PIPE CUTTING AND THREADING MACHINE.

The slow and tedious process of cutting and threading wrought iron pipe with the tools now used, together with the great waste of material and the imperfect work produced (except with expensive and cumbersome machines), have long been causes of complaint among steam and gas fitters.

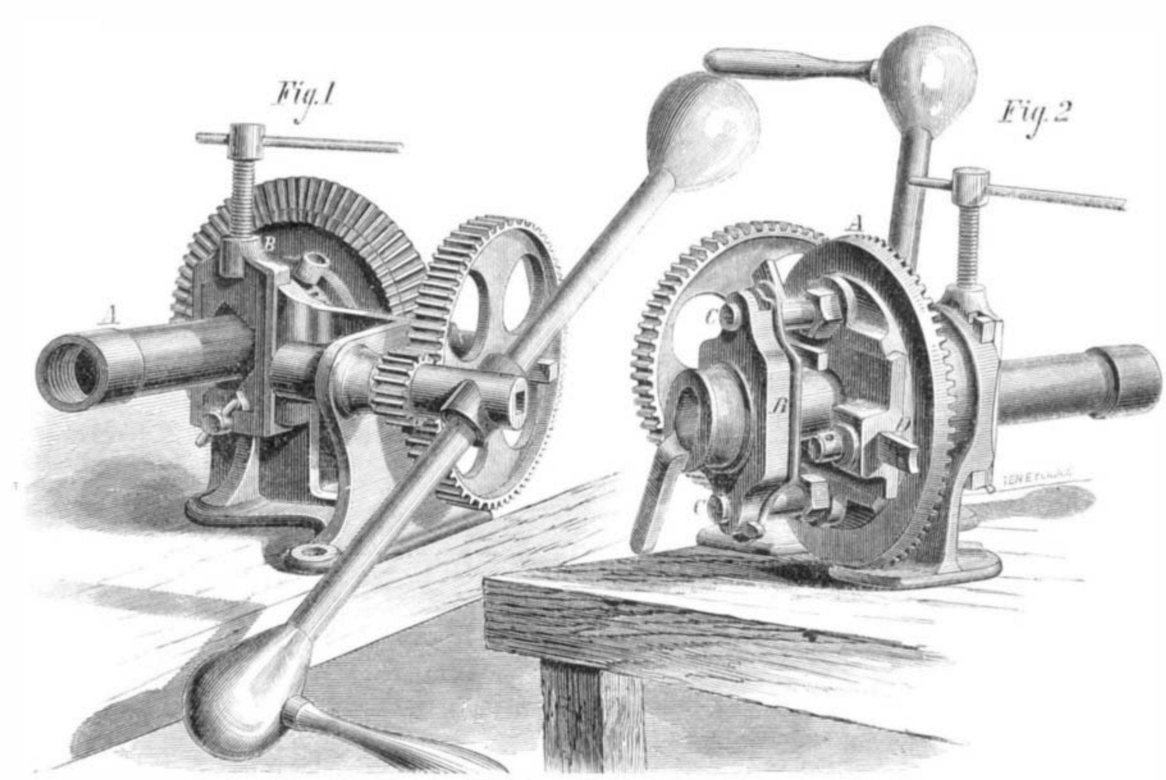
Our illustration represents a machine claimed to have the same capacity as more costly stationary machines, with the great advantage of compactness and portability, weighing but one hundred pounds, occupying a space of 15x17 inches only, and so constructed that a boy can thread, cut, or make nipples from pipe, as large as 2 inches diameter, with perfect ease.

Fig. 1 shows the machine as fitted for hand power, motion being transmitted to the several parts by means of gearing, as shown; while on the extreme left is seen the pipe, A, held stationary by the adjustable jaws of the pipe vise, B.

Fig. 2 shows the reverse of the side shown in Fig. 1. The pipe is held stationary in the vise, and passes through the center of gear, A, the rotary motion of which is imparted to the die held in the die box, B, by means of the studs or guides, C C, upon which the die box freely slides forward as the die passes upon the pipe.

When cutting pipe, the tool post, with the cutter, D, has automatic feed, cutting ends of pipe square and smooth.

Wherever steam, gas, or water pipes are used, this machine, it is claimed, will be found of great value, especially upon steamships and in places where economy in space and portability are desirable.



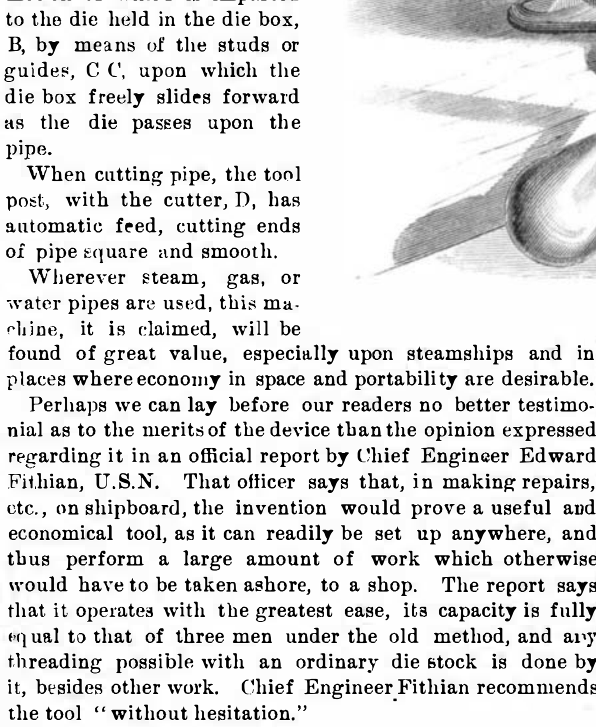
PIPE CUTTING AND THREADING MACHINE.

Perhaps we can lay before our readers no better testimonial as to the merits of the device than the opinion expressed regarding it in an official report by Chief Engineer Edward Fithian, U.S.N. That officer says that, in making repairs, etc., on shipboard, the invention would prove a useful and economical tool, as it can readily be set up anywhere, and thus perform a large amount of work which otherwise would have to be taken ashore, to a shop. The report says that it operates with the greatest ease, its capacity is fully equal to that of three men under the old method, and any threading possible with an ordinary die stock is done by it, besides other work. Chief Engineer Fithian recommends the tool "without hesitation."

Patented April 27, 1869, and September 30, 1873. For further particulars, address the Chase Manufacturing Company, 120 Front street, New York city.

IMPROVED TRENCH BRACES.

Mr. Samuel G. McKiernan, of Paterson, N. J., has patented, December 2, 1873, through the Scientific American Patent Agency, a novel arrangement of adjustable braces for supporting the sheathing of sewer trenches and similar excavations. The construction of the device will be readily understood from the sectional view in the foreground of the accompanying engraving.



There is a rod, A, having a right hand screw thread formed upon one end, and a left hand screw thread upon the other. To the center of this rod is rigidly attached a block, B, in which holes are made to receive a lever by which the device is turned. Two blocks of wood, C, are perforated longitudinally to receive the rod, A; and in these, near their inner ends, are secured metallic nuts, D, into which the threads of rod, A, fit.

In using this invention, when the sheathing planks are placed upright, cross boards are set at suitable distances apart for the blocks, C, to rest against. The inventor adds that his adjustable braces permit of excavations being made by first sinking a hole for the width of one sheathing board. Against each side of the trench a plank is placed horizontally and supported by a suitable number of braces. Then the excavation continues down for the width of another board and the same operation above noted is repeated, and so on until the desired depth is reached. In filling up, the lower board upon each side is first removed, and the earth thrown in, and thus for each plank in turn from the bottom upwards.

Natro-Metallurgy.

The various processes of refining lead, employed at the present day, cause, in cases where the metal is impure, considerable waste, and necessitate the reduction of an enormous quantity of oxide, to which they are besides inadequate for the removal of certain foreign metals. A new plan which has recently been devised by MM. Payen and Roux, of Marseilles, France, allows the complete refining of any argentiferous lead without the formation of oxides of lead, and has, according to the *Chronique de l'Industrie*, the particular advantage of permitting the collection of all foreign metals, of which the value may be worth considering. The process is founded on the property which a bath of caustic hydrated melted alkali possesses in dissolving or at least oxidizing successively all the metals except three, by drawing them into a soluble scoria, in a state of igneous fusion. The three exceptions are lead, silver, and gold. The metals united with the lead are, one after the other, removed by melted soda, the action of the bath being maintained first by a jet of steam, designed to restore constantly the water of the hydrate from which the metals gain oxygen, and urged, according as the metals are in a less degree oxidizable, either by a blast of air, or, finally, by carefully measured additions of nitrate of soda.

The theory of the reaction is as follows: By simple solution in water, soda abandons all the oxides which it holds in solution or suspension, and is evaporated and dried for use in the operation, almost without loss. The metals oxidize in the melted alkaline bath in the order of their affinity for oxygen, an order modified, however: 1, by their particular affinity for soda: 2, by the action of affinity exercised by the largest mass present. Thus tin and the metals of platinum, although much less oxidizable than lead or copper, are attacked very rapidly, and before the latter in the soda bath, by reason of their propensity to act as electro-negative elements. Hence also, in an alloy very rich in lead, the copper oxidizes first.

Another phenomenon of not less importance is that the solutions of the oxides in the soda bath act chemically in presence of the reagents exactly as do the metallic salts dissolved in water. It is thus in this igneous solution: All the metals are precipitated, one after the other, in the inverse order of their solubility; and in the direct order, they preserve each other from oxidation. In this respect, even insoluble reducing agents, such as charcoal, may be employed in the bath.

The principal applications in the process are its adaptation, not only to the refining of lead and the extraction of silver by the zinc process from lead and argentiferous scoria, but the purification of argentiferous copper and old complex alloys; the treatment of ores of platinum, gold, silver, etc., of ores of chromium, etc.

Since March last, the inventors have constructed a plant and have carried on the process at Marseilles; and we learn that the hard leads of Greece (containing 2¼ per cent antimony 1 per cent arsenic, ½ per cent copper, and 1 to 2 per cent iron and sulphur), hard Spanish lead, and other forms of the metal containing large quantities of foreign substances, have been successfully treated. A company has been formed for the fusion of ores, separation of metals, and then refining by the processes of natro-metallurgy.

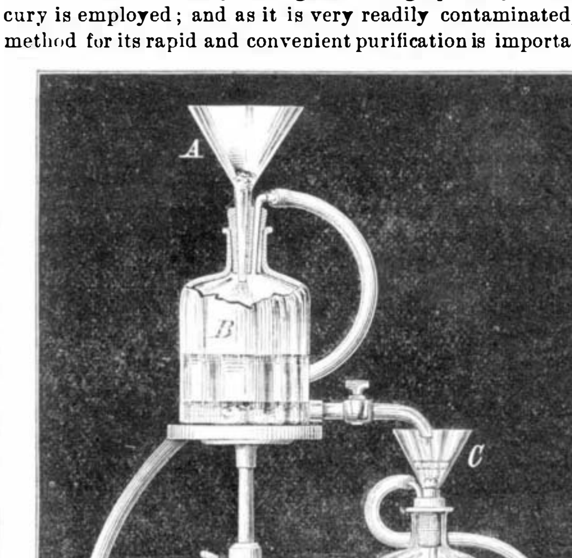
Hot Beds.

Prepare materials at once, consisting of cleanly collected leaves, and rank, but well moistened, stable litter, for the construction of these. In making a hot bed, have a good wide foundation marked by inserting some strong stakes in the corners, for by these stakes the plumb, and hight of the beds, too, can be determined. The foundation should consist of a layer of brush wood, over which asparagus, bean, and pea haulm should be placed, and fermenting material placed over that, being careful to make it firm by beating with the fork in preference to much trampling, and leaving space on either side of the frames for the convenience of linings. One made immediately of equal parts of stable litter and leaves, will be found useful for starting a few early gloxinias, caladiums, achimenes, and roots of *lilium auratum*; also for cuttings of different kinds; and it will afterwards be useful for the raising of various kinds of seeds. Throw into a heap a mixture of two or three parts of leaves and one of litter, and turn it once or twice, applying some manure water if dry; the material may also be used for another bed in February. Besides the hot beds necessary for bringing plants into flower, several are required for vegetable forcing, especially where there are few hot-water-heated structures. In April and the two following months, these beds will be useful for soft-wooded greenhouse plants, such as balsams, cockscombs, some annuals, and various odds and ends. In others, cucumbers, chilies, etc., may be grown; and those not required can be removed and used as manure, or turned for forming a compost for the potting bench. Their size must be in proportion to the amount and continuity of heat they are required to produce. If for starting stove plants on, they may be built as high as 5 feet; but if for growing potatoes, carrots, radishes, and other vegetables, 3 feet will be found sufficient. They sink considerably after being built; and when the heat begins to fail, the best way of recruiting it is by adding fresh linings around the frames.

ON THE PURIFICATION OF MERCURY.

BY PROFESSOR ALBERT R. LEEDS.

In investigations carried on in physical laboratories, and in the volumetric analysis of gases, a large quantity of mercury is employed; and as it is very readily contaminated, a method for its rapid and convenient purification is important.



Such a method must provide for the removal of the three kinds of impurities which are usually present: First, foreign metals, especially lead, zinc, and tin; secondly, common dirt and dust; and thirdly, water or other liquids.

The most convenient device hitherto employed was a long glass tube, into which the mercury was poured through a paper funnel, the funnel having a pin hole at the bottom, and serving to retain the dirt and dust. The tube was partly filled with dilute nitric acid, and was provided with a stop cock below, or with a bent tube, so that a short column of mercury might balance a long column of acid.

The device herein recommended consists of a glass funnel, A, capable of holding five or ten pounds of mercury, the tube of which is cut off at a point just below the stopper of the bottle, B. Cotton wool is jammed into the tube until it fills up the neck, and bulges out at the bottom of the funnel. A short glass tube bent at right angles passes likewise through the india rubber stopper of the bottle and is connected with a water air pump. The bottle is two thirds filled with dilute nitric acid (one part of acid and four or five parts of water). The impure mercury poured into the funnel, A, is drawn through the cotton plug in a multitude of streams, and passes as a fine rain through the acid below. The foreign metals, if not in too large quantities, are removed by solution in the acid, and the pure mercury collects below. It is then run off through the stop cock into a second funnel, C; and, after being thoroughly dried by suction through another plug of cotton wool, it is caught and preserved in the bottle, D. A short time suffices for the almost automatic purification of a large quantity of mercury.

Stevens Institute of Technology, February, 1874.

Correspondence.

The Principles of Ventilation.

To the Editor of the Scientific American:

Unless I greatly mistake the intelligence and disposition of the average American, his "scientific" representative will be deluged with articles protesting against the crude notions contained in the article coming from "the land o' cakes," entitled "The Ventilation of the United States Senate Chamber." I purposely ignore the special subject of his article, the senate chamber, and beg leave to refer very briefly to some of the most untenable of his general assertions.

He boldly asserts that "the whole secret of ventilation consists" in providing "an entrance for fresh air below and an exit for foul air above," and bases this erroneous idea upon the false assumption that "foul air," making no distinctions, "ascends and accumulates at the ceiling" only. He also says: "If our halls, like the ancient Greek houses, were without roofs, ventilation would cause no thought," for "the foul air from our lungs and bodies would ascend right into the air, and a fresh supply would come down to us through the same opening."

As a simple and plain refutation of his statement regarding the tendency of foul air to "accumulate at the ceiling," I would refer him to the familiar experiment of placing a bit of lighted candle at the bottom of a tall glass jar with open top. He will find, upon exhausting the lungs into the bottom of the jar, by means of a tube, that the light will be extinguished almost immediately; and if he breathe downward into the jar—not directly over the flame, but near the side of the vessel—the light will just as certainly be put out as in the previous experiment, only the inevitable and fatal result will be retarded. If, instead of the lighted candle in the tall jar, he places "the ancient Greeks" or a few live Scotsmen in a "high" room, closed at the bottom and open to the free air of heaven at the top, he will find results quite parallel to those in his previous experiments. Any causes favoring the sudden generation of an excessive amount of carbonic acid gas would result in speedy death to them all, or in asphyxia, as in the first experiment. Confinement in the same place, under more favorable circumstances, would somewhat retard the fatal result; but ultimately, as the air became contaminated by poisonous exhalations, languor, decay, and death by some "chronic" malady, would occur as surely as the light was slowly extinguished in the second experiment.

In both these instances, "the destroying angel" is carbonic acid; it is the principal deleterious element which contaminates the air we breathe, and to which we are most universally exposed; it is generated by decomposition, by combustion, and by respiration. At any ordinary comfortable living temperature, the specific gravity of this poisonous gas, even when exhaled from the lungs, is greater than that of the surrounding air; therefore it of necessity gravitates to the bottom of the jar or to the bottom of a room, instead of rising to the ceiling. No matter what may be its source, if in excess it is "the destroying angel," always injurious, often fatal. We find, in what is called pure air, about 4 5 parts of carbonic acid to 10,000 of air; the open air of cities is often contaminated by from 6 to 15 parts to 10,000, while the confined air of some public halls and school rooms has been found to contain as many as 75 parts to 10,000, in such cases rendering the air absolutely poisonous.

If warming were not inseparably connected with proper ventilation, as, unfortunately for the position of your correspondent, it is in our climate, it might do to provide only for the escape of foul air above and the introduction of fresh air below; but, as he admits, "one undeviating law of air currents is that they always take the shortest cut, and depend upon it" the necessary and inevitable effect of providing an opening for inlet below and an opening for outlet above would be to "freeze out" the inmates of a room, whether the incoming fresh air is warm or cold. If cold, the incoming fresh air would spread itself out and fill the lower part of the room first; if warm, it would immediately take "the shortest cut" and escape at the top, without materially affecting the temperature or the quality of the air throughout the room, except in the direct course of the moving current, which would be from inlet to outlet.

For these plain reasons, the crude method advocated by your correspondent is not commendable even in a warm climate or in the summer weather, for then, if the doors and windows be left open, the air will freely circulate in any natural direction. In short, his positions are contrary to the advanced experience and philosophy of such able specialists as Box (see his work on heat) Reid, Ruttar, Leeds and others on ventilation. His ideas are diametrically opposed to modern practice and experience, especially in the West, where the downward exhaust principle has been introduced very generally in nearly all new public and private buildings.

A. R. MORGAN.

To the Editor of the Scientific American:

Your correspondent, Mr. Wm. Mackean, in his article on ventilating the senate chamber, must either allude to summer ventilation or be without practical experience of the subject; for ventilation in cold weather, when we require warmth and comfort as well as air, necessitates an entirely different arrangement.

First, if he use an opening of two square feet in the roof for ventilation, and numerous smaller ones (their combined areas being equal to or less than the roof aperture) in the floor or wainscoating, the heated air would go direct to the opening in the roof, warming the surrounding air but little, and leaving the large body of air in the room very cold. I have seen the temperature of a room fall 3° in 5 minutes on opening the hot air register in the floor and the ventilator in the ceiling; and although the fire was kept up about four hours, the temperature did not rise half a degree.

Secondly, he says that the air, on being discharged from the lungs, is warmer than the surrounding air, and therefore rises; which is true, but it only rises a short distance, when it becomes of the same temperature as the air through which it passes; and being loaded with matter thrown off from the lungs, it becomes heavier and falls to the floor to be again inhaled.

There is a vast difference between ventilation in the summer and ventilation in the winter, also between a building heated by hot air and one heated by direct radiation from a heated surface.

CHARLES A. WEST.

Richmond, Va.

The Centralization of Matter.

To the Editor of the Scientific American:

A few modern scientists have recently proclaimed the theory that the resistance of space to the planets, in their revolutions around the sun, will ultimately cause them to approach to and become part of the sun. Another writer says that the centralization of matter is one of the great laws of Nature, which will eventually produce the same result: that each satellite, as it loses its internal heat, will be absorbed by its planet, and the planets by the sun. I do not know whether this is orthodox science, or whether it is a "new departure;" but if this process of Nature is in existence, it certainly has been going on for all time, and our own planet should exhibit some of the results or footprints of this great law. Therefore I ask: Has the earth, since it has taken its place as a planet, received any accession of considerable bodies of matter, going to make up the great mass it now presents? Most assuredly it has; several of the continents still bear unmistakable evidence of being a deposit of this character, having probably been former satellites of the earth, and to have been precipitated upon it without great violence, but sufficient to crumble and scatter their contents in the direction of their motion. South America bears the most striking illustration of a phenomenon of this character. When the satellite had gradually wound its diminishing orbit, until it came within the confines of the earth's atmosphere, by a storm or commotion below it is suddenly enveloped in our heated atmosphere; and losing its hold upon the cold medium of space, with a plunge it is precipitated to the earth. The first contact is at Cape Horn; then with a rolling, settling, and crumbling motion, it spreads out nearly to its present limits, and, while yet in motion, commences the grandest feature of all. Before this great mass of *débris* can acquire the motion of the earth in rotation, the great waters and sediment of the Pacific are surged up to the very clouds, rolling up the western border like a scroll, of which the Andes bear witness, and of which your correspondent, Professor Orton, (page 40 of your current volume) says: "Here the landscape was purgatorial, presenting the confusion of the grab box of a geologist."

The fact that guano is now admitted to have been a sediment of the ocean, and is found on the mountain sides, as well as on the islands, and that the beds of the ocean (especially the Atlantic) are crushed down near the borders of the continents, all tend to confirm this theory. The crowding up of the Andes proves that the earth was rotating in about the same position as now, although what is now Cape Horn may have been near the equator before this occurrence. As the surface of the satellite would be a frozen mass, her glacial period would soon have an end; and the sudden acquisition of so large a body of matter on one side of the earth (within what is now the southern hemisphere) would necessitate the withdrawal of a large body of water from the northern hemisphere to establish an equilibrium, and complete the spheroid. Hence the greater exposure of land surface now in the northern hemisphere, much of which is known to have been submerged.

Where then is the base line of geology, when we find that our igneous rocks were produced in other worlds, before being deposited with us?

A. D.

A Substitute for Mica in Stoves.

To the Editor of the Scientific American:

The want of durability in mica and the difficulty in bending it renders the application of another material desirable. My observations have convinced me that we have the most desirable qualities in thin glass tubes, so arranged as to present an even and a nearly airtight surface. As glass tubes are drawn at the glass houses, they are slightly though perceptibly conical, a matter of no moment, as, by alternating the larger and smaller openings, when they are laid parallel, close joints result.

Three kinds of glass are met with in the market: Brown bottle, greenish lime, and cullet and flint glass, more or less perfect. Either of these kinds may be used, as radiant heat from the fire will anneal them; flint glass, being the most pliant, is best adapted to the nicer purposes. Tubes drawn quite thin, from one eighth to one third of an inch bore, may be used, always with reference to the thickness of the envelope of which they form a part. They may be arranged side by side, either vertically or horizontally, to fill any size or space, resting loosely in a recessed space or in a clip of malleable metal to support them and exclude dust. Combinations of shorter and longer tubes may be used for paneling or otherwise varying the surface. But ornamentation will doubtless be best gained through colored and particolored tubes, so arranged as to produce the most pleasing variety. It is well known that silvering within the colorless or colored tubes can be easily so adjusted that much light will be transmitted, while on another part the luster of burnished metal may be obtained, while little light is lost.

Sliding, folding, and curved screens of any size, flexible or fixed, can be formed with these tubes, so that stoves with open or closed fronts may be made. There is not the slightest risk of fracture of the tubes, excepting from a blow or similar accident; and any partial destruction can be repaired by substitution in a few minutes' time; indeed, the pliancy of the structural forms of large size is a safeguard. Washing or other cleansing of the surfaces can be done without danger when the glass is cool.

The increased consumption of glass in this way will diminish its cost in the form of small tubes, and lead to the introduction of ornamental and beautiful designs in all appliances for warming apartments by visible fires.

A. A. HAYES.

Electroplating Pewter Surfaces.

To the Editor of the Scientific American:

I noticed in a recent number of the SCIENTIFIC AMERICAN that a correspondent experienced great difficulty in plating pewter surfaces. To him, and all others who have met with similar difficulties, I will give the following recipe, which will be found simple and very effective:

Take 1 ounce nitric acid and drop pieces of copper in it until effervescence ceases; then add ½ ounce water, and the solution is ready for use. Place a few drops of the solution on the desired surface, and touch it with a piece of steel, and there will be a beautiful film of copper deposited. The application may be repeated if necessary, though once is generally sufficient. The article must now be washed and immediately be placed in the plating bath, when deposition will take place with perfect ease. This is an excellent recipe, and should be known to all electroplaters.

Friendsville, Ill. JAMES POOL.

About Ourselves.

To the Editor of the Scientific American:

We have come to the conclusion that a thing of real practical value has but to be advertised in the SCIENTIFIC AMERICAN to insure its success. From one week's advertisement of our small Welch Water Engine, in your columns, we have answered as many as eighty letters in a single day. That single advertisement will pay us largely as an investment, unless the overwhelming amount of correspondence therefrom really ruins us.

THE NEW ENGLAND MOTOR AND MOWER COMPANY.

Danbury, Conn.

The Aerophore.

This is an apparatus for enabling persons to breathe and work, with a light, in unbreathable and explosive gases in mines, wells, sewers, and caverns. It is the invention of Messrs. Denayrouze, of Paris. The aërophore consists of a number of large or small cylinders as desired, which are lowered into the mine with the workman. Connected with the cylinders is a long flexible tube about an inch in diameter, of such strength that it cannot be damaged even by being trod upon. The person who is to use the aërophore first puts on a strongly made jacket of webbing, to the back of which is attached a couple of moderating valves which serve to supply the compressed air to the mouth at ordinary atmospheric pressure—not higher—the pipe being attached to these valves. Another pipe passes over the shoulders and to a mouth piece. The nostrils are closed by a nipper. The mouth piece is constructed so as to be available either for a light or heavy breathing man. Exhalation is accomplished by means of a small aperture in the tube about two feet from the mouth. This aperture is fitted with a proper valve, which stops the ingress of all air or gases By another valve and tube, air is supplied to the lamp which the miner carries in his hand, and enables it to burn brightly, and a pair of "goggles" are provided in case the eyes are likely to be affected. These can readily be fastened on by means of an elastic strap.

D. D. S. writes to suggest that lightning rods be made in the form of an elongated oval, about 6 feet wide, so that the conductor would present the appearance of two rods, side by side, joined at the top; and they would also be joined under ground. He thinks that this arrangement will give better protection to a building, from the better ground communication it would afford.