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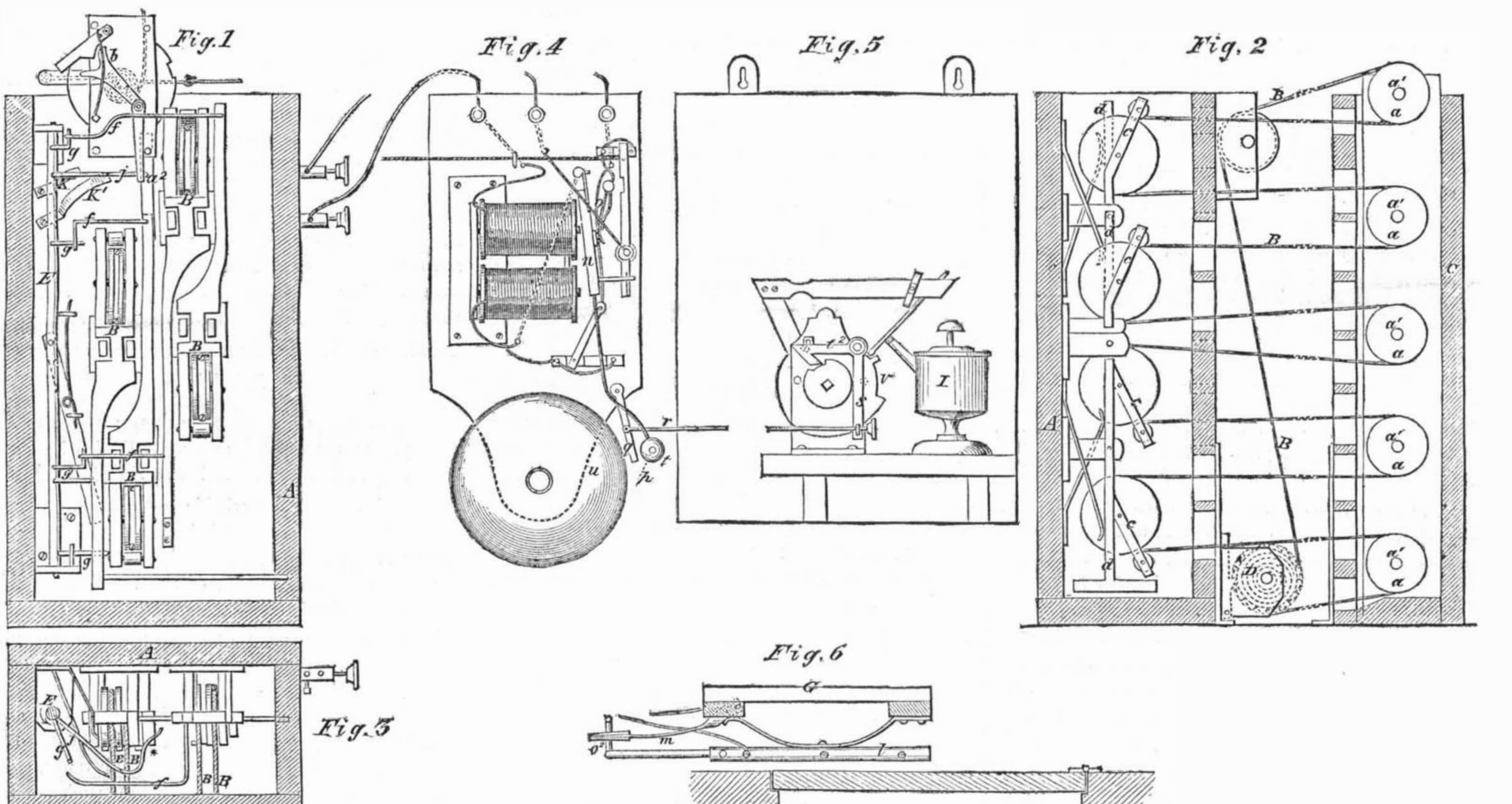
IMPROVED MAGNETO-ELECTRIC BURGLAR ALARM.

The fools are not all dead yet, neither are the rogues, as is proved by the number of inventions of burglar alarms. The one which we here illustrate, not only embraces a vast variety of mechanical devices, but calls to its aid the subtle force of electro-magnetism, and surrounds a house with such a net-work of cords and traps as would doubtless deter the Artful Dodger, or even Old Fagin himself, from endeavoring to steal his way through its meshes. If any of our readers who have houses in the country, containing valuable property, would like to know how their possessions may be rendered perfectly secure against the attacks of burglars, let jecting from their long arms near the end. E is a rocking shaft which is pressed by a spring tending to turn it upon its axle, but it is prevented from turning by its short arms, *g g g*, coming against the bar, *f*, the tension of the cords, B B B, being so adjusted as to hold the rocking bar, E, in the desired position; but if this tension is increased, the bar, *f*, will press the arm, *g*, and turn the rocking arm, F, in one direction, while if the tension is diminished, the bar, *f*, recedes from the arm, *g*, and allows the spring to turn the rocking bar, E, in the opposite direction. When the tension of the cords, B B B, is properly adjusted, the arm, *j*, of the rocking bar, E, rests between the two metallic plates, K K′, which are connected with one of the poles of the electro- ward the rod, *r* (see Fig. 2), which is connected with the apparatus for lighting a lamp. As the rod, r^2, moves forward, it actuates the arm, *s*, of a bent lever which releases the other arm, t^2, from its hold upon the friction wheel, *v*, thus allowing the wheel to revolve under the impulse of a spiral spring provided for the purpose, and rub its roughened edge against a friction match which rests upon it, and which is placed in close proximity with the wick of the lamp, J, thus lighting the lamp.

Fig. 6 illustrates a simple plan by which the circuit of the galvanic battery may be closed on the opening of a door. The light frame, G, secured for the night behind the door, supports the metallic plate, *l*, which is connected with one pole of the battery, while the rod, *m*,



HALLER'S IMPROVED MAGNETO-ELECTRIC BURGLAR ALARM.

them accompany us through the description of this wonderful apparatus.

The plan consists in stretching, within the house, along the side of the wall in front of the windows, a series of cords, three or four inches apart, one above the other, and in connecting a bell with these cords in such a manner that if the tension of the cords is either increased or diminished, the bell will be sounded.

Similar letters in all the figures refer to corresponding parts. The box, A (see Fig. 2), stands at one end of the room, and the case, C, at the other, both against the outer wall of the house, so that the cords, B B B, will be drawn, one above the other, in front of the windows. The pulleys, *a*, in the box, C, are secured upon their fixed axles, *a′*, but the pulleys, *b*, have their axles attached to forked levers, *c* (see Figs. 1 and 2), which are strained backwards by springs, but may be pulled forward by the tension of the cords, B B. The description will now be more intelligible if the reader confines his attention to one of the levers, *c*. The levers, *c*, have their fulcra at *d*, and the arms or bars, *f*, rigidly pro- magnetic apparatus, Fig. 4, while the arm, *j*, is connected with the opposite pole. Thus it will be seen that either increasing or diminishing the tension of the cords, B B B, will rock the shaft, E, and bring the arm, *j*, in contact with one of the plates, K or K′, thereby closing the circuit of the electro-magnet. This closing of the circuit (the battery being in operation) imparts magnetism to the cores of the helices, which causes them to attract the armature, *n*, and thus bring the hammer, *t*, against the bell, *u*, sounding an alarm. As the armature moves forward, a simple device breaks the circuit and allows the armature to fly back under the impulse of the spring, *o*, when the circuit again being closed, the armature is drawn forward and another stroke sounded on the bell, and thus the ringing of the alarm is continued until the circuit is permanently broken by turning the rockshaft, E, so that the arm, *j*, will be in contact with neither of the plates, K or K′.

When the hammer, *t*, moves forward, a pin, *p*, on the further side of the hammer, and, therefore, not shown in the cut, strikes against the lever, *q*, and draws for- is connected with the opposite pole. The end, o^3, of the plate, *l*, is bent in the form of a semicircle, partly encompassing the rod, *m*, so that as the plate, *l*, is moved by the opening of the door, its bent end, o^3, will come in contact with the rod, *m*, and close the circuit.

In Figs. 1 and 3, is shown a plan for operating an alarm by any variation in the tension of the rods B B B, Fig. 2, without the intervention of a galvanic battery. In this case, the arm, *j*, of the rocking shaft, E, is bent in the form shown in Fig. 3, and a lever, a_2 (Fig. 1), passes by the side of the arm, *j*, at the point indicated by the star, *, so that if the arm, *j*, is moved by the rocking of the shaft in either direction, the lever, a^2, will be actuated, and the catch of an alarm of ordinary construction will be released, and the alarm sounded.

The case, A, may be placed permanently in one corner of the room, and the case, C, fitted with castors, may stand against it in the day time, but at night might be run into the opposite corner, thus drawing all the cords at once before the windows, when their tension is to be adjusted by turning the ratchet wheel D. When properly arranged before all the windows, and before all the doors leading out of the house, the family may retire perfectly secure from the undetected entrance of burglars.

The patent for this invention was granted through the Scientific American Patent Agency, on September 5, 1860, and any further information in relation to it may be obtained by addessing the inventor, Jacob Haller, at Ann Arbor, Mich.

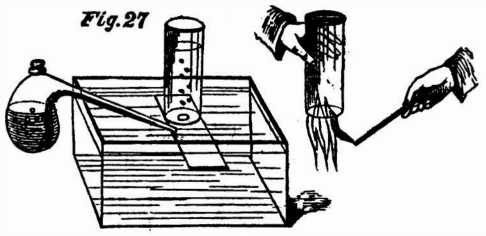
SCIENCE MADE POPULAR.

PROFESSOR FARADAY'S LECTURES ON THE PHYSICAL FORCES.

LECTURE IV.—CHEMICAL AFFINITY—HEAT.

We shall have to pay a little more attention to the forces existing in water before we can have a clear idea on the subject. Besides the attraction which there is between its particles to make it hold together as a liquid or a solid, there is also another force, different from the former—one which, yesterday, by means of the voltaic battery, we overcame, drawing from the water two different substances, which, when heated by means of the electric spark, attracted each other and rushed into combination to reproduce water. Now, I propose to-day to continue this subject, and trace the various phenomena of chemical affinity; and for this purpose, as we yesterday considered the character of oxygen, of which I have here two jars (oxygen being those particles derived from the water which enable other bodies to burn), we will now consider the other constituent of water, and, without embarrassing you too much with the way in which these things are made, I will proceed now to show you our common way of making hydrogen. (I called it hydrogen yesterday; it is so called because it helps to generate water.) I put into this retort some zinc, water and oil of vitriol, and immediately an action takes

Fig. 27



place which produces an abundant evolution of gas now coming over into this jar, and bubbling up in appearance exactly like the oxygen we obtained yesterday.

The processes, you see, are very different, though the result is the same, in so far as it gives us certain gaseous particles. Here, then, is the hydrogen. I showed you yesterday certain qualities of this gas; now let me exhibit you some other properties. Unlike oxygen, which is a supporter of combustion and will not burn, hydrogen itself is combustible. There is a jar full of it; and if I carry it along in this manner, and put a light to it, I think you will see it take fire—not with a bright light; you will, at all events, hear it if you do not see it. Now that is a body entirely different from oxygen; it is extremely light; for, although yesterday you saw twice as much of this hydrogen produced on the one side as on the other by the voltaic battery, it was only one-eighth the weight of the oxygen. I carry this jar upside down. Why? Because I know that it is a very light body, and that it will continue in this jar upside down quite as effectually as the water will in that jar which is not upside down; and just as I can pour water from one vessel into another in the right position to receive it, so can I pour this gas from one jar into another when they are upside down. See what I am about to do. There is no hydrogen in this jar at present, but I will gently turn this jar of hydrogen up under this other jar (Fig. 28), and then we will examine

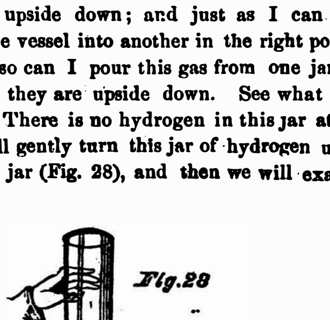
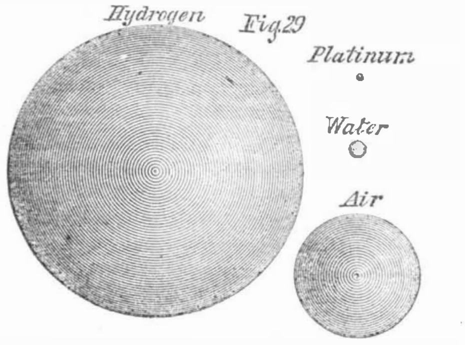


Fig. 28

the two. We shall see, on applying a light, that the hydrogen has left the jar in which it was at first, and has poured upward into the other, and there we shall find it.

You now understand that we can have particles of very different kinds, and that they can have different bulks and weights; and there are two or three very interesting experiments to illustrate this. For instance, if I blow soap bubbles with the breath from my mouth, you will see them fall, because I fill them with common air, and the water which forms the bubble carries it down. But now, if I inhale hydrogen gas into my lungs (it does no harm to the lungs, although it does no good to them), see what happens. [The lecturer inhaled some hydrogen, and, after one or two ineffectual attempts, succeeded in blowing a splendid bubble, which rose majestically and slowly to the ceiling of the theater, where it burst.] That shows you very well how light a substance this is; for, notwithstanding all the heavy, bad air from my lungs, and the weight of the bubble, you saw how it was carried up. I want you now to consider this phenomenon of weight as indica-



cating how exceedingly different particles are one from the other; and I will take as illustrations these very common things, air, water, the heaviest body, platinum, and this gas, and observe how they differ in this respect; for if I take a piece of platinum of that size (Fig. 29), it is equal to the weight of portions of water, air and hydrogen of the bulks I have represented in these spheres; and this illustration gives you a very good idea of the extraordinary difference with regard to the gravity of the articles having this enormous difference in bulk. [The following tabular statement, having reference to this illustration, appeared on the diagram board.]

Hydrogen........	1		
Air..............	14.4	1	
Water...........	11943	829	1
Platinum........	256774	17831	21.5

Whenever oxygen and hydrogen unite together they produce water, and you have seen the extraordinary difference between the bulk and appearance of the water so produced and the particles of which it consists chemically. Now, we have never yet been able to reduce either oxygen or hydrogen to the liquid state; and yet their first impulse, when chemically combined, is to take up first this liquid condition and then the solid condition. We never combine these different particles together without producing water; and it is curious to think how often you must have made the experiment of combining oxygen and hydrogen to form water without knowing it. Take a candle, for instance, and a clean silver spoon (or a piece of clean tin will do), and, if you hold it over the flame, you immediately cover it with dew—not a smoke—which presently evaporates. This, perhaps, will serve to show it better. Mr. Anderson

Fig. 30

will put a candle under that jar, and you will see how soon the water is produced (Fig. 30). Look at that dimness on the sides of the glass, which will soon produce drops, and trickle down into the plate. Well, that dimness and these drops are *water*, formed by the union of the oxygen of the air with the hydrogen existing in the wax of which that candle is formed.

And now, having brought you, in the first place, to the consideration of chemical attraction, I must enlarge your ideas so as to include all substances which have this attraction for each other; for it changes the character of bodies, and alters them in this way and that way in the most extraordinary manner, and produces other phenomena wonderful to think about. Here is some chlorate of potash, and there some sulphuret of antimony. We will mix these two different sets of particles together, and I want to show you, in a general sort of way, some of the phenomena which take place when we make different particles act together. Now, I can make these bodies act upon each other in several ways. In this case, I am going to apply heat to the mixture; but if I were to give a blow with a hammer, the same result would follow. [A lighted match was brought to the mixture, which immediately exploded with a sudden flash, evolving a dense white smoke.] There; you see the result of the action of chemical affinity overcoming the attraction of cohesion of the particles. Again: here is a little sugar, quite a different substance from the black sulphuret of antimony, and you shall see what takes place when we put the two together. [The mixture was touched with sulphuric acid, when it took fire and burned gradually, and with a brighter flame than in the former instance.] Observe this chemical affinity traveling about the mass, and setting it on fire, and throwing it into such wonderful agitation!

I must now come to a few circumstances which require careful consideration. We have already examined one of the effects of this chemical affinity, but, to make the matter more clear, we must point out some others. And here are two salts dissolved in water. They are both colorless solutions, and in these glasses you cannot see any difference between them. But if I mix them, I shall have chemical attraction take place. I will pour the two together into this glass, and you will at once see, I have no doubt, a certain amount of change. Look! they are already becoming milky, but they are sluggish in their action—not quick, as the others were—for we have endless varieties of rapidity in chemical action. Now, if I mix them together, and stir them so as to bring them properly together, you will soon see what a different result is produced. As I mix them they get thicker and thicker, and you see the liquid is hardening and stiffening, and before long I shall have it quite hard; and before the end of the lecture it will be a solid stone—a wet stone, no doubt, but more or less solid—in consequence of the chemical affinity. Is not this changing two liquids into a solid body a wonderful manifestation of chemical affinity?

There is another remarkable circumstance in chemical affinity, which is, that it is capable of either waiting or acting at once. And this is very singular, because we know of nothing of the kind in the forces either of gravitation or cohesion. For instance: here are some oxygen particles, and here is a lump of carbon particles. I am going to put the carbon particles into the oxygen; they *can* act, but they *do* not—they are just like this unlighted candle. It stands here quietly on the table, waiting until we want to light it. But it is not so in this other case; here is a substance, gaseous like the oxygen, and if I put these particles of metal into it the two combine at once. The copper and the chlorine unite by their power of chemical affinity, and produce a body entirely unlike either of the substances used. And in this other case, it is not that there is any deficiency of affinity between the carbon and oxygen, for the moment I choose to put them in a condition to exert their affinity, you will see the difference. [The piece of charcoal was ignited and introduced into the jar of oxygen, when the combustion proceeded with vivid scintillations.]

Now, this chemical action is set going exactly as it would be if I had lighted the candle, or as it is when the servant puts coals on and lights the fire; the substances wait until we do something which is able to start the action. Can anything be more beautiful than this combustion of charcoal in oxygen? You must understand that each of these little sparks is a portion of the charcoal, or the bark of the charcoal, thrown off white hot into the oxygen, and burning in it most brilliantly, as you see. And now let me tell you another thing, or you will go away with a very imperfect notion of the powers and effects of this affinity. There you see some charcoal burning in oxygen. Well, a piece of lead will burn in oxygen just as well as the charcoal does—or, indeed, better—for, absolutely, that piece of lead will act at once upon the oxygen as the copper did in the other vessel with regard to the chlorine. And here, also, a piece of iron; if I light it and put it into the oxygen, it will burn away just as the carbon did. And I will take some lead, and show you that it will burn in the common atmospheric oxygen at the ordinary temperature. These are the lumps of lead which you remember we had the other day—the two pieces which clung together. Now these pieces, if I take them to-day and press them together, will not stick, and the reason is that they have attracted from the atmosphere a part of the oxygen there present, and have become coated as with a varnish by the oxyd of lead, which is formed on the surface by a real process of combustion or combination. There you see the iron burning very well in oxygen; and I will tell you the reason why those scissors and that lead do not take fire while they are lying on the table. Here the lead is in a lump, and the coating of oxyd remains on its surface, while there you see the melted oxyd is clearing itself off from the iron, and allowing more and more to go on burning. In this case, however [holding up a small glass tube containing lead pyrophorus], the lead has been very carefully produced in fine powder and put into a glass tube and hermetically sealed, so as to preserve it, and I expect you will see it take fire at once. This has been made about a month ago, and has thus had time to sink down to its normal temperature; what you see, therefore, is the result of chemical affinity alone. [The tube was broken at the end and the lead poured out on a piece of paper, whereupon it immediately took fire.] Look! look at the lead burning!—why, it has set fire to the paper! Now that is nothing more than the common affinity always existing between very clean lead and the atmospheric oxygen; and the reason why this iron does not burn until it is made red hot, is because it has got a coating of oxyd about it which stops the action of the oxygen—putting a varnish, as it were, upon its surface as we varnish a picture—absolutely forming a substance which prevents the natural chemical affinity between the bodies from acting.

I must now take you a little farther in this kind of illustration (or consideration, I would rather call it) of chemical affinity. This attraction between different particles exists, also, most curiously in cases where they are previously combined with other substances. Here is a little chlorate of potash containing the oxygen which we found yesterday could be procured from it; it contains the oxygen there combined and held down by its chemical affinity with other things, but still it can combine with sugar, as you saw. This affinity can thus act *across* substances, and I want you to see how curiously what we call combustion acts with respect to this force of chemical affinity. If I take a piece of phosphorus and set fire to it, and then place a jar of air over the phosphorus, you see the combustion which we are having there on account of chemical affinity (combustion being in all cases the result of chemical affinity). The phosphorus is escaping in that vapor, which will condense into a snow-like mass at the close of the lecture. But suppose I limit the atmosphere, what then? Why, even the phosphorus will go out. Here is a piece of camphor which will burn very well in the atmosphere—and even on water it will float about and burn, by reason of some of its particles gaining access to the air. But if I limit the quantity of air by placing a jar over it, as I am now doing, you will soon find the camphor will go out. Well, why does it go out?—not for want of air, for there is plenty of air remaining in the jar. Perhaps you will be shrewd enough to say for want of oxygen.

This, therefore, leads us to the inquiry as to whether oxygen can do more than a certain amount of work. The oxygen there (Fig. 30) cannot go on burning an unlimited quantity of candle, for that has gone out, as you see; and its amount of chemical attraction or affinity is just as strikingly limited; it can no more be fallen short of or exceeded than can the attraction of gravitation. You might as soon attempt to destroy gravitation or weight, or all things that exist, as to destroy the exact amount of force exerted by this oxygen. And when I pointed out to you that eight by weight of oxygen to one by weight of hydrogen went to form water, I meant this, that neither of them would combine in different proportions with the other, for you can-not get ten of hydrogen to combine with six of oxygen, or ten of oxygen to combine with six of hydrogen; it must be eight of oxygen and one of hydrogen. Now, suppose I limit the action in this way: this piece of cotton wool burns, as you see, very well in the atmosphere; and I have known of cases of cotton mills being fired as if with gunpowder through the very finely divided particles of cotton being diffused through the atmosphere in the mill, when it has sometimes happened that a flame has caught these raised particles, and it has run from one end of the mill to the other and blown it up. That, then, is on account of the affinity which the cotton has for the oxygen; but suppose I set fire to this piece of cotton which is rolled up tightly; it does not go on burning because I have limited the supply of oxygen, and the inside is prevented from having access to the oxygen just as it was in the case of the lead by the oxyd. But here is some cotton which has been imbued with oxygen in a certain manner. I need not trouble you now with the way it is prepared; it is called *gun cotton*. See how that burns [setting fire to a piece]; it is very different from the other, because the oxygen which must be present in its proper amount is put there beforehand. And I have here some pieces of paper which are prepared like the gun cotton, and imbued with bodies containing oxygen. Here is some which has been soaked in nitrate of strontia; you will see the beautiful red color of its flame; and here is another which I think contains baryta, which gives that fine green light; and I have here some more which has been soaked in nitrate of copper: it does not burn quite so brightly, but still very beautifully. In all these cases the combustion goes on independent of the oxygen of the atmosphere. And here we have some gunpowder put into a case, in order to show that it is capable of burning under water. You know that we put it into a gun, shutting off the atmosphere with shot, and yet the oxygen which it contains supplies the particles with that without which chemical action could not proceed. Now, I have a vessel of water here, and am going to make the experiment of putting this fuse under the water, and you will see whether that water can extinguish it; here it is burning out of the water, and there it is burning under the water; and so it will continue until exhausted, and all by reason of the requisite amount of oxygen being contained within the substance. It is by this kind of attraction of the different particles one to the other that we are enabled to trace the laws of chemical affinity and the wonderful variety of the exertions of these laws.

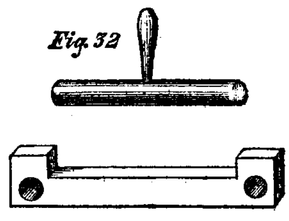
Now I want you to observe that one great exertion of this power which is known as *chemical affinity* is to produce HEAT and light: you know, as a matter of fact, no doubt, that when bodies burn they give out heat; but it is a curious thing that this heat does not continue—the heat goes away as soon as the action stops, and you see, thereby, that it depends upon the action during the time it is going on. It is not so with gravitation; this force is continuous, and is just as effective in making that lead press on the table as it was when it first fell there. Nothing occurs there which disappears when the action of falling is over; the pressure is upon the table, and will remain there until the lead is removed; whereas, in the action of chemical affinity to give light and heat, they go away immediately after the action is over. This lamp *seems* to evolve heat and light continuously, but it is owing to a constant stream of air coming into it on all sides, and this work of producing light and heat by chemical affinity will subside as soon as the stream of air is interrupted. What, then, is this curious condition of heat? Why, it is the evolution of another power of matter—of a power new to us, and which we must consider as if it were now for the very first time brought under our notice. What is heat? We recognize heat by its power of liquefying solid bodies and vaporizing liquid bodies; by its power of setting in action, and very often overcoming, chemical affinity. Then how do we obtain heat? We obtain it in various ways; most abundantly by means of the chemical affinity we have just before been speaking about, but we can also obtain it in many other ways. Friction will produce heat. The Indians rub pieces of wood together until they make them hot enough to take fire; and such things have been known as two branches of a tree rubbing together so hard as to set the tree on fire. I do not suppose I shall set these two pieces of wood on fire by friction, but I can readily produce heat enough to ignite some phosphorus. [The lecturer here rubbed two pieces of cedar wood strongly against each other for a minute, and then placed on them a piece of phosphorus, which immediately took fire.] And if you take a smooth metal button stuck on a cork, and rub it on a piece of soft deal wood, you will make it so hot as to scorch wood and paper and burn a match.

I am now going to show you that we can obtain heat not by chemical affinity alone, but by the pressure of air. Suppose I take a pellet of cotton, and moisten it with a little ether and put it into a glass tube (Fig. 31), and then take a piston and press it down suddenly, I expect I shall be able to burn a little of that ether in the vessel. It wants a suddenness of pressure, or we shall not do what we require. [The piston was forcibly pressed down, when a flame, due to the combustion of the ether, was visible in the lower part of the syringe.] All we want is to get a little ether in vapor and give fresh air each time; and so we may go on again and again, getting heat enough by the compression of air to fire the ether vapor.

Fig. 31

This, then, I think, will be sufficient, accompanied with all you have previously seen, to show you how we procure heat. And now for the effects of this power. We need not consider many of them on the present occasion, because when you have seen its power of changing ice into water and water into steam, you have seen the two principal results of the application of heat. I want you now to see how it expands all bodies—all bodies but one, and that under limited circumstances. Mr. Anderson will hold a lamp under that retort, and you will see, the moment he does so, that the air will issue abundantly from the neck which is under water, because the heat which he applies to the air causes it to expand. And here is a brass rod (Fig. 32) which goes through that hole, and fits also accurately into this gage; but if I make it warm with this spirit lamp, it will only go in the gage or through the hole with difficulty; and if I were to put it into boiling water, it would not go through at all. Again: as soon as the heat escapes from bodies, they collapse; see how the air is contracting in the vessel now that Mr. Anderson has taken away his lamp; the stem of it is filling with water. Notice, too, now, that although I cannot get the tube through this hole or into the gage, the moment I cool it by dipping it into water it goes through with perfect facility, so that we have a perfect proof of this power of heat to contract and expand bodies.

Fig. 32



THEORETICAL ECONOMY OF THE AIR ENGINE.

The theory of the greater power derived from a given amount of heat by the air engine, than by the steam engine, may be thus briefly stated:—

1,170 degrees of heat imparted to one cubic inch of water will raise 15 lbs, 1,696 inches.

The specific gravity of water is 770, air being 1, consequently air of a weight equal to 1 cubic inch of water will measure 770 cubic inches.

Air at zero, Fah., has its bulk doubled by 493 degrees of heat, hence 1,170 degrees of heat imparted to 770 cubic inches of air will raise 15 lbs. 1,658 inches.

Now, the specific heat of air is 2,669, water being 1; hence, it takes but about one quarter the quantity of heat to impart the same number of degrees to air as it does to water, and as the work of a given number of degrees imparted is about the same, heat performs, in round numbers, four times the work when applied to air that it does when applied to water.

THE London *Mechanics' Magazine* says:—"Inventors are without doubt a troublesome class (to government officers), but, nevertheless, it is to inventors that we owe this very remarkable production—the British empire! Take away the inventors from amongst us, and we should sink to the condition of the Chinese."

AMERICAN NAVAL ARCHITECTURE.

THE STEAMER "HANKOW."

This steamer, erected by Thomas Collyer, of this city, is owned by Messrs. J. M. Forbes & Co., of Boston. She will soon assume her appropriate position on the route of her intended service—the river trade in the Chinese empire. This is the third boat constructed for this firm for the China trade, all of which have been successful. We subjoin full and correct particulars of her hull, &c.:—

Length on deck, from fore part of stem to after part of stern-post, above the spar deck, 212 feet; breadth of beam at midship section (molded), 30 feet 6 inches; depth of hold, 11 feet; depth of hold to spar deck, 11 feet 4 inches; draft of water at load line, 7 feet; light draft of water, 5 feet 6 inches; tunnage, 720 tuns.

Her hull is of white oak, hacmetac, &c., and very securely cross fastened with copper and treenails. The floors are molded 14 inches; sided, 4 inches. Frames apart from centers, $27\frac{3}{8}$ inches; these frames are strapped with diagonal and double-laid braces, $3\frac{1}{2}$ inches by $\frac{1}{2}$ an inch, thereby securing great strength and durability.

The *Hankow* is fitted with one vertical, beam, condensing engine; diameter of cylinder, 48 inches; length of stroke of piston, 12 feet; diameter of water wheels, over boards, 29 feet; material of same, iron; length of wheel blades, 7 feet 6 inches; depth, 2 feet; number of same, 26.

She is also supplied with two return tubular boilers, located in the hold; length of boilers, 20 feet; breadth of same, 11 feet; and their hight, exclusive of steam chimney, is 9 feet; number of furnaces to each, 2; breadth of these, 4 feet 9 inches; length of grate bars, 7 feet; number of tubes above, in each boiler, 64; number of flues below, 10 in each boiler; internal diameter of tubes above, $5\frac{1}{4}$ inches; internal diameter of flues below, 8 of $12\frac{1}{2}$ inches, and 2 of $15\frac{1}{2}$ inches; length of tubes above, 14 feet; length of flues below, 7 feet 10 inches; diameter of smoke pipe, 64 inches; hight of same, above grate surface, 45 feet. The engine is fitted with expansion gear; point of cutting off, variable; the boilers possess a grate surface equal to 132 square feet, and a heating surface of 3,216 square feet.

In addition to these features, she is provided with one independent steam fire and bilge pump, and has bilge injections and bottom valves to all openings in her bottom. The depth of her keel is 4 inches. She has 2 masts and is schooner rigged. Ample protection has been made against fire, &c. The machinery was constructed by the Morgan Iron Works, foot of Ninth-street, this city. Capt. George W. Sand will command this vessel.

THE STEAMER "FIRE DART."

This steamer is intended for service on the Chinese coast. Her hull was constructed by Thomas Collyer, foot of Forty-third-street, this city; the machinery being supplied by the Neptune Iron Works. Her commander will be Capt. Henry W. Johnson. We append full and correct particulars of her hull and machinery:—

Length on deck, from fore part of stem to after part of stern-post (above the spar deck), 200 feet; breadth of beam (molded), 30 feet; depth of hold, 11 feet; depth of hold, to spar deck, 11 feet 3 inches; draft of water at load line, 5 feet 6 inches; area of immersed section at the above draft, 140 square feet; tunnage, 650 tuns.

Her hull is of white oak, hacmetac, &c., and cross fastened with copper and treenails. The frames are molded 14 inches; sided, 5 inches, and 26 inches apart from centers; these frames are strapped with double-laid and diagonal braces, $3\frac{1}{2}$ inches by 7-10ths of an inch. The floors are not filled in solid.

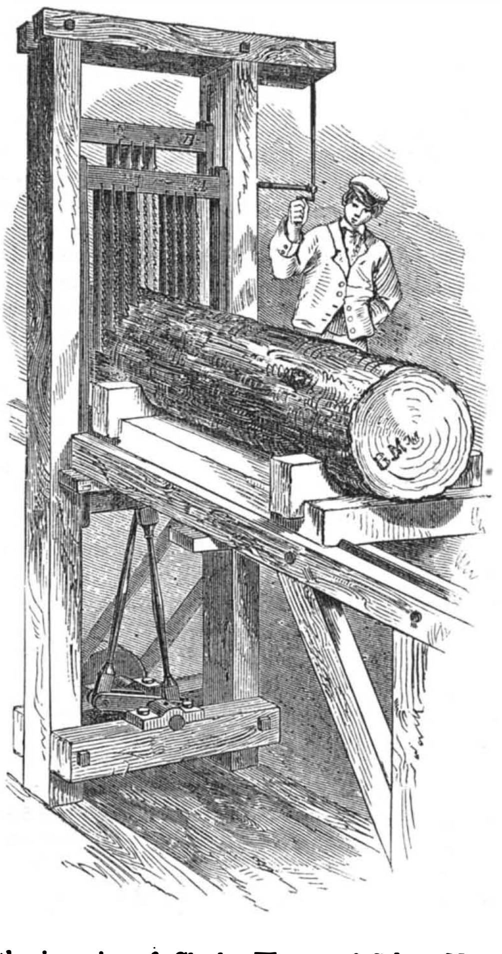
The *Fire Dart* is fitted with one vertical, beam, condensing engine; diameter of cylinders, 46 inches; length of stroke of piston, 12 feet; diameter of water wheels, over boards, 28 feet; material of same, iron; length of wheel blades, 8 feet; depth of same, 2 feet, and the number is 24.

She is also supplied with two return-flue boilers, located in hold; length of boilers, 27 feet; breadth of same (at furnace), 9 feet 9 inches, and their hight (at shell), exclusive of steam chimney, 8 feet, 9 inches; number of furnaces, 2 in each boiler; breadth of these, 4 feet 3 inches, length of grate bars, 7 feet; number of tubes above, 14 in each boiler; number of flues below, 10 in each boiler; internal diameter of tubes above, 7 inches; internal diameter of flues below, 6 of 12 inches, 2 of 14 inches and 2 of 16 inches; length of tubes above, 19 feet 6 inches; length of flues below, 14 feet; diameter of smoke pipe, 72 inches; hight of same above grate surface, 42 feet. The engine is fitted with expansion gear; point of cutting off, variable.

Ample protection has been made against communication from fire by the boiler, by zinc, felt, &c. The boiler possesses a grate surface equal to 120 square feet, and a heating surface of 3,259 square feet, the keel is 4 inches in depth. She has one independent steam fire and bilge pump, and bilge injections and bottom valves to all openings in her bottom; bunkers of wood; has 2 masts and is schooner rigged. This vessel is owned by Messrs. Augustine Heard & Co—an American house in China. She has been constructed of the best materials, which have been put together in a masterly manner. The model appears to be without fault, and it is hoped that she will equal any of her builder's previous efforts.

WESTON'S IMPROVEMENT IN HANGING SAWS.

Uniformity of resistance is very important in order to secure a good running of machinery, and there is perhaps no machine in which there are more frequent changes in the amount of resistance than in the reciprocating saw. As the whole of the cutting is done during the descent of the saw, and none while it is rising, the rapid alternations of great resistance with an almost complete cessation of resistance, sometimes produce vibrations which shake the whole mill. This difficulty is very effectually obviated by the plan here illustrated,



the invention of Charles Weston, of Salem, Mass., which consists in the employment of two saw gates, one just in the rear of the other, both operated by pitmans from a double crank on the same shaft. The front gate, A, has two or more saws to operate, upon the outer portions of the log, while the rear gate, B, carries the saws for cutting the middle portion of the log. As one saw is descending, and consequently cutting, while the other is rising, the resistance is rendered very nearly uniform; and all the jerks, strains and vibrations caused by the old mode of hanging are avoided.

The patent for this invention was procured through the Scientific American Patent Agency on the 8th of May, 1860; and further information in relation to it may be obtained by addressing Charles Weston & Sons, Salem, Mass.

TO MAKE STEEL FROM PIG IRON.

The last number of Newton's London *Journal of Arts* contains a report of an interesting patent trial had before Baron Wilde, at Liverpool, England, relating to the infringing of Rieppe's English patent for manufacturing the famous "puddled steel" from pig iron. The suit was brought by Jacob Mayer, steel manufacturer, of Prussia (the assignee of the patent), against Messrs. James Spence and F. Worthington, manufacturers of steel and tin plate. Ewald Rieppe—now deceased—was a German, and obtained his patent in 1850, and since that time puddled steel has become well known. The most distinguished patent counsel were employed on both sides, and men of great scientific reputation appeared as expert witnesses, who, as usual in such cases, contradicted each other. The evidence before the court was substantially as follows:—

The common method that had before been practiced in the making of steel was by reducing pig iron to wrought iron—which contains less carbon than steel—then carbonizing this wrought iron again in close crucibles. The object of Rieppe's invention was to stop the decarbonization of pig iron in the puddling furnace, at that point where it holds the exact amount of carbon in steel, and thus do away with the old round-about process of cementation. In the specification of Rieppe, the invention is described as follows:—"I employ the iron puddling furnace in the same way as for making wrought iron. I introduce a charge of about 280 pounds of pig iron and raise the temperature to redness, and as soon as the metal begins to trickle down in a fluid state in the furnace, the damper is to be partially closed to temper the heat. From twelve to sixteen shovelfuls of cinder (oxyd of iron) taken from the squeezers, are now put in on the top of the molten iron, and the whole is then uniformly melted down. A little black oxyd of manganese, some common salt, and dry clay (technically called "physic"), in powder, are now placed among the mass. Up to this point, the process is the very same as that for making puddled iron, but at this point, 40 lbs. of pig iron are put into the furnace near the fire bridge, upon an elevated bed of cinders, and when this melts and trickles down, and when the other mass of 280 lbs. also throws up a well-known blue flame, the 40 lbs of the pig iron are raked into the mass, and the whole mixed together. The entire mass now swells up, small *grains* are seen to form in it and then break through the cinder on the surface."

This is the grand criterion point claimed as Rieppe's invention; this is the sign or discovery made by him that the melted mass is now steel, that the requisite quantity of carbon has been expelled, and that a sufficient quantity for steel remains. This, then, is the point at which to arrest the decarbonizing process, and is an important discovery, because everything in the management of the furnaces depends upon the appearance of the iron. As soon as these *grains* appear in the puddling furnace, the damper is shut down about three-fourths, and the mass is thoroughly stirred. The blue jets of flame now gradually disappear, the peculiar *grains* fuse together and form a wax-like mass, which is then gathered together in a ball, taken out and rolled or hammered, and is the *steel*. Such is a description of Rieppe's process for making steel from pig iron in a puddling furnace.

Mr. Wm. Clay, of the Mersey Steel Works, Liverpool, stated that he manufactured steel by license under Rieppe's patent; he did this without difficulty; but unless he wanted very hardsteel, for tools, he never added the extra forty pounds of pig iron. He manufactures puddled steel on a large scale, and has been engaged in the business all his life, but never knew how to make it from pig iron until he read the specification of Rieppe.

Dugald Campbell, an analytic chemist, of London, Dr. Frankland and Mr Homersham had been appointed by the court to examine the works of Messrs. Spence & Worthington, and report how the process was conducted in them. Mr. Campbell stated that a common puddling furnace was employed with the exception that it contained two fireplaces and no dampers in the chimney. When the decarbonization of the pig iron was to be stopped in the furnace, instead of doing this by shutting down the damper to exclude the air, the air was excluded by shutting the ashpit doors.

He considered that the process of the defendants was substantially the same as that of Rieppe, and he was not aware that steel had ever been made in a puddling furnace before this patent was taken out. Dr. Frankland and Mr. Hobersham, as well as several other witnesses, gave similar testimony for the plaintiff.

The defense contended that they did not employ the same process, that Rieppe's specification was vague; and besides this, his patent was void, because the process was quite old and had been practiced in England long before 1850. Dr. Lyon Playfair, professor of chemistry in Edinburgh, was then called. He had given great attention to the manufacture of steel, and had published a work on the subject. The average quantity of carbon in cast iron is 3 per cent; in steel, from ½ to ¾ per cent; in wrought iron, rarely more than 2-10ths per cent. The process of making steel from ore had been known from the days of Aristotle, and from cast iron, for several centuries. He had read Rieppe's patent and thought steel could not be made if the temperature (cherry-red) mentioned in it were adhered to. Redness, in scientific works, is used for a temperature of about 1,000°, Fah.; cast iron melts at 2,700°, Fah. In his judgment Spence's process was different, because two fires were used and the furnace was kept at a strong white heat, which was a great advantage over the process where the damper was shut down and the temperature lowered.

Crace Calvert, professor of chemistry in Manchester, also a witness, agreed with Professor Playfair; but the most important witness was Mr Joseyh Beezley, ironmaster at Smethwick, Birmingham, who produced a specimen of steel iron, and said it was made by him in a puddling furnace before 1850 (the date of Rieppe's patent). He asserted that he had made some hundreds of tuns of it before that date. He regulated the heat of the furnace with a damper, and used cinder, slack and *physic*, and obtained as great a heat as possible in the furnace. The process adopted by him was similar to that of Rieppe, only he employed a higher temperature in the furnace, and this was an advantage.

The judge called attention to this evidence and stated that unless the plaintiff could convince the jury that Mr. Beezley was telling an entire falsehood, which he did not believe was possible, it was fatal to his case. The solicitor-general (Sir Wm. Atherton), for the plaintiff, admitted this, and rather than allow it to go to the jury for a decision, he selected to be non-suited.

TUNGSTEN.

The article on "tungsten steel," published on page 256 of the present volume of the SCIENTIFIC AMERICAN, has excited considerable attention, and many persons have expressed a desire to know something more than is there stated about this metal.

Tungsten is a distinct metal, one of the known simple substances, like gold, silver, copper, &c. It exists in the form of tungstic acid in several minerals, the most important of which are the tungstate of lime and *wolfram*—the tungstate of manganese and iron. Its name—tungsten—means "heavy stone in Swedish. Tungstic acid parts with its oxygen easily, and may be reduced in a glass tube by dry hydrogen gas at a red heat The metal is obtained in the state of a dense dark grey powder, which requires a very intense heat to fuse into globules. When melted it has the color and luster of iron, and is not altered by exposure to the air. Wolfram is found in the tin ores of Cornwall, but its tungsten can only be separated by a chemical process Sulphate of soda is mixed with the ore and a small quantity of charcoal dust added, and the whole kept at a red heat for some time in a furnace. The tungstic acid combines with the soda forming the tungstate of soda. This product is now removed, while hot, into tanks containing water; this quickly dissolves the tungstate of soda, which is then run off into receivers and crystallizes by evaporation. It has been proposed to use this tungstate for dyeing, as a substitute for that common mordant, "stannate of soda," but it has been seldom employed, as yet, for this purpose. Tungstate of lime makes a very good white paint, so does the tungstate of lead. Fused with sulphur, to make the sulphuret of tungsten, it forms a dark substance which has been proposed as a substitute for black lead. Metallic tungsten combines with several metals forming peculiar alloys, and forms a great number of salts by chemical combinations.

PEASE'S IMPROVED OILS.

The readers of the SCIENTIFIC AMERICAN have no doubt noticed, in the advertising columns of this paper, for several years past, a modest advertisement of F. S. Pease, of Buffalo, N. Y., relating to a patent oil sold by him for both lubricating and burning purposes. We have often heard the article highly spoken of by persons who had used it for a long period, but who had no selfish interest to promote in recommending it.

Often having inquiries from manufacturers and railroad superintendents for information concerning lubricating materials, we have taken some trouble to inform ourselves relative to the oil manufactured and sold by Mr. Pease, and the following we have learned respecting it, which we communicate through these columns for the benefit of those who have occasion to use lubricating material. This oil has been in use on the New York Central for over five years, on the Buffalo, New York and Erie for over six years, on the Toledo and Wabash for over four years, on the Buffalo and Erie, and a number of other first-class roads, and recommended by them in point of economy and durability for railroad purposes. It has been in use for several years on our government steamers, and is endorsed and recommended by the United States government for lighthouses, signals and engine use. A dynamometer test was made at the American Institute with the greatest care, by an instrument as accurate as mechanism could make it, arranged for testing the friction of metals and oils. These oils proved themselves equal to the best sperm, and they granted to the exhibitor a medal. Chemical tests by Headly show that these oils have no acid reaction; that they stand the greatest degree of heat without change; that of melted lead 600° Fah. and higher without change, and consequently were unaffected when other oils were burned or dried up. In burning, some parties testify that they proved themselves equal, if not superior, to the best sperm, the heating of the lamp being much less and the burning far better than sperm; but this statement should be taken with some degree of allowance. In a trial made with the car oil, as the manufacturer terms it, on the New York Central Railroad, a sleeping car was run over 10,000 miles with only one oiling; the bearings remaining in good order and free from gum. This oil is equally superior for manufacturers, steam engines and mechanical works generally, from what we learn of it, as it is for railroad purposes; and while it is not a volatile oil, it is free from acid reaction, and will stand a great degree of cold or high degree of heat. Mr. Pease is in possession of folios of recommendations from users of his oil, some of them speaking of it in terms too flattering for us to believe.

Having thus called the attention of our readers to what we believe to be a good article, we refer them to Mr. Pease, whose advertisement appears in our columns from week to week, for further information.

OUR OBSTINATE CRITIC AGAIN.—The editor of the *Engineer* seems to have lost the power of directing aright the axes of both eyes towards one object. Failing in his attempts to overthrow the logic we directed against his apparant ignorance of the fundamental laws of chemistry, he swings out in a recent issue, right and left, striking at objects in every direction which appear to float before his visual organs. He contents himself with simply denying our teachings respecting the oxydization of iron—denounces our explanation of the Giffard injecor—manifests considerable flunkeyism over a short paragraph which appeared in the SCIENTIFIC AMERICAN about Lord Renfrew's visit to the Patent Office; and even takes up a palpable typographical error which ordinary professional courtesy might have caused him to overlook, and makes himself unhappy generally If the *Engineer* man is mad, we pity him; if not, we commend him to a more sound discretion, and to a better knowledge of somethings whereof he undertakes to write. We drop him to fight on his own hook.

A LITERARY CAB DRIVER.—A prize of $100 for the best essay on the effects of Sunday cab driving has been won by John Cochrane, a London cab driver At the meeting at which the prize was awarded, Cochrane told his audience that the essay consisted of 19,000 words, and was all written in the open air, on the top of his cab.

RECENT AMERICAN INVENTIONS.

The following inventious are among the most useful improvements lately patented:—

QUARTZ CRUSHER.

This invention consists in the use of one or more pairs of crushing rollers of peculiar form, in connection with a rotating cylinder provided with a bed of novel construction and with drags; all being arranged to operate in the most efficient manner to favor the separation of the gold from the quartz. The difficulty attending the operation of the ordinary stampers has been that the quartz, although crushed, is allowed to carry away particles of gold imbedded in it and covered by foreign substances, such as sulphuret of iron. The object of this invention is to obviate this difficulty by dragging or scraping, by a sort of grinding process, the gold which may be imbedded in the sands of the crushed quartz, so that such particles of gold may be exposed, amalgamated and saved with the general mass. T. A. Morris, of Green Bay, Wis., is the inventor.

VALVES FOR STEAM ENGINES.

H. E. Woodford, of Watertown, N. Y., is the inventor of an improvement in oscillating induction and eduction valves for steam engines, the object of which is to bring the faces of the valves as near as practicable to the bore of the cylinder, and so to prevent as far as possible the loss of steam in filling the passages. The improvement consists in so constructing and arranging such valves that while their axes of oscillation are transverseto the axis of the cylinder, the longitudinal profiles of their sides form arcs concentric with the latter axis.

OIL LAMP PRIZES.

On page 377 of the last volume of the SCIENTIFIC AMERICAN, we called the attention of inventors to the premiums of $4,500 for four improved lamps, offered by the oil merchants of New Bedford, Mass. A large number of inventors competed for the prizes, but the committee appointed to investigate the merits of the lamps have reported that none are entitled to the premiums. They, however, give the following prizes to the best lamps, to encourage the inventors to perfect and introduce them. For stand lamps, J. W. Taber, of New Bedford, $600; to Jared Parkhurst, of Baltimore, $600; to Wm. H. Topham, of New Bedford, $500; to A. D. Richmond & Co., of New Bedford, $250; to James Duff, of New Bedford, for solar lamp, $100; to O. P. Drake, of Boston, for stand carcel lamp, $100; to A. D. Richmond & Co., of New Bedford, for hand lamp, $100; to M. Burnett, $100; to James Beete, $100. The committee are of opinion that bleached whale oil, burned in the best manner, is a cheaper light material than any other oil in the market.

DAVIDSON'S BOAT-LOWERING APPARATUS.

On page 321 of our last volume, the reader will find an engraving and description of a new boat-lowering and detaching apparatus, the invention of Lieutenant Davidson, of Annapolis, Md. Commander Craven, of the practice ship *Plymouth*, has reported favorably as to its practicability. We make the following extract:—"The cry of 'Man overboard' was given when the ship was going at the rate of eight knots; the life buoy was let go, a boat was lowered, the ship brought to, the body picked up, the boat brought alongside again and hoisted up in her place, the ship filled away and was standing on her course under all sail in seven minutes and twenty seconds from the time the first alarm was given." The report further shows that the life boat was loosed from her grippings, lowered and detached in twenty-five seconds, without arresting the headway of the vessel. The boat was drawn up and secured again in one minute.

HAVE YOUR MODELS PERFECT.—We learn from R D. M. Edwards, of Tecumseh, Mich., that in our illustration of his Wool Folder in No. 15 (page 232) of the present volume of our journal, there was an omission of a board to be placed over the wool when the follower is pressed up against the wool from below by the treadle This omission resulted from the piece not being attached to the model sent us, from which the illustration was prepared. Other persons forwarding models for illustration will please take warning from this circumstance, and see that their models are complete

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

The usual weekly meeting of this association was held at the Institute rooms, on Thursday evening, Oct. 25—Professor C. Mason presiding.

MISCELLANEOUS BUSINESS.

Deterioration of India-rubber.—Mr. Churchill presented an india-rubber toy ball, which appeared perfect till it was pressed, when the surface showed well-defined zigzag and nearly parallel cracks, which seemed to extend to the depth of over an eighth of an inch. On pressing the ball in another direction, a new series of cracks appeared. The ball came from France, and he was inclined to believe that the effect was connected with the use of the chloride of sulphur in the vulcanising process. Mr. Churchill has experimented much on vulcanizing oils with chloride of sulphur, and had noticed similar effects when too much chloride was used.

Mr. Dibben believed that such deterioration might occur in the ordinary process if too high a heat was used. The surface of the rubber is too rapidly vulcanized; its structure then is somewhat similar to unannealed glass.

The Evaporating Power of Hot Coal.—Mr. Fisher wished to know how much water would be evaporated by the cooling down of a mass of ignited coal in the fire-box of a locomotive after access of air was cut off. The question was briefly commented upon by several members, and it seemed to be agreed that no useful answer could be given till a variety of details were determined, and, of these, that the most important was the specific heat of coal.

The regular subject—"Caloric Engines"—was here called up.

DISCUSSION.

Mr. Seely—This subject has engaged a good share of my attention for the past year and a half. I have studied, planned, experimented and built models, and I believe I have attained results that are new and useful. In order that my remarks may have an interest to those who are not skilled in engineering, I propose to relate the story of the gradual development of the subject in my own mind, asking it to be understood that, in fact, the novelties which I claim are very few, and that hundreds before me have been laboring in the same field. The theory of the air engine is simple: confined air is expanded against a piston, which it moves; the air to be expanded is forced into the heater by a pump. I commenced planning on the supposition of a needless waste of power, by reason of back action on the pump. I drew a square to represent the heating chamber, and by the side of it a pump with a solid piston. If the cylinder be filled with cold air—the piston being at the top—and connection be made with the heater from the top and bottom of the cylinder, the pressure will be equalized, and the cold air will go into the heater by the weight of the piston. On again raising the piston (valves being properly reversed), the hot air which, on its descent, filled the cylinder above the piston, will be exhausted, and cold air will come in from below. The application of this plan for feeding steam boilers at once occurred to me, and I believed I was blessed with a brilliant thought. But the brilliancy grew fainter and fainter as it was tested by mathematics; I abandoned it. It next occurred to me that if the fire box was inclosed in the heater, like a stove in a room, the air to feed the fire of course coming from the outside of the heater, and the smoke going away by itself in a proper pipe, the fire thus being surrounded, the greater part of the heat would be realized. This appeared some advance upon the ordinary practice of making the fire against only one side or end of the heater, and allowing the heat to be radiated and carried away in every other direction. But it was also evident that much heat would still go up the flue, and that if the products of combustion were mingled with the hot air, all the heat would be utilized. But there are two serious practical objections to such use of the products, viz: the excessive heat and the ashes cannot be used in a cylinder. These are the difficulties to be overcome. I was at first tolerably satisfied with plans for interposing reservoirs of water, oil, mercury or air between the hot air and ashes and the cylinder; so well satisfied that I built a model illustrating the idea. But there are sound objections to the plan, although it overcomes the difficulties for which it was made. If there were no valves or rubbing parts in the engine, the ashes would do no harm; and it happens that we have such a form. I allude to the Barker mill or Avery engine. This engine was once in extensive use for steam, and mathematics show that it develops 75 per cent of power—in fact, about as much as the cylinder engine working at full stroke. But the difficulty of excessive heat is not overcome. If hot air be made to pass in contact with water by a coiled pipe, jet of water, &c., the air will be instantly cooled, and steam will take the place of the condensed air, keeping up the tension in good degree.

Mr. Babcock—And you will have a steam engine.

Mr. Seely—Call it a steam engine, if you please, but it will be an engine having many of the advantages of the air engine without the dangers of steam. I have built a model of an engine on the Barker mill principle, and consider nothing further is to be done than to show the exact practical value of the plan. I have confidence in it only where the first cost and simplicity are concerned. I come now to a part of the subject where I think there will be less doubt. Ashes are the necessary product of the burning of our ordinary fuel, wood and coal, and I have almost abandoned all hope of using the products of combustion of either for a cylinder engine. But, fortunately, there is a large class of substances which burn and leave no ashes. The products of their perfect combustion are carbonic acid and steam. I allude particularly to coal oils and other hydro-carbons. They can be burned perfectly and without difficulty in a constant flame in a close heater. I have studied their use in this way, on theory and by experiment, and it is my earnest faith that, in this direction, I am far in advance of others, and that I have made a valuable invention. I will endeavor, at the next meeting, to bring to the club a working model. [Mr. Seely illustrated his remarks by drawings on the blackboard.]

Mr. Babcock—The plan of using the products of combustion direct in the engine for producing power is not new, and I do not understand the gentleman to claim it. The earliest instance I now recollect is shown in "Arnot's Elements of Physics." Sir Geo. Caylie, in England, experimented some time previous to 1846 in the same line, but did not succeed, owing to the destruction of his cylinders by the ashes, &c. But a few years since we witnessed an extensive experiment by Captain Bennett, who spent $50,000 in building a locomotive to be propelled by the products of combustion. The engine was a failure from the same cause, and was sold and altered into a steam locomotive. At the present time, Mr. Whipple, of Boston, is experimenting on a similar engine, which runs finely for a few minutes, but, so far, the inventor is unable to run it for any length of time, owing to the excessive heat developed. If such engines are made finally to work successfully, it must be by using a fuel which produces no solid products of combustion, and Mr. Seely deserves credit for his researches in that direction. Mr. Seely doubts the practicability of raising the air in an ordinary engine by connection to over 300°. To prove the contrary, I will state some experiments. In the Wilcox engine (one of which may be seen in the basement of the Cooper Institute), the air is found to leave the engine at 300°. Previous to exhausting, the air passes through an "economizer," similar to the "regenerator" of Stirling and Ericsson. Now, if the economizer removes any heat from the air, it must have been above 300° within the engine. To prove that it does remove considerable heat from the air, the valve motion may be discontinued and the valve so set that no fresh air can be taken in, the same air being alternately changed above and below the changing piston, passing through the economizer at each change. In this condition, it is found that the engine will run itself for half an hour or more, the power being attained solely by the difference in temperature of the air caused by passing through the economizer.

Mr. Koch—I have seen that experiment. The engine ran 40 minutes by my watch before stopping.

Mr. Babcock—Thus, it will be seen that the economizer *does* remove a considerable proportion of heat from the air discharged, and, as a consequence, the air must be much above 300° in the engine. But I do not look to the employment of the products of combustion within the cylinder for an advance in air engineering. While air is taken in and exhausted at each stroke of the engine, we must be contented with small powers; but for small powers, that plan answers a very good purpose. The engines of the caloric ship *Ericsson* proved the impracticability of that plan for large powers. But by using air at a high pressure, and using the same air over and over again, so as to avoid the necessity for compressing it at each stroke, engines of considerable power may be built within reasonable compass. Robert Stirling patented an engine of that character in Great Britain in 1827, and again in 1840; and afterward built one of 12 inches diameter, 2 feet stroke, for the Dundee Foundry Company, which was proved capable of lifting 700,000 lbs. one foot high per minute. This was afterward removed, and one of 16 inches diameter and 4 feet stroke, making 28 revolutions per minute, put in its place. This engine was tested to the capacity of raising 1,500,000 foot pounds, and ran 12 hours at the average of 1,250,000 foot pounds with 1,000 lbs. of coal, or about 2½ lbs. per hour per horse power. These facts were brought out in a discussion before the Institution of Civil Engineers in London in 1846. This engine had then been running for two and a half years.

The President—Can you inform us why its use was discontinued?

Mr. Babcock—Another engine was placed in a linen factory in Scotland, and about 1851 Mr. A. S. Lyman, of this city, wrote to the proprietors of that factory, making inquiries about it. They answered that the engine drove their works to their satisfaction for some years, when the heater cracked. Mr Stirling was dead, and as they could find no mechanic who was willing to repair it, they were obliged to throw it out and substitute a steam engine. If these statements are true (and there is no reason to disbelieve them), then the capability of the high-pressure plan is already demonstrated. In our own country an engine is now being built upon this principle, to be 12 inches diameter and 12 inch stroke (double acting), which promises to prove superior to Stirling's, as it combines several points which are improvements thereon. This will, if successful, supply the demand for powers of 10-horse and over; for smaller powers, the well-known engines of Ericsson, or the still later ones of Wilcox—receiving the air at atmospheric pressure—are, perhaps, all that is required.

Mr. Garvey—Sixteen years ago, in London, I examined the project of using the products of combustion in an engine, and gave it up.

Mr. Seely—It was given up by all men fifty years ago.

Mr. Dibben—Mr. Babcock's statements with reference to Stirling's engines vary materially from reports which are elsewhere made. To Mr. Ericsson is due almost all the credit that is attached to the caloric engine—he has kept it before us against the greatest discouragements for a quarter of a century; he has tried all plans, and has constantly made improvements. The caloric engine has its place for utility, and engineers generally concede its claims. The great objection to it is the friction—seldom less than 50 per cent. If the heater burns out or melts, $35 will renew it; but $35 will buy seven tuns of coal. Air is safe; a little boiler may blow up a large house, while a heater can only melt.

Mr. Churchill spoke of Sieman's superheater engine, which was furnished with a regenerator, and otherwise had many of the advantages of the caloric engine.

Mr. Seely remarked that he had taken great pains to learn what has been done toward the use of products of combustion for motors, and had omitted to give credit to others for want of time. There are hundreds of plans described, but which were all failures. What he had added was little, but, he believed, was just the difference between failure and success. He had taken the proper steps to settle any questions of priority of invention, should they arise.

The association then adjourned.

The directors of two gas companies in London—the South Metropolitan and Phœnix—have reduced the price of gas 8 cents per 1,000 feet.

GLUTINE – IMPORTANT MANUFACTURE

Everything which is usually wasted or thrown away as refuse, when saved and converted into something useful, is like a new creation. The conversion of the waste rags picked up in our streets into beautiful white paper is a benefit to society similar in kind to the improvement in agriculture by which two blades of grass are made to spring up where only one had grown before. To such a topic we briefly invite attention, and will point to a specific object.

There are some hundreds of factories scattered throughout the United States in which the manufacture of starch from wheat is carried on to a very large extent. Wheat contains other substances besides starch, but these are allowed to flow away as refuse, except a small quantity that is used as swill for feeding animals. One very useful substance in this refuse is called "glutine." It is manufactured in France, and is much used for fixing the colors on calicoes, paper hangings, and as a varnish. It is also employed as a substitute for glue, and, when mixed with various other substances, it is used for manufacturing artificial horn, shells, pearls and porcelain. On the whole, it is a most valuable substance; bnt the common way of obtaining it in France is by the expensive process of washing farinaceous substances with hot alcohol. We do not think that its manufacture in this manner could be carried on profitably in America, but it appears to us that the *waste slimes* in our starch manufactories present an inviting field for experiment. Gluten can be precipitated from acidulous starch slimes with an alkali, and from alkaline slimes with weak acids. Thousands of tuns of it are annually suffered to run down into our rivers and creeks, and if some economical process were discovered whereby it could be recovered and saved, it would certainly be a most valuable acquisition to the productive capacities of our country.

A Popular Fallacy in Regard to the Steam Engine.—It is stated in many standard works that there is a waste or loss of power in overcoming the resistance which the water encounters as it is forced into the boiler against the pressure of the steam, and this is a very common notion in the community. It requires, however, but a moment's reflection to discover its fallacy. If the passages are open from the boiler to the cylinder, the pressure is transferred directly to the working piston, where it performs just as much work as was expended in overcoming the resistance of the steam to the entrance of the water. If the passages are closed the pressure in the boiler is increased without the consumption of heat, and in either case, all the power expended is that consumed by the friction of the feed pump and its connections.

The Cultivation of Ireland.—The proportion of waste land in any country would probably surprise the most intelligent of its inhabitants if the quantity were actually measured. For instance, the returns of the Registrar General of Ireland, for 1860, show that less than one-third of that green isle is under cultivation. The area of Ireland is 31,874 square miles, which is equal to 20,469,360 acres, and there were under crops this year 5,967,970 acres. Of this area, 2,637,557 acres are devoted to cereal crops: 1,607,483 to green crops; 1,594,486 to meadow and clover; and 128,444 to flax. Maine contains 32,854 square miles, New York 47,000

Workers in metal are finding good use for a new kind of bronze, made by melting together 10 parts of aluminum with 90 of copper. It is described as being tenacious as steel, and well adapted for the bearings of machinery. A polisher, who used it for bearings in his lathe, which made 2,000 revolutions a minute, found it last six times longer than bearings made of other kinds of metal. It is good also for pistol barrels, and is to be tried for rifles and cannon.

An excellent furniture polish is made with one pint of linseed oil and about half a gill of alcohol, stirred well together and applied to the furniture with a linen rag. After this, it is rubbed dry with a soft cotton cloth and finished by rubbing with an old piece of silk, when, after several weeks' labor, a most beautiful gloss on the furniture will be the result

AMERICAN RAILROAD BUILDERS IN BRAZIL.

We learn from a correspondent of the Philadelphia *Ledger* that the Don Pedro Railroad is progressing favorably in the hands of the active American engineer engaged in its construction. The emperor, who is a friend to progress in the arts and sciences, has recently visited the road attended by a party who rode through one of the tunnels, and the Emperor descended several shafts, being determined to inspect closely this gigantic undertaking about which so much had been said and written. On descending the main shaft of the grand tunnel, Major Ellison was selected to sit opposite his majesty, as being near his size and weight. The ministers present endeavored to persuade him from the attempt, but as he was satisfied with the security of the arrangements, he determined to gratify his curiosity and set them an example. Since his Majesty's visit to the road all opposition to the tunnelling has ceased, and the contractors will be allowed an extension of time, on account of the hardness of the granite and the abundant flow of water in the shafts.

The third section has been surveyed, and proposals have been issued. Some of the contractors will give in proposals, and it is supposed that the work will commence soon, so that it may be finished at the same time with the grand tunnel, when the route will be opened from the Rio to the Parahiba river. The arching of the small tunnels with brick is about to commence, and the grading is nearly ready for the rails for some distance beyond Balem.

French Mustard.—One of the most relishing condiments which has ever been invented is that now known as French mustard. It is equally good with fish, flesh, or fowl, and wonderfully helps bachelors' bread and cheese (Betty says they don't deserve anything better) to go down savorily. The following recipe is an excellent way to make it, and plain table-salt may be used in place of the anchovies, where there is any difficulty in procuring them. Take one pound of flower of mustard, a quarter of an ounce each of the following plants in a green state, and quite fresh; parsley, tarragon, chervil, and celery, together with one or two eschalots, or garlic, and half-a-dozen pickled anchovies. Mince all these latter very fine, then rub them with the mustard. Next mix one ounce of honey. one ounce of salt, and a wineglassful of vinegar, in half a pint of water, more or less, as you wish the consistence of the mixed mustard to be, then put the mixture into small pots, with a teaspoonful of vinegar on the top. cork well down, and as its flavor improves by age, it may be kept a month or six weeks before it is brought to table. No less than five tuns of mustard so prepared are imported every year from France into England, and a large amount is annually imported and consumed in this city. Why not make it at home?

Among the recent applications of electro-metallurgy we may instance the happy idea of Mr. Gaudin in employing it in setting jewels. This is a very delicate and expensive branch of jewelry, and so difficult that the setting of a jewel can seldom be fully relied upon. The inventor first takes a mold in wax of the ornament that is to receive the jewels, then places on it, at the proper points, the jewels, embedded in the wax to a sufficient depth; the wax model, rendered a conductor of electricity, is placed in the gold solution. and the metal deposited upon it. When the deposit is completed, the jewel is found firmly enchased in the metal, from which, if the process has been properly conducted, it will be impossible for the jewel to escape. The saving of time effected by this process is also very considerable By the ordinary process a jeweler can scarcely set 60 jewels in a day. but by the new process as many as 1,500 to 2,000.

Dr. Christopher Girtanner, an eminent professor of Gottengen, has prophesied, in a memoir of Azote, that in the 20th century, the transmutation of metals will be generally known and practised. Every chemist and every artist will make gold; kitchen utensils will be of silver, and even gold, which will contribute more than anything else to prolong life, poisoned at present by the oxyds of copper, lead, and iron, which we daily swallow with our food. The doctor may properly be called the Golden Prophet.

Rubber and Steel Springs.—It is probable that rubber will be soon abandoned altogether as a material for railroad springs. Unless a very large quantity be used it does not have sufficient range of action, and it becomes hard also by use. Most of the rubber now made will become soft in very hot weather, and will freeze in cold weather. Some of the Southern roads, as the Pensacola and Georgia, the Savannah, Albany and Gulf, and the South Side Railroads, are substituting steel springs in place of rubber and a similar change is being made on the Long Island Railroad.

Cast Steel.—The French mechanical papers have been largely occupied for a year or more with discussing improvements in the process of manufacturing cast steel, from which we infer that this manufacture is extending in France. Is not the manufacture of this great staple the fairest field of enterprise now open for American capitalists? We have been told by one of the firm of Naylor & Co. that the United States was the principal market for their steel, and that the Americans understood working cast steel better than any other people. Why can we not make it?

Explosions.—We have noticed with great regret that quite a number of steam boilers in factories have exploded this year. On the 24th inst., two exploded in Massachusetts, namely, one employed for heating the Suffolk mill, Lowell, by which Walter Briggs, assistant-engineer, was killed; and the other at Lee, in Platner & Smith's new paper mill, by which one man was also killed. In both cases, the injury to property was considerable. We have no doubt that the frequency of explosions in factories is caused by the growing tendency to use very high pressure steam.

At the royal mint in London is a small hand-press constructed in Paris expressly for coining silver Maundy pennies, which are given away, according to immemorial custom by the monarchs of England, to certain pensioners on Maundy Thursday every year. Maundy Thursday is the Thursday before Easter, so called from the French *mande;* it being the custom on that day to give a largess or bounty to certain poor men, whose feet the king formerly washed, as a mark of humility, and in obedience to the command of Christ. The dye-presses of the mint are operated by atmospheric pressure. The air is exhausted from the lower ends of cylinders by means of steam engines, and the presses are worked by the weight of the atmosphere on the upper sides of the pistons.

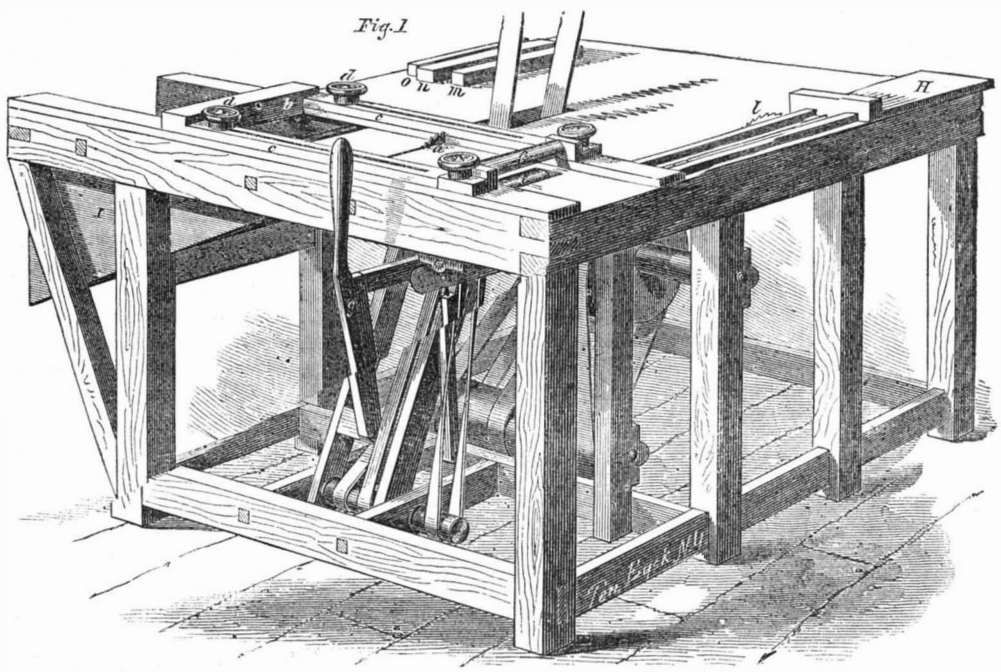
There is now before the Academy of Sciences, at Paris, "a wonderful invention" of Mons. Helvetius Otto, of Leipsic, by which he promises to "insure fine weather." He erects a platform at a considerable hight in the air, on which he places a "propeller," or huge bellows, worked by steam. With these bellows, which are "very powerful," he blows away the clouds as they gather; and, as rain comes from the clouds, it must necessarily follow that where clouds are not allowed to gather there can be no rain. He maintains that if a certain number of his rain propellers, or "pluvifuges," as he has named them, are placed at intervals over the city, he can provide for the inhabitants a continuance of fine weather, and a certain protection from sudden showers and muddy streets, so long the terror of fair pedestrians.

Heavy Rifle Contract.—We see it stated that Sharp's Rifle Company, of Hartford, Conn., has entered into a contract with a foreign government to furnish $200,000 worth of arms, with the proviso that the order may be extended to $1,000,000, on giving the company sixty days' notice before the completion of the first lot. The same government had also contracted with the company for several thousand dollars worth of the latest and best gun-making machines.

Poison Bottles.—The *Lancet*, in referring to several recent cases of accidental poisoning, strongly recommends the adoption of bottles with contracted necks for all liquid poisons. From these the contents can only be poured by drops—*guttatim et gradatim*—by which means it would become apparent to any person using them that caution was necessary in the use of the contents.

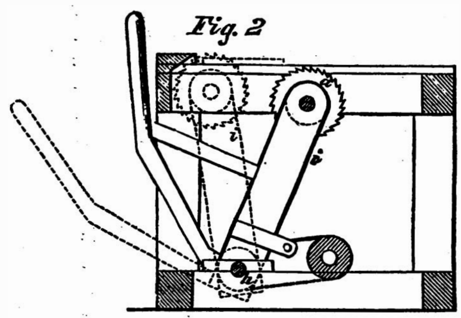
IMPROVED BOX-MAKING MACHINERY.

In a recent number we gave an account of the amount of the annual sales of some of the leading dry goods houses in this city, from which it appears that Claflin, Mellin & Co. sell about eleven millions of dollars worth, A. T. Stewart & Co. eight millions, Lord & Taylor six millions, and Arnold, Constable & Co. four millions and a-half each year. Besides these, there are hundreds of jobbers engaged in selling dry goods by the package to dealers. And as a large portion of these fabrics are encased in wooden boxes for distribution over the country, the manufacture of boxes has become a very extensive industry, involving a large amount of capital and labor, and the saving of any considerable portion of this labor is a matter of great importance. We have described several machines designed to facilitate the making of packing boxes, and we here illustrate one more recently invented, which performs all the operations of cutting the boards to the proper lengths and widths, and tonguing and grooving the edges all ready to be nailed together. Though the machine performs all the operations, and is very easily adjusted to boards of different dimensions, it is exceedingly simple in its construction.



DRAKE'S IMPROVED BOX-MAKING MACHINERY.

The boards are first cut to the desired lengths by



means of the circular saw, *a*, Figs. 1 and 2. The gage head, *b*, Fig. 1, which is fastened to the slotted slides, *c c*, is placed at a distance from the saw corresponding with the desired length of the boards, and secured in position by the set screws, *d d*. The end of the board is then entered between the rollers, *e* and *f*, the roller, *e*, being turned by machinery, and feeding the board in till its end comes against the gage head, *b*. The operator now seizes the handle of the lever, *g*, Figs. 1 and 2, and draws it forward, thus carrying the circular saw, *a*, through the board and cutting it off. The mode in which the saw, *a*, is belted, so as to permit this oscillating motion while it is rapidly rotating, is clearly shown in Fig. 2. The bearings of the pulley, *h*, for the belt, *i*, which drives the saw, are placed in the fulcrum on which the saw oscillates in its motion back and forth through the board. The driving roller, *e*, also has a vibrating motion, and the first operation of the lever, *g*, forward is to carry down the feed roller, *e*, away from the board, so that the latter may not be pressed inward while it is being cut. As the boards are sawed off they fall down the inclined chute, J, out of the way.

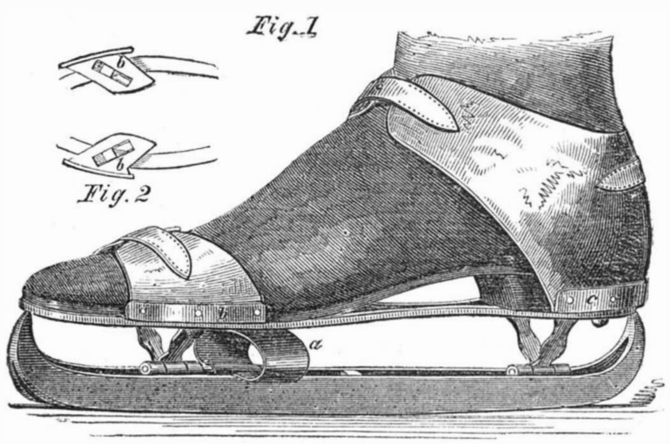
The next operation is to cut the boards to the proper width. To this end they are laid upon the sliding carriage, K, with the near edge corresponding with such line on the carriage as may give them the desired width, when the carriage is pushed along past the circular saw, *l*, which cuts the boards as desired. The tongues and grooves are made in the edges by passing the boards, on edge, between the guides, *m* and *n*, and the guides, *n* and *o*, revolving cutters of the ordinary construction, one for forming the tongue and the other for the groove, being arranged to run between the guides. This operation finishes the boards ready to be nailed together into boxes.

This machine is not adapted merely for making boxes, but the cut-off part would be very useful for cabinet makers, door, sash and blind makers, and joiners and carpenters, for cutting up long lumber into short pieces. And, by dispensing with the small roller over the feed roller (and inserting a few short iron points in the feed roller to catch into the timber), it would be useful in shingle mills to cut up the bolts, and in saw mills to cut up slabs for lath.

The patent for this machine was granted, through the Scientific American Patent Agency, on July 3, 1860, and further information in relation to it may be obtained by addressing the inventor, Timothy Drake, at Windsor, Conn., or S. A. Heath & Co., No. 102 William-street, New York.

FOGG'S IMPROVED SKATE.

Of the numerous improvements in skates suggested



FOGG'S IMPROVED SKATE.

by the fashionable and truly delightful exercise of skating, which has been the rage for two or three winters past in this city, and which will doubtless be on the increase for years to come, there is none more novel than the one here illustrated.

This skate has two parallel runners, from one-half to three-fourths of an inch apart, firmly connected together and joined by a hinge to the wood, in the manner plainly shown in the cut, Fig. 1. This hinge allows the wood, and with it the foot of the wearer, to turn down sideways, while the runners preserve their parallel position on the ice, thus very materially relieving the ankle from that strain which is the most fatiguing part of the exercise. A stiff spring, *a*, is firmly secured at the middle to the bottom of the wood and has its ends bent down between the runners, pressing against their inner sides, and preserving the wood in a horizontal position except when the power of the spring is overcome.

The mode of fastening this skate to the foot is remarkably simple, convenient, and effectual. Two plates, *b b*, Fig. 2, are secured to the toe of the skate, by bolts passing through inclined slits in the plates, so that the plates may be adjusted both to the length and to the width of the foot of the wearer. Similar plates, adjustable in the same manner, are attached to the heel of the skate, and when all these plates have been fitted to the size of the foot, they are screwed fast and will remain firmly fixed in their position. The plates have raised lips at their edges, which, with the straps and buckles, not only hold the skate in the most effectual manner to the foot, but permit it to be put on and taken off with the utmost possible facility.

Besides the extraordinary case to the ankle of the wearer, this skate runs with unusual smoothness on the ice, and is considered a decided improvement on all the styles hitherto invented.

The patent for this invention was granted on the 4th of September, 1860; and further information in relation to it may be obtained by addressing the inventor, Luther Fogg, at Boston, Mass.

HYDRAULIC ASSOCIATION–WATER WHEEL EXPERIMENTS.

We have received a communication from Messrs. Bastion & Overton, of Watertown, N. Y., complaining—as has been done by many others—of the treatment which they received from those who had charge of the water wheel experiments at Philadelphia. They intended to compete in the experiments, but were prevented from doing so by answers which they received from Philadelphia to certain letters of inquiry. They believe that these experiments were not fair tests of the power of the wheels, and they propose the organization of a Hydraulic Engineers' Association, for the purpose of testing wheels upon the most approved principles and in an impartial manner. A committee of millwrights and engineers is suggested to be appointed as a board to test wheels, and publish the results of their experiments without expressing opinions as to which wheel is best. It is also proposed that this board shall be kept ignorant of the names of the owners of wheels under test, so that the whole proceedings may be conducted without collusion.

These are a few of the suggestions made by our correspondents for regulating the actions of such an association, and if it be formed, other necessary rules may be added. The proposition for the organization of such an association, we think, is to be commended. At present, owing to the great number of wheels now manufactured, and the variety and contrariety of opinions respecting their merits, it is scarcely possible to give advice to manufacturers who are desirous of purchasing and erecting new wheels. From one place we receive news that an overshot wheel has been superseded by a turbine; from another that a turbine has been replaced by an overshot. We hope that Messrs. Bastion & Overton will receive a hearty response to their propositions.

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VOL. III., No. 20....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, NOVEMBER 10, 1860.

THE MANUFACTURE OF STEEL.

WE feel no hesitation in attributing the great advance made in the mechanical arts, in modern times, to improvements in the manufacture of iron and steel. All our important tools are made of steel, and these are the very life-springs of the industrial arts. It is only by tools of hard steel that the mines are bored and wrought from which we obtain our fuel and other metals. Our chisels, saws, and other tools by which all machines are fabricated, are composed of steel. We are so dependent upon this useful metal that, were a knowledge of its manufacture to be suddenly lost, most of the use ful arts would soon fall back into barbaric rudeness. It is asserted as a historical fact that the ancients were acquainted with a method of tempering bronze, whereby they made tools as hard as those of steel; but we can only speak of that which we possess, not of that which is to us unknown. Of the usefulness of steel, and our dependence upon it, we have full and accurate knowledge; it is the grand agent which is employed in the fabrication of all kinds of machinery.

It would naturally be inferred that, with the vast extent of American manufactures and the illimitable number of machines which are annually constructed in our country, the manufacture of steel would also be carried on very extensively among us. Such, however, is not the fact; for—with the exception of some of the coarser qualities of steel that are made in several places in Pennsylvania, and the single establishment at Port Richmond, Staten Island, for making fine steel, and one at Troy, N. Y.—we import all that is used in this country. This should not be so, as we have the materials for making it stored up in endless profusion throughout the length and breadth of the land.

We have on several occasions directed public attention to the importance of manufacturing American steel, and a very peculiar opportunity is again presented for doing this. In decarbonizing pig iron in the puddling furnace, there is a point in the process when the whole metal in the furnace is actually steel; and if the deoxydation be arrested at this stage, steel is obtained as cheaply as wrought iron. The whole of this remarkable process is fully explained on another page, in the account we have given of Rieppe's invention, in the law case, relating to the manufacture of puddled steel. With such information, steel may be made from good qualities of pig iron in any puddling furnace; and surely our "iron men" will not be slow in adopting the system.

This kind of steel is not equal in quality to good cast steel; still it is a very valuable product, and it is now made by a number of the leading steel makers in Eng land. So far as we know, there is only one establishment in the United States where the process of making puddled steel is carried on, viz.: Corning, Winslow & Co., near Troy, N. Y., where we have witnessed the operations and examined some of their excellent specimens.

The advantages of employing steel in place of iron are very obvious, because its cohesive strength is about double. By using it, we can greatly reduce the size and weight of many machines, and make them equally as strong, and run them at a higher velocity. Thus, if we take a power loom and reduce its weight about a fourth, it can be run at nearly one-fourth higher velocity, and thus about twenty-five per cent more goods may be woven by it in the same period.

Here is a hopeful subject for reducing the long hours of factory labor, and enabling the operatives to enjoy more time for recreation—mental and physical. This puddled steel may not be suitable for many purposes, as a substitute for cast iron; but as it is now made on an extensive scale in England—and may be in America—it is certainly a subject which should awaken general attention. And in addition to this, we assert that the field is also very inviting for conducting experiments to make steel in one continued process direct from the ore, instead of the round-about methods of puddling and cementation.

NEW ORDER OF THINGS AT THE PATENT OFFICE.

In our last number we published a letter from a Washington correspondent, touching the recent action of the Commissioner of Patents in creating a Board of Revision in the Patent Office. The suggestion thrown out by our correspondent, that the business of the Office would be thereby largely diminished, is likely to be verified to the fullest extent; and we feel confident that the retrograding tendency of the Office towards the illiberal policy which was swept out of its doors several years ago, will not only decrease the number of applications, and consequently the revenue of the Office, but will render the Office itself odious to the great body of our people, and especially to inventors.

The questions may be pertinently asked, why this new movement on the part of the Commissioner? What purpose has this officer to serve in appointing one set of Examiners to watch over the acts of another? Has the examination of the claims of applicants become so rickety and careless as to call for the creation of a board of surveillance and confirmation? The statement of a single fact may help us to explain this sudden and extraordinary movement Not many months ago, two inventors quarreled about their respective rights to an invention, and the attorney, failing in his endeavors to reconcile the contestants, pointed out to them the only available remedy, viz.: the application for a patent by both parties, and the settlement of the question of priority of invention before the Patent Office by submitting testimony under its rules. The Examiner having charge of the cases, by an oversight, doubtless, allowed a patent to issue to each of these parties for the same invention. A sharp-sighted editor, over in New Jersey, discovering this fact, with singular infelicity of temper, charged the Patent Office with being *drunk*, which we have every reason to believe was not true. When the Commissioner's attention was brought to this hydra-headed issue, he was naturally solicitous about it, and felt, no doubt, that the integrity of the Office was in some degree affected by it. A worse calamity than this, however, could have overtaken the Office, such as being struck by lightning or swallowed up by an earthquake. Or it would be worse even to deny one single applicant the grant of a patent for an invention to which he is justly entitled. This has been done time and again, and often for such palpably absurd reasons, that one might almost charge the Office with the dual affliction of drunkenness and insanity.

We may be wrong in selecting our starting point, but, if we mistake not, the oversight here referred to led to the establishment, by the Commissioner, of this patent police arrangement.

Such a mistake as the one referred to is a rare occurrence in the Patent Office, and is not very likely to be repeated; it seems to us, therefore, unnecessary and unwise, however laudable the intentions of the Commissioner, to shackle the business of the Office, and its applicants, with such new-fangled schemes and checks.

Commissioner Holt, in his annual report to Congress, January, 1858, in referring to the progressive increase in the number of patents issued from year to year, gave utterance to sentiments which found a response in the heart of every American inventor He says:—"This result is due alike to the inherent and irrepressible energy of the national mind, and to the admirable system by which it is excited and fostered. That system, while it wisely avoids the laxity of European laws, as decidedly, on the other hand, eschews that stern, unsympathising, distrusting temper, which would receive the inventor as a stranger beneath the roof of the Patent Office. That better policy, which adopts the happy medium between these two equally pernicious extremes, and which, while welcoming the inventor as a friend and patron, in that frank and free conference with him enjoined by law, kindly and anxiously sifts from his invention its minutest patentable features, is a policy essentially American in its aims, and must be inflexibly maintained in the administration of this Office so long as it remains faithful to the high mission with which it is charged." Noble language and noble sentiments, worthy the head and heart of their author!

Any departure from the principles so happily ennunciated by the late Commissioner Holt, will not only work mischief to the Patent Office, but will serve to crush out the energies of the inventor.

We believe that Commissioner Thomas desires to discharge the duties of his office with fidelity. We believe he desires to do only that which will promote the best interests of the Patent Office, and those who seek its fostering protection and encouragement, and that he would regret to leave it in a less prosperous condition than he found it. We cannot, however, shut our eyes to the fact that, in making changes and filling appointments, he has selected those who will give shape to his policy from among the number who have never been accused, so far as we know, of pursuing that essentially American policy which welcomes the inventor, and kindly and anxiously sifts from his invention its minutest patentable details.

Some of the older Examiners, who are now, by virtue of their positions, exercising a most potential influence over the affairs of the Office, are stoics to the policy so eloquently enforced by Commissioner Holt.

In confirmation of what we have said about the effect of this new and singular experiment of the Commissioner, the official list of claims published in our paper this week will show its first fruits. It will be observed that the number of patents which usually averages nearly one hundred per week, is reduced, at one *stroke*, to thirty. So much for the *revisionary* experiment. At this ratio it will not be long before the doors of the Patent Office will be plastered over with these significant words, "TO LET; inquire of the Secretary of the Interior, office on F-street, round the corner."

WATER GAS.

A fierce dispute is raging in the city of Philadelphia in regard to water gas, and in order to ascertain the merits of the case, the proprietors of this journal determined to send a commission to Philadelphia to examine the matter. We selected Charles A. Seely, a gentleman whose scientific acquirements and whose knowledge of the subject gave us confidence in his ability to conduct the inquiry. His report will be found on another page; and while the bearing of his statements will be readily understood by chemists and gas makers, perhaps the following facts will render them intelligible to a wider circle of our readers.

Gas can be made from rosin as well as from coal, and under many circumstances it is more economical. The St. Nicholas Hotel, in this city, is lighted by rosin gas made on the premises, at an expense of about $1 50 per thousand feet, while the gas companies charge $2 50 per thousand feet, and the rosin gas is better than the city gas. In order, however, to burn rosin gas successfully it must be made in the neighborhood where it is burned, as it is loaded with inflammable substances which add much to the light, but which are deposited if the gas is carried through long pipes laid in the ground. The hotter the gas is when it reaches the burners, the more of these inflammable substances will it contain.

Now, Sanders' process, about which the discussion is going on in Philadelphia, and by which it is said the Girard House is lighted, consists simply in throwing a jet of steam into the retort along with the rosin. His specification has been published in full in our paper (Vol. I., page 286, new series). It is claimed that, by this plan, five-fold more gas can be produced from the same rosin, without any considerable deterioration in the quality, and at a cost of 30 cents per thousand feet. If this is true, it is certainly one of the most valuable discoveries of the age, and one which it will give us pleasure to publish to the world. It will be seen that Mr. Seely comes to the conclusion that the statement is not correct, reciting in his report the leading facts on which this conclusion is founded. Our only desire is of get at the real facts of the case, and if there is any proof that gas can be made of such quality, at so low a rate, we shall be much gratified at an opportunity of laying it before our readers. It will be seen by Mr. Seely's report, that he thinks the matter might be determined in half an hour at any time, with the apparatus in use at the Girard House, by simply turning a stop-cock and observing the gasometer and the burner.

PATENT OFFICE DECISIONS.

We have for several weeks intended to notice some of the recent decisions of the Patent Office which we deem of special importance and interest to our readers. We now propose to commence the execution of that design by a review of the case of H. Muller, for a patent for sewing machine shuttles.

The application was rejected by the Examiner, merely on a reference to "a spindle stop, as built by Rodgers, "Ketchum & Grosvenor, of Paterson, N. J., in the year "1838, and before then." The case was then carried before the Board of Appeals, who recommended "that "a patent be allowed unless a specific reference can "be pointed out by the Examiner, in which the device is "to be found in the same or an analogous use."

The Examiner then entered a formal protest against the issue of a patent under such circumstances, for the reason that "a rule requiring more precision than now "used would prevent the exercise of the knowledge of the "Office though familiarly remembered in the conduct of "examinations, unless that knowledge was absolutely "precise as to every particular that could enter into the "state of the arts to which the application related." To this protest the Board of Appeals made a very able and conclusive reply, and the Commissioner, after full deliberation, adopted their view of the matter, and ordered the patent to issue, which was accordingly done.

This construction of the act of 1836 is so clearly correct that we wonder how it could have been doubted by any intelligent and impartial Examiner. Whenever an application is rejected the law requires the Office to give the applicant "briefly such information and references as may be useful in judging of the propriety of renewing his application, or of altering his specification to embrace only that part of the invention or discovery which is new" It is not sufficient for the Office to say to the applicant *ex cathedra*, "Your contrivance is not new." If the Examiner knows the fact, the grounds of that knowledge can be given by him, so that the applicant can test the correctness of the opinion of the Office for himself. Peradventure the Examiner may have made a mistake; and if such is not the case, there may be shades of difference between the old contrivance and the new which may serve as the foundation for a valuable patent. And if even this is not the case, the feverish anxiety of an inventor may justly claim a liberal construction of that law which not only protects his substantial interests, but even respects those which are often only imaginary. When, therefore, an application is made for a patent, it is a safe and just rule always to allow it to issue, unless some specific reference can be given showing the same thing to have been previously in existence.

We do not say that the Office cannot properly reject an application in any case without a specific reference. If an applicant were to ask a patent for a contrivance substantially the same as any well-known article which is in general use, it would be sufficient for the Examiner to state the fact, and reject the application accordingly, without further reference.

But if the rejection is made on the ground that the same article exists or has existed in one single instance, or in a limited number of places, a specific reference should be given, and an opportunity allowed to test the correctness of the opinion of the Examiner or the accuracy of his recollection. It is not enough for the Examiner to state that he has known a contrivance of the same kind before, or that he once saw it in a particular place, provided it is no longer to be found there. If it is in common use, it is enough to say so, and the applicant may deny the fact, if he believes it untrue. But how can he deny the fact that the same thing was once seen twenty years since at a particular place; or how can he test the correctness of the reference or amend his specification and claims so as to avoid what is old, and embrace only what is new, which the law intends he shall have the right to do.

The distinction above stated is not capricious. A similar distinction is recognised among the established rules of law. To discredit the testimony of a witness by showing his general bad reputation for truth and veracity, is always permitted, but it is not permissible to show any specific instance of falsehood on his part. The purpose is different in the two cases, but the principle is analogous. Each allows of a general reference to facts of public notoriety and rejects (in the one case absolutely and in the other conditionally) proof of, or reference to, specific facts.

The recent decision of his Honor, Judge Morsell, in the case of Fassmair, is in harmony with these views. It was held in that case that it was competent for the Examiners to reject an application on the ground "that "it is within their own knowledge that the device in "literal or exact formation throughout, is a very com-"mon one in a great variety of analogous uses." Doubtless, if the applicant had denied the fact, and called for more definite information, it would have been given him; but we see no objection to a rejection in the first instance for such a reason. It refers to a contrivance then existing *in common use*, and does not therefore militate in any degree against the rule above laid down.

The reason for requiring a specific reference to some existing contrivance of substantially the same character is well set forth in the argument of the Board of Appeals.

After a full statement of the case they proceed as follows:—

1. Granting that the memory of the Examiner is infallible as to the device remembered, is a reference to a firm having existence "in the year 1838, and before then," at Paterson, New Jersey, such precise information as may *be useful* to the applicant *in judging* of the propriety of renewing his application?

2. May not the Examiner be mistaken? The Report (No. 2599) says, the Examiner verbally admits that this firm no longer exists. If the firm no longer exists, then what becomes of the reference? Paterson contained in 1844, fifteen thousand inhabitants; now, perhaps, there may be near twenty thousand. Is it incumbent upon Mr. Muller to grope his way through a city of that population in the uncertain endeavor to find a device which the Examiner only "remembers" to have seen "in the year 1838, and before then," in the manufactory of a defunct firm? The maxim of the law is, that a man shall not be required to do a vain thing; but here Mr. Muller is required to hunt up a firm which has no existence, and which, by the terms of the instructions to make a search, leaves him in doubt whether it has existed for the last twenty years; or else take the assertion of the Examiner as conclusive. What we mean to say is, that such a reference is vague, uncertain, not specific. It does not, we submit with all due deference, accord with the spirit of that law which requires certainty and tangibility to be a characteristic of its reasons for the refusal of a patent. An applicant has a right to know *where* the thing is which the Office says anticipates his invention, and the means by which he may with *certainty* arrive at a knowledge of its existence. He is not to be put upon an uncertain investigation, and required by vain efforts to find by searching for it, something which, if found, might only in the end be productive of no other or further result, than as furnishing an additional example of the treachery of human memory, or the fallibility of human judgment. It is quite enough that an applicant should be advised how he may without uncertain search inform himself of that, which, when found, too often proves an error of the Office.

* * * * * *

Your honor is told in the protest, that "a reference more specific than the one on which this application was refused by the Examiner," if required, "would lead to the necessity of granting a patent in all cases where a specific reference as understood" by your decision of the 25th ult. "could not be given." And so to remedy the fancied evil of an inability to tell the applicant how, when, and where, he was anticipated, the memory of the Office must suffice. That for your Honor to return an application for a more specific reference than shadowed forth by the recollection of a device "built" twenty-two years ago by a firm which the Examiner admits is no longer in existence, is invading the "sound approved practice" of this office, and introducing into its administration a "dangerous innovation!"

The Commissioner, in approving the views of the Board of Appeals, very justly remarks that, "in a reference like the present, existing solely in the knowledge or memory of the Examiner, the party would have no means of forming a judgment except by an examination of the machine or device referred to, and he is therefore entitled to be furnished with such information in regard to its whereabouts as will enable him to begin his search for it with a reasonable prospect of success." In other words, he should be told *not where it was, but where it is to be found;* for if it really was manufactured more than twenty years ago, and was then of sufficient importance to entitle it to the protection of a patent, the legal presumption is that it would now be in general use, and hence the means of access to it could, necessarily be readily pointed out by the Office. This view clearly corresponds with the decisions and practice of the Office as cited in the foregoing paper.

The decisions of the Office thus referred to abundantly show that the rule which has for many years been observed is in full accordance with the final decision in the present case; and yet it is a little remarkable that one of the most experienced, and, by some, thought the ablest of the Examiners, should pertinaciously insist upon the observance of a rule, which is not only in opposition to that uniform practice, but also to the plain principles of law and justice, as applied to such cases, and that he should even go beyond the beaten track of ordinary official practice for the purpose of defending and causing the adoption of his errors. The explanation is to be sought for in the fact, that some of the older Examiners were educated under the old *regime*, and like the Bourbons have never accommodated their notions to the new order of things. They seem to regard it as the business of the Office to prevent, if possible, the granting of a patent, and are ingenious, prompt and eager in devising the reasons for rejection. It is said that the most difficult part of learning is to unlearn our errors, and we feel satisfied that some of the Examiners in the Patent Office have not overcome that difficulty.

ILLUSTRATIONS OF THE PATENT OFFICE REPORTS.

We have received from Messrs. E. R. Jewett & Co., of Buffalo, N. Y., a set of their engravings of the illustrations to accompany the report of the Commissioner of Patents for 1859, which are neatly printed on one side of the paper by the engravers, in advance, and bound in two elegant volumes of 370 pages each. On comparing these engravings with those of former years, we are very much gratified to see so marked an improvement; and when contrasted with the first that were engraved in 1853, the difference is wonderful.

These illustrations increase the value of the Commissioner's report many fold. A person will get a better idea of a machine from a single glance at a good drawing of it, than he will from reading a very long description in words; indeed, in many cases a man might read whole volumes of letter press description and still have a very vague conception of the invention, when a brief inspection of an illustration would make it clear to him at once. We therefore trust that these engravings will continue to receive the increased attention from the Commissioner which their importance demands, and that they will never be allowed to fall in quality below the standard established by E. R. Jewett & Co.

BRADFIELD'S MODE OF HANGING VEHICLES.—On page 152 of the present volume of the SCIENTIFIC AMERICAN, we published an illustration of Bradfield's improved mode of hanging wagons, and last week we saw one of these carriages in the street. It will be remembered that there is no axletree passing across the carriage, the axle being simply a short spur secured to vertical slides on the side of the carriage, which rest upon spiral or other springs. It enables the carriage to be hung much lower than ordinary vehicles, thus making it more convenient for a great many purposes, such as plumbers' and express wagons, and far more safe against being overturned. The inventor also claims for it many advantages in constructing pleasure carriages, but we think it more specially adapted to the lighter truck uses, which renders it convenient to load from the storehouse or sidewalk.

BOILER EXPLOSIONS—FACTS WANTED.

MESSRS. EDITORS:—For the purpose of publishing some statistics in connection with steam boiler explosions, we wish to be informed of as many casualties of this character as we can obtain. What we wish to know particularly is, if the explosion took place at the time of starting the engine, and where said boiler was located. Can you aid us through the medium of the SCIENTIFIC AMERICAN? HOARD & WIGGIN.

Providence, R. I., Oct. 31, 1860.

REPORT ON THE WATER GAS.

[Prepared expressly for the Scientific American.]

MESSRS. MUNN & Co.—In accordance with your instructions to make a careful and impartial inquiry into the merits of Sanders' water gas, which was reported to be in successful operation at the Girard House, in Philadelphia, I went to that city suitably provided with letters of introduction to the proper parties from Dr. Sanders, the patentee of the water gas process.

I have collected whatever evidence seemed pertinent to the purpose of my commission. I present below, a brief account of what has transpired, together with the conclusions at which I have arrived, and the most important considerations upon which they are based.

THE VISIT TO PHILADELPHIA AND THE GAS WORKS.

I reached Philadelphia at 10 P. M., on Monday, Oct. 21st. On entering the Girard House, I had the good fortune to meet Abraham Hart, Esq., one of the directors of the Keystone Water Gas Company, to whom I explained the object of my visit. I stated that you were wholly disinterested, and desired only to obtain reliable information of the practical working of the process. Mr. Hart conversed with me quite courteously on the subject, and assured me that the friends of water gas would be pleased to afford me every facility for procuring information, and in the morning I should see the gas making, have an interview with the engineer, and at 11 o'clock I should call on the directors, &c.

On Tuesday morning I made an early call for the engineer, but failed to see him, and this search, with the apparently willing assistance of the employés of the hotel, I renewed at frequent intervals up to nearly 11 o'clock, but always without success. At 11 o'clock, I presented myself at the office of the Keystone Company, in Walnut-street, and found the directors in session with closed doors. The agent, Mr. Brown, however, appeared, and stated that the directors were unable to see me, and that he would call at the hotel at 3 P. M. At about 5 P. M., instead of 3, Mr. Brown called, and after a short and unsatisfactory conversation as to the *rationale* of the water gas process, he introduced me to the engineer, Mr. Place, when it was intimated that I might go into the gas house and ask any questions of the engineer, but there was little encouragement to believe that other privileges would be accorded. I then made a rapid survey of the gas house with the engineer, and was shown the various parts of the apparatus.

The gas house, situated at the rear of the hotel, is a one and a half story brick building, about 20 feet square; the entrance to the building is from an alley-way parallel to Chestnut-street. The retort room is about 20 by 12 feet; the south end of this room is occupied by a bench of three retorts, and two rather large steam boilers, running north and south, which are constantly in operation for the use of the hotel, for cooking, warming, steam engine, &c. The gas from the retorts passes into a small room on the east side, through a hydraulic main, to a set of condensing pipes and scrubber; thence it returns to the retort room, is measured by a meter, from which it ascends in the direction of the furnaces up to the gas holder, which is at the top of the building. The arrangement and location of the apparatus, it will thus be seen, favor the warming of the gas, to prevent the deposition of condensible products.

The retorts are in the shape of a boot, the horizontal part being of the usual ⌓ form, and the upright part cylindrical. The rosin tank, placed back and above the retorts, is a cast iron vessel of the capacity of about two barrels. The whole apparatus is well made and in appearance quite imposing to those who are familiar only with the ordinary rosin gas apparatus. It seems to have been modeled after the apparatus in use for coal gas.

After the inspection of the gas house, the engineer sat down with me, and, in answer to questions, gave the following statement of the operations for one day:—

Amount of gas, 20,000 feet, rosin used, 660 lbs; fuel for retorts (coke), 15 bushels, lime, about 3 bushels. The charge of charcoal for three retorts is 4 bushels, of which about one-third is recovered, sifted, and used again.

Steam at 30 lbs., through a $\frac{3}{8}$ inch pipe nearly closed, cost, practically nothing. Labor done by two men, working alternately, which would, however, produce three times the amount of gas This estimate is for such gas as they were then making. The amount of tar from main, scrubber and condenser was practically nothing. Pressure on gas holder, 2 inches; specific gravity had not been determined. Six-feet burners were used; some smaller, of the double slit fishtail variety. Gas had not been analyzed. Candle value had not been lately determined; supposed to be 18 or 20; had made gas of 30 candles. The manufacture was regular and certain. Gasometer, 3,000 feet. A 3-inch main, 235 feet in length, carried the gas to the front of the hotel; average depth of the main in the ground, about 2 feet. The drip from this main, in six weeks, was half a bucket of water, with no tar or oil; water supposed to have come from water of the gasometer. No experiments had been lately made on condensible products; Professor Sanders had subjected the gas to a freezing mixture without deterioration. Dimensions of retorts: Vertical part, 63 inches high, 8 inches diameter; horizontal part, 34 inches long, 8 inches wide, 6 inches high.

Q. Can you conveniently vary the proportion of steam and rosin, or can you easily shut off either or both?

A. Certainly; it only requires the turning of the cocks.

Q. What is the effect when you shut off the rosin?

A. We should only get rosin gas.

Q. That is evident; but what would be the variation in quantity and quality?

A. (After a little hesitation.) The amount would be diminished to about one-fifth or one-sixth. The quality would of course be that of rosin gas, and but a trifle richer than what was before made.

Q. What is the effect if you shut off the steam?

A. I cannot positively state. We do not feel at liberty to make such experiments while the hotel depends on us for gas.

Q. What is the amount of steam you ordinarily use?

A. Very little; I cannot easily estimate how much. The cost is practically nothing when the boiler is not expressly fired for the purpose.

At the conclusion of this interview I said to the engineer that I would look over his statements and call on him again, when I would make other inquiries.

Shortly after, I went to the gas house and said to the engineer that I had found his statements very clear and comprehensive; that they were, however, of such an extraordinary character that I could not endorse them without some verification, they represented that a gas, nearly equal in quality to rosin gas, was produced for about one-fifth the cost. But, fortunately, the points in doubt were few and simple, and could be determined without expense or trouble: it was only necessary to turn the stopcocks and observe the meter and trial burner. The engineer replied that his statements were all true, but it was not consistent with his duties to make experiments. I suggested that I had brought some instruments, and would willingly be at the trouble and expense of making certain tests in my own room. For this he thought the company should be consulted. At this point the engineer was called out of the room, and I was left, with a workman in charge. While the engineer was absent, in order to see more plainly the connections about the retorts, I passed over to them by a plank, which was placed uncomfortably n ar the steam boilers. As I stood before the apparatus, it occurred to me that it was strange that I heard no steam issuing into two retorts, while from one the sound was quite distinct. I leaned towards the retorts in succession, and satisfied myself that I was not mistaken; and into the one from which the sound came there was little or no rosin flowing. This observation occupied only a moment, and, as you may readily suppose, was accompanied with a very painful suspicion, which was not at all lessened by the rapid approach of the workman in charge, who then manipulated the stopcocks in what appeared to me an excited manner, and as if something had gone quite wrong. I came away from the retorts, and not a word was spoken. I passed into the hotel, and made inquiry for any member of the gas company. I found Judge Sanders, a brother of the inventor, and represented to him how easily every doubt about the utility of water gas could be settled. He agreed with me that it was desirable that I should go before the directors and present my views.

On Wednesday, 11 A.M., on my way to the office of the company, I was intercepted by Mr. Brown, the agent, by whom I was told that the directors were engaged in urgent business, and that they were not accessible. I stated that I was very desirous of seeing one or more of the directors. The result of a little further parley was that Mr. Brown engaged to see that Mr. Hart should meet me at the hotel at 3 P.M. Mr. Hart, however, did not appear. At about 4 P.M., I met Mr. Brown in the public hallway of the hotel, and was told, in answer to inquiry, that he had not spoken with Mr. Hart respecting an interview with me. After this time I sought for Mr. Hart and others of the company, but without success. As I had now consumed more than two days, and there appeared only a poor prospect of any further information from the Keystone Company, I returned to New York on Thursday morning.

The above account will give you some idea of the drift of events; but it cannot make so deep an impression upon you or your readers, as did the actual presence of the circumstances upon myself. Besides seeking information from the Water Gas Company, especially as soon as I had doubts of their willingness to assist me, I used every reasonable opportunity to make inquiries elsewhere. I called at the City Gas Works, and at various other places where water gas was supposed to be understood. I found an interest in the subject everywhere, and people ready to talk about it. Every one had an opinion about the utility of water gas, but the opinion was almost invariably based on personal likes or dislikes, rather than on practical demonstrations or scientific reasoning. The effect of all the testimony of this kind is to strengthen the conclusions to which I have come. Moreover, by subsequent inquiries made in New York at the St. Nicholas Hotel, and other places where water gas was attempted, those conclusions are further confirmed.

WATER GAS CONSIDERED FROM A SCIENTIFIC POINT OF VIEW.

The manufacture of rosin gas is a very simple operation, and is generally understood. At a hotel like the St. Nicholas, and possibly the Girard House, it is cheaper than the city coal gas. The maximum of illuminating gas that is producible from one pound of rosin is ten cubic feet. In practice, however, the product is only six to eight feet. Where rosin tar is valuable, the smaller yield of gas may be preferable. Now, by injecting with the rosin a small quantity of steam, the water gas folks say that the yield of gas will be increased fivefold without material depreciation of quality. In explanation, they say that the elements of water and rosin re-act on each other, and, by the peculiar action of some of the elements in the nascent state, new arrangements and combinations take place.

My view of the effect of steam is as follows: steam, when brought in contact with intensely heated charcoal, is decomposed, and carbonic oxyd and hydrogen are the products. The temperature at which this decomposition takes place is several hundred degrees higher than the temperature at which rosin is decomposed; and, consequently, if rosin and steam be introduced into a retort charged with charcoal, rosin gas will be first formed, and this gas, mingled with steam, will pass out unless the steam chance to come in contact with the charcoal at a temperature high enough to decompose it. But the temperature at which the steam is decomposed is probably high enough to decompose the rosin gas also, so that it will precipitate its carbon and its quality be thus greatly impaired. The gases finally thus resulting might be almost entirely hydrogen and carbonic oxyd, of no value for illuminating. It is plainly to be seen on this theory, that the practical result will be influenced especially by the proportion of steam and temperature of the charcoal; but, in no case, would the use of steam in the manner supposed increase the illuminating power, but, on the contrary, diminish it whenever the steam was decomposed. If the steam be decomposed in a separate retort, as in the process of White and others, the mixture of the water gases with the rosin gas would apparently be somewhat advantageous, for the reason that the hydrogen and carbonic oxyd would carry in solution or suspension a notable quantity of hydro-carbons which otherwise would condense with the tar. This result would also be, in some degree, attained by causing the rosin to enter at one end of a long retort and steam at the other. But the advantage in such ways obtained I understand to have been proved in practice to be of little consequence. Although water for water gases costs nothing, yet the machinery and fuel are as expensive as for the manufacture of more useful products.

This theory, in my opinion, is consistent with all the facts with which I am acquainted. It affords a clear explanation of the irregularities and failures of Sanders' gas which have been reported, and also of the peculiar working of Dr. Cresson's retort, about which so much has been said in the Philadelphia papers.

THE CONCLUSIONS.

From a careful comparison of all the evidence to which I have had access, I have arrived at the following conclusions.

1st. That persons connected with the Water Gas Works of the Girard House were unwilling to permit me to make a scientific and practical examination of the process.

2d. That the Sanders water gas process does not produce the increased quantity of illuminating gas claimed for it.

If I have erred in these conclusions, fortunately the Keystone Gas Company have the power to confute me at once. For, let it be distinctly understood, that it is only necessary to turn a steam cock and watch a meter and burner for a few minutes to settle the leading question upon which the whole claim is founded. Such a test, made before reliable witnesses, is a ready way to settle the matter and crush all their supposed enemies. Here is the point at issue: without steam, the Girard House apparatus produces rosin gas; with steam, it produces Sanders' water gas, but five times as much and nearly as good, and at about one-fifth the cost. Surely, this is a clear, simple statement; and it is just so clear and simple that its truth or falsity may be determined by the turning of a stopcock.

Finally, it is proper to state that I concluded to go to Philadelphia only after the consent and almost request of gentlemen interested in the success of water gas, and with assurances that the company would be pleased to see me and afford me all the necessary facilities for examination. CHAS. A. SEELY, Chemist.

New York, Oct. 29, 1860.

HOW MUCH PORK WILL A BUSHEL OF CORN MAKE?

The followng valuable facts are from the *Valley Farmer*:—Upon the question of "how much pork will a bushel of corn make,?" Mr. Richard Thatcher, of Pennsylvania, gives, in the New York *Tribune*, the result of his feeding scalded or cooked corn meal, in several instances, to fattening hogs. The result of one trial gave sixteen and one-half pounds of pork for each bushel of fifty six pounds of meal fed out. In another instance, seventeen and nearly one-half pounds were the gain from a bushel. The breed of hogs experimented upon was the "Chester" (county, Pa.) white, which we regard as among the best breeds now in the country. We have recently seen accounts of several other experiments of feeding hogs in the same way, with similar results, while the same breed of hogs fed in the ordinary way, upon dry corn, in the ear, gave a return of but about one-third of the weight compared with those fed on the cooked meal.

The experiments of Mr. Clay, of Kentucky, as detailed in the December number of the *Valley Farmer*, for 1856, afford conclusive evidence of the advantages of feeding cooked over raw food. In the experiments on the same animals, it was proved that dry corn would afford a gain of about five and three-quarters to six and three-quarters pounds of pork to each bushel consumed, but when changed to food prepared by grinding and cooking, gave a return of from fifteen to nearly eighteen pounds of flesh for each bushel of corn fed out. These various experiments demonstrate facts worthy the consideration of farmers, and especially when the price of corn and pork is constantly advancing.

With care in breeding from a good stock of hogs, and with their proper management throughout, keeping the hogs constantly thriving, at least an average of fifteen pounds of flesh may be received from every bushel of corn consumed. A few well conducted experiments in feeding, with appropriate apparatus for preparing the food, compared with facts determining the amount of gain from the ordinary method of feeding, would forever settle the question and lead to valuable improvements in this most important interest to Western farmers.

USEFUL MEDICAL HINTS.

We find the following remarks (by the editor) in the *Cincinnatus*, a scientific and agricultural journal, published at Cincinnati, Ohio:—

If a person swallows any poison whatever, or has fallen into convulsions from having overloaded the stomach, an instantaneous remedy is a tea-spoonful of common salt and as much ground mustard, stirred rapidly in a tea-cup of water, warm or cold, and swallowed instantly. It is scarcely down before it begins to come up, bringing with it the contents of the stomach; and lest there be any remnant of poison, however small, let the white of an egg or a tea-cupful of strong coffee be swallowed as soon as the stomach is quiet; because these nullify many virulent poisons. In case of scalding or burning the body, immersing the part in cold water gives entir relief, as instantaneously as the lightning. Meanwhile, get some common dry flour, and apply it an inch or two thick on the injured part the moment it emerges from the water, and keep sprinkling on the flour through anything like a pepper-box cover, so as to put it on evenly. Do nothing else; drink nothing but water; eat nothing until improvement commences, except some dry bread softened in very weak tea of some kind. Cures of frightful burnings have been performed in this way, as wonderful as they are painless. We once saved the life of an infant which had been inadvertently drugged with laudanum, and which was fast sinking into the sleep which has no waking, by giving it strong coffee, cleared with the white of an age—a tea-spoonful every five minutes—until it ceased to seem drowsy.

THE HIGHEST BUILDINGS IN THE WORLD.

The following list of lofty bnildings is taken from the French scientific almanac (*Annuaire par le Bureau des Longitudes*) for 1860. The measurements are above the earth in each case (not above the sea):—

	Meters.	Feet.
Highest Egyptian pyramid	146	479
Tower of the Strasburg cathedral	142	465.90
Tower of St. Etienne (Vienna)	138	452.75
Ball of St. Peter's (Rome), over the dome	132	433
Tower of Michael's (Hamburg)	130	426.50
"The Arrow" of Antwerp church	120	393.70
St. Paul's at London	110	360.90
The Milan cathedral tower	109	357.60
Pantheon at Paris	79	259.18

This may answer the question asked by one of your correspondents not long ago, to name the five highest buildings in the world. Who will give us an authentic statement of the hight of American buildings?

* * *

[To the above we add that the chimney of Messrs. Tennant's chemical works in Glasgow, Scotland, is 450 feet in hight, and there is another now building in that city which is to be 460 feet.—EDS.

APPLICATIONS FOR THE EXTENSION OF PATENTS.

Machine for Manufacturing Cordage.—William Joslin, of Cleveland, Ohio, has applied for the extension of a patent granted to him on the 19th of January, 1847, for an improvement in the above-named class of inventions. The testimony will close on the 24th of December next; and the petition will be heard at the Patent Office on the 7th of January, 1861.

Diaper Pins.—James Rabbeth, of East Hartford, Conn., has applied for the extension of a patent granted to him on the 21st of January, 1847, for an improvement in the above-named class of inventions. The testimony will close on the 1st of January next; and the petition will be heard at the Patent Office on the 14th of same month.

FIGS IN MARYLAND.—We were not aware that figs were grown in Frederick county (says the Frederick *Union*) until we saw and tasted them at the agricultural exhibition in this city last week, and learned, upon inquiry, that between four and five bushels are raised each year at Mt. St. Mary's College, in this county. Those we saw were the second crop, in size about as large as a hen's egg. The first crop, we learned, are about twice the size of the second crop.

LADIES' SKIRTS IN COURT.—On the 1st inst., in the United States District Court, this city, before Chief-Justice Nelson, a verdict of $2,000 damages was given by a jury against Moran, Kelly & Co., for infringing the patent of Dougherty and Draper, for what is known as the "woven skeleton skirt." The defense set up was that the invention was not new and not patentable, but the evidence failed to prove this; hence the jury sustained the patent.

WEALTH OF THE CANADAS.—The English journals contain glowing accounts of the beauty and fertility of the scenery and soil of Upper Canada, furnished by the representatives of the London papers who accompanied the Prince of Wales to America. The London *Times'* correspondent, in speaking of the advantages offered to British emigrants from Upper Canada, says that in this agricultural El Dorado there are millions upon millions of acres of virgin ground, waiting only for the hand of the cultivator to disgorge their boundless wealth, and urges that all vexatious restrictions with respect to the purchase of land should at once be abandoned, as he anticipates a "mighty future for Upper Canada if emigration is only fairly encouraged and developed by the government at home." This sounds very much like the discovery of a new country. If we mistake not, Upper Canada has long been down on the maps, and its resources pretty well understood on this side of the Atlantic.

OLD BATTLE SHIPS.—The commission appointed under Senator Mallory's resolution for an examination of the sailing vessels of war belonging to the United States navy have completed their survey of the ships at the navy yards, and are now deliberating on the subject. The commission consists of Captains Stringhorn and Stover, and constructors Lenthol, Delano and others. They will be ready to report in a few days. Our old line-of-battle ships are all found, it seems, to be sound, and capable of conversion into war steamers; that is, they have sufficient breadth of beam for the purpose. The cost of conversion and of machinery, &c., will, o. course, be reported. The twenty new steamers which have been built under this administration have been found eminently useful, and more of the same class are much wanted for the protection of our commerce. The Secretary of the Navy will, as heretofore, recommend to Congress a provision for an additional number of war steamers. The twenty war steamers last built cost but $5,000,000 in the aggregate.

A NOVELTY IN RAILROAD TRAVELING.—According to a correspondence which we find in a French provincial paper, the railroad companies in France are about to put in operation a plan which cannot fail of being received with favor by the public. It is proposed to run, each week, a train of cars between distant points, for which tickets can be obtained in advance, and to which the companies will guarantee to admit only a limited number of passengers, four hundred, for example. All the places being occupied, the engine not carrying any "dead weight," to use a technical expression, the traveler can be transported at the price of merchandise; and the companies, not only without any loss, but even with a certain and calculable profit, will apply to these special trains a tariff, the great cheapness of which cannot fail of producing an immense business. By this arrangement the fare is about one-fifth the usual price. Cannot some such plan be perfected by our railroad companies?

HOW TO OBTAIN A PATENT.—We have just issued a circular in the German language, giving full directions how to obtain Letters Patent for new inventions. Any one who may desire this circular will receive it free of charge by addressing MUNN & Co., 37 Park-row.

AIR ENGINES.—The report of the discussion of the Polytechnic Association, published in this week's paper, will be found of more than usual interest, as the subject of air engines was the leading topic and was handled in a very intelligent manner.

AN intelligent writer in the *Atlantic Monthly*, who spent some time in the Portuguese island, Fayal, one of the Azores, in speaking of the extreme indigence of the mass of the people, says that he knew one old woman who boarded with a poor family for five cents a week.

THE American Institute at their meeting, Nov. 1, voted to sell their property on Broadway, and put up a building in the upper part of the city, for their exhibitions, &c. Their property in Broadway is, we believe, in the neighborhood of Leonard-street, and is said to be worth about $150,000.

ISSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING OCTOBER 30, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

30,525.—G. S. Bosworth, of Troy, N. Y., for an Improvement in Molding Cast Iron Wheels:

I claim forming a mold by means of a flask consisting of three parts, to wit, a cope, a nowel, or drag, and cheeks or chill, the two former being open to ram up the sand to form the mold on face patterns which can be printed back, the mold being formed in the manner and by the means set forth, and the thickness and weight of the wheel being determined by the depth of the cheeks which can be varied in the same sized wheel and with the same pattern and same cope and nowel.

30,526.—Z. B. Brown, of Simsbury, Conn., for an Improvement in Seeding Hoes:

I claim the seed-box, d, hoe handle, b, and seed slide, e, the latter being provided with the adjustable plate, f, and spring, k, and arranged at right angles to said box and handle for operation, conjointly in the manner and for the purpose described.

30,527.—W. A. Coe, of Greensboro', N. C., for an Improved Peach Parer:

I claim, first, The peculiar arrangement of the two prongs, A B, of a peach paring and slicing machine, and crank, c, in combination with a lever, F, hinged at one end at I, and hung to an oblique rack H, by a link, G, all constructed substantially as and for the purposes set forth.

Second, A curved and elastic slicing knife, P P' P, and curved guide rods, R R' R R R' R, in combination with a reciprocating stirrup, M M' M, constructed and operating substantially as set forth.

30,528.—H. Collier, of Smithville, Ark., for an Improved Machine for Delineating the Course of Rivers:

I claim delineating the course of rivers or other courses by means of a "plotter," rotating at a speed corresponding with that of the boat or other object upon which it is carried, and making upon a sheet which is held in position corresponding with the points of the compass, substantially as and for the purposes set forth.

30,529.—J. A. Cowdery, of North Middletown, Ky., and G. W. Cowdery, of Great Bend, Ohio, for an Improvement in Straw-cutters:

I claim, first, The combination of the cam, M, lever, N, and fork O, constructed and arranged as described, for the purpose set forth.

Second, The combination of the lever, V, with its spurs, c and d, with the fork, o, and spring pawl s, as and for the purpose set forth.

Third, The combination with the top, W, of the lever, Y, and its spring, i, arranged and operating as described.

30,530.—Elliot Dickerman, of Richmond, Vt., for an Improved Clothes-dryer:

I claim the employment in clothes-dryers of the arms, P, and clothes lines, K, in combination with the arms, D, and clothes lines, J, and with suitable stops on D, substantially as specified.

30,531.—R. B. Donaldson, of Washington, D. C., for an Improved Door Spring:

I claim the arrangement of the respective parts of said apparatus which enables its actuating spring to exert its power upon a door through the medium of the axle, a, the lever, c, and the cord or chain, d, substantially in the manner set forth.

30,532.—Henry Evans, Jr., of Baltimore, Md., for an Improved Machine for Bending Sheet Metal:

I claim a bed and hinged tongue provided with grooves or shoulders, H, for the bent edges of the tin, in combination with two levers hinged to said bed, for bending the sheet of metal, as described.

30,533.—Lewis Evans, of Morgantown, Va., for an Improved Flask for Casting Packing around Cannon Balls:

I claim, first, The use of the flasks, A B, connected together by a vertical hinge, and having semi-cylindrical shouldered recesses, L L, formed on their inner faces, in combination with cast iron projectiles which have circumferential and longitudinal grooves, J J J, formed in them, and with or without the bar, D, and pins, F F, all substantially as and for the purposes set forth.

30,534.—Wm. Heppenstall, of Springfield, Mass., for an Improvement in Skirts:

I claim, as a new article of manufacture, a skirt constructed substantially as described.

30,535.—Eugene Mack, of the United States Navy, for an Improved Machine for Stretching the Straps of Ships' Blocks:

I claim the fid wedge, screw and gages on the fid, when combined and arranged substantially as and for the purpose specified.

30,536.—J. W. Lyon, of Brooklyn, N. Y., for an Improved Machine for Finishing Gas Fittings:

I claim, first, Interposing between the jaws and the body of the chuck spindles or joints, substantially as described, whereby the jaws may be turned on axes at right angles to the axis of the spindle and chuck, for the purpose of presenting different parts of the fitting, clamped between them to the action of the cutting tools, substantially in the manner and for the purposes described.

Second, In combination with the jaws of the chuck, the adjusting screws substantially as described.

Third, In combination with the jaws of the chuck, the mechanism whereby they are clamped and locked together on the fitting at one operation, to wit, the cams, levers, and rack-sliding bars, substantially as described.

Fourth, In combination with the cams operating the jaws of the chuck, a collar wrench not removable from the chuck and spindle, substantially as described.

Fifth, In combination with the jaws of the chuck, the indices and self-acting detents, substantially as described.

Sixth, In combination with the indices and detents, the locking cams or wedges, substantially as described, and when in connection with the chuck and jaws, substantially for the purposes set forth.

Seventh, The chuck constructed substantially as described and containing the improvements separately specified in the first, second, third, fifth, and sixth claims.

Eighth, The combination of a friction brake directly with the chuck, substantially as described.

Ninth, The combination of the brake chuck and clutch shifter, or its equivalent, when so arranged as to communicate motion to the chuck spindle when the brake is released from the chuck, substantially as described.

Tenth, The sliding carriage and series of mandrels, in combination with the spindle and chuck, substantially as described.

Eleventh, The division plate, self-acting clamp and releasing lever, in combination with the sliding carriage, substantially as described.

Twelfth, The latch bolts in the mandrel bearings, in combination with the mandrels, substantially as described.

Thirteenth, Constructing the sliding carriage mandrels in two parts, arranged and combined together substantially as and for the purposes described.

Fourteenth, The combination of the adjustable drill with the adjustable facing tool constituting the cutting tool, k, substantially as described.

Fifteenth, Alternating taps or dies with cutting tools, in combination with two or more pairs of parallel mandrels arranged in combination with a chuck, substantially as described.

Sixteenth, The driver, in combination with the sliding carriage and mandrels, substantially as described.

Seventeenth, In combination with the driver and spindle through which it slides, the pulley, brake and clutch shifter, substantially as described.

Eighteenth, In combination with the mandrel socket of the driver, the spring latch and releasing cam, substantially as described.

Nineteenth, The employment of an adjustable friction plate, in combination with the chuck and tap or die to hold the fitting against the action of the tap or die by a yielding pressure sufficient for the purpose of cutting the screw thread, but yielding to prevent stripping the thread or breaking the tap when requisit, substantially as described.

Twentieth, And finally, I claim combining together in one machine a series of parallel mandrels, carrying cutting tools, driver, sliding carriage and chuck, substantially as described, and arranged so as to operate substantially in the manner and for the purposes set forth.

30,537.—Edward Maynard, of Washington, D. C., for an Improvement in Breech-loading Fire Arms:

I claim the employment of a solid headed hinged cone seat, B, for closing the lateral opening between the mouth of the chamber of the barrel and the solid head at the after end of said opening, when the proportions of the said cone seat and the lateral opening which receives the same are such that a thin-sided metallic cartridge (either loaded or unloaded) can be readily placed within the chamber of the barrel when the cone seat is in its open position, and then be securely retained in said chamber by throwing the cone seat into its closed position, substantially as set forth.

When the mouth of a chamber of a breech-loading fire arm is closed by the head of a hinged block, B, which forms the cone seat of said arm, I also claim the placing of a thin-sided metallic cap within the said chamber for the purpose of forming a tight joint between it and the said hinged block, substantially as set forth.

I also claim giving the bottom of the thin-sided chamber cup, f, of my improved fire arm such a degree of thickness and strength that either a laterally projecting arm or a looped thong or cord may be combined therewith, of such a size and shape as shall enable the said cup to be readily withdrawn from the chamber of the barrel, substantially as set forth.

When the lateral opening between the mouth of the chamber of the barrel and the solid head at the after end of said opening is closed by a properly proportioned hinged cone seat, I also claim so proportioning the hinges of said cone seat that the recoil thereof, at the instant of firing the arm, will be wholly exerted against the solid head opposite the after end of said cone seat.

30,538.—H. L. Pierce, of Millpont, N. Y., for an Improvement in Smut Machines:

I claim the adjustable metallic scouring rods, R R R, fluted, notched or grooved, in combination with the cylinder, D, and cap, M, constructed and operating substantially as described.

30,539.—C. A. McEvoy, of Richmond, Va., for an Improved Sabre-bayonet Fastening:

I claim, first, Fastening a sabre or other bayonet to the muzzle end of a rifle by a lock located in the rear of the handle of said bayonet, substantially as and for the purposes set forth.

Second, The arrangement of a stationary and slotted plate, F, movable and slotted disk, L, and spring stop, M, all located in the rear end of the handle of a bayonet, in combination with a T-shaped projection, B C C, near the muzzle end of a rifle, substantially as and for the purposes set forth.

30,540.—John Outram, of Elmira, N. Y., for an Improvement in Machines for Cleaning Grain:

I claim, first, The arrangement of blast and suction fans on a horizontal shaft, in connection with separating chamber, F, and pipes, E D and G, as described and shown.

Second, The movable double acting deflector, i, in the pipe, G, constructed and operating in the manner described and shown, for the purpose of dividing and directing the currents of air upward and downward.

30,541.—John Parsons, of Cleveland, Ohio, for an Improvement in Brick Machines:

I claim, first, the wheel, B, fitted with cams, e e e, and studs, d d d, in combination with lever, G, rack, e, hub, f, friction wheel, I, substantially as described and for the purposes set forth.

Second, I claim the escape door, Fig. 3, with slide, t, formed hollow at the back part, inclined planes, x x, spring, w, latch, n, guide, n*, substantially as described and for the purposes set forth.

Third, I claim the arrangement of the parts of the driver, 4, viz:—the plates, 6 7 and 8, the regulating screws and pinch nuts, in connection with the guide rods, 15 15, guides, 16 16, operated substantially as described and for the purposes set forth; but I do not claim as my invention the rack, 10, nor the spur wheel which operates it on the shaft under the mud box, 14.

Fourth, I claim the arrangement of the bevel wheel, y, pinion wheel, z, in combination rollers, m m, band, o, spring, n, or its equivalent, the mold table, l, and driver, p, substantially as described and for the purposes set forth.

30,542.—W. H. Peckham, of Hoboken, N. J., for an Improved Heel for Boots and Shoes:

I claim the hollow metallic heel formed with the cavity, 6, and connected to the boot or shoe by the nut, c, in the manner specified.

30,543.—Robert Pilson, of Laurel, Md., for an Improvement in Machines for Dressing Warp:

I claim the combination of the sectional warp beams, c d d2, racks or guides, g2 g2, the distributing cylinders, e e, and squeezing rollers, f f, the brushes, h h, the copper metal comblike guide rack, K K, the upper metal harness, m2 m3, the lease rods, z z, the drying drums, N O J, the loom beam, T U, the smoothing, controlling cylinder, X, and fan, Y, when so arranged relative to each other as shown, forming one individual machine, and through all of which intermediate auxiliary cones and cog gearing are dispensed with, and all undue drag, strain and tension of the threads of the warp are prevented and the several improved results in the manufacture of cotton fabrics hereinbefore recited are attained, substantially as set forth and described.

30,544.—J. M. Pitts, of Sumter, S. C., for an Improvement in Fences:

I claim the combination and arrangement of the short and long stop battens and braces with the semi dovetails which are formed in reverse positions on the upper and lower rails of the panels, substantially as and for the purposes set forth.

[This invention consists in providing reverse semi dovetails upon each end of the top and bottom rails of the panels, and having the said dovetails interlock in a straight line. The panels are prevented from lateral, longitudinal and vertical movement by means of long and short battens and a triangular brace. This is a very simple and ingenious fence, and, as the panels, after being constructed separately, can be set up and locked together without the aid of nails, keys, clasps or other detachable fastenings, it is very useful and convenient.]

30,545.—E. M. Roxford, of Indianapolis, Ind., for an Improvement in the Manufacture of Square Pans of Sheet Metal:

I claim the adjustable arrangement of plates, C and D, for raising and folding the metal overlapping them, which at the same time compress the slack in the corners, and in connection with plate, H, bends the compressed slack against the sides; the whole constructed and operating as set forth.

30,546.—W. H. Racey, of St. Augustine, Fla., for an Improvement in Lamps:

I claim the employment or use of the perforated plates, F F, placed in relation with the cap, c, wick tube, E, and inner deflector, D, to operate as and for the purpose set forth.

[The object of this invention is to supply the flame with the necessary amount of oxygen to support a perfect combustion, with or without the aid of the usual glass chimney, and at the same time have the flame very persistent, so that it will not be materially affected while the lamp is being moved through the air in any direction.]

30,547.—D. R. Pratt, of Worcester, Mass., for an Improvement in Bearings for Railroad Cars:

I claim, first, The employment of the inclosed circular plates, E E', or the quadrantal boxes, F F', constructed and used as and for the purpose specified.

Second, In combination with the inclosed plates and boxes, I claim the balls and rollers, I and L, as and for the purpose specified.

Third, The use of the division plate, d, in the manner and for the purpose specified.

30,548.—Silas Stevens, of Worcester, Mass., for an Improved Tool Holder:

I claim the arrangement of the adjustable head, c, tool, D, and rod, B, with the hollow bar, A, screw, f, and nut, E, as and for the purposes shown and described.

[The object of this invention is to economize in the material or stock used in the construction of turning and planing tools, and also to facilitate the construction of the same as well as the keeping of them in proper working order.]

30,549.—Wm. Watts, of Newark, N. J., for an Improvement in Hangers and Boxes for Shafting:

I claim a box adjusted and supported in an open bottomed hanger (said hanger having the flanges, c o) by means of the bolts, g g, the bolt, E, and sliding caps, f f, substantially in the manner and for the purposes described.

30,550.—H. E. Woodford, of Watertown, N. Y., for an Improvement in Valves for Steam Engines:

I claim the employment of valves, C, that have an increasing radius from one end to the other and that are adjustable with their axes of motion, in combination with cylinder, A, and chest, B, when said valves are constructed and arranged to operate in the manner substantially as shown and described.

30,551.—Josee Johnson, of New York City, assignor to himself and John Ward, Jr., of Brooklyn, N. Y., for an Improved Clothes Dryer:

I claim the arrangement of the blocks, A B, arms, C D, joints, e, lines, G H, and tension cord, J, in the manner substantially as described, so as to produce the effects set forth.

30,552.—C. W. Shedd, of Addison, Ala., assignor to himself and R. Jamieson, Jr., of Tuscaloosa, Ala., for an Improvement in Grinding Mills:

I claim, first, The arrangement of the plate, J, tubes, M, tube, K, sleeve, L, provided with nut, r, and the cutter disk, H, essentially as and for the purpose set forth.

Second, The notches, o o, in the cutter disk, H, when used in connection with the cutters, l l, and the plate, J, provided with the tubes, M, for the purpose specified.

[This invention relates to an improved mill of that class which is designed for grinding corn and cobs in the husk. The invention consists in a novel and improved arrangement of a cutting and primary crushing device, together with an improved means for properly presenting the ears to the cutters; the above parts being used in connection with grinding stones, and all so arranged that the desired work may be expeditiously and thoroughly performed.]

30,553.—S. S. Turner (assignor to himself and O. F. Vinton), of Westborough, Mass., for an Improved Machine for Splitting Leather:

I claim my improved welt splitting machine as constructed with a rotary circular knife, the shaft, e, thereof, and conical feed rollers arranged with respect to each other and so as to operate therewith substantially as specified.

30,554.—S. S. Hogle, of Cleveland, Ohio, for an Improvement in Rotary Harrows:

I claim combining two or more harrow toothed wheels or frames with a draught frame or with a draught beam, in such a manner as to cause the forward movement of said draught frame or beam to impart positive rotary movements to the said harrow toothed wheels or frames, substantially as set forth.

NEW BOOKS AND PERIODICALS RECEIVED.

CROSBY, NICHOLS, LEE & CO., of Boston, Mass., have just published the works of Charles Lamb in four elegant volumes; price $1 25 per volume. The paper and printing are worthy of the publishers. There have been writers of more brilliant wit than Lamb; his books do not make you roar with laughter, but in reading them you find the corners of your mouth drawing up with a pleasant smile, and he holds you pervaded with a most delicious enjoyment page after page. His writings are suffused with the very best and highest kind of humor—original, deep, refined, pure and exquisitely delicate. Our readers are aware that Charles Lamb had a sister who was subject to paroxysms of insanity, in one of which she killed her mother. On the occurrence of this tragedy, Charles, who was affectionately attached to this sister, gave up all hopes of marriage, and consecrated his life in uncomplaining silence to the care of the invalid. With his moderate salary as clerk in the service of the East India Company, he was obliged to practice the greatest self-sacrifice and economy, and with a constant dread of the recurrence of the paroxysms in the disease of his honored sister, he lead a life of quiet heroism as noble as has ever adorned humanity. And it was this life that was sparkling from beginning to end with the inimitable flashes of his fancy. His witticisms which have found their way into the papers are those of the most palpable character; but even in these there is a certain depth which is peculiar to Lamb. For instance, when at a dinner party the company were disturbed by the persistent turbulence of a troop of children, Lamb, in his stuttering way, offered a toast: "To the m-m-memory of that m-much abused p-p-potentate, the g-g-good king, Herod!" We like "The Essays of Elia" the best of all his writings, and suggest to our readers as a good specimen, "A Dissertation upon Roast Pig."

LESSONS AND PRACTICAL NOTES ON STEAM; The Steam Engine, Propellers, &c., &c.—for young Marine Engineers, Students and others. By the late W. H. King, U. S. N.; revised by Chief Engineer J. W. King, U. S. N. 168 pages. New York: Frederick A. Brady, No. 24 Ann-street.

The above is the title of a book which we can heartily recommend, especially to those who like to learn without hard study. The practical and useful facts about steam are here given without any mystification of theory or high mathematics. This is one of a class of books which it always pleases us to commend.

BLACKWOOD'S MAGAZINE, re-published by Leonard Scott & Co., New York.

The number of this unrivaled periodical for this month contains a highly scientific article on the traces of man on earth before the historic period of Father Adam.

THE RISE AND PROGRESS OF INVENTIONS

During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & CO., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,538; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

We may safely assert that no concern has the combined talent and facilities that we possess for preparing carefully and correctly applications for patents, and attending to all business pertaining thereto.

FREE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable are advised to make a sketch or model of their invention, and submit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

PRELIMINARY EXAMINATIONS AT THE PATENT OFFICE

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

CAVEATS.

Persons desiring to file a caveat can have the papers prepared on reasonable terms, by sending a sketch and description of the invention. The government fee for a caveat is $20. A pamphlet of advice regarding applications for patents and caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

HOW TO MAKE AN APPLICATION FOR A PATENT.

Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row, New York.

REJECTED APPLICATIONS.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, enclosing the official letters, &c.

FOREIGN PATENTS.

We are very extensively engaged in the preparation and securing of patents in the various European countries. For the transaction of this business we have offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that three-fourths of all the European patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency, the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

CAUTION TO INVENTORS.

Messrs. MUNN & CO. wish it to be distinctly understood that they neither buy nor sell patents. They regard it as inconsistent with a proper management of the interests and claims of inventors, to participate in the least apparent speculation in the rights of patentees. They would also advise patentees to be extremely cautious into whose hands they entrust the power to dispose of their inventions. Nearly fifteen years' observation has convinced us that the selling of patents cannot be conducted by the same parties who solicit them for others, without causing distrust.

BUSINESS CONDUCTED CONFIDENTIALLY.

We would inform inventors that their communications are treated with the utmost confidence, and that the secrets of inventors confided to us are never divulged, without an order from the inventor or his acknowledged representative.

TESTIMONIALS.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

Messrs. MUNN & Co.:—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

Notes and Queries

R. C. B., of Ill.—You do not seem to understand yet what is meant by friction being independent of velocity. It is that the aggregate power expended in overcoming the friction of sliding one body over another a given distance is the same whatever the velocity. Not that the power expended per minute is the same. All of your inferences are based on the latter idea, and not on the former.

A. F. W., of C. W.—Brass is fully as strong when heated to 212° as when cold at 50° Fah. Hard silver solder is composed of four parts silver to one of copper; a softer solder is composed of two parts silver to one of brass. The latter is generally employed to solder with the lamp and blow-pipe.

T. J. L., of Pa.—The woolen factories with which we are acquainted felt their goods with the "stocks," or old reciprocating pounders.

G. S., of N Y.—We think the guiding of balloons by any power whatever entirely impracticable, in consequence of their great bulk and enormous resistance to motion in the air. By pouring out ballast they may be raised, and by allowing the escape of the gas through a valve in the top they may be lowered; and by thus taking them into a higher or lower stratum of air, their course may sometimes be altered. We have already said that an Ericsson air engine is too heavy in proportion to its power to drive a flying machine, and that a yoke of oxen would be better adapted to the purpose.

F. R., of Cal.—We agree with you in regard to the absurdity of the several theories which you mention that have been advanced to account for the formation of the gold deposits. Before writing for the press on geology, it would certainly be well to read at least some elementary treatise on the subject.

J. W., of N. Y.—You can obtain adjustable packing rings for pistons of Charles W. Copeland, of this city.

J. P. M., of Ills.—We did read your communication with great care. You promised a series of experiments to prove that horse hairs turn into snakes, and we advised you that, in order to have your conclusions accepted, it would be necessary to conduct your experiments in a very careful manner. The conversion of reciprocating rectilinear motion into rotary by a spiral thread is an old device. There is no loss of power by the crank motion on the dead points except that which results from increase of friction.

M. S., of Va.—You will find a description of paints for painting tin roofs on page 165, Vol. I. (new series), of the SCIENTIFIC AMERICAN.

E. M. G., of La.—The Patent Office employs its own draughtsmen. They are appointed by the Commissioner the same as other offices. The Office does not prepare drawings for applicants; these must be furnished.

C. H. J., of Texas, and J. H. G., of Fla.—Since the publication of Mr. Hyatt's proposition in reference to a flying machine, we have received a large number of communications and suggestions on the subject; but candor compels us to say that not a single practical hint of any value has been offered. The scheme is just where it was years ago—a mere plaything for fool-hardy adventurers.

N. P., of N. Y.—We have read your communication upon the subject of retardation of currents in submarine cables, and we do not think your suggestions upon the subject will meet any of the difficulties at present experienced.

H. D J., of Ohio.—We do not know where you can obtain a large circular saw with adjustable teeth. We do not think such saws are made in this section.

F. G., of Ky.—Whenever your diagrams are ready for examination send them on by mail. Your remarks in reference to the "transcendental excellencies" of this journal are duly appreciated. When you speak of it as a "beautiful palladium," your language is eloquent and touching. We cannot, however, make room for the letter to the exclusion of other matter.

J. G., of Pa.—Saucepans of cast iron are tinned upon the inside by scouring the surface bright with sand and dilute sulphuric acid, then washing and drying the surface thoroughly. Grain tin is then poured into the pan, which is heated on a fire and rolled about until the surface is covered, when the extra tin is poured out and the inside rubbed with cloth. Powdered rosin is also sprinkled upon the iron surface to prevent the formation of oxyd, which would keep the tin from uniting and adhering to the iron.

W. L., of La.—We cannnot tell how long the oil wells in Pennsylvania will continue to yield, but recent reports from the principal greasy districts represent the supply as gradually diminishing in all the wells, thus involving the necessity of sinking new ones to keep up the supply. There is a tract of country in Pennsylvania, we are informed, about 200 miles long and 30 wide, in which oil can be obtained anywhere by sinking wells.

L. C. S. & Co. and A. R. B., of Conn.—We have inquired for tungsten steel, but cannot find that any has been as yet imported into this city.

E. W. E., of Ala.—You can stain black walnut or pine in imitation of rosewood by mixing some carmine with lac varnish for the red streaks, and using a little copperas and logwood in solution for the black streaks. You can make a cheap red stain for wood with a strong solution of red Brazil wood mixed with lac varnish.

G. B. H., of Pa.—The link motion in common use is an old English invention, and is not the subject of any existing patent.

J. R., of Va.—The "pepper and salt" color of your cotton cloth cannot be made permanent so as to stand sun, wind and rain, by either salt, alum or any kind of lye whatever. The color is fugitive, and cannot be made fast.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Nov. 3, 1860:—

A. M., of N. Y., $30; W. H. & M., of Ga., $30; F. W. R., of Ind., $25; H. T. P., of Mass., $30; P. P. W., of N. Y. $30; J. H. W., of N. Y., $30; H. B. B., of England, $552; J. M. R., of Tenn., $20; G. E. W., of S. C., $10; P. R., of Ill., $40; L. B., of Texas, $100; T. E. B., of Fla., $25; P. H. T., of Va., $30; W. W. H., of Mo., $30; C. J. S., of N. Y., $30; S. K. W., of Pa., $10; C. R. A., of Conn., $63: J. C. H., of N. Y., $30; C. A., of Ill., $30; P. & M., of Mass., $30; T. F. B., of Vt., $55; H. N., of N. Y., $25; W. C., of N. Y., $25; B. & D., of Ill., $30; A. R. T., of La., $30; W. C. W., of N. Y., $30: A. L. F., of Pa., $35; N. R. B., of N. Y., $120; C. W. F., of Ill., $25; R. B. B., of N. Y., $30; H. C. A., of Ill., $25; C. & N., of Oregon, $250; J. W. B., of N. Y., $10; M. & S., of Ky., $25; C. & S., of Pa., $25; H. M. C., of N. Y., $30; J. H., of Ind., $25; W. H. S., of Ill., $30; P. H., of Mass., $30; J. T. P., of N. Y., $58; G. I. M., of Conn., $25; I. S. & J. W. H., of Ill., $30; C. C. F., of Mass., $30; T. S. D., of N. J., $30; E. H. B., of N. Y., $25; J. P. H., of N. Y., $15; A. J. B., of Mich., $30; J. T. P., of Conn., $25; J. G., of Ga., $25; C. S., of N. J., $30; J. R. J., of Ky., $30; W. & F., of ——, $250; R. C. B., of N. C., $25; J. H., of Cal., $80; J. Y., of Ohio, $55; P. M., of Mich., $25, M. K., of N. Y., $35; G. B. P., of N. Y., $100; M. D., of Ind., $25; M. R. F., of N. Y., $40; J. McN., of Pa., $55; P. J. A., of N. J., $55; J. W. L., of N. Y., $45; E. B. B., of N. Y., $30; R. & H., of Iowa, $30; H. & H., of Va., $30; J. L., of N. Y., $25; B. T. B., of N. Y., $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Nov. 3, 1860:—

P. C., of N. Y.; F. W. R., of Ind.; H. C. A., of Ill.; R. C. B., of N. C.; C. W. F., of Ill.; P. M., of Mich.; M. & S., of Ky.; S. M., of N. Y.; G. I. M., of Conn.; E. P., of Mass.; J. G., of Ga.; J. T. P., of N. Y.; E. H. B., of N. Y.; J. R. J., of Ky.; C. & S., of Pa.; T. E. B., of Fla.; M. D., of Ind.; J. P. H., of N. Y.; H. N., of N. Y.. J. T. P., of Conn.; R. C., of Texas (2 cases); C. R. A., of Conn.; T. G., of Miss.; G. W. C., of Texas; J. L., of N. Y.; A. L. F., of Pa.; W. C., of N. Y.; S. La F., of Ohio.

THE GRAEFENBERG THEORY AND PRACTICE OF MEDICINE.—On the 1st day of May, 1860, the Graefenberg Company's Sales-rooms, Consulting Offices and Medical Institute were removed from No. 34 Park-row to—
No. 2 Bond-street, New York,
(first door from Broadway,) in order to afford greater facilities and a more central location, demanded by the rapid increase of confidence in the Graefenberg Theory and Practice. The Graefenberg Theory and Practice, and the use of their medicines, together with complete symptoms of all diseases incident to this country and climate, the best method for their prevention and cure, will be found in the "Graefenberg Manual of Health."
This valuable family medical work, containing 300 pages, has been revised and improved, and elegantly illustrated with beautifully colored engravings of the human system. Sent by mail to any part of the country, on receipt of 25 cents. It is a complete guide to all diseases and their cure. Address
JOSHUA F. BRIDGE, M. D.,
Resident and Consulting Physician Graefenberg Co.,
No. 2 Bond-street, New York.
One of the leading journals says of the Graefenberg Manual of Health:—"This is the only medical book for family and general use ever published. It is written in plain language, free from scientific terms, and condenses more practical medical information than can be obtained anywhere else, unless a regular medical course of education is undergone. The popularity of this admirable and compendious work is well shown by this being the twenty-fourth edition. It contains a number of colored anatomical plates, and is a complete family physician. It is at once simple, popular, plain and explicit; and the mother, with such an adviser, is prepared at once to apply the proper remedies in case of sudden sickness in the family. In the country, a copy of the 'Manual of Health' is indispensable, and every family should possess one. It will save a hundred times its cost in doctors' bills, and, what is far better, will be the means of preserving many valuable lives to their families and relatives."
1eowtf

NOTICE TO CAPITALISTS—PROGRESS.—A new discovery (patented in France and the United States), for the prevention of railroad accidents, is presented for public approbation by A. MORTERA, Engineer. Models have been submitted to the inspection of and approved by leading railroad men throughout the country—especially H. Ulmy, Esq., Superintendent of Locomotive Works, and J. P. Dougherty, Esq., at Danforth, Cooke & Co.'s, at Paterson, N. J.—and the inventor desires to enter into relations with a capitalist who will assist in bringing this important invention into general use. M. Mortera will be happy to give particulars and exhibit his models any day, from 1 to 3 o'clock P. M., at his office, No. 93 Crosby-street, New York. P. S.—Messrs. Coudert Brothers, Advocates of Mr. Mortera, No. 49 Wall-street. 1*

WANTED—A SITUATION AS SUPERINtendent in an Iron Foundry, by a man of steady habits, who has had over 20 years' experience as molder. Good reference can be given, if required. Address J. N., Providence (R. I.) Post Office. 20 3*

WANTED—A PARTNER, WITH SEVERAL thousand dollars, in a well-established Foundry and Machinery concern; or I will sell or exchange for an improved Farm said Foundry, Tools, Patterns, &c., with a good run of custom. Location second to none in the United States, especially for Steamboat Machinery. Address F. SIMON, P. O. Box No. 178, Paducah, Ky., or C. SIMON, Agent. 20 3*

POCO METALLIC PAINT—POSSESSING ADvantages over all others—viz: varieties of color, finer ground and cheaper. STRATTON & CO., Agents,
20 4* No. 1 Pine-street, New York.

A RETIRED STENCIL CUTTER'S OUTFIT for Sale.—For particulars, send postage stamp to S. W. ROBINSON, Ann Arbor, Mich. 1*

IT COSTS 10 CENTS, AND WILL SAVE ANY family $35 per year.—Something new; everybody wants it. ☞ Sent free for One Dime; it sells readily. Agents wanted. Address EXCELSIOR CO., New York. 1*

FOR SALE—THREE PIN MACHINES (FOWler's pattern) for making solid head pins—makes Nos. 3, 4 and 5 pins; all new and in good order. Also, one sticker to stick the pins in the paper. Also, one hair-pin machine, capable of making 100 perfect hair-pins per minute, wire straighteners; all the fixtures complete for starting the business. For further particulars address E. IVINS, corner of Fifth-street and Columbia-avenue, Philadelphia, Pa. 19 4*

500 AGENTS WANTED—TO ENGAGE IN AN honorable business which pays from $3 to $7 per day. For particulars, address M. M. SANBORN, Brasher Falls, N. Y. 19 3*

LABORATORY OF CHEMISTRY.—CONSULTAtions and advices on chemistry applied to arts and manufactures, agriculture, metallurgy, mining surveys. Information on chemical fabrications, with drawings, such as colors, varnishes, coal oils, paper, gas, candles, soaps, dyeing, animal black, manures, acids, alkalies, salts, india-rubber, gutta-percha, &c. Address Professor H. DUSSAUCE, chemist (from the Conservatoire Imperial of Arts and Manufactures, Paris), New Lebanon, N. Y. 1*

SOMETHING NEW.—JUST OUT, GENTLEmen's Water-proof Cloth Coats, Sporting Coats and Leggings, and a variety of new styles of Water-proof Clothing, from the new factory of the N. Hayward Company. For sale by the New York agent, at No. 181 Broadway. [18tf] SAM. C. BISHOP.

HOUSEHOLD ARTICLE FOR EVERYDAY use—Patent for sale.—A self-soaping Scrubbing Bath or Nail Brush. Can be got up cheap; an excellent opportunity to make money. Patent granted May 22, 1860. Address WM. TUSCH, Box No. 773 New York Post Office. 18

NEW AND PERFECT BARREL MACHINERY, consisting of a Head-turner, Stave-dresser, Jointer and Crozer, and especially adapted to rice tierces, sugar and molasses hogsheads, and to tight or slack work of every description. They are at once the simplest, cheapest and most efficient Machines made. Liberal terms offered to agents and others to sell Machines and Rights. For full descriptive circulars, address C. B. HUTCHINSON, Auburn, N. Y. 18 4*

CHARLES A. SEELY, CHEMIST, NO. 424 Broadway, New York.—Analyses of ores, minerals, articles of commerce, &c. Advice and instruction in chemical processes generally; advice on chemical patents. 8*

A FINE LATHE FOR SALE—5½ FOOT BED, 8-inch swing; made by Stewart, and never used. Cost over $300, and will be sold for $150. Apply at No 113 East Forty-second street, New York. 1*

LUBRICATING COAL OIL—FOR RAILROADS, Cotton and Woolen Factories, Steamboats, &c., free of chemicals and odor. Price—60 cents per gallon, by the barrel.
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The reputation of these governors is well established. Parties troubled with unsteady power may send for them in entire confidence. They never fail.
The numerous valves in use are all equally good, if well made; the form of the opening is immaterial. The governors are warranted to work perfectly with any and all valves, which move freely and close tolerably tight.
A style is made expressly adapted to waterwheels, to which they will give a perfectly uniform motion, under any variation of resistance.
I have long done with troubling my customers for certificates; but am able to refer to a large number of parties now using this governor in a majority of the States of the Union.
I will send a governor to any responsible party for trial. If it does not operate perfectly it may be returned.
A liberal discount to the trade, whose orders will always be promptly filled.
CHARLES T. PORTER,
No. 235 West Thirteenth-street, corner of Ninth-avenue,
14 tf New York City.

FOR SALE.—AN 8-HORSE (MONTGOMERY patent) Boiler; all in perfect order except the tubes; will be sold or traded for machinery or hardware, at $75—cost new, $750. Address Post Office box No. 187, Harrisburg, Pa. 18 3*

THE WEAVER'S GUIDE.—TWO HUNDRED samples of different kinds of weaving, from 2 harness upwards to 16, with drafts and explanations. Price $5 per copy. Address for particulars or copies, E. KELLERMANN, Moosup, Conn. 17 4*

SWISS MATHEMATICAL DRAWING INSTRUments of the finest finish, in large quantities, constantly on hand, for sale by JAMES W. QUEEN & CO., No. 924 Chestnut-street, Philadelphia. N. B.—An illustrated sheet of the instruments in full size, with priced list, sent by mail free on application. 17 5*

5.000 AGENTS WANTED—TO SELL FIVE new inventions—one very recent, and of great value to families. All pay great profits to agents. Send four stamps and get 80 pages particulars. EPHRAIM BROWN, Lowell, Mass.
17 13*

THE BLANDY PORTABLE STEAM SAW MILL, after a fierce contest with numerous competitors, having more powerful machinery, was awarded the first premium at the United States Fair, at Cincinnati, Ohio, 1860, as the smoothest working, easiest handled and fastest cutting mill. We cut, in the presence of the awarding committee and thousands of spectators, 675¾ feet first-class inch lumber, out of two logs, in 8 minutes 15 seconds. All the machinery worked by two hands. Also the first premiums at Ohio State Fairs for 1857, 1858 and 1859, and is the national premium and champion mill. The Blandy Patented Portable Steam Engine was described and illustrated on page 273, Vol. II. (new series), of the SCIENTIFIC AMERICAN. Send for circulars.
17 4c H. & F. BLANDY, Zanesville Ohio.

INVENTORS' MODELS MADE BY P. L. SLAYTON, corner of White and Center-streets, New York. 18 3*

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W. K. LANPHEAR & Co.—Gents:—As you are aware, I suppose, that I am one of the pioneer Stencil Cutters in this country, having worked at the business for over 21 years, which, I believe, will allow me to know something about the business, I have no hesitation in saying that the tools made by you for cutting small Stencils are the best I have ever seen, and far superior to those made by any other concern. I do not compare yours with those made by machinery—they are the poorest in the market. Wishing you that success which a good article is always sure to attain over a bad one, I remain, yours sincerely, A. W. MORGAN, Stencil Engraver.
Cleveland, Ohio, Sept. 31, 1860.
Address W. K. LANPHEAR & CO., Cincinnati, Ohio. 1*

STEEL DIE SINKER.—WANTED, A GOOD Steel Die Sinker, to work on our first class Stencil Tools. Address W. K. LANPHEAR & CO., Cincinnati, Ohio. 1*

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J. W. HOARD, } Providence, R. I.
14 15* GEO. B. WIGGIN, }

MACHINISTS' TOOLS FOR SALE.—TWO double-geared screw-cutting slide lathes, swinging from 20 to 24 inches and shears 12 to 16 feet long; one double-geared slide lathe, 4 feet diameter and 20 feet in length; four planing machines, various sizes; three card wheel boring machines, three card axle lathes, three shop cranes, &c., &c. All second hand; in good order. Apply to CHAS. W. COPELAND, No. 122 Broadway, New York.
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Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu adressiren an
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WOODWORTH PLANERS—IRON FRAMES TO plane 18 to 24 inches wide, at $90 to $110. For sale by S. C. HILLS, No. 12 Platt-street, New York. 1 tf

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IRON PLANERS, ENGINE LATHES, AND OTHER Machinists' Tools, of superior quality, on hand and finishing, and for sale low; also Harrison's Grain Mills. For descriptive circular, address New Haven Manufacturing Co., New Haven, Conn. 1 26

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STEAM HAMMERS.—THE UNDERSIGNED, makers of the celebrated Nasmyth hammers, having a full assortment of patterns, continue to furnish them at reduced prices, and of any size, from 5 cwt. upwards. The large number hitherto made by them, and in successful operation, precludes the necessity of presenting any recommendations. They are also patentees and exclusive makers, for this country, of what is generally known as the "Condie," or inverted hammer, one of which of six tuns, falling six feet, has been in operation at the Franklin Forge, New York, since 1849. [1 eowtf] MERRICK & SONS, Philadelphia.

HARRISON'S GRIST MILLS—20, 30, 36 AND 48 inches diameter, at $100, $200, $300 and $400, with all the modern improvements. Also, Portable and Stationary Steam-engines of all sizes, suitable for said Mills. Also, Bolters, Elevators, Belting, &c. Apply to S. C. HILLS, No. 12 Platt-street, New York. 1 e3w

ALCOTT'S CONCENTRIC LATHES—FOR Broom, Hoe and Rake Handles, Chair Rounds, &c.—price $25 and all other kinds of wood-working machinery, for sale by
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NEW SHINGLE MACHINE—THAT WILL RIVE and Shave 24,000 Shingles in a day, for sale by
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READY THIS DAY.—NEW EDITION, REvised and Enlarged.—"Wel's' Every Man his Own Lawyer and United States Form Book." A complete and reliable guide to all matters of business negotiations for every State in the Union, containing simple instructions to enable all classes to transact their business in a legal way without legal assistance. Also, containing the laws of the various States and Territories concerning the Collection of Debts, Property Exempt from Execution, Lien Laws, Laws of Limitation, Laws of Contract, Legal Rates of Interest, License to Sell Goods, Qualifications of Voters, &c., &c. ☞ No man or business woman should be without this work; it will save many times its cost, much perplexity and loss of time. 12mo., 408 pages, law binding; price $1. Sent postpaid. Agents wanted for this and other popular publications. Address JOHN G. WELLS, Publisher, corner of Park-row and Beekman-streets, New York. 25 tf

PORTABLE STEAM ENGINES, COMBINING the maximum of efficiency, durability and economy with the minimum of weight and price. They received the large gold medal of the American Institute, at their late fair, as "the best Portable Steam Engine." Descriptive circulars sent on application. Address J. C. HOADLEY, Lawrence, Mass. 1 22*

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence.
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CHROMATIC PIANOFORTE KEYBOARD.

A matter of great interest to the musical world is an improvement in pianoforte keyboards, patented by M. Philippi, of Troy, N. Y., on Oct. 11, 1859.

The chromatic keyboard, although very simple in its construction and differing but little from the ordinary keyboard, opens an entirely new field for the production of a great many most brilliant, novel and hitherto unattainable effects on the piano.

Fig. 1 represents a plan view of this keyboard and Fig. 2 a vertical section of the same, with the bar and nameboard of a square piano. The space for the additional part of the keyboard—2½ inches—is obtained by making the piano case about one inch deeper, shortening the white and black keys three-quarters of an inch, cutting out the bar as far as the sounding board will permit, and by setting the nameboard (which is made hollow to give more room for the hands) oblique, slanting inward three-eighths of an inch at the bottom. In this space, A, all the keys—white and black—are raised to one level, and one-sixteenth of an inch above the tops of the black keys. This new portion of the keyboard, appearing like a second set of little keys just back of and above the others, B, is, in other words, nothing but small pieces about 2½ inches long, ½ inch wide and ½-inch high, glued on to all the keys in the above-mentioned place. They present a perfectly level surface when at rest, and those back of the white keys are all white; those back of the black keys have the larger part of their surface made black, in order to distinguish them readily. They have a double thickness of ivory, and are considerably rounded off on both sides. The material set against the ivory on the partly black keys is hard rubber.

By thus bringing all the keys of the piano to a level, as far back as has been described, players of very moderate skill are enabled to execute:—1. The simple chromatic scale; 2. Runs in double notes, as, for instance, the chromatic scale in minor and major thirds, in fourths, in minor and major sixths and in octaves; 3. Chromatic progressions of chords, as sixths with thirds, octaves with thirds and sixths, chords of the diminished seventh in all their different forms, and, in short, all chromatic passages with either hand, legato as well as staccato, and from the most delicate pianissimo to the forte, not only with greater perfection than they can be played by a Liszt or Thalberg, but also with a rapidity which could not be approached by a lifetime of practice on the ordinary keyboard.

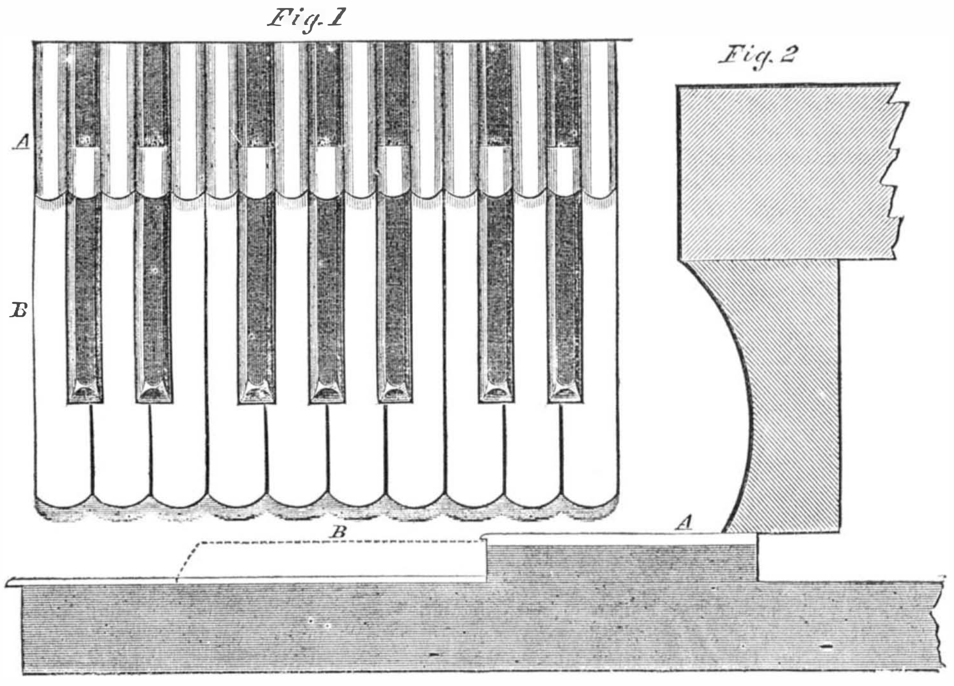
All such passages are played on these keys by adopting fixed extensions for the hands and fingers, and then using the same fingers throughout the whole passage; if written legato, they are played glissando (sliding over the keys with the surface of the nails or the fleshy part of the thumb and little finger). For this manipulation these little keys are exceedingly well adapted, as the fall is very shallow so far back, it being about one-half of that of the white keys in front.

Hitherto glissando playing has been very limited, as it could only be effected on the white keys, and consequently, introduced in very few compositions. Not so now; for chromatic passages are the same in all major and minor keys, and this mode of playing will be available in all compositions.

To some these upper keys may seem rather narrow at first; but the distances are exactly the same as those of the semitones below, to which we are already accustomed, appearing only narrower because they are all on one line. The rapidity with which staccato passages can be played is of course greatly increased by the narrow (level) keys and the shallow fall.

Another advantage is to have two sets of keys; while one hand performs on the lower, the other can move up and down the upper unhindered. In compositions for two or more performers, this keyboard will also be very useful.

In order to illustrate more fully the many advantages and the surprising effects which can be elicited from the instrument with the aid of this little addition to the ordinary keys, the inventor has written pieces expressly for the piano, with chromatic keyboard; they will be followed by compositions from some of our best writers here and abroad. We have the first of these pieces, which is dedicated to Franz Liszt, before us; it is quite a curiosity, and we advise those who take an interest in such matters to send to the inventor for a copy.



PHILIPPI'S IMPROVED CHROMATIC KEYBOARD

Not taking the utility of this keyboard into consideration at all, the exceedingly elegant and rich appearance which it gives to the piano, and the freeness which is obtained for the hands, alone exceed its trifling extra cost.

It is the unanimous opinion of all who have examined this invention and can judge of its importance, that the time is not far off, when the finest seven octave piano, without chromatic keyboard, will be considered just as inadequate and out of fashion as the six octave piano is at the present day.

A number of these pianos have already been made and sold by Gruner & Ossenkop, piano manufacturers at Troy, and we understand that some of our first firms in the city have made arrangements with the inventor. One of these instruments can be seen at Mixsell's, corner of Greene and Fourth streets, New York.

For further information address the inventor and patentee, M. Philippi, at the Troy Female Seminary, Troy, N. Y.

GREEN HOUSES IN GARRETS.

A writer in the *Evening Post* recommends people living in cities to convert their garrets into green houses for raising choice grapes, nectarines, flowers, &c. His plan is to make the roof of glass, and cover the floor with a suitable depth of soil for cultivation. Of course it would be necessary to cover the floor beneath the soil with concrete, zinc, or some other water-tight material, and to provide for leading off the surplus moisture into the gutters. The writer thinks that where furnaces are used in houses, the waste heat would be ample for such a greenhouse, so that there would be no expense except the labor, and thus every family might have a winter supply of black Hamburg grapes, japonicas, &c., for the mere trouble of raising them, which would be a pleasing and amusing employment for the ladies of the household. This is an excellent suggestion. If any of our readers adopt it, we suppose it will require no reminder from us to prompt them to be very careful indeed to have the covering of their floors beneath the soil absolutely water-tight.

CHICAGO SCIENCE.

In Chicago, Ill., there is an association of gentlemen, termed the "Chicago Academy of Science," which was organized in 1857 with the laudable object of promoting science in the northwest. They have adopted some excellent rules for the accomplishment of their designs. In the short space of four years they have collected a cabinet of 40,000 specimens in the various departments of natural science; and of twelve monthly meetings held during the year, five of them must be out of doors among the scenes of nature. The third out-door meeting held this year was in an excursion to the coal mines of La Salle, on the Illinois river, when the whole party descended the mine and explored it thoroughly; and Professor Blaney delivered a lecture on the coal formations of that district.

On the 16th ult., the fourth excursion was taken to Dubuque, celebrated for its lead mines. The lead ore in this region is galena—a sulphuret of lead, which is very rich. It contains no less than 86.6 of lead and 13.4 of sulphur. The whole country around is honeycombed with mines. A lecture was delivered on the occasion, in the theater at Dubuque, on these lead deposits, by Prof. McChesney.

This is the true way to cultivate a knowledge of natural science.

ENGLISH AND AMERICAN GOLD COIN.—English gold coin is 22 parts of pure gold to 2 parts of alloy. One thousand pounds of American gold coin contain 900 pounds pure gold, 50 pounds of silver and 50 of copper. The English coin is the finer.