Scientific American.

A JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, AGRICULTURE, CHEMISTRY, AND MANUFACTURES.

VOL. IV.---NO. 9. NEW YORK, MARCH 2, 1861. NEW SERIES.

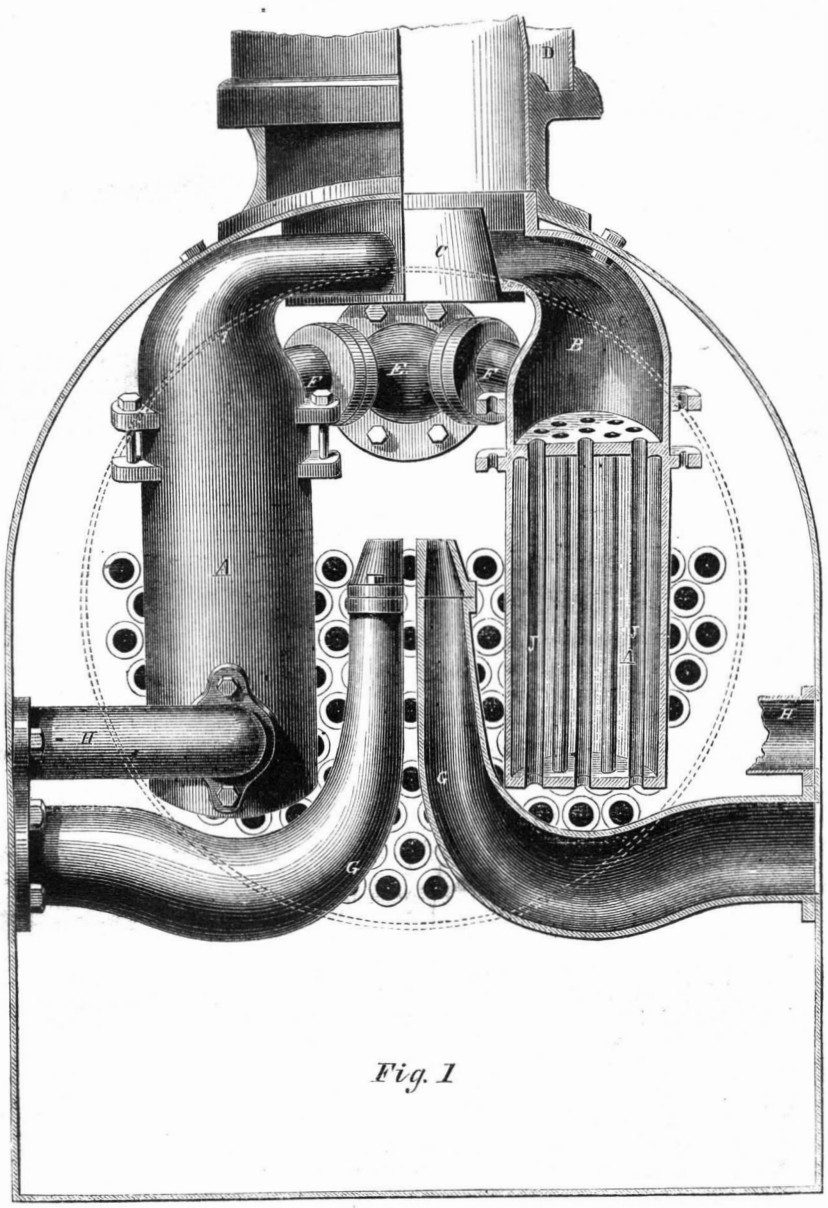


Fig. 1

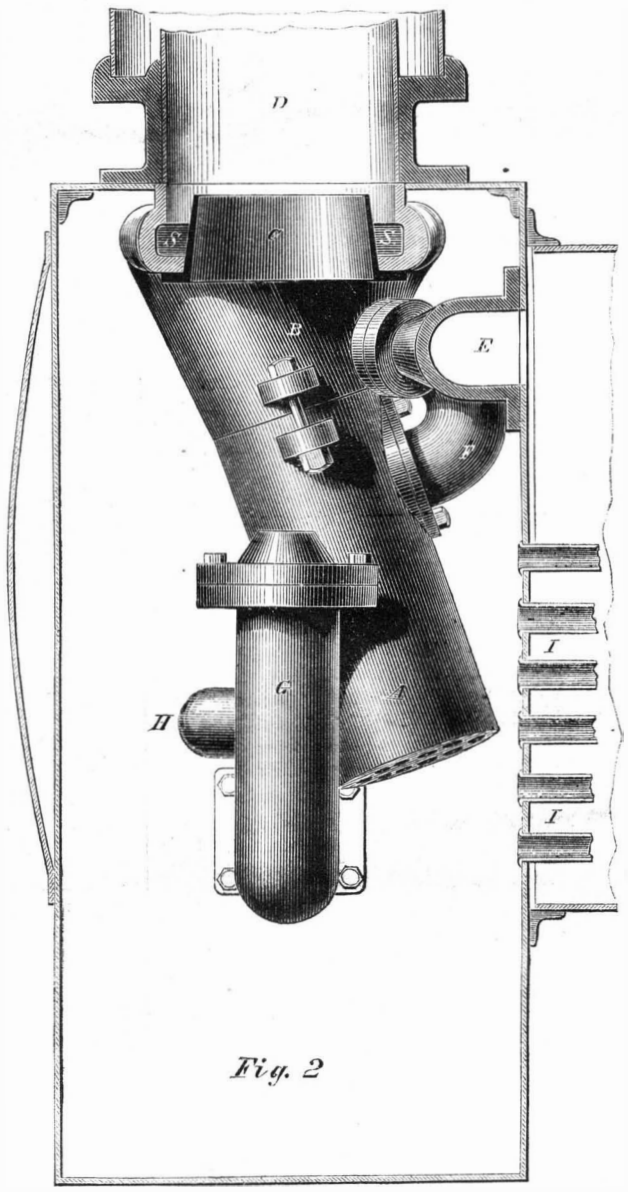


Fig. 2

IMPROVED SUPERHEATER FOR LOCOMOTIVES.

In boiling water that portion is converted into steam which is nearest to the fire, and as the little globes of steam rise up from the bottom of the boiler through the water, they drive up a portion of water, filling the steam space with spray. As this water is carried into the cylinder it of course does no work there, and thus all the fuel expended in heating it is wasted. To complete the evaporation of this spray, the plan has been adopted of imparting to the steam an additional quantity of heat after it has left the water. This is called superheating; it has attracted a great deal of attention, and many forms of mechanism have been devised to accomplish it. The plan which we here illustrate is designed for locomotive engines only. It is now in use on several locomotives on the Grand Trunk Railway of Canada, where it is said to have the most satisfactory success.

In the accompanying engravings Fig. 1 is a transverse section of a locomotive smoke box, in which is placed the improved exhaust chamber and steam surcharger, shown partly in elevation. Fig. 2 is a longitudinal section of the same.

Like letters refer to like parts in each of the figures.

A A are tubular chambers arranged within the smoke box, having a number of flues, J, opening at the bottom into the smoke box, and opening at the top into the large flues or pipes, B B. These pipes, B B, are connected to the tubular chambers, as shown at S. Their upper ends are bent inwardly toward each other, and flattened and elongated and connected to, and passing nearly around the short cylinder, C, placed within the smoke pipe, and forming by their junction therewith an annular chamber, S, which opens into the smoke pipe, D, and causes a strong draught through the flues, J, and through the lower flues of the boiler.

F F are steam pipes branching from the main steam pipe leading from the boiler, and conveying steam from the boiler into the tubular chambers, A, in which the steam will fill the spaces between the flues, and become superheated by the flues.

From the chambers, A A, it is conveyed to the steam cylinders of the engine by the pipes, F'. G are the exhaust pipes opening into the smoke box in the usual way. H H represent the pipes leading from the superheating apparatus to the steam chest.

The operation of this improvement may be described as follows:—The exhaust steam, as it is discharged from the exhaust pipes, G, will cause a strong draught through the chimney. But this draught, though it will strongly exhaust those flues of the boiler which open into the smoke box near the top and center, or at the level of the mouths of the exhaust pipes, will only partially exhaust the lower and side flues, and hence, without further improvement, the lower flues become more or less choked up, as is well known. But the strong draught through the chimney, made by the exhaust, will cause a vacuum to be formed in the annular chamber, S, to fill which vacuum a strong draught will be formed through the flues, J, of the chambers, A, and the pipes, B B. As these flues open into the smoke box near the bottom and sides thereof, the draught through them will thoroughly exhaust the lower and side flues of the boiler, and thereby keep them free from all obstructions and allow the flame a free passage. The smoke and hot gases which pass up these flues, J, will superheat the steam as it circulates in the space around them in the chambers, A, on its way to the steam cylinders, so that, when it passes from the chambers, it will be perfectly dry and free from moisture. It will thus be seen that, by the use of this improvement, is accomplished several great and important advantages: 1st, The increase of the draught through the lower and side flues of the boiler;

2d, The superheating of the steam by the use of waste smoke and hot gases which accumulates in the smoke box or which pass out of the smoke pipe; 3d, And as a consequence thereof, an increased power of steam and great economy in the use of fuel.

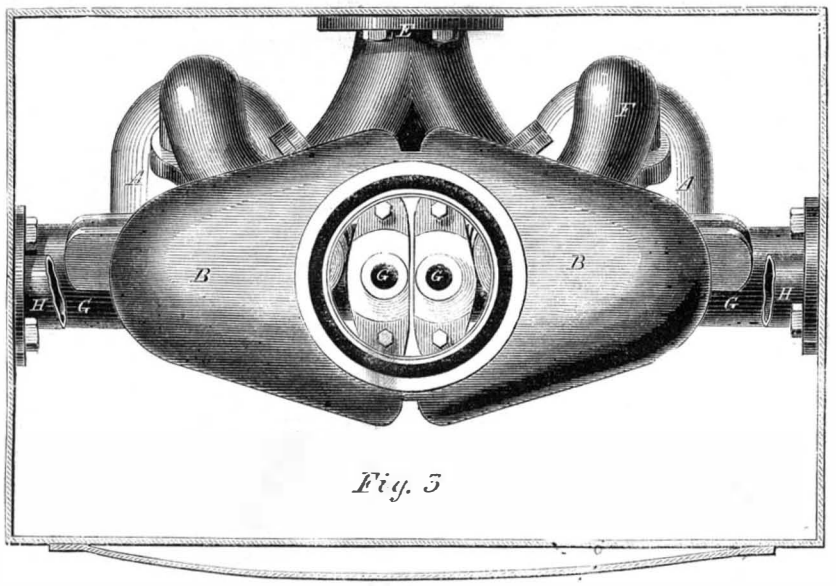


Fig. 5

The American patent bears date Dec. 4, 1860. Patents have also been secured abroad through the Scientific American Patent Agency. Any further information in relation to the invention may be obtained by addressing James E. Thompson, at Buffalo, N. Y.

We Sleep too Little.

On this subject, Dr. J. C. Jackson, celebrated as a water cure practitioner in Western New York, says:—

As a habit and fashion with our people, we sleep too little. It is admitted by all those who are competent to speak on the subject, that the people of the United States, from day to day, not only do not get sufficient sleep, but they do not get sufficient rest. By the preponderance of the nervous over the vital temperament, they need all the recuperating benefits which sleep can offer during each night as it passes. A far better rule would be to get at least eight hours' sleep, and, including sleep, ten hours of incumbent rest. It is a sad mistake that some make, who suppose themselves qualified to speak on the subject, in affirming that persons of a highly-wrought, nervous temperament, need—as compared with those of a more lymphatic or stolid organization—less sleep. The truth is, that where power is expended with great rapidity, by a constitutional law, it is regathered slowly; the reaction, after a while, demanding much more time for the gathering up of new force, than the direct effort demands in expending that force. Thus, a man of the nervous temperament, after he has established a habit of overdoing, recovers from the effect of such overaction much more slowly than a man of different temperament would, if the balance between his power to do and his power to rest is destroyed. As between the nervous and the lymphatic temperaments, therefore, where excess of work is demanded, it will always be seen that, at the close of the day's labor, whether it has been of muscle or thought, the man of nervous temperament, who is tired, finds it difficult to fall asleep, sleeps perturbedly, wakes up excitedly, and is more apt than otherwise to resort to stimulants to place himself in conditions of pleasurable activity. While the man of lymphatic temperament, when tired, falls asleep, sleeps soundly and uninterruptedly, and wakes up in the morning a new man. The facts are against the theory that nervous temperaments recuperate quickly from the fatigues to which their possessors are subjected. Three-fourths of our drunkards are from the ranks of the men of nervous temperaments. Almost all opium-eaters in our country—and their name is legion—are persons of the nervous or nervous-sanguine temperaments. Almost all the men in the country who become the victims of narcotic drug-medication, are of the nervous or nervous-sanguine temperaments.

Dr. Cornell, of Philadelphia, in the *Educator*, gives the following opinion corroborative of the above as an explanation of the frequency of insanity. He says:—

The most frequent and immediate cause of insanity, and one of the most important to guard against, is the want of sleep. Indeed, so rarely do we see a recent case of insanity that is not preceded by want of sleep that it is regarded as almost a sure precursor of mental derangement. Notwithstanding strong hereditary predisposition, ill health, loss of kindred or property, insanity rarely results unless the exciting causes are such as to produce a loss of sleep. A mother loses her only child; a merchant his fortune; the politician, the scholar, the enthusiast may have their minds powerfully excited and disturbed; yet, if they sleep well, they will not become insane. No advice is so good, therefore, to those who have recovered from an attack, or to those who are in delicate health, as that of securing, by all means, sound, regular and refreshing sleep.

"And," says Dr. Spicer, "there is no fact more clearly established in the physiology of man than this, that the brain expands its energies and itself during the hours of wakefulness, and that these are recuperated during sleep; if the recuperation does not equal the expenditure, the brain withers—this is insanity. Thus it is that, in early English history, persons who were condemned to death by being prevented from sleeping, always died raving maniacs; thus it is also, that those who starve to death become insane; the brain is not nourished, and they cannot sleep."

The Mechanical Employment of Women.

On this subject, the London *Mechanics' Magazine* contains the following sensible remarks:—At the present moment 650,000 females are employed in the United Kingdom as milliners, dressmakers, seamstresses and shirtmakers; and their labor being manual, they are, on an average, the most enslaved, most dependent and most unhappy of the industrial classes. Half a million of sewing machines is much needed amongst them. Their introduction would double their wages, and enable them to obtain three times the quantity of clothing which they can purchase out of their present earnings. Nor is there any danger that this market for female labor will be overcrowded, at least for several generations. Men must eventually resign the monotonous drudgery of hand-sewing to machines wrought or attended to by women. Three-fourths of the journeymen and apprentice tailors of Great Britain —50,000 able-bodied men—could well be spared to man our navy, or engage in some more suitable employment than handling the needle. The stitching of men's clothing is a field for labor which women are only beginning to occupy, which is practically unlimited in its extent, and which will give them constant, suitable and remunerative employment. We need scarcely mention the stitching of women's apparel as work suited to the sewing machine and to female hands, nor refer to each of the numerous trades into which this invention has either carried women's labor or increased its value. The employment of women in other kinds of mechanical labor, as printing, telegraphing, watchmaking, &c., is desirable. When new trades are introduced, the unskilled labor of women is naturally preferred, and her sphere of usefulness is widened. But whatever she may gain by new inventions, or by competition with men in the lighter mechanical trades, women's chief employments must ever be, as they have been, connected with the manufacture of clothing; and improvements in the machinery for spinning, weaving and sewing must be ranked among the most important agencies which are at work for the elevation of women and the civilization of our race.

THE CHEMICAL HISTORY OF A CANDLE.

By Professor Faraday.

A Course of Six Lectures (adapted to a Juvenile Audience) Delivered before the Royal Institution of Great Britain.

LECTURE II.—(Continued.)

A Candle; Brightness of the Flame—Air Necessary for Combustion—Production of Water.

Supposing I take a candle and examine it in that part which appears brightest to our eyes. Why, there I get these black particles which already you have seen three or four times evolved from the flame, and which I am now about to evolve in a different way. I will take this candle and clear away the gutterage which occurs by reason of the currents of air; and if I now arrange a glass tube so as just to dip into this luminous part, as in our first experiment, only higher, you see the result. In place of having the same white vapor that you had before, you will now have a black vapor. There it goes, as black as ink. It is now certainly very different from the white vapor, and when we put a light to it you will find that it does not burn but that it puts the light out. Well, these particles, as I said before, are just the smoke of the candle; and this brings to mind that old employment which Dean Swift recommended to servants for their amusement, namely, writing on the ceiling of a room with a candle. But what is that black substance? Why, it is the same carbon which exists in the candle. How comes it out of the candle? It evidently existed in the candle, or else we should not have had it here. And now I want you to follow me in this explanation. You would hardly think that all those substances which fly about London, in the form of soots and blacks, are the very beauty and life of the flame, and which are burned in it as those iron filings were burned here. Here is a piece of wire gauze, which will not let the flame go through it, and I think you will see, almost immediately, that when I bring it low enough to touch that part of the flame which is otherwise so bright that it quells and quenches it at once, and allows a volume of smoke to rise up.

I want you now to follow me in this point—that whenever a substance burns, as the iron filings burnt in the flame of gunpowder, without assuming the vaporous state—they may become liquid or they may remain solid—they become exceedingly luminous. I have here taken three or four cases away from the candle, on purpose to illustrate this point to you; because what I have to say is applicable to all substances, whether they burn or whether they do not burn, that they are exceedingly bright if they retain their solid state, and that it is to this presence of solid particles in the candle that it owes its brilliancy.

Here is a platinum wire which does not change by heat. If I heat it in this flame, see how exceedingly luminous it becomes. I will make the flame dim for the purpose of giving a little light only, and yet you will see that the heat which it can give to that platinum wire, though far less than the heat it has itself, is able to raise the platinum wire to a far higher state of effulgence. This flame has carbon in it; but I will take one that has not carbon it. There is a material, a kind of fuel—a vapor, or gas, whichever you like to call it—in that vessel, and it has no solid particles in it; so I take that because, it is an example of flame itself burning without any solid matter whatever; and it I now put this solid substance in it, and you see what an intense heat it has, and how brightly it causes the solid body to glow. This is the pipe through which we convey this particular gas, which we call hydrogen, and which you shall know all about next time we meet. And here is a substance called oxygen, by means of which this hydrogen can burn; and although we produce, by their mixture, far greater heat than you can get by the candle, yet there is very little light. If, however, I take a solid substance, and put that into it, we get a great light. If I take a bit of lime, which is a thing which will not burn, and which will not vaporize by the heat, and because it does not vaporize remains solid and remains heated, you will find what happens as to the glowing of it. I have a most intense heat here produced by the burning of the hydrogen in contact with the oxygen; but there is as yet very little light—not for want of heat, but for want of particles which can retain their solid state; but when I hold this piece of lime in the flame of the hydrogen as it burns in the oxygen, see how it glows! This is the glorious lime light, which rivals the vol-

taic light, and which is almost equal to the sun light. I have here a piece of carbon or charcoal which will burn and give us light exactly in the same manner as if it were burnt as part of a candle. The heat that is in the flame of a candle decomposes the vapor of the wax and sets free the carbon particles; they rise up heated and glowing as this no glows, and then enter into the air. But the particles when burnt never pass out from a candle in the form of carbon. They go off into the air as a perfectly invisible substance, about which we shall know hereafter.

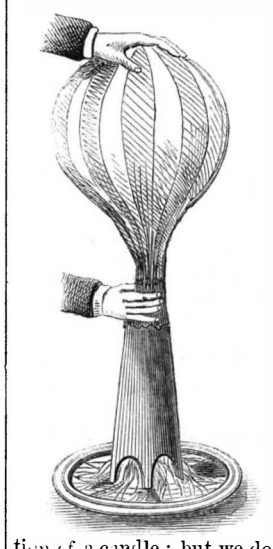
Is it not beautiful to think that such a process is going on, and that such a dirty thing as charcoal can become so incandescent? You see it comes to this—that all bright flames contain these solid particles; all things that burn and produce solid particles, either during the time they are burning, as in the candle, or immediately after being burnt, as in the case of the gunpowder and iron filings, all these things give us this glorious and beautiful light.

I will give you a few illustrations. Here is a piece of phosphorus, which burns with a bright flame. Very well; we may now conclude that phosphorus will produce, either at the moment that it is burning or afterwards, these solid particles. Here is the phosphorus lighted, and I cover it over with this glass for the purpose of keeping in what is produced. What is all that smoke? That smoke consists of those very particles which are produced by the combustion of the phosphorus. Here again are two substances. This is chlorate of potassa, and this is sulphuret of antimony. I shall mix these two things a little, and then they may be burnt in many ways. I shall touch them with a drop of sulphuric acid, for the purpose of giving you an illustration of chemical action, and they will instantly burn. [The lecturer here ignited the mixture by means of sulphuric acid.] Now, from the appearance of things, you can judge whether they produce solid matter in burning. I have given you the train of reasoning which will enable you to say whether they do or do not. And what is this bright flame but the solid particles passing off?

Mr. Anderson has in the furnace a pretty hot crucible—I am about to throw into it some zinc filings, and they will burn with a flame like gunpowder. I make this experiment because you can make it well at home. Now, I want you to see what will be the result of the combustion of this zinc. Here it is burning—burning beautifully like a candle, I may say. But what is all that smoke, and what are those little clouds of wool which will come to you if you cannot come to them, and make themselves sensible to you in the form of the old philosophic wool, as it was called? We shall have left in that crucible, also, a quantity of this woolly matter. But I will take a piece of this same zinc and make an experiment a little more closely at home, as it were. You will have here the same thing happening. Here is a piece of zinc; there [pointing to a jet of hydrogen] is the furnace, and we will set to work and try and burn the metal. It glows, you see; there is the combustion; and there is the white substance into which it burns. And so if I take the flame of hydrogen as the representative of a candle, and show you a substance like zinc burning in the flame, you will see that it was merely during the action of combustion that this substance glowed—while it was kept hot; and if I take a flame of hydrogen and put this white substance from the zinc into it, look how beautifully it glows, and just because it is a solid substance.

I will now take such a flame as I had just now and set free from it the particles of carbon. Here is some camphene, which will burn with a smoke; but if I send these particles of smoke through this pipe into the hydrogen flame, you will see that they will burn and become luminous, because we heat them a second time. There they are. Those are the particles of carbon re-ignited a second time. They are those particles which you can easily see by holding a piece of paper behind them, and which, whilst they are in the flame, are ignited by the heat produced, and, when so ignited, produce this brightness. When the particles are not separated you get no brightness. The flame of coal gas owes its brightness to the separation, during combustion, of these particles of carbon, which are equally in that as in a candle. I can very quickly alter that arrangement. Here, for instance, is a bright flame of gas. Supposing I add so much air to the flame as to cause it all to burn before those particles are set free, I shall not have this brightness; and I can do that in this way:—If I place over the jet this wire gauze cap, as you see, and then light the gas over it, it burns with a non-luminous flame, owing to its having plenty of air mixed with it before it burns; and if I raise the gauze up, you see it does not burn below. There is plenty of carbon in the gas; but because the atmosphere can get to it and mix with it before it burns, you see how pale and blue the flame is. And if I blow upon a bright gas flame, so as to consume all this carbon before it gets heated to the glowing point, it will also burn blue. [The lecturer illustrated his remarks by blowing on the gas light.] The only reason why I have not the same bright light when I thus blow upon the flame is, that the carbon meets with sufficient air to burn it before it gets separated in the flame in a free state. The difference is solely due to the solid particles not being separated before the gas is burnt.

You observe that there are certain products as the result of the combustion of a candle, and that of these products one portion may be considered as charcoal or soot; that charcoal, when afterwards burnt, produces some other product; and it concerns us very much now to ascertain what that other product is. We showed that something was going away; and I want you now to understand how much is going up into the air; and for that purpose we will have combustion on a little larger scale. From that candle ascends heated air, and two or three experiments will show you the ascending current; but in order to give you a notion of the quantity of matter which ascends in this way, I will make an experiment by which I shall try to imprison some of the products of this combustion. For this purpose, I have here what boys call a "fire balloon" I use this fire balloon merely as a sort of measure of the result of the combustion we are considering; and



I am about to make a flame in such an easy and simple manner as shall best serve my present purpose. This plate shall be the "cup," we will say, of the candle; this spirit shall be our fuel; and I am about to place this chimney over it, as it is better for me to do so than to let things proceed at random. Mr. Anderson will now light the fuel, and here, at the top, we shall get the results of the combustion. What we get at the top of that tube is exactly the same, generally speaking, as you get from the combustion of a candle; but we do not get a luminous flame here, because we use a substance which is feeble in carbon. I am about to put this balloon—not into action, because that is not my object, but to show you the effect which results from the action of those products which arise from the candle as they arise here from the furnace. [The balloon was held over the chimney, when it immediately commenced to fill.] You see how it is disposed to ascend; but we must not let it up, because it might come in contact with those upper gas lights, and that would be very inconvenient. [The upper gas lights were turned out at the request of the lecturer, and the balloon was allowed to ascend.] Does not that show you what a large bulk of matter is being evolved? Now there is going through this tube [placing a large glass tube over a candle] all the products of that candle, and you will presently see that the tube will become quite opaque. Suppose I take another candle and place it under a globe, and then put a light on the other side, just to show you what is going on. You see that the sides of the jar become cloudy and the light begins to burn freely. It is the products, you see, which make the light so dim, and this is the same thing which makes the sides of the jar so opaque. If you go home and take a spoon that has been in the cold air and hold it over a candle—not so as to soot it—you will find that it becomes dim just as that jar is dim. If you can get a silver dish, or something of that kind, you will make the experiment still better; and now, just to carry your thoughts forward to the time we shall next meet, let me tell you that it is *water* which causes the dimness, and when we next meet I will show you that we can make it, without difficulty, assume the form of a liquid.

Great Salt Lake.

From an interesting description of the Great Salt Lake, which we find in the Philadelphia *Ledger*, we make the following extracts:—

Away out in the Western wilds, some three hundred miles beyond the Rocky Mountains, and amidst other and loftier mountains still, there exists one of the most remarkable natural curiosities in the world—the Great Salt Lake.

All the streams and rivers which run into Salt Lake have their sources in the Great Basin, and what is remarkable, none of them find their way out of it. There are no outlets to the great lake; it receives the waters of several large rivers, swollen annually by their mountain tributaries, but in no very extensive degree are the waters of the lake increased during the seasons of the most copious flowing of these rivers. What becomes of the water is a question solvable only by the universal laws of nature, which keep the waters within these circumscribed limits in equilibrium, as the same is done on an immeasurable grander scale with the waters of the great oceans of the world. Great Salt Lake, according to the United States government survey, which was completed in 1850, is two hundred and ninety-one miles in circumference on the shore line. The storm line, as it is called, would make it much more extensive. This storm line is the extent to which the waters of the lake are driven by the frequent and violent winds which sweep over its surface, chasing the waters in rolling waves far out upon the salt marches and sandy plains. The lake is oblong, being about twice as long north and south, as it is wide. There are several islands in the lake, which obstruct the view of its whole surface. Of these, Antelope Island is the largest. It is sixteen miles long, and five miles across in its widest part, and it rises three thousand feet above the level of the lake. These islands are all similar in appearance, being long rocky barren mountains, ranging north and south; the same being the general course of all the mountains in that region. On some of the mountain islands are found innumerable quantities of wild water fowl, such as gulls, ducks, white brandt, blue herons, cormorants and pelicans, and the eggs are sometimes found so thick upon the ground in favorite spots, that it is impossible to walk without tramping upon them; these fowls find their food in the rivers and streams which flow into the lake. No living thing of any kind exists in the waters of the lake. A deep dark colored substance is washed to the shore, which on the shore somewhat resembles very small dried leaves, and in the water looks like mud; this has been proved to be the larvæ of insects, and when disturbed it emits a most nauseating smell. Where they come from, is a question which has never been solved; perhaps they were winged insects and fell into the lake. The water of the lake is salter than any other upon the face of the earth. Persons engaged in boiling salt on the shores of the lake, say that three buckets of the water dipped out of the lake and boiled in an open wooden trough, with a sheet iron bottom, will yield one bucket of salt; or, in other words, that it is one third salt.

The analysis of the water made under the United States Survey in 1850, says that the water contains more than twenty per cent of pure chloride of sodium, and about two per cent of other salts, making one of the purest and most concentrated brines known to the world. The specific gravity of the water is very great; this in the same analysis is given at 1.170, water being 1000. The water is so heavy or buoyant, that a person bathing in it can sit upright, with head, shoulders and arms out of the water, like sitting on a rocking chair; and a person can lie on the surface with head, hands and feet out of the water. In the lake the color of the water is a very deep dark blue, much more so than the ocean, but when taken in the hand it is transparent. The water in the lake is generally very shallow for long distances from the shore, and though it is deeper farther out, yet it cannot be said to be a deep lake. Its rapid changes, receding from one place and rolling out upon another, caused by the frequent and violent storms, which come sometimes suddenly without any premonition, sweeping over it with the resistless fury of tornadoes, render it very unsafe for navigation in boats; indeed, it is not considered naviga-

ble. This great salt lake is only used at present for boiling a little salt upon its dreary, desolate shores.

A Burner that will Save One-third of the Gas.

The French scientific and mechanical journals are very enthusiastic in their praises of a new gas burner which has recently been invented in France. The warmth and heartiness of their admiration are perfectly delicious. Hear *Le Cosmos*:—

"A new burner, greatly improved, which should give a flame nearly absolutely steady, perfectly similar to that of the best lamps with purified oil, and a light like that of very rich and dense portable gas; which, at an equal expense to the consumer, should furnish a half or a third more light, or which should give the same quantity of light with a consumption less than a half or a third; which, finally, entirely transparent or diaphanous, allows itself to be traversed freely by the light of the flame, in a manner to illuminate completely objects situated immediately below it, would be a precious conquest—a beneficent progress. This conquest—this progress has been made, and *Le Cosmos* is happy to announce that its realization is due to a modest inventor of Province, Mr. Monier, of Manosque. His athermic and diaphanous burner is so simple, so easy to construct; it produces so great economy of gas; it is so agreeable to the eye; the chimney which covers the flame becomes so little heated; this flame is so dense and so steady, that it has seduced (the word is not in the least exaggerating) all those who have tried it; and not a single one of the consumers at whose houses it has been put up has consented to part with it. Hence it is spreading with an incredible rapidity."

L'Invention says:—"We desired to be satisfied for ourselves of the veracity of the reports, and we visited five or six of the numerous establishments where the burners of Mr. Monier are in operation, in order to know whether the praises of the press had not been in any respect exaggerated. After a conscientious examination, we are, in effect, convinced of the four following verities:—

1st. The complete absence of all shade.
2d. Considerable diminution of heat.
3d. A softer and more intense light.
4th. Remarkable steadiness of the flame.

In regard to the fifth condition, which had been affirmed by the inventor, and which is also asserted in divers scientific reports, viz., that the crystal burner effects an *economy of thirty per cent at least of gas for an equal quantity of light*, we ought to rely with confidence on the testimony of the Imperial Conservatory of Arts and Trades, of the Universal Academy of Arts and Manufactures, and, finally, of the Society of Encouragement for National Industry, who have made experiments with it, the result of which is pronounced by the honorable reporter, Mr. Silberman, in the following terms:—

"'The new burner of Mr. Monier has been tried in comparison with three different burners. The burners were arranged each on a meter, and after one experiment, the position of the burners in relation to the meters was reversed. The Monier burner was pierced with 30 holes. It was compared with, 1st, A Manchester burner with two inclined holes; 2d, A Maccaud burner with 30 holes; 3d, A porcelain burner with a steel tip, with 25 holes. (Here follows an account of the experiments.) It will be seen by the above experiments, adds Mr. Silberman, that the Monier burner effects a saving of one-third in the consumption of gas.'

"It is in presence of these brilliant proofs that the Society of Encouragement have voted thanks to Mr. Monier, and have decreed to him a silver medal, to be followed a short time after by a medal of honor from the Universal Academy of Arts and Manufactures. Both of these learned societies have also admitted him among their members.

"In regard to us, impartial organ of the industrial press, after all that we have seen with our own eyes, we have no need of the numerous certificates which have been presented to us; we have found in them only a superabundant manifestation, although very honorable, of all the facts which have been stated above, and which time and experience will, without doubt, more fully confirm."

THE Oswego Starch Company have made 8,500,000 lbs. of starch the past year. They have the largest establishment of the kind in the world.

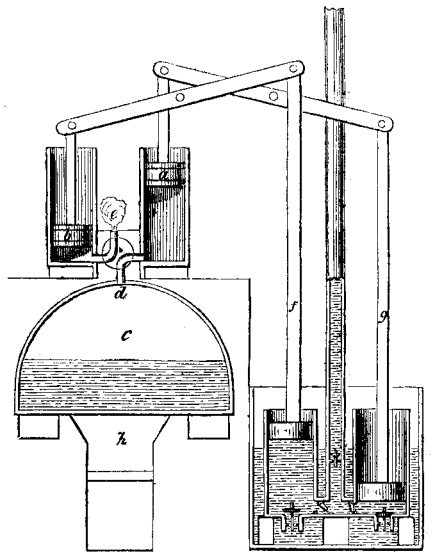
ROMANCE OF THE STEAM ENGINE.

ARTICLE XII.

LEUPOLD'S HIGH-PRESSURE ENGINE.

We have now published engravings representing the steam engine in its various stages of growth, dating back to centuries before the Christian era; and through the many dark ages of its childhood it had only attained to the ability to "walk alone" under the care of Newcomen, Cawley, Potter and Beighton, as shown by the illustration in our last article. With the exception of the engines of Newcomen and Cawley, no motion had before been given to machinery by means of a steam engine through the intervention of a piston, still this motion was just as much produced by atmospheric pressure as by steam. The piston was raised in the cylinder to the end of the stroke by steam, then a vacuum was produced under the piston by the injection of cold water, when the pressure of the atmosphere forced down the piston. We have now come to the description of a different kind of piston engine, one which may be operated entirely by the pressure of the steam, hence it was called "Leupold's High-pressure Steam Engine," because the steam that was required to operate it was necessarily maintained at a higher pressure than that of the atmosphere.

The accompanying figure is a vertical section of this steam motor. The two steam cylinders are set above



the boiler and quite close to it. This was the customary arrangement of all the first piston engines; *a b* are the two pistons, connected by rods to separate vibrating levers; *h* is the furnace and *c* is the boiler. The levers of the steam cylinders are connected with rods, *f* and *g* of two force pumps for raising water through the pipe, *i*. The operation of this engine is peculiar. A communication is opened with the boiler by means of a channel, *d*, in a four-way cock, and the under side of the piston, *a*, when the steam raises up the piston to the top of the cylinder. This presses the pump rod, *g*, on the other end of the lever downward in the pump barrel, when the water was forced up the pipe, *i*. When the piston, *a*, was elevated to the end of its up-stroke, the four-way cock shown above the boiler was turned round, when the channel, *d*, became an exhaust from under the piston, *a*, into the atmosphere, and at the same time the channel, *e*, was brought into position similar to that which *d* had occupied. The steam now entered under the piston, *d*, which is now elevated in turn, and it forced down the other plunger of the pump. This is an engine composed of two single high-pressure cylinders operating two single-acting force pumps. The four-way cock for admitting, shutting off and exhausting the steam is a most ingenious arrangement.

The inventor of this engine was E. Leupold, a German, and a native of Planitz, who published a description of his invention in 1723. He was a most ingenious man and early exhibited a great taste for mechanism. He learned the trade of cabinet maker and turner, but being of a delicate constitution, he afterwards studied theology, with a view of entering the Church. He attended the university of Wirtemberg, where he found favor with the professors, and was accorded the privilege of admission to the library and all the mathematical instruments connected with it. He published a work on machinery, containing illustrated descriptions of all the machines he was able to collect models and drawings of; and it cost him great labor and research. Prior to this invention he had greatly improved the steam wheel of Amontons (illustrated on page 68, present volume of the SCIENTIFIC AMERICAN), but he soon saw its impracticable character. Leupold was a man of great candor and honest simplicity. He gave the renowned Denys Papin full credit for the four-way cock which he employed for his steam passages, as he had merely transferred it from an air to a steam engine. Leupold came very near inventing the high-pressure steam engine as we now have it. If he had only made the steam to act upon the piston for both the up and down-strokes, he would have achieved this object, but this was left for a more comprehensive mind to accomplish.

Burning and Half-burning Coal.

There are two proportions in which oxygen combines with carbon. To illustrate these let the oxygen atoms be represented by O O, and the carbon atoms by asterisks, * *. Now when one atom of oxygen combines with one of carbon, thus, *O *O *O, a substance is formed which is called carbonic oxyd. It is produced when carbon is burned with an insufficient supply of air. As one atom of carbon combines with one atom of oxygen to form an atom of carbonic oxyd (C O), and as the carbon atom weighs 6 to the oxygen atom, 8, it follows that 14 pounds of carbonic oxyd contain 6 pounds of carbon and 8 pounds of oxygen.

The other proportion in which carbon combines with oxygen is one atom of carbon with two of oxygen, (CO_2), thus, O*O, O*O, O*O, forming carbonic acid. Carbonic oxyd may be burned into carbonic acid, each of its atoms, *O *O, taking on another atom of oxygen, O*O, O*O, CO becoming CO_2. As substances in burning give off heat in proportion to the oxygen with which they combine, when carbon burns into carbonic acid it gives off just twice the heat that it does when it burns into carbonic oxyd, and carbonic oxyd in burning into carbonic acid gives off just as much heat as was produced at the first combustion of the carbon into carbonic oxyd.

Coal may be wasted by allowing the carbon to pass off either unburned at all in the form of smoke, or half burned only into carbonic oxyd. If an ample supply of air is furnished to the burning coal, and the mass is confined so as to retain the heat, it is generally burned at once into carbonic acid, but in most anthracite furnaces a considerable portion escapes as carbonic oxyd. Great attention is now being given by engineers to prevent this waste, the plan usually adopted being to admit air over the top of the fire. Holes in the furnace doors have been found to effect a considerable economy in coal. When carbonic oxyd burns it produces a beautiful blue flame, and this may frequently be seen playing on the top of an anthracite fire in a grate. When fires in steamboats are too freely fed with coal, the carbonic oxyd may be seen burning with the same blue flame at the top of the smoke stacks.

Winding up a Steamboat.

It is seldom one sees a more forcible instance of the "pursuit of knowledge under difficulties" than is recorded in the following sketch of a verdant Connecticut youth's first voyage in a steamboat:—

His curiosity was unbounded. He examined here, he scrutinized there; he wormed from the engineer a compulsory lecture on the steam engine and mechanics in general; and from the fireman an essay on the power of "white heat," and the average consumption of pine wood, &c.

At length his "inquiring mind" was checked in the investigations. He had mounted on the wheel house, and was asking the pilot:—

"What you doin' that for, Mister? What good does it do?"

He was here observed by the captain, who said, in a gruff voice:—

"Go away from there! Don't you see the sign?—'No talking to the man at the helm.' Go 'way!"

"Oh, certain'—y-e-s; but I only wanted to know ——"

"Well, you do know now that you can't talk to him; so just go 'way."

With reluctant unwillingness the verdant youth came down, and as it was soon dark, he presently went below; but four or five times before he "turned in" he was on deck and near the wheel house, eyeing it with a thoughtful curiosity, but, with the captain's rebuff still in his ears, ventured to ask no questions.

In the first gray of morning he was up and out on deck; and, after some hesitation, perceiving nobody near save the pilot, who was turning the wheel as when he last saw him, he asked his suppressed question in an oblique style, somewhat characteristic of his region:—

"Wal—goin' it yet, ha? Been at it all night, ha? *A screwin' on her up, ha?*"

What vague ideas of "screwin' up" to make her "go ahead" must have bothered the poor fellow's brain during the night!

We warrant this genius has taken out patents before thistime for an improved steering apparatus.

THE MOTIONS OF THE FIXED STARS.

That grandest of all problems that have ever engaged the attention of the human mind—the structure and motions of our stellar system—is moving steadily forward to its solution. The early observers of the heavens saw the sky rolling constantly around the earth from east to west, as if it was a great hollow globe hung upon a pivot at the north star, and upon another pivot at the south pole. The fixed stars seemed like silver nail heads driven firmly into the rolling shell, and carried with it in its daily revolution around the earth, but preserving the same position in relation to each other from year to year, and century to century. This opinion in regard to the immovable position of the fixed stars continued to prevail down to the last century, when the large and bold intellect of Sir William Herschel, as the inscription on his monument says, "broke through the inclosures of Heaven" (*cœlorum perrupit claustra*), and went forth to the study of the universe of stars. The observations of Herschel proved that the stars which are visible to our eyes, including the innumerable multitudes whose blended light makes up the "milky way," form a cluster or system by themselves, which is separated by inconceivable distances from other clusters that are to be seen as faint nebulæ in the depths of space. Since Herschel's observations were made, the study of our stellar system has occupied a large share of the attention of astronomers. The most important contribution to our knowledge of the subject has been made by the herculean labors of M. Maedler, superintendent of the Observatory of Dorpat, in Russia.

The most prominent questions which presented themselves to astronomers, in regard to our stellar system, were: What are its form and dimensions? Is there a great central body about which the others are revolving, as the planets revolve about our sun? Is our solar system moving among the other stars? and if so, in what direction and with what velocity? Some of these questions have been pretty satisfactorily answered, while suggestions of greater or less probability are offered in relation to the others.

There can be no doubt that our solar system is moving through space in the direction of the constellation Hercules, the precise point being not far from 262° right ascension, and 40° north declination. Nearly all astronomers acquiesce also in Maedler's conclusion, that there is no large central body which controls the movements of the other stars by its preponderating mass. Maedler is, however, satisfied that all the bodies of our stellar system are revolving about a common center of gravity, and to the determining of the position of this center he has devoted a great deal of labor and study.

Among all the constellations in the sky, there is no other which has, in all ages, attracted so much human interest as the little cluster of the Pleiades. One of the finest passages in Scripture is the question to Job: "Canst thou bind the sweet influence of Pleiades, or loose the bands of Orion?" And, for many centuries, a succession of poetic feeling has gathered around "The long lost sister of the seven stars." But a fresh interest has now been given to this storied group, for the computations of Maedler lead to the conclusion that Alcyone, the brightest star of the cluster, occupies the very center around which the hosts of heaven roll their majestic courses.

The distance of our sun from the centre of gravity of this stellar system, as well as the velocity of its motion, is yet undetermined, though some of Maedler's observations indicate that the distance is such that it would take light 640 years to pass through the space, that the sun's velocity in his orbit is about 1,000 miles per minute, and that it will take him about 20,000,000 of years to make one revolution. The latest conclusion in regard to the size of our stellar system, is that a ray of light, moving at the rate of 192,000 miles per second, would require about 4,000 years to pass through its diameter.

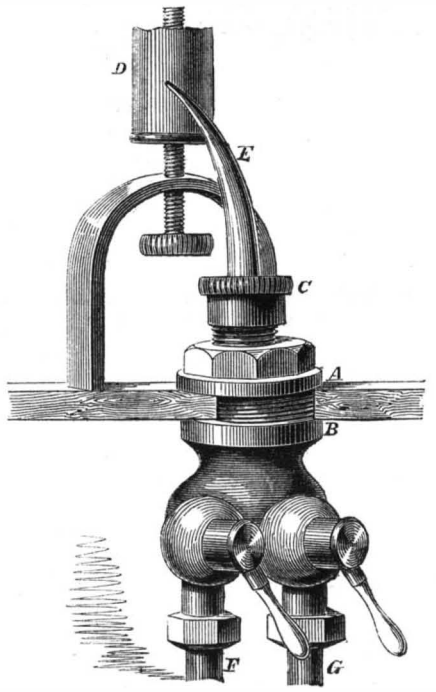
The Pleiades are at this time of the year almost exactly overhead at 6 o'clock in the evening, and, of course, farther west later in the evening. A little way to the southeast of the Pleiades are the Hyades—five stars in the form of a V, with a bright star in the end of one side. Still farther to the southeast is Orion, with the three bright stars in his belt. Farther still, in the same direction, forming almost a straight line with the three groups mentioned, is the Dog Star, Sirius, the brightest of all the fixed stars. But, as we have said, the most interesting of these is the faint little cluster of Pleiades, for it is probable that around the brightest of this group, Alcyone, our own sun and all the stars that we can see in the sky, are sweeping in their immense orbits.

THE LIME LIGHT.

The production of artificial light is attracting an unusual amount of attention throughout the civilized world, and there is no subject more worthy of attention. As in this connection the interest in the lime light has been revived, and efforts are being made to overcome the obstacles to its practical use, we give an illustration and description of it.

Early in this century, Dr. Robert Hare, of Philadelphia, first suggested the idea that hydrogen burning in pure oxygen ought to produce a greater heat than the burning of any other substance, and he contrived the first apparatus for testing the matter. Filling one reservoir with pure oxygen gas and another with twice the bulk of pure hydrogen, he inserted a pipe in each and brought the two pipes together in fine points at their end, so that the two gases might flow out in a mingled jet. On lighting this jet, the heat was found to be, as Hare anticipated, more intense than any other produced by artificial means; substances which had never been melted were very soon fused when exposed to this flame, and compound substances which had resisted the action of all chemical agents were at once decomposed by it into their primitive elements. Professor Silliman gave to the apparatus the name of "The Compound Blowpipe," by which name it was soon known throughout the civilized world, where it has played a great part and made important contributions to our knowledge of nature. By its means Sir Humphrey Davy decomposed potassa, soda, &c., and ascertained that the crust of our earth is composed almost wholly of metallic oxyds.

Dr. Hare noticed that certain substances exposed to the flame of the compound blowpipe emitted a very



brilliant light; and on trying different substances it was found that lime thus heated gave out a more intense light than any which had before been produced by artificial means. This is the lime light, sometimes called "The Calcium Light," as lime is the oxyd of that metal, or "The Drummond Light," from Lieut. Drummond, of England, who first applied the light to practical purposes.

In constructing and using the compound blowpipe, some precautions are necessary. If hydrogen and oxygen gases are mixed together mechanically in the same vessel, in the proportions in which they unite to form water—that is, two volumes of hydrogen to one of oxygen—they will remain thus mixed for any length of time; but if a spark of electricity, or the least particle of flame comes in contact with them, they immediately unite in chemical combination, generating intense heat which expands them momentarily, producing a violent explosion. Though the gases are kept in separate reservoirs, they are liable to become mixed by the back flow of one through the pipe of the other, and to guard against an explosion, a wire gauze is introduced into the pipe near the jet; gauze, as is well known, having the singular property of cutting off the flame of gas.

The annexed cut represents the simple apparatus for producing the lime light. The two gases are brought from their reservoirs by the pipes, F and G, and being combined and lighted throw out the hottest of all flames. D is the cylinder of lime, which may be half an inch or less in diameter, and which is pierced through its length with a hole for the screw that supports it. The pipe is secured to the table by means of the shoulder, B, and nut, A. The tube upon which the nut, A, works is filled with a number of fine gauze disks, and the jet, E, fits upon it; the joint being made air-tight by a washer screwed down by the nut, C.

In using the light, the hydrogen gas should first be turned on and lighted to heat the lime gradually, for if it is too suddenly heated by the flame of the combined gases, it will crack or decrepitate. Thick green spectacles should always be worn to protect the eyes while experimenting with this intense light. It is now usual to employ the common illuminating gas in place of pure hydrogen, from the greater convenience of procuring it. In this case, the volume of illuminating gas used is not twice that of oxygen, but is nearly the same, varying somewhat with the quality of the gas.

AMERICAN NAVAL ARCHITECTURE.

[Reported for the Scientific American.]

THE STEAMER "THOMAS FREEBORN."

The hull of this vessel was constructed by Messrs. Lawrence & Foulkes, Williamsburgh, L. I. The machinery was made by the Allaire Works, New York city. Her owners are Mr. Richard Squires and others of this city, and she will be commanded by that experienced pilot and great favorite, Mr. Otis F. Morrell. Her intended service will be that of towing on the coast, and in the harbor of New York. She is such a thoroughly excellent vessel of her class, we deem it not inappropriate that the particulars of her hull and machinery should have a place in our columns, and so proceed to give them, in detail, as follows:—

Length on deck, 143 feet; length at load line, 140 feet; breadth of beam (molded), 25 feet; depth of hold to spar deck, 9 feet; draft of water at load line, 6 feet; area of immersed section at this draft, 127 square feet; tunnage, 306 tuns. Her hull is of the best seasoned white oak, &c., and very securely fastened with copper, treenails, spikes, &c., &c. The floors are molded 14 inches, and sided 5 inches. Distance of frames apart from centers, 16 inches. She has one 14-inch keelson running the entire length of her, and two of 7 inches on her bilge; she has also 9 feet of dead wood forward, and 7 feet aft; every deck beam is kneed and bolted in the most substantial manner; the ceiling is of yellow pine.

The *Thomas Freeborn* is fitted with one vertical beam condensing engine; diameter of cylinder, 40 inches; length of stroke of piston, 8 feet; diameter of water wheels over boards, 20 feet; length of wheel blades, 7½ feet; number of same, 14.

She is also supplied with one return flue boiler; length, 22 feet; breadth, 10½ feet; hight (exclusive of steam chimney), 9 feet; number of furnaces, 2; breadth of these, 4 feet 5½ inches; length of grate-bars, 7 feet; number of flues in boiler above, 16; number of flues below, 10; internal diameter of those above, 9½ inches; internal diameter of those below, 2 of 19 inches, 4 of 12 inches, and 4 of 10 inches; length of those above, 15 feet 3 inches; length of those below, 9 feet; she possesses one smoke pipe, fitted with slip-joint; diameter of this, 48 inches; hight above grates, 47 feet. The boiler possesses a grate surface equal to 62 square feet, and a heating surface of 1,457 square feet; maximum pressure of steam, 30 pounds; point of cutting off, one-half; the boiler is located in hold, and does not use blowers; the bunkers are of wood. She has one bilge injection, and bottom valves or cocks to all openings in her bottom. She is named after one of our Sandy Hook pilots, who lost his life while in the discharge of his duty on board the ship *John Minturn*, some nineteen years ago on the Jersey coast, at that time a greater terror to mariners than now.

Our Correspondence.

Rifles---Breech and Muzzle Loaders.

Messrs. Editors :—I noticed in the Scientific American, page 73, present volume, an article from you upon the subject of fire arms and rifle breech-loaders. I have looked long and anxiously in your columns for a series of articles upon the nature, principles, construction, and manipulation of small arms, particularly rifles. But whilst almost every other manufacture has heretofore received a very careful description in detail in all their parts and principles of construction and application, the subject of small arms seems to have been reserved to the present time, which is not an inappropriate one, considering the present aspect of affairs in our country. I therefore embrace it to bring forth additional facts and shed such light upon this important subject as must interest a large portion of your readers.

There is one point in your article to which I wish to call your attention. You say, "there is nothing in theory, and there should be no positive difficulty in practice, to prevent a breech-loading rifle from being made to carry as accurately as any other." I believe that this can never be done for reasons that I will endeavor to advance. Having been engaged in the manufacture of customer rifles for several years past, and having given the subject of their construction a great deal of reflection, based upon many careful experiments of my own, I think I can safely say, without danger of contradiction, that the majority of all the so-called secrets of a first class shooting rifle are wrapped up in that one word *friction*. In the production of a perfect rifle a certain amount of friction must be given to the ball throughout every part of the bore of the gun, but the friction in different parts of the bore, of course, is not equal. The exact amount of friction to be secured to the ball is of less importance than that it should be exactly the same for every shot that is fired; because if it is not the same, the shooting will be irregular—incorrect. Too much friction retards the ball, and a slight diminution of it increases its speed. If the diminution of friction is considerable, the ball is ejected from the bore before the full pressure of the charge is brought to bear upon it, and its speed is thereby lessened.

Now I believe that a breech-loading rifle can never be made to carry so accurately as a muzzle-loading one, for the reason that its balls can never be made to receive such an exact and equal amount of friction, as those balls that are loaded at the muzzle, because the latter are gaged to the size of the bore on being forced into the muzzle. And being fitted to the creases, and having once passed through the bore, they are perfectly conformed to every part of its surface. These balls, when discharged, receive a sufficient amount of friction to secure the best results. It is necessary for balls that are loaded at the breech to have a longer bearing, as this greatly increases its friction; and I am not aware that breech-loaders can make use of a patch, which I consider is a very important diminisher and equalizer of friction, and for which I know of no substitute. Take the patch away from the muzzle-loading rifle, and the weapon is manifestly inferior.

While very great pains have been taken to render the rifle perfect, so far as to shoot with the greatest accuracy, there is one important part in the construction of this weapon which seems to be almost overlooked, that is a sight, which can be quickly and accurately adjusted to all the different ranges for which a rifle is used. Such a sight I invented several years ago. I have made a great number of them since that time, and I am confident they are very superior and useful. The importance of this part of a rifle may be better appreciated and understood, when I state a few facts that are known even to but few persons who are in the daily habitual use of this weapon. Thus an ordinary sized rifle, such as is commonly used for hunting and sporting purposes, and carrying a conic ball with the usual charge of powder, will, at the distance of twenty rods, drop its ball eight inches below the line of the bore; at 40 rods, its fall will be nearly 4 feet; at 60, 10 feet; at 80 rods, 22 feet; at 100 rods, about 40 feet; and a proportionate amount at all intermediate distances.

If any rifle shooter should doubt these statements, he can immediately convince himself of the truth, in the following very simple manner :—Having charged his rifle as usual, let him draw a horizontal line across his target at which to direct his aim, then let him place his rifle upon a rest; but, instead of the usual upright position, turn his rifle over directly upon one side, so as to bring the sights in a direct horizontal line with the center of the bore. In this manner it can be held to the shoulder, and, with careful aim, discharged. The target should be such a size that it will not be missed by the shot. If the rifle lies upon its right side, which is most convenient for the experiment, the shooting will be somewhat to the right of the aim; but the distance below the line at which the ball strikes, will indicate accurately the amount of the fall. Such an experiment to the person who makes it, will be more convincing than an hour of argument.

John S. Dutton.

Jaffrey, N. H.

Rifle Barrels---Hard or Soft?

Messrs. Editors:—Reading the articles which appeared on pages 57 and 86, present volume of the Scientific American, on rifles, allow me to address you a few words on the subject stating my opinion, which is founded, not merely upon a limited experience in the use of the rifle, but also upon experience in its mode of construction.

Your correspondent, "B," on page 86 asserts that the Western hunters prefer a very soft barrel, but he does not give any reason why, and I presume that these hunters themselves cannot explain why a barrel made from fine, soft cast steel should shoot any better than one made from hard steel of the same quality.

My experience in rifling barrels has led me to believe that the superior qualities ascribed to a soft barrel are due more to the perfect finish it receives than to any particular degree of softness of the material of which it is made. Any practical gunsmith will testify to the difficulty of straightening, boring and rifling a hard barrel. The tools for boring and rifling require to have very keen, smooth cutting edges, and if the barrels are soft, the tools make a clean cut, leaving a smooth even surface that requires but a very little polishing to finish it. On the contrary, if the barrel is hard, the sharp cutting edges of these tools are sure to wear or crumble off speedily, and instead of cutting they scrape off the particles of the metal, thereby leaving a rough, uneven surface, and then, in order to make it smooth, it requires an excess of polishing with emery. This wears away the sharp angles of the grooves, so essential for a good-shooting rifle.

H. W. Oliver.

Whitneyville, Conn., February 4, 1861.

Singular Accident.

Messrs. Editors:—The latter end of last July, during a tremendous rain storm, the six tin conductors from the roof of our new market house collapsed, and from 10 to 20 feet of the upper part of the pipes, which were 5 inches in diameter and about 30 feet in hight, instantly flattened, all at the same time, so that no water could pass. Likewise, some time past, a tinman having finished the roof of a house and put on the large conductor, wished to give it a coat of paint. He placed a wooden plug in the eave pipe to hold his rope, but forgetting to take out the plug until the gutter was filled with water by a sudden rain, when he took it out; the pipe instantly flattened. Another instance has been mentioned to me similar to these. There may have been a satisfactory explanation, but I have not heard it. I wish to give my view, and then, if not correct, you can put me right. Many thought it singular that a pipe full of water should be pressed flat.

I think it is thus:—The deep gutter was filled with water, the rain falling faster than the pipe could carry it off, and it fell almost in a solid perpendicular mass. The law of falling bodies in vacuo being about 16 feet the first second and a greatly accelerated velocity the next second, so that the lower portion of the column of water traveling faster than the upper would have a tendency to produce a vacuum; but the tin being weak gave way, as the lower part of the pipe with the velocity of that portion of water would discharge more water than the upper end of the pipe would take in, only having the pressure of 4 feet of water, or even less.

This law of falling bodies, and this, the momentum of the falling body, drew the lower portion of the water from the upper, so that the column of water was stretched and the tin pipe could not withstand the pressure.

I think either or both these explanations must be the cause. The first I give I think amply sufficient, as it would act precisely as a suction pump to a hose full of water; the leather sides would be pressed together when the pump acted.

You will much oblige me by referring to this rather novel accident and give us the true explanation.

Robert T. Knight.

Philadelphia, Pa., January 22, 1861.

[The explanation seems to us plausible. The flow of water into the top of the pipe became obstructed, perhaps simply by counteracting motions of the water, that at the bottom run out, leaving a vacuum between, when the pipe was flattened by the pressure of the atmosphere on the outside.—Eds.

Explosions in a Tea Kettle.

Messrs. Editors:—On the morning of the 31st of December last an explosion took place at my house in a copper tea kettle, in which water was heating, but had got only moderately warm. The cover was blown about three feet from the stove. I stood immediately by at the time. No harm was caused by the explosion. Lime had collected at the bottom of the kettle to nearly a quarter of an inch in thickness. On examination, I found the lime at the bottom entirely loose, having apparently started in the center, leaving the pieces as though cut from side to side through the center. My idea is, that as metal is the best conductor, and as the metal expanded and contracted by heat and cold, and, the crust becoming more stiff day by day, the two partially separated, a crack having occurred in the crust; a small quantity of water suddenly came in contact with the hot metal causing steam, raising and breaking the crust, letting more water to the metal, and an explosion took place. May not this be a cause of some of the mysterious boiler explosions?

Major A. Willcocks.

Rolley, Iowa, Feb. 5, 1861.

Heavy Iron Castings.

Messrs. Editors:—The Novelty Iron Works of this city have recently completed two massive iron castings for a new steamer belonging to the Pacific Mail Steamship Company. They are a steam cylinder and a surface condenser, portions of an engine now building. The dimensions of the castings are as follows;—Diameter of steam cylinder, 105 inches, bored; length, 13 feet 9 inches; and weight of metal, 20 tuns. Dimensions of condenser: 9 feet 9 inches high, 10 feet 9 inches wide, and 13 feet long, containing 5,500 brass tubes, ⅝ths of an inch in diameter by 9 feet long, and weighing, for the casting alone as it comes from the foundry, 25 tuns. Both of these castings have unrivaled sharpness of outline, and, so far as ascertained, are without flaw or blow hole; as specimens of workmanship they are admirable. The sole plate for the engine upon which the before-mentioned structures are bolted has not yet been poured. It is a novel sight to witness the casting of these large pieces; the men hurrying hither and thither, the sullen glare of the molten metal and the huge ladles or cauldrons of liquid iron decanting their contents seemingly into the ground, the anxious eye of the master workman, and the corruscations of the seething metal as it flows through the "gates," and so finds its way into all the intricacies of the mold, the little spurts of blue flame flickering here and there—these form a combination of effects which once seen are always remembered.

E.

Hair Dyes.

Messrs. Editors:—Several noted parties are advertising a "hair restorer." I have analyzed three of them and find them identical, viz.:—two ounces of sulphur, one ounce of sugar of lead, one quart of water. The testimonials from clergymen and others to the efficacy of the mixture for restoring gray hair to its original color, &c., are overwhelming. Now, is it safe? Will it do what is claimed for it?

T. N. J.

North Reading, Mass., Feb. 8, 1861.

[We have no doubt that our correspondent is amply competent to decide for himself about the value of advertised nostrums, and that he is able to estimate "certificates" at about their just weight. Such hair mixtures are old and well known, and are sold under different names with a slight alteration in their composition. They are usually made with sulphur steeped

in alcohol, and a little rose water added to neutralize the offensive sulphurous odor. Thus made, it is called "Twigg's mixture," as it is stated the redoubted general of this name, having been recommended to use such a wash for a wound in his head, found, to his own and the surprise of his acquaintances, that his gray locks, after a few applications, had renewed the hues of youth, and had become brown and blooming. The above mixture will turn gray hairs into a dark brown color, but it is an unclean application, as it becomes a sort of paint when combined with the natural oil or grease of the head. It forms a hydrated sulphuret of lead, and if not poisonous, is certainly not a desirable application by any means. It sells for one dollar per quart; the cost of the materials is about five cents. In some cases, partially bald heads may have been restored by its use; but pure water, applied to the scalp, with gentle rubbing, morning and evening, might have effected like results. From the nature of the mixture, no person can judge whether it is or is not a hair restorative; it does not, at least, contain nitrogen, which is the principal substance of which hair is composed. Those who may wish to try such hair tonics, or those who are in the habit of using them, may manufacture their own supplies at but a small cost from the above receipt, adding, as we would advise, a little cologne or rose water to it out of a tender conscience to atmospheric influences.—EDS.

Sewing Machines.

MESSRS. EDITORS:—Having a natural fondness for machinery and its operations has caused me to be somewhat interested in the sewing machine, and to watch its progress and improvements from its earliest date to the present time; and I was, therefore, much interested and entertained in reading your report of the discussion at the Polytechnic Association of the American Institute on that subject. Being disinterested in a pecuniary sense, I am in a position to judge impartially of the merits and demerits of the various statements therein contained. The statements seemed candid and unbiassed, with a few exceptions. Of course those interested in particular companies will make their statements favorable to the machine those companies manufacture, as in the case of the statement of the number returned to Mr. Howe as sold in 1859, by Mr. Wood, an employé of the Wheeler & Wilson Company, making it appear altogether in favor of the machines taking the single lock stitch; but when the statement of Mr. Potter, of the Grover & Baker Company, is placed beside it, the aspect is changed in favor of the machines making the Grover & Baker stitch; therefore it is somewhat difficult arriving at a truthful conclusion in the matter.

Mr. Lancey's experiments are worthy of notice, and evidently show the hand and Grover & Baker (double lock) stitch to be preferable to all other stitches yet in use; and, taking everything into consideration, that is my disinterested opinion. The Grover & Baker stitch seems well adapted for all kinds of family sewing; and if it is so much more elastic, as shown by Mr. Lancey, than the simple lock or Howe stitch, then, of course, it is preferable. But time and use have shown the Howe stitch to be good, and, in some kinds of work, perhaps preferable to some others.

Although more elastic, the work done with the double lock stitch seems quite as firm as that done with the single lock stitch. Could it be positively decided which of the various stitches by machinery now in practical use was the best, the next consideration would be, which of the numerous machines now made (price considered) would take *that* stitch with the most ease and simplicity? Believing, as I now do, that the double lock stitch (excepting the hand stitch, which I will yet speak of) is superior for family use, which I think should be the first consideration, *I* should make choice of Clark's "Revolving Looper," made at Windsor, Vt. It is a well-finished, convenient, simple and easily managed machine, and, unlike the Grover & Baker, as I understand it, can be varied on the underside by the change of tension, length of stitch and size of thread, to give it a number of varied appearances, and thereby be used for ornamental work. It will sew the finest of fabrics, biased or otherwise, without drawing them, in a beautiful manner, and also the thickest cloth; in short, it is more convenient, more easily managed and less liable to get out of order than any other machine I have yet treadled.

I quite agree with Mr. Dibben concerning the imperfection of some of the machine needles at the present prices, and with Messrs. Babcock, Lancey and Dr. Gardner, regarding the wholesomeness of running sewing machines; but I take exceptions to Mr. Lancey's answer to the President, that no machine had ever yet done as good work as the best hand sewing, for the reason that I have a machine which takes the real hand stitch of various kinds, viz.: the full back, half back, quarter back, side, hem, over and over and running stitches; therefore, I would modify Mr. Wood's statement that "Mr. Howe had found that the ordinary hand stitch could not be made by machinery," &c., to read that "Mr. Howe had *supposed* that the ordinary hand stitch could not be made by machinery, and set to work to devise a stitch that could be made by machinery."

The machine I have is the Robinson & Roper, made by other parties in Boston, Mass.; and it is the most ingenious and perfect sewing machine, in my estimation, ever yet invented. It is highly finished, and works very fine and exact; but some would object to it, no doubt, on account of its lowness of speed consequent upon the principle upon which it operates, which evidently is too low for extensive operations, but for family use it is quite practical. Others, again, would object to the slenderness of its needles, but I find, after running it for family use for some four years, that the more perfect of them stand much beyond my former expectations; nevertheless, from carelessness and other causes, my small stock has become somewhat reduced. The makers failed, I have been informed, after the machines were brought to perfection, in consequence of their being engaged in the clock business, but I have hoped that the manufacture of them would be revived. Although it appears somewhat complicated at first sight, yet its operations are simple and perfect, and the work done with it, although not done so speedily as on some other machines, is better done than ninety-nine hundreths by hand.

The sewing machine is a great boon to domestic life, and what invention has come so rapidly to perfection and into general use?

C. B. THOMPSON.

St. Catherines, C. W., Feb. 6, 1861.

Highly Important Discovery---Saltpeter and Nitric Acid Produced from the Nitrogen of the Atmosphere.

MESSRS. EDITORS:—The following communication to *Le Cosmos*, by the celebrated *savan*, Abbé Moigno, of Paris, we consider of the highest importance to the sciences and arts:—

Mr. Salmon, manufacturing chemist of Paris, has succeeded in preparing inconsiderable quantities of nitric acid and nitrate of potassa by means of the nitrogen of the atmosphere and the oxygen extracted from the peroxyd of manganese by elevation of temperature. In effect, in the conditions where Mr. Salmon prepares and causes his oxygen to act, it is in its essential electro-negative state, without having yet acquired its electro-positive atmosphere which ordinarily constitutes it as inactive.

In 1845, Abbé Moigno mentioned that oxygen, when in its nascent state as ozone, is able to combine even in nature with nitrogen to form nitric acid, which, without trouble, can be made into nitrate of potassa.

What gives more value to Mr. Salmon's process, now being tested in the laboratory of the French Arsenal, is that by bringing to the deoxydized manganese, under proper temperature, a current of steam, the latter renders to it the oxygen which it has lost; and, in this way, it can be used over and over again.

For those who want to keep cool, we give here a process (also communicated to the Academy in Paris) how ice may be prepared at a very cheap rate, and we foresee that numerous ice machines will soon be introduced to "keep cool:"—

Two iron retorts, strong enough to stand the pressure of eight atmospheres, are connected with a strong iron tube. One of the retorts is filled with a highly concentrated solution of ammonia, while the other is left empty, and is placed in a vessel containing cold water. The retort containing the ammonia is slowly heated, when this gas will be compressed by its own pressure and condense then in the empty retort to a liquid; as soon as the heat is withdrawn, the ammonia in the second retort rushes back, and taking the heat from the water in which it is placed, converts the same into a corresponding quantity of ice.

A. L. FLEURY.
FR. RUSCHHAUPT.

New York City, Feb. 11, 1861.

THE Illinois State Fair is to be held at Chicago this year, commencing Sept. 9, and continue open until the 15th. The cash premiums offered amount to $20,000; citizens' prizes, $2,000.

Column of Varieties.

The city of Honolulu in Oceanica has become completely Americanized, as it is now supplied with fresh water by pipes in all the streets.

The *Commercial Bulletin* states that the Boston mechanics connected with shipbuilding never had such an abundance of work as during the present winter.

Parkersburg, Va., is something of an oil region, as well as Oil Creek, Pa. Three wells at Parkersburg yield from 45 to 200 barrels of oil per day.

It appears from official returns that there are at present 43 steam vessels of war building in England, ranging from 1 to 90 guns, and with a steam power ranging from 80 to 1,250 horses.

The boot and shoe trade of Baltimore, Md., amounts to $4,435,000 per annum, as stated in the *Shoe and Leather Reporter*. Of this $2,650,000 worth is of New England manufacture, the remainder home-made work.

A large new cotton manufactory is nearly completed at Thorwald, on the Welland Canal. It is the first of this character erected in Canada West. The machinery has been obtained by its proprietors, Gordon & McKay, of Toronto, from England.

A small cutter of 20 tuns burden has made the voyage from Greenock, Scotland, to Australia. She stopped at Madeira and the Cape of Good Hope for provisions, and the trip was not much longer than some made by large ships.

In England land is sometimes manured by confining sheep at night on a small space of ground, then moving the hurdle fence which encloses them every night until the whole field is thus treated to a few nights' lodging.

Some stoves have been constructed for cooking with gas flame. Unless the gas used for this purpose is very pure, it will impart an unpleasant taste to the articles cooked. Most of the gases used for illumination contain traces of ammonia and sulphur. A bright coal or wood fire is best for cooking meat.

The Merrimack Print Works, at Lowell, Mass., print 430,000 yards of calico per week, or 22,360,000 per annum. They use annually 1,900,000 pounds of madder, 150,000 pounds of sulphate of iron, 170,000 pounds of alum, 20,000 pounds of indigo, 160,000 pounds of sumac, and 40,000 pounds of soap. A new steam engine of 1,000 horse-power, costing $30,000, has recently been put up at these famous works.

Coal ashes are stated, by some who have tried experiments with them, to be excellent for putting around the roots of peach-trees and gooseberry bushes in the spring. They are generally held to be of no use whatever, but as they contain some traces of potash and considerable lime, they will no doubt tend to destroy grubs and worms.

Augendre's white gunpowder consists of one part ferro-cyanide of potassium, one part of white sugar, and two parts of chlorate potassa. These substances are reduced to powder separately, then mixed by hand in a porcelain mortar. It is more easily inflamed than common gunpowder, and is excellent for filling shells, but unsuited for small firearms, because it oxydizes the steel and iron so rapidly.

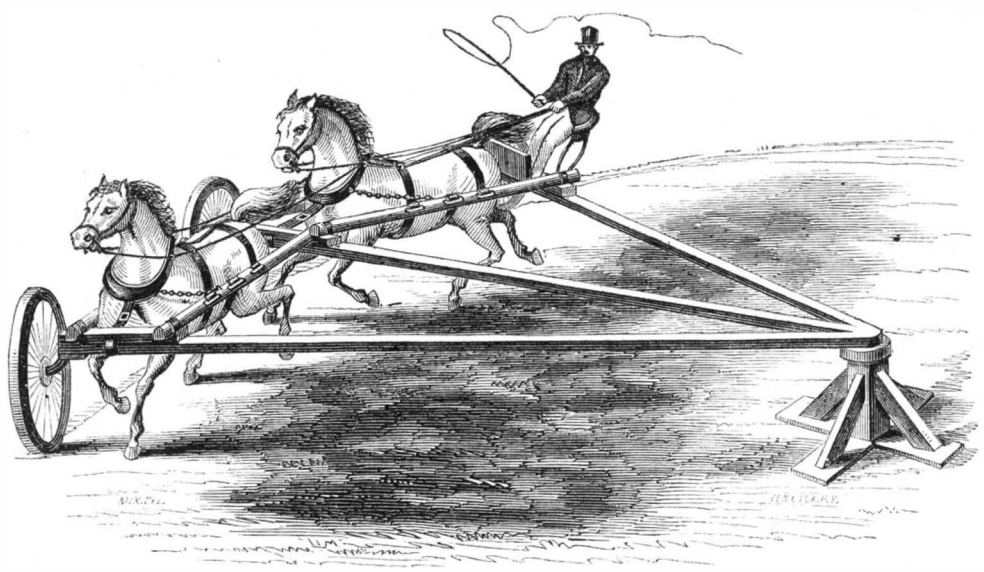
The city of London contains a population of nearly three millions of people, and it increases at the rate of 20,000 per annum. It extends eighteen miles in one direction and ten in another, and it goes on devouring up fields and gardens like a great monster.

The total imports into the United States during 1860, including specie, was valued at $362,163,941. The iron and steel imports amounted to $20,526,594; woolen manufactures to $37,937,191, and silks $30,767,744.

The pea-nut is cultivated in Georgia, Alabama, North Carolina, &c. It is planted in ridges about three feet apart, and the vine stands up about a foot in perpendicular hight. The stems shoot out in all directions from it for about fifteen inches around. These runners have joints about an inch and a half apart; and at each joint a strong root strikes down into the ground about two inches deep; at the end of this root the pea-pod is formed, and comes to maturity. Some farmers cover these lateral vines with earth, while others leave them bare all the time. It is not agreed which is the better mode. When ripe, one bunch of vines will have from one to two quarts of peas. One acre will produce from thirty-five to fifty bushels of peas.

Breaking Horses by Machinery.

Rarey talks about the mind of the horse, and his system of breaking may be called the mental or educational system. But if a horse's intellect is too obtuse to be enlightened by the gentle persuasion of the knee straps, or as a rudimentary course for very obstreperous brutes, use may be made of the apparatus here illustrated. This operates simply by physical force, holding the animal so that he can neither kick, bite, lie down, rear, nor run back. It will be seen that the straps and bars hold him down and hold him up, and prevent him from turning either to the right hand or the left.



MECHANICAL HORSE BRAKE.

No Yankee can refrain from suggesting that a beveled gear might be placed on the lower end of the turning shaft, and a rod carried off underground outside of the track so as to turn some sort of a mill, and thus utilize all the power which is now wasted in this apparatus.

This apparatus may be usefully employed in training horses to drive tandem, a fashion which is becoming quite common among the *bloods* in our large cities, and developed more generally at fashionable summer resorts.

No Secession Among Inventors.

A vast improvement is experienced in every department of business, and, among others, we observe an immense activity among inventors.

Within the past few weeks, the number of applications for patents through this office has greatly augmented, and we are happy to notice a vast improvement in the quality of the inventions over those which were presented to our notice a year or two ago. Several inventions which have lately come before us are very important, but not more than about one-fourth of the entire number of alleged improvements which are submitted to us possess such novelty or merit as will warrant our advising parties to apply for patents upon them.

Within the last two weeks there have been granted FIFTY-EIGHT Letters Patent for the United States, exclusive of a number in foreign countries, to inventors whose applications were prepared and conducted through this office.

FIRST SHIPMENT OF GAS TO LONDON.—"We saw yesterday," says the *Philadelphia Gazette*, February 11, "at the passenger station of the Pennsylvania Railroad, at Eleventh and Market street, a number of wrought iron cylindrical vessels, which, we were informed, contained compressed gas. Upon further inquiry we learned that Mr. Williams, who had fitted up the cars on the Pennsylvania Central Railroad for burning gas, had also taken a contract from Hathaway & Leach of this city, for fitting out a number of cars to be used on the street railways in London. These cylinders had been sent to the railroad workshops in Altoona, to be filled with gas by means of the company's apparatus there; so that before long we may expect to hear of American street railway cars in London, lighted with gas made at the foot of the Alleghany mountains."

GOLD PENS AND PATENTED MACHINES.—In a circular of Mr. A. Morton, of this city, which has accidentally come under our observation, we find the following:—"In regard to the 'cheap gold pens,' I beg leave to say that, previous to operating my new and patented machines, I could not have made as good writing pens for the price had the gold been furnished gratuitously."

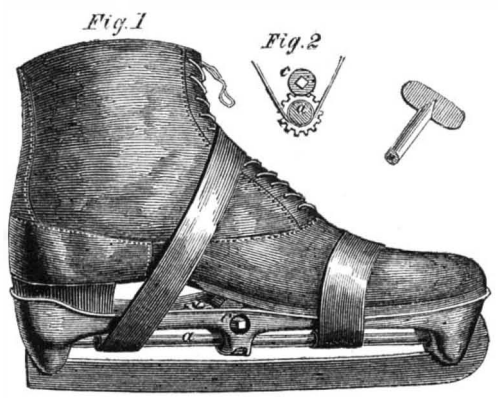
THE Fall River *News* says the eight cotton mills in that city which have been running for the past few weeks on three-fourths time, are now running full time.

SKATING, AND HOW TO DO IT.—As skating is one of the sensations of the time, we may as well inform our non-instructed readers how the art can be acquired in a fortnight. Begin by walking on the ice, crossing the feet at each step, and they should practice it also who only run forward on the inside edge if they wish to become proficient. Walk any ten paces forward, crossing one foot over the other at every ten paces, and then walk the same line backward, crossing the one foot behind the other at every pace. You will get a fall or two at first, but in a few lessons you will find that you can do without them. As soon as this is accomplished with moderate facility, still adhering to the crossing of the feet, which is the whole secret, let the foot follow the skate, and you will find that you are, insensibly as it were, rolling both backward and forward on the outside edge. It is a simple truth, and is a mechanical certainty, as the leg once crossed, the skate on each foot can only rest on the outside edge, and the balance of the body in that position has been learned.—*New York Despatch.*

STETSON'S IMPROVED SKATE.

The skate here illustrated is fastened to the foot by broad straps without any buckles, in the firmest manner possible, enabling it to be put on and taken off with the greatest facility.

A metal rod, *a*, Figs. 1 and 2, extends the whole



length of the skate above the iron and below the foot rest, the latter being formed of brass, and fashioned into the proper shape by being struck up in a die. Through two slots in the rod, *a*, are passed the ends of two broad straps, one for the toe, and the other for the instep of the foot, as shown. Upon the shaft, *a*. near its middle, is secured a small gear wheel, the teeth of which mesh into a worm upon the short transverse shaft, *c*, so that by turning the short shaft by means of a key the rod, *a*, is rotated, and the straps are wound around *a*, taking them up and tightening them upon the foot to any extent desired. By inserting the key and unwinding the straps, they are instantly loosened so that the skate may be taken off. The toe strap is wedged in place permanently, but the ends of the instep strap are drawn loosely through the slot in the rod, *a*, so that they may be adjusted to the size of the instep.

The brass foot rest is filled with a plate of wood at the toe and another at the heel, and the metal at the heel rises a little above the wood to prevent the skate from slipping.

The great advantage of this fastening is that the skate can be put on or taken off instantly with the thickest mittens on, having no screws to put in nor buckles nor laces to fasten. The strap can be tightened on the foot with an equable pressure, without the use of buckles or heel spurs, in a moment's time, thereby saving cold fingers.

This skate was awarded a diploma and bronze medal at the Mechanics' Fair, at Boston, October, 1860, and a diploma at the Baltimore Fair also last Fall.

The patent for this invention was granted April 24, 1860, and further information in relation to it may be obtained by addressing the inventor, Bradford Stetson, at Uxbridge, Mass., or O. M. Vail, No. 446 Broadway, New York. Skates are supplied by either of these parties.

AN UGLY TRICK.—One of our Philadelphia exchanges says, the quickest way to disperse a collection of people in a building, is to place a handful of Cayenne pepper upon a red hot stove. The atmosphere is thus rendered so stifling that its inhalation must terminate in asphyxia. The trick was played recently upon a Dutchman who keeps a "musical beer house." Some mischievous person applied the pepper, and awaited results. A splay-footed female doing up a *pas seul* on the "stage" was the first victim. Two minutes afterward, splay-footed female, proprietor and spectators were all on the sidewalk together, coughing in a manner that threatened cervical dislocation to all hands. The party was effectually broken up for the night. The proprietor threatens, should he catch the offender, to "throw him mit a brick."

ON the recent trial of Abson for the murder of his wife in New Jersey, Dr. Doremus, who analyzed the contents of the murdered woman's stomach, in the course of his testimony, exhibited to the court the bodies of two frogs, one of which had been killed by dropping strychnine upon it and the other by dropping upon it some of the matter taken from the woman's stomach. Both exhibited the same peculiar, rigid appearance, which is the characteristic effect of strychnine poison.

HOTBEDS.—Now is the time to make hotbeds. Make a pile of horse manure a few feet square and two or three feet thick. Nail four rough boards together in the form of a box without top or bottom, set it upon the pile of manure and fill it with good soil to the depth of four or five inches. Cover the bed with glass (old window sash will do), and in two days it will be warm enough to receive the seed. Tomatoes, cabbages and lettuce are the most suitable plants to force.

PATENTS AT THE SOUTH.—We have just received a letter from one of our correspondents residing in South Carolina, in which he states that in a recent conversation with a prominent member of the State Convention, he was advised that if the Union should be forever dissolved, patents already granted would hold good in all the seceding States. Patentees residing South are as much interested in this as are those residing in the Northern States.

MUSIC.—We have received from Professor Eugene A. Wiener, No. 765 Broadway, the following pieces of music: "The Grasshopper Waltz," "Young America," and "Salamagundi." The Professor announces himself one of the greatest living pianists and musical writers. We have never witnessed his skill on the piano; but, so far as our taste in such matters is concerned, we should pronounce his musical writings very moderate.

Scientific American

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY
At No. 37 Park-row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum.—One Dollar in advance, and the remainder in six months.
Single copies of the paper are on sale at the office of publication, and at all the periodical stores in the United States and Canada.
Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.
☞ See Prospectus on last page. No traveling Agents employed.

VOL. IV. NO. 9.....[NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, MARCH 2, 1861.

COAL OIL LAMPS—IMPROVEMENTS WANTED.

In the last issue of the SCIENTIFIC AMERICAN, we published an important communication on the subject of hydro-carbon oils, which article has no doubt been very generally read and studied by this time. We now allude to it as an appropriate introduction to some remarks which we are about to make concerning the lamps which are employed in the burning of such oils.

As a burning fluid for household illumination where gas cannot be obtained, coal oil has very generally superseded all other fluids, such as fish and lard oil, and the alcoholic camphene mixtures called "explosive fluids." Some very good improvements have recently been effected in the construction of the lamps for burning coal oil, by Mr. Racey and others; still we think the subject ought to receive further attention.

As coal oil requires a considerable current of air directed into the flame to prevent it from smoking, a glass chimney is provided for each lamp to produce an effective draft. Such chimneys are very subject to breakage; and thus a considerable expense is constantly entailed to replace them, in addition to the cost of the oil that is consumed. Lamps for burning this oil without a chimney have been invented, and they are excellent in their way; but by producing a draft with a chimney, a greater quantity of oxygen is brought into contact with the flames, and thus a more brilliant light is produced. Some invention to obviate the expense incurred for chimneys in coal oil lamps is demanded, and the inventor who first effects such improvement, and, at the same time, preserves the brilliant flame peculiar to the Argand burner, must, we think, make a handsome fortune.

Common coal oil lamps—at least those that we have examined—are also defective in the mode of operating the wick. This is usually done by turning a nut which has a small spur that takes into the wick in the tube, and raises or lowers it, according as it is turned to the right or left. This is a very convenient device, and no fault can be urged against it theoretically, but practically, it is defective. Thus, when a wick becomes very soft by being saturated with oil, the spur will cut into it and become choked, so that it can neither be raised nor lowered. And if the wick is a little too thin, or a little too thick, the spur is equally at fault in operating. In addition to the wick spur, every one of these lamps should, therefore, be provided with a supplementary device or arrangement by which the wick can be raised and lowered.

These lamps are also defective in the brass hollow cone inside of the chimney surrounding the wick for conveying a current of air to the flame from below. This cone is also an air deflector, and it generally extends too high above the top of the wick tube; it therefore hides a part of the flame, thus rendering it practically useless for the purpose of giving light. Another defect belongs to the arrangement, or rather want of good arrangement, for getting at the wick to ignite it, as in doing this, the chimney and the brass cone have first to be removed, and the wick tube has to be unscrewed and taken out. These are certainly troublesome, and not only troublesome, but uncleanly operations, all to get the spout of the oil can into the wick tube—operations which have afterward to be reversed before the lamp can be lighted. The old-fashioned oil lamp, provided with a feed channel independent of the wick tube, contains a provision for convenience which should be applied to every coal oil lamp.

We have thus pointed out some of the defects existing in the common lamps used for burning coal oil. That these defects can be remedied, we have no doubt whatever, as the word "impossible" does not belong to the dictionaries of American inventors.

NEW PATENT BILL.

Since our last issue, we have read the discussion that took place in the House of Representatives on the passage of the Patent Bill. The bill was urged by Judge Niblack, of Indiana, one of the committee, and the only opposition came from Hon. Mr. Phelps, of Missouri, who objected to the increase of the Commissioner's salary from $3,000 to $4,500. The bill, however, passed as recommended by the committee.

It provides, as stated in our last number, that no patent shall be extended hereafter when the net profits of the invention shall exceed or equal $100,000. A very important amendment reported by the committee relates to designs, viz.:—

Be it further enacted, That any citizen or citizens, or alien or aliens, having resided one year in the United States, and having taken the oath of his or their intention to become a citizen, who, by his, her or their own industry, genius, efforts and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material or materials, or any new and original design for the printing of woolen, silk, cotton, or other fabrics, or any new and original design for a bust, statue or bas relief, or composition in alto or basso relievo, or any new and original impression or ornament, or to be placed on any article of manufacture, the same being formed in marble or other material, or any new and useful pattern, or print, or picture, to be either worked into or worked on, or printed, or painted, or cast, or otherwise fixed on, any article of manufacture, or any new and original shape or configuration of any article of manufacture, not known or used by others before his, her or their invention or production thereof, and prior to the time of his, her or their application for a patent therefor, and who shall desire to obtain an exclusive property or right therein to make, use and sell, and vend the same, or copies of the same, to others, by them to be made, used and sold, may make application, in writing, to the Commissioner of Patents, expressing such desire; and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of application for a patent, for the term of three and one-half years, or for the term of seven years, or for the term of fourteen years, as the said applicant may elect in his application; *Provided*, That the fee to be paid in such application shall be, for the term of three years and six months, ten dollars; for seven years, fifteen dollars; and for fourteen years, thirty dollars; *And provided*, That the patentees of designs under this act shall be entitled to the extension of their respective patents, for the term of seven years from the day on which said patents shall expire, upon the same terms and restrictions as are now provided for the extension of Letters Patent.

Hon. Mr. Bigler reported the amended bill in the Senate on the 13th ult., and it was passed with another slight amendment. The House must now act upon this amendment before the bill can become a law. This, we think, will be promptly done.

IMPORTANT TO INVENTORS.

An act of great importance to the inventive interests of the country passed the Senate on the 11th ult. It will be remembered that, through the instrumentality of Hon. Jefferson Davis, an amendment to the Appropriation Bill was agreed on at the last session of Congress, prohibiting any department from purchasing patented articles for the various Bureaus, either naval or war. This cut off a large number of manufacturers, and crippled some branches of government materially. The last reports of the Secretaries of War and Navy recommended the repeal of this law, which the Senate has effected, but with the proviso that no more patented firearms are to be purchased.

The latter important interest is stricken down, notwithstanding the general protest from an immense number of inventors. Congress has made the discovery, during the past year, that inventive genius is an important element in the national progress.

SHIPS' CABLES.—In the month of August last, a severe hurricane visited the river Platte, and did great damage to vessels lying in the roadsteads of Buenos Ayres. Fifteen sail were stranded and two sunk, and among them, several American vessels received great damage. At that time there were twenty-two Spanish vessels in the same port, not one of which parted a cable or was otherwise damaged. These vessels were provided with superior cables. English and American cables are now made too light; they are not equal in strength to those which were generally made thirty years ago. A reform in this direction is certainly demanded.

WAR—FOOD FOR REFLECTION.

Let any man sit down, with a cup of cold water in his hand, and think the matter over soberly and seriously, and we think he will agree with us that it is one of the strangest things in the world when two civilized nations actually get to the point of fighting each other. There is a good deal of force in the old saying, "Old men for counsel, young men for war." Many thoughtless, hair-brained youths seem to look upon war as a species of rare sport; and even old men will sometimes become testy and pugnacious, and if they do not actually engage in battle, will

"Shoulder their crutch, and show how fields are won."

As there is a considerable disposition on the part of some of our people to explode a little gunpowder around the domestic hearthstone, we have thought that a little food for reflection on this subject might be more acceptable to our readers than to offer themselves as food for powder. No one who thinks at all will pretend to assert that a war between two nations can be otherwise than detrimental to their several and mutual interests. An immense amount of money loss in war expenditure is certain on both sides, to say nothing of the indirect and incalculable loss from the suspension of commercial relations, the prostration of industry, the withdrawal of men from profitable employments, and the loss of human life and the sorrow resulting therefrom. That it is a virtue and a necessity in self-defence, we do not deny; and all history proves that self-interest and national interest will not prevent men from incurring its terrible responsibilities. Millions of men and thousands of ships are kept in constant preparation for war, while 15 per cent of the adult male population of Europe are said to be required to supply the complements of standing armies and navies. It is a terrible comment on this era of boasted civilization that the newly-completed naval arsenal of Cherbourg, in France, has cost the astounding sum of nearly forty millions of dollars. Every country in Europe, we believe, has national debts in nearly all instances of most serious amount in proportion to their population and resources, and the origin of these national debts is traceable to war, and their perpetuity is solely attributable to war and warlike armaments.

Everybody reads, from time to time, of new inventions and improvements in the "deadly art of war;" but it may not be so generally known that they are far more costly than the simple and less destructive implements in use fifty years ago. The various kinds of improved rifles cannot be supplied at the price of superannuated "Old Brown Bess," the common flint musket of former days. As an example of the increased costliness of warfare, we may mention that, during the great conflict which terminated in the overthrow of Napoleon Bonaparte, solid shot was the missile usually fired from cannon, whereas shells are now preferred, being much more destructive. A 32-pound ball cost about $1.62; while a 32-pound shell, filled ready for firing, costs about $8; and the guns to fire it, weighing from three to five tuns, in round numbers, cost from $300 to $500 each.

The standing armies and navies of Europe, even on what is called the "peace footing," are on a prodigious scale; take, for example,

FRANCE.

Army, 600,000 men; 170 field batteries; guards, 30,000 men; navy, 425 vessels and 30,000 sailors.

AUSTRIA.

Army, 600,000 men, of which 525,000 are infantry, 75,000 cavalry, 60,000 artillery and 10,000 engineers and staff.

PRUSSIA.

Army, 525,000 men.

ENGLAND.

Army, 225,000 men, including the colonial troops; navy, 600 vessels, of which over 300 are sailing vessels, 250 steamers and 40 ships of the line, carrying about 18,000 guns and 70,000 men.

RUSSIA.

Army, 1,000,000, including the reserve, besides 225,000 irregular troops; navy, 200 vessels and 60,000 sailors and gunners.

TURKEY.

Army (regular), 180,000 men; reserve, 148,000; irregular troops, 61,000; various contingents, 110,000. Total, 319,000. Navy, 70 vessels and 30,000 sailors and gunners.

BELGIUM.

Army (on a war footing), 85,000 infantry and 14,000 cavalry.

SWITZERLAND.

Army, 125,000 men.

GERMAN CONFEDERATION.

Army, 525,000 men, beside 50,000 cavalry—including the contingent of Austria and Prussia.

UNITED STATES.

Army, 13,000 men; militia, 2,862,614 men; navy, 10 ships of the line, 10 frigates, 21 sloops of war, 3 brigs, 1 schooner, 30 screw steamers and tenders, 9 side-wheel steamers, 3 store vessels, 6 permanent store and receiving ships (in all, 94 vessels), a naval asylum, a naval academy, and 8 navy yards.

As regards the comparative cost of standing armies and navies of various countries, a Belgian paper asserts that the maintenance of these armies in times of *peace* costs the countries of Europe annually $385,000,000, and the fleets about $90,000,000. The expense of the two greatest navies in the world, during the last seven years, is stated (on English official authority) to be, for England, $265,000,000; and for France, $90,000,000. We have before us two calculations of the cost of only the great wars of England, and we find by the lowest calculation that the war occasioned by the revolution of 1688, "to establish William and to humble France," cost $155,000,000. The war of the Spanish succession, "to deprive Philip of the crown of Spain and to humble the Bourbons," cost $220,000,000. The Spanish war of 1739, "a quarrel about Campeachy and the crown of Hungary, commonly called the Logwood War," $235,000,000. The seven years' war, in 1776, about Nova Scotia, $535,000,000. The American war, resulting in the independence of the United States, cost $755,000,000. The war of the French Revolution, "to repress antimonarchical principles in France and the rest of Europe," cost $2,360,000,000. The war against Bonaparte, "to restrain the ambition of Napoleon," cost $2,930,000,000.

The ablest statistical writers—the men most competent to form a practical judgment on money value in any shape, and to authoritatively state the national loss or gain from any given problem—would despair to calculate the positive loss incurred by any country by the employment of hundreds of thousands of fine young men in warfare or preparation for warfare, in lieu of devoting themselves to industrial pursuits. And then the positive, irreparable loss to the nation by death or maiming! Every man killed or disabled in war requires another man to supply his place; and that, in turn, creates a fresh vacuum in the lists of productive labor. At the conclusion of the late Russian war, the following statement of losses appeared in the public journals:—"England lost 19,584 gallant men by death in action, wounds and disease, and 2,873 were discharged from the service on account of the two latter causes; thus England has sealed her declaration of unflinching devotion to the cause of national independence by the sacrifice of 22,457 gallant soldiers. The losses of the French, as far as ascertained, amounted to 60,000; and Count Orloff admitted in Paris that the Russian loss was not less than 500,000. The loss sustained by the Sardinians has not been, and the loss sustained by the Turks never will be, ascertained."

That very war cost England alone, according to careful calculations, the sum of $500,000,000. A few rugged facts like these may well lead the thoughtful mind to inquire, "Whence come wars and fightings among you?"

Street Railways in Europe.

We understand that several leading capitalists in London, Manchester and Liverpool are associated with our countryman, Mr. Train, in his efforts to apply and extend the American system of street railroads n England. The first laid down was in Birkenhead, opposite Liverpool, the rails for which were defective, but the rails for new lines in London and Manchester are said to be of the first quality.

We also learn, by recent European news, that Mr. Valentine, an American residing in Paris, has proposed such railroads for the French cities, and a complete system has been devised and accepted, it is said, by the Emperor. English contractors engage to build such railroads in France, and furnish one-half of the capital, provided French capitalists furnish the other half.

AMERICAN ENGINEERS' ASSOCIATION.

[Reported for the Scientific American.]

On Wednesday evening, February 6th, the regular weekly meeting of this association was held at its room, No. 24 Cooper Institute, this city—Charles McCarthy, Esq., Vice-president, in the chair; Benj. Garvey, Esq., Secretary.

MISCELLANEOUS BUSINESS.

Mr. BROADBENT, of the Newark Engineers' Society, was present, and presented to the notice of the members an improved steam gage. Its peculiarities, and the principles involved in its construction, were fully described by him.

Mr. GARVEY submitted to the association a new and original plan for portable boilers and engines.

These inventions were referred to the Committee on Science and New Inventions, and when reported upon by them, they will receive further attention from us.

The Committee on Membership reported favorably upon Messrs. Charles H. Haswell, Alex. Scatterly, — Roosevelt and J. B. Kierstead, which gentlemen were duly elected by ballot.

The Committee upon Nominations had completed their duties, and accordingly submitted the subjoined report:—

For President.....	Thomas B. Stillman.
For Vice-President.....	B. F. Isherwood. John C. Merriam. A. L. Holley.
For Secretary.....	Benjamin Garvey.
For Treasurer.....	H. E. Roeder.

For Chairman of the several standing committees:—

Science and New Inventions.	Chas. H. Haswell.
Library and Cabinet.....	C. F. Holden.
Printing and Publication..	Richard Lockwood.
Accidents and their Causes.	T. D. Stetson.
Statistics	Louis Koch.
Admission of Members.....	John K. Simpson.

Mr. A. L. FLEURY contributed a paper upon Fuel, which was read by Mr. Merriam. It contained much useful information, and was highly appreciated by the members. A vote of thanks was awarded Mr. Fleury for his excellent paper.

The Committee selected by the society to prepare a memorial to be presented to the Legislature, relative to the employment of practical engineers to inspect the boilers of this city, reported; the memorial, as prepared by them, is as follows:—

To the Honorable the Legislature of the of StateNew York:

The undersigned engineers, manufacturers and proprietors of steam engines, boilers, &c., residing in the cities of New York and Brooklyn, respectfully represent:—That the vast increase in the number and variety of steam boilers, and their appendages, in the cities of New York and Brooklyn, and the increasing danger arising therefrom, as well as from improper construction, defective materials, and incompetent management, known to exist to an alarming degree, require, as essential to the safety of life and property, that a proper and uniform system of inspection should be legally instituted; and your memorialists therefore respectfully ask that your honorable body would enact a law, the provisions of which shall extend to the inspection of the materials and construction of all steam boilers, engines, and apparatus which, from misconstruction, misuse or deterioration, may become liable to explosion, thereby endangering life and property in said cities.

And your memorialists would further represent: That, for the proper security of those concerned in the manufacture or use of such boilers, engines, and their appendages, as well as for the security of the public, there should be appointed a Board of Inspectors, composed of persons whose experience and scientific attainments should be a sufficient guarantee to all parties for the proper discharge of the duties of such inspectors; and such Board of Inspectors should have power to approve and license the use of all proper boilers and engines, or their appendages and attachments, and also to suspend or to prohibit the use of any boiler, engine or fixture which may, in their judgment, be considered hazardous to life or property, or which, upon proper examination or tests, may be found defective.

And your memorialists would further represent: That said Board should have power to examine the credentials of all persons who may, at the time of the organization of said Board, or thereafter, be employed as engineers or boiler tenders, or have the charge of any boiler or engine, and to inquire into their qualifications for such employment, and thereupon to approve and license such as, in their opinion, are qualified for such charge, and to restrain all others from officiating in such capacity.

And your memorialists further represent: That, if any further discretion or power be required to secure the proper execution of the duties of such inspection, a Commissioner, or Board of Commissioners, composed of engineers of high professional standing and integrity, should be created with power to supervise and superintend the acts and doings of said inspectors, and make such rules and regulations for the government of said inspection as may be deemed proper.

Upon motion of Mr. Simpson, it was resolved that the Secretary should send a copy of this memorial to each member.

A remark or two by Mr. Simpson resulted in the subject of expansion being again brought before the association. Messrs. Koch, Dibben, Rowell, Simpson, Van der Weyde, Kierstead, Cameron, Fleury and Merriam took part in the discussion. The following is the *gist* of it:—

The experiments at Erie were referred to, and also those at the Hecker Mills.

Mr. CAMERON said that he had a case in point that went totally against the non-expansion theory. An engine, cutting-off at two-thirds, required more fuel than the refuse from the planing mill in which it worked would furnish. He took out the cylinders and put in a larger one, with a variable cut-off, which reduced the fuel consumed to such a degree that the mill had fuel to sell.

Mr. KIERSTEAD considered the question settled by something that had occurred on board the steamer *Alabama*, some time ago, during the trial of the Sickles' cut-off case. This steamer was compelled to make one trip without using the cut-off, during which time the consumption of coal was very much increased.

Mr. KOCH, in the midst of other remarks, argued that if the same boilers were used with the same pressure of steam, the steam used at full stroke would be dryer than that used expansively.

Mr. DIBBEN objected to the law of Mariotte as applied to steam, and stated further that, if it was followed, it should be modified by the dynamic law, which would give us a lower theoretical line.

Mr. ROWELL stated that, at the Metropolitan Mills, they found it took less fuel to do precisely the same work with a single cylinder following nine-tenths stroke, than it required for two cylinders (same size), cutting-off at one-fifth.

Mr. DIBBEN wished to see the diagrams, and on seeing that of one-third cut-off, argued that if there was no leak in the valves, it must have been more economical than the other, and that the power yielded must show, by the indicator card, if the instrument was perfect.

Mr. MERRIAM objected to Mr. Cameron's case as proof, until it could be determined, that the economy was due to working expansively. He also thought that the experience of engineers would rather go against Mr. Koch's theory, and that the less steam taken from a boiler the dryer it would be; the short experiment at Erie conclusively proved this. With regard to the *Alabama*, they continued to use the same cylinder for full stroke they had used for expansion, and could not furnish steam enough; it was by no means satisfactory. Had they been able to replace their cylinders by smaller ones, they would have found different results.

The evening being far advanced, the meeting at this period adjourned.

Patents a Source of Wealth.

Probably but few of our readers are aware of the amount of business annually transacted at the Bureau of Patents in the city of Washington, and the profits realized by the inventors from the sale of their patents. According to the recent report of the Secretary of the Interior, it appears that, during the year 1860, 4,781 patents were issued to citizens of the United States, 21 to subjects of Great Britain, 5 to subjects of France, and 5 to subjects of other nations.

The government fee to a citizen of the United States is $30; to a subject of Great Britain, $500; to subjects of all other foreign countries, $300. It is not every patentee who is as successful in coining money from his invention as McCormick on reaping machines, Morse on the telegraph, Goodyear on india-rubber, Peeler on the plow, Howe on the sewing machine, Bigelow on carpet looms, Burr on hat machines, or Colt on firearms, beside many others we might name who have amassed immense fortunes from their patents; but, as a general thing, the patentee who manages his invention with any ordinary degree of enterprise, can usually realize a competence from his patent.

We are led, in connection with these remarks concerning patents, to refer to the extensive establishment of Messrs. Munn & Co., proprietors of the SCIENTIFIC AMERICAN, a weekly newspaper, which is especially devoted to mechanical subjects and inventions, located at No. 37 Park-row, this city.

Messrs. Munn & Co. have been engaged in procuring patents for more than thirteen years, and we learn, upon inquiring at their office, that they have been employed by more than fifteen thousand applicants for patents in the United States, and that more than three-fourths of all the business done in foreign countries by American inventors is transacted through their Home and Foreign Offices.

In ordinary times, the firm petition for about two hundred patents a month, and from the number of employés engaged in their office as draughtsmen, specification writers and clerks, and the hundreds of models displayed under glass cases around the walls of their office, a visitor would suppose himself in the United States Patent Office. Persons having a taste for inventions and mechanical subjects will find the office of the SCIENTIFIC AMERICAN, No. 37 Park-row, a place worth visiting, whether they have patents to secure or not.

The above we copy from that excellent pictorial newspaper, the New York *Illustrated News*, published at No. 63 Ann-street, this city.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The usual weekly meeting of the Polytechnic Association was held, at its room in the Cooper Institute, this city, on Thursday evening, Feb. 14, 1861—Professor Mason in the chair.

PROJECTILES.

Mr. MASQUERIER read a paper upon "Progressive and Rotary Motion," instituting the inquiry whether a rotary motion could not have a leverage upon the progressive motion of a bullet or planet, so as to deflect it from a rectilinear into a curvilinear direction. If the direction of the axis of rotation is such that the momentum of the rotary motion in one-half is more or less in the direction of the progressive motion, and in the other half in the contrary direction, might it not have a leverage to deflect the ball from a rectilinear direction? He suggested that the aberrations of projectiles fired from smooth bore pieces might be due to this cause, and that long cylinders, pointed, and hollowed out at the other end, might obviate the necessity of rifling; or, if not, that a spirally-shaped chamber behind the ball might give the rotary motion required.

Mr. DIBBEN said that there was no such leverage in rotary motion. The rotary motion of globular balls is caused simply by the eccentricity of the center of gravity.

The PRESIDENT inquired whether a cannon ball was ever made without this eccentricity.

Mr. DIBBEN said that Mr. Hotchkiss had a method of centering his ball to accomplish that result. It is easy to determine upon which side of a round ball is its center of gravity, by immersing it in mercury.

Mr. PARKHURST said that, according to the law illustrated last week, there is a tendency in the lengthened ball for rifled cannon to take the shortest axis of rotation, and showed, by experiment, that a model of these balls would thus change its axis of rotation, even in opposition to the force of gravitation. In practice, however, this tendency may be overcome if the rotary motion is not too rapid, by placing the center of gravity forward of the center of the mass, or by the feathering of the rear of the ball from the action of the expanding gases upon the leaden belt, so that the atmospheric resistance shall counterbalance the lateral centrifugal force; the progressive momentum will tend very much to retard the change of axis.

THE WEIGHT OF THE ATMOSPHERE.

Dr. VAN DER WEYDE exhibited a new process for weighing the atmosphere. In the common method, the air is not directly weighed, for when we weigh the flask containing the air, we do not weigh the air in it. We first weigh the flask by itself, and then the flask, minus the amount of air abstracted from it; and it is very difficult to determine precisely how much air is abstracted, because we cannot easily make the vacuum perfect. The new method reverses the process. A flask being made sufficiently strong, air is compressed into it, and the weight of that additional air is ascertained. A single stroke of the piston was sufficient to increase the weight of the apparatus, the whole being weighed together, by two grains, which turned the scale very perceptibly. After four strokes, the air was measured by discharging it into a glass receiver filled with water, when it displaced about one pound of the water. The weight of the atmosphere is thus ascertained to be about $\frac{1}{800}$ part the weight of water, varying as the barometer varies.

FUEL.

Mr. PELL read a paper upon "Fuel," reviewing the whole subject. The most ancient fuel is wood, and the different kinds of wood give out heat according to the relative quantities of their carbon. Wet wood contains more than one-third of water, and much heat escapes up the chimney while converting this water into steam. The quantity of water contained in recently-cut wood amounts frequently to 50 per cent, while wood felled a year will contain 25 per cent. As a tree decays, its value for fuel diminishes. To produce the greatest effect from fuel, it should be placed in close stoves. Charcoal is very valuable as fuel, and also possesses qualities that are serviceable in the arts. It prevents putrefaction by absorbing sundry gases, and will remove taint from meat that has been kept too long. The most important fuel now known is coal. Non-bituminous coal consists almost entirely of carbon. Bitumens, oils and alcohol form a liquid fuel, giving out a great deal of heat. The Exquimaux and Greenlanders produce all their heat by the use of lamps, with wicks made of moss. Much heat is lost from the escape of unconsumed fuel in the form of smoke or gas. Whenever a lighted paper held over a fire will ignite the smoke or gas, there is a loss. A new fuel, as carboniferous as coal, but of a much earlier geological period, has lately been discovered in Russia, and is attracting the attention of scientific men.

Mr. SEELY said that it was an error to suppose that charcoal has antiseptic properties. It will not assist in the preservation of meat, or of any animal or vegetable substance. The power which it really has, is that of absorbing gases, so that it absorbs the offensive emanations from decomposing meat, and, apparently, makes them sweeter.

Mr. STETSON narrated an experiment with fine charcoal, by which meat which had become quite offensive was entirely changed in one night so that it was cooked and soon eaten up.

Mr. PELL related an incident with regard to the manufacture of glue. He had proposed the use of charcoal to render inoffensive a residuum which had formerly been thrown into the river, and turned it to agricultural purposes. It became perfectly sweet, and was a valuable manure.

Mr. SEELY said that these facts were not inconsistent with his theory; for meat would decompose just as rapidly under charcoal as under brickdust, although its decomposition in the former case would not be evident to the sense of smell.

The PRESIDENT remarked that fuel was almost invariably the product of organization. We do not warm our feet or cook our dinner from the heat given out by the crater of a volcano; and even where gases are emitted from the surface of the earth, although they have been used for light, they have not been used for heat. It may be a question, too, whether they are not the product of organization. It is a matter of profound interest to observe how wonderful a provision was made for the occupation of the earth by human beings, before the existence of man, by the storing of the vast coal cellars which we find immediately under the surface of the earth. Coal is not only a source of heat, but of power, of wealth, and even of life, to a very large proportion of the population of this country. It is the reason why this city sustains such an immense population. It is the reason why the growth of our population for the last ten years has been almost entirely upon the seaboard. The agricultural portions of the community have not much progressed, because the improvements in agriculture enable men to take care of larger farms. Thus, a large proportion of the population are left free to mechanical, scientific and artistic pursuits. Within ten miles of the City Hall, the stationary steam engines and machinery driven by them do the work of at least ten millions of men. This is the work done by coal; and such is its cheapness at the mines, that it will not pay for an additional shoveling over. The cost of this immense amount of labor may then be estimated merely at the cost of oiling and taking care of the machinery, the cost of the fuel being regarded as nominal. In England the question has been agitated how long the coal will last. With us the question may be, for a century to come, When shall we have to dip out the first pail of water to get at the coal? New disclosures for the last dozen years have increased the amount of coal above the water level known to be accessible for fuel. It is now becoming a matter of great importance to appropriate each kind of coal to that work for which it is best adapted. Zinc paint can be made here much cheaper than abroad, because we have the Lehigh coal, which is especially adapted for its manufacture. The Lackawanna will not answer the purpose, although it is better adapted than the Lehigh for steam purposes. Thus there is a distinction even among our different mineral coals, as to their uses in the arts. Immense amounts are lost from our ignorance of the art of adapting our fuel to our work. This will grow upon us as we advance. We consumed over nine million tuns of coal last year, and every year we are progressing. Thus we are making room for a larger population of well-fed, well-housed, well-taught men by the economy of fuel, and the economy of the machinery driven by fuel.

Mr. CHURCHILL remarked that gaseous fuel is particularly appropriate when it is desired to apply all the heat at a particular point.

COMPRESSED AIR FOR RAILCARS.

Mr. HASKINS read a paper upon the use of compressed air for propulsion, and especially as a substitute for steam for locomotives. The compressed air is to be placed in a receiver, which is to be recharged every four to eight miles, as it may become necessary. The air is to be compressed by a stationary steam engine. The effect from an equal pressure in the engine will be as great as from steam, while the pressure can be safely made much greater. The loss from radiation of heat from the locomotive is avoided. He proposed especially a plan for a railway over Broadway, the cars to be 16 feet above the pavement, and to be run by compressed air.

Mr. DIBBEN and Mr. Butler feared there would be a practical difficulty from the great diminution of pressure in the last mile, so that it would require not merely a variable cut-off, but a larger cylinder.

Mr. STETSON considered that a difficulty which could be overcome, and believed that the advantages of compressed air for a motive power had been generally underrated.

The PRESIDENT considered a practical method of conveyance of city passengers as of great importance. Horses could not be used as for an elevated track, and there should be some substitute.

FREE SPEAKING *vs.* FREE LISTENING.

Mr. FISHER proposed the use of a voting apparatus to indicate when it is time for a speaker to sit down, so as to avoid prosy speeches, irrelevant digressions, and unwelcome subjects.

The subject selected for the next meeting is "The Mechanical and Chemical Properties of Cotton, and Substitutes Therefor," proposed by Mr. Stetson.

The meeting then adjourned.

Items about Patent Matters.

A special correspondent of the New York *World*, writing from Washington, says:—

A large list of patents have been issued this week, showing, to that extent, that political troubles are not affecting the interests of the country. The number issued compares favorably with the best days of the Patent Office. Three of the patents granted this week are to inventors in seceded States.

The same correspondent also says that protests continue to be received against the extension of the McCormick patent. If this case was before Congress for extension, this is the right way to defeat it, and we should second every proper effort to accomplish that result; but the case is to be decided upon the evidence offered in legal form, before the Patent Office, and we humbly submit that simple protests are not evidence taken in due form. We contend for the right of every patentee to have a fair hearing under the law. No fears need have been entertained that the Acting Commissioner would have violated his oath or done injustice to the interests of either the claimant or the opponents. His recent decision in the great extension case of Burr & Taylor, for making hat bodies, we think conclusive evidence on this point. Burr was as abundantly able to pay his case through as McCormick or any other patentee, had such a course been open.

An effort is being made to procure the extension of one of Morse's telegraph patents by an Act of Congress.

Dr. Leverett Bradley, of this city, the inventor and patentee of improvements in telegraphing, is now in Washington, to oppose any special legislation extending the Morse patent, claiming that it would have the effect of preventing the public from enjoying the advantages of improvements which would reduce the cost of telegraphing fifty per cent on the present rates, and increase the facility of transmitting matter to four-fold the amount now sent, and on the ground that any extension would, while injuring the public, only benefit a company which has a monopoly.

We have received the annual report of the Commissioner of Patents, and shall publish it in our next issue, with such comments as we may think it deserves.

The Board of Arts and Manufactures for Upper Canada recently sitting at Toronto, strongly recommended that amendments should be made to the patent laws of that province, on the basis of a bill introduced in the session of 1859, giving to British subjects non-residents in Canada, and foreign subjects, the right to obtain patents in that province on paying an

amount equal to the fees and charges that may be payable, at the time of such application, by a Canadian inventor to secure a patent in the country of the applicant. Restricting grants of patents to British subjects, actual residents of Canada, is impolitic and leads to constant evasion of the laws of the province, and consequent frequent litigations.

The present patent laws of the Canadian provinces are a libel upon all justice and comity between reciprocating neighbors, and ought to be modified so as to give foreign inventors a chance to protect themselves against a wholesale appropriation of their inventions.

Recent American Inventions.

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

CIGAR MACHINE.

This invention consists in arranging a series of small rollers, of a suitable length and diameter, in such a manner as to form a hollow cylinder of rolling surfaces, within which the filling of the cigar is formed into a proper shape, and the wrapper wound around it. It also consists in combining, in a suitable manner, with the cylinder of rollers before mentioned, two or more conical cap-formers which may have sharp-cutting edges at the circumference of their bases, the nearest point of contact of said edges with each other being in, or nearly in a line, with the axis of the cylinder of rollers, whereby the "cap" of the cigar will be formed, and the point cut off before the cigar is removed from the machine. It further consists in arranging, in one end of the cylinder of rollers, a pressing head, which is so acted upon by a spring, as to keep the cigar up to the cap-formers during the operation of forming the cap on the cigar; also, in the use of an adjustable pressure roller, in combination with a feed table for feeding the wrappers to the work, and also keeping the wrappers smooth and under the proper degree of tension. W. W. Huse, of Brooklyn, is the patentee of this invention.

BRAN DUSTER.

The object of this invention is to obtain a simple and efficient machine for thoroughly separating all flour from bran. In machines of this class, which are commonly termed bran-dusters, the chief difficulty has been the thorough cleansing of the flour from the bran without cutting up the latter so fine that it will escape with the flour, a contingency due to a too rigid scouring operation, and which, it is believed, is fully avoided by this invention, and, at the same time, the flour thoroughly separated from the bran. To this end we employ stationary brushes and revolving screens, one or more in connection with a fan and other concomitant parts, whereby the bran, while being acted upon by the brushes, is discharged out from the screen or screens, so that it will not be unduly acted upon, and still a thorough separation of the flour and bran effected. Mr. George Clark and Peter T. Elting, both of Sandusky, Ohio, are the patentees of this invention.

SEWING MACHINES.

This invention relates to the use of a clamping device, attached to the bar or carrier of the perforating needle, for the purpose of clamping the thread of the said needle firmly against the said bar or carrier during the first part of the ascent or withdrawing movement of the said needle, and so causing the thread to be drawn up through the cloth, preventing any loop from being thrown out on the wrong side of the needle, and preventing the thread from being drawn back through the eye of the needle, and thereby insuring a proper quantity of slack being thrown out from the needle, on the proper side, for the entry of the looping device. By the means heretofore used for operating such a clamping device, it is made to clamp the thread at one stage of the downward or perforating movement, as well as during the upward or withdrawing movement of the needle, which is very objectionable; and this invention consists in certain improved means of operating the said clamping device, whereby it is caused to clamp the thread at the proper stage of the stitch-making operation, but is prevented clamping the thread during the perforating movement of the needle, and during any greater portion of the withdrawing movement than is necessary. This invention was patented by C. W. Williams, of Boston, Mass.

DEVICE FOR RAISING WATER.

This invention consists in the employment, in combination with the buckets and windlass of a well, of a self-acting device so made that when a filled bucket has risen to the spout or trough to discharge its contents, the said self-acting device will come into operation, and change the direction of motion of the windlass, and cause the alternately filled bucket to rise while the empty bucket descends. Thus by a continuous motion of the windlass shaft in one direction, the buckets alternately rise and fall without any special manipulation, and the drawing of water is rendered less laborious and inconvenient than usual. P. Anderson, of Norwich, N. Y., is the inventor.

TUCKING AND PLAITING GUIDE SEWING MACHINE.

This invention consists in an improvement in tucking and plaiting guides for sewing machines, whereby the edge of the fold of the tuck or plait is kept infallibly at a uniform distance from the needle. It also consists in a certain arrangement, in combination with the guide, of a pencil or marker, by which, as one tuck or plait is being stitched, the proper line in which to fold the next one is marked upon the cloth. Warren L. Fish, of Newark, N. J., is the patentee of this invention.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 12, 1861.

Reported Officially for the Scientific American.

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359.—R. A. Adams, of Indianapolis, Ind., for an Improvement in Grainers' Tools:

I claim carved or stamped leather, gutta-percha or other flexible material above referred to, secured to a crescent or other suitably shaped board or plank, substantially in the manner and for the purposes set forth.

360.—J. A. Allen, of Deerfield, Mass., for an Improved Butter Worker:

I claim the arrangement of the pressing roller, E, with a reciprocating frame, D, that has its extremities hung upon pins which run in longitudinal grooves in the tub, which pins serve as the axis of motion and also as guides for said frame, substantially as shown and described, whereby the distance between the roller and the bottom of the tub may be varied at pleasure, and whereby the butter may be gathered to the center at will by the roller, all as set forth.

[This invention consists in the employment or use of an inclined platform and a roller, the latter being fitted in a suitable frame which is provided with rollers that are fitted in guides at either side of the platform, whereby butter may be "worked" and deprived of all buttermilk with great facility.]

361.—P. Anderson, of Norwich, N. Y., for an Improvement in Water Elevators:

I claim the employment in combination with the buckets, windlass and windlass shaft of a well of the self-acting device, composed of the oscillating double armed lever, K, sliding toothed collar, J, and oscillating lever, M, with its spring, L, in the manner shown and described.

362.—Daniel Barnum, of Jersey City, N. J., for an Improvement in Guides for Sewing Machines:

I claim in gages for sewing tucks and seams, the combination of the following elements or features, as follows, to wit:—

First, Thin elastic and flexible sheet metal under and upper clamping surfaces, a and e, outside of a gage, as specified.

Second, A gage turned up from or attached to the under spring plate, a, forming a base to the clamping surfaces, a and e, at the line, b e d, as specified.

Third, The upward deflection of the edge, h, of the upper clamping surface, e, as set forth.

I also claim, in combination with the combination first claimed, male and female, corrugations or grooves, k, struck up in and diagonally across, both under and upper clamping surfaces, a, and e, as and for the purposes specified.

363.—Charles Beach and Thomas Brown, of Jacksontown, Ohio, for an Improvement in Cultivators:

I claim the arrangement of the concave shovel, c, shield or guard, b, beam, A, with its curved neck, x, the curved standards, M M, and the handles, N N, the whole being constructed as and for the purpose set forth.

364.—D. R. Bowker and Wm. P. Bensel, of New York City, for an Improved Machine for Chiming and Jointing Staves:

I claim the arrangement of the rotating cutter disk, C, with the rotating cutter heads, G G, and swinging clamp frame, J, arranged for joint operation, substantially as and for the purpose set forth.

[The object of this invention is to obtain a simple machine for chiming staves, that is to say, cutting the chamber, cross, and bevel, and also for jointing the staves, the work being done at one operation. The invention consists in the employment or use of a rotary cutter disk, in connection with a swinging clamp frame and rotary cutters, whereby the desired object is obtained.]

365.—S. R. Bryant, of Waterford, Pa., for an Improvement in Bee-hives:

I claim, first, The inclined bottoms, a a′, in connection with the hinged comb frames, I, and a quadrilateral box, A, formed of side and end pieces, b b′, c c′, arranged to open, substantially as and for the purpose set forth.

Second, The vertical guide strips, q, placed in the comb frames, I, substantially as and for the purpose set forth.

Third, The V-shaped cross rails, m, of comb frames, I, when constructed narrower than the upright bars, l l′, and used in connection with the guide strips, q, for the purpose specified.

[The object of this invention is to obtain a hive of simple construction that may be kept clean without any trouble, the combs readily inspected and manipulated or operated upon when necessary, and in which the bees will be induced to build the combs even or in the same planes with the respective frames thereof.]

366.—J. R. Cannon, of New Albany, Ind., for an Improvement in Whips:

I claim the within described whip, as an article of manufacture, constructed as and for the purpose specified.

367.—George Clark and P. T. Elting, of Sandusky, Ohio, for an Improvement in Bran Dusters:

We claim, first, A horizontal disk screen, provided on its under side with fan blades rotating within or above a packed chamber, h, to produce a downward suction through the meshes of the screen, as set forth.

Second, In combination with the screen, and brushes, F, the adjustable frame, G, arranged substantially as shown to regulate the stiffness, elasticity or yieldingness of the brushes for the purpose specified.

Third, The horizontal brush, E F, formed with oblique or tangential spaces, o, operating in combination with a horizontal disk screen, substantially as and for the purposes set forth.

Fourth, The employment or use of the wheel, L, in connection with the oval faced hub, e′, and the flanch, d′, of the hopper, M, arranged to operate as and for the purpose set forth.

368.—N. W. Clark, of Clarkston, Mich., for an Improvement in the Manufacture of Salt:

I claim the process described of separating and precipitating the salt contained in saline water by the aid of artificial heat whilst the water is continuously flowing through the series of pans or kettles at the surface of each, and carrying off the impurities still held in solution or suspension, at the end of the series of pans, substantially as described.

369.—Howell Cooper, of Watertown, N. Y., for an Improved Heater for Cheese Vats:

I claim, first, The combination with the heater and vat of a valve or valves, arranged within the heater, and so as to close against the water in the vat or pipe or pipes leading from the heater thereto, substantially as specified.

Second, The employment of two or more valves in connection with the heater and vat, arranged to control the supply to the vat on opposite sides of it, essentially as set forth.

Third, So arranging the valves which control the supply of hot water to the vat, as that they balance each other, and are exposed on their respective faces and backs to like conditions of the fluid in the heater and vat, substantially as specified.

370.—H. N. DeGraw, of Green Island, N. Y., for an Improved Boot Jack:

I claim the jaws, C C, attached to the foot piece, A, and provided with the shanks or levers, D D, in connection with the shaft, E, provided with spiral grooves, d d, in which pins, c c, of the levers, D, fit, and the cord, G, connected to the shaft, E, all being arranged substantially as and for the purpose set forth.

371.—Robert Dodsworth, of St. Louis, Mo., for an Improvement in Hemp Breaks:

I claim the arrangement of the frames, A A, the breakers, E F, the strippers, C C C, on the bars, b b b, and the gangway, the whole to be arranged jointly and operated in the manner described.

372.—O. Doolittle and N. Eldridge, of Dansville, N. Y., for an Improvement in Ditching Machines:

I claim, first, Supporting the carrying bands at an intermediate point from the sliding frame, substantially as described, so that the band may be extended or contracted as the scoop is raised or lowered.

Second, The combination of a carrying band with a receiving and delivering spout, and a mechanism for giving the spout a positive vibratory motion, arranged substantially as described for the purpose set forth.

Third, The combination of a ditching scoop with grading plows arranged between the wheels, in order to remove the uneven surface of the ground in line with the track of the wheels, for the purpose set forth.

373.—C. H. Dunbrack, of Jacksonville, Ill., for an Improved Water Elevator:

I claim the adjustable drum, D, arranged with the permanent wheel, C, substantially as shown, to admit of the facile adjustment of the rope, E, to suit the hight of the water in the well.

[The object of this invention is to attain a simple and efficient machine for elevating water from wells for domestic purposes—one that may be manipulated with facility, and not liable to get out of repair. The invention consists in the employment or use of valvular buckets, with an adjustable windlass and movable spouts, whereby the desired end is attained.]

374.—Rufus Dutton, of Dayton, Ohio, for an Improvement in Harvesting Machines:

I claim, first, The construction of the frame consisting in the combination of the upright standard, provided with the journal boxes for supporting the gearing and driving wheel or wheels, the curved brace, a a′, and shield board, b, connected and arranged in the manner and for the purposes specified.

Second, The use of the auxiliary arm for supporting the reel in three bearings, one of which extends over the platform, thereby supporting, in a substantial manner, the reel which has no support on the grain side of the machine, said reel being capable of adjustment upon a pivot, when constructed and arranged, substantially as described.

Third, The arrangement of the main frame and metallic coupling arm, R, adjustable hinged connection of the finger bar, and auxiliary carrying wheel, B′, in the manner and for the purposes described.

Fourth, The combination of the axle, V, and auxiliary driving and carrying wheel, B′, with the main driving wheel, B, whereby additional traction is secured for operating the cutter when the machine is used for mowing, substantially as and for the purpose described.

375.—W. L. Fish, of Newark, N. J., for an Improvement in Guides for Sewing Machines:

I claim, first, The combination of the pressure roller, D, having a spirally arranged system of teeth and the oblique lip, f, on the lower plate, substantially as and for the purpose described.

Second, The employment, applied substantially as described, in combination with the gage, E, of a tucking or plaiting guide, of a pencil, r, or other marker, for marking the proper line in which to make the fold for the next tuck or plait, while one is being stitched.

376.—E. C. Fraser, of New York City, for an Improved Machine for Cutting and Punching Sheet Metal:

I claim the application of the tool, C, constructed with a neck as described, for punching and cutting sheet metal, in combination with the adjustable die and die-bed, A B, as set forth.

377.—C. C. Garrett, of Spring Hill, Ala., for an Improvement in Seed Planters:

I claim the arrangement of the shaft, J, wheel, K, cylinder, S, gearing, H I, hoppers, K R, concave, N, bottom, L, spring, M, slides, O, lever frames, P, screws, Q, springs, T, harrows, U, and frame, A, all in the manner and for the purposes shown and described.

[The object of this invention is to obtain a machine by which corn may be planted alone or in connection with cotton seed, as may be required.]

378.—S. M. Goff, of East Addison, Vt., for an Improvement in Cultivators:

I claim the arrangement of the adjustable shares, L, bar, M, and frame, K, with the frame, N, segment bar, O, roller, N′, frame, D, share, E, toothed shaft, F, and hooks, J, in the manner and for the purpose shown and described.

[This invention consists in a novel and improved manner of attaching a cultivating device to the axle of a pair of wheels, whereby one pair of wheels are made to answer for both devices, and serve equally as good a purpose as if permanently secured to either and used with one device only.]

379.—G. S. Greenleaf and Cyrus Buckland, of Springfield, Mass., for an Improved Carpet Stretcher:

We claim a carpet stretcher, constructed and operating substantially as set forth and for the purpose specified.

380.—N. D. Hartley and M. S. Morehouse, of Quincy, Ill., for an Improvement in Beehives:

We claim the arrangement of a chamber, A, slotted and perforated at C D Y B, box, J, also slotted and perforated as seen at F and K, hives, A′, provided with perforations, L M N, through top, bottom and one side, cap, O, perforated at R and P, through top and sides, in combination with a tube, T, and lamp, Y, all constructed and operating substantially as and for the purposes set forth.

381.—I. I. Harwood, of Boston, Mass., for an Improvement in Pianoforte Action:

I claim a yielding spring lever resting upon the jack, and so operating therewith as to keep the jack at each blow of the hammer in proper position to lift the hammer butt, whereby the hammer is always kept in readiness to strike the string whatever may be the position of the key lever.

382.—D. W. Henderson, of Deerfield, Pa., for an Improved Stump Machine:

I claim, first, The construction of the bar, K, in combination with the hooks, V 8, constructed and combined as described.

Second, I also claim the connecting the levers, E and F, together by the cord, a′ a′, the same operated by means of the combination of the cords, M M M M P P N N N O O O, the pulleys, U S T W, and the wheel and axle, 14 G H, when the same are constructed in the aforesaid combination, and for the purposes set forth.

383.—A. C. Herron, of West Farms, N. Y., for an Improvement in Car Brakes:

I claim, first, In combination with a car, the spur gears and the clutches, C C F N D and O, the sway bars, O Q, the shifters, M, the rollers, L, the chains, K, and the hand, P, or their equivalents, arranged as shown by Fig. 1, No. 1, and Fig. 2, No. 2, of the drawings, for the purpose specified.

Second, The scroll wheel, H, in combination with the springs, G, and the inclined planes, F F, or their equivalents, for the purposes described.

Third, The spring, B, and sway bar, A, as shown by No. 1, Fig. 4, of the drawings, for the purposes set forth.

384.—T. D. Hoxsey, of Paterson, N. J., for an Improvement in Tape for Spring Skirts:

I claim the combination of the longitudinal sack, B, running lengthwise through the tape, with the rectangular bag or pocket now in use, for the purpose of receiving a spring in such longitudinal sack or bag, in order to re-extend the skirt after the same may have been collapsed sitting or otherwise.

385.—Henry Hunsiker, of Lewisburgh, Pa., for an Improvement in Machines for Separating Clover Seeds, &c.:

I claim the screen, F, as described, with its shoe, G, and vibrating board, J, when the same are constructed and arranged in the relation to the discharge box, E′, concave bed, D′, and fan box, K, set forth for the purposes specified.

[This invention consists in effecting the discharge from the rear part of the concave, on a vibrating curved screen, which is so combined and arranged in relation with the fan box that a blast of air will be caused to act upon the seed, chaff, &c., at a point where it impinges upon the screen in its fall from the concave, thereby effecting a better separation of the seed from its impurities.]

386.—W. W. Huse, of Brooklyn, N. Y., for an Improvement in Cigar Machines:

I claim, first, The rotating cap formers, J J, constructed substantially as described, in combination with the head, i, adjustable rod, H, and spring, K, or their equivalents, for keeping the cigar up to the work of forming the cap.

Second, The adjustable pressure roller, L, arranged and operated as described, in combination with the table, C, substantially as and for the purpose set forth.

Third, I claim the arrangement of the several parts, or their equivalents, substantially as described, and operating as a whole in the manner and for the purposes stated.

387.—Hiram Hutchison, of Newark, N. S., for an Improvement in the Manufacture of India-rubber Goods. Patented in England, Dec. 29, 1858:

I claim coating or combining india-rubber or other gums with sheets of cloth, leather, or other material, in the places and of the forms required by the employment of pattern rollers, substantially as described, so that when the said sheets are cut up into shaped pieces of the required size and form, the remainder of the cloth, leather or other material which becomes useless will not be coated or combined with the india-rubber, thereby producing great economy and great improvement in the goods.

388.—T. B. Jones, of Earlville, Ill., for an Improvement in Seeding Machines:

I claim the employment or use of the pivoted or adjustable plate, G, in connection with the elastic plates, g, wheels, E, seed box or hopper, D′, tubes, I J, and passages, e, arranged substantially as and for the purpose set forth.

[This invention has for its object the obtaining of a machine which may be used for sowing seed, either broadcast, in drills or in check rows, as may be desired, and one that will operate in any of the above-named ways as well as machines made separately for each. The invention consists in a novel arrangement of seed-dropping devices, a reversible guide-board and seed tubes, whereby the desired end is attained.]

389.—R. A. Leeper and Z. B. Kidder, of San Jose, Ill., for an Improvement in Cultivators:

We claim the employment of the laterally swinging bars, I I, and shares, J, in combination with the uprights, j′, beams, L L, crank shafts, M, rods, t k, and lever, N, in the manner shown and described.

The arrangement with the above-named parts of the arms, a a, bars, b b, and slotted plates, D, and frame, A, seat, E, lever, F, beams, m m, uprights, j, and standards, G, in the manner and for the purposes shown and described.

[This invention consists, firstly, in attaching the wheels of the implement to the pawl in such a way that they may be adjusted to keep the frame in a balanced state at all times, or with the device on or off it. It consists, secondly, in a novel and improved arrangement, whereby the same may be readily manipulated by the driver or attendant, as may be required in the prosecution of the work, and while either riding or walking..]

390.—William Linton, of Baltimore, Md., for an Improvement in Machines for Molding Pottery:

I claim a revolving core mold in combination with a stationary yielding or traversing lip mold or top molder, operated by springs, so as to hold the vessel formed in the mold when the core is removed, substantially as described.

391.—W. S. Morris, of New York City, for an Improvement in Fish Hooks:

I claim the slide, c, upon the line, d, in combination with the spring hooks, a a, that are hinged together as set forth, so as to spread apart by pressing the upper ends together, and confining them by the slide, c, as specified.

392.—M. H. Mansfield, of Ashland, Ohio, for an Improvement in Apparatuses for Evaporating Saccharine Juices:

I claim the arrangement of the incline sides, H, and strainers, I, and the troughs, J, in the manner and for the purpose set forth.

I also claim the guide bars, F, with the inclines, h, in combination with the incline sides, H, and strainers, in the manner and for the purpose described.

393.—Alfred Owen, of Buffalo, N. Y., for an Improved Nail Machine:

I claim, in combination with a stationary anvil, and a moving hammer, each provided with suitable shaping dies, an endless chain carrier that brings up and carries past the dies, the nail rods, substantially in the manner described.

I also claim, in combination with an endless chain carrier, the series of grippers traveling with it, for firmly holding and turning the nail rods, to bring their several sides to the action of the hammer, substantially as described.

I also claim, in combination with a series of grippers that hold, carry and turn the nail rods, the levers, m, for causing an increased gripping force, when the hammer is acting upon the spike rod.

I also claim, in combination with a traveling chain carrier, and a series of grippers that hold, carry and turn the nail rod, a delivering mechanism for releasing the nail when finished, substantially as described.

394.—B. O. Paige, of Lowell, Mass., for an Improvement in Stop Motion for Railway Drawing-heads:

I claim the arrangement of hinged clearers, I and J, both above the upper and below the lower drawing rollers, D E and F, and coming in contact with the entire length of each of these rollers, to perform both the functions of constantly cleaning or wiping them their entire length, and also to readily and certainly detect any and the least improper accumulation of sliver on any portion of any or all of the upper and lower drawing rollers, to instantly stop the railway drawing-head and all the connected cards, by the adjustable combination of both the same clearers for convenience in primary construction and subsequent use, with catch lever, Z, slide rod, W, and shipper, U, and operated in the manner set forth.

I also claim the swinging frame, P, carrying the calendar roll, M, and the stand, B2, and screw, C2, when combined and so arranged with catch lever, Z, slide rod, W, and shipper, U, as described, for regulating my stop motion in its primary construction, as well as adjusting it in its subsequent use; these parts being embodied with railway drawing-head and connected cards, and so operated by calendar roll, M, as to produce an even and uniform endless sliver, by instantly detecting and stopping the movement of the railway drawing-head and that portion of every connected card for moving the sliver, as described, whenever the latter becomes uneven or improperly reduced.

395.—Ferdinand Pimmer, of Grand Junction, Tenn., for an Improvement in Ditching Plows:

I claim, first, The arrangement of the chain or rope, f, extending from the ends of the thill, H, to the chain wheel, G, on the arbor, b, in combination with the guide pulleys, h, slide, l, and hand lever, I, constructed and operating as and for the purpose described.

Second, The arrangement of the bent lever, r2, rockshaft, q4*, slide, q4, and journal box, q1*, in combination with the regulating lever, E, constructed and operating as and for the purpose set forth.

Third, The arrangement of the rotary cutter, K, in combination with the share, J, as described, for the purpose of beveling one side of the ditch.

Fourth, The arrangement of the reciprocating reversible shovel, L, in combination with the share, J, constructed and operating substantially in the manner and for the purpose set forth.

Fifth, The arrangement of the arms, t t′, chains, t* t′*, pulleys, w w′, cams, u* u′*, and anti-friction chuck, S, in combination with the shovel, L, constructed and operating in the manner and for the purpose specified.

[The object of this invention is to produce a plow which will open a ditch to any desired depth, throw the dirt on one side by means of a reciprocating shovel, and bevel the other side by the action of a rotary cutter, and which enables the driver to raise and lower the share or to throw it out of the ground altogether, and also to cause the plow to run in any desired direction.]

396.—Whitman Price, of Mount Olive, N. C., for an Improvement in Cultivators:

I claim the arrangement of the beam, A, side frames, A′, handles, B and B′, shovels, C, standards, a, rake head, A2, and teeth, b, pin, c, and yoke, d, the whole being constructed, combined and operating as and for the purpose set forth.

397.—J. H. Renshaw, of Knoxville, Tenn., for an Improvement in Metallic Coffins:

I claim, first, The compound joint consisting of the beveled lapped portions, a a, and the cemented channeliuside of the coffin, so arranged that the gas will press upon the surface of the cement, as and for the purposes set forth.

Second, The adjusting screw, E, nut, k, jointed arms, F F, and spring support, G, combined, arranged and operating, in combination with a coffin, in the manner and for the purposes set forth.

[This invention relates to a new and improved device for supporting the head of the corpse in a proper position and in keeping it in this position. The invention consists in combining with a curved plate, which fits around the back of the head, two jointed and adjustable screws, in such a manner that the head of the corpse may be secured rigidly in its desirable position.]

398.—Stephen Reynolds, of Richmond, R. I., for an Improvement in Machines for Binding Grain:

I claim, first, The revolving gatherers, D, in combination with the endless apron, B, operating substantially as and for the purpose set forth.

Second, The reciprocating carrier arm, H, for passing the wire or string first across the opening in D, and then around the bundle, in combination with proper mechanism for holding the ends of the band and fastening the same, substantially as set forth.

Third, The employment of the double jaws, L L′ L″, so arranged and operated that one end of the band shall be placed in one jaw, and the other end in the other jaw, by the action of the carrier, H, or its equivalent, without disturbing by the latter operation the security of the other end, substantially as and for the purpose described.

Fourth, Causing the double jaws, L L′ L″, to make one-half a revolution upon their axis after the wire has been placed in one jaw and before it is placed in the other jaw, substantially as and for the purpose specified.

Fifth, Giving the jaws, L L′ L″, an end motion by means of the stationary cams, P P′, or equivalent device, for the purpose of bringing them into and removing them from the path of the carrier arm, H, as set forth.

Sixth, The cutter or shear, T, attached to the jaw, L′ L″, for the purpose of cutting off the wire after it is griped by the said jaw, in combination with the cam or wedge piece, t, or equivalent, substantially as specified.

Seventh, Rotating the double jaws, L L′ L″, by means of the stationary gear or rack, M, for the purpose of twisting the ends of the wires and securing the bundle, substantially as set forth.

Eighth, The arrangement of the guard, W, for holding the wire in the proper position for the action of the twisting device, substantially as specified.

Ninth, The employment of the spring arms, U V, in combination with the gatherers, D, for supporting a small bundle in the proper position relatively to the binding devices, substantially as set forth.

Tenth, The employment of the stationary cam, R, in combination with the jaws, L L′ L″, for the purpose of relieving the bundle at the proper point, substantially as set forth.

Eleventh, The employment of the wedge-formed projection, Y, pierced by the eye, X, on the end of the carrier arm, H, for opening the jaws, L L′ L″, and depositing the wire therein, substantially as set forth.

Twelfth, The construction and arrangement of the double jaws, L L′ L″, in the manner shown, so that they are both operated by the single spring, l′, and are both released by pressing upon the rear end of L′, substantially as set forth.

399.—Martin Riling, of Altoona, Pa., for an Improved Sausage Stuffer:

I claim the combination and arrangement of the two screws, F F, and the cog wheels, C and E E, substantially as and for the purpose specified.

400.—M. L. Roberts, of Mount Union, Ohio, for an Improvement in Knitting Machines:

I claim the arrangement of the vertical guides, G′ G′, and the presser, G, with the said horizontal needle cylinder, B, so that the guides and presser shall be outside of the face of the cylinder, substantially as described.

401.—D. M. Robertson, of Manchester, N. H., for an Improved Machine for Feeding Screw Blanks:

I claim an endless chain or its equivalent, with openings for the screws, screw blanks or articles fed, working in a slot or groove in a hopper, so as to carry forward and feed the articles supplied to the hopper.

I claim, in combination with the inclined planes, S, the fingers, R, which receive the screws from the chain, J, or pulleys, M, substantially as described.

I claim, in combination with the cams on the disks, c, the lever, m, spring, n, and rocking lever, J, for the purpose of operating the latches, a and i, as required.

I claim the tube, V, in combination with the yielding lever, d, or its equivalent, making one side, g, of the tube, V, to yield as described, for the purpose specified.

402.—W. B. Robertson, of West Baton Rouge, La., for an Improvement in Cane Harvesters:

I claim, in combination with the knives, d d, and fenders, J J, the double moldboard plow, C, and adjustable dividing wings, C′ C′, substantially as specified.

[This invention is intended for cutting sugar cane and throwing it down into rows, to be afterward gathered and stacked up for use. It consists in the employment of two horizontal knives, with two fenders or guards arranged a suitable distance above the knives, in conjunction with a double turn plow, said knives being made adjustable both vertically and horizontally, and said fenders being made adjustable horizontally.]

403.—H. D. Rogers, of Grafton, Ohio, for an Improvement in Plows:

I claim the rabbetted portion, A, bevel-edged slots, A′, countersunk studs, B B B, and the extended portion of the wing marked, C, the whole being combined with the shoe and point, D, for the purpose described and set forth.

404.—Gelston Sanford, of New York City, for an Improvement in Mills for Grinding Paper Pulp:

I claim, in mills for grinding paper pulp, constructing the sides of conical-shaped staves, with roughened surfaces, set alternately in reverse positions, so that the spaces between them can be adjusted as set forth, in combination with the serrated rubbers, E, constructed and operating substantially as described.

405.—I. J. Saunders, of Sparta, Ga., for an Improvement in Guano Spreaders:

I claim the combination of two hoppers, A and B, slide, S, cam wheel, c, and its driving pulley, a, with an ordinary wheelbarrow frame, all the parts being constructed, arranged and operating in the manner and for the purpose set forth.

[This invention consists in the combination of two hoppers, a discharge governor or slide, and a cam wheel and its driving pulley, with an ordinary wheelbarrow frame, the same constituting a very simple and efficient apparatus for spreading guano and other pulverized fertilizers by hand.]

406.—C. H. Schadt, of New York City, for an Improvement in Anvils:

I claim the arrangement of the stout spring, G, rising and falling plate, E, and weak springs, H, in combination with the case, C, and anvil, A, constructed and operating substantially as and for the purpose described.

[This invention consists in the arrangement of a stout spring acting on the under side of a rising and falling plate which supports the anvil, and which is acted upon from the upper side by a series of weak springs in such a manner that the force of the blows is counteracted by the stout spring, and the recoil of this spring is counteracted by the weak springs.]

407.—L. H. Smith, of Salem, N. Y., for an Improvement in Sewing Machines; ante-dated August 12, 1860:

I claim, first, The endless belt or chain, U, pulleys, T R, and clamping mechanism, V′ f g, or substantially equivalent devices, operating in combination with the camshaft, I, and ways, Z′, substantially as and for the purposes set forth.

Second, The adjustable cloth holders, Z E′, and wires or knes, W, upon a stationary frame operating substantially as set forth, in combination with a moving frame or carriage carrying the sewing mechanism.

Third, The connecting rod, H, cam disk, M, and slotted rocker, J K L, operating in combination with the hinged slide, D, substantially as set forth, to impart an intermittent lateral motion to the needle carrier.

408.—H. T. Stanard, of Wayne, Mich., for an Improvement in Hanging and Operating Window Sashes:

I claim the two sashes, B B′, connected by cords, b b′, running over suspended pulleys, c c′, in combination with the cord, d, stationary pulleys, g e e′, movable pulley, f, cord, i, and spool, h, with its accessories, all arranged and operating as specified.

[See engraving of this invention on page 16, present volume, of our journal.]

409.—V. Stirewatt, of Albany, N. Y., for an Improved Churn:

I claim the ribs or cleats, L L, on the inner surface of the churn body, A, arranged and operating, in combination with the dasher, H, substantially as and for the purpose specified.

410.—J. C. Stoddard, of Worcester, Mass., for an Improvement in Rake Heads:

I claim attaching the steel rods, B, to the head, A, by means of the hooked end, b, coil, c, on the rods, and the slot, a, and strips, d, on the head, A, substantially in the manner set forth,

[This invention relates more especially to hay rakes and hay spreading machines, and it is intended to furnish a simple and efficient means for attaching the teeth or tines to their crossbars or heads, whereby they may be easily adjusted longitudinally on their bars and securely fixed at any desirable distance apart without bolts, screws, clamps, or anything of the kind. The invention consists in forming a groove of a sufficient depth from end to end of the bar or rake head, to which the wire rods are to be attached, and in forming a coil and a lock on one end of the wire rods or teeth to be attached to the car, so that the coils can be slipped on the rod with the lock or straight portions in the groove in said bar, using strips of a suitable length and thickness to fit into this groove and to secure the wire rods at the desired distance apart, which strips are held in their places by the coils on the ends of the rods.]

411.—E. J. Story, of Getyville, N. Y., for an Improvement in Truss Bridges:

I claim the construction of the posts, A, with balls, a, and the arch sections, B, with sockets, e, in the manner and for the purpose substantially as shown and described.

[This invention consists principally in the connection of cast iron arch sections and posts in a bridge, by means of sockets formed in the ends of said sections and balls formed on the posts, so fitted as to form universal joints and to give perfect bearings to the parts in all conditions of the bridge.]

412.—J. W. Taylor, of Ashland, Va., for an Improvement in Cultivators:

I claim the arrngement of the parallel stays, c, draw bar, d, with its hinge, e, cultivator frame, X, and harrow frame, y, the whole being constructed as and for the purpose described.

413.—O. C. Taylor, of East Burlington, Pa., for an Improvement in Straw Cutters:

I claim the lever, F, provided with the pawls, H H, applied to the feed box, A, and connected to the knife gate, C, and crankshaft, G, substantially as shown, for the purpose of serving as a means for operating the knife gate, C, and feed rollers, I I′.

[This invention consists in a reciprocating knife gate and feed rollers, whereby said means may be employed, when desired, for operating a churn, the dasher of which is connected to the knife gate. By this invention, therefore, the straw cutter is greatly augmented in value, as its driving mechanism is made to perform a double function and to work well in either capacity.]

414.—Ebenezer Tuttle, of Canaan, Maine, for an Improvement in Water Wheels:

I claim the combination of the horizontal, adjustable plates, f, with the buckets, c, and gate, F, of a water wheel, substantially in the manner and for the purpose shown and described.

[This invention consists in the employment of a cylindrical gate applied to the wheel so as to encompass and revolve with it, and having a series of horizontal projections attached to its lower end, so as to fit between the buckets of the wheel and form horizontal partitions therein; all being so arranged that, as the gate is actuated or adjusted to admit water to the wheel, the partition plates will also be adjusted, and the capacity of the buckets varied according to the volume of water admitted. By this means a greater or less amount of power may be obtained from the wheel without an unnecessary expenditure of water.]

415.—Gabriel Utley, of Chapel Hill, N. C., for an Improvement in Plows:

I claim the arrangement of the mold board, H, cutters, h, lower share, G, and cutters, f, with the land side, E, standard, D, adjustable upright, F, and beam, A, in the manner and for the purpose shown and described.

[This invention relates to an improvement in subsoil plows, and has for its object the pulverizing of the subsoil, or the breaking of it up, so as

to prevent its packing after being acted upon by the subsoil share. The invention also has for its object the puiverizing of the surface soil simultaneously with the subsoil, so as to render the whole light and friable and, therefore, permeable to air and moisture.]

416.—D. S. Wagener, of Penn Yan, N. Y., for an Improvement in Machines for Hulling and Cleaning Clover Seed:

I claim, in combination with a clover hulling and cleaning machine, a suction fan that will concentrate the dust and other light impurities within the machine and then pass them out through a suitable conductor to any proper depository, substantially as described when the same is accomplished by an arrangement of mechanism and passages, as described, for effecting the object and purposes represented.

417.—Dutee Wilcox, of Providence, R. I., for an Improvement in Sleeve Fasteners:

I claim the sleeve fastener constructed with a slider, f, its spring catch, h, and hook, g, or its equivalent, arranged and applied to the body, a, and the hook, e, or its equivalent, substantially in manner and so as to operate as specified.

418.—C. M. Wilkins, of West Andover, Ohio, for an Improvement in Upsetting Tire:

I claim the combination of the wedges, D D, with an anvil in the manner described.

419.—C. W. Williams, of Boston, Mass., for an Improvement in Sewing Machines:

I claim the peculiar combination of the jaws, F and G, and doubly beveled tongue, h, and doubly beveled switch, H i; the said parts being constructed and arranged as shown and described and operating in the manner described, to cause the clamping of the thread during the early stage of the withdrawing of the needle and prevent the clamping thereof during the downward stroke.

420.—Theodore Burr (assignor to himself, Augustus Rower and Parcel Brinkerhoff), of Battle Creek, Mich., for an Improved Life-preserving Ship:

I claim the use of the socketed masts in connection with a life escape ship detached by means of straps and keys, substantially as described, and for the purpose set forth.

421.—Joseph Davis, of East Wilton, N. H., assignor to himself and J. A. Locke, of Watertown, Mass., for an Improvement in Carding Machines:

I claim the described application and arrangement of the fluted rollers under the main card cylinder and to operate therewith substantially in manner as specified.

422.—C. W. Fossler (assignor to himself and J. Balsbaugh) of Freeport, Ill., for an Improvement in Seeding Machines:

I claim the arrangement of the seed boxes, I, slides, H J, shaft, D, rods, F, bar, G, rollers, B, lever, M, rod, N, caster wheel, O, and shares, c' b', in the manner and for the purpose shown and described.

[This invention relates to that class of seeding machines which are designed for planting seed either in drills or in hills and in check rows. The invention consists in a novel and improved arrangement of seed slides and a cut-off, whereby the seed-distributing device is placed under the complete control of the driver. The invention also consists in an improved means for elevating and depressing the front end of the implement so as to regulate the depth of the planting, as may be desired, or to elevate the furrow shares entirely above the ground when the seed distributing device is rendered inoperative and the implement is being drawn from place to place.]

423.—L. K. Jenne (assignor to himself and William Ashley) of Grand Rapids, Mich., for an Improvement in Corn Planters:

I claim the arrangement of adjustable plows, d d and f f, seed and fertilizing slides, e e, sliding shaft, b, by which the machine is thrown in and out of gear, lever, a, double boxes, D D, and check pins, n n, when the whole shall be combined and operated substantially as and for the purpose specified.

424.—Jefferson Nash (assignor to himself and A. K. Cutts), of Janesville, Wis., for an Improvement in Grain Separators:

I claim, first, A hinge or joint formed by means of mouth, d, of a gang of sieves and the edge of apron, D, of a separator shoe, when used in adjusting the angle and supporting the front end of a gang of sieves, substantially as described.

Second, Sustaining a gang of sieves within the compressible sides of a separator shoe by means of a rod, a, or its equivalent, substantially in the manner and for the purpose described.

425.—Quartus Rice, of West Winstead, Conn., assignor to himself and L. H. Smith, of Salem, N. J., for an Improvement in Sewing Machines:

I claim the employment of a sewing machine on a railroad in such manner that the machine shall travel on the road, while sewing, in combination with any suitable mechanism for imparting motion to the machine and sewing mechanism from a stationary driving shaft, substantially as and for the purposes described.

426.—William Harson (assignor to himself and F. N. Bangs), of New York City, for an Improved Rock Drill:

I claim, first, The gibs, M N, constructed and operating substantially as and for the purpose specified.

Second, The combination of the hollow piston rod, D, the gibs, M, N, and the rings, O P, constructed and arranged for conjoint operation, substantially as described.

Third, The combination of the rings, O P, with the tubes, G G', and the cylinder, A, in the manner and for the purpose substantially as described.

Fourth, The combination of the tappet bar, F, slotted box, f, and valve rod, e, constructed and operating as and for the purpose described.

Fifth, Operating a drill tool or pounder by the direct application of steam or compressed air to the tool holder, substantially in the manner set forth.

Sixth, The holes, m, in the tubes, G, for the purpose specified.

427.—H. C. Alford, of Minooke, Ill., for an Improved Washing Machine:

I claim the arrangement of the oscillating bar, G, slotted arms, H, and hinged levers, E, with the oscillating bar, D, stem, E, oscillating rubber, F, and oscillating tub, A, in the manner and for the purpose shown and described.

[The object of this invention is to facilitate the washing of clothes in such machines as have a segmental slotted concave working in the interior of a semi-cylindrical swinging tub, by connecting the concave with the tub in such a manner that by imparting an oscillating motion to the tub the concave is caused to oscillate in an opposite direction, at the same time leaving the concave free to bear down upon the clothes with its whole weight during the whole operation.]

RE-ISSUE.

32.—S. R. Parkhurst, of West Bloomfield, N. J., for an Improvement in Machines for Ginning Cotton and Burring Wool. Patented May 1, 1845, and Extended:

I claim, first, A hollow cylinder having an outer acting surface composed of flat, strong, long-topped metallic teeth combined with plain surfaces below the tops of the teeth, substantially as described, and capable of being used to produce the results specified.

Second, In combination with a hollow cylinder provided with an acting or working surface, substantially as is described, I claim feeding rollers constructed and relatively arranged therewith, substantially as set forth, the combination operating substantially as described, and these I also claim in combination with a rotating beater constructed relatively, arranged therewith, and operating substantially as herein set forth.

Third, I claim a rotating beater, substantially such as is described, in combination with a hollow cylinder having an acting surface of teeth and cylindrical surface, substantially such as is specified, and in combination with these I also claim a burr box or trash box and a rotating brush or its equivalent, or either of them, all the parts enumerated being substantially such as are hereinbefore set forth.

Fourth, I claim a hollow cylinder having substantially such an acting surface as is hereinbefore described in combination with a rotating beater, as specified, and with a carding engine or machine, the combination acting substantially as set forth, and in combination with these three elements or parts of a whole machine I also claim feeding rollers and a trash box substantially such as specified, by which combinations the cleansing preparatory to carding and the carding of wool are carried on jointly as a continuous process.

DESIGNS.

H. G. Thompson, of New York City, assignor to the Hartford Carpet Company, of Hartford, Conn., for Designs for Carpets (16 cases).

NOTE.—The above list contains the claims of SIXTY-EIGHT patents which were granted on the 12th inst., being the work of the Examiners, Revising and Appeal Boards for the week previous. Out of this number of patents granted, THIRTY—nearly one-half of the entire issue—were solicited through the Scientific American Patent Agency.

Notes and Queries

B. F. N., of Vt.—By the use of warm solutions of sulphate of copper, the metal is deposited more rapidly in obtaining electrotypes than when cold. The description of the process of electrotyping given on page 257, Vol. I. (new series), of the SCIENTIFIC AMERICAN, is as full as we can give. Our electrotypers can take a full electrotype in two hours, but they prefer a more slow deposition.

F. C. S., of Mass.—The mineral powder which you have sent us appears to be chalk; but without an analysis of it, no person can positively tell what is its real composition. By adding the sulphate of zinc (white copperas) to boiling oil, very slowly, its drying properties are greatly improved. Fine lampblack, mixed with boiled linseed oil, makes a glossy black paint. Enameled oilcloth is rubbed down and polished. Any drab colored pigment, mixed with linseed oil, is suitable for making this color on enameled cloth.

J. M. S., of Ohio.—You state that the chimney of your boiler is 50 feet high; this is sufficient. The fire space under the boiler leading from the furnace should be 243 square inches in sectional area, and the throat of the chimney, when the flues enter, should have two square feet of area. If you cannot obtain sufficient natural draft, you must exhaust the steam into the chimney, and this will remedy the evil. We are in favor of using the blast extensively for steam boilers. Palmer's artificial leg would be very suitable for you.

Q. & Co., of S. C.—Dextrin, or British gum, which you may obtain at the druggists, when boiled, forms the mucilage used for envelopes, &c., and it may suit your purpose. We advise you to try a strong solution of isinglass, dissolved in whiskey, as a cement for enclosing your ambrotypes.

F. E., of N. Y.—The painted shades for windows are prepared by laying on a ground of white varnish first, then the colors mixed with varnish afterwards. Oil paints being opaque, will not answer for such shades.

J. L. W., of Ohio.—Your ideas of "the peculiar odor of coal oil" may be very different from those which we entertain. If you have made the discovery of deodorizing fœtid coal oil, and improving its illuminating qualities at the same time, it is a very valuable discovery, as great quantities of offensive smelling oil are still to be found in the market, thus showing that the mode of deodorizing it is not known by all its manufacturers.

H. W., of N. Y.—A very good and durable dark green paint, for out-door work, may be made by mixing a certain quantity of ground charcoal, with litharge as a drier, and some common ochre. mixed like any common pigment with boiled linseed oil.

A. H. S., of Pa.—Correctly speaking, all coal oil contains paraffine, which should become a whitish mass when the oil is exposed to a very low temperature. Because your coal oil was "frozen whitish," it affords no evidence of its having been adulterated.

J. C. B., of Pa.—Wood-drying kilns are made of brick or wood, and are simply close buildings in which planks and boards may be dried by stoves or steam heat at about 212° or 300° Fah.

H. M., of Pa.—The diagram which you have sent us of a railroad brake represents a metal shoe thrust under the wheel between the latter and the track. This kind of brake is old and well known, but has never been brought into common use on railroads. It is, however, very generally used for wagons running on common roads in hilly countries.

R. W. B., of Pa.—Dissolve some india-rubber in refined turpentine and add it to the lard oil which you employ for lubrication, and you will find that your oil bill will be much reduced.

E. J. W., of Mo.—An undershot float wheel is the cheapest you can make for your saw mill. As you do not give us the velocity of your stream we cannot estimate its power.

G. L. L., of Pa.—We find no mention of any European government offering a reward for a mode of squaring the circle.

G. V. R., of N. S.—Mr. Holcomb's idea was that the battery was formed by the zinc on the wire and the copper plate in the ground, with the damp air between.

G. W. P., of N. Y.—What the non-expansionists say is, that smaller cylinders should be used, so that by working steam full stroke, no more steam would be required to do the same work, while there would be a saving in the cost of the engine.

W. M. H., of Mass.—Water being heavier than steam will run under it whether subjected to pressure or not. In the open air, water and its vapor are both subjected to a pressure of 15 lbs. to the inch, but the water falls below the vapor.

G. B., of N. Y.—We think you would be rewarded with an increase of both knowledge and modesty, by a thorough study of the investigations which have been made in vegetable physiology.

J. L. L., of Pa.—Write to your member of Congres to send you the Patent Office reports.

C. C., of N. Y.—If your iron ore contains clay, lime is the proper flux; but if it contains lime, then clay will act as a flux. The cinder will float on the top of the melted metal.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Feb. 16, 1861:—

S. & J., of Ill., $25; L. Y., of N. Y., $25; F. B., of N. Y., $10; H. B., Jr., of Pa., $25; J. N., of N. Y., $30; J. E. B., of N. Y., $25; C. H. A., of Conn., $30; E. & M., of N. H., $25; W. E. W., of Cal., $30; G. N., of N. Y., $25; W. H. A., of Ill., $25; E. W. F., of La., $25; J. S., of Maine, $25; S. R. W., of Conn., $30; L. A. B., of N. Y., $30; G. & S., of N. Y., $55; J. D. J., of Miss., $30; F. W. A., of N. Y., $30; W. W., of Cal., $60; W. J. M., of N. J., $30; M. J., of Mass., $25; D. W. S., of Ga., $55; A. G. S., of N. Y., $25; F. McJ., of Ohio, $25; H. P., of N. Y., $30; S. McQ., of N. Y., $10; R. & W., of N. Y., $30; R. W., of Pa., $10; T. P., of Ill., $30; D. M. C., of Ind., $12; E. B. C., of R. I., $25; N. A. R., of Vt., $25; F. C. T., of N. Y., $30; W. H. G., of N. Y., $30; J. McA. G., of Mass., $25; E. T. S., Ohio, $30; A. M. G., of N. H., $32; B. W. H., of Mass., $25; A. L. W., of N. Y., $12; C. C., of N. Y., $30; B. & N., of La., $25; J. A. A., of N. Y., $25; F. R. W., of Pa., $25; W. H., Jr., of R. I., $30; G. I., of Mich., $30; W. D. H., of Ga., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Feb. 16, 1861:—

A. L. W., of N. Y.; A. C. J., of Wis.; H. B., Jr., of Pa.; S. B. S., of Ill.; J. E. B., of N. Y.; D. M. C., of Ind.; G. N., of N. Y.; L. M., of Wis.; N. A. R., of Vt.; C. E. L. H., of Conn.; J. McA. G., of Mass.; A. G. S., of N. Y.; L. Y., of N. Y.; R. W., of Pa.; E. & M., of N. H.; G. & S., of N. Y.; B. W. H., of Mass.; E. B. C., of R. I.; F. C. T., of N. Y.; C. C., of N. Y.; M. J., of Mass.; F. R. W., of Pa.; A. C. M., of Vt.

Important to Hat Manufacturers---Rejection of an Extension Patent Case.

A brief summary of facts relating to the rejection of a patent extension, on the 9th ult., by the present Acting Commissioner of Patents, will be of very general interest to the public, and the manufacturers of hat bodies in particular.

On the 25th of April, 1846, H. A. Wells obtained a patent for an improvement on machines for making hat bodies, the essential features of which related to the conduit for feeding the fur to the revolving exhausted cone upon which the hat body was formed. This conduit was made adjustable in its size, either by hand or otherwise, to feed the proper quantity of fur upon the cone. Messrs. Burr and Taylor became owners of this patent for a very moderate sum, and before it had expired, the inventor died. The patent, however, has been extended for seven years upon the petition of the widow, but the extension has also been purchased by the same parties.

On the 9th of February, 1847, Messrs. Burr and Taylor obtained a patent for an improvement on their Wells' hat-body feeder, which consisted in rendering the feed trunk better suited for adjusting the discharge opening to cones of various sizes, and for throwing greater or less quantities of fur upon different parts of a hat body. This is the patent, the extension of which has just been refused.

The principal grounds for the refusal of any patent is, that sufficient remuneration has been derived from the invention according to its value to the public. The facts presented in this case show, that from 1847 43,788,717 hat bodies were made by machines embracing the Wells and Burr & Taylor improvements, and the owners of these patents have received $626,084 above the cost of manufacturing, of which sum $156,621 were profits for the patent which has been refused an extension. These were held to be large according to the small improvement that was secured in the patent.

Silliman's Philosophy.

We frequently receive inquiries for the best elementary work on natural philosophy, and hereafter we shall experience no embarrassment in answering them, as we shall refer without hesitation to Silliman's work, the second edition of which has just been published by H. C. Peck and Theo. Bliss, of Philadelphia. The title page reads, "Principles of Physics or Natural Philosophy, designed for the use of Colleges and Schools. By Benjamin Silliman, Jr., M.A., M.D., Professor of General and Applied Chemistry in Yale College. Second edition, revised and re-written. With 722 illustrations."

The several treatises on light, heat, electricity, magnetism, &c., embrace the very latest discoveries, and the work contains a great mass of information in relation to the strength of materials, the melting point of metals, &c. As a specimen of the style, we give the following extract:—

A stove snaps and crackles when the fire is lighted, and again when it is extinguished, because of the unequal expansion and contraction of the different parts. The pitch of a pianoforte or harp is lowered in a warm room, owing to the expansion of the strings being greater than that of the wooden frame which supports them; and for the reverse reason, the pitch is raised, if the room is cooled.

Nails driven into wood often become loose; the expansion and contraction of the nails, through variations of temperature, gradually enlarging the holes. A gate in an iron railing may be easily shut or opened in a cold day, but only with difficulty in a warm day, because the gate itself, and the surrounding railings, have become expanded by the heat.

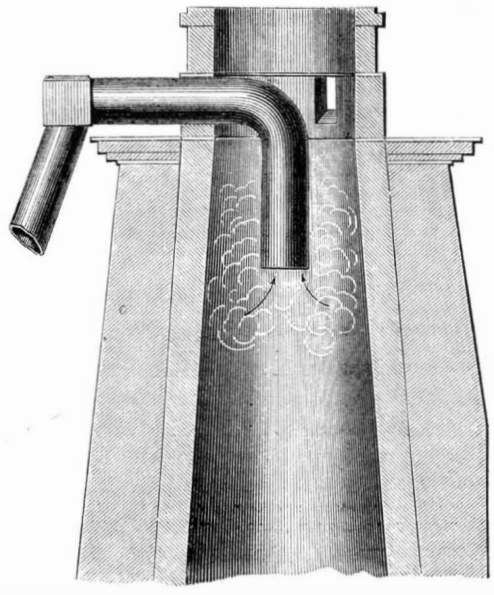
Astronomical instruments, placed on elevated buildings, are sometimes sensibly deranged by the expansion of the walls exposed to the sun. Iron and platinum wires may be successfully soldered into glass, because their mutual expansibility differs very little, while silver, gold and copper, similarly treated, crack out as the joint cools, because their expansibility is much greater than that of the glass.

MICROSCOPIC BODIES IN SNOW.—Professor Pouchet, of Rouen, has examined snow which fell near that city, for the purpose of discovering what substances it swept down in the atmosphere. The snow was placed under the glass and allowed to thaw, and on the surface of the water thus obtained or precipitated from it were plenty of "smuts," a number of starch grains (some of which were colored blue, as if already acted upon by iodine), a few diatoms and a very small number of remains of infusoria. After many hundred observations, he failed to discover the eggs of animals, or spores of vegetables, except two eggs of infusoria and two spores of *lycoperdon* or puff ball.

ECONOMIZING THE HEATED GASES OF SMELTING FURNACES.

The accompanying figure is an elevated section of an apparatus which is employed in a large iron work at Wolverhampton, England, and was put up by C. E. Darby for taking the waste inflammable gases from two smelting furnaces, and conducting them under steam boilers, &c., for raising steam without using furnaces under the boilers. It is described as follows in the London *Engineer*:—

It consists of a large pipe or tube inserted into the middle of the top part of the furnace, and which is made to descend a short distance down into the materials, and is carried over the top of the side of the furnace in the form of a syphon, a continuation of which pipe is taken to the boilers, or hot-air stoves, where the gas is burned in the usual way. Some of the advantages which this plan is claimed to possess over those heretofore used are as follows:—Its extreme simplicity of construction; the small expense its application requires; the ease with which it can be applied to any furnace at work, which has a wide top; and the short stoppage required to put it in; and that it avoids evils which have ensued from the previous plans, viz., the burning of the tuyeres caused when the cylinder is inserted in the top of the furnace, and the gases are taken away from the space between it and the sides of the furnace; and is not liable to the objections that may apply to the closed top or cap, of putting a check on the free escape of the gas, thereby impeding the driving of the furnace, and deteriorating the quality of the iron made. It therefore tends to obviate the forcible objections of some ironmasters to the use of the blast furnace gas, viz., that though there may be a saving of coal at the blast engine and stoves, yet the diminished burden, in some cases, carried in the furnace counterbalances this saving; and that if the make of iron is decreased, much more loss than gain is occasioned by the process.



The two furnaces, to which this method of carrying off the waste gases has been applied, smelt about 240 tuns of iron weekly, and the saving in fuel which has resulted, has amounted in value to about $6,000 per annum.

Mixtures of Nickel and Cast Iron.

A paper has lately been presented to the Manchester and Philosophical Society by Wm. Fairbairn, Esq., C.E., describing the effects of nickel upon cast iron in forming alloys of the two metals. Meteoric iron oftentimes contains about 2½ per cent of nickel, and this iron generally possesses peculiar properties, it being tenacious, malleable, and almost proof against corrosion. In order to determine whether an artificial compound of the same nature could be produced, Mr. Fairbairn made quite a number of experiments with compound bars of nickel and cast iron. He mixed nickel with cast iron at the rate of about 2½ per cent of the former to the latter, fused the alloy in crucibles, and run the products into bars, which were tested with respect to their power for resisting a transverse strain. It was found by these experiments that the tenacity of cast iron was greatly reduced by its mixture with nickel.

A Useful Article for House Owners and Builders---Howland's Adjustable Window Stop.

On page 32, Vol. III. (new series) of the SCIENTIFIC AMERICAN, we illustrated and described a newly patented mode of securing "stops" to window frames, invented by Mark Howland, of Waterbury, Conn. The inventor is now prepared to furnish the article, and we think so well of it that we have given an order to apply it to the windows of our own dwelling. The stop is secured to the frame by a silverplated screw, with a neat porcelain washer intervening between the frame and screw head, which is quite ornamental as well as useful. The use of this stop enables the sash to be readily taken out for setting a broken pane or other purpose with the greatest facility. The screw holes in the stop are elongated laterally, allowing the stop to be readily adjusted to compensate for shrinkage, swelling or warping of the sash, so that a window sash may be kept tight in the frame by simply turning a screw. Persons building new houses, and desiring to introduce all the modern improvements, should not fail to use the patent sash stop of Mr. Howland, whose address is at Waterbury, Conn.

PETROLEUM is from the Greek *petros*, a stone, and *olaion*, oil, meaning stone oil, or rock oil.

FROM THE STEAM PRESS OF JOHN A. GRAY.