2d vol

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IMPROVED BRICK MACHINE.

We illustrate herewith a new brick machine, in which the bricks are moulded in sockets made in the periphery of a cylinder which rotates beneath a pug mill. The construction of the apparatus is both strong and simple, while its action is as rapid as is consistent with the production of properly pressed bricks. A perspective view of the machine is shown in Fig. 1, and a section in Fig. 2.

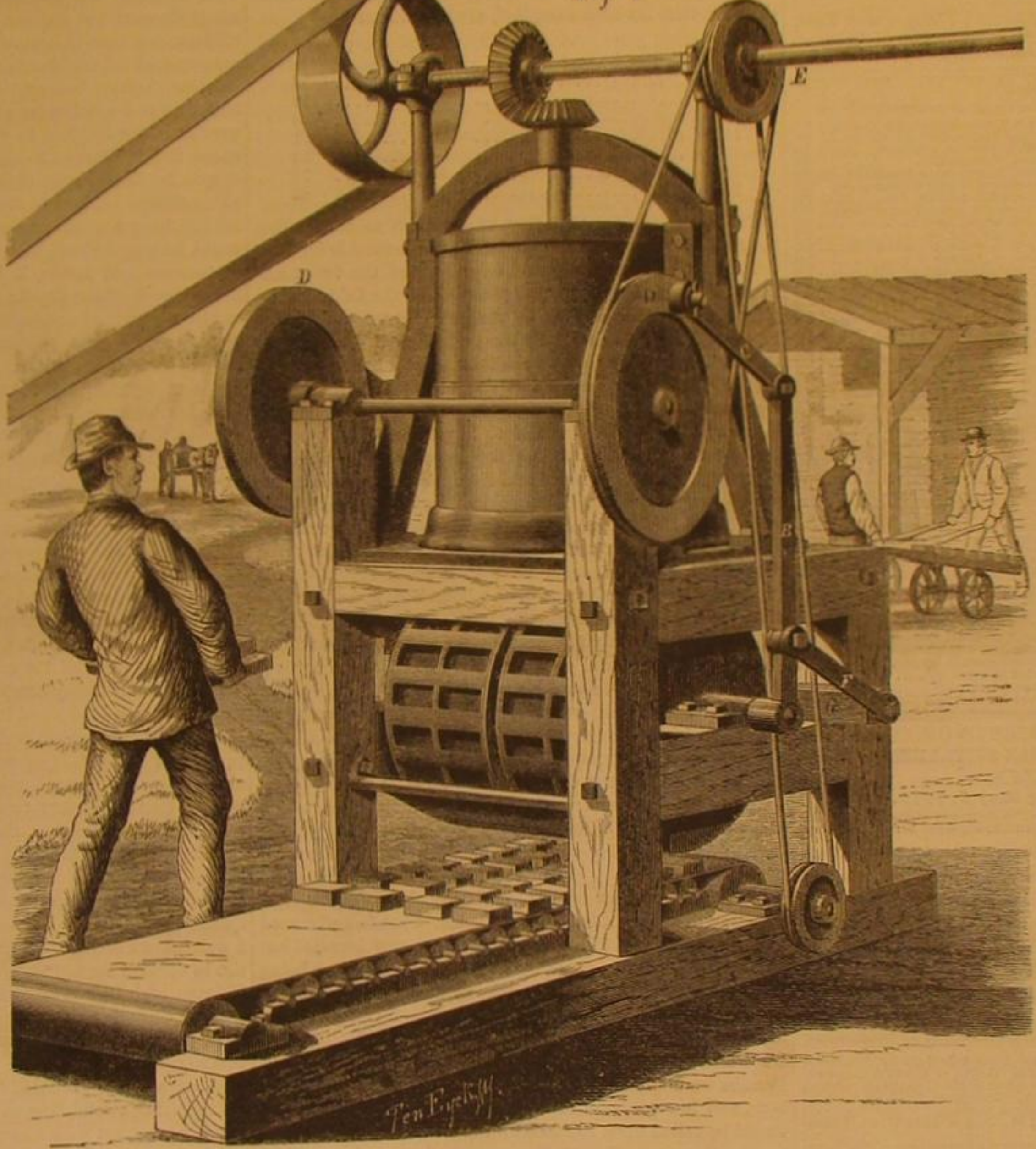
A is the pug mill, in which the clay is ground and mixed. Beneath is a hollow cylinder, on the end of the shaft of which is a ratchet wheel, not shown in Fig. 1, being on the obscured side of the machine. The periphery of the cylinder is provided with a series of recesses or moulds, in each of which works an accurately fitting plunger. Each plunger has a stem, about which a spiral spring is coiled, and on the end of which is a roller. The clay having been received into the mould, from which the plunger is withdrawn by the action of its spring, the cylinder is then caused to rotate. Two levers, B, are secured, one at each end of the cylinder shaft, so as to have free motion thereon. The upper ends of these levers are connected to other levers, C, which, in turn, are attached to the wristpins of the crank wheels, D. Said crank wheels receive rotary motion from the pulley on the main driving shaft, E, by the belt shown.

The inner face of the lever, B, on the opposite side of the machine from that shown in Fig. 1, has a spring pawl, so arranged that it will engage with the ratchet wheel on the cylinder shaft, and rotate the same. Another pawl prevents any backward motion of said wheel. The levers, B, are connected by the arms, F, with a horizontal bar or press, G, and in their operation draw said bar against the clay in the series of moulds presented to it. The endless belt placed below the machine, for the reception of finished bricks, is prevented from sagging by passing over a series of small rollers, and is driven by a band from the main shaft.

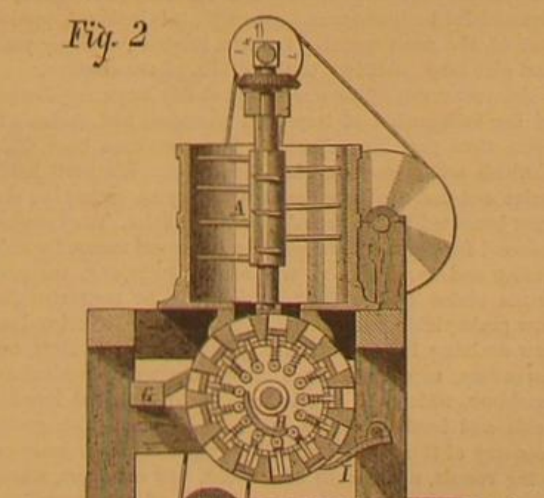
The clay is delivered from the pug mill into the moulds while the cylinder is stationary, and, at the same instant, the press bar operates upon the clay in another set of moulds. The cylinder is then rotated, presenting another series of recesses to the mouth of the pug mill, as the press bar is drawn back. In the continued forward motion of the cylinder, and after the bricks in the moulds have been subjected to the action of the press bar described, the rollers on the end of the plunger stems roll upon the outer face of a fixed cam, H, Fig. 2, and force the bricks out of the moulds by throwing outward the plungers: so that, when the first mould filled has reached a point directly under its first position, the knife, I, Fig. 2, will pass between the brick and the face of the plunger and cause the brick to fall upon the endless belt.

For further information, address the patentees, Messrs. W. H. & H. P. L. Machen, Jr., Toledo, Ohio.

Fig. 1



MACHEN'S ROTARY BRICK MACHINE.



To Take Rust Out of Steel.

Place the article in a bowl containing kerosene oil, or wrap the steel up in a soft cloth well saturated with kerosene; let it remain 24 hours or longer; then scour the rusty spots with brickdust. If badly rusted, use salt wet with hot vinegar; after scouring, rinse every particle of brickdust or salt off with boiling hot water; dry thoroughly; then polish off with a clean flannel cloth and a little sweet oil.

Stopping the Wood Pores in Barrels.

The *Brewers' Gazette* gives the following: Put into an open vessel 1 lb. fine shreds of leather, 1 oz. oxalic acid, and 2 lbs. water. Suspend the vessel containing this mixture in one of larger size containing water, and boil until the contents of the inner vessel are dissolved by the action of the heat imparted from the boiling water (this is the water bath process). It must then be diluted with 3 lbs. of warm water. The mixture, when applied to the surface of wood, oxidizes and becomes insoluble, completely closing the pores of the wood. It is used for alcohol, and will neither crack nor peel off.

Dyspepsia and Long Life.

A writer in the New York *Sun*, who has undoubtedly experienced the feeling produced by the disease, or he could not describe the effect so truthfully, says:

The dyspeptic, as a rule, is not numbered among the happiest of men; and there are good reasons why he should not be. He has an abiding notion that something is wrong somewhere in the universe, maybe everywhere; though, like the man who meets death suddenly, he often does not exactly know what hurts him. In some extreme cases he doesn't much care; only he would like to get rid of it, whatever it may be.

There is a well founded American tradition that pie baking and the frying pan have been fruitful sources of dyspeptic woes, though there are many victims of indigestion who have not fed upon pie crust or fried meats, while there are many people who have grown robust and ruddy on this diet, or in spite of it. Randolph, of Roanoke, who contributed to the philosophy of dyspepsia the cynical theory that though the Lord had given us the meats the devil had sent the cooks, only touched one part of the evil, for there are more sufferers from ill regulated digestion among luxurious people, who live upon the most nutritious and best cooked food, than among those whom exercise and labor give a hearty appetite for whatever they can get to eat.

The late Dr. W. W. Hall, formerly editor of the *Journal of Health*, has written very sensibly of this disorder in a little book just published in this city by R. Worthington. According to this writer, nine out of every ten cases of dyspepsia are caused not by any defect of the digestive organs, but by improper dieting and insufficient exercise, mental or physical. People, whom a disordered digestion requires to pay attention to these matters, frequently outlive by many years their more robust neighbors. The author cites the case of one poor dyspeptic patient in whose case no less than sixty-three ailments were manifested: among them fretfulness, nightmare, and, most dismal of all, a sense of goneness. This was undoubtedly a very bad case, for, in spite of all that wealth could supply or careful treatment do to remove the disorder, it remained unabated, until finally the offending article of diet was discovered, and then recovery was rapid. In about a month's time the only trouble this restored dyspeptic had to complain of was that she could never get enough to eat. With this instance before his eyes, the most desperate dyspeptic may hope to live cheerfully to a ripe old age by searching out the cause of his troubles and resolutely applying himself to the removal of it.

Dr. Hall recommends the sufferer to begin by eating little of one or two articles of food at regular meals. If that agrees with him let him increase the quantity; if not, he should try something else. In this way the dyspeptic will soon find out what agrees with him, and what kinds of food he should avoid. After he has made these discoveries, it will be his own fault if he continues a dyspeptic.

To CLEAN paint, take 1 oz. pulverized borax, 1 lb. small pieces best brown soap, and 3 quarts water; let simmer till the soap is dissolved, stirring frequently. Do not let it boil. Use with a piece of old flannel, and rinse off as soon as the paint is clean. This mixture is also good for washing clothes.

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(Illustrated articles are marked with an asterisk.)

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No. 70,
For the Week ending May 5, 1877.

THE EUROPEAN WAR AS AFFECTING AMERICAN INVENTORS AND FARMERS.

The latest advices report that a war between Russia and Turkey is almost inevitable. Much as such a calamity is to be deplored, especially in these days when many have hoped that peaceful arbitration of national differences would permanently supplant the appeal to the sword, it cannot be doubted but that the conflict, if prolonged, will prove of material benefit to the people of the United States. And in no instance is this so apparent as in the great impetus which will be given to agriculture and to invention.

The two great grain-producing countries of the world are South Russia and the valley of the Mississippi; and between these sections there exists active competition for the supplying of the nine to fourteen million quarters of foreign wheat required by England, and the large additional amount needed by other European nations. Already in this rivalry our Western farmers are far ahead; and statistics, recently gathered by the Odessa (Russia) Committee on Trade and Manufactures for the information of the Russian Government, show with what remarkable rapidity this advance has been accomplished. The proportions of wheat supplied by Russia and the United States to England during the seven years from 1867 to the close of 1873, the period over which statistics have thus far been compiled, are as follows:

Year.	Russia, per cent.	United States, per cent.
1867	44	14
1868	32	18
1869	32	18
1870	38	21
1871	40	23
1872	51	24
1873	21	44

The committee say that they have reason to believe that the result for 1874 will be found even less favorable for Russia. It will be seen that within seven years the two countries have relatively changed places; and the Odessa committee frankly admit that in the near future the United States will be "so absolutely the controller of the prices of the London market that we shall be utterly unable to compete with them." Nor is this due to any decrease in the Russian supply, which the foregoing figures might seem to indicate had fallen off from 44 to 21 per cent in the period mentioned. Notwithstanding the increase from the new ports of export, Sebastopol and Königsberg, the Odessa export shows a constant increase in quantity as well as in value; and Mr. Arthur Arnold, from whose recent work relating to Russia we take the above facts, adds that "the conviction is forced upon us that Russian agriculture is stationary in comparison with the boundless and successful activity of the United States."

There are obviously two great events, either one of which, apart from the natural progress indicated by the foregoing, will tend to secure to us the supremacy of the grain trade. First, the magnificent success of Captain Eads' opening of the Mississippi, through which loaded vessels will be able to proceed directly from their river points of loading to Europe, and thus the export costs will, it is stated, be reduced fully 50 per cent: and second, the coming war, which bids fair to paralyze Russian agricultural activity, especially in the grain-producing country which is nearest to the territory of her enemy.

Already the market reports in this city show that, in view of the conflict, prices have been affected. Corn has advanced ten cents a bushel within a week, and the same increase has taken place in Chicago, doubtless through the same being held for further advance. If other nations become involved in the conflict, as appears possible, a wonderful effect on our market is anticipated by the Produce Exchange dealers, who are watching events. The closing of the Black Sea and Danube would send much of the shipping interest of Europe here, and low ocean rates would result; while this country would be called upon to make up the deficiency in the grain supply thus cut off. At the present time, owing to last year's short crop, we have little corn to spare; but next year, should the war continue and the crop prove good, the demand for both wheat and corn will, it is believed, produce one of the most exciting markets known for many years, and give large additions to the wealth of the country.

Another result of the war will probably be the requirement of the belligerents of improved weapons; and, indeed, for some time past New England factories have been filling Turkish orders for arms and munitions. We need hardly point out that the inventors will be by no means the class least benefited by the probable turn of affairs. The increased demand for grain will necessitate improved means for cultivating and harvesting, as well as for developing, the great fertile plains of the West, which will be converted into new grain-yielding territory. New means of clearing land, new draining implements, new plows and cultivators, new harvesters, new applications of steam power to agricultural machines, which will enable farmers to deal with immense fields and immense crops more rapidly and with greater economy of time and labor, will be needed. New grain-carrying vessels, new means of loading, new elevators, storage warehouses and granaries, new means of transportation—notably light, portable farm railroads—will all be called for. Such inventions will be needed at home. From abroad will come the demand for new firearms, torpedoes, cannon, accoutrements, camp equipage, field telegraphs, new signal systems, new projectiles, new adaptations of recently investigated explosives, and so on through the immense category of inventions so prolifically produced by American inventors during our own war. The merchants are already watching their opportunities; the farmers will do likewise.

HOTEL FIRES.

The Southern Hotel, one of the largest and finest hotels in St. Louis, Mo., was recently burned. The fire broke out at a little after midnight. The house was filled with guests, many of whom were roused from sleep only to find all avenue of escape cut off. About a score of people, it is estimated, have lost their lives, and the building is wholly destroyed.

So long as the law permits the construction of edifices which are not fireproof, the public have a right to insist that such structures shall contain ample means for preventing fires and for the safety of the inmates. The recent Brooklyn Theatre conflagration has been the means of directing attention to the condition of auditoriums all over the world; and it has probably resulted in a great many precautions being taken which otherwise would not have been suggested. Hotels are nearly as inflammable as theaters, and they should be as carefully protected. The St. Louis building, although it is reported to have had an elaborate fire alarm system, with hose and taps on every floor, proved, by the rapidity with which it was consumed, that means supposed to be adequate were not so; and further showed that, for such edifices, not merely ordinary but extraordinary safeguards are required. Lofty hotels should have a fire escape at every window, besides bridges, wherever possible, leading from both roof and windows to adjacent buildings. It would cost very little also to place in every room about 60 feet of stout chain, firmly attached to the wall near the window. There should be huge tanks of water on the roofs, holding a supply sufficient to drench the building. The gas pipes also should have a water connection, so that every gas burner could be transformed into a fountain at will. Again, both in theatres and hotels, it has been found that shortly after the outbreak of the fire the gas has gone out, probably owing to the products of combustion cutting off the necessary supply of oxygen, or a pressure being generated which forces the gas back in the pipes. The remedy for this is the provision of separate lights, such as candles inclosed in tight glass lanterns connected with a ventilating tube or flue—or electric illumination might be used. There are few large hotels in the long halls of which a stranger might not easily mistake his way, and so, in case of danger, waste precious time. A hand balustrade along the wall leading to the stairways would in this respect be of the greatest use, even in the dark; and the walls besides might have directions painted on them in prominent characters for daytime use.

We have illustrated and described a number of simple fire alarms which give warning automatically. We published one quite recently, which was especially invented for hotels, it taking the place of the ordinary electric bell press button. This can be set to any temperature; and when the dangerous degree of heat is attained in the apartment, electric connection is instantly established, and an alarm, situated in any prominent locality, is sounded. It might be a good plan, also, in constructing hotels, to follow the compartment system, that is, to carry two or three principal partitions of solid brick clear through the house; and wherever there are openings, to provide them with heavy fireproof doors. In this way, one part of a building might be sufficiently isolated from the adjoining portion to allow of the prevention of the spread of fire to the whole structure. Mr. R. G. Hatfield, a well known architect of this city, says that iron beams and ties in flooring are not to be commended. The experience of Chicago and Boston shows that these beams are not to be trusted, since a moderate degree of heat deprives the metal of its power of resistance; and softened by heat, they yield by bending, and fall. Instead of iron beams and intervening brick arches, it is proposed to use wooden beams laid close, thus forming a solid floor of timber. Wooden beams are ordinarily set apart with spaces between them, and thus constitute, with the flooring and ceiling, an excellent arrangement for kindling or extending a fire. Setting the beams in contact with each other fills up the air-spaces and prevents the fire acting upon the beams, except in charring the surface to a small depth. There is reason for believing that a floor of this construction would resist fire better than one of iron beams and brick arches, while its cost at present prices would be but four sevenths of the cost of the latter.

If travelers and others who patronize hotels would take a few simple precautions for their own safety, there would be less of the loss of life that is now common. Hotel keepers will run their edifices skyward, as high as can be made to pay; but people should realize the risk incurred in accepting such quarters. By the aid of the elevator, the most aerial garret is perfectly easy of access; but it is well to remember that that elevator shaft in time of fire becomes a chimney to create draft, and generates a column of flame, which speedily attacks the lighter-built upper portion of the edifice. We know several cautious people with whom a coil of rope is as much a part of their luggage as their satchels. The rope takes up little room, and it may save life. A light wire ladder, which can be compactly folded, is even better. Some inventions of this kind are already in the market; but there is plenty of room for improvements. A wire gauze respirator, which can be tied over the nose and mouth, is another convenient article to have at hand when it becomes necessary to venture through smoke; or a wet towel similarly applied is equally good—especially if the wearer will keep on his hands and knees, close to the floor, where the least smoke is present. There is an excellent opportunity for inventors to devise convenient and suitable devices of the kinds mentioned. Let us have some new ways of permanent protection for buildings; and meanwhile, who will be the first to put up a light ladder, a coil of stout rope, treated with tungstate of soda or other fireproof wash, so as to be uninflammable, a respirator, and a self-lighting lantern, all in a case, which will take up less room than a Patent Office model? Inventors might contrive a trunk, satchel, or portmanteau, with these arrangements stowed away in a special receptacle, and containing besides a box for holding valuables, made of asbestos pasteboard, which will withstand even the heat of a fierce furnace fire for some time. Pocketbooks of this material might be made, which, if lost in a burning building, would stand a good chance of being found in the ruins; perhaps, however, with the contents destroyed, unless they contained coin.

OUR IRON SHIPBUILDING INDUSTRY.

Messrs. David Brown & Co., a London shipping house, has recently issued a circular, practically addressed to American shipowners, on the substitution of iron for wooden vessels, and on the supposed superior advantages existing in England for the construction of the former. After setting forth the advantages of the iron ships, the circular says: "It behoves American shipowners, therefore, to consider their disadvantageous position, in not being allowed to compete with those of all other countries by buying their ships in the cheapest market. The protective laws of the United States might serve the interests of shipbuilders if any builders pure and simple existed; but it does appear a hardship that the owners who, for the most part, now build their own ships, should be hampered by such restrictions, and have their shipping property confined to such ships as are built only in the United States. Iron ships in this country can now be built at about £13 10s. to £14 per ton, and with most profuse outfit."

It is true that American owners have not adopted iron sailing vessels to any such extent as have their English competitors; but there are reasons, notably the cheapness and abundance of wood in this country, the skill of our constructors in producing fast and durable vessels of that material, besides others, which tend to account for the slowness of the substitution. The assertion in the foregoing circular which calls, however, for an exposition of the facts, which carry with them its denial, is that relative to the absence of builders in the United States, and the further inference that England is the cheapest market. The New York *Tribune* has recently published a valuable review of our iron shipbuilding industry; and this, in connection with the elaborate report which *Engineering* has lately given of shipbuilding on the Clyde during the past year, forms the basis of the following:

Five years ago, in all the items that go to make up the cost of a ship, England possessed an incontestable advantage. Raw materials and labor were much cheaper than in the United States, while the facilities for shipbuilding were greatly superior. But in this short interval material changes have been accomplished. Shipbuilders in this country have erected rolling mills, furnaces, and shops; and a remarkably large amount of the best labor-saving machinery known has been invented and put in operation. One single builder, Mr. John Roach, has spent, including his original capital invested, some $2,000,000 in supplying his yards and shops; and other builders have not fallen behind in proportionate outlay. Again, the price of iron has been reduced. Five years ago, pig iron ranged from $45 to $70 per ton in the United States. Since then, our imports, in view of the progress made in the development of mines, have fallen from 800,000 to 165,000 tons, and the price is reduced to $18 per ton—as cheap as anywhere in the world. Copper has fallen so in price that we are now exporting it. The great item, however, is labor, the cost of which constitutes fully 60 per cent. of that of a steamer, and at least 50 per cent. of that of a sailing vessel; or, starting with the pig iron and sawn lumber, it is estimated to amount to 80 per cent. of the cost of a steam vessel. This we have reduced by the invention of new labor-saving machinery, which the English do not employ; and a reduction has also taken place owing to the general shrinkage in values, so that the price of labor here and in Europe is more nearly equalized. Mr. Laird, the great English shipbuilder, during his recent visit to this country, admitted that, with the appliances in use in American shipyards, it might be possible, all other things being the same, for Americans to produce as cheap a ship as the English, and even pay the men better wages. It is not a question of "might," however, for our builders are now standing ready to furnish the class of vessels, specified in Messrs. Brown's circular, at Clyde prices; and Mr. Roach offers within the present year to complete any number of iron sailing ships, from one to six, for the same price ($67.50 to $70 per ton), referred to, and in currency, and to deliver the vessels on the other side, provided he has the privilege of taking a cargo in them. He guarantees them further to receive the best ratings from European and American insurance companies.

Our iron shipbuilding industry began in 1868; and since that time there have been built for American owners 251 iron vessels of all sizes, having a total tonnage of 197,500. The annual aggregate of iron vessels now built in this country is over 30, worth from $12,000,000 to $15,000,000; and the business is rapidly expanding. These figures are of course small beside the immense totals of the Clyde industry, at present; but for the four years beginning with 1872, the returns shown by the latter are phenomenal, and the 1876 report indicates notable diminution. Vessels aggregating 224,000 tons were built in 1872; in 1874 the figures showed 266,000 tons; in 1876, 204,770 tons. It is suggestive to note that since 1873 the number of iron screw steamers built on the Clyde has steadily fallen off. Thus, in 1873, 125 were built; in 1874, 120; in 1875, 113; and last year but 83. Paddlewheel steamers show a slight increase, as follows: 1873, 14; 1874, 10; 1875, 13; and 1876, 16. Now in the face of this decline abroad, Roach alone reports the construction of 33 iron steamers, aggregating 68,150 tons, since 1872. This is an average of 13,630 tons per year for this builder, on these vessels alone (not counting all kinds, "from the tiniest yachts to ironclad ships of war," such as are included in the English reckoning); and this average, compared with the figures of individual English builders for 1876, would place the American concern third on the list—above John Elder & Co., and far ahead of the Napiers, whose total tonnage for 1876 was but 9,111.

It needs but a brief examination of Mr. Roach's tabular statement, showing how he has invested nearly $15,000,000 in iron shipbuilding within five years, to perceive how vastly profitable to the country this industry promises to become. Here, for instance, is the list of items of material and of necessary expenditures: Plate iron, angle iron, deck beams, rivets, bar iron and forgings, pig iron, steel, ingot copper, sheet copper and brass, tin, spelter, brass tubes and condenser tubes, iron boiler tubes, brass boiler tubes, lumber, paints, files, hardware, bolts, nuts, rubber, oil waste, etc., steam pumps, windlasses, boats, wire and manilla rope, sails, blocks, steam and gas pipe and fittings, anchors and chains, lead, plumbing, coal, improved facilities for manufacture, new inventions in machinery, sundries, lamps, hose, glass, masts, capstans, etc., and wages. Of Mr. Roach's $15,000,000, over $7,000,000, or about 50 per cent, have gone for wages alone; plate iron takes about 17 per cent, and wood, cotton, hemp, etc., costs about 5 per cent of the whole. Sifted down to the crude raw material, it will be found that 80 per cent of the total cost of a vessel for skilled labor is a low estimate, and that 90 per cent would be nearer. Inspection of the list also shows at once what a large number of trades are directly benefited.

It may be added that our iron ships are not merely a source of national prosperity, but an important addition to our naval strength. All are constructed so as to be adaptable as men-of-war in case of necessity. Should such need ever arise, the government has at its disposal, free of cost, 50 iron screw steamers capable of steaming at the rate of from 10 to 14 knots per hour. In ten days, in other words, a fleet of better and stronger vessels than the famous Alabama could be gathered and equipped for predatory warfare on an enemy's commerce.

THE ADVANCEMENT IN MICROSCOPY IN THE UNITED STATES.

To all who take interest in the progress of scientific investigation, it is a cheering sign that, in different parts of this country, the use of the microscope—that powerful appliance for investigating the secrets of Nature—is spreading rapidly by the establishment of microscopical societies in most of our large cities. At the late annual meeting of the American Association for the Advancement of Science, the members became acquainted with the Microscopical Society in New York city, which is in a very prosperous condition; and from time to time we notice, in various journals, reports of meetings of such societies which show that few of them are inferior in status to the Microscopical Society of this metropolis, of whose annual exhibition we gave an account in our issue of April 7. The accounts of the recent meetings in San Francisco deserve a place in our columns.

The San Francisco Microscopic Society has fifty resident and forty corresponding members; it holds semi-monthly meetings; and at the annual reception, twenty members exhibited their instruments before three hundred visitors. It has a library of two hundred and fifty volumes, and a cabinet of six hundred slides, besides much valuable apparatus—acquired by purchase and donation. It appears that the new Tolles objectives had previously not answered the expectations of the members, as a failure in resolving the details of some difficult diatoms was reported. Now, however, the President stated that, in justice to Mr. Tolles, it should be acknowledged that the fault did not lay in his objective, but in the members' inexperience, and that intercourse with experts in this special branch of work had rendered the solution so simple and easy that it caused wonder that it had ever appeared difficult. The one-tenth inch objective of Tolles most satisfactorily accomplishes all that was claimed for it; while the one-sixth immersion objective, by the same maker, gave a clearness of definition that was wonderful, and far surpassed anything which the President had ever witnessed. Not only this, but this glass possesses such ample working distance and such great penetration that it is admirably adapted for investigation upon animal and vegetable tissues, for which these qualifications, especially distance, are so necessary.

The President reported the formation of a class for instruction in microscopy, under the tuition of the librarian, Mr. Clark. The formation of such classes is of great importance, and was impossible a few years ago, when the microscope was regarded as a novelty and a toy, rather than as a tool for the acquirement of valuable and important knowledge.

This San Francisco society is likely to cause some rivalry and emulation among other associations; and the New York society must actively push the science of microscopy forward or it will be overshadowed by the growing institution on the Pacific side of this continent.

In Harvard University it has been concluded to establish classes for laboratory work with the microscope, with special instructions in its use for botanical study, the preparation of anatomical and other objects, etc. Professor Goodale has charge of the course on phenogamic botany, and Professor Farlow of that on cryptogamic botany. Their names are an ample guarantee of the excellence of this newly established department.

The microscopic societies in the United States are attracting attention in Europe; and in a microscopic journal published in London, England, we find accounts of meetings in some of our large towns. From Dunkirk, N. Y., it is reported that Professor J. Edward Smith, of Ohio, read a most interesting paper on "The Use and Abuse of the Microscope as an Instrument of Precision." He propounded several new ideas, such as the use of lenses of the widest angle of aperture for all kinds of work, and demonstrated practically his proposition by an exhibition of various objects, some of them illuminated by oblique light thrown at an angle of 75° from the axis of the instrument, and some by a diaphragm plate perforated with an aperture of $\frac{1}{100}$ of an inch in diameter, and with various amplifications from 500 to 2,000 diameters. Professor Smith also exhibited Tolles' $\frac{1}{10}$ and $\frac{1}{8}$ inch duplex objectives, of 180° air angle, and the President, G. E. Blackburn, M.D., a $\frac{1}{6}$ inch Tolles' immersion objective of 95° balsam angle. In view of the importance and value of some of the tests exhibited, a resolution of acknowledgment and commendation was drawn up and urged by the members and guests present. The report of the meeting is a very creditable indication of scientific progress in the young city of Dunkirk, which twenty-five years ago, when it was the first terminus of the Erie railroad, was a most insignificant country town. Had its growth and intellectual society, now realized, been predicted, the statement would have been deemed incredible.

For the benefit of those readers not conversant with the latest improvements in microscopic objectives, and therefore perhaps ignorant of the expressions "immersion objectives," "angle of aperture," "balsam angle," and "air angle," we will explain these terms.

The immersion objectives are lenses of which the extremity has to be used immersed in a minute drop of water, placed upon the slide. The advantages are that loss of light by two reflections, namely, from the upper surface of the slide and the lower surface of the lens, is done away with, as the water drop unites their two surfaces and makes the lower lens of the combination and the covering glass of the slide practically one body. Next, the distance is increased, and a powerful lens, of which otherwise the focal length would be too short to be used with a covering glass, may, by the immersion system, be used at a more convenient distance without changing the magnifying power. As a result of the short focal distance, the working distance is considerably increased; but the great advantage of these lenses is their wonderful clearness and definition, which are of the utmost importance in examining minute objects accurately, so as to obtain a correct idea of their structure and not to be misled by deceptive appearances to which ordinary lenses of short focus frequently give rise.

In regard to angle of aperture, we ought to state that experience has shown that central illumination often drowns minute details in a flood of light, and that objects can be better seen by oblique illumination; but with the latter, with ordinary lenses, the visible field is darkened. The makers of lenses have in some instances contracted them so that, even by very oblique illumination, the light reaches the eye, and the field remains bright. The extreme positions in which the light may be placed sideways from the axis of the instrument, and still be thrown in the axis, give us what is called the aperture; and the angle formed by the lines of these positions is the angle of aperture. The air angle is that obtained when the light passes through air only; the balsam angle is that obtained when the light passes through a slide of which the object is preserved in Canada balsam. As different fluids have different angles of refraction, they of course influence the angle of aperture.

We shall keep watch for news of further proceedings of these valuable societies, and hope to hear of the formation of new ones in all parts of this country.

TRIALS have been made in Rome of a solution of chloride of calcium as a substitute for water in laying dust in streets, and the results are said to have been highly satisfactory. The dampness communicated to the road remains for a whole week. The road remains damp without being muddy, presenting a hard surface, on which neither the wind nor the passing of pedestrians or horses has any effect.

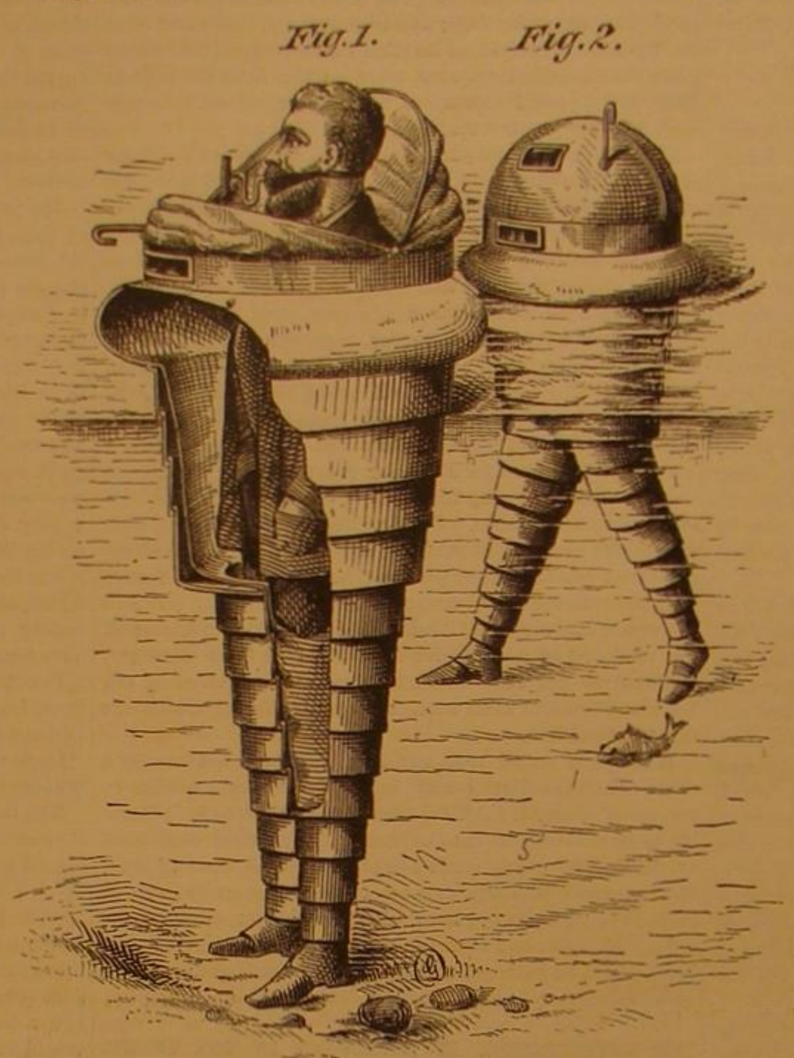
C. M. writes to point out that minute objects photographed in large size by the help of a microscope are properly termed photo-micrographs; and that the minute photographs which require a microscope for their explanation are called micro-photographs.

E. N. L. writes to point out that a cracker-packing machine is needed, and a successful appliance of the kind would amply reward the inventor, especially as it would be useful in many trades in which similar articles have to be prepared for shipping.

A NOVEL LIFE PRESERVER.

The lower portion of the curious device which is represented in the annexed illustration resembles a life-preserving dress; the upper part is a kind of buoy or floating chamber, in which the occupant has some freedom of motion for his head and arms. The object is to provide the shipwrecked person with not only a means of flotation but with complete shelter. Inside the enlarged upper chamber, it is proposed to place provisions and a water supply; so that the wearer can stay afloat for a month, if need be, with safety and comfort.

The interior of the apparatus is shown in Fig. 1. Fig. 2 represents it closed. The upper portion is made of strong sailcloth, waterproofed and distended on a jointed cylindrical frame. Across the lowest ring a diaphragm is placed, in which are two apertures for the legs, which are incased in waterproof pants and boots, covered with metallic rings, in order to afford protection against fishes and sharp rocks. These rings are made to fit one within the other when the dress is folded so as to enable the device to be stowed in small space. The top of the upper chamber is inclosed by a hood, in which a window is made. An air pipe is provided, leading to a respirator fastened over the mouth of the occupant. An annular air chamber is provided, which keeps the upper part of the apparatus well out of the water. Mr. Traugott Beek, of Newark, N. J., is the inventor.



BEEK'S LIFE PRESERVER.

How a Chinaman Caught a Ticket Agent.

Silver coin is at a discount in California just now, and it is customary to demand gold when the amount is over $10, which explains the following from the San Francisco *Bulletin*:

"Too muchee smartee" was what the moon-eyed child of the Orient said to the ticket seller at the wharf when gold was demanded for three tickets to Stockton, at $3.50 each, making $10.50.

"Too muchee smartee; you no cachee gold allee time."

"Yes, John, I must have gold for these tickets—ten dollars and a half. Come, out!"

"How muchee one ticket?"

"Three dollars and a half."

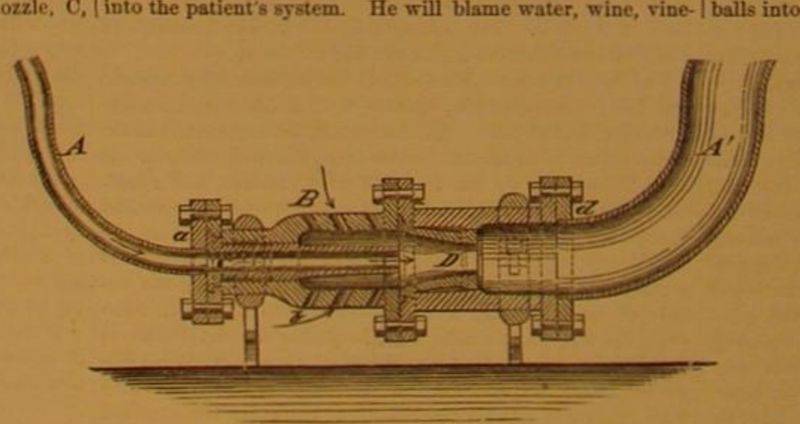
"Allee light; me takee one," and he paid his three dollars and a half in silver; then bought another one and paid three dollars and a half in silver, and bought a third in the same way, having paid out ten dollars and a half in silver without showing any gold. With a look of triumph the mild-eyed son of Confucius gathered in his last ticket, and said:

"Too muchee smartee."

IMPROVED WATER ELEVATOR.

We illustrate herewith an improved steam pump for raising water by the direct action of the steam, in analogous manner to steam injectors. A is a steam-conducting pipe, which is placed within an outer pipe, and surrounded by coal ashes to prevent condensation. It is bolted, by a face plate, *a*, to a flanged casting, B, so as to be readily detached therefrom, for changing without removing the casting from the seats. The casting, B, is submerged in the water, and made of two flanged sections, which are jointed together, one section supporting, in suitable bearings, the nozzle, C, that connects with the steam pipe, A. The other section supports, in similar manner, a tapering spout, D, through the contracted opening of which the water is drawn through perforations, *b*, of the nozzle section, and forced by the action of the steam into the wider discharge pipe, A'. The latter is attached, by a face ring, *d*, binding on the flanged rim of the pipe, to the opposite end of the casting, B, so as to be changed with the same facility as the steam pipe. The action of the steam produces a partial vacuum and creates a suction that draws in the water to be raised, forcing it forward and upward to any height through the water-discharge pipe. The pump, it is claimed, may be used with advantage as a bilge pump on board of steamers.

This device was patented through the Scientific American Patent Agency, February 13, 1877, by Mr. Alexander Wright, of Havana, Cuba.



WRIGHT'S WATER ELEVATOR.

Poisonous Silk Dresses.

In purchasing silk, many require that the material shall possess both weight and stiffness, these qualities adding to its rich appearance and allowing it to be draped more gracefully. Heavy silk is also commonly believed to be of better manufacture and to wear better, as the extra weight is supposed to be due to a thicker and closer fabric. While all heavy silks are not necessarily weighted, a large proportion of them are.

The weighting of black silks with a compound of tannic acid and oxide of iron, far exceeding in quantity what is really needful for the production of a black color, has now been known for a considerable time, and has been carried so far as to deprive the material of its non-conducting power for heat and electricity, greatly to impair its strength and durability, and even to render it liable to spontaneous combustion. Consumers, however, till lately "laid the flattering unction to their souls" that white and light-colored silks must be genuine. Alas! the depraved ingenuity of the age has introduced sophistication in this department also, and it is possible to buy white silks—white goods, rather—consisting of about one third to one half the genuine product of the silkworm, the remainder being made up with oxide or carbonate of lead. This stratagem is not merely a fraud upon the purchaser—who asks and pays for one thing, and receives another very inferior in its properties—but it is a direct attack upon public health, and (we learn from the *Chemical Review*) in that capacity has already brought forth evil fruits. Persons who are continually handling such weighted silks are liable to lead poisoning. Still greater is the risk for milliners and dressmakers who sew with silk, and who are in the habit of biting off the end of the thread, or of putting it in the mouth to make it the better enter the eye of the needle. A minute quantity of lead is taken into the system each time; it remains and accumulates, and, at last, colic, palsy, and other alarming symptoms make their appearance. These are soon traced to lead poisoning, but not one medical man in a hundred will suspect how the lead is introduced into the patient's system. He will blame water, wine, vinegar, food cooked in leaden vessels, etc. In the last guess he may often be right, for the tin with which saucepans are "tinned" is no longer tin, but an alloy containing a large proportion of lead. The so-called tins in which meat, butter, fruits, etc., are now imported and sold are also no longer "tins," save in a "Pickwickian sense," but "leads."

But, to return, so long as the silk is not recognized as the source of the lead, the patient will go on using it, and recovery will therefore be impossible. This, it must be understood, is no mere matter of conjecture or probability, but of actual fact. Poisoning cases of the kind described have already occurred, and will certainly become more and more frequent if the evil practice is allowed to continue.

The detection of lead is not difficult. If a piece of the silk, or a little of the thread or yarn suspected of being weighted with lead, is moistened with pure water and then exposed to sulphuretted hydrogen gas (as obtained by putting a little sulphuret of iron in a cup and pouring dilute sulphuric acid upon it), if lead is present it will change color and rapidly thicken. Ladies applying this simple test are, however, cautioned that if they have been made artificially "beautiful for ever" with powders and enamels, their faces may possibly change color as rapidly as the weighted silk.

Marvelous Jugglery.

The jugglers of India have for centuries been noted for their remarkable skill in the mysteries of the "black art." The editor of the *Commercial Bulletin*, traveling in the East, has contributed to that paper some very interesting letters on the customs of the strange people he has visited. Under the above heading he tells, in the last issue, his readers that "convalescence is a capital time for mild amusements which will not tire the languid brain, and we had some jugglers up almost every day. We never could find out their tricks, which are very marvelous. Of course, everybody has heard of the basket trick, where a small boy gets inside a basket, and the juggler plunges a sword through and through it, bringing it out reeking with blood, then holds up the basket, shows there's nothing there, and calls the boy, who calmly appears from outside the circle of spectators. And also of the mango trick, where a seed is placed in the ground, is covered with a cloth, and appears as a shrub, growing visibly before one's very eyes, and then bears fruit, which ripens and is edible in five minutes from first planting. These fellows have very scanty clothing, and apparently no apparatus whatever. There are some wiseacres who profess to know all about these tricks. I never saw the disemboweling and immediate healing of fakirs, in India, nor men sitting in the air, 'levitated,' as Madame Blavatsky calls it. But I have seen other tricks as surprising, and equally unaccountable by any art or science with which Europeans or Americans appear to be acquainted nowadays. I have seen a man throw up into the air a number of balls numbered in succession from one upwards. As each went up, and there was no deception about their going up, the ball was seen clearly in the air, getting smaller and smaller till it disappeared altogether out of sight. When they were all up, twenty or more, the operator would politely ask which ball you wanted to see, and then would shout out 'No. 1,' 'No. 15,' and so on, as instructed by the spectators, when the ball demanded would bound to his feet, violently from some remote distance.

"Then I've seen them swallow three different colored powders, and then, throwing back the head, wash them down with water, drunk in the native fashion in a continuous stream from a *lotah*, or brass pot, held at arm's length from the lips, and keep on drinking till the swollen body could not hold another drop, and water overflowed from the lips. Then those fellows, after squirting out the water in their mouths, have spat out the three powders on to a clean piece of paper, dry and unmixed. As to the thimble-riggery of their minor tricks, they are exceedingly expert, but are probably equalled by many of our distinguished *prestidigitateurs*; and whatever may be said of the basket and mango tricks, or the sitting in the air, I don't think any of our people are up to the sending of balls into space and recalling them in an unpremeditated order. This reminds me of the trick Marco Polo, the great Venetian traveler of earlier times, speaks of having seen at the Court of Prester John, in Central Asia, when a bean was planted and sprung up rapidly toward the heavens, its summit being lost in the clouds. Up this, one juggler traveled, and then another after him, with a drawn sword. In a few minutes, down dropped ears, a nose, a head, and limbs of No. 1; No. 2 leisurely descends, wiping a bloody sword, shovels up the fragments of his victim into a box, and goes on with other performances, presently calling out for his defunct companion, who thereupon presents himself, as large as life, all alive and kicking, from the throng. This is not a modern trick, but those I have seen are certainly not less marvelous. Then, too, it is a well authenticated fact that some of these jugglers, on more than one occasion in recent years, have suffered themselves to be buried alive, and have been dug out alive after the lapse of a year."

Treatment of Hydrophobia.

The following treatment of hydrophobia is suggested in the *Medical Journal*. The patient is to be undressed, seated on a cane chair, and the whole body up to the neck enveloped in blankets. Under the chair a spirit lamp is placed. This lamp is protected in a cage, on the top of which is a receptacle for the calomel (twenty or thirty grains), and a saucer for water. The flame beneath boils the water, and volatilizes the calomel. Moderate salivation, which is all that is required, says the writer, may be induced in a quarter of an hour, and judiciously repeated if the symptoms seem benefitted by the treatment. This treatment is said to have been successful in a case of hydrophobia in India during 1867.

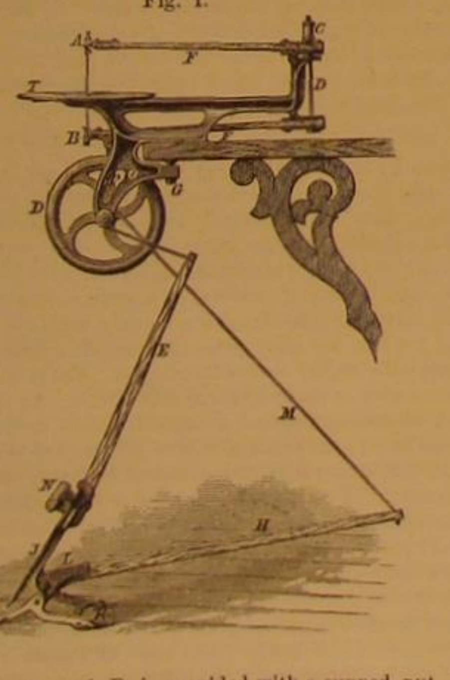
Potassic Xanthoxate.

This salt, the remarkable antiseptic properties of which were noted in a recent issue of the Scientific American, may be prepared by adding carbonic disulphide to an alcoholic solution of potash, or by the action of potassic sulphydrate on neutral ethylic disulphocarbonate. If fused hydrate of potassium is dissolved in half its weight of absolute alcohol, and carbonic disulphide is added slowly till the liquid no longer exhibits an alkaline reaction, and the mixture is cooled to 32° Fah., the xanthate of potassium separates in colorless needles; and an additional quantity may be obtained by evaporating the mother liquor in a vacuum, after the excess of carbonic disulphide has been separated by water. But the salt is most easily prepared by adding to absolute alcohol an excess of very pure caustic potash, and then an excess of carbonic disulphide. The mixture immediately solidifies to a mass of interlaced silky needles, which must be washed on a filter with ether to free them from bisulphide of carbon, then pressed between fibulous paper, and dried over oil of vitriol. The salt crystallizes in shining, colorless prisms, which turn slightly yellow on exposure to the air. It is very soluble in water, and diss lves readily in 5 or 6 parts of absolute alcohol. It is insoluble, or nearly so, in ether. Its solution in absolute alcohol is not affected by boiling, but its aqueous solution decomposes when heated above 122° Fah., yielding potassic trisulphocarbonate, alcohol, sulphuretted hydrogen, and carbonic acid, thus: $2C_2H_5KOS_2 + 2H_2O = K_2CS_3 + 2C_2H_6O + H_2S + CO_2$. In the dry state, it may be heated to 200° without alteration; but at higher temperatures it gives off ethylic sulphydrate, sulphurretted hydrogen, water, and carbonic oxide, leaving a residue of potassic sulphide, mixed with charcoal. The solution heated with potash is resolved into mercaptan and potassic ethylmonosulphocarbonate. Strong nitric acid decomposes it with violence. Xanthate of sodium forms yellow needle-like crystals, resembling those of the potash salt, but of a darker color. The solutions of these salts form a yellow precipitate with salts of lead; yellow with copper salts (hence the name of the acid); light yellow with silver nitrate and mercurous salts; the last mentioned, however, quickly becomes brown and black.

THE DEXTER SCROLL SAW, EMERY GRINDER, AND POLISHER.

We illustrate herewith a scroll saw which has an entirely new treadle mechanism, and which is excellently adapted for amateur use. The frame, Fig. 1, is a solid casting, provided with a clamp, G, to secure it to a table or bench. The bows, F F, of hard ash, are fitted with iron plates on the back end. These plates have knife edges, carefully made, upon which the bows rock with little or no friction. The front ends of the bows are fitted with pivoted steel screw clamps, A B, for holding all sizes of saws. The plates on which these swing are adjustable, so that the pitch of the saw can be altered if desired, or corrected if it does not run straight.

Fig. 1.



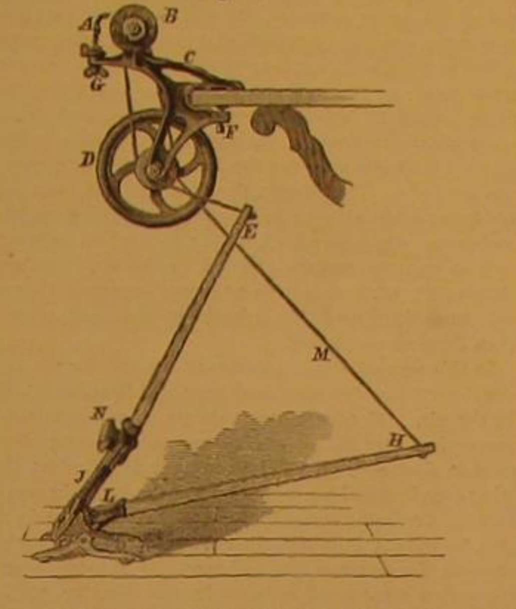
The straining rod, D, is provided with a cupped nut, C, containing a spiral spring. This and the stop in the back end of the frame hold the upper saw arm still, and the lower one in place, when from any cause the saw is disconnected.

The treadle arrangement is a floor piece or frame, K, upon which is pivoted the foot piece and rod, J E, and the counter-rod, L H. The former is forced up and the latter down, or in opposite directions, by springs. A single cord or strap, M, the ends of which are fastened to the ends of the treadle rods, is passed over the hub of the driving wheel, D, in which is cut a V groove. Pressure on the foot piece forces the cord into the groove and causes a rapid rotary motion of the wheel; as soon as released the foot piece returns to its original position, throwing the cord out of the groove, the wheel continuing its forward movement; the slack cord is instantly taken up by the counter rod; the treadle is then ready for another propelling movement.

We are informed that with ordinary treadling 1,600 revolutions of the wheel and strokes of the saw are made per minute; and as 800 to 1,000 strokes are ample for sawing, it will be seen that work may be rapidly executed with this machine with but little labor.

The same treadle motion has also been applied to an emery grinder and polisher, which is represented in Fig. 2. This is well suited for the uses of jewelers and dentists as well as for general employment. Wheels under 4 inches diameter and ½ inch thick, of any grade or make, can be used.

Fig. 2.



Each end of the spindle is furnished with plate hubs for wheels with ¼ inch holes and fitted for a small chuck which will carry drills, burrs, and small-shanked dental wheels. An adjustable rest for work to be ground is attached. With ordinary treadling, a speed of 3,500 revolutions per minute is obtained. Patented October 24 and December 12, 1876. For further information, address Trump Bros., Wilmington, Del., inventors and manufacturers of the Fleetwood and Dexter machines.

Artistic Dentistry.

Dr. J. Allen, a well known dentist of this city, has recently shown us some very fine results of his process of enameling plates for artificial teeth, on which he has experimented the past thirty years. The plates are of platinum, and the enamel is so artistically and continuously applied that every characteristic of color and form of the natural parts is accurately reprod:uced. At the same time, by carefully disposing the teeth in their support and by the addition of ingenious arrangements for sustaining the muscles, Dr. Allen has succeeded in restoring to the face the natural expression and fullness, usually lost by the change of the features caused by the absence of teeth. The artificial sets exhibited to us deserve high rank as a product of art; and the process has already won the commendation of the dental profession as well as awards at the three last International Expositions.

Bee-Keeping in the Himalayas.

A correspondent gives, in the London *Agriculture Gazette*, an interesting account of bee culture in India. He writes:

"Some of the villages make the keeping of bees their chief business; and although their method would perhaps hardly answer either with Englishmen or English bees, it is at any rate curious, and it is certainly very successful and exceedingly profitable.

"The houses are built of a framework of wood, which it would not be easy to describe without a sketch, but which leaves everywhere in the walls, both in their whole length and height, open spaces of about 2 feet high and from 10 to 12 feet long, which are subsequently filled up with stones and clay, after which the whole is plastered inside and out with a preparation of gypsum, which is found in abundance in the hills. The roofs are flat, of beaten clay, and the eaves project about 3 feet beyond the walls. As the whole weight of the roof rests entirely on the wooden framework, the stones and clay, with which any one of the spaces I have mentioned is filled, can at any time be removed and replaced without at all interfering with the stability. In each of these spaces, particularly in the walls facing the south, is placed one or more round earthenware waterpots, the height of which ought to be equal exactly to the thickness of the wall; these are built into the wall lying on their sides, with the round bottom outside, and its extreme convexity flush with the outside of the wall; whilst the mouth of the vessel, which is 6 or 8 inches in diameter, is flush with the wall in the inside of a room; in some houses there are as many as 40 of these waterpots (called ghurrahs in India) thus imbedded. All that is now wanted is to make a small hole on the outside convex bottom of each waterpot for the bees to enter—stick on a small patch of clay below it for them to alight on—put in a swarm and close the mouth of the pot with an earthenware lid made to fit. When honey is to be removed, all that is required is for the operator to enter the house, close the door, tap on the lid of the ghurrah to drive out the bees, or, if that is not sufficient, open the lid a little and blow in two or three puffs of smoke from a lighted rag, then open the lid fully and remove as much of the honey as may be deemed expedient, after which the mouth of the pot is reclosed, and the bees soon return and go to work again; enough of the honey always seems to be left to support the stock through the winter, and I could not ascertain that artificial feeding is ever resorted to. As the houses are occupied by the family as well as the cattle of the owners, and in winter pretty constant fires are kept up, the bees, no doubt, benefit by the heat.

"Besides these hives, which are never killed off, each house generally has a large number of others, the result of swarming, which are managed in a different way. For these a hive is prepared thus: A piece of the trunk of a pine or cedar tree, of about 18 inches in diameter, is cut to a length of 2½ feet; this is split down the middle, and each half hollowed out in the center, so that when rejoined there is a considerable space inside. A hole is made in one of the halves for the bees to enter; and a swarm having been secured, it is lodged in the hollow log, the two parts of which, having been securely tied together, are then hung up close under the projecting eaves of the house and well out of the reach of bears, which are numerous in the district, and are very partial to honey. To get the honey from these swarms, I believe it is usual to destroy the bees; but I have heard, although I do not know exactly how it is done, that, instead of destroying all the bees, the queen only is sometimes killed, and the workers added to one of the stocks in the house wall, which may have become weak."

Dried Eggs.

A large establishment has been opened in St. Louis for drying eggs. It is in full operation, and hundreds of thousands of dozens are going into its insatiable maw. The eggs are carefully "candled" by hand—that is, examined by light to ascertain whether good or not—and are then thrown into an immense receptacle, where they are broken, and by a centrifugal operation the white and yolk are separated from the shell very much as liquid honey is separated from the comb. The liquid is then dried by heat, by patent process, and the dried article is left, resembling sugar; and it is put in barrels and is ready for transportation anywhere. This dried article has been taken twice across the equator in ships, and then made into omelet, and compared with omelet made from fresh eggs in the same manner, and the best judges could not detect the difference between the two. Is this not an age of wonders? Milk made solid, cider made solid, apple butter made into bricks! What next?—*Philadelphia Trade Journal.*

DEVICE FOR HOLDING DOOR KNOB SCREWS.

One of the commonest defects of the ordinary door knob is that the screws work loose, and thereupon the whole arrangement becomes shaky and liable to rupture. In the invention herewith illustrated, a simple little device effectually overcomes the difficulty. It consists of an elastic band, Fig. 3, of metal (steel or brass), of a proper width to suit the shank of the knob. A slit is made through the band, at A, and a small tongue, B, is also provided, which enters the

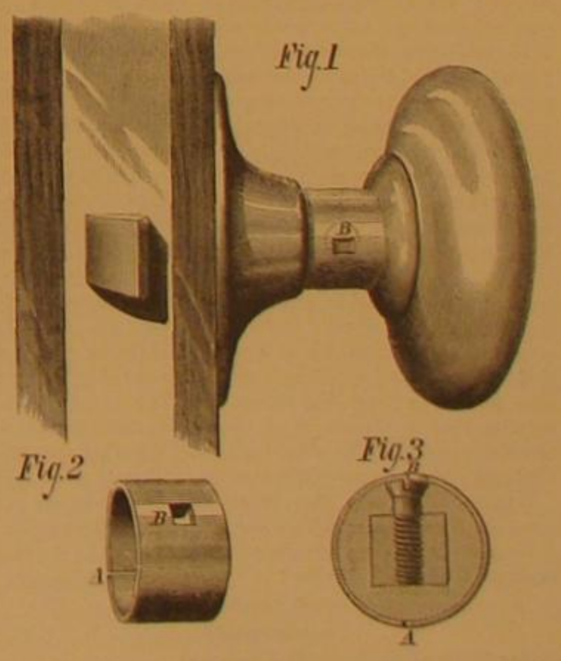


Fig.1 Fig.2 Fig.3

nick in the screw. The band is placed in position by springing it open and passing it over the shank. The tongue is then introduced in the screw slot, and the band allowed to spring shut. The parts then appear as in Figs. 1 and 2, the latter being a section through band and shank. Once in position, neither the band nor the screw can turn.

Patented through the Scientific American Patent Agency, April 3, 1877. For further information, address De C. May, 42 Mount Vernon Place, Baltimore, Md.

Patents at Auction.

A novel mode of disposing of patents is announced in our advertising columns. Mr. George W. Keeler, an auctioneer of experience, proposes to receive letters patents on consignment, which he will offer at public auction at stated intervals, in the same way as coal is disposed of monthly in this city.

Communications.

Novel Discoveries in Aerial Propulsion.

To the Editor of the Scientific American :

I recently picked up the *Galaxy* for April, 1872, and my attention was drawn to an article entitled, "Flight a Screw Propulsion." Glancing over it, I came to the following: "In 1867, Dr. J. Bell Pettigrew, of the Edinburgh University, before the Royal Institution of Great Britain, first propounded the now celebrated theory of the figure of 8 wave motion of the animal wing, and this has since been confirmed by the observations of Marcy."

"Pettigrew himself, before giving his conclusions to the public, had, with commendable caution, subjected them to careful verification."

"He continued his researches, and in 1868 published an elaborate memoir on the mechanical appliances by which flight is attained in the animal kingdom."

"During the wing's vibrations, it twists and untwists, so that it acts as a reversing, reciprocating screw, and resembles the blade of an ordinary screw propeller."

"The twisted configuration of the wing, and its screwing action, are due to the presence of figure of 8 looped curves on its anterior and posterior margins," and "Dr. Pettigrew has derived his ideas of the structure and movements of wings from careful anatomical study, and the most patient observation and experiment with winged animals themselves; and in view of these facts, he does not hesitate to avow the opinion that a thorough knowledge of this branch of animal mechanics will yet give man the power of artificial flight."

At considerable length the remarkable discovery by Pettigrew is entered into, and would seem to have been the result of years of observation, and promises still to be its object until man shall fly away on the strength of it. But it is evidently supposed by the great scientist that the mainspring of flight not only consists in the figure of 8 described by the extremity of the wing, but involves the necessity of particular muscles and sinews especially provided to give it the required twist.

In the first place, so far as regards the novelty of the idea that flight is accomplished by the screw propulsion of the wing, he has but to find himself forestalled by the Scientific American (in 1853, I think somewhere about October), wherein are two engravings of the propeller for which a patent was granted to Charles T. P. Ware, consisting of two elastic blades or wings, adjusted to an oscillating shaft, and which have their submerged reciprocating sweeps in an arbitrary plane perpendicular to the line of propulsion, forming a screw at each sweep. This arrangement, the inventor says that he adopted from his closest observations of the wing action in the swiftest of birds and insects, as well as the two-bladed tail of the East Indian swordfish. Indeed, the wings of the dragon-fly are so fixed in that position that they cannot be actuated in any other way. The idea, then, of screw propulsion in the animal wing would not seem to be quite so original with Dr. Pettigrew as he might have supposed, and to which he lends such weighty importance as a "discovery" long held secret until verified!

In conclusion, the screw action is not due to the figure of 8 configuration, the latter not being a cause, but an effect or consequence, of the propulsive movement of the wing. The very fact of the blade, or wing, being elastic, with the forward edge rigid and tapering, and the sweep forced rapidly and directly from upward to downward and *vice versa*, it could not impinge on the resisting medium (air or water) without describing at the tip that double loop from the points where it takes its start for every return stroke. This latter discovery, which is necessarily embodied and referred to as a feature demonstrated in practice, in Ware's patent, is therefore not only no novelty from the Doctor who is said to have first propounded the now celebrated theory, but shows that no mechanical appliances need be resorted to by inventive genius to twist the action into figures of 8, since, whether that be the secret of the motive force or not, it is already supplied by the simple action of the wing arbitrarily confined to a plane perpendicular to the direction of flight.

It therefore appears that, in the matter of the two great foregoing startling novelties, the Scientific American is at least about fifteen years ahead of Pettigrew and the Royal Institution of Great Britain! Lecteur Constant.

Aeronautics.

To the Editor of the Scientific American :

I have noticed in some of your recent issues several articles on flying machines. The subject is one in which I have taken a great deal of interest; and as the conclusions at which I have arrived differ altogether from those of your correspondents, it is just possible they may give a new direction to the discussion.

I believe the invention of a machine, to fly by acting mechanically on the air, as birds do, is simply impossible if the machine, with its load, weighs more than 50 or 60 lbs. I do not say that a machine of any weight may not be constructed which shall be just a little heavier than the air displaced, and then the machine may be raised mechanically by acting on the air; but such a machine will, for reasons which follow, be little, if at all, better than a balloon. That which enables a bird to fly is the support which the pressure of the air gives to the bird's body. This support depends, I think, on the proportion between the weight and the surface exposed to the air. If the size of a bird is increased, all other things being equal, the weight increases in a greater ratio than the surface exposed to the air; so that, if with a certain amount of wing area and muscular power a bird weighing 10 lbs. could fly well, and his weight were increased to 30 lbs., with muscular power and wing area increased in the same proportion, he could not fly at all. Or if an eagle grew as big as an elephant, he could no more fly than the elephant. Let us suppose that a bird of 10 lbs. weight is a perfect flying machine. Our object is to increase the size of the machine and keep the same perfection of parts. If the weight is doubled, keeping the same proportion of all the parts and using the same material, we will find that the muscular power has not quite doubled, and the supporting surface exposed to the air has not increased in anything like the same proportion; so that a limit is soon reached where the machine ceases to have any power of flight, and that limit, where muscular force is the power used, I take to be about 30 lbs. This accounts for the fact that all the largest birds are not fliers. The ostrich, the emu, and the moa ceased to be flying birds as soon as they grew beyond a certain size, which size was determined by the proportion between their weight and the surface exposed to the air. Geology also shows that, while mammals and reptiles grew in past ages to enormous sizes, no flying animal ever appeared much larger than those now existing.

In this way only is it possible to account for the fact that small particles of iron or steel dust will float for a long time in the air. Of course each particle is as much heavier in proportion than the air as if it were a solid cube several inches in diameter. This also accounts for the fact that the wing area in small birds is not nearly so large, in proportion to weight as in the larger birds; and the wing area in proportion to weight is still further diminished in many insects, such as the common bee and many of the beetle tribe. I have seen some small animals in this country, such as the opossum and the rock wallaby, fall 50 feet on a solid rock without injury; and this first set me speculating on the why. A bullock falling under the same circumstances would have been crushed, bones and all, to a shapeless mass; and yet the wallaby is not more strongly made than the bullock. I have stated my views as shortly as possible, and if I have not made them plain to general readers, I trust some mathematician among your correspondents may take the matter up and show that according to well known mathematical laws flying (as birds fly) is impossible for men.

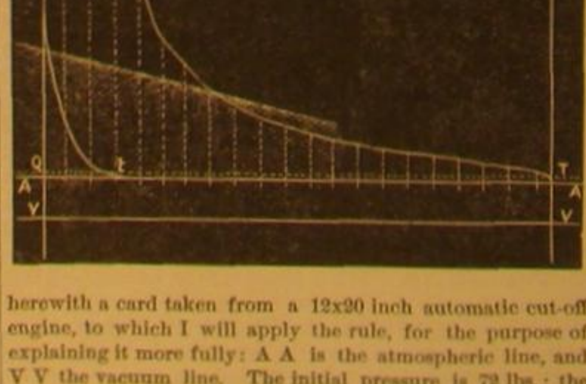
Murrurundi, New South Wales. W. E. Abbott.

Water Evaporated through Engines.

To the Editor of the Scientific American :

I have before me the circular of an engine manufacturing company, in which the proprietors explain their method of computing the water consumption per horse power per hour, of any engine, from its indicator card alone. The method is as follows: "Divide the constant number 859.375 by the mean effective pressure of any diagram, and the quotient by the volume of its total terminal or exhaust pressure, the result will be the theoretical consumption in pounds of water per horse power per hour." "The constant number used is the piston displacement for one hour, in lbs. of water, of an engine which would develop one horse power with 1 lb. pressure of water instead of steam. Then, with pressures of more than 1 lb., the amount required would be as many times less as the pressure was greater than 1 lb.; and when steam is used, the amount would be as much less as the volume of the steam at the pressure at which it is released is greater than an equal weight of water. The volumes of the pressures are taken from Forney's "Catechism" and Roder's "Handbook."

It is easy to see that if the steam in the cylinder followed, strictly, Mariotte's law of expansion, and if the valve and piston fittings were perfect, this would be a very accurate, as it is a simple, rule to go by; but as indicator cards give us but very little clue to the amount of leakage and condensation, a considerable amount of water will pass through the engine, for which the rule makes no allowance. Indicator cards are of great value in determining the initial, mean effective, and terminal pressures, the back pressure, the cushion, whether by compression or lead, the point of cut-off, and the relative economy of different engines, aside from leakage and condensation. As so much depends upon the construction of the engine, it seems to me that no definite rule can be given for arriving at a near result. I inclose



herewith a card taken from a 12x20 inch automatic cut-off engine, to which I will apply the rule, for the purpose of explaining it more fully: A A is the atmospheric line, and V V the vacuum line. The initial pressure is 72 lbs.; the mean effective pressure is 25⅖ lbs.; and the total terminal about 16 lbs. (measuring from vacuum line). The cut-off is effected at about 16 per cent of the stroke. Applying the rule to this card, we have 859,375÷25⅖=33,834÷954=35·46 lbs. of water per horse power per hour (954 being the volume of the 16 lbs. pressure).

When cushioning by compression is employed, a part of the steam is saved; so that, when greater accuracy is desired, we proceed thus: "Multiply the result obtained by the rule by the length of the dotted line, T, *t*, and divide the product by the length of line, T, *a*." I would like to hear from others on this subject,

Hinckley, Ohio. W. A. Mussen.

Decomposition of Water by Sodium Amalgam.

To the Editor of the Scientific American :

In a recent number of your valuable paper, my attention was drawn to the article by Professor Merrick entitled "Mortification and Water," taken from the *American Chemist*. As I have repeated the experiment a number of times, and have had precisely the same experience in breaking the glass vessel, I at last hit upon the method of forming an amalgam of the sodium with mercury, which not only makes the decomposition of the water to take place slowly, but, by increasing the weight of the sodium, may be conveniently kept in a small capsule of porcelain at the bottom of the jar, and the minute bubbles of hydrogen rise rapidly through the water, thus increasing the beauty of the experiment. A wire cage may be also employed for confining the sodium; and such an instrument, furnished with a handle, can be bought in our stores where philosophical and chemical apparatus are sold. A tea ball, made of wire gauze, and intended to keep the leaves of the tea together in the pot, may also be pressed into service; but of all the plans proposed I decidedly prefer the amalgam one, which will also answer, when thrown into a solution of ammonium chloride, for forming that remarkable compound which, when seen for the first time, excites so much wonder, namely, the ammonium amalgam.

Philadelphia, Pa. Isaac Norris, M.D.

[For the Scientific American.]

EXPERIMENTS WITH LOCUST EGGS, AND CONCLUSIONS DRAWN THEREFROM.

BY PROFESSOR C. V. RILEY.

There are many questions respecting the manner in which the eggs of the Rocky Mountain locust are affected under different conditions, which are of intense practical interest, and which are frequently discussed with no definite result being arrived at, or no positive conclusion drawn. Such are, for instance, the influence of temperature, moisture, and dryness upon them; the effects of exposing them to the air, of breaking open the pods, of harrowing or plowing them under at different depths, of tramping upon them. Everything, in short, that may tend to destroy them or prevent the young locusts hatching, is of vital importance. With a view of settling some of these questions, and in the hope of reaching conclusions that might prove valuable, I have carried on during the past winter a series of experiments which will be reported in detail in my 9th report, and the conclusions drawn from some of which I give you herewith:

Nine experiments, to test the

EFFECTS OF ALTERNATELY FREEZING AND THAWING,

showed that: 1st, the eggs are far less susceptible to alternate freezing and thawing than most of us, from analogy, have been inclined to believe. Those who have paid attention to the subject know full well that the large proportion of insects that hibernate on or in the ground are more injuriously affected by a mild, alternately freezing and thawing winter, than by a steadily cold and severe one; and the idea has quite generally prevailed that it was the same with regard to our locust eggs. But if so, then it is more owing to the mechanical action which, by alternate expansion and contraction of the soil, heaves the pods and exposes them, than to the effects of the varying temperatures. 2nd, that suspended development by frost may continue with impunity for varying periods, after the embryon is fully formed and the young insect is on the verge of hatching. Many persons, having in mind the well known fact that birds' eggs become addled if incubation ceases before completion when once commenced, would, from analogy, come to the same conclusion with regard to the locust eggs. But analogy here is an unsafe guide. The eggs of insects hibernate in all stages of embryonic development, and many of them with the larva fully formed and complete within. The advanced development of the locust embryo, frequently noticed in the fall, argues nothing but very early hatching as soon as spring opens. Their vitality is unimpaired by frost.

A series of sixteen experiments, to test the

INFLUENCE OF MOISTURE UPON THE EGGS,

establish a few facts that were somewhat unexpected. I give one of the experiments as a sample. The insect is a denizen of the high and arid regions of the northwest, and has often been observed to prefer dry and sunny places, and to avoid wet land, for purposes of oviposition. The belief that moisture was prejudicial to the eggs has, for these reasons, very generally prevailed. The power which they exhibit of retaining vitality and of hatching under water or in saturated ground is, therefore, very remarkable—the more so when viewed in connection with the results obtained in the succeeding experiment. That the eggs should hatch after several weeks' submergence, and that the young insect should even throw off the post-natal pellicle (*ambion*) was to me quite a surprise, and argues a most wonderful toughness and tenacity. After being dried and soaked for over six weeks, under conditions that approach to those of spring, I found a good proportion of the eggs to contain full-formed and living young larvæ, which, though somewhat shrunken, and evidently too weak to have made their exit, were still capable of motion. The water evidently retards hatching. An examination of the submerged eggs that remained unhatched, long after others had hatched which had been under similar treatment up to a certain time and then transferred to earth, showed the jaws and tibial spines to be still quite soft. It is, therefore, in preventing the proper hardening of these delivering points that water doubtless retards the hatching, and prevents its accomplishment long before the embryon perishes. Yet, when once life has gone, the egg would seem to rot quicker in the water than in the ground.

The experiments, further, prove conclusively that water in winter time, when subject to be frozen, is still less injurious to the eggs. Altogether, these experiments give us very little encouragement as to the use of water as a destructive agent; and we can readily understand how eggs may hatch out, as they have been known to do, in marshy soil, or soil too wet for the plow, or even from the bottom of ponds that were overflowed during winter and spring. The only instances in which water can be profitably used is where the land can be flooded for a few days just at the period when the bulk of the eggs are hatching.

Several experiments, to test the

EFFECTS OF EXPOSURE TO THE FREE AIR,

proved very conclusively that we can do much more to destroy the eggs, by bringing into requisition the universally utilizable air, than we can by the use of water. The breaking up of the mass, and exposure of the individual eggs to the desiccating effects of the atmosphere, effectually destroys them; and when to this is added the well known fact that thus exposed they are more liable to destruction by their numerous enemies, we see at once the importance of this mode of coping with the evil.

Five experiments, to test the

EFFECTS OF BURYING AT DIFFERENT DEPTHS,

showed that, where the newly hatched insect has not the natural channel of exit prepared by the mother, it must inevitably perish if the soil be moderately compact, unless cracks, fissures, or other channels reaching to the surface, are at hand.

From the four series of experiments mentioned I draw the following deductions, which have important practical bearing: 1. Frost has no injurious effect on the eggs: its influence is beneficial rather, in weakening the outer shell. 2. Alternately freezing and thawing is far less injurious to them than we have hitherto supposed, and tends to their destruction, if at all, indirectly, by exposing them to the free air. 3. The breaking open of the egg masses, and exposure of the eggs to the atmosphere, is the most effectual way of destroying them. Hence, the importance of harrowing in the fall is obvious. 4. Moisture has altogether less effect on the vitality of the eggs than has heretofore been supposed, and will be of little use as a destructive agent except where land can be overflowed for two or three days at the time when the bulk of the young are hatching. 5. Plowing under of the eggs will be effectual in destroying them just in proportion as the surface is afterward harrowed and rolled. Its effects will also necessarily vary with the nature of the soil. Other things being equal, fall plowing will have the advantage over spring plowing, not only in retarding the hatching period, but in permitting the settling and compacting of the soil; while, where the ground is afterwards harrowed and rolled, the spring plowing will prove just as good, and, on light soils, perhaps better.

Are Moles Useful?

The season for these annoying creatures to begin their annual work is at hand; and very soon evidences of their presence will be observed on the lawns and in the gardens of many an agriculturist. The question whether moles eat vegetation, or only destroy it in search for worms, is a mooted one; and almost every season the discussion is renewed in our agricultural papers. A correspondent states, in the Ohio *Cultivator*, that the present winter, when the thermometer was down to 22° Fah. below zero, moles were found in fodder shocks, where they had collected some corn, upon which they live, and some of which was found in their stomachs, and no other food was distinguishable. Of course, moles found in different places, adds the writer, live upon different food; some on the bark or the roots of trees, etc.; and the above is corroborated by the *Rural New Yorker*, who does not care whether high or low authorities declare that ground moles eat nothing but insects, but says that the assertion is simply false, and any man who possesses skill enough to catch a live one can prove it to be so. The ground mole will devour earth or angle worms when in confinement or at liberty, and those worms are not insects. Furthermore, this worm, *lumbricus terrestris*, is the mole's principal animal food, if our own personal observation, says the *Rural* editor, has not led us far astray. But leaving the food out of the question, a vigorous ground mole will lift up and kill a row of plants in far less time than a thousand of our most noxious insects, not excepting grasshoppers and potato beetles. It is to be feared that our authorities who talk so glibly about the useful mole know little of cultivating gardens infested with these pests. One season of gardening with a dozen moles per acre would satisfy them to dispense with these secret subterraneous assistants.

And here comes a defence of the mole from across the water. "In some parts of Belgium," says a contemporary, "attempts have been made to extirpate the moles from the soil. At one of the chateaux in that country, surrounded by a park adorned by fine lawns, men were employed to catch and kill the animals. After a time they were killed off, and disappeared entirely, in consequence of which the velvety grass of the lawns soon withered. The cause of the mischief was a small white insect which had been killed by the moles. The proprietor of the chateau, after he had made the discovery, was obliged to stock his place with a fresh supply of moles, after which the lawn flourished as before."

Having experienced considerable annoyance from these destructive creatures, we have read with special interest whatever agricultural papers have had to say about the moles' habits, their destructiveness, and their utility; and we have arrived at probably about the same conclusion that most persons who read the above have already reached. The heading of our article may provoke a discussion in some debating society, which will determine the mole's future. A great many who have waited in vain for the agricultural writers to settle the mole's destiny will certainly rejoice if his fate be sealed.

The Sewing Machine Monopoly.

A correspondent of the *Philadelphia Enquirer* writes from Washington to that paper as follows: "A number of lobbyists, representing an immense sewing machine combination interest, have made their appearance here. Their object is to procure, by some means not now apparent, a renewal or extension of patent upon the feed motion, which is vital property, and the basis of the Wheeler & Wilson, Howe, Singer, and other sewing machine combinations. The patent has already been extended and will expire on the 8th of May. It was the original intention of the great sewing machine pool to go to Congress and procure an act enabling the Patent Office to again extend the monopoly, but the excitement of the electoral count prevented them from putting this plan into operation.

"The agents of the pool now have, it is said, a very large sum of money at their command, and will thus be able to make a persuasive argument before the Patent Office people. Their case is in an awkward shape, and will expire by default on the day above indicated unless some action can be procured from the patent officials which will give the pool the color of a claim upon which to go to Congress when it sits. It is possible, however, that an application for a new patent covering the principle, in a slightly varied form, will afford means of escape from this dilemma, if adopted by the secret workers of the monopoly.

"The enormous benefits to accrue to the public in the event of the sewing machine pool failing to buy an extension will be seen when it is considered that the manufacturing cost of an ordinary $65 sewing machine is about $6.25, while an $85 machine from the Bridgeport shops costs in the frame, ready for shipment, something under $10. As things are now, a $65 machine is put to the local agent at $25, and the agent gets $40 for his time and labor in selling and instructing. An $85 machine costs the agent $35, so on up to the fancy, full cabinet, pearl inlaid article, which costs the customer from $150 to $200. The same rule applies in about the same proportion to all machines in the combination.

"The breaking down of the monopoly which sustains these ruinous figures will enable any machine shop in the country with proper appliances to turn out sewing machines with the lock stitch and wheel or ratchet feed. Competition will thus bring down the price of machines to a legitimate figure, about one half the present rates. This, a patent official remarks, may result in curtailing the agency system to some extent, but he adds that it is a system which deserves curtailing on account of the pertinacity of competing agents in attempting to force their wares upon a forbearing public. The patent men are exhibiting pretty much the same forbearance toward the pool emissaries here that the public exhibit toward sewing machine agents, and it is quite possible that the country may for a time be cheated out of the profits of which the law entitles it."

Patent Right Notes.

A rather important decision was made in the United States District Court at Cincinnati, a few days ago, involving the standing of notes given for patent rights. Pennsylvania was, we believe, among the first States to enact a law requiring that such notes should bear upon their face the words "given for a patent right," further providing that notes so distinguished shall, in the hands of any third parties, remain subject to all the equities between the original parties. The same law was subsequently enacted in Ohio and other Western States for the purpose of stopping the frauds which have been from time to time committed by patent right dealers upon innocent and unsuspecting farmers. In the case heard before Judge Swing, at Cincinnati, the defendant offered to prove that he had been defrauded, and insisted that he was not bound to pay the note, and claimed that the present owner of the note, who bought it before due, was bound, under the Ohio law, to permit such a defence to be made. Judge Swing, however, took a different view, and pronounced the Ohio law unconstitutional, saying in substance that the insertion of the words "given for a patent right" is no protection to the maker, and of no force whatever. He decided this upon the principle that such a law impaired the value of patent right property, a species of property created by the Constitution and laws of Congress, and as such entitled to all the protection given to any other property, and not properly the subject of individual discrimination. The Indiana courts have decided the same way.

American Competition in the Hardware and Implement Industries.

We last month, says the London *Ironmonger*, drew attention to the activity of American hardware producers in seeking to dispose of their products in this country. That activity has not, during the month, diminished. On the contrary, more diligence is noted. The number of representatives of American firms visiting our own hardware districts and the leading buying centers of Great Britain is larger now than it was a month ago. American travelers, directly representing American firms, bid fair soon to occupy a conspicuous place on the list of those who call upon English hardware merchants and wholesale ironmongers, nor can it be said that their prospects are altogether cheerless. It is true that, like most other people of their class, they carry specimens of excellent and also of indifferent goods. Goods, some cheap, others dear: goods which sell themselves and goods which need pushing.

As previously, so now, the Americans are successful in cutting and cultivating tools. Axes and spades, forks and scythes, find the most ready sale, and the thousand and one labor-saving apparatus, so handy in the kitchens of boarding houses, hotels, and the like, prove tempting at first sight, though they have not invariably the quality of endurance. While the makers of such products at home are thus vigorously elbowed at their own doors by American competitors, English engineering and light iron foundry firms have not exemption. In addition to light castings of the sort particularized last month, heavier and more complicated products of the engine shop and the foundry are presented by those same American travelers. Handy machinery required by the manipulator of metals and wood, in the turning and in the casting shop in particular, are brought under the notice of Englishmen. Nor are the makers of New World implements required by the farmer any less active than for some time they have been. Rather, more agencies of American agricultural implement firms have been formed, at the same time that business direct is being increasingly cultivated by firms who have not before done business in England, and in goods not previously offered.

More significant, however, to the British hardware and implement manufacturers is the competition of the American in the foreign markets before largely supplied from English works. In this direction even more activity and ingenuity is noticeable than in respect of Great Britain itself. If equally recent information be accurate, English agricultural implement manufacturers have cause for some apprehension as to the market for agricultural implements in Russia. The statement is that, convinced that American plows and other labor-saving farm tools are more adapted to the cultivation of the soil of Russia than goods of English make, several Russian Boards of Agriculture have appointed an agent in New York who has already given orders for tools and implements—one order being to a firm in Louisville, Kentucky, for 10,000 plows. It is added that a pattern of a mowing machine adapted to Russian soil has also been selected, and that a considerable number are being made; whilst experiments are in progress in New England to ascertain the best kind of portable engine for Russian employment. Though the account may not be wholly devoid of the exaggeration which frequently accompanies intimations of the kind, there is probably truth enough in it to make it at least unpalatable to those manufacturers in England to whom the farmers in Russia have formerly come for a supply of implements. It is not with satisfaction that we are compelled to supplement this with the statement that American plow makers have devised a plow to be drawn by native oxen, which threatens to supersede in numerous uses the Caffre mamootie, which has for so many years formed a profitable branch of British edge tool manufacture. Further, that a British hardware merchant has, during this month, been required by a Cape customer to send out, not English, but American hardwares. The consignment will be a valuable one, and it will embrace nearly all the classes of hardware which have hitherto been sent out to the same customer. In this case the order is an experimental one; but taken in connection with the foregoing, it is one to which it is our duty to direct the prominent attention of English hardware firms.

Metallic Fireproof Curtain.

A fireproof curtain for theaters, made in corruguted plate by Voss, Mitter & Co., of Berlin, is soon to be tried. It is being fitted to the theater in Dresden, now rebuilding after destruction by fire. Exposed to heat, a brisk circulation of air is set up in the sections of tubes formed by the corrugations, the heated particles ascending, and colder particles flowing in to supply their place. The latter keep down the temperature so considerably that a sweating breaks out in the plate of which the curtain, or shutter, as it is, speaking strictly, is composed. The shutter made for the Dresden theater is 40 feet high and 46 feet wide. The method of riveting the plates of which it is composed, and of raising and lowering it, are the subjects of patents.

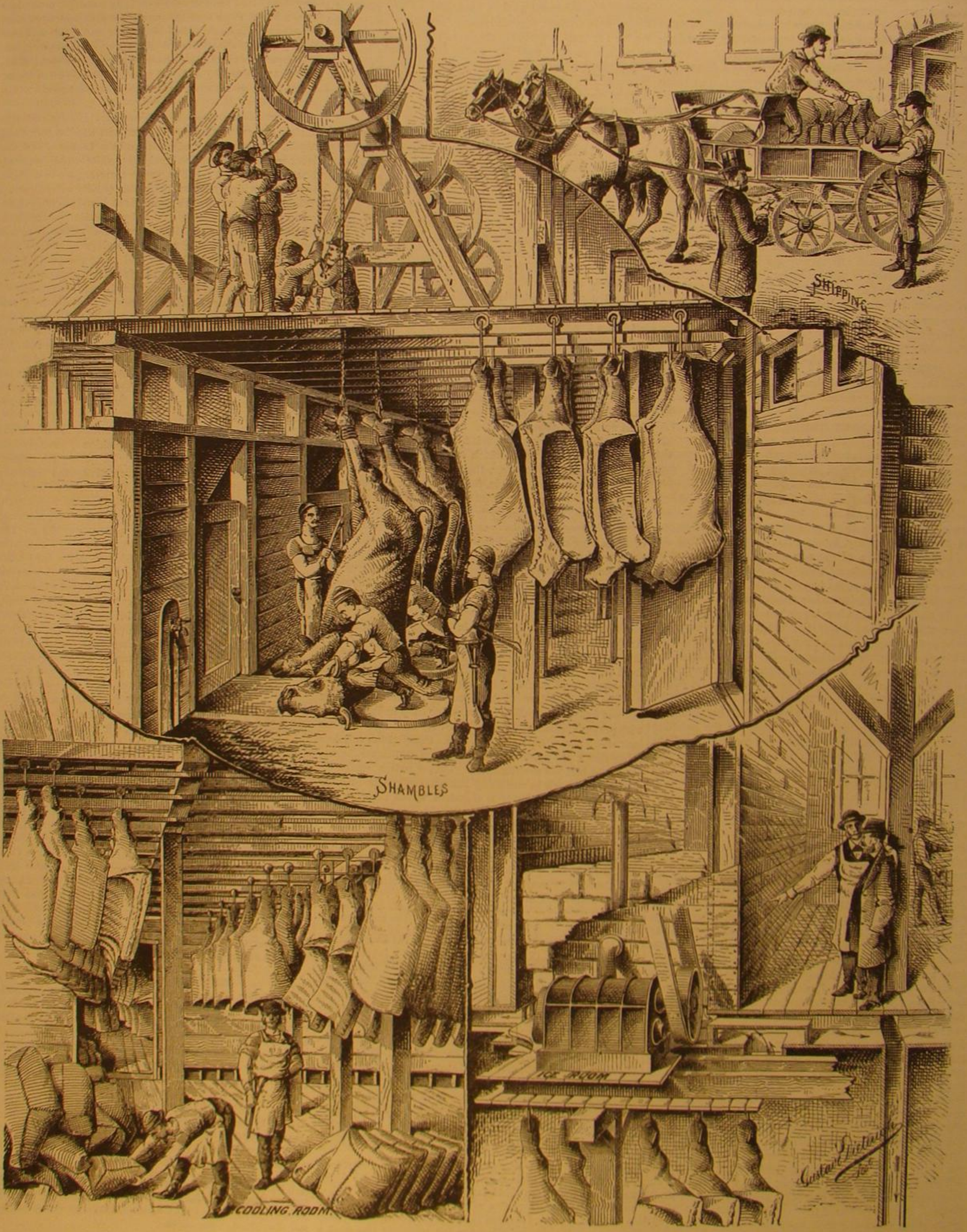
WE have to correct an error in our article on the results of evaporation and rainfall, in our last issue. We should have said that the waters of the Caspian Sea are less, and not more, salt than those of the ocean.

THE EXPORTATION OF AMERICAN MEAT TO ENGLAND.

We have already made passing reference to the large export trade of American meat which has been established since last summer between this country and Great Britain. The first shipment, made in June, 1876, consisted of 432 quarters of beef and 70 sheep, the whole weighing in the aggregate 81,000 lbs. At the present time the weekly export is nearly 300,000 lbs., and a still further increase is confidently expected, so that it may be fairly considered that the foundation of a new commerce, which will be beneficial not merely to dealers in live stock, but especially so to our farmers and cattle raisers, has been successfully laid. The whole secret of the possibility of transporting the meat and delivering it in England and Scotland, possessed of better keeping qualities than even the meat killed on that side of the Atlantic, is found in the simple fact that a dry atmosphere having a constant temperature of from 36° to 38° Fah. is employed. Care is taken that the freezing point is never reached. The meat is also thoroughly chilled immediately after killing, and thus starts on its journey entirely free from its natural animal heat.

The cattle from which the beef for the foreign market is derived—and in the following article we shall refer to beef only, as the export thereof is considerably larger than that of mutton—are raised in Illinois, Ohio, Indiana, and Kentucky. The largest dealer and shipper, as well as the first to undertake the export, is Mr. T. C. Eastman, of this city. He informs us that the steers are ordinary American cattle, selected by his buyers principally in Chicago, and devoted to foreign shipment on account of their superior condition. Stringy Texan stock and poor animals generally are not sent abroad. The steers are purchased by middle-men from the farmers and raisers, and are driven into Chicago. Thence they are shipped to New York, the journey lasting about five days, and are delivered in the stock yards of the New York Central and Hudson River Railroad Company, at the foot of 60th street. The slaughter-house occupies a portion of the immense cattle building there located, an edifice which is the largest of its class in the world.

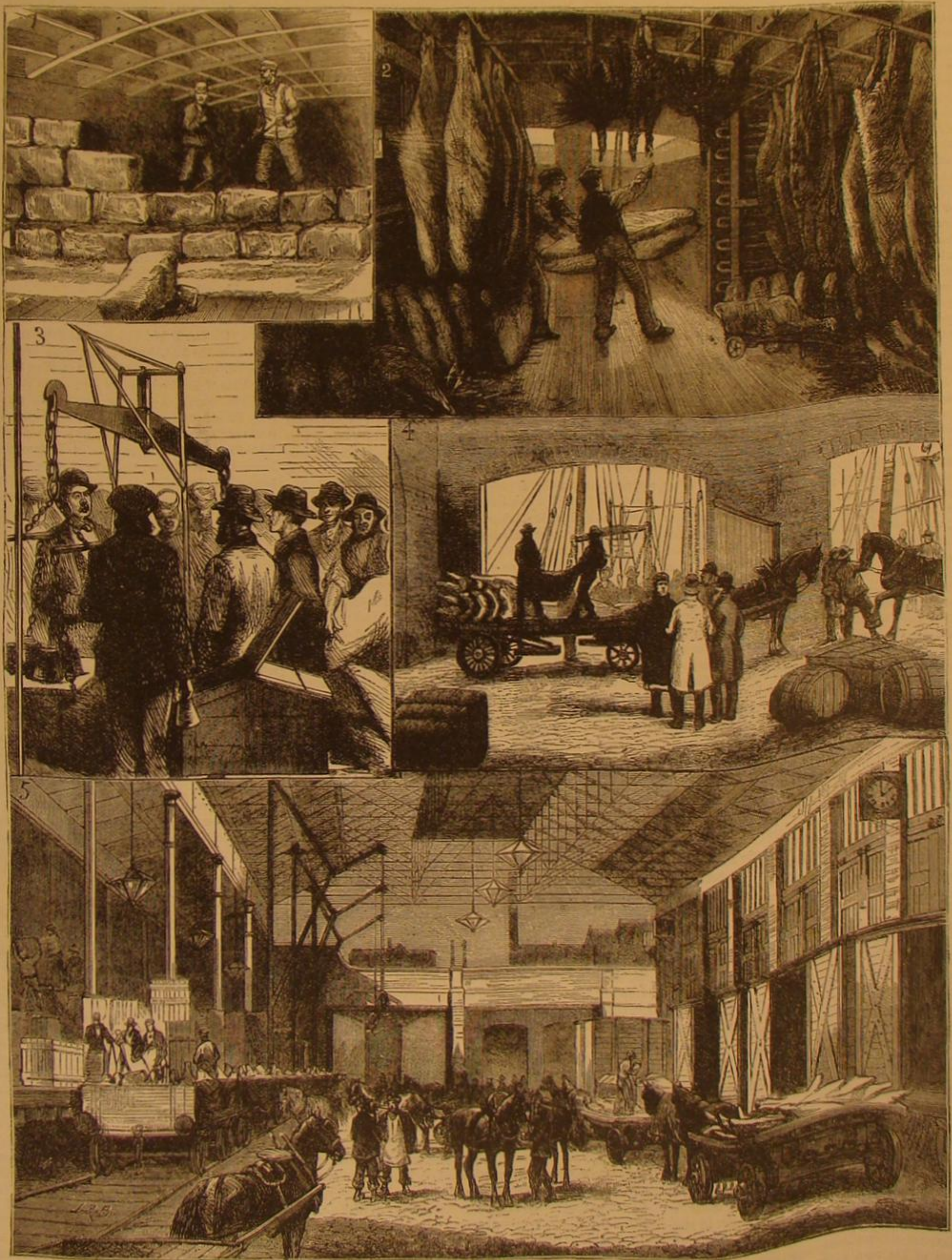
The animals selected for shipment are driven from the yards into a central passage in the basement of the buildings, and thence into pens which open directly upon the shambles.



The scene in that sanguinary locality is represented in our engraving. There is an atmosphere of blood and steam. Men—models of magnificent physical condition—work rapidly upon the suspended carcasses, using their keen knives with the dexterity of surgeons. No one wastes any time. The red door of a pen is swung open, the hooked rope from one of the many huge pulleys above is hitched around the hind leg of a steer, and, before the astonished animal fairly realizes the novel sensation of being hung up by the heels, the sharp knife has pierced his throat and the life blood rushes forth. Instantly a number of men attack the body: some skin it, others remove hoofs, others the interior, and thus in a very few minutes the animal is cut up, and his reeking quarters are shifted upon traveling hooks which move along the iron railways suspended from the beams. One thousand steers a week are killed in this manner, or an average of one ox every three minutes during working hours.

The various overhead tracks lead into the cooling rooms, of which there are six, three on each side of the building; so that the quarters can be moved, without any lifting, directly into these apartments, and there left until the time for shipping arrives. The construction of one of the ice boxes, showing how the cooling room beneath is rendered of the proper temperature, and also a view of the interior of one of the cooling rooms, are given in our first illustration. The ice box is a huge double-walled room, placed in the story above the cooling apartment and capable of holding over a hundred tons of ice. It has no openings, save one in the ceiling for the insertion of the ice and the necessary apertures for the escape of air driven through the frozen blocks. The blast is generated by a powerful blower, impelled by steam and located outside the box. This forces air into the receptacle at the top; and the current, descending, passes through the ice, thence through apertures at the base of the sides of the room, then down through the walls of the cooling chamber, and enters the latter near the floor. Meanwhile, there is a conduit from the upper part of the cooling chamber to the blower, which in this case acts as an exhaust, drawing the hot air from the top of the cooling room and constantly replacing it with the cold air forced in below.

After the meat is thoroughly cooled, it is sewn in strong canvas bags, and sent aboard the steamers. At present six of the vessels of the Anchor line are fitted each with two refrigerators, these being capable of holding from 180 to 225 carcasses each. Our second engraving, from the London *Graphic*, represents the ice box between decks (1), the refrigerator room (2), weighing the meat (3), loading carts on the quay at Liverpool (4), and packing a meat train at the railway station (5). The meat room aboardship is lined with patent oilcloth, and also with airtight boarding; the roof is studded with iron hooks, at such distances as to keep the quarters of beef from touching each other, friction being found to damage their chances of preservation. The place is kept exquisitely clean. On the side of this chamber, opposite to the ice house, are placed wooden flues, open at the top and perpendicular to another and larger flue, which runs alongside of the chamber and crosses the floor into a wooden chest, attached to which is a fan worked from above by a donkey steam engine. The fan, when set in motion, causes a current which draws the heated air from the top of the compartment down through the wooden flues, and along that running across the floor into the chest, thence passing into the ice house, with great force, by an orifice at the top. The air becomes cold in the ice house, and this cold air, passing out of the ice house at the bottom, is sent into the meat room. The air is subjected to the same treatment again and



THE AMERICAN MEAT TRADE IN ENGLAND.

again, so that a constant current of pure cold air is being supplied by the refrigerator at a temperature of about 37°, or sufficiently cold to preserve the meat, but without freezing. When the fan is in motion the current of air is strong enough to draw into the flues any small pieces of paper thrown into the air. The door of the meat store, as well as that of the ice house, is cased with india rubber, and is fastened on with screws which make it airtight, if required. The ice house is somewhat smaller than the meat room; it is packed with block ice. The floor, being covered with coarse canvas, acts as a filter for any sediment which may gather, preventing it from passing away with the water formed by the melting ice. The ice, if allowed to go with the water, would choke the pipe connected with this part of the arrangements.

The London *Graphic* gives the following particulars as to the American meat trade in London:

"The fact that beef can be brought over from North America in good condition has therefore been abundantly proved, but the check to the further development of the trade has been that directly the meat is unloaded it must be sold and used. The simple way to meet this difficulty is, naturally enough, to unload the quarters into a wharf with a refrigerator that will continue the conditions under which they have been brought over and in which they can be kept till they are wanted in the market. The care taken both in America, and in regulating the temperature in bringing the meat over, is of but little practical value if, on its arrival in England, the meat be allowed to fall into a condition in which it is unfit for use before it reaches the consumer. But, although the remedy is so obvious and so simple, it is not until now that any plan for definite action in the matter has been proposed.

"It was Mr. D. Tallerman, Managing Director of the Australian Meat Agency, who proposed the new arrangement for the reception of foreign beef into London, based upon the adoption on a large scale of a simple principle already well known. Mr. Tallerman's plan was simply to have a large refrigerator for the reception of foreign meat, from whatever country it may come, when brought in the ice compartments, and also for fruit, game, and other perishable foods. The company, of which he is managing director, secured premises having an area of five eighths of an acre, and this, with a flooring of a portion of it, makes a total floor space of an acre. Arrangements are being made for converting this into one vast refrigerator. The building is divided into eleven arches, and by airtight doors each arch is to be a separate compartment. One compartment is arranged to contain the ice supply, and by earthenware pipes to the different compartments the temperature of each is to be regulated. A fan, worked by a two horse power engine, will draw the dry cold air from the ice chamber through the compartments. A large portion of the upper floor is fitted up with shelves, which can be used for the storage of fruit and poultry.

"When the arrangements of the company are completed the whole of the premises will be one vast refrigerator, in which during the hottest summer the temperature will not rise above 40° Fah. Passing through an ice chamber to reach the required point, the air is to be filtered through cotton wool before circulation through the storage refrigerators. These are large enough to hold the meat supply of London for a fortnight, exposed to a continuous gentle current of the coolest, purest, and driest air. An important feature in these arrangements of the London company is that the transport from Liverpool is effected without any handling after the quarters of beef leave the steamer's hold. For this purpose, Captain Acklom's refrigerating wagons and a Great Western converted van are employed. In these vehicles a low temperature is maintained by the circulation of water outside the central chamber, which is fitted with hooks. As soon as the forty-eight quarters, which one of the Acklom wagons will carry, are placed in them, the doors are closed, and the meat can then be transported any distance and in any weather without fear of deterioration. One of Acklom's wagons, containing quarters of beef just as they had come from Liverpool, was exhibited at the entrance of the New Meat Market, and excited much interest.

"In order to familiarize the public with the sale and quality of American fresh meat, some hundreds of sides of beef have been daily brought for sale to a market formed by a single arch of the company's premises in Upper Thames street, and sold to all comers; 14 cents per lb. is the average price of the whole side of beef, but fore-quarters are sold at 13 cents, while 16 cents is charged for boiling and roasting joints taken together."

Spring Fever: How Not to Have It.

In the *Christian Union*, a writer gives the symptoms and several remedies for a very common complaint, prevalent with almost every one to a greater or less extent at this season of the year:

The hampered body, says the writer, which has been coddled, petted, stuffed with carbon-bearing fats, and calorified in every possible way, begins to protest. The machinery is clogged; headache, dyspepsia, and the thousand nameless sensations of discomfort which we charge to variable weather, afflict and hamper poor humanity. To-day the fog depresses our vital force, to-morrow the brain is pierced with blinding sunshaft; and so each day's external is made responsible for internal shortcoming. The *littérateur*, in atrabilious humor, afflicts the world with morbid philosophy. The pastor sees weak humanity more than ever sinful, and his Lenten homilies are unconsciously tinctured with a deeper dye for the pangs of his own mortality. The housewife, in overheated rooms, with a monotone of circumscribed care and too little outside diversion, finds dirt and despair in the kitchen, chaos in the nursery, a forlorn hope in her mending basket.

Among other remedies for people who say, "I always have a bilious attack in the spring," the following seems the most potent:

On rising, sponge the body lightly and quickly with cold water, briskly toweling after. It is not necessary that this be a long or laborious operation: the more rapidly the better, with sufficient friction to bring a glow to the skin. If you cannot secure time to go over the whole bodily surface, at least make it a point to daily sponge the trunk and arms. Rousing and stimulating the whole system, clearing and opening the pores, it imparts an indescribable freshness and exhilaration, amply repaying the effort. Rehabilitated, you are now ready for your morning bitters, namely, the clear juice of a fresh lemon in a wineglass of water, without sugar. This is a bomb straight at the enemy, for a more potent solvent of bile is not in the *materia medica*. Searching out rheumatic tendency, attacking those insidious foes which are storing up anguish against our later days—calculi—it pervades the system like a fine moral sense, rectifying incipient error. It is needful, perhaps, to begin with two lemons daily, the second at night just before retiring.

A primitive but most efficacious prescription, which corrected the physical reaction after a pork-eating winter for our ancestors, was a wineglass full of very hard cider, made effervescent by a crumb of sal soda. More potent and palatable is the concentric force of the pure lemon acid.

We venture to claim for this self-treatment alone, faithfully applied, more relief for the body and stimulus to the mind than from a battery of pills or quarts of herb decoction.

Self-Made Men.

Self-made men, in the common acceptation of the term, are those who, with but few outward opportunities, have by their own unaided energies risen to acknowledged greatness. There is some danger, however, lest in bestowing this appellation exclusively upon such persons we convey the impression that those who possess the advantages of instruction, training, and assistance, *cannot* be self-made. It is a truth which is sometimes overlooked that, whatever there is valuable or excellent about a man, comes primarily from his own capacity, energy, and industry. The most abundant advantage and the most generous education can never supply the lack of brains, or implant innate power, or compel untiring perseverance. If they could, there might be some justice in regarding the academy or university as the rival of self-education, and in distinguishing rigidly between the self-made man and the college-made man. As it is, every one whose life amounts to anything at all is self-made in the true sense, whether he be favored with outward helps or not. He must not only supply the foundation of a capacity to learn, but must also furnish a continual relay of power in the form of assiduous and patient labor. If he fail in this, no system of instruction, however admirable, no corps of teachers, however able, no amount of wealth, however judiciously expended, can ever avail to give him significance as a scholar. He must be self-made, if made at all, though he be surrounded from infancy with every appliance that money or affection or wisdom can suggest.

The same thing holds good of excellence in all other pursuits. If a man is to become a superior mechanic, or merchant, or physician, or artist, he must be self-made, whatever be his advantages of training or instruction. The force to overcome obstacles and the courage to face difficulty, the ability to form wise plans and the energy to execute them, the patience to wait for success, and the industry to secure it, must all come from within. Without these, it is of no avail that the boy be placed in the best mercantile house, that the apprentice be trained by the most skillful artisan, that the medical student be prepared by the most learned professors. It will all end in disappointment and failure, if he put not his own shoulder to the wheel, with a vital power that no outside influences can supply.

It would, however, be folly, for this reason, to undervalue the helps we obtain from external sources. Indeed, it is only as we assign to them their true office that we can appreciate their real worth. They cannot, it is true, make valuable men, but when rightly used, they can vastly aid men in making themselves valuable. There are but few who can rise to greatness in any branch without such aids. Occasionally a great man astonishes us by the heights to which he climbs, unsupported save by his own mental strength and powerful will. But these are exceptional characters, and might have risen to still loftier eminences had they been favored with more propitious circumstances. Most of us need all the help we can obtain—the discipline of the schools, the training of faithful instructors, the hints and suggestions of experts in our special callings, and every other outside influence that can be brought to bear upon our improvement—in order that we may attain a moderate degree of excellence. Gladly should we welcome all such assistance, eagerly grasp it, and earnestly strive to profit by it, only remembering that it can never supplant but only supplement and invigorate our own exertions. Just as the warm sun rays and refreshing rain drops descend to bless the plant that is charged with vitality, but fall powerless on one without root or sap, so outside help is invaluable to the energetic living worker, but impotent to one who lacks brains or energy, or the will to exert them.

It is especially encouraging to one who can command but few external advantages to reflect that he is by no means dependent upon them for his success in life. It is true that the best results may be expected where a strong self-energy comes under wise instruction and guidance; but while the latter alone can do nothing, the former alone can do much. Besides, it never is quite alone. Capacity and industry always find appreciation and help, and are apt to make it all the more useful for its scarcity. All young persons especially can be, and should resolve to be, self-made. Whether poor or rich, whether wholly self-dependent or favored with assistance, they must evolve whatever they would become mainly from their own native abilities and enthusiastic efforts. With these in active exercise, none need despair of excellence; without them, none will attain it.—*Philadelphia Ledger*.

ASTRONOMICAL NOTES.

OBSERVATORY OF VASSAR COLLEGE.

The computations and some of the observations in the following notes are from students in the astronomical department. The times of risings and settings of planets are approximate, but sufficiently accurate to enable an ordinary observer to find the object mentioned. M. M.

Positions of Planets for May, 1877.

Mercury.

On May 1, Mercury rises at 5h. 49m. A.M., and sets at 8h. 49m. P.M. It can be easily seen in the first half of the month, especially on the 3d, when it has its best position. At that time it sets about 8° north of the point of sunset. On the 31st, Mercury rises at 4h. 23m. A.M., and sets at 6h. 23m. P.M.

Venus.

On May 1, Venus rises at 5h. 1m. A.M., and sets at 6h. 44m. P.M., too nearly with the sun to be seen. On the 31st, Venus rises at 4h. 57m. A.M., and sets at 7h. 55m. P.M. Venus may perhaps be seen after sunset at the last of the month, as it sets a little north of the sunset point.

Mars.

Mars rises on May 1 at 1h. 23m. A.M., and sets at 10h. 55m. A.M. On the 31st, Mars rises at 0h. 18m. A.M., and sets at 10h. 26m. A.M. Mars is among the stars of *Capricornus*, and, although small, is very readily known by its ruddy color.

Jupiter.

Jupiter is very brilliant in the morning. It rises on the 1st at 11h. 2m. P.M., and sets at 8h. 4m. A.M. of the next day. On the 31st, Jupiter rises at 8h. 54m. P.M., and sets at 5h. 56m. the next morning. On May 3, only three of the satellites of Jupiter will be seen when it rises, one of them being in transit across the disk of the planet. On May 5, only three satellites will be seen before midnight, the smallest being in transit across the disk. On the 21st, when Jupiter rises, only three satellites will be seen, as one of them is in the shadow of the planet, or is eclipsed. On the 25th, the largest satellite cannot be seen in the evening, being behind the planet. A good opera glass, an ordinary ship's glass, or a small telescope will show these moons of Jupiter.

Saturn.

On May 1, Saturn rises at 3h. 2m. A.M., and sets at 2h. 15m. P.M. It can scarcely be seen at all. On the 31st, Saturn rises at 1h. 9m. A.M., and sets at 0h. 27m. P.M. At this time it can be seen for a few hours in the morning. It is among the stars of *Aquarius*.

Uranus.

On May 1, Uranus rises a few minutes before noon and sets at 1h. 49m. the next morning. On the 31st, Uranus rises at 10h. A.M., and sets at 11h. 52m. P.M. It is still among the stars of *Leo*.

Sun Spots.

From March 16 to April 15 the sun has been unusually free from spots, even for this minimum period. But two groups have been seen, the first composed of two small spots, on March 18, and the second, a large group, on April 15. A peculiar interest attaches to them, however, as they seemed to appear suddenly near the middle of the sun's disk. No spots could be seen on April 14, yet on the 15th a double spot of large size, surrounded by several smaller ones, is found near the center, seeming to show a sudden disturbance in that region.

The Comet.

On the morning of April 15, the small comet, just visible to the eye, was very near the star 32 *Pegasi*, and moving slowly toward the north. It had a bright nucleus, and could be seen with a glass until just before sunrise. It is increasing in brightness. The train is broad, and up to April 15 not more than a degree in length.

Substitute for Sulphate of Quinine.

Dr. Woodworth, Supervising Surgeon-General, calls the attention of medical officers of the U. S. marine hospital service to the extraordinary increase in the market price of quinia sulphate, and at the same time to the accumulating testimony in favor of the employment of the quinidia, chinchonidia, and chinchonia sulphates, of which the two first named are believed to be as efficacious as the quinia sulphate. He suggests that the less costly salts be accorded a fair trial, and that medical officers take this matter in consideration in preparing their next semi-annual requisition for medical supplies.

A. K. S. writes to say that strong draught is indispensable in a coal oil lamp, and that there exists a demand for a flat-wicked lamp with an argand chimney, which will supply the draught necessary to give perfect combustion.

NEW YORK ACADEMY OF SCIENCES.

The regular business meeting of the Academy was to have been held on Monday evening, April 2, but owing to the storm a quorum was not present and no business could be transacted. Professor Chas. A. Seeley continued his paper of the previous meeting on devices for securing pressure in filtration; after which Professor G. J. Rockwell, of the Japan University, presented a paper entitled

INDEX TO THE LITERATURE OF VANADIUM, 1801 to 1877,

which was read by title, and will be published in full in the *Annals* of the Academy. This index is on the same plan as those on uranium and manganese, by Dr. H. C. Bolton, and on titanium, by E. G. Hallock, previously presented to the Society. Vanadium has recently been discovered to be one of the most useful metals, especially for the manufacture of aniline black and indelible ink. As yet the sources are few, and the amount found very minute; so that the metal sells for $330 per ounce. Some of our New Jersey ores, however, says Dr. J. Walz, contain vanadium, and the Yankee who succeeds in extracting it on a commercial scale will confer a lasting benefit and secure a fortune at the same time. Mr. Rockwell has given in his index some 500 references, which will enable the investigator to find out with but little labor just what has already been known and written.

The Section of Chemistry held their regular meeting Monday evening, April 9, at the School of Mines, Columbia College. The first paper of the evening was by Mr. T. O'Conor Sloane, E.M., on the

EXPERIMENTAL EXAMINATION OF GAS COAL.

The speaker, who is a practical gas engineer, first described the methods of making illuminating gas from coal by dry distillation on a large scale. The subject was suitably illustrated by lantern pictures. The wet and dry meters were also exhibited, and their action explained. Mr. Sloane then described the experimental gas apparatus employed by him for determining the quantity and quality of gas that may be obtained from a given specimen of coal. The retort employed is 7 feet 4 inches long, and will hold a charge of 224 lbs. of coal. The stand pipe is 7 inches in diameter; beyond the main, the hydraulic main 3 and 4 inch pipes may be used. The usual forms of condenser, scrubber, purifier, and meter are employed. The gasholder, which has a capacity of 15,000 cubic feet, is so arranged that, when the holder is down, it will be entirely empty. It is weighed by running water into a basin formed by the top sides of the holder. By-passes are used to cut out any of the purifiers or meter if desired. Gas from the large works can also be sent through this apparatus for experiments with the condensers and purifiers. A preliminary charge is made at 7 A.M., to get all the old gas or air out of the apparatus, and is drawn at 10 or 11 A.M., when 1,100 cubic feet of gas have been run through and registered. The next charge is carefully weighed and put in, the meter reading taken, and the apparatus connected with the holder. About 5 P.M., when the gas comes off so slowly that it requires two to three minutes to make a foot of gas, the charge is drawn. Two determinations are usually made: one of maximum yield, the other of quality at standard yield. The coke is also weighed at the close of the operations. The gas ought then to be subjected to a careful and complete analysis, which is not done in any of our city gasworks, probably owing to the labor and expense, which influences the penny-wise, pound-foolish action of the directors.

The second paper of the evening was on the

DETERMINATION OF IODINE BY THE BLOWPIPE,

by Mr. Walter B. Devereux. The determination of iodine in the presence of the other halogens, chlorine and bromine, has hitherto been a difficult and uncertain operation in blowpipe analysis. Mr. Devereux takes advantage of the well known property which sulphate of copper possesses, of decomposing metallic iodides and liberating the iodine. The substance to be tested is mixed with one third its weight of pulverized sulphate of copper, and the mixture is introduced into a glass tube closed at one end and heated. The iodine is easily recognized by the violet color of its vapor, or by holding a piece of moistened starch paper at the open end of the tube, taking care that the paper does not become heated, which would destroy the blue color of the iodide of starch. This precaution is more especially necessary in the case of iodide of silver, which requires a high heat for its decomposition. At the close of Mr. Devereux's remarks, Professor Egleston spoke of the great value of this test, and expressed the hope that equally simple tests might be found for chlorine and bromine when mixed together.

The third paper for the evening, by Dr. P. de P. Ricketts, was on the

REFINING AND COINING OF GOLD AND SILVER.

Dr. Ricketts illustrated his remarks by a series of magic lantern views, showing the apparatus and machinery employed in the Government assay offices and mints. The treatment of the crude bullion with nitric and sulphuric acids was decribed, and the method of assaying the same referred to. The alloying of the fine bars from the parting for the manufacture of coins was explained; and the various operations of rolling, annealing, culling, milling, and cleaning the coin dies, also the stamping and adjusting of the coins, were shown by views taken from the mint in Philadelphia. The method of making the steel dies for coining and the apparatus for utilizing the waste of the mints and Assay Office was illustrated and explained, some reference being made to the European mints.

Binocular Vision Experiments.

BY FRANCIS E. NIPHER.

It is possible that the phenomena here described may have been observed before, but I have been unable to find any record of them.

1. Fold a sheet of writing paper into a tube about an inch in diameter. Look through the tube at some distant object with one eye, and toward the open hand with the other eye, the edge of the hand being in contact with the tube. The dissimilar objects producing unlike images upon the retinæ, the sensations blend, and a hole will appear to be cut through the palm of the hand, through which the tube passes. That part of the tube between the eye and hand will appear to be transparent, as though the hand were seen through it.

This experiment is very old, but seems not to have found its way into scientific literature.

2. Replace the hand by a sheet of unruled paper, upon which a drop of ink has been placed. By proper management, the ink blot may be made to appear within the tube, by so placing the paper that the hole, which is apparently cut through it, coincides with the blot. Ordinarily the blot will then appear opaque, the paper immediately around it, and apparently within the tube, being invisible. The blot appears as it were suspended in space. By concentrating the attention strongly on objects seen through the tube, especially if they are strongly illuminated, the blot becomes more hazy, transparent, and may even be made to disappear altogether. The mental effort necessary to do this cannot be maintained more than a few seconds, and the spot will reappear. If the effort to cause the spot to thus disappear be kept up, the attention being strained to its highest pitch, the blot will disappear and reappear at regular intervals of a few seconds, the absolute time depending upon the illumination. It seems as though the organs exerted become fatigued, and, relaxing for a few moments, refreshment sets in, which again renders possible the exertion necessary in causing the blot to disappear. It is possible that these experiments may be so made as to throw some light upon the conditions necessary in fixing the attention. Interesting experiments may also be made by substituting a fragment of a plane mirror for the sheet of paper. Looking through a rather large tube at a distant object with the right eye, the reflected image of the left eye will appear staring up the tube, the adjoining parts of the head being invisible.

3. Substituting for the ink blot a small hole cut through the paper, the small hole can also be made to appear within the tube, distinguishing itself by its different illumination, the surrounding paper being invisible, unless attention be directed too strongly to the paper in which the hole is cut. The relative illumination of the small hole, and the space immediately around it, depends upon the relative illumination of objects upon which the tube is directed, and that of the sheet of paper exposed to the other eye.

4. Keeping the same arrangement, place at a distance of one foot from the end of the tube a sheet of paper so that objects beyond it are still visible; arrange matters so that it is visible to the eye looking through the tube, but not to the other, directed at the small hole in the paper sheet. This second sheet will now appear to be traversed by a hole the same in size as that cut through sheet No. 1.

Cutting a small hole in sheet No. 2, matters are easily arranged so that it appears within the hole which was before seen within the tube. These experiments may be utilized in showing the simultaneous accommodation of the two eyes.

5. Tubes of this kind, blackened on the inside, are very convenient in studying color sensations. Using two such tubes, look through one with the right eye, say, at red, through the other with the left eye at green paper, illuminated by the direct solar ray. The color sensations fade with marvelous quickness. Transferring both eyes to either color, say red, the eye fatigued by green sees the red greatly intensified, the effect being rendered the more striking by the simultaneous impressions received by the two eyes. Experiments in the combination of color sensations will readily suggest themselves.—*American Journal of Science.*

American Industry.

A public dinner was recently given in Cincinnati to the Hon. A. T. Goshorn, Director-General of our late Centennial Exhibition. In response to the toast, "American Industry," Mr. Goshorn made an interesting speech, from which we extract as follows:

"There is loud and bitter complaint that the American people are too industrious—do not have enough holidays, and burn candles at both ends, wasting adipose tissue and the precious phosphorus of the brain. A young man hardly gets fairly into business, and learns to love it and make it go, when he is set upon by wise physicians and told that he is toiling too much, and especially enjoined not to overwork the brain. Distinguished strangers mourn over us because we are lean, and say we do not chew our food because we have not time, and that temperance fanaticism runs riot in the land until generous liquids are unpopular, and we are washed pale and cold with floods of ice water. Still, from time to time, there are to be seen in public resorts American citizens who do not overwork themselves. The heavy sitting around corner groceries, drug stores, cigar shops, and beer halls is, I think, sufficient to secure the safety of the country. Then a wire-edged person might say that this visible inertia is the surface indication of the industry of those who get their living out of politics, and so save us all.

"The new world of geography is the old world of geology. There is in our valleys and mountains written proof that some of the six days the Lord spent in making the earth must have been measured on old-fashioned timepieces, not used in the historic period. Our illustrious ancestors in crossing the Atlantic were no doubt animated by the noble purpose of having a good time. Their medical advisers told them they wanted a change of air, and that they musn't work too much with their brains. Life was heavy in Europe. There wasn't such a Paris then as there is now. This continent contained the fatness of the ages in its soil. Virginia was a vast park filled with the red deer. The rivers were flush with fish, the air was full of canvas-backed ducks and honey bees, the bays were paved with oysters, the soft-shelled crabs tickled the seaweed, and the point clams bored the sands, while the diamond-backed terrapin ambled away over the soft meadows. The fragrant sassafras tree gave its buds and roots to make tea delicious as the beverage of the Celestials—and in the deep woods were autumnal rains of nuts on the tinted leaves—walnuts, hickory nuts, beech nuts, and butternuts—and the pawpaws and persimmons, richer than Spanish figs, grew mellow and yellow in the white frosts, and fattened the succulent opossum—a providential preparation to soften the asperities of life for the approaching African. Talk of the hardships of the pioneers! They had a variety of sea food and forest game that would have confounded the old Romans. They lived on the cream of the universe, and licked it up to the utmost of their highly cultivated capacity.

"I do not feel that we have occasion to be always astonished at what has been accomplished, when we consider the fine continent we had here in the aboriginal package, and the endowment in capital and labor that Europe has bestowed. Let us learn to look upon the world with the understanding that the American citizen is not a being whose mission is the astonishment of the rest of mankind. The fact is, we may land at any of the European ports and stand in square-toed American boots without imparting an additional vibration to the tottering thrones.

"It is the better part of the experience of travel to be pleasantly surprised on coming home. When first contemplating America from the European standpoint, it is interesting to be asked whether you are from North or South America. They do know there are two Americas, even where they do not know the difference between Kentucky and Kansas. Returning from Europe in 1870, after attempting to identify myself in the foreign mind with North America, the popular inquiry in Cincinnati was: 'Have you seen the great Exposition?' Of course I must have seen it, wherever it was or whatever it was! The mood in which one returns from abroad is not that of being sensitive to home-made spectacles.

"When a journalist in a city of the first class, containing less than four million inhabitants, longs for the unattainable, it is likely to take in his mind's eye the form of a copy of the London *Times*. It is the expression of the highest public opinion, and therefore the best authority in England. The leading article of the *Times* of March 1 is a discussion of the importance of the representation of England at the Paris Exposition. It speaks of the superiority of the trained intelligence of the workmen of Germany and America—and so 'the competition at Philadelphia was not altogether satisfactory to us.' The fineness of the mechanical work shown at Philadelphia 'could not have been exceeded if every man who had any share in its production had originally conceived it and had been solely interested in its success.'

"It is important, then, that American industry shall be represented in Paris, so as to confirm the marvelous reputation won at Philadelphia. The fame of our Exhibition should be justified and made brilliant in the polite capital of the world. We should be represented at our best. Goshorn would be a good man, but he is from Ohio. The fact that the President, Chief Justice, General, and Lieutenant-General of the United States are from Ohio, and that their predecessors in those offices were Ohioans, seems to the country at large a shade too much for one State. We are modest: we have the 'reserve,' though Mr. Evarts cannot see it; but what can we do? True, we must draw the line somewhere on our embarrassing superabundance of talent.

"The Thunderer of London is right. There are brains in American industry. Why, the great Corliss engine at the Centennial Exhibition had brains, for I saw it pick up its own valves and drop them when there was just steam enough on, and very few men can be trusted to do that. It had so much sense it would not waste 1 lb. of steam, for it knew that steam cost money. American brains shine in the finish and fitness of the work that is commanding even the markets of Asia. It is the busy brain behind the cunning hand that guides the great artisan to perfect his workmanship, just as the colors of the artist must be mixed with brains if they are to be radiant for ever. And yet American industry has been struggling under the disadvantage arising from political disturbances and financial disorder. We must endeavor to remove our professional politics from the pathway of intelligent industry. There is a chance for strokes of statesmanship.

"One virtue in which the Americans are not conspicuous, they need to complete the round of their triumphs. It is thrift. The growth of two blades of grass or two stalks of grain where there was one should be celebrated. Cutting down trees was the beginning of our industry. The time has come to plant trees, and to cover the fields with clover to bind up the wounds of the soil—to restore to the fire-swept deserts the blooming wilderness, tempting the gentle rains from heaven that the waste places may be fruitful, that the rivers may not run turbid with the riches of the earth to the seas, and that the great continent we inherit may be good for the generations to come."

Inventions Patented in England by Americans.

From March 26 to March 29, 1877, inclusive.

Animal Trap.—J. Martin, Palestine, Texas.
Brush.—H. Rosenthal, New York city.
Friction Coupling.—T. A. Weston, Stamford, Conn.
Furnace, etc.—R. L. Walker, Boston, Mass.
Horseshoe Machine.—J. A. Burden, Troy, N. Y.
Knitting Machine.—W. H. Abel, Laconia, N. H.
Lamp.—L. H. Olmsted, Brooklyn, N. Y.
Making Steel, etc.—C. M. Nes, York, Pa.
Ratchet Clutch.—T. A. Weston, Stamford, Conn.
Refrigerator, etc.—J. Tiffany *et al.*, Chicago, Ill.
Screw-lifting Jack.—J. O. Joyce, Dayton, Ohio.
Stove.—J. K. Dimmick *et al.*, Cincinnati, Ohio.
Vehicle Wheel.—J. B. Sammis *et al.*, New York city.
Wheel Skate.—C. W. Saladee, Wolcottville, Conn.

Recent American and Foreign Patents.

NEW MISCELLANEOUS INVENTIONS.

IMPROVED CARD RACK.

James P. Lamoree, Canandaigua, N. Y.—This card rack is formed of a series of clamping strips or slats, connected in step shape at their thicker ends, so that the thinner spring ends extend one beyond the other, and form spaces for the storing of the cards.

IMPROVED CHECK-REIN SPREAD AND ATTACHMENT.

Daniel Schoonmaker, Newark, N. J.—This consists of a rein-spread formed in one piece, of cast metal, which is attached to the ends of the check-rein straps, or is provided with loops running transversely to its body, in which case the strap may be continuous from one end of the bit to the other, simply passing through the loop of the spread. The spread is of such form as to be readily placed on, or removed from, the water-hook. The device further consists in a bolt having a head of peculiar form, to be applied to the saddle, to be used in place of the usual water-hook, in connection with the rein-spread.

IMPROVED ADJUSTABLE HAT.

I. Ygnacio Cassiano, San Antonio, Tex.—The present invention is an improvement upon a former patent granted to same inventor December 2, 1873; and the object of the same is to furnish sectional bands for hats, so constructed as to leave the forehead of the wearer free, and so that the band may be adjusted to a larger or smaller head, and to fit closer or looser, as may be required, or, if desired, to cover the whole or part of the forehead.

IMPROVED THILL COUPLING.

Thomas B. Farrell and Martin D. Borst, Cobleskill, N. Y.—This consists of a fork or yoke for receiving the thill irons, that fits into a socket attached to the axle by means of a clip. The said fork is provided with a rubber spring, that presses against the thill iron, and abuts upon a plate that rests against the socket. A nut is provided at the rear end of the fork, for drawing it into the socket and tightening the rubber spring.

IMPROVED SHACKLE FOR CONVICTS.

Jay L. Quackenbush, Portland, Oregon.—This invention consists in the combination of hidden screws with the semi-cylindrical jaws of the half-ring parts of the shackle, having a screw thread cut upon their outer surface, and caps having a screw thread cut upon their inner surface. The key may be made with a fork to enter holes in the heads of the screws.

IMPROVED BALE TIE.

Joseph H. Fisher, Chicago, Ill.—This consists in a buckle of peculiar construction, adapted to a metallic strap to which it is attached. A lever engages projections on the sides of the said buckle, and there is a hooked pawl for engaging holes in the bale band.

IMPROVED PHOTOGRAPHIC PLATE HOLDER.

Charles L. Kempf, Brooklyn, N. Y.—This is an improved holder for photographic plates, so constructed as to enable the solution to be saved, and at the same time to protect the said frame from being destroyed by the solution. The double reversible corners are provided with a rabbet along their inclined edges, a groove along their lower flange, and other arrangements to adapt them to receive and carry off the solution. Tubes pass through the angles, and there is a curved solution bottle, provided with a mouth at each end, in combination with the recessed bottom bar of the frame, and with the two corners.

IMPROVED FIRE ESCAPE.

Tobias Lyness and Joseph P. Dunne, New York city.—This consists of a crosspiece with spurred end cheeks, placed across the inside of a window casing, and having a rope ladder suspended from adjustable eyes. The rounds of the rope ladder are provided at the ends with brackets, and that part of the ladder which passes over the lower window is arranged with one or more crosspieces in place of the brackets. In case of fire, the main crosspiece is placed across the window casing, and the rope ladder, with the lower crosspieces, lowered from the window, after which the fire escape is ready for use.

IMPROVED CARTRIDGE-LOADING IMPLEMENT.

James H. Dudley, Poughkeepsie, N. Y.—This instrument may be used as a rammer for loading, capping, removing an exploded cap, or for withdrawing a cartridge shell from a gun barrel, or the paper cylinder of a cartridge from a gun barrel should the metallic base-piece pull off. It may also be used for grooving a cartridge shell to prevent the charge from dropping out.

IMPROVED THILL COUPLING.

James F. Hill, Fleetwood, Pa.—This is an improved thill coupling, by which the shafts may be readily shifted from one carriage to another. The invention consists of a shaft box or bearing, with hinged top attached by a clip to the axle. The center pin of the shaft attachment turns in the box, and is retained therein by a locking lever mechanism, that binds on a tongue of the cap.

IMPROVED BAG FASTENER.

Henry Bedden, New York city, assignor to Andrew M. Underhill, of same place.—The object of this invention is to improve the construction of the bag for which letters patent were granted to same inventor May 23, 1876, in such a way that its contents may be discharged readily and quickly, and which, when tied, will prevent any leakage. When the bag has been filled, the outer edges of two flaps are brought together, and the said flaps are rolled together within the mouth of the bag. The mouth of the bag is then drawn together over the flaps by cords. The apron is fastened on the inside near inner edge of hem, while the cord runs parallel to the hem, to allow the bag to be fastened quickly without sewing, and opened without cutting.

IMPROVED CHAIR SEAT AND BACK.

Paul Rath, New York city.—The bottom of this chair seat is made preferably of a piece of pasteboard which is stamped by suitable machinery, so as to form a central opening; and a concaved moulding, of suitable depth, extending around the opening. The sides of the pasteboard are turned down to form flanges by which the seat or back may be attached to the piece of furniture. The pasteboard is covered at both sides with canvas or other fabric, that passes across the center opening, so as to close the same and provide a flexible base for the seat. When the bottom is thus finished it is exposed, with a quantity of wadding or other stuffing, and with a loose leather or other covering, to the pressure of a powerful hydraulic or other press, by which the bulk of the wadding is reduced to smaller compass, and sufficient elasticity given to the same to furnish a soft and flexible seat.

IMPROVED NECKTIE.

Robert Swenarton, Newtown, N. Y.—This consists of a slotted plate for receiving the collar button, which is provided with a barb or projecting point at each side for engaging the ends of the band that encircles the neck. The object of this invention is to provide a necktie that may be securely fastened, so that it cannot become accidentally loosened, and which is capable of being worn either with or without a band to encircle the neck.

IMPROVED BUCKLE.

Benjamin F. Melton, Gainesville, Tex.—This consists of a buckle with fixed loop extending at the under side from the lateral tongue bar of the buckle. It may be manufactured quicker and cheaper than when the loop has to be sewed with the buckle to the strap end.

IMPROVED SHANK SUPPORT FOR BOOTS AND SHOES.

George W. Wells, Black Hawk, Col.—The invention illustrated herewith is an improved spring for the soles of boots and shoes, so constructed as to prevent the soles from twisting or getting otherwise out of shape, while giving great elasticity. A is the spring, which is made of steel, and of such a length as to extend from the heel to, or nearly to, the ball of the foot, and which is bent to give the desired arch to the sole. The spring, A, is made with a crosshead, B, at each end, as shown in Fig. 2. Through the ends of the crossheads, B, are formed holes, to receive rivets for securing the said spring to the insole of the boot or shoe. The rivets have wide flat heads, to give them a firm hold upon the insole, and prevent them from hurting the feet of the wearer. This construction gives the springs great strength to recover themselves from a lateral twist or strain, and at the same time gives to the sole elasticity in walking. The inventor, who may be addressed as above, desires to contract for the manufacture of this device.

Fig. 1.

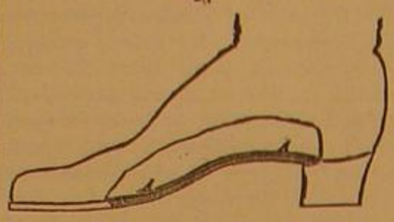


Fig. 2.

IMPROVED MODE OF EXTINGUISHING FIRE, ETC.

Donald McLennan, West Green, assignor of one half his right to Mary Ann Davis, London, England.—This is an improvement in means for extinguishing fires by discharging water from stationary perforated tubes attached to the walls or ceilings of rooms, halls, etc., of buildings. The improvement relates particularly to the construction and arrangement of devices for turning on and shutting off water in the several rooms in which the perforated tubes are located. Each cock is operated by a connecting rod, elbow lever, and a pull rod. The several pull rods are arranged together, and extend downward by the side of the wall of the building, and are provided with suitable handles. By pulling any one or more of the rods, the water will be let on in the corresponding room or rooms.

IMPROVED TRUNK CATCH.

Eliakim Rice, Cazenovia, N. Y.—This consists of a trunk catch made of three castings, provided with a spring, and capable of being put together without special fitting. It is so constructed that two dowels cast on the portion attached to the cover enter sockets formed in the part attached to the body of the trunk. The whole is arranged so that the parts may engage automatically, and may be readily disengaged.

IMPROVED SMOKING PIPE.

Bengt A. Jonasson, Warren, Pa.—This is a folding smoking pipe whose joint consists of two rabbeted hollow half-spheres and an open ring spring retainer. With this construction the mouthpiece can be turned down beneath the base, and the pipe thus reduced to small compass.

IMPROVED WIRE FENCE.

Charles D. Johnson and Levi F. Johnston, Marshalltown, Iowa.—The post is made semi-circular in cross section, and slotted to adapt it for attachment of staples for supporting the wires. This form of post secures the desired combination of strength, lightness, and cheapness. The staples are formed of short lengths of wire whose ends are twisted together and project from the post, thus forming barbs which prevent cattle rubbing against the post.

NEW WOODWORKING AND HOUSE AND CARRIAGE BUILDING INVENTIONS.

IMPROVED DUMPING WAGON.

Robert A. Reed, Hoboken, N. J.—This is an improved device for attachment to the frames or bodies of trucks, wagons, cars, etc., to facilitate their loading and unloading. The general construction is such that by operating a lever the forward end of the load is raised, so that it will readily slide off. When the load is arranged to be carried, swiveled crank screws are turned to force a crossbar down upon the load, and thus bind it in place.

IMPROVED SASH BALANCE.

Adam Kolb and Charles Osberghaus, Sandusky, O.—This invention consists in combining, with pulleys, cord, and spring clutch, a rod pivoted to the clutch, and passing through a hole in the casting. The operation is as follows: When the bolt is withdrawn the lower sash may be moved upward, when the upper sash will move downward, the two sashes counterbalancing each other. If it is desired to lower the upper sash without raising the lower one, the free end of the connecting cord is drawn outward, thus drawing the clutch away from the cord by means of a rod. The cord is, at the same time, permitted to pass through an eye and between the pulleys, allowing the sash to drop.

IMPROVED SASH FASTENER.

Henry Jones, East Saginaw, Mich.—This consists of a bearing piece, supported in a casting mortised into the window sash, and which is made to press with more or less force against the casing, according to the weight of the sash, by an adjustable volute spring. The device is capable of being locked by turning a button against the bearing piece when it has dropped into a notch provided in the casing for that purpose.

IMPROVED SKY-LIGHT BAR.

Joseph Henry, Chicago, Ill., assignor to himself and R. Philip Gormully, of same place.—This consists of a sky-light bar formed with two gutters and two glass supports at both sides of the double center part, to which the cap is connected by flat bolts and fastening cross bolts or rivets. The glass supports are concaved for receiving the putty, while the double gutter forms an interior gutter for any leak-moisture of the bolts.

NEW MECHANICAL AND ENGINEERING INVENTIONS.

IMPROVED WINDMILL.

Elias Stats, Cape Vincent, N. Y., assignor to Mary E. Stats, of same place.—This consists in the combination of a hoop or shield and a governor with a vertical windmill, in such a way that the action of the governor applies a portion of the power of the mill to raise the said shield, exposing more or less of the wheel to the action of the wind, thus controlling its motion.

IMPROVED SPIKE EXTRACTOR.

John A. Powell, California, Pa., assignor to himself and Jos. B. Crowthers, of same place.—This machine pulls the spikes without bending them, and is so constructed as to allow the operator to always stand within the track, so that the instrument can be used in cuts and tunnels. The arms of a clamp are pivoted to each other in such a position that their jaws may be opened enough to receive and grasp the head of a spike, which is then drawn by bearing down upon the free end of a lever.

IMPROVED CAR COUPLING.

George W. Gomber, Sybertsville, Pa.—This coupling enables the cars to be coupled and uncoupled from their tops or sides, and have sufficient play to prevent binding when the cars pass around curves. By operating a lever to press a rod downward, bars will be pressed against the inner end of the link so as to raise the outer end of said link and drop it over the hook of the adjacent car. In the same way the link may be raised *to* uncouple the cars.

IMPROVED CAKE MACHINE.

Daniel M. Holmes, New York city, assignor to J. Cutler Fuller, Orange, N. J., and Martha G. Holmes, New York city.—The object of this invention is to improve the construction of the machine for making cakes—such as jumbles, kisses, drops, macaroons, etc.—of soft dough, for which letters patent were issued to same inventor February 29, 1876. The invention consists in the combination of movable plungers with the hollow cutters, the cutter plate, and the dough box of a cake machine. The plungers serve to cut out the dough in suitable shapes. The machine contains considerable mechanism both novel and ingenious.

IMPROVED ROD COUPLING.

William C. McClintock, Hooperston, Ill., assignor to himself and William B. Steele, Bernhart's Mills, Pa.—This consists in a rod or shaft having scarfed ends, upon which are formed alternate transverse recesses and projections, which are so proportioned that the projections of one section of shaft fit the recesses in the adjacent section. The adjoining ends of the sections are held together by a sliding sleeve, which is retained in place by a spring latch. The device is applicable to pumpsucker rods, and to shafts.

IMPROVED LIFTING JACK.

Abram R. Hurst, Mechanicsburg, Pa.—This invention relates to an improvement in lifting jacks designed with a view to simplicity, ease of adjustment, and compactness of folding; and it consists in a stationary standard having a lift bar provided with laterally projecting teeth or pins, and arranged in guides or keepers to slide longitudinally upon the standard, in combination with a lever pivoted to the standard and having an oblong or elliptical camhead which is provided with a laterally projecting flange adapted to engage with the teeth of the lift bar to elevate the same, or to be disengaged therefrom.

IMPROVED DEVICE FOR THROWING BELTS ON PULLEYS.

Robert Reinhard, Langendreer, Prussia.—The object of this invention is to provide a simple, cheap, and efficient device for applying broad or tightly stretched bands or belts to pulleys, and thereby avoiding the difficulty and danger incident to such operation when effected by hand in the usual way. The device consists of a spring clamp for holding the belt, and a screw clamp for attaching it to a pulley. The spring clamp projects radially at one side of the pulley rim, and the screw clamp is applied directly to one of the pulley spokes.

IMPROVED WATER ELEVATOR.

Christian E. Lykke, Grand Island, Neb.—This improvement relates particularly to the form of the buckets, the construction of the chain whereby alternate links may be readily detached or separated to facilitate the attachment and removal of the buckets; also to the provision of fixed rollers journaled in a frame set in the well and serving to keep the chain distended; also to the use of a weighted stand or platform placed in the well to hold the chain taut.

IMPROVED DEVICE FOR BALANCING FLYWHEELS, PULLEYS, ETC.

Charles Seymour, Defiance, O.—The pulley to be balanced is supported horizontally upon a vertical spindle having a yoke provided with arms which engage the spokes of the pulley, so that when the spindle is rotated the pulley partakes of its motion and assumes an inclination to the horizon corresponding to the extent to which one side overweighs the other. Weights are then attached to the lighter side to make the pulley assume a horizontal position.

NEW AGRICULTURAL INVENTIONS.

IMPROVED HOG TRAP.

Elijah K. Jenkins, Elkhorn Grove, Ill.—This is an improved trap for catching and holding hogs while ringing, castrating, and marking them; and the invention consists in the combination of hinged doors, connecting bars, spring, swinging gate, bent lever, and strap with the pen. In using the trap, the hogs, one at a time, are driven into the open rear end of the pen, and, seeking to pass through it, they push back the doors by forcing their heads through between them, which doors immediately close behind their ears, so that they cannot withdraw their heads, while the gate prevents them from passing any further, and they are thus held securely.

IMPROVED COCKLE SEPARATOR.

Hermann Kurth, Milwaukee, Wis.—This machine belongs to that class of separators in which a revolving cylinder, having indented inner cavities, is made to catch the small impurities, such as cockle, foreign seed, dirt, etc., and to deliver them to a trough or pan which separates and carries them out of the cylinder apart from the clean grain. The main features of the improvement consist: First, in locating above the main indented cylinder one or more indented cylinders whose cavities or indentations are larger than those of the lower cylinder, the same being designed to separate the large wheat from the small wheat and impurities, and to take the place of sieves ordinarily employed for this purpose. Secondly, in constructing the cylinder with both indentations or cavities and perforations, which perforations are separate from and independent of the cavities and serve to effect the preliminary separation of the fine seed and dirt. Thirdly, in arranging the cylinders with one end free from, and the other end attached to, the central shaft, so as to work a conveyer and deliver cockle, etc., at opposite end of the cylinder from clean grain. Fourthly, improved construction of catch board, made automatically adjustable through hinges and provided with an adjustable flexible strip for removing cockle and impurities from cavities of cylinder and delivering them to trough. Fifthly, in the improved arrangement of the metal of the cylinder in forming the cavity, designed to increase the durability of the said cylinder.

IMPROVED GRAIN BINDER.

Harvey Hull, West Exeter, N. Y.—This is a novel construction of grain binder, belonging to that class in which the sheaf is bound with a cord which is tied in a single bow knot. It consists generally in a set of pincers which, in tying the knot, operate somewhat after the manner of the human fingers. Prominent among its novel features is an arrangement for looping and holding the cord around the tying pincers in such a manner that the loop will not slip off while the knot is being tied, but will slip off after the knot is tied; the leading device being a spring catch which, operating simultaneously with the tying pincers, projects laterally from the pincers outside of the loop while the loop is being formed, but which recedes when the pincers close, to pull the cord through the loop, and thus permits the loop to slip off. Among other important features, also, is a spring arm for holding the cord while the knot is being tied, and a hook for drawing the knot well down to the bundle.

Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion. If the Notice exceeds four lines, One Dollar and a Half per line will be charged.

Notes & Queries

W. Z.'s query as to the stick of timber is a schoolboy's problem.—W. A. M. will find directions for making liquid glass on p. 225, vol. 23.—A. D. should advertise his query as to the high speed engine at the Centennial.—C. A. H. will find directions for making battery carbons on p. 187, vol. 32. We cannot recommend particular machine makers in these columns.—J. T. K. will find a description of an incubator on p. 273, vol. 33. —J. F. will find directions for making yeast on p. 185, vol. 30.—L. A. K. will find directions for bluing gun barrels on p. 123, vol. 31. For giving a fine brown color to gun barrels, see p. 11, vol. 32.—F. D. will find a good recipe for tooth powder on p. 72, vol. 34.—F. H. B. W. H. C. will find on p. 154, vol. 34, directions for tinning iron castings. As to polishing metals, see p. 57, vol. 34. —J. L. K. will find directions for making mirrors on p. 267, vol. 31.—R. F. W. is informed that the art of graining is too complicated for description in these columns. —A. L. B.'s query as to postage stamps was answered on p. 203, vol. 36.—A. R. D.'s queries are business questions, and should appear in our advertising columns.

(1) W. E. W. asks: Can sheets of spring steel be rolled out to $\frac{1}{16}$ of an inch thick, 4 feet wide, and 21 feet long, without flaws? A. Yes.

(2) D. D. asks: How much clearance should a 12 x 20 inch steam engine of good design, running 120 revolutions per minute, have between the piston head and cylinder head? A. About ⅛ to $\frac{3}{16}$ inch.

(3) M. G. says: 1. I have an apparatus for calcium light, with which I have some trouble. My reflector is 18 inches in diameter and about 11 inches deep, and set the lamp how I please, I never get a plain, brightly illuminated surface. The whole surface is covered with black and white rings, in the center of which is a large black spot. As soon as I set the lamp in a different way, the black spot disappears and in its place comes an intense bright one, surrounded by darkness. A. Clean, dry, and polish the reflector, and adjust the jet, with its lime cylinder, facing directly into the reflector so as to concentrate all the light upon its surface. For ordinary purposes the ignited surface of the lime should be within about 2 inches of the back of the reflector. Turn on first a good supply of hydrogen (or coal gas) so as to give a flame of about 6 inches length; then immediately turn on the oxygen, and adjust the supply of gases so that neither will be in excess. If too much hydrogen is on, the flame will flare out around the sides of the lime; if too much oxygen, it will either make a singing noise or extinguish the light. A little practice will soon teach you when the adjustment is perfect. The lime cylinder should be within about the 16th of an inch of the tip of the jet, and should be turned occasionally so as to present fresh surfaces to the flame. 2. Which is better for the light, common lime or the prepared lime cylinders, and what do the latter contain, that make them preferable? A. Almost any kind of good fresh lime will answer; but the best results are of course obtained with lime that is pure—free from sand and earthy materials—well burnt, perfectly dry, and caustic. The prepared cylinders of lime are usually made of the finest and hardest quality of lime, and therefore generally give the best results. The cylinders are best small. 3. Which are better, gas bags, or the copper tanks into which the gas must be pumped? A. The greater the pressure of gas, the better the light within certain limits. Wrought iron cylinders, containing the gases under a pressure of about 15 or 16 atmospheres (225 or 240 lbs. to the inch), are safest and best. Gas bags, when used as reservoirs, should have a total weight put on them of about 500 or 600 lbs. 4. Which is preferable for tinting effects, gelatin plates or colored glass panes? A. Use plates of colored glass.

(4) W. H. R. says, as to snakes catching fish: During the summer of 1872 or 1873, I was residing in Marriottsville, Md. One day we took a small net about 10 feet long and went to the stream that divides Howard and Carroll counties, for the purpose of catching fish. On one of the hauls, we succeeded in catching about a dozen minnows, about 3 inches long, and a water snake, about 2 feet long. Immediately after raising the net out of the water, the snake glided over the netting to one of the fish and swallowed it down without any apparent difficulty. As we did not appreciate his efforts in that line, we threw him on the land and stopped his fishing career with a stick. My brother told me that he once saw a snake swimming in a deep pool just below Marriottsville with a trout in his mouth about 10 inches long.

(5) S. says, as to patterns for fret saw work: I have been using a sheet of thin zinc between my pieces of wood; and by sawing out the patterns pasted on one piece of wood, I obtain a stencil with which any number of patterns can be rapidly made. The stencil will not wear out.

(6) B. G. S. asks: If two boilers having connection only by a feed pipe have different pressures, what would happen if I open the feed pipe? I think that the water will run from the higher pressure boiler till the pressure is equal, and then the water will come to the same level in both boilers. Am I right? I had four boilers, and two others set about 6 feet above the four, 45 feet long with two 15 inch flues, connected with the coal boilers at the middle and at the end, the connections being set on two steam drums across the boilers. The coal boilers were under 75 lbs. pressure; and having too much steam, I went to open the connecting valve, I felt a strong push ahead by the boilers, enough to crack the walls in two or three places. Can you explain this? A. The steam as it escaped from the boiler, having the higher pressure, acted precisely as it does in the reaction engine, and moved the boiler slightly.

(7) F. H. B. asks: Please tell me how to find the area of a circle in square inches? A. Square the diameter in inches, and multiply by 0·7854.

(8) D. H. M. asks: What is sisal? A. Sisal is the prepared fiber of the *agave Americana*, or American aloe; so called from Sisal, a port in Yucatan. The fiber is white, and of nearly the same thickness throughout its great length of 7 to 20 inches. The fibers are used, in the rough state, for cordage.

(9) G. W. H. says: The specific gravity of wrought and cast iron, as given by various authorities, varies considerably. Why is this? A. It is scarcely possible to obtain pure iron. The metal ordinarily known as iron is virtually a combination of the elements iron and carbon. According to the amount of carbon present, the metal is called wrought iron, steel, malleable iron, and cast or pig iron. The specific gravity of electro-deposited iron is 8·139; that of steel bars and plates averages 7·823; that of tilted or hammered iron bars and forgings ranges from 7·76 to 7·798; that of rolled iron plates or bars varies between 7·76 and 7·54. The specific gravity of cast iron ranges between 6·85 and 7·35; that used in construction averaging 7·1. Wrought iron is very bad in quality when its specific gravity is less than 7·5.

(10) W. H. W. K. asks: Is there any work that will instruct me how to erect a building that will answer as a kind of refrigerator without the use of ice, that will lower the temperature inside to one half of what it is outside? A. We do not know of any. 2. Have you any drawings of the Alden process of drying? A. No.

(11) E. W. H. asks: Can you give me directions for stamping cashmere, broadcloth, etc., in patterns, that will stay on long enough to have the pattern worked in embroidery? A. Try the following: Prepared chalk, 5 parts; dextrin, 1 part. Rub into a paste of the proper consistence with a strong, hot solution of soap and a few drops of glycerin.

(12) C. R. asks: What is a reliable test for pure gold? A. One of the most reliable tests for the purity of gold is its specific gravity (19·34). It should retain its luster at all temperatures and resist the action of hot nitric acid. Take a clean piece of slate, make a mark or streak on it with the piece of metal to be examined, note the appearance of this with a strong magnifying glass; heat the slate over a gas burner and note if any change has occurred. If not, moisten it with a drop of strong nitric acid free from chlorine. If this does not affect it, and its specific gravity equals 19·34 or 19·4, it may be considered pure gold.

(13) R. T. L. asks: How can I remove varnish and paint from window glass? A. Remove as much as you can with a suitable scraper, and rub off the remainder with a cloth saturated with strong ammonia water.

(14) B. asks: What is the least amount of mercury that will unite with 1 oz. of pure gold, forming an amalgam, so that no free gold will remain? A. The proportion should be about 33 parts mercury to 57 gold.

(15) J. M. asks: Please give a recipe for softening muskrat skins. I have dried a dozen of them by putting alum and salt on them, but they are too hard. A. The skins should be thoroughly washed in clean water and treated with the alum bath and albumen mentioned in answer to C. C. F., p. 251, vol. 36.

(16) J. R. M., Jr., asks: What is the simplest way to obtain iridiated glass? Is it 100 parts of water to 15 of acid, and how can I obtain the required pressure of from 2 to 3 atmospheres? A. Make a solution consisting of 15 parts of strong hydrochloric acid and 85 of pure water. Place this in a glass vessel in a strong metallic receiver capable of standing a pressure of 100 lbs. to the inch. Close all the openings airtight, and pump in air until the pressure gauge with which the receiver must be provided indicates about 50 lbs. Then allow to stand for several days. You will succeed best with soft glass.

(17) W. G. asks: Can kerosene oil be adulterated with water? During the winter I bought a lot of kerosene oil and put it into my oil safe; and in a few days I was unable to draw any oil, and upon examination I found that the pipe was frozen full of ice. I cleared it, but in a few days it was again stopped with ice, which made me suspicious that the oil was adulterated with water, as I never knew oil to freeze solid. A. No. Kerosene oil and water are not miscible. The water must have got into the tank in some other way.

(18) J. R. McC. says: A brass moulder told me that he had a lot of old brass given him to remelt. It was a very hard composition, and he was asked if he could make it softer without adding any more copper; he said he could not; one of his men said *he* could, and he did. He was watched, but no one saw how he did it. Can you explain? A. He probably melted the brass and kept it at a very high heat, so that part of the tin and zinc evaporated.

(19) J. J. W. says: 1. In a recent issue of the SCIENTIFIC AMERICAN I noticed an article which stated that coal oil reproduced a full growth of hair on the head of an old servant who had become bald. Is it true? A. We think it is very doubtful. 2. Is there any injurious ingredient in coal oil? A. Yes. 3. Can you tell me of a simple preparation that will prevent the hair from falling out, or one that will make hair grow on a bald head? A. See answer to N. R. on p. 251, vol. 36. As a general rule, hair cannot be made to grow again on a bald head, especially if the baldness is due to the natural infirmity of advanced age.

(20) A. C. asks: How are indelible pencils made? A. Reduce nitrate of silver to an impalpable powder, add just enough lampblack to give it a black color, and enough of a thick solution of gum arabic in hot water to make the powder coherent. Rub these ingredients well together, form into thin sticks, and dry.

What is moulders' wax composed of? A. Stearin or paraffin.

(21) R. P. P. says: This morning I send a small bottle of grape wine, which soured on my hands. It is well sugared, and on exposure to the air will evaporate to a thick syrup. How can I redeem it, so that it will be fit to use as a beverage? A. Treat it with enough bicarbonate of soda to neutralize the acetic acid. The proper quantity of the carbonate may be ascertained by first experimenting with a small sample of the wine. Judging from the sample of wine you send us, however, we think it doubtful that you will succeed in rendering it again palatable by this or any other means, as the second fermentation has been permitted to go so far that a great part of the alcohol has been acetified. If the wine be treated with enough slaked lime to neutralize the free acid, and then distilled, the spirituous constituents may be recovered and utilized.

(22) Mrs. P. R. V. S. asks: How is glycerin made? A. The greater part of the pure glycerin is obtained by distilling with superheated steam the dilute solution remaining after the saponification of the oil with lime, in the manufacture of stearin candles. Crude glycerin is obtained in a similar manner from residues of soap-making. 2. What is the difference between glycerin and nitro-glycerin? A. Glycerin is converted into nitro-glycerin by treating it with a mixture of fuming nitric and sulphuric acids. This treatment causes a substitution of nitric acid for the hydrogen in the glycerin. They are entirely different in their properties.

(23) E. H. asks: Why does nitrous oxide gas deteriorate by time? Does the water kill its anæsthetic properties by degrees, giving it up to the atmosphere through the space between the water tank and the gasometer? A. Pure nitrous oxide is a permanent gas at ordinary temperatures, and, when isolated, will retain its characteristic properties for an indefinite length of time. The gas is quite soluble in cold water, and if inclosed in a tight vessel, in contact with a quantity of water, it will displace much of the air held in solution therein, which, mixing with the unabsorbed gas, will of course dilute it. Again, if the water or the gas reservoir contains any quantity of organic matters, they will become oxidized at the expense of a portion of the oxygen of the nitrous oxide, liberating at the same time the equivalent of inactive nitrogen. But ordinarily the chief cause of the dilution may be attributed to the gradual diffusion of air and gas through the water, joints, rubber tubing, valves, etc. As the density of nitrous oxide is something more than that of air, the diffusion is in favor of the entrance of the air over the exit of the gas in the reservoir.

(24) A. E. D. says: How are moulds for cakes of toilet soap made? I made some of plaster of Paris, and ran the soap in them, but the soap did not form smoothly, little holes forming on the surface. A. Use moulds made of tinned iron.

(25) E. W. asks: Are the glasses which make an achromatic lens ground separately? A. Yes. 2. Will a single lens 1½ inches in diameter do for a small camera? A. A single achromatic lens will make a picture whose diameter equals ½ the focal length of the lens. The smaller the aperture, the sharper and better the picture.

What size of engine would it require to run a lathe of 6 inches swing? A. Such a lathe will require ¼ horse power to work it.

(26) A. S. B.—Red, brown, green, and other colored crayons are made with fine pipeclay, worked into a paste with water and intimately mixed by grinding with earthy or metallic pigments, or in general with a body of surface colors; then moulded and dried.

(27) C. B. P. asks: 1. How can I find out whether a telescope is achromatic or not? A. Look at some bright white object, say the moon; and if the edge is not fringed with color, but is clear and white, then the telescope is very nearly achromatic. 2. How can I find out the magnifying power of a telescope? A. Set up two sticks one foot apart at a distance of about two hundred feet from you; look at the sticks through the telescope with one eye and outside with the other. See how many feet on the ground outside the one foot in the telescope appears to cover. This will give the approximate magnifying power.

(28) G. W. M. asks: Is the article on astronomical observations, published in your issue of March 24, which says that the precession of the equinoxes is 50½ minutes of arc, correct? A. It should have been seconds of arc, instead of minutes.

(29) J. S. asks: 1. How long does an elephant live? A. Elephants attain maturity in 30 years, and live to 150, perhaps to 200. 2. How long does it take elephants to breed? A. The period of gestation is about 20½ months.

(30) J. E. L. asks: How many square miles of territory has England on this side of the ocean? A. About 3,194,690.

(31) R. H. R. asks: How can I color red and polish the edges of books? A. When the edges are trimmed, keep the book in the press, and brush on a coating of dilute gum tragacanth (about ½ lb. gum to 1½ gallons), colored to the desired hue with a mixture of 3 parts rose pink with 1 vermilion. Let dry in the press, and burnish with an agate burnisher.

(32) B. J. asks: What can I use as dryers for coal tar, when applied as paint? A. We do not know of any such substance; but the addition of a little black oxide of manganese will aid in the drying.

(33) J. McN. asks: What is the best method of whitening the grease obtained from pork scraps, which, on coming from the press, is quite dark in color? I have tried several things, such as carbonate of soda, alum, etc., but have not obtained satisfactory results. A. Agitate the grease with hot water containing 10 per cent of oil of vitriol, allow the impurities to settle, and draw off the fused grease with a siphon.

(34) C. I. K. says: I have a lot of cast and wrought iron pipes used for steam heating, running through a battery room. The fumes from the batteries cause the pipes to corrode. Is there any paint which will protect this? A. Coat the pipes with good asphalt, thinned down with turpentine or naphtha.

(35) E. G. S. says: I find that soluble glass, in the state in which it is in when bought, cannot be used or applied as a paint, by reason of its setting too quickly. I desire to apply it to pine boards, that will be subjected to dampness. I wish to prevent the boards from damp, warping, and smelling, by reason of decay, and thereby prevent the tainting of any matter or eatables that the box may contain. Can soluble glass be mixed with paint in any manner without destroying its properties, so that a painter could apply it to the outside of a dwelling house without leaving brush marks? A. Water glass may be mixed with dry zinc white (ox

ide of zinc) or other similar metallic oxide, not affected by it, to form a paint. Ground asbestos mixed into the strong aqueous solution also forms a good paint. It should be applied with a flowing brush, and rapidly. It cannot, of course, be mixed with oil paints.

From what kind of wood is the best charcoal, for preserving and purifying, made? A. Charcoal made from bones (bone black) is best for this purpose. If wood charcoal is to be used, the best is from willow or other light wood.

(36) E. H. says: If a steam boiler, having water at a proper height and steam at 60 lbs. pressure, should be closed so that no steam could escape, and fired enough to maintain the same pressure for 1 hour, would the water be any lower in the boiler at the end of that time than at first? Would there not be the same amount of water in the boiler? A friend claims that there would be less, as the water "would dry up?" A. There would be no change in the amount of water.

(37) J. K. M. says: Please give me a recipe for reducing quicksilver to a fluid, for plating brass and copper? A. We do not understand you. Mercury (quicksilver) is liquid at ordinary temperatures. Brass and copper may be coated with mercury by applying the metallic mercury directly to the clean surface of the article to be coated. Or an aqueous solution of the bichloride of mercury (corrosive sublimate) may be used as a dipping bath. Corrosive sublimate is prepared by first converting the metal or its oxides into protosulphate of mercury, and then subliming this with common salt. Or the mercury may be converted into the red oxide by cautiously heating the sulphate, and this, dissolved in hydrochloric acid and the solution evaporated until crystallization takes place, gives the corrosive sublimate. In inexperienced hands, these reactions are dangerous.

(38) H. F. asks: Can you give me a recipe for making red and blue inks for rubber stamp use? How can I make red and blue ink for stamp ribbons? A. For red, dissolve alizarin or aniline red in warm glycerin. For blue, make a glycerin solution of aniline blue. These inks will serve for ribbons as well as for inking pads.

(39) W. H. asks: How can I convert the degrees centigrade to Fahrenheit and Fahrenheit degrees to centigrade? A. To convert centigrade to Fahrenheit, multiply by 9, divide by 5, and add 32. Thus: 100° C.×9=900; divide by 5=180, +32=212° Fah. To convert Fahrenheit to centigrade, deduct 32, multiply by 5, and divide by 9. Thus 212° Fah. — 32=180, ×5=900, ÷9=100° C.

(40) G. H. E. S. asks: 1. How can I produce musical sounds from glass tumblers? A. Moisten the fingers with water, and with their tips pressed firmly on the rim of the goblet, move them quickly around it so as to jar the glass and cause it to vibrate. You will probably succeed after a few trials. 2. What is made use of for moistening the fingers, to produce the sound? A. Water is generally used; but a better way is to moisten the finger tips with a drop of turpentine, and then rub them in finely powdered rosin. If rosin is employed, the goblet must be clean and dry.

(41) W. L. Y. asks: How is French mustard prepared? A. Take salt, 1¼ lbs., scraped horseradish, 1 lb.; garlic, 2 cloves; boiling vinegar, 2 gallons. Macerate in a covered vessel for 24 hours, strain, and add sufficient flour of mustard.

(42) S. B. says: I have seen some chimneys on dwelling houses that sweat, or have the appearance of being wet. Please give the cause. A. Damp air when suddenly chilled precipitates water, as is seen by the result of the air of a room coming in contact with a pitcher of cold water; and from this cause the water coming from flues can be accounted for. When the flue is not used for a fire, it still acts as a ventilator, and as the warm air from the interior of the house comes in contact with the cold air falling from the top of the flue, it throws off its moisture and deposits it upon the interior surfaces of the flue.

(43) D. D. says: 1. Has a drum with two partitions, utilizing the heat from stove pipe, ever been tried? A. We are not aware of such a device for that purpose. 2. I am informed that, in London, dwellings are constructed with chimneys that return the smoke to the furnace, where it is burned, instead of throwing it out upon the open air. Can you give me any information in regard to the construction of such chimneys? A. We think there must be some mistake as to there being chimneys of such construction in use in dwellings; many factories in England are compelled by law to construct smoke-burning chimneys. We have not at hand the data required to give the precise nature of their construction. 3. What is the cheapest and best preparation for the preservation of shingles? A. Probably a wash of lime, tinted to suit.

(44) J. O. says: We desire information in the matter of conveying water in iron pipes. We wish to carry a spring running about 1 miner's inch (12 gallons per minute) of water a distance of about 5 miles over a broken country. The spring is at least 50 feet higher than the point of delivery. Two thirds of the first mile is a regular descent down a mountain side, fall in that distance being about 600 feet. The remainder of the distance is around the base of a mountain, broken up by gulches and ravines not very abrupt. The first two miles gradually descend 50 to 100 feet, thence gradually ascending to point of delivery. We propose to use 1 inch (inside diameter) iron pipe, lap weld, providing some means for the escape of air at every summit, but have been told that water cannot run through a pipe of that size for that distance if the grade was on a straight line from the spring to the point of delivery on account of the friction. Please tell us the best mode of conveying said stream of water? A. The greatest difficulty you have to encounter is in the siphons; but supposing these to work well and no leakage to the pipe, the water will discharge at the lower point notwithstanding the friction. The friction is in proportion to the velocity, but the velocity being reduced to a minimum, the water will flow to some extent; it will also soon acquire a momentum that will in a measure compensate for the friction, and if received in a reservoir it will finally discharge all the water supplied. Water will find its level, and the important condition here is that the point of discharge shall be lower than the spring.

(45) J. H. asks: What is the best way for testing a boiler, to find out how much fuel it burns? A. We think there is only one method that will be satisfactory, to weigh the fuel *before* putting it into the furnace.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the result stated:

J. A. A.—They consist of sulphate of iron, together with some organic matter, the nature of which we cannot undertake to examine.—J. K. W.—No. 1 consists principally of clay containing a large quantity of sesquioxide of iron. It might be used with oil as a cheap paint. No. 2 is a variety of sandstone. No. 3 appears to be powdered basalt, with small crystals of quartz and sulphide of iron.

F. H. says: We have a lot of postal cards, on one side of which is printed a circular. Is there any cheap preparation that I can make which will take this printing off, and leave the card fit to write on?

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Prismatic Pictures. By J. C.
On a New Motor. By A. M.
On Glass for the Studio, etc. By T. G.
On Scientific Experiments. By J. P.
On Kaolin. By H. K. S.
On Blue Glass. By J. S. B.
On the Welding of a Mill Spindle Point. By H. B., by A. M. W., by W. J. F., by J. H. P., by R. L. C., by N. W. T., and by J. O.
On the Mountains in the Moon. By P. E. S.
On Early Locomotive Engineering. By J. V. B.
On Carelessness in Sawmills. By L. D. D.

Also inquiries and answers from the following:
H. M.—G. H. B.—A. W. S.—C. R.—L. S. B.—S. R. S.—J. W. F.—F. C.—H. R.—J. M.—C. A. S.—J. D. H.—J. H. C.

HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them. The address of the writer should always be given.

Inquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.

Hundreds of inquiries analogous to the following are sent: "Who sells a preparation for blasting tree stumps, which is safer than gunpowder, dynamite, or nitroglycerin? Who sells telephones, and what do they cost? Who sells rope belting, and what does it cost? Who sells platinum, nickel, tungsten, and aluminum? Whose is the best mangling machine?" All such personal inquiries are printed, as will be observed, in the column of "Business and Personal," which is specially set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.

OFFICIAL.

INDEX OF INVENTIONS

FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

March 27, 1877,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering, please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Advertising case, E. D. Richmond	188,954
Advertising frame, W. H. Naulty	188,814
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Air cooling apparatus, J. C. Mack	188,923
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Slate frame, H. C. Goodrich	188,792
Slate, hinged, R. S. Barnum	188,840
Spark extinguisher, J. J. Gilbert	188,897
Speed indicator, W. Heckert	188,738
Spinning bobbin, etc., T. L. Luders (r)	7,570
Spinning machine ring, W. T. Carroll (r)	7,575
Spinning quill, J. C. Stanley	188,825
Spinning, ring, J. Goulding	188,736
Spring shaping machine, E. C. Lewis	188,922
Stamp, perforating, J. L. Wickers	189,000
Station indicator, C. Jensen	188,915
Steam generator, A. Van Horn	188,990
Steel, manufacture of, H. Schierloh	188,820
Steering apparatus, power, A. Crosby	188,859
Stereoscope, A. Beckers	188,769
Stocking, M. Landenberger, Jr.	188,921
Stove, H. M. Smith	188,973
Stove, cooking, E. S. Shantz	188,966
Straw cutter, J. E. Andrews	188,837
Straw cutter, W. S. Gibson	188,791
Sugar, treating, Duncan & Newlands	188,873
Sulphurous acid, making, W. D. Jones	188,801
Tackle block, Simpson & Pope	188,759
Tag, E. F. Krelwitz	188,920
Thill, center draft, C. H. Matthiessen	188,927
Thill coupling, B. P. Morrison	188,933
Tobacco, marking plug, E. C. Venable	188,991
Tobacco transplanter, J. W. Beverly	188,847
Towel rack, S. T. Kanuse	188,918
Toy, automatic, W. Baxter, Jr.	188,841
Toy frog, E. Durand	188,875
Toy, musical, C. W. Banks	188,839
Toy ship, G. Taylor	188,983
Trace buckle, T. J. Hubbell	188,910
Transom lifter, F. A. Reiher	188,947
Treadles, etc., attaching, A. Hitchcock	188,739
Trunk catch, E. Rice	188,950
Tubing oil wells, etc., Lewis & Boynton	188,806
Umbrella tip cup, O. M. Smith (r)	7,572
Umbrella tip cup, etc., C. C. Clay	188,857
Vapor burner, J. G. Hobert	188,906
Ventilation, car, C. G. Lea (r)	7,578
Ventilator, G. Yon	189,006
Ventilator for chimneys, A. Van Horn	188,989
Washing machine, W. W. Goodwin	188,735
Water channels, prevent obstruction, L. H. Beebe	188,842
Water closet basin, C. Harrison	188,897
Water elevator, A. Vantrump	188,988
Water wheel, S. C. Humphreys	188,911
Water wheel, A. B. Strand	188,979
Water wheel and gate, J. W. Ross	188,960
Well, driven or bored, J. E. Morrison (r)	7,580
Whiffletree iron, J. Irvine	188,912
Windlass, F. S. Manton	188,925
Windmill, W. T. Burrows	188,853
Windmill, J. Lochhead	188,743
Window screen and awning, S. Colahan	188,724
Window shutter, Hopkins & Johnston	188,908
Wrench, J. Shepard	188,968
Wrench, adjustable tap, R. H. St. John	188,976

DESIGNS PATENTED.

9,866.—COOK STOVE.—A. P. Corse, Troy, N. Y.
9,867.—PAPER BOXES.—L. P. Heath, Springfield, Mass.
9,868.—BALL ROOM FAVORS.—M. Keppler, N. Y. city, N. Y.
9,869.—MATCH BOXES.—F. Markoe, Philadelphia, Pa.
9,870.—PEN HOLDER, ETC.—P. Schrag, N. Y. city, N. Y.
9,871.—COOK STOVES.—G. Smith *et al.*, Philadelphia, Pa.
9,872.—RANGE.—G. Smith *et al.*, Philadelphia, Pa.

For the week ending March 20.

9,857.—TYPE.—D. W. Bruce, New York city.
9,858.—INSULATOR.—J. M. Brookfield, Brooklyn, N. Y.
9,859.—PLAYING CARDS.—J. H. Bingham, Hartford, Conn.
9,860.—GLASS JARS.—F. L. Bodine, Philadelphia, Pa.
9,861.—FORK HANDLES, ETC.—J. M. Culver, Wallingford, Conn.
9,862.—HEAD COMB.—P. J. Cullinan, New York city.
9,863.—ERASER PENCIL.—F. H. Holton, Brooklyn, N. Y.
9,864.—BURIAL CASKETS.—A. H. Nirdlinger, Rochester, N. Y.
9,865.—PICTURE EXHIBITOR.—J. W. Taft, Chicago, Ill.

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