked together with water into dense

mortar; and having the property of subtracting the oxygen from the air which is in contact with it, when placed over the mouth of any receptacle, depriving the air so inclosed of its oxygen, and thereby its principle of decomposition.

The same method may be applied, upon a much larger scale, to preserves of fruits in rooms, lofts, &c. the access of air being prevented by a *stopping* of paste or mortar so made, and perhaps the exhibition of a fresh quantity upon the walls, floor, and cieling of the room, or loft, in which the fruit is deposited.

203. *Light produced by Friction.*

Two pieces of lump sugar, of fine quality, being rubbed together briskly in the dark, emit a sensible light; so does the stroking the back of a cat in a dark situation; a much greater light may be produced by the friction of silex or quartz; that which we have examined coming from Penzance. Take two pieces that have one flat surface each, lean forward with the elbows upon your knees, and a book open before you, or a watch lying upon a chair, then rubbing their surfaces briskly together, you shall catch a few words in the book, or the *time* on the watch. If the operator's hands be immersed in a pail of water during the friction, the like effect will be produced upon either a watch or printed paper attached to the side of the pail.

204. *Bug-Trap.*

Some one has humorously converted an easy and clean mode of catching those noxious vermin into a means of amusement! he calls it "Bug-hunting," and the

operator receives the title of "huntsman." Let some long slips of paper, say three inches wide, be pasted all along the *middle* thereof, say an inch in width, which may be best done by folding back the outer two inches, whereby the paste will be laid on smoothly and straight, which facilitates ulterior operations. These slips are then to be attached to various parts of the wood-work of your furniture, as, along the cheeks of a bed-stead, or circling the pillars at the top of the shaft, or round the foot; the edges of the paper must be kept a litte raised, and every morning, during the season, the bugs that have travelled that way will be found in the recesses of your traps. With a brush, the top of a feather, or a fowl's wing, they may be brushed into an earthen vessel, and so destroyed at a distance.

205. *Bread.*

When flour has contracted a musty smell and sour taste, both may be eradicated by mixing with the flour a small quantity of magnesia of the shops, in the proportion of one ounce to seventy pounds for ordinary cases, though more might be required when the material is very much affected. Even *good* flour or bread, i. e. *sweet*, of the usual London manufacture, as *seconds*, *thirds*, and *browns*, acquire admirable sweetness by a much less addition of the magnesia carbonata, which is far from being a dear article, considering its rare good qualities. This corrective is considered still more necessary to those persons whose stomachs &c. may be obnoxious to the acidulous state which forms a necessary quality in producing fermentation.

206. *Apple Bread.*

A VERY light pleasant bread is made in France of a mixture of apples with flour, in the proportion of one of the former to two of the latter. The usual quantity of yeast is to be employed, and being beat up in the flour with the warm pulp of the apples, after they have been boiled, the spunge may be considered set; place it in a vessel, and let it rise to its utmost, for eight or twelve hours, then bake well in long low loaves; little or no water is necessary.

207. *Hooping-Cough, Catarrh, &c.*

SEVERAL successful cases of catarrh, cured by inhaling the gas of tar, were long ago laid before the public, and the remedy is worthy a trial in all cases where expectoration is difficult, and the inflammatory symptoms low. To these we have now to add some well attested instances of its good effects in the last stages of *Hooping-cough;* in which the branches of the wind-pipe being choked up by the accumulation of its *secretion*, the patient is seen to struggle for existence, and to prolong it by the most painful exertions to get rid of this increasing viscid mucus—in failure, the little sufferers are lost. Then procure Barbadoes tar, and placing it in a vessel, apply a hot poker or other similar utensil, and the patient may be brought to breathe over, or near the vapour that ascends; the effects hereof will be immediate and striking—the operator must even take care it be not too strongly applied *at first*, and he may repeat the same twice a-day in increased quantities.

Note.—Some inflammatory symptoms, which have ori-

ginated the disorder, will be increased by the patient's exertions, but they again subside with *sleep*, which invariably succeeds the exhibition of this remedy; the less heat there may be in the poker the finer will be the gas; but if you heat it *red hot*, the tar will blow up, of course, to the imminent peril of all around. An open pipkin might answer the purpose, but we have seen an old tin coffee-pot employed to most advantage.

208. *Sea-Sickness.*

It seems strange that some persons are much affected with sickness at first going to sea, whilst others wholly escape; the former, including the most robust as well as the most delicate; among the latter being found all those landsmen who may be compelled to serve in the royal navy. The fact is, that the large ships on board which these men are almost invariably carried, do not *roll* like smaller vessels; their motion is steadier, whether at anchor or under weigh, and therefore the stomachs of persons subjected to the influence of *the roll* are less liable to discharge their *contents*; to say nothing of the paucity of food in such men *previous* to going to sea, nor that the peristaltic or creeping motion of the intestines is then less capable of allowing its rightful motion and regurgitating *its contents* also. Boys who are joyous and active on getting aboard, never turn sick—we never saw or heard of one, though native of a port and given to *voyaging*: all those who stick themselves in a corner, moping over the new dangers to which they may be exposed, never fail to be sick; the valetudinary, consumptive, and physic-taking, earliest *fœil* victims of the ship's motion; people fleshy, gouty, phlegmatic, and those who are very strong internally,

feel it more in the apparent inversion of the alimentary canal.

Persons whose attention may be engaged (not sitting) who giving, or *give their bodies* to the motion of the vessel, like outside passengers by a stage-coach, who keep their olfactory out of the effluvia of *other's ills*, who are given to abstraction, who have the capacity of shutting up six out of the seven senses—and, above all, who will deny themselves part of the greasy enjoyments of the table, are most likely to escape sea-sickness.

209. *Mariner's Compass Improved.*

An invention which goes any way, however little, towards securing a more accurate polarity to the mariner's compass, must needs be hailed as one step gained on the road to perfection, in an art the most useful and important of any, as that of navigation most undoubtedly is. Simple and certain at the same time, the contrivance of Mr. W. Clark (of Chatham dock-yard) consists in nothing more than adapting to the common card *two needles* instead of *one;* the poles whereof being placed on each side of the polar *mark* on the card, equally distant from it stedieth *the mark* of polarity.

210. *Cyder of superior Strength*

May be produced by setting out any required quantity in open tubs during a severe frosty night, when the top will be found frozen over. The ice, being the aqueous particles, is then to be taken off and thrown away, and the residue, of strong cider, casked and corked down.

211. *Quadrature of the Circle.*

This problem may be solved by a very simple method, for the invention whereof we are indebted to Mr. A. C. Luthman, printer, of Hereford.

Let a sphere be made, likewise a perfect *hollow cube*, one of the internal sides of which must be equal to the diameter of the sphere. Then let the sphere be placed in the hollow cube, and pour water into the vacant space around the sphere, until the water is exactly level with the edge of the cube, and consequently with the top of the sphere; after which take the sphere carefully out, and measure the proportion which the depth of water left in the cube bears to the vacant space lately occupied by the sphere. Deduct the quantity of space occupied by the water from the entire space contained by the cube, and the remainder will be the solid contents of the sphere. In order to find the proportion between the circle and the superficial square, let a cylinder be made of the same diameter as the sphere above-mentioned, and equal in height to one of the internal sides of the cube; pour water around it, until the water is level with the edge of the cube; then carefully take out the cylinder, and find the proportions, as previously directed for the sphere. As the proportion of the cylinder is to the cube, so will the proportion of the circle be to the square.

212. *A brilliant Red Colour*

May be obtained by collecting from the plant *Belladonna Atropia* its white shining particles, that are found crystallizable in long needles; mix these with *potassium*, in a red heat, and the ashes, when mixed with the muriate of iron, come off of a brilliant red.

Journal de Physique.

213. *Old Fruit Trees resuscitated.*

Those, which by producing small shrivelled fruit in small numbers, show signs of decay—if that be not also visible on the back, may be restored, in great measure, by the application of a good strong lime-wash; at least, such has been the case with a good number of apple trees in the hundreds of Essex. The lime being brought unslacked to the spot, is there to be made into a wash, and as quickly, as may be, applied to the trunks and lower branches of the trees with a brush or house-broom; the consequence was, that the decayed rind fell off, and with it the moss and insects that infest the aged, a new rind formed of healthy aspect, and the trees again bear fruit of fine quality.

314. *Macaroni and Vermicelli.*

In *substance* the same, though differing in *form*, they are both held grand secrets pertaining to the south of France, about Nice. Flour of wheat is the basis of both, and the chief secret consists in bringing it to market in a showy state. The meal is first to be cleared of the husks, or bran, or *cuticle* of the seed; then the finest of the flour being taken away speedily, there will remain two parts to be divided. The coursest of these being bolted, or sifted, in equal parts from the residue, (which will be found the more glutinous.)

215. *Contagion-preventive.*

A piece of sulphur rolled up in cotton, and worn constantly about the person, is said to be an effectual preventive of every kind of contagion. Care must be taken to renew the sulphur from time to time.—*French Journal.*

Tar is found to be a preservative against the plague, and is frequently used in lazarettoes and infected places, being applied to the doorways, passages and floors of entry. The case of a monster (man) supposed to be invulnerable occurred at Barcelona, in 1822; he covered himself with a coil of tarred rope from head to foot and wore a mask with glass eyes; and in this manner, walking upon stilts, visited the most frightful abodes of disease and death in several infected places, without having contracted the plague or fever, though death spread its victims on every hand. He was detected slaying a diseased Frenchman, and immolated on the spot.

216. *Platinum.*

THE largest piece of this metal ever heard of weighs one pound and a half. It was found by a negro slave in the gold mines of Condolo, in the government of Choco, and is now lodged in the royal museum of Madrid.

217. *New Yellow Dye for Silk.*

IMMERSE well-cleansed skeins of silk in a weak solution of subacetate of lead, made warm; in a quarter of an hour take it out, let it drain, and then put it in a weak solution of chromate of potash, which brings up a yellow colour that increases as the silk lies longer in the last solution. A greater degree of heat is necessary for the first mentioned liquid, when cotton, linen, or woollen are to be dyed; but even then these articles are liable to lose the colour upon being washed with soap.

Instead of the neutral chromate of potash, a solution of native chromate of iron may be substituted: then let it be decomposed by nitrate of potash, and saturated with nitric acid.

233. *Discoloured or Damp Walls.*

Whatever the impregnation such walls have received, several kinds are wholly incurable) penetrating through fresh plastering, and rotting hollow cloth linings; but if the sheet lead, which comes to us in the way of lining round tea-chests, be nailed up, with copper nails, against walls so affected, they may be papered immediately, and will resist the influence of whatever acid may be in the walls. Lead may be rolled of extreme lightness, say three or four yards to the pound, and will be found to answer the purpose well.

234. *Fresh or Potable Water*

May be obtained on the sea-shore, by digging wells a short distance above high-water-mark in the sand, through which the water may filtre. The depth and distance from the sea must be regulated by the quality of the substratum, or an artificial bottom may be formed of clay. When dug, which should be at the time of low water, the pit or well should not then admit water in any quantity. The chance of obtaining a good supply will be increased, if the sides of those dry drains are chosen where the rain has descended from the country during the rainy season.

235. *Artificial Jewels of Eight Kinds.*

Much has been said on this subject, and the ancient methods, with their modern improvements, resolve themselves into the manufacture of *strass*, as the basis of seven or eight close *imitations of precious stones.*

Strass, or *white crystal.* Three different recipes are given by Mr. Wieland, for forming the base of his subsequent imitations, rock crystal being the chief ingre-

dient; for the modification whereof the other materials are but applied and fly off, or are nearly destroyed in the fusion. His proportions, given with much exactness, but which may be altered according to circumstances, are as follow, each producing a very fine *strass*.

	1st.	2d.	3d
Rock crystal	0.318	0.3170	0.300
Minium	0.490	0.4855	0.565
Pure potash	0.170	0.1770	0.105
Borax	0.021	0.0200	0.030
Oxide of arsenic . . .	0.001	0.0005	—
	1.000	1.0000	1.000

Melt in Hessian crucibles, and subsequently a pipe-maker's furnace may be employed, or that of a potter, taking especial care that the fusion be prolonged and tranquil, which produces greater hardness and brilliancy than when the process is hurried.

Another recipe, composed by Mr. Lanson, produces a pure strass :—

Litharge	0.540
White lead	0.406
White tartar, or potash .	0.054
	1.000

Emerald Paste.

This imitation is the easiest mode of those we shall here describe the method of making; and that which comes off nearest to the mineral is as follows :—

Take of strass	0.98743
Green oxide of copper .	0.01200
Oxide of chrome	0.00057

Another recipe for emerald imitation :—

Take of strass	0.9905
Acetate of copper	0.0080
Per oxide of iron	0.0015
	1.0000

Deep coloured Emerald and Peridot

May be procured by augmenting the proportion of oxide of copper and oxide of chrome in the before-mentioned recipe, and adding also oxide of iron; hereby the green shades are varied, and the imitation of either rendered more perfect.

Sapphire.

The composition for this paste is,

Very white sample of strass	0.9855
Pure oxide of cobalt	0.0145

Place the mixture in a crucible carefully luted, and let it remain thirty hours in the fire, and if the process be carefully conducted, according to the general instructions, the result will be a very hard glass, without bubbles.

Syrian Garnet.

This paste is used for small jewel imitations :

Take of strass	0.6630
Glass of antimony	0.3320
Purple of cassius	0.0025
Oxide of manganese . . .	0.0025
	1.0000

Beryl, or Aqua Marine.

Take of strass	0.9926
Glass of antimony .	0.0070
Oxide of cobalt. . .	0.0004

Amethyst.

Two methods are employed. First, for very deep amethyst,

Take of strass	0.9870
Oxide of manganese .	0.0078
Oxide of cobalt . . .	0.0050
Purple of cassius . .	0.0002
	1.0000

Amethyst Paste.

Second method :—

Take of strass	0.9977
Oxide of manganese .	0.0022
Oxide of cobalt	0.0001
	1.0000

Topaz.

The imitation of topaz is difficult. The white of strass passes to yellow (like sulphur), to violet, and to a red purple, according to circumstances not yet ascertained. The most simple and palest is composed of 99 per cent. of white strass, with one per cent. of oxide of iron.—Secondly,

Take of white strass	0.95816
Glass of antimony . . .	0.04089
Purple of cassius . . .	0.00095
	1.00000

These mixtures sometimes yield an opaque mass, translucent at the edges and of a red colour, in thin plates. By mixing it with eight times its weight of strass, and keeping the mixture in fusion for thirty hours in a potter's furnace, the result is a fine yellowish crystal.

Ruby.

Take of the crystal last produced, and submit it to the action of the blow-pipe until remelted, when the most exact imitation of eastern *ruby* comes off. But another method, with a less brilliant result, is to

Take of strass	0.9755
Oxide of manganese .	0.0245
	1.0000

General instructions on the foregoing.— In making these pastes many precautions are necessary, which can be learned only by experience; meanwhile the reader may as well take care not to inhale the effervescence arising from some of these experiments. The hard materials should be carefully pulverised, and the same carefully sifted separately. None but the most pure should be employed, particularly where that precaution has been more generally given, lest bubbles and stripes do supervene. Mix in a state of extreme tensity; and graduate the fire up to the maximum temperature, leaving the mass in the fire from 24 to 30 hours, and let it cool very slowly.

236. *Rheumatism.*

No doubt the pain experienced by thousands of persons throughout this humid island, resides in the various component parts of the solids, differently in different

persons. Hence the variety of remedies proposed and believed to have been found efficacious, as the habits or ages of the patients differ. A *young man* of Horsham, reduced to the extremity of going upon crutches, found relief in the application of young nettles to the parts, and a cure in three days.

237. *Plumbs may be preserved*

For years by observing the economy here recommended. Let the fruit be gathered when quite dry, taking care not to bruise it. Lay it in a sieve for a day or two to shrivel. Prepare a jar by rincing it with a small quantity of brandy; and use moist sugar. Place a layer of fruit and another of sugar, till the jar is full, then bung and rosin it, and it may be kept for years.—Damsons may be done the same way, but the result is more precarious.

238. *Solder for Steel Joints.*

Take of fine silver . . . . 19 pennyweights.
Copper . . . 1 ditto.
Brass . . . . 2 ditto.

Melt these under a coat of charcoal dust, and a most excellent silver solder will be the result: it possesses several advantages over the usual speltar solder, or brass, when employed in soldering cast steel, &c. as it fuses with less heat, and its whiteness has a better appearance than brass.

239. *Atar of Roses.*

The production of this precious essence is by no means difficult, provided the material is supplied in quantities

sufficient for the purpose,—an hundred weight of roses seldom yielding more than two or three ounces of atar. Let the roses, with their calyxes, be immersed in double their weight of water; put the whole into a still (Dutch fashion) and run off carefully, and the operator will find he has obtained a strongly scented rose-wine. This he must cool quickly by the night air, and next morning gather from its surface the globular particles to be found more or less, according to the quality of the roses employed, which depends less upon the kind than the land they grow on, and the sort of season they are produced in. These circumstances affect the colour of the atar, which comes off sometimes of a golden yellow, approaching to red; at others, brownish (earthy), and seldom *green*. Grass of peculiar fragrance is frequently employed along with the roses, which also imparts a greenish tinge, is less oily, and less fragrant than the germinal atar; as is in a greater degree the introduction of sassafras, sandal wood, &c.

After the atar has been gathered a good rose-water remains; which, if not of the desirable pink colour, may be rendered so by the admixture of some fresh juice of red rose-leaves.

240. *Poisoning by Oxalic Acid.*

So many accidents have occurred in this year, 1822, to persons who have unfortunately taken the oxalic acid, under the appalling mistake of shopfolk serving it for Epsom salts, that no apology is necessary for *recreating* the reader with this admonition, and the ready means of avoiding the same dreadful catastrophe. Simply by placing *a drop* on the tongue, the acid is more apparent, fetor is produced by the action of this trivial quantity,

and the patient will soon find occasion to quell its effects by the saliva or by water.

No means can be more obvious than this, and the precaution thus seriously given, may provoke the risibility of the inconsiderate. Let it: but most people take physic, not only with their eyes shut, literally, but their senses also, by reason of nauseating the remedy; and these belong to the same inconsiderate class we just now rebuked. These require strong reasons and many words to put them on their guard, even of their lives; and there is no propriety in permitting people to poison themselves unwittingly, because they happen to belong to the foolish part of the creation; for we might thereby lose some very valuable men-milliners and dancing-masters, and leave in danger the greater half of our population.

Second Test. Since so many people dread *the taste* of salts until they have got them fairly down, when, in case of mistake, no remedy is at hand, nor any measure more proper than making a nuncupative last will and testament:—let the salts be mixed with a silver spoon; then wiping it dry, smell at it, and if the mixture be really salts, nothing will be perceptible, more than if it had been in simple water. But should the spoon have been in a solution of oxalic acid, it will impart a very strong and suffocating smell, so nauseous and filthy, as to leave a lasting impression on the remembrance of the operator.

*** It is known from experience, that a heaped table spoonful of magnesia, mixed in a middling-sized tumbler of water, and drunk immediately after oxalic acid has been swallowed, will save life.—*Morning Herald.*

241. *Bread: two Methods of obtaining the Leaven.*

1. The Swiss method, is performed by agitation in a simple machine. It is a deal box, a foot in breadth and height, and two feet in length, placed on supports, by which it is turned by a handle like the cylinder used for roasting coffee. One side of the box opens with a hinge to admit the dough, and the box is turned round. The time requisite to produce fermentation depends on the temperature of the air, the quickness of the turning, and other circumstances; but when the operation is perfect, it is known by the shrill hissing of the air making its escape, which generally takes place in half an hour The leaven is always extremely well raised; perhaps too much sometimes. The labour is nothing, for the machine, such as is here described, may be turned by a child. No hooks, points, cross-bars, or any other contrivance are necessary within the box, to break or separate the mass of dough; for these operations are effected sufficiently by the adhesion of dough to the sides of the box.

N. B The box need not be cleaned out in the intervals of its being so employed.

2. Mix up smoothly a pound of new wheat-flour with water, increase the quantity to two gallons, adding thereto a pound of moist sugar and two ounces of salt. Boil it well about an hour, and when the temperature is of a milk warmth, bottle and cork it for use—which may be the next day. A wine pint will raise a stone of flour.

242. *Water-proof Boots.*

Ordinary boots and shoes may be rendered impervious to water by applying the following compost, which

has undergone a little mutation, according as the seasons vary :—Take three ounces of spermaceti, and melt it in a pipkin, or other earthen vessel, over a slow fire; add thereto six drachms of Indian rubber, cut into slices, and these will presently dissolve. Then add, *seriatim*, of tallow eight ounces; hog's lard, two ounces; amber varnish, four ounces. Mix, and it will be fit for use immediately. The boots, or other material to be treated, are to receive two or three coats, with a common blacking-brush, and a fine polish is the result.

243. *Fish Preserver.*

Sugar effects this desirable end, and kippered salmon is produced of peculiarly fine flavour, on being cured by this process. If deemed desirable, salt may be first applied to the fish; but it is not necessary to its preservation. Let the fish be opened, and apply sugar to the fleshy parts, leaving it on a dish or tray three or four days; then hang it up in a dry place, or near the smoke of wood fire; wipe it, if mouldiness appears.

244. *Water raised by boring.*

After the Cornish method of finding minerals has been pretty much and successfully employed, where none had been hitherto found. It being the cheapest way of coming at the most inexhaustable supply hitherto practised, no apology is necessary for the minute description; 1st of, the tools; 2d, of the manner of using them more effectually.

A circle being dug to the depth of eight or ten feet, the first tool used is an auger; the shell part, which forms the hole or bore in the earth or strata through which it passes, is mostly from three and a half to four inches in

diameter; the hollow part of it being about twelve inches in length, and constructed nearly in the form of a carpenter's common auger. There are also a chisel and punch for screwing on, in going through hard gravel or metallic substances, in order to expedite the passage of the auger, which could not otherwise perforate such hard bodies. The punch is often used, when the auger is not applied, to pierce or open the sand or gravel, and give a more easy issue or discharge to the water.

The manner of using the auger in working of it is simply thus:—Two or three men are necessary.—Two stand on a stage, erected about twelve or fourteen feet above the ground, who turn it round by means of a wooden handle, and when the auger part is full, they draw it, out of the hole, and the man below clears out the earth with an instrument for the purpose, and assists in pulling the auger up out of the hole or bore, and in directing it into it again; and can also assist in turning with the iron handle or key, when the depth and length of the rods require additional force to perform the operation. The workmen should be careful, in boring, not to go deeper at any one time, without drawing an exact length of the shell of the auger, otherwise the earth, clay, or sand, through which it is boring, after the shell is full, may make it hard to pull out.—A cylindrical pipe being passed in the hole, and driven downward with a mallet, and the boring continued, the pipe may be forced down to a great depth, so as to reach the water or spring. The pipes should be either of cast iron, or other metallic substance, and made to fit with great exactness the aperture made by the boring auger, or they will not be durable, but speedily become leaky and out of order. Wells made in this manner are superior to those constructed in the common method, not only in point of cheapness, but also

by affording a more certain and constant supply of water. In case the water near the surface should not be of good quality, the perforation may be continued to a greater depth, till the pure fluid can be procured. When old wells have become injured or tainted, the bottom may be perforated in a similar manner, so as to reach the lower sheet of water or main spring: the water will then rise in the cylindrical tube in a pure state, and flow into the body of the well or pump fixed for the purpose of bringing it up.

246. *Process for purifying Oil.*

Generally speaking, the use of animal charcoal (made of boiled beef bones, &c.) has been insisted upon pretty strongly in the earlier pages (26, &c.) of this volume; the present application of it, as a cleanser, may, therefore, be looked upon as only an additional proof, with more marked particulars, and accurately estimated results.

Let the charcoal be mixed with oil of the most ordinary quality, and greatly agitated for a season—from one week to six, according to circumstances; and there will be found to subside much, if not all the impurities which cause the noxious effluvia. The supernatant oil will obtain the quality of fine sperm; but if it is desirable it should be of the finest, a second operation of the same kind may be resorted to, and the additional one or a filter through the same species of cleanser—animal charcoal.

N. B. Observe it be used *as soon as made*, according to our general observations made, as before referred to.

During the operation, a great quantity of gas is evolved by the bones, which is collected and used in the

factory where this cleansing is carried on upon a large scale.

About 15 per cent. is lost in residuum, which is worth but little as joint manure with other substances, or as out-door fuel when mixed with clay. On the other hand, the fine material produced is 40 per cent. better than originally; leaving a balance of about 20 per cent. to the manufacturers; and not 25 per cent. as erroneously stated elsewhere.

247. *Enamel, called Niello.*

Take one part of pure silver, two of copper, and three of pure lead, fuse them together, and pour the amalgam into a long necked earthenware matrass, half filled with levigated sulphur; let the mouth of the vessel be immediately closed, and the contents left to cool. The mass which results, when levigated and washed, is ready for the purposes of the artist. The cavities left by the fusion having been filled with it, the plate is to be held over a small furnace, fed with a mixture of charcoal and wood, taking care to distribute the enamel with the proper instrument. As soon as fusion has taken place, the plate is to be removed; and, when sufficiently cooled, is to be cleared by the file, and polished by fine pummice and Tripoli.

248. *Corrosive Sublimate.—Antidote.*

M. Taddei, professor of pharmacy, in the hospital of Santa Maria Nuova, at Florence, has discovered that the gluten of wheat, dissolved in water with soap, is an antidote for the terrible effects produced by corrosive sublimate.

249. *Cold Cream.*

The article sold under this name is composed of white wax, almond oil, and rose water, in the following proportions :—

Take of almond oil . . . . 4 oz.
White wax . . . . 1 oz.

To be gently melted, and well blended with four ounces of fresh rose water, by trituration in a warm marble mortar. The rose water should be added very gradually.

250. *Lithography: cheap Substitute for the Stone usually employed.*

Pasteboard or Card-paper, covered with an argillo calcareous mixture, has been employed by Mr. Senefelder with complete success, and effects a great saving, — the Magnerian limestone having become exceedingly dear. The material is to be reduced to a powder, and laid on wet: it sets of course immediately, and may be applied to a more substantial article than paper, and upon a more extensive scale than the inventor has yet carried it to. This coating receives the ink or crayon in the same way that the stone does, and furnishes impressions precisely in the same manner as the stone does.

251. *Shower-bath and Cold Affusion.*

Although it would not be going out of the course prescribed to the composition of these pages, to show the valuable effects of *the bath*, yet is the beneficial tendency of its free use so universally known, as to warrant us in at once pointing out that most obvious shower-bath,— the garden watering-pot Excelling the plan usually

adopted in simplicity, ease, and neatness, this machine is to be found almost everywhere at hand, at a small or no expense. Let the patient sit on a stool, and the operator presenting the rose or nozzle of the pot over his head, he may apply a shower of more or less quantity at will: he will walk round the patient, probably, and not alarm the latter by an application too forcible at first. Our own family convert the operation into a subject of high diversion.

Affections of the head, which arise, notwithstanding the usual remedy of an open canal fail, by reason of study, or other perplexity, may be alleviated in a great measure by wiping the head frequently with a large sponge charged with water. This checks the determination of the blood that way, and keeps off delirium, if not insanity.

252. *To render Wood Fire-proof.*

Linen and paper resist the action of fire awhile (though they become charred by it) after being dipped in a solution of acidulous phosphat of lime, of the specific gravity of 1.25 or 1.30 at most. Timber may be simply immersed or saturated in the solution, to render it incombustible, or, according to the more laboured process of Mr. Cook, of Birmingham, when the tree is cut down, the sap being driven out (it will *run* off, if the tree be kept aslant or upright) he saturates it by filling up the pores with a solution of alkali, which occupies little time at a small expense.

Ladies' dresses of muslin, &c. after being wrung out of the last water as usual, should be rinced in a solution of pure vegetable alkali, which may be obtained perfectly colourless, and is without effluvium.

Apartments, furniture, &c. which may be inhabited by troublesome or noxious insects, may be cleared of those disagreeable inmates of all large towns, by the same means, besides the additional recommendation of being rendered incombustible.

It is worthy of observation, that bugs never infest houses or furniture in which wood-fires only are used, nor the towns where these prevail; and also that wasps and bees prosper little, where they are exposed to an atmosphere impregnated with the smoke of coal.

253. *Curious Percussion Experiment.*

If a blacksmith strikes his anvil with a hammer, action and re-action are equal, the anvil striking the hammer as forcibly as the hammer strikes the anvil. If the anvil be large enough, a man may place it on his breast and suffer another person to strike it with all his force, without sustaining any injury, because the *vis inertio* in the anvil will resist the force of the blow; but if the anvil be too small, the blow will be fatal.

254. *Females Clothes being fired,*

It is usual for the domestics to tear them off as soon as possible, but they should know that this is at all times a dangerous proceeding. Instead of this destructive practice, throw a large quantity of vinegar over the clothes the instant the fire is extinguished, without taking any off, and continue to do so for an hour or two—this will lay some blisters, and prevent others rising—then the clothes may be safely taken off. If a blister break, it must be dressed with ointment used for burns; but in

general an immediate application of vinegar will prevent all bad consequences. Violently tearing off the clothes causes the tops of the blisters (which rise immediately from scalding or burning) to be broken, and they become inveterate sores. If blisters do not fall, lay cloths over them steeped in vinegar, and wet them often. The immediate cure depends on the blisters not being broken, persons ignorant of this, generally let the water out with the scissars—a ruinous error. If vinegar is not handy, throw water over the clothes, and continue to do so until vinegar can be procured.

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255. *Arithmetical Paradox.*

In an Arabic manuscript was found the following remarkable decision of a dispute :—Two Arabians sat down to dinner; one had five loaves, the other three. A stranger passing by, desired permission to eat with them, which they agreed to. The stranger dined, laid down eight pieces of money and departed. The proprietor of the five loaves took up five pieces, and left three for the other, who objected, and insisted for one half. The cause came on before Ali, the magistrate, who gave the following judgment :—" Let the owner of the five loaves have seven pieces of money, and the owner of the three loaves one." *Query*, The justice of the sentence? — *Answer*. Ali's sentence was just; for, suppose the loaves to be divided each into three equal parts, making twenty-four parts in all the eight loaves, and each person to eat an equal or eighth part: therefore, the stranger had seven parts of the person who contributed five loaves, or fifteen parts, and only one of him who contributed three loaves, which make nine parts!

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256. *Turkish Mode of Correspondence.*

The art of writing is not general among the Turks; and when they are in love with a person to whom they cannot have easy access, they have a mode of writing their sentiments without pen, ink, or paper, by means of flowers, fruits, wood, silks, stuffs, and colours, of which they make a packet, each article having an allegorical sense; this packet they call a *selam.* Those who employ this mode of communication have always a casket full of things to compose a *selam.* They have a dictionary which they know by heart, of the allusions they wish to give by their flowers, &c. Thus: An ambret signifies—*We are both of one mind.* A piece of a rose bush—*I weep continually, but you deride my tears.* A piece of cloth—*I am tired with your importunities.* A piece of canvass or buckram—*We shall be together to-morrow.* A piece of silk—*You have gained my mind.* A piece of looking-glass—*I am ready to sacrifice myself to you.* A pistol—*I love you very much.* A grain of a raisin, some blue silk, a pea, a morsel of sugar, and a piece of wood of aloes arranged in certain order, forms a billet-doux to this purpose:—"My heart, I am in love with you; the pain which my love occasions me has nearly deprived me of my senses; my heart passionately desires you.—Give my disease the necessary remedy."

257. *Sea-Sickness.*

In addition to some general instructions for keeping off this disagreeable species of attack (page 165) we are furnished with the following practical adoption of one idea there thrown out. The person had already experienced an attack, when, says he, "I seated myself in a chair upon the deck, and commenced a sharp libration

of the body, such as it receives in trotting; and, in a few minutes, the previous nausea abated. In a quarter of an hour I recovered my spirits; in half an hour felt a desire to eat, which I indulged, to the surprise of those who were around me. In fine, I kept up the action, more or less, during the three hours in which we were in rough water, in which time I emptied my pockets of eatables; and, afterwards, I was as well as though I had merely taken my customary morning's ride."

258. *A Corrective of bad Water.*

Five drops of sulphuric acid put into a full quart decanter of bad water, will cause the noxious particles to fall to the bottom. Twenty drops of diluted vitriolic acid will answer the same purpose. The water should stand two hours, and then pour off about three parts for use, the rest throw away.

259. *Dysentery and Bilious Disorders.*

The medical qualities of pulverized charcoal are daily developing themselves. In addition to its value in bilious disorders, two ounces of the charcoal, boiled in a pint of fresh milk, may be taken in doses of a wine glass full, by adults, every two hours, in the most obstinate dysentery, until relief is imparted, which has not failed to be the effect in almost every instance. It is harmless, and the experiment may be safely tried. Charcoal made from maple wood is the fittest for this purpose.

260. *Method of breaking Glass in any required Direction.*

Dip a piece of worsted thread in spirits of turpentine, wrap it round the glass in the direction that you require it to be broken, and then set fire to the thread, or apply a red-hot wire round the glass, and if it does not immediately crack, throw cold water on it while the wire remains hot. By this means glass that is broken may often be fashioned, and rendered useful for a variety of purposes.

261. *A Mordant for Moiree of Chrystallised Tin.*

Sulphuric acid, diluted with six parts of water	3 ounces.
Nitric acid, from	1 to 2 drachms
Dilute solution of chlorine	4 ounces.
Oxalic acid	2 scruples.
The juice of an orange.	

With this liquor the brilliant ground may be darkened at pleasure. An addition of ammonia to the liquor makes it darker; and still more so, by adding to it a little sulphate, or acetate of copper. After the action of the mordant ceases, it may be again altered. By carbonate of potash the brilliancy is softened, and raised by caustic potash: either must be well diluted with water. If a tinned iron of a fine grain be required, the mordant must at first be applied, and then the tinned iron be heated in a furnace till the tin begins to melt; it is then taken out and sprinkled with fine drops of water.

262. *Black Paper for tracing Patterns for Needle-Work, &c.*

Mix smoothly lamp-black and sweet oil; with a bit of flannel spread it over a sheet or two of large writing paper, then dab the paper dry with a bit of fine linen, and keep it fit for use in the following manner:—

Put the black side on a sheet of plain paper, and fasten the corners together with a small pin, lay on the back of the black paper the pattern to be drawn, and go over it with the point of a steel pencil; the black paper will then leave the impression of the pattern on the under sheet, on which you must now draw it with ink.

Cloth or muslin may be so treated instead of paper, in which case use stone blue, a bit of sugar, and water (instead of lamp black and oil) employing a piece of wool to lay on the colour. In this case, the mixture may be kept ready made in a cup, and it will always be fit for use, if a little water be added when too dry.

Patterns on cloth or muslin may be drawn with a pen dipped in this mixture of blue.

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263. *Pomad Divin.*

Clear a pound and a half of beef marrow from the strings and bones, put it into an earthern pan or vessel of water fresh from the spring, and change the water night and morning for ten days, then steep it in rose water 24 hours, and drain it in a cloth till quite dry. Take an ounce each of storax, gum benjamin, ordoriferous cypress powder (of Florence), half an ounce of cinnamon, two drachms of cloves, and two drachms of nutmegs, all finely powdered, and mix them with the mar-

row above prepared. Put all the ingredients into a pewter pot that holds three pints; make a paste of white of egg and flour, lay it upon a piece of rag, and over it another piece of linen. With this cover the top of the pot very close that none of the steam may evaporate; put the pot into a larger copper pot with water, taking care to keep it steady, that the water may not reach to the covering of the inner pot. As the water shrinks, constantly add more, boiling hot; for it must boil four hours without ceasing a moment. When the steam has ceased to rise, uncover and strain the ointment through a linen cloth into small pots; and cover these up close with bladder and paper as soon as cold. Silver knives and spatula should be used, those of other materials absorbing a part of the odours.

264. *Rouge for the Ladies.*

Fine carmine, properly pulverized and prepared for the purpose, is beyond all question the best composition that can be employed with safety and effect; it gives the most natural tone to the complexion, and imparts a brilliancy to the eyes, without detracting from the softness of the skin. In order to use it economically, procure some of the finest pomatum (without scent) in which mix a very small portion of white wax; of this pomatum take about the size of a pea, flatten it upon a piece of white paper; then take, on a pointed penknife, or the end of a toothpick, about the quantity or size of a pin's head of the *carmine*, mix it gently with your finger, and when you have produced the desired tint, rub it on a little compressed cotton, pass it over the cheeks till the colour is entirely spread, and it ceases to be greasy. Ladies who have been accustomed to paint,

and cannot therefore entirely relinquish the use of it, will find, upon trial, that this economical rouge will neither injure the health nor the skin, and that it imitates perfectly the natural colour of the complexion.

265. *Cold Cream, or Pomatum for the Complexion.*

TAKE oil of sweet almonds one ounce, and half a drachm each of white wax and spermaceti, with a little balm of gilead; melt these ingredients in a glazed pipkin over hot ashes, and pour the solution into a marble mortar, stirring it about with the pestle till the whole becomes smooth, and is quite cold. Add gradually an ounce of rose or orange-flower water, stirring the mixture till all is well incorporated, so as to become extremely light and white, resembling cream, from its similitude to which the name is derived. This pomatum, or cold cream, is an excellent cosmetic, rendering the skin at once supple and smooth. It is also serviceable in preventing marks from the small pox, especially when it has the addition of a little powder of saffron. The gallipot in which cold cream is kept should have a piece of bladder tied over it.

266. *Lip Salve.*

TAKE half a pound of hog's lard, put it into a pan with one ounce and a half of virgin wax; let it stand on a slow fire till melted. Then take a small tin pot filled with water, and put therein some alkanet root; let it boil till of a fine red colour; then strain off some, and mix it with the preceding ingredients, according to fancy.

Scent the compost with essence of lemon ; pour it into small boxes, making smooth the top with your finger.

267. *Sweet scented Bags to lay in Drawers among Linen, or for the Pocket.*

PROCURE half a pound of coriander seeds, half a pound of sweet orrice-root, half a pound of damask rose leaves, half a pound of calamus aromaticus, one ounce of mace, one ounce of cinnamon, half an ounce of cloves, four drachms of musk powder, two drachms of loaf sugar, three ounces of lavender flowers, and some rhodium wood ; beat these well together and sew up small portions in silk bags.

268. *Opiate for the Teeth.*

TAKE one pound of honey, boil and skim it well ; add a quarter of a pound of bole ammoniac, one ounce of dragon's blood, one ounce of oil of sweet almonds, half an ounce of oil of cloves, eight drops of essence of bergamot, two ounces of honey water: mixed these ingredients well together, and put into pots for use.

269. *Improved Hungary Water.*

THIS fine scented water, well known by the name of the water of the Queen of Hungary, for whose use it was originally contrived, is generally made with the flowers and leaves of rosemary, infused an hour in spirits of wine, and drawn off by a slight distillation.

A readier and much improved method, however, has been adopted in France, where it is made without distillation in the greatest perfection. They take a large

handful of the flowers and tender leaves of rosemary, with a few of thyme, lavender and sage; then, putting all into a thick glass bottle, pour in a quart of spirits of wine; afterwards, by way of giving it colour, they put in a few pieces of alkanet root, instantly recork the bottle and shake it briskly, till the water obtains a purple tinge. This water is preferable to any other Hungary water, and particularly so, if it be placed, for at least a month, exposed on sand or gravel to the heat of the sun.

270. *Eau de Luce.*

Is a kind of liquid volatile soap, of a strong pungent smell, and is prepared as follows:—Ten or twelve grains of white soap are dissolved in four ounces of rectified spirit of wine, after which the solution is strained; a drachm of rectified oil of amber is then added, and the whole filtred. With this solution mix, in a crystal glass bottle, such a proportion of the strongest volatile spirit of sal ammoniac as will, when sufficiently shaken, produce a beautiful milk-white liquid. If a kind of cream should settle on the surface, add a small quantity of the spirituous solution of soap. Those who may wish to have this liquor perfumed, may employ lavender or hungary water instead of the spirit of wine.

This celebrated composition is however seldom obtained in a genuine state at the shops. Its use as an external remedy is very extensive, for it has not only been employed for curing the bites of vipers, wasps, bees, gnats, ants, and other insects, but also for burns, and various other purposes. Besides, it affords one of the safest stimulants in cases of suffocation from mephitic vapours, and in that state of apoplexy termed serous, as, likewise, after excessive intoxication, and in all those paralytic

complaints where the vessels of the skin or the muscular fibre require excitement; nevertheless, it must be used with due precaution.

271. *Vinegars of Orange Flowers, Elder Flowers, Clove, Gilliflowers, Musk Roses, Tarragon, &c.*

Dry an ounce of either of the above flowers, (except the orange flowers, which will not bear drying) for two days in the sun; then putting them into a bottle, pour on them a pint of vinegar, closely stop the bottle, and infuse fifteen days in moderate heat of the sun. Vinegars of any other flowers, as tarragon, &c. may be made in a similar manner.

272. *Superfluous Hairs, to Extract.*

Take two ounces and a half of rosin, and one ounce of bees' wax, melt these together and make it into sticks. Place the stick near the hair to be extracted, and press the hair's point into the stick and twist the latter round gently.

273. *Tooth Powder.*

Take half an ounce of cream of tartar, and a quarter of an ounce of powder of myrrh; rub your teeth with it thrice a week. See art. *Charcoal*, which being powdered, is also an excellent tooth powder.

274. *Rosemary Pomatum.*

Strip from the stem a large double handful of fresh gathered rosemary; boil it in a tin or copper vessel, with

half a pound of common soft pomatum or hog's lard, till it comes to about three or four ounces ; strain it off, and keep it tied down with bladder.

275. *Honey Water.*

Take of coriander seeds one pound ; cassia, four ounces ; cloves and gum benzoin, each two ounces ; oil of rhodium, essence of lemon, essence of bergamot, and oil of lavender, each a drachm ; rectified spirit of wine, twenty pints ; rose water two quarts ; nutmeg water a quart ; and musk, and ambergris, each twelve grains. Evaporate the water to dryness.—This is the *best* honey water.

An ordinary sort of honey water is frequently made, by merely putting two drachms each of tincture of ambergris, and tincture of musk, in a quart of rectified spirit of wine and half a pint of water ; filtering it, putting it up in small bottles, and it may pass for the best.

276. *Lavender Water.*

In a pint of spirit of wine put three drachms of the essential oil of lavender, and one drachm of essence of ambergris.

277. *White Chimney Ornaments,*

Of varied shape, or fantastically disposed, may be obtained from a solution of alum. Employ half a pound of alum to every pint of water, which may be deemed necessary for the entire submersion of the article to be heated ; put the same into a saucepan or other vessel adapted to the size and shape of the article,—say a stone,

a small vase, or a bit of cinder from coal, either of each will form a very pretty ornament. Suspend it by a string in the centre of the solution, place the vessel over the fire, and boil for an hour or more according to quantity, and the material will come forth with pleasing corruscations resembling spar or petrifaction.

278. *Ear Ache.*

Such attacks arise from several causes besides *cold;* and the pain has been removed in many cases by the introduction to the ear of small pellets of green hyssop. Like all other simple applications, it may not be invariably successful, nor is green hyssop always attainable; but the facility of procuring it, generally, and the unostentatious recommendation vegetable remedies carry with them, should deter us from turning our backs upon such recipes untried.

279. *Cement.*

For the use of turners and artisans generally, Mr. S. Varley makes known the following preparation of a very eligible cement, which has moreover the recommendation of being prepared at a small expence :—Sixteen parts of whiting are to be finely powdered and heated to redness, to drive off all the water. When cold, it is to be mixed with sixteen parts of black rosin, and one part of bees' wax; the latter being previously melted together, and the whole stirred till of an uniform consistence.

280. *Modelling.*

THE elegant and cheap chimney ornaments, manufactured by oriental seamen (mostly) here in London, are formed of rice-flour, cast into moulds, or *shaped* with tools whilst yet plastic.

An elegant cement may also be made from rice-flour, which is at present used for that purpose in China and Japan. Mix the flour intimately with cold water, and gently simmer over the fire; when it readily forms a delicate and durable cement, not only answering all the purposes of common paste, but is admirably adapted for joining together paper, card, &c. in forming the various beautiful and tasteful ornaments which afford so much employment and amusement to the ladies. When made of the consistence of plastic clay, models, busts, basso-relievos, &c. may be formed; and the articles, when dry, are susceptible of a high polish and are very durable.

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281. *Parsnip Wine.*

WINE made from the expressed juice of parsnips approaches nearer to the Malmsey of Maderia and the Canaries than any other wine. It is made with little expence or trouble, and only requires the addition of a small portion of brandy, and to be kept a few years, to make it as agreeable to the palate as wholesome to the body.

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282. *New Electrical Phenomena.*

THE effect of stroking a cat's back briskly with the hand, is well known as a domestic recreation; has been long and generally practised as an amusement, and is

frequently adopted as pastime of winter evenings. *Shocks* may also be imparted to *the other hand* than that which is employed in stroking the animal, by forming the electric circle as follows :—Let the cat be placed before a good fire, some ten or fifteen minutes ; then take it up on the lap of the operator, who passing the palm of the hand over its back the usual scintillæ will be emitted ; but let *the other hand* be applied to the throat, so as the finger and thumb touch the jaw or shoulder bone, and the hand so applied will feel slight shocks, as if discharged by the Leyden phial.

283. *Poison,*

By corrosive sublimate. M. Taddei, a French chemist, has found gluten to succeed as an antidote to this poison, better than the *white of an egg*, recommended by Orfila. A solution of the sulphuret of potash is considered by many practitioners as a more certain antidote than either of them.

284. *Sherbet.*

This celebrated oriental beverage, about which so much hath been written, said, and sung,—from the Arabian Nights to the present day, and which has been classed with the intoxicating wines of our civic gourmands, is the most simple diluent imaginable. A decoction of oatmeal and sugar seasoned, when cold, with rose water, is the brief recipe for making this far-famed drink.

285. *Action of Water on Metallic Arsenic.*

If water be boiled on metallic arsenic, which has been previously freed from any adhering oxyde, still the water will be found to contain, on examination, abundance of oxyde of arsenic. If water be distilled from off the metal, oxyde of arsenic will pass over in solution. Those experiments indicate a decomposition of the water by the metal; but the hydrogen which might be expected to result from such decomposition has not yet been obtained. "Probably," adds the experimentalist from whom this is derived, "it unites with the arsenic to form an *hydruret*.

286. *Jelly.*

A tolerable substitute for currant jelly, when this cannot be obtained readily, may be drawn from apples; and indeed is more agreeable to some palates. The more juicy fruit should be preferred. Let them be quartered, pared, and freed from the seed vessels. Put them into an oven, in a pot, but with a close lid, without water; or a good substitute for the oven will be found in the common boiler of the kitchen; in which having boiling water, the pot with the apples in, and closed down, may be placed and the heat kept up, until the contents are reduced to a pulp; say two or three hours. When the heat has made them soft, put them into a cloth, and wring out the juice. Put a little white of egg to it. Add the sugar. Skim it carefully before it boils. Reduce it to the proper consistency, and you will have an excellent jelly. Instead of egg, the back sinew of a cow-heel may be employed, or that of a leg of beef; after this has been reduced to jelly, mix the simple apple

juice; all being warm, add sugar and a few drops of lemon juice; and you will have another variety, more excellent than the first.

287. *Fabrication of Artificial Magnets.*

To the method of procuring the magnetic power for certain steel bars, &c. as given in the first volume (P. R. page 184) if we unite in the form of a square, two steel bars, and two contacts of iron, it is better to operate by the double touch in a circle, than by a motion forwards and backwards. Again, when we combine these bars in a square, the force of that which we wish to magnetise, ought to increase in proportion as the other magnet has become more energetic; that, in magnetising horse-shoe magnets, it.is much more advantageous to place two of these bent bars, with their friendly poles so situated as that the magnetic circle be completed; and that we should then touch circularly, with the magnet intended to communicate the power. When the two horse-shoe bars are separated, they will both lose a considerable part of their force, if we do not previously decompose the great circuit into two smaller ones, by applying each contact to its curved magnet before the separation. By observing this part of the process, the two separated magnets lose little or nothing of their power; and the two may be touched in the same time that one is, on the usual plan. Mr. Steinhäuser also lays the bar to be magnetised on others previously made, arranging these in the horse-shoe form.

*** To the long series of facts and observations in the first volume, we can add nothing new at present; though the *Magnetic Tour* of Mr. Hausteen, recently announced

and the return of Capt. Parry's polar expedition promise to add much to the stock of knowledge on this subject, and which we rather compress than dilate upon in these pages.

288. *Cure for Smokey Chimneys.*

Inflate a large ox's bladder with air, and tie it by the neck to the middle of a stick, which place across the inside of the chimney, about two feet from the top, or at the foot of the chimney-pot. The buoyancy of the air keeps the bladder continually in a circular motion, and thereby prevents the rush of air into the tunnel from descending so low as the fire-place.

289. *Ignis Fatuus, or Will-o'-Wisp.*

To a small quantity of water, in a glass tumbler, add phosphoret of lime in two or three small lumps: shortly will arise little flashes of light, darting out like petty lightning, and ascending subsequently in curling clouds; these appearances continue some time, and constitute a lively illustration of the formation of *ignis fatuus*, or light proceeding out of shallow pools of water.

290. *The Tulip,*

In its root, resembles, with much exactness, the ramifications of the future bulb, except in being produced under ground, as the latter is above it, and includes the leaves and flower in miniature, which are destined to be expanded in the ensuing spring. By cautiously cutting, in

the early spring, through the bulb of a tulip longitudinally from the top to the base, and taking off successively the concentric coats thereof, the whole flower of the next summer's tulip is beautifully exposed to the naked eye, with its petals, pistil, and stamina.

291. *Methods of Foretelling Rainy and Fair Weather.*

Let a line be made of good whip-cord, that is well dried, and a plummet affixed to the end of it, and then hung against a wainscot, and a mark drawn under it, exactly where the plummet reaches; in very moderate weather the plummet will be found to rise above the mark before rain, and to sink below it when the weather is likely to become fair. But a better contrivance still, is a good pair of scales, in one of which place a brass weight of a pound, and in the other a pound of salt, or of saltpetre, well dried; a stand being placed under the scale, so as to hinder its falling too low. When rain is about to fall, the salt will swell, and sink the scale; when the weather is growing fair, the brass weight will regain its ascendency.

292. *Contrivance for a Watch Lamp, perfectly safe, which will show the Hour of the Night, without trouble to a person lying in bed.*

It consists of a stand with three claws, the pillar of which is made hollow, for the purpose of receiving a water candlestick of an inch diameter. On the top of the pillar by means of two hinges and a bolt is fixed, on

a small proportionate table, a box of six sides, lined with brass, tin, or any shining metal, nine inches deep and six inches in diameter. In the centre of one of these sides is fixed a lens, double convex, of at least three inches and a half diameter. The centre of the side directly opposite to the lens is perforated, so as to receive the dial-plate of the watch, the body of which is confined on the outside, by means of a hollow slide. When the box is lighted by a common watch-light, the figures are magnified nearly to the size of those of an ordinary clock.

293. *Luminous Bottle, or Watch-light.*

A BIT of phosphorus, the size of a pea, is to be put into a long glass phial, and boiling oil poured carefully over it, till the phial is one-third filled. The phial must be carefully corked, and when used, should be unstopped a moment to admit the external air, and closed again. The empty space of the phial will then appear luminous, and give as much light as a dull ordinary lamp, and just sufficient to see the face of a watch. Each time that the light disappears, on removing the stopper it will instantly re-appear. In cold weather the bottle should be warmed in the hands before the stopper is removed. A phial thus prepared may be used every night for six months.

294. *Electrical Phenomena.—The Kite.*

MAKE a small cross of two light strips of cedar, the arms long enough to reach to the four corners of a large silk handkerchief, when extended; tie the corners of the

handkerchief to the extremities of the cross, and you have the body of the kite; which being properly furnished with a tail, loop, and string, will rise in the air like those made of paper; but this being of silk, is better adapted to bear the wet and wind of a thunder gust, without tearing. To the top of the upright stick of the cross is to be fixed a sharp pointed wire, rising a foot or more above the wood. To the end of the twine, next the hand, is to be tied a silk ribbon, and where the silk and twine join, a key may be fastened. This kite is to be raised when a thunder-storm appears to be coming on; and the person who holds the string must stand within a door or window, or some such cover, so that the silk ribbon may not be wetted with the rain; and care must be taken that the twine does not touch the frame of the door or window.

As soon as any thunder-clouds come over the kite, the pointed wire will draw from them the electric fire, and the kite, with all the twine, will be electrified, while the loose filaments of the twine will stand out every way, and be attracted by an approaching finger. When the rain has wetted the kite and twine, so that it can conduct the electric fire freely, the operator will find it stream out plentifully from the key on the approach of his knuckle. At this key an electric phial may be charged; and from electric fire, thus obtained, spirits may be kindled, and all other electric experiments performed, which are usually done by the help of a rubbed glass or tube, and thereby the identity of the electric matter with that of lightning completely demonstrated.

N. B. Much care is necessary when much lightning takes place; the string must then be held by a peg.

295. *Barometrical Curiosities of Nature.*

In flowers of every description, some change or other may be seen by the close observer, at every change in the state of the air in which they vegetate; and indeed this extends in more or less degree to every part of vegetable creation. We are even told, that in Siberia, where this operation of nature goes on most rapidly, it may be *heard* also on placing the ear to the ground. Of this, however—*non-constat.* The petals of most flowers expand in the sun, but on the approach of rain they contract, as they all do at night; but as the seeds become mature these indications cease. On the contrary, every one of the *trefoils* contract their leaves invariably at the approach of falling weather, and thus serve the cultivator as his natural barometer.

The Aquatic Tripod, or Tricipede.

WITH A PLATE,

representing its application to Wild Duck Shooting.

The principle upon which this machine is constructed, is that of procuring buoyancy in the water for a superincumbent weight, equal to the body to be placed upon it at any time; and is derived from the formation of military bridges by means of pontons; the mode of propelling it along being a new application to the ponton, varying in some trifling points in the hands of the several makers. Three strong tin, iron, or copper cases are to be formed of oval plates (in pairs) each of these being hollow in the middle, and bearing some resemblance to the largest dining dishes, say 30 inches long by 20 inches wide, and two being laid together, the edges are to be soldered, or welded strongly, and the case or ponton is com-

plete. See fig. 1; *a*, *b*, represents the side view, the *dotted line c* being the *side edge* of the junction of the two plates. All round, at this edge, let it be defended from injuries, by a sheathing of the same material, soldered on, with a wire in the middle, from which four other wires or rods are to ascend, from *a*, and *b*, from *c*, and its opposite, so as to meet just above the top of your ponton, with a centre resembling that of a crown; or rather the *lower plate* may be made larger than the upper one, and the projecting rim be hammered over the wire, and then welded, soldered, or brazed, according to the material employed. At the apex, or point of meeting, a knob of adequate dimensions *d*, to act as a socket for the supporting rod *e*, is to be attached. This knob may be made of box, oak, or any hard wood, or indeed of iron, and a pin passing up through the apex and knob will serve also to enter a hole in the *supporting rod*. A nut secures the whole together compactly.

The three pontons are thus arranged:—The first in front, the other two in the rear, at a distance of ten feet from the first and eight from each other. From each, as is seen, ascends a strong iron rod; these bending towards each other, at the junction, a seat is formed for the marine traveller, or sportsman, as the case may be; and the contrivance for navigating still waters may be considered complete. For his convenience and safety, however, the rider has a breast-high support ascending from his seat, in order that he may sit firm while taking aim at wild fowl, &c. for which this machine is peculiarly well adapted. He has also a pair of slings or stirrups the length of his legs, which being fastened to the saddle, add still more to the firmness with which he may carry on his operations. Several other addenda may also be contrived, as a ring to secure a fishing rod, or a gun-

before, and a basket to carry his *game*, &c. *behind*. Of course the strength of his whole machine must be adapted to these circumstances of additional incumbent weight, and of his own—if he be above the common size. The ascending wires (where they submerge) as well as the rims and *crowns* of the pontons, should be flattish at the sides, or sharpish *fore and aft*, so as to offer the least possible impediment to progression.

Next come to be described the means of strong, exact, and varied propulsion. This will of course be regulated by the obstruction offered to the rider's progress by parts of the machine itself in passing through the water, and the pressure he is enable to give to the water in the contrary direction, so as to steer himself along, or diagonally, as may be requisite. The machine of *M. de la Chapelle* had not its recommendation in the first particular †; that of *Mr. Kent* (a Scotchman) in the latter. That used by *Mr. Andrew Scheerborn*, at Scheveningen, in Holland, was more remarkable for strength than ingenuity: he traversed the rough sea off that place, and actually went through the terrible *breakers* there on the 15th of July, 1822, when they broke 12 feet high.

To Mr. Kent we are indebted for the application of *the paddles*, which are fastened to the soles of the feet or boots, by leather straps, like the spur-leather. These are made of block-tin four or five inches wide below, narrowing to the width of the boot, in shape of a dove's tail; at the narrow part next the sole is a joint, with a shoulder, to keep the paddle vertical when the rider

† Nearly a third of the voyager's body was under water, resembling the contrivance of Daniels, of Kendal, and others of our day; and we do not hear that M. de la Chapelle ever brought his Scaphander to perfection:—it was tried at Paris 1760. The same Frenchman invented *La Ventriloque*.

strikes out the foot, as he does backward ; but in bringing his foot forward, it will be seen, the joint permits the paddle to yield to the water as each foot respectively is preparing to strike out anew. The ordinary pace is that of walking, or alternating, now the right leg, now the left; but much greater speed, not to say velocity, is acquired by the rider seizing his " breast-high support," and striking out both legs at once. In the act of turning to this or that side, one leg is used vigorously, while the other remains quiescent, or the toe of the boot is protruded into the water to assist this operation, by way of pivot, or as boatmen say, to *back-water*. That is a mistake of Dr. Brewster's wherein he states, that the machine of Kent was " directed by means of a bridle."

The same exhibitor was also wrong in the shape of his pontons, which was an oblong hemispheroid, and presented four times the obstruction that will be found in those made after the foregoing directions. The consequence was, that he never proceeded with his machine at a greater rate than five miles an hour, and yet named it *Velocipede*. We cannot agree with the practice of throwing any degree of fable into the description of a machine (or other matter) likely to be applied to an useful purpose; and therefore protest that no gas or air (other than atmospheric) was introduced, or is at all necessary to the buoyancy of such pontons. That Mr. Kent might have " filled these cases with little hollow balls, attached by a chain, and capable of floating the machine in case of accident," is not improbable. We do not believe the fact, and conceive them utterly useless; and moreover, feel sincerely sorry to have occasion for making this remark.

We may add here, that this machine has been brought into use during the winter of 1822, in shooting the nu-

merous arctic birds which the season impelled upon our shores. I quote a cotemporary: "The Editor of the Chester Chronicle attributes the plenty of wild ducks to another cause than the hard weather: he says, 'These birds have had *a* desperate and fatal enemy in two men, from (we believe) Lincolnshire; they have a *sort of raft*, on which they float along the margins of rivers or lakes left by the tide. *On this raft is a large gun*, &c. Without further information, however, than that just quoted," says the Editor, whom I now transcribe, "We strongly suspect that the *sort of raft* spoken of is no other than the AQUATIC TRIPOD, or Tricipede, which has been lately used on some waters of Lincolnshire, with complete success."' Vide *Annals of Sporting* for January, 1823, page 126.

The sportsman represented on our plate is alone, without dog to fetch his game, or bag *to bag* it; he is likewise drawn uncumbered with the concealment sometimes practised, of bushes or sprigs hung about his person—that a clearer understanding might be had of the machine itself: in this instance, as in many others throughout this little volume, appearance is again sacrificed to utility.

THE END.

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