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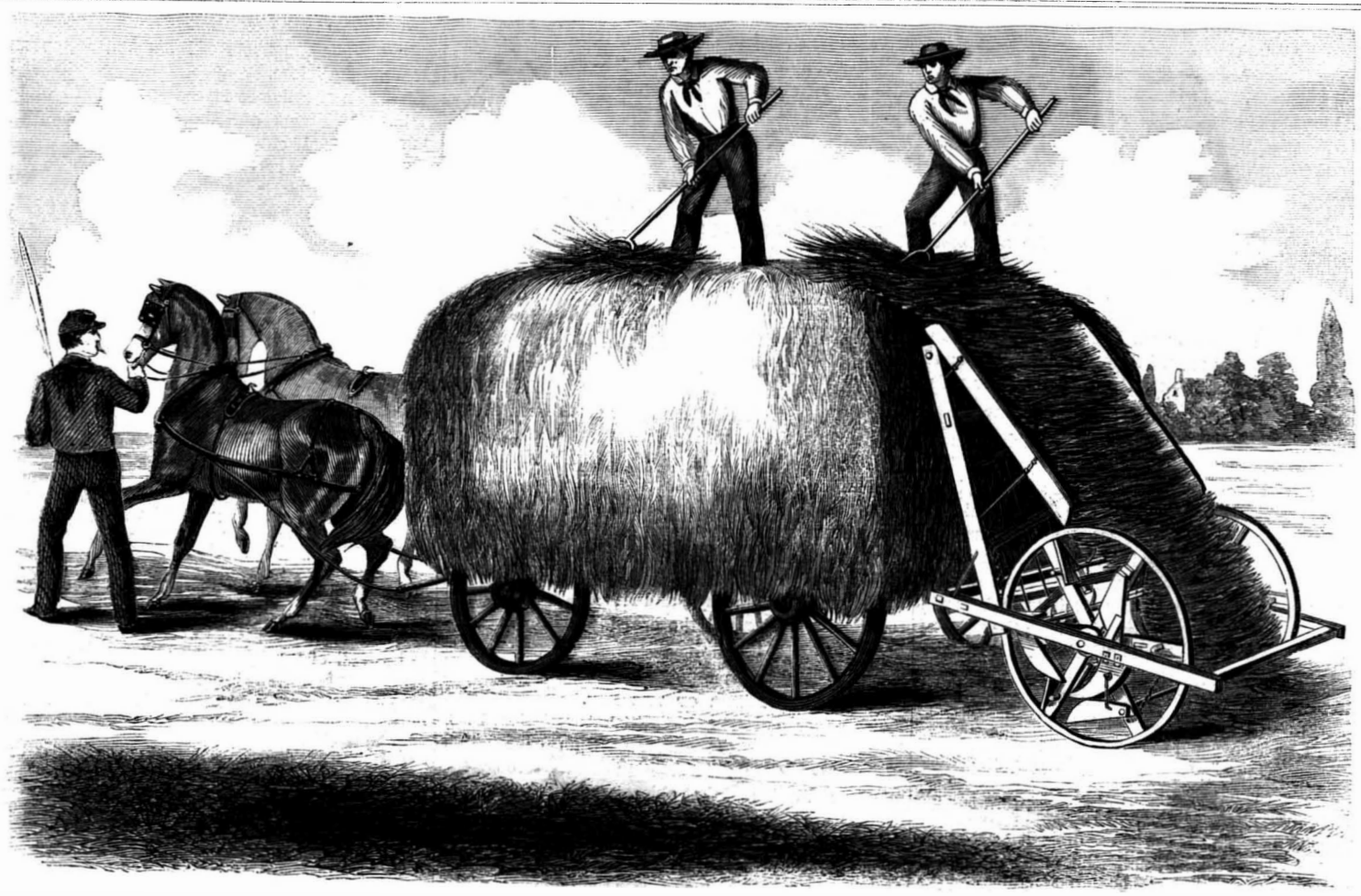


FOUST'S MACHINE FOR LOADING HAY.

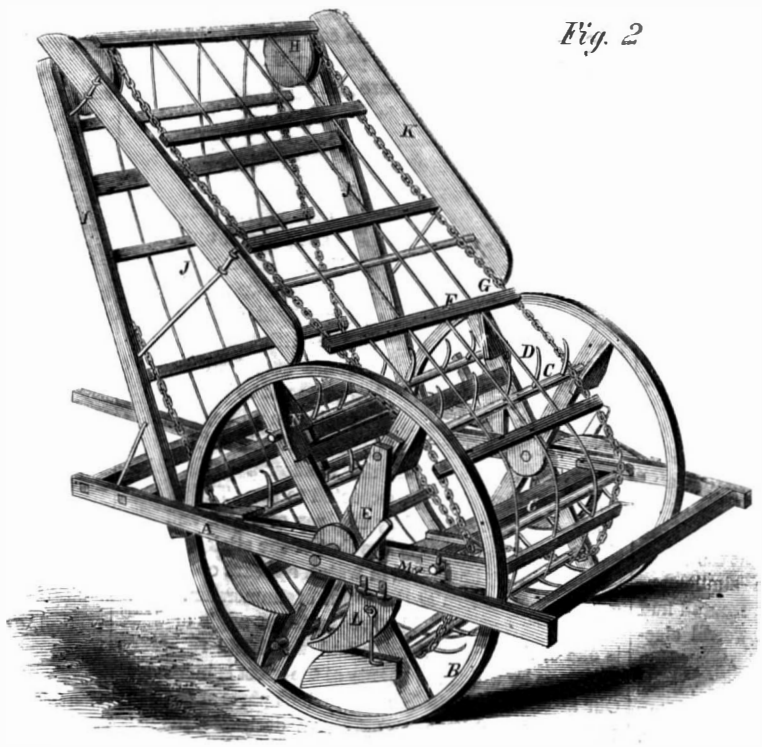
Our engravings represent a new and improved machine for loading hay. It is intended to expedite the work and relieve men from performing this labor, so that they can attend to other duties.

In the large engraving, our artist has given a view of the hayfield with the machine attached to the back of the wagon and men on top stowing the load. In Fig. 2 the machine is shown distinctly with all its parts complete.

The principle of this machine is comprised in a revolving drum fitted with a series of toothed or forked shafts, which, in rotating, gather up the hay from the windrow, and, aided by an endless apron formed of slats and cords, carry the hay to the wagon or rack, where it is compactly loaded as shown.

In Fig. 2, the frame A, is supported by the axle on the drum or wheels, B. These wheels run on the ground and have the shafts C fitted in the arms of the wheel. On these shafts the metallic forks D, which lift the hay, are set. If the reader will look on the ends of the shafts, he will see that every alternate one on each side has an arm, E, attached to it. These arms are weighted at the outer ends and by their action cause the forks to clasp the hay as it is drawn up and hold it so that it it will not be scattered about or clog in the machine. As the forks come up on the back end of the machine the counter-balanced arms, E, fall down perpendicularly, thus throwing the shaft and forks with their loads over against the bars F. These bars are connected to chains, G, which run over pulleys, H, in the uprights I. As the machine advances and the forks pass round with the wheels, these bars strip the hay off the forks, and carry it up on the cords J, to the top of the machine; from thence it falls in the wagon below.

Fig. 2



The side boards K prevent the hay from being scattered about in its ascent.

There are also two pendants, L, one on each side, which prevent the machine from acting when they are turned down as shown; they may be turned up and connected to frame A by means of the hook attached to them, when it is desired to continue loading the wagon. By this arrangement the team can be backed without disarranging the other parts of the machine, and the forks be prevented from acting when it is desired to go from one field to another, or over parts of the same ground from which the hay has already been removed. The fork-shafts have small pins in them which strike other pins, M, in the frame, and regulate the point at which the forks stop. The pendant arms have also stops at N, so that they will not carry the forks beyond the reach of the slats or bars.

A patent was procured on this invention through the Scientific American Patent Agency, on November 18, 1862. For further information address the in-

ventor, Mr. J. W. Foust, at Evansburgh, Crawford Co., Pa.

SOME weeks ago, a New York rogue sent circulars about the country, offering a choice steel-plate engraving of Gen. Jackson for the low price of 25 cents. Those who sent the quarter received in due time a two-cent postage stamp.

THE DISCOVERIES OF 1863.

We have received from the editor, the "Annual of Scientific Discovery or Year-Book of Facts in Science and Art for 1864." This is a volume of 350 pages being bound in uniform style with the preceding volumes of the series. It is ably edited by David A. Wells, A. M., M. D., author of "Principles of Natural Philosophy," "Principles of Chemistry," "First Principles of Geology, &c., It is published by Gould and Lincoln, Boston. The following extracts will give a good idea of the book, which we recommend as useful and entertaining to all persons interested in the progress of science, art, and mechanics :—

RAILWAY TUNNELS IN GREAT BRITAIN.

At a recent meeting of the Institution of Civil Enginners, Mr. J. S. Fraser stated that the aggregate length of the tunnels, now daily traversed by railway trains in the United Kingdom, amounts to eighty miles; and, supposing their cost to have been on an average fifteen pounds on a lineal yard, their construction must have caused the expenditure of six and a half millions sterling—equal to $400,000 per mile.

REPAIRING THE SILVERING OF LOOKING-GLASSES.

The repairing of the silvering on the backs of looking-glasses has hitherto been considered a very difficult operation. A new and very simple method, however, has been described before the Polytechnic Society of Leipsic. It is as follows: clean the bare portion of the glass by rubbing it gently with fine cotton taking care to remove any trace of dust and grease. If this cleaning be not done very carefully, defects will appear around the place repaired. With the point of your knife cut upon the back of another looking-glass around a portion of the silvering of the required form, but a little larger. Upon it place a small drop of mercury; a drop the size of a pin's head will be sufficient for a surface equal to the size of the nail. The mercury spreads immediately, penetrates the amalgam to where it was cut off with the knife, and the required piece may now be lifted and removed to the place to be repaired. This is the most difficult part of the operation. Then press lightly the renewed portion with cotton; it hardens almost immediately, and the glass presents the same appearance as a new one.—*Builder*.

CURIOUS ELECTRICAL PHENOMENA.

Prof. Tyndall publishes the following account of some curious electrical phenomena observed by Mr. R. Watson, and a party of tourists in ascending a portion of the Jungfrau mountain in Switzerland. Mr. W. in a letter to Prof. Tyndall says : "On the 10th of July, 1863, I visited with a party of three, and two guides, the Col de la Jungfrau. The early morning was bright, and gave promise of a fine day, but, as we approached the Col, clouds settled down upon it, and, on reaching it, we encountered so severe a storm of wind, snow and hail, that we were unable to stay more than a few minutes. As we descended, the snow continued to fall so densely that we lost our way and, for some time, we were wandering up the Lotsch Sattel. We had hardly discovered our mistake when a loud peal of thunder was heard, and shortly after I observed that a strange singing sound, like that of a kettle, was issuing from my alpenstock. We halted, and finding that all the axes and stocks emitted the same sound, stuck them into the snow. The guide from the hotel now pulled off his cap, shouting that his head burned; and his head was seen to have a similar appearance to that which it would have presented had he been on an insulated stool, under a powerful electric machine. We all of us experienced the sensation of pricking or burning in some part of the body, more especially in the head and face, my hair also standing on end in an uncomfortable but very amusing manner. The snow gave out a hissing as though a heavy shower of hail were falling; the veil on the 'wide-awake' of one of the party stood upright in the air, and on waving our hands, the singing sound issued largely from the fingers. Whenever a peal of thunder was heard, the phenomena ceased, to be resumed before the echoes had died away. At these times, we felt shocks, more or less violent, in those portions of the body which were most affected. By one of these, my right arm was paralyzed so completely that I could neither use nor raise it for several minutes, and I suffered much pain in it at the shoulder-joint for several hours. At half-past twelve, the clouds began to pass away, and the phenomena finally ceased, having lasted twenty-five minutes. We saw no lightning, and were puzzled at first as to whether we should be afraid or amused."

THE TENEBROSCOPE FOR PROVING THE INVISIBILITY OF LIGHT.

At the last meeting of the British Association, the Abbe Moigno exhibited and described an instrument invented by M. Soleil, of Paris, for illustrating the invisibility of light, and called the "Tenebroscope." It is well known to scientific men, although the general public do not sufficiently appreciate the fact, that light in itself is invisible unless the eye be so placed as to receive the rays as they approach it, or unless some object be placed in its course, from whose surface the light may be reflected to the eye, which will generally thus give notice of the presence of that object. Thus, if a strong beam of sunlight be admitted into a darkened chamber through a small opening, and received on some blackened surface placed against the opposite wall, the entire chamber will remain in perfect darkness, and all the objects in it invisible, except in as far as small motes floating in the air mark the course of the sunbeam by reflecting portions of its light. Upon projecting a fluid or small dust across the course of the beam its presence also becomes perceptible. The instrument exhibited consisted of a tube with an opening at one end to be looked into, the other end closed, the inside well blackened, and a wide opening across the tube to admit strong light to pass only across. On looking in, all is perfectly dark, but a small trigger raises at pleasure a small ivory ball into the course of the rays, and its presence instantly reveals the existence of the crossing beam by reflecting a portion of its light.

SOME PHENOMENA PRODUCED BY THE REFRACTIVE POWER OF THE EYE.

In a paper read before the British Association, 1863, by Mr. A. Claudet, the author gave an explanation of several effects of the refraction of light through the eye; one of which is, that objects situated a little behind us are seen as if they were on a straight line from right to left. Another, that the pictures of external objects which are represented on the retina, are included in an angle much larger than one-half of the sphere at the centre of which the observer is placed ; from this point of view a single glance encompasses a vast and splendid panorama extending to an angle of 200°. This is the result of the common law of refraction. All the rays of light passing through the cornea to the crystalline lens are more and more refracted in proportion to the angle at which they strike the spherical surface of the cornea. Consequently, the only objects which are seen in their true position are those entering the eye in the direction of the optic axis. By this refraction, the rays which enter the eye at an angle of 90° are bent at 10°, and appear to come from an angle of 80°. This phenomenon produces a very curious illusion. When we are lighted by the sun, the moon or any other light, if we endeavor to place ourselves in a line with the light and the shadow of our body, we are surprised to find that the light and the shadow seem not to be connected at all, and that, instead of being in a line, they appear bent to an angle of 168° instead of 180°, so that we see both the light and the shadow a little before us, where they are not expected to be. The eye refracts the line formed by the ray of light, and the shadow and the effect is like that of the stick, one-half of which being immersed in water, appears crooked or bent into an angle at the point of immersion. This enlargement of the field of vision to an angle of 200° is one of those innumerable and wonderful resources of nature by which the beauty of the effect is increased. Our attention is called to the various parts of the panorama which appear in any way a desirable point of observation, and we are warned of any danger from objects coming to us in the most oblique direction. These advantages are particularly felt in our crowded towns, where we are obliged to be constantly on the lookout for all that is passing around us.

THE CHEMISTRY OF GUN-COTTON.

All vegetables, from the cabbage to the oak, are built up of little sacs or cells. Some of these cells, as those in the pulp of the orange, are visible to the naked eye, being $\frac{1}{25}$ of an inch in diameter; others are but $\frac{1}{1500}$ of an inch in diameter, and can be seen only by means of a compound microscope. The walls of these cells, in whatever plant they may be found, are always composed of the same elements combined in the same proportions; forming a definite chemical compound, which has received the name of cellulose.

In some plants the cell walls form a very small quantity of matter in proportion to the contents of the cells, in others they form a very large proportion. The cellulose in the beet-root is but 3 per cent. of the weight, while the fibers of linen and cotton are almost pure cellulose.

An atom of cellulose is composed of 12 atoms of carbon, 10 atoms of hydrogen, and 10 of oxygen, $C_{12}\,H_{10}\,O_{10}$. If cotton is subjected to the action of nitric acid under certain conditions the acid and the cellulose of the cotton are both decomposed. Nitric acid consists of 1 atom of nitrogen and 5 of oxygen, NO_5; 1 atom of the oxygen of the nitric acid combines with 1 atom of the hydrogen of the cellulose, the remaining NO_4 taking the place of the hydrogen thus removed. Thus 4 atoms of oxygen are carried into the cotton in place of 1 atom of hydrogen. This oxygen is held to the nitrogen with which it is combined by a very feeble affinity, and if exposed to a temperature of 273°, it leaves the nitrogen, and combines with the hydrogen and carbon—burning those substances so suddenly as to cause an explosion.

Oxygen is introduced into gunpowder through the medium of the same agent, nitric acid; but in that case the nitric acid is combined with potash, in the form of nitrate of potash, or saltpetre.

The extent to which hydrogen is displaced by NO_4 in gun-cotton depends upon the manipulation. As prepared for photographic use, there are not enough of the atoms substituted to carry in sufficient oxygen to burn all of the hydrogen and carbon. If photographic gun-cotton is set on fire in a close vessel only a portion of it will be burned. But when treated by Baron von Lenk's process, the German chemists say that 3 atoms of hydrogen are displaced by 3 atoms of NO_4. This would be sufficient to burn all of the hydrogen, and to burn a portion of the carbon into carbonic acid, and the remainder into carbonic oxide.

$C_{12}\,H_{10}\,O_{10}+3\,NO_5$ would become $C_{12}\,H_7\,O_{10}+3\,NO_4$; 3 HO escaping. On burning this would become $4\,CO_2+7\,CO+7\,HO+3\,N$.

These products are all gaseous at temperatures above 212°, and if cotton was pure cellulose, this form of gun-cotton would burn without leaving any residuum whatever. But as the cotton is not pure cellulose it leaves on burning a small deposit of ash.

Since writing the above we have received a statement of Karoly's analysis of the gases resulting from the combustion of gun-cotton, from which it seems that the theoretical results above stated are almost exactly realized in practice. Karoly gives the following proportions in a hundred parts:—

Nitrogen,	12.7
Carbonic acid,	20.8
Carbonic oxide,	29.
Hydrogen,	3.2
Carbon,	1.8
Water,	25.37
Light carbureted hydrogen,	7.2

PROF. HOFFMAN, of London, has patented a process for making a new coloring matter by means of iodine extracted from sea-weed, and which produces a beautiful violet, blue violet, or red violet. The patented process consists of mixing in certain proportions the substance called rosaniline with the iodides of ethyl-methyl, or amyl. This dye may be used in the same manner as the aniline colors, and is already in the hands of practical people in all the manufacturing districts, and bids fair to be "the color of the season."

MR. JOHN P. SCHENCKL, the inventor of the celebrated Schenckl shell, died recently of consumption at Nuremburg, in Germany, whither he went last summer for the benefit of his health. Mr. Schenckl was for several years a gunsmith in Boston.

Manufacturing Items.

THE new buildings erected the past season in addition to the before extensive works of Woodruff and Beach, in Hartford, are now occupied. The boiler-shop, one of the finest in the country, is nearly filled with the furnaces and boilers of one of the new steam frigates, the engines of three of which are being constructed here. In the new foundry are two immense cranes, each capable of lifting and moving forty or fifty tuns weight. A huge pit about 20 feet square and 14 feet deep, is being dug to contain the mold for a casting, which will require not less than 28 tuns of iron, a larger quantity than has ever been cast here before. A cylinder, for which 13 tuns of metal was melted, was cast on Thursday last, and is now being unearthed. The arrangements of the new foundry, which make it the most complete in the country, are from designs by Edward J. Murphy. Some idea of the amount of machinery necessary to propel one of the first-class ships, for which Messrs. W. & B. are constructing the engines, can be gained by the statement that the engines and boilers for each will weigh about 500 tuns, the brass-work alone weighing about 450, 000 lbs. The engines for the three vessels will task the resources of this immense establishment for about two years. New tools and machinery are being added as fast as they can be obtained, but there is such a demand all over the country for new machinery that it is difficult to get tools as fast as required. A new steam derrick will soon replace the present one in use in the yard.

THE monthly pay-rolls of the Manchester (N. H.) factories says the *Mirror*, are as follows:—Manchester Mills, $42,000; Amoskeag Mills, $22,000; Amoskeag Machine Shop and Gun Factory, $16,000; Stark Mills, $12,000; Print Works, $10,000; Locomotive Works, $5,500; Langdon Mills, $5,500; Brugger's Stocking Factory, $5,000; Duck and Bag Mill, $2,000; Edge Tool Factory, $2,000; Martin's paper mill, and the numerous small mechanical works in Mechanic's row, $3,000. Previous to the war, the largest average monthly pay-rolls for labor alone were in 1856--7, and came up as high as $108,000, from the class of establishments named above. They are now paying for workmen $194,000 per year more than then.

AN ingenious pocket map, made of two pieces of paper, thirteen inches by five, has been contrived by M. Carrington, of London; these by being folded in a peculiar way, give at pleasure a complete map of the world and of the heavens.

AT the recent periodical meeting of the British Electric and International Telegraph Company, it was stated among other things that the best marine cables were perishable, and there was a necessity for providing means for replacing them.

A YOUNG man who was carried fifteen or twenty times around a shaft in Taylor's soap-stone works at Perkinsville, Vt., the other day, had every article of his clothing torn from him, but escaped without a scratch upon his person.

THE first locomotive engine was landed last month at Ceylon from the ship *Palmerston*. It was landed on a bamboo raft, and was to be drawn to the railway station by a team of three elephants.

THE dam across the Merrimack at Lawrence, is—the overfall—900 feet long, and the water falls 25 to 27 feet.

THE oil wells of Pennsylvania have produced 554, 000 barrels of petroleum since February, 1862.

The Constitution of Nature.

We have received a pamphlet under this title, written by Mr. William Andrew, of Milwaukee, Wis. It treats of the operations of nature; some idea of its contents may be formed from the appended paragraph, the only one, we regret to say, we can find room for. If any of our readers desire to peruse the pamphlet they can address the author as above:—

"MATTER AND VACUUM.—A pure vacuum is space void of all matter. Were all matter out of the universe, nature would then be nothing but a pure vacuum, and this pure vacuum would have some kind of an aspect. This aspect would be something similar in quality to the zigzag light which is formed when concentrated electricity suddenly divides the air, as when it lightens. Could a certain amount of space be freed of all matter, say a cubic mile, the freed space would have an appearance similar to the vacuum caused by concentrated electricity dividing the air, as when it lightens."

MISCELLANEOUS SUMMARY.

FIFTY-DOLLAR UNITED STATES TREASURY NOTES.—COUPONS DETACHED.—A few days ago, says the *Baltimore Sun*, one of the banks of this city received, in the way of business, a fifty-dollar United States Treasury note, dated Dec. 1st, 1863, payable two years after date, with interest of five per cent. per annum, the latter payable semi-annually. Subsequently it was ascertained that the interest coupons had been detached from the note, The United States Treasurer at Washington was thereupon inquired of as to the effect on the value of the note by the detachment of the coupon, and replied as follows:—"The coupons having been detached, it ceases to be a legal tender until the 1st of June, 1865, at which time it will be received for its full face value." This is an important fact to all persons receiving Treasury notes with coupons attached.

GOOD WOOL.—The first requisite for good wool is fineness, which is governed by and produced under the laws of stock-raising, as the breed of variety, climate, the summer and winter food of the sheep and their management. The second requisite is softness. This depends on the character of the yolk or oily secretion that fills the tube of the hair or fiber. This yolk crystallizes in the fiber after shearing, and renders it brittle and harsh, or soft and silky, according as its character is formed by those matters which govern its growth. The last requisite is the length of the wool or of the fiber composing it, and this is governed by climate changes and the condition of the animal.

THE REBEL TORPEDO BOATS.—It is stated in the *Herald* of the 20th inst., that the torpedo vessel which blew up the *Housatonic* and attacked the *Minnesota* is a Northern invention, and her constructor an individual named "Guider." This person states that he offered his boat to the Government for a certain sum and that it refused to purchase her, and that afterwards certain agents of the rebels in this city purchased her for $15,000 in gold. After the transaction the boat was carried South and set to work. The whole story is highly improbable, and we give it place only as one of the rumors of the day.

REMEDY FOR BOILS.—Dr. D. B. Hoffman, of San Diego, Cal., says (*San Francisco Medical Press*) that "Tincture of iodine, *double* strength, of the formula given in the United States Dispensatory, applied thoroughly to boils, bunions, and carbuncles, will cut short the suppurative stages more than one-half, as well as relieve the patient of all pain. All of the feverish symptoms, with alternate agues, chills, and unpleasant feelings in the same, that are met with in delicate females and other persons, are relieved almost entirely by the first application."

HOW TO SAVE A DROWNING PERSON.—It may not be generally known that when a person is drowning, if he is taken by the arm from behind, between the elbow and shoulder, he cannot touch the person attempting to save him, and whatever struggles he may make will only assist the person holding him in keeping his head above water. A good swimmer can keep a man thus above water for an hour. If seized anywhere else the probability is that he will clutch the swimmer, and perhaps, as is often the case, both will be drowned.

SHORTHAND.—We have received from the author, D. P. Lindsley, of Hartford, Conn., a small pamphlet explaining his system of shorthand writing, which he claims to be superior to any other. Mr. Lindsley tells us that girls show particular aptitude for learning this rare accomplishment. We have known $20 per hour to be charged by shorthand reporters, and this is certainly a fair field for extending the employments of women.

A BELGIUM paper says that petroleum oil lamps are affected by music—a certain note on a brass instrument puts them out. M. Duhem extinguished eight lamps in succession by the sound of a trumpet. He was one of the late M. Jullien's band, and is professor at the Brussels Conservatoire of Music. These petroleum lamps, probably, were unable to appreciate the music of M. Duhem.

THE NATIONAL DEBT OF ENGLAND.—The English correspondent of the New York *Times* says:—"War feeds war, and has its own prosperity. When England was engaged in the war with Napoleon, the Bank of England suspended specie payments for twenty years. But money was plentiful, wages were high, there was work for everybody, and though England came out of the war with a debt of $4,000,000,000 it has never impeded, but rather increased her prosperity. A great debt at home is an element of that prosperity. Owed abroad it would be a constant drain upon the country. Owed at home, it is a stimulus to industry. Not a penny of it is lost. It is like taking money from one pocket and putting it into the other. Those who pay the interest on this debt must work a little harder, and those who receive it have more capital to invest and more money to spend. The effect upon the nation has been a constant and vast accumulation of wealth. It is not debt, but capital. There can be no doubt that the wealth, power and security of England have been immensely increased by this so-called national debt; and where is there any reason to apprehend that like causes will not produce like effects on the other side of the Atlantic?"

GREEN PICKLES.—Dr. Gerard Avink publishes in the *Rochester Democrat and American* a very sensible article upon the folly of the common practice of greening pickles, and tells how to detect the copper, which he says is "a beautiful and simple experiment, within reach of everybody." It may be conducted thus:—Cut a greened pickle into small pieces, and put them in a glass of rain water, adding ten to fourteen drops of sulphuric acid; put the bright blade of a knife or any bright steel surface in the liquid for twenty-four hours, and if the pickle contains copper it will be found upon the steel blade, as though it had been coated by the galvanic process. All pickles greened in brass or copper kettles show this result. The green color comes from verdigris, which is a deadly poison. The quantity usually taken with pickles does not often kill, but it produces disease. Such pickles are furnished to our soldiers in large quantities. Why are they colored? Only to please the eye, and make them represent green cucumbers. A poisonous pickle may be eaten upon a full stomach, it never should be upon an empty one. They should never be allowed among sanitary stores.

SUBSTITUTE FOR GUNPOWDER.—Dr. Paul Swift, of Haverford College, Pennsylvania, lately discovered that sulphureted hydrogen in carbon, forms a very explosive compound, it having blown a hole through a thick oaken bench, upon which the first experiment was tried. The carbon being placed under a receiver imbibes from 90 to 100 times its bulk of sulphureted hydrogen, and becomes very explosive. The doctor, aided by Dr. Robert Chase, of New York, is now pursuing a course of experiments which have thus far been eminently successful. They are confident of having found a substitute for gunpowder, which can be manufactured at less than half the cost of the article now in use.

JELLY OF CODLIVER OIL.—M. Dufourmantle proposes the following recipe for preparing a jelly of this disagreeable medicine. Take of codliver oil, 30 grammes, isinglass, 2 grammes, water, a sufficient quantity to dissolve the isinglass. When the latter is dissolved, add the oil gradually, stirring constantly, aromatizing it at the same time with anise or other oil, four drops. A large tablespoonful of this jelly is a dose.—*Jour. de Pharm.*

BUTTER.—With the appearance of spring and "green feed" all fears on the butter subject will vanish. We shall probably enjoy the privilege again of slicking off our bread as much as we wish. In the meantime let us eat our crust in silence, and wait for the days of "buttercups and clover."

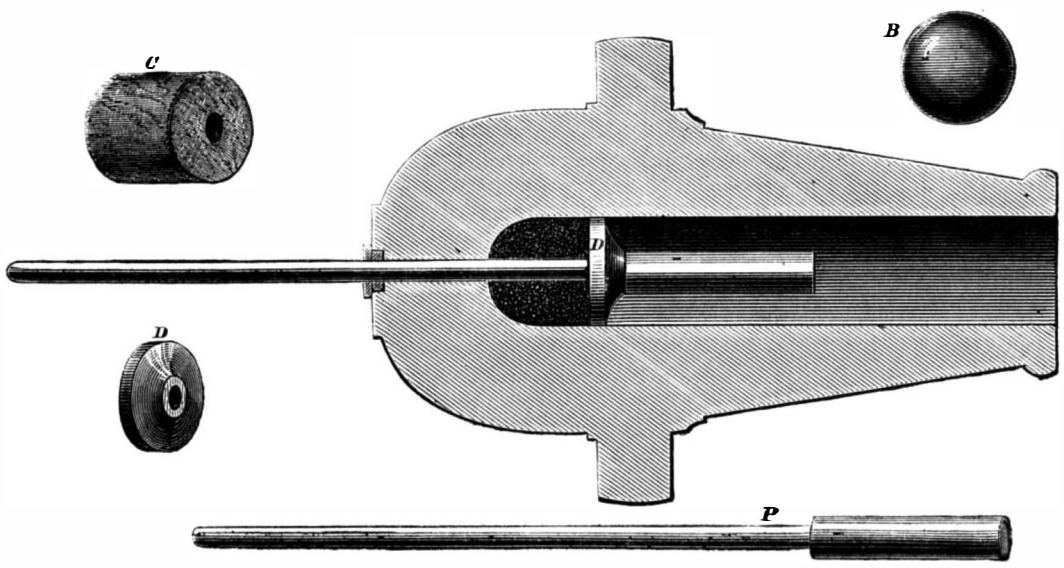
TO PROTECT DRIED FRUIT FROM WORMS.—It is said that dried fruit put away with a little sassafras bark (say a large handful to a bushel) will keep for years, unmolested by those troublesome insects, which so often destroy hundred of bushels in a season. The remedy is cheap and simple.

TO MAKE CLEAR COFFEE.—Stir one egg into half a pound of ground coffee, and set away for use as required. No further substance for settling will be needed, and the egg tends to preserve the aroma.

Improved Shaft-shooting Cannon.

This invention herewith illustrated represents a new kind of cannon and projectile recently invented by Mr. Benjamin Bates. The weapon is thus described by the inventor:—

"The invention requires a muzzle-loading, smooth-bore piece, fitted with a small bore through the breech for the insertion of the tail of the shaft projectile, or the piece may be adapted to contain the entire projectile, in which case it must have a differential bore; or a jacket can be fitted to cover the protruding tail of the shaft, in pieces which are fitted in the manner shown in the engraving, should it prove desirable. The advantage of the rifle motion can be gained without the expensive and weakening process of grooving the bore of the gun, by means of a rifle-box inserted in the breech which shall act upon the rifled tail of the projectile. This arrangement leaves the gun smooth-bored for the discharge of round shot or shell. It is effected by stopping the bore in the breech with a close-fitting bolt, which is secured in place with a screw.



BATES'S SHAFT-SHOOTING CANNON.

"This ordnance will fire the following classes of projectiles:—1. Round shot and shell, or other smooth-bore missiles. 2. Shaft-shot and shell with smooth-bore motion. 3. Shaft-shot and shell with rifle motion. The easy application of this improvement to ordnance already in service is a very great advantage. All smooth-bore cannon can be fitted readily according to this system, thus vastly improving their efficiency; without some such alteration great numbers of them are likely to be condemned.

The force is applied to the base of the head of the projectile by means of the disk, D, as shown in the engraving. It fits loosely on the tail, and occupies the bore when loaded, and guides the head in passing from the gun. The windage is stopped by a leaden flange inserted in the rear edge. When freed from the gun, the disk is stripped from the projectile, and comes to the ground within range at command.

Not only can smooth-bore cast-iron guns be fitted to throw an improved projectile, but they may be made to discharge one of greater weight than the caliber ball, with a higher striking velocity. This is not all. The shaft projectile will strike with its *end*, no matter at what elevation it may be fired, or to what distance it reaches. Along the entire path of its flight its axis is maintained in a tangent to the trajectory. This is not true of any other kind of projectile, as a consequence the shaft projectile shot or shell, has unequaled adaptation to penetration at long range. Its superiority for entering the water is not less strikingly manifest. It will not ricochet or glance like a round ball or rifle shot, but will pursue the original direction, as in the air. Whether it be discharged into the water from above or below the surface, its motion is governed by the same principle. This theory has been proved in pratice.

These facts indicate how futile, henceforth, is the endeavor to secure the boilers, engines, screws and magazines of ships below the line of the water from the effects of shot and shell. The shaft projectile will reach a ship's hull below water with nearly the same ease as above water, whilst the ship which could successfully resist a blow from the 600-pound gun shown in the engraving, would not float her armor. The 600-pound shaft would represent six 100-pound rifle balls acting simultaneously on the same surface.

For further information address B. F. Bates, 42 Clinton Place, New York.

FARMERS' CLUB.

The Farmers' Club of the American Institute held its regular weekly meeting at its room at the Cooper Institute on Tuesday, April 19, the President, N. C. Ely, Esq., in the chair. From the proceedings we select the following:—

SUGAR FROM THE BUTTERNUT TREE.

In the course of a discussion on maple sugar the President remarked that the butternut tree would run as much sugar as the sugar maple, and in his opinion that from the butternut is of the better flavor.

FILTERING CISTERN WATER.

A letter having been read asking for the best plan for filtering cistern water, Mr. Robinson stated that he used cistern water at his house, and that he obtained it very pure by filtering through the walls of a porous pipe. When pipe is made of water cement and gravel with just sufficient water to make the cement adhere under powerful pressure, water will percolate through the walls, and it is an excellent filtering medium. A coil of 4-inch pipe is laid around the bottom of the cistern, one end is stopped tight and the pump is connected with the other, so that all of the water which reaches the pump must pass through the walls of the pipe.

GOLDSMITH AND GREGORY'S SWINE-CATCHING IMPLEMENT.

Every person who has caught hogs knows the trial of patience, as well as danger, attending the operation. There are very few of these animals that are not either wild or vicious, and most of them are both; making it dangerous, when one of them turns at bay, to approach. In fact the bite or rather the tear of the hog's tusks is almost as dangerous as that of a mad dog. The accompanying engraving

represents a simple implement, designed for catching animals without venturing too near them. It somewhat resembles, in form, a pair of nippers, having jaws of a hooked form, sliding one over the other. Extending from one arm, A, to the hook joining the same, is an arched rack, having teeth, in which a spring pawl, B, works, this is attached to the other arm. At the junction of the rack with the hook is a depression, C, in which the pawl catches when the machine is opened, and prevents it from closing accidentally. The socket, D, shown on the side of the arm is for the insertion of the pole, E, to convey the instrument toward the animal to be caught. A rope passes through a socket in one arm, and is fastened to the other arm. On pulling the rope the machine closes, when the pole is withdrawn, and the animal may be secured without further trouble. These instruments are made of malleable cast-iron, and weigh one pound. The inventors have had numerous testimonials from persons who have used them, who express perfect satisfaction.—The invention herewith described was patented Nov. 3d, 1863, through the Scientific American Patent Agency; and further information may be obtained by addressing the inventors, Louis Goldsmith or Noah Gregory, Jr., Goshen, N. Y.

On the Purification of Sulphuric Acid.

The best means of obtaining sulphuric acid, entirely free from arsenic, fully bear out the fact recorded by MM. Bussy and Buignet, viz., that arsenic, in order to pass during distillation, must be present in the state of arsenious acid. I have, however, been led to em ploy a different mode of purification, chiefly with a view to ensuring the complete absence of all nitrous products, and obtaining a pure acid from the very first and of thereby obviating the necessity of changing the receiver—a most dangerous operation when distilling sulphuric acid. If the acid contains nitrous compounds I heat it in a porcelain capsule to a temperature of about 110° C., with a small portion of oxalic acid, till the latter is decomposed, and all effervescence has ceased; about $\frac{1}{4}$ or $\frac{1}{2}$ per cent. is amply sufficient for nearly all samples of commercial acid. It is best to add the oxalic acid before heating, and to stir constantly till the reaction is completed. I now allow the acid to cool down to about 100° and to add to it a solution of bichromate of potassa in sulphuric acid, or some of the salt itself in fine powder, until the pure green color at first produced by the formation of sesqui-oxide of chromium is replaced by a yellowish green indicating an admixture of chromic acid in the free state. The acid so prepared, being now distilled, passes from the first perfectly free from all impurity. The addition of the bichromate has another advantage viz., that if it be first of all applied to a small sample of the commercial acid, it indicates the presence of free sulphurous acid, as well as of arsenious acid, and either of these being present, we may presume on the absence of nitrous compounds. No doubt permanganates would answer equally well; but the bichromate of potassa, which is cheap and easily procured, is so convenient and inexpensive as to leave nothing to be desired.—*F. Maxwell Lyte*

SPECIAL NOTICE.

JOSEPH HOLLEN, of Blair county, Pa., has petitioned for the extension of a patent granted to him on July 16, 1850, for an improvement in knitting machines.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 27, 1864.

All persons interested are required to appear and show cause why said petitions should not be granted. Persons opposing the extensions are required to file their testimony in writing, at least twenty days before the final hearing.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting at its room at the Cooper Institute, on Thursday evening, April 14th; the President, S. D. Tillman, Esq., in the chair.

ROPER'S AIR ENGINE.

The President announced that the first portion of the meeting would be devoted to the examination of new inventions, and invited Mr. S. H. Roper, of Boston, to explain his air engine, which he did by means of an elaborate drawing that he had previously made upon the blackboard. This engine is the same that was illustrated on page 97, Vol. VIII. of the SCIENTIFIC AMERICAN. The products of combustion are used. The fire is in an air-tight vessel equivalent to the boiler of a steam engine, and the air is forced in by an air-pump both above and below the grate, about one-tenth of the air passing through the fire. The heated air and the gases resulting from combus, tion pass by a circuitous passage into the cylinder-driving up the piston, which is carried down by the fly-wheel, the engine being single-acting. The piston is prolonged downward by a hollow drum not quite fitting to the cylinder, and giving an annular space around it filled with cool air which keeps the hot air away from contact with the lubricating material of the piston. The average working pressure is about 8 lbs. to the inch, The description of this engine called forth a brief discussion.

The President:—What is the weight and price of your two-horse-power engine?

Mr. Roper:—The weight is 3,500 lbs., and we sell them for $600. And by a two-horse-power engine, I mean one that in its ordinary working will actually raise 66,000 lbs. one foot high per minute.

Mr. Stetson:—What is the cost of fuel?

Mr. Roper:—In an experiment that I made with my own engine, which was doing a regular duty of 57,000 lbs. per minute, 2½ tuns of coal lasted 41 days.

Mr. Stetson:—Do you consider your engine more economical than a steam engine?

Mr. Roper:—Yes, more economical than any small steam engine. We get a horse-power from 5 lbs. of coal per hour, and some large steam engines do a great deal better than that, but in small engines the saving in coal is not the main thing. The saving in engineering is twice as much as the whole cost of the coal. And more important still, is the constant running of the engine. The first of my engines was put up 15 months ago in a shop where 206 hands are employed, and the stopping of that engine half a day would result in a loss more than equal to the whole cost of the engine. It is in a shoemaker's shop, and if any repairs have been made on it, they have been made by the shoemakers.

Mr. Garvey:—Do you find any difficulty from the sulphur in the anthracite coal?

Mr. Roper:—We have not had any yet.

After the exhibition of some other newly invented articles, the President proceeded to read his usual summary of news. We select the following items :—

STEEL BOILERS.

An account was read of the experiment with steel and iron boilers described on page 73 of our current volume. This was followed by a brief discussion.

Capt. Maynard:—I would ask what is meant by steel. We hear a great deal about a very mild steel. If steel is mild enough it is iron, and costs about the same as other iron. If a boiler were made of genuine steel, I should apprehend great danger of its breaking to pieces. I have seen a claret bottle filled with water and subjected to a gradually increasing pressure up to 120 lbs. to the inch without breaking, but when the pressure was reduced to 20 lbs. and made percussive, the bottle flew to pieces.

Mr. Miller:—I was at Mr. Krupp's works while this experiment was in progress, and saw the boilers. The steel is made by Mr. Krupp, by a process somewhat similar to Bessemer's. The most interesting thing to me was the method recently adopted by Mr. Krupp for rolling boiler plate in complete rings from a single ingot in the same way that he rolls the tires for locomotive wheels, so that no longitudinal riveting is required. He makes the rings about three feet long.

RESIDUAL MAGNETISM.

Dr. A. Van Waltenhofen asserts that the amount of magnetism remaining in the soft iron of an electro-magnet, after the cessation of the electric current, is dependent on the manner in which the current is interrupted. The amount is greater after a gradual interruption. The residual magnetism in very soft iron is often of an opposite nature to that previously existing, after the very sudden interruption of a strong current. This seems to him to furnish strong proof that magnetism is not caused by the separation of two fluids, but by the motion of magnetic molecules to which is opposed a certain amount of frictional resistance. He compared each magnetic molecule to a spring which is bent back. If suddenly released it will return to its original position or go beyond it, but if gradually released it will not go quite to its primitive place.

THE SPECTRUM OF CARBON.

M. Morin, of Versailles, finding that coal, charcoal, and the diamond cannot be vaporized by heat when isolated, yet the same spectrum produced by the common gas flame, cyanogen, carbonic oxide, carbonic acid, acelytine, and the hydro-carbons generally, he concluded this result must be due to the only element common to all these compounds, carbon, and in a state of vapor. It follows that the theory of the candle flame must be somewhat modified. The base of the flame being blue is the vapor of carbon preserved from combustion but kept at a very high temperature by the envelope of hydrogen, which being the more combustible element alone unites with the oxygen of the air. Above the blue part comes the luminous part produced by the passage of the carbon from the gaseous to the solid state, giving out in the passage a considerable amount of heat. The black cone surrounding the wick of the candle is formed of gaseous carburets of hydrogen which burn only in the upper part of the flame where they come in contact with oxygen. Hydrogen being not very combustible, but very subtle, diffusive, and penetrating, its combustion takes place under conditions in which it would be impossible for other gaseous vapors or bodies to burn. If a candle be gently moved so that the flame may be inclined, and the air allowed to come in contact with the vapor of the hydro-carbons which surround the wick, we see the hydrogen take fire and above the wick appears the blue vapor of the carbon. The latter can exist alone and give its luminous reactions, only when it has near it the high temperature produced by the combustion of hydrogen. When cyanogen is burned in a current of oxygen, the high temperature produced by the interior of the flame makes the vapor of carbon intensely hot, and hence very luminous; consequently its spectrum is very luminous also.

INK PLANT.

Prof. Jameson, of the University of Quito, states that the expressed juice of the berries of the *coriaria thymifolia* is used by him in preference to the ordinary ink, because it does not corrode the steel pen.

PRODUCTION OF OXYGEN WITHOUT HEAT.

Mr. J. Robins has explained before the London Chemical Society the process used by him for obtaining pure oxygen. The combinations made by him are not original, yet they may not be generally known among those who separate and use the gas. The compound used is the peroxyde of barium and bichromate of potash. It is placed in a glass flask or bottle provided with an exit tube, and a mixture of dilute sulphuric acid and hydro-chloric acid is poured on, when the oxygen is rapidly evolved. Peroxyds of potassium, sodium, strontium, and calcium may be severally substituted for the peroxyd of barium. And manganate or permanganate of potash, binoxyd of manganese, and binoxyd of lead may be used in the place of bichromate of potash, but the cost of these articles render the latter most available. The chemical changes, not readily explained, in this process are the formation of the sulphate of baryta and peroxyd of hydrogen, or oxygenated water. This in contact with chromic acid is reduced to water, and the sesqui-oxyd of chromium is formed; oxygen gas being disengaged from both substances quite pure and fit to be used for medicinal purposes.

UTILIZATION OF WASTE PRODUCTS.

The regular subject of the evening was taken up, and Dr. Parmelee was called upon to open it.

Dr. Parmelee:—If this subject includes the employment of spent products illegitimately used for adulteration as well as the re-working and useful application of refuse articles, it opens a very wide field; none the less interesting and perhaps valuable for such an extension. In this case facts might be presented which would lead us to attend to a personal examination of our diet, clothing, and various articles of domestic consumption.

Mr. Mayhew, of London, tells us that, according to information which he received, about 78,000 lbs. of exhausted tea-leaves, dried and blended with cheap genuine tea, are sold annually by inferior shop-keepers to the poor Irish and others.

Beet and turnip leaves are largely employed in the manufacture of segars.

The waste made by the sawyer and turner has several economic uses. Mahogany dust is valuable for smoking fish; box-dust for cleaning jewelry; the shavings of cedar for making the otto of cedar wood, a hundred pounds producing 28 ounces.

It may not be uninteresting to know that there are woolen rags too poor for shoddy, and these may be used as manure; 2½ lbs. of woolen rags are considered equal to 100 lbs of farm-yard manure.

The following estimate has been made of the carcass of a dead horse, the average weight of which is from 12 to 13 cwt.:—

Hair of main and tail, 1½ lbs., used for hair-cloth, stuffing mattresses, and for making bags for crushing seed in oil-mills, and other purposes. Fat, 20 lbs., used for lamps after distilling and other purposes. Intestines, 80 lbs., for gut-strings. Heart and tongue a mystery. Bones, 160 lbs., for knife-handles, phosphorus, super-phosphate of lime. Hoofs, gelatine, prussiate, fancy snuff-boxes. Shoes, 5 lbs., used for shoes again, sold for old iron.

A correspondent of Mr. Simonds, editor of the *Technologist*, London, states that a foreman of the bindery department of Messrs. Harper & Brothers came in one morning with a bar of gold valued at $307½, the proceeds of the gold dust swept from the floor and wiped off on rags used by binders during three months. This was a few years ago. He further states that the gold sweepings were worth $1,500 a year; shavings from paper, $5,000; shavings from pasteboard $700; scraps from leather $150; making in the aggregate $7,850.

The speaker then gave a brief account of Prof. Everett's invention for utilizing waste tin scraps, a full description of which will be found in another part of this paper.

The same subject was continued for the next evening.

Curious if Credible.

From a business letter we make the following extract:—

"Before I close, allow me to ask the explanation of the following phenomenon:—A tin ladle, last winter, was left in a tub containing water enough to reach nearly to the top of the dipper, that is to say it was immersed nearly to its rim; within the dipper was water about one-fourth filling it. There came a cold night, and the water in the tub froze solid to the bottom, but the water in the dipper was not frozen at all. For three days the weather was cold, the ice in the tub gave no sign of thawing, and the water in the dipper gave no sign of freezing. But, by-and-by, the ice thawed; then the water in the dipper froze. Could the heat given out by the freezing of the water in the tub be sufficient to keep the water above the freezing point? If so, in the first instance, where did the heat come from, to prevent it from freezing during the three days that the water in the tub remained a solid mass of ice? Water froze quickly everywhere else in the room any time during the three days; but in the dipper it was limpid as in summer.

"C. G. D."

[It seems to us that there must have been some error in the observations.—EDS.

A CONVENIENT substitute for a cork-screw, when the latter is not at hand, may be found in the use of a common screw, with an attached string to pull the cork.

THE paper having the largest circulation in the world, is now said to be that issued by Secretary Chase. It is an extremely loyal publication, too. It supports both the Administration and the Union.

Correspondence

Is Water of Condensation Unhealthy?

Messrs. Editors:—I make the following suggestion for the benefit, I hope, of "those who go down to the sea in ships;" it is the result of a conversation which I held a short time ago with a engineer, who had formerly been in the United States Navy, but had obtained his discharge on account of ill health; the cause of which he could not at first discover. On most of our naval vessels, fresh water is obtained by a condensing apparatus. We use it on this steamer, and it seems very acceptable to a "thirsty soul." This gentlemen told me that as soon as his vessel approached the Mississippi river or any place where they obtained fresh water from shore, he noticed an improvement in the condition of his health; and upon subsequent reflection he was led to decide that the fault was in the water used on board his ship. It was condensed into covered tanks—covered to prevent the rats from getting at the water—and there remained until pumped out for use. His theory was, that being closely covered, the air was excluded from the tanks, which consequently prevented the formation of animalcula in the water, which he thinks is very essential to the health of those who drink the water. I have since made inquiry, but have found no others subject to the same inconvenience of ill health from this cause, or if any have and do suffer it, they perhaps have remained ignorant of the cause. I should like to hear—for the good of sailors—the views of scientific men on this point. My remedy, however, is cheap: it is simply to have, instead of close covers to such tanks, covers made of strong wire cloth like a coarse sieve, thus admitting air, but excluding rats from them. C. H. K.

Fortress Monroe, Va., April 12, 1864.

[Animalcula are not found in the currents of large rivers. Our correspondent might spend months in searching water taken from the middle of the Mississippi, without finding in it a living organism, either animal or vegetable. Though if he should take a drop from some little cove where the water was still and covered with scum, and place it under the microscope, he would find it swarming with multitudes of strange little beings. Water from the condensers may, however, be unhealthy from another cause—the absence of air and carbonic acid. Water absorbs its own volume of carbonic acid, and a small quantity of atmospheric air, both of which tend to make it more congenial to the stomach. When water is heated the gases are expelled, and consequently water condensed from steam is at first free from carbonic acid and air, but by exposure to the atmosphere it will absorb both of these. Our correspondent's remedy, therefore, is a good one. The water may be more rapidly aerated by pouring it from one cask to another, especially through a sieve, or through the rose of a watering-pot.—Eds.

The Stevens Battery.

Messrs. Editors:—The subject of iron-clads engrosses much of the public attention at this time, and I frequently hear the question asked—"What has become of the famous Stevens battery, about which so much has been said?" Since the declination, on the part of the Government, to accept her on the terms offered by the Messrs. Stevens, the public have heard nothing of her. At the present time our want of efficient *sea-going iron-clads* is so apparent that the above question very naturally occurs. Can you give any information on the subject? If so, by so doing you will be affording gratification to—

More than One.

Philadelphia, Pa., April 14, 1864.

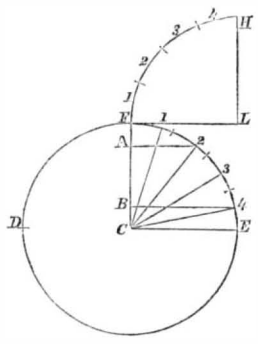
[The principle difficulty in this case is, or was, the objections of some "old fogy" naval officers who are nothing if they are not opposed to progress. We laugh at the English for being stubborn and conventional, but we defy any one to point out a case where Government at war and requiring ships declined to vail itself of those at its disposal, because some octogenarians did'nt like them. No disposition has been made of the battery. She lies—like many another good invention—in her "cradle," patiently biding her time.—Eds.

The Strength of Boilers.

With reference to letters previously published in the Scientific American, on the subject of the strength of boilers [see pages 71, 134, 150 and 198], a correspondent writes as follows:—

Messrs. Editors:—The question for solution is the pressure exerted by the steam, tending to rupture a cylindrical boiler, C, say at D and E, whether at the diameter or semi-circumference.

The required intensity of two opposing forces is inversely as the motions, in the directions in which they act, whether the motion be actual or supposed, "sensible" or "latent."



In the first case, the forces are *moved*, and in the latter *held* in opposition. The quadrant, F E, of the boiler is divided into four spaces, 1, 2, 3, 4, between the marks, and with radii to the centre of each space representing the steam pressure on the same. Now if *any* extent of motion be supposed to one of the radii, in its own direction—the upward distance (direction of rupture) attained thereby determines the required resistance, by which process, the force on space 2 gives an upward distance of C A, while the equal force on space 4, only attains the upward distance of C B; showing that as E is approached, the required resisting force becomes theoretically infinite.

From the above, I deduce the rule, that the force at any one point to rupture at E is inversely as the cosine to the radius; and is mathematically conclusive in favor of the semi-circumference, which will be more plainly evident by inspection of the equal quadrant, F H. This quadrant is divided into similar and corresponding spaces 1, 2, 3, 4, with F E of the boiler, the spaces of which (F H) are in the directions respectively of the radii on F E; and the sum of these directions, representing that of the forces, forms the quadrant F H, and also showing the sum of the upward distances equal L H, or radius. Then as formerly stated, the force to rupture is as the *semi-circumference*, and 52 per cent greater than the usual estimate "as the diameter." T. W. B.

Cincinnati, Ohio, April 2, 1864.

Cause and Prevention of "Interfering" of Horses' Feet.

Messrs. Editors:—At the risk of being thought prolix I will, with your leave, add a little to my remarks published on page 231, present volume of the Scientific American, on the subject of the "interfering" of horses' feet. I would not be understood to imply that all or a majority of horses would "interfere" if not well fed. I believe that the tendency to "interfere" is an anatomical fault, always to be avoided in the selection of a horse, and not very difficult of detection. If the motion of the feet is strictly parallel with or outward from the direction of the body in a forward movement, the horse will rarely be found to "interfere;" consequently, a narrow chest, particularly the lower part, should be avoided for this reason, as well as that it contains small lungs.

If that part of the body, especially between the lower parts of the shoulders, be thin, the feet will, under circumstances of fatigue or weakness, be found to exhibit a slightly inward circular motion, striking the fetlock of the other leg. Many, perhaps all, horse-dealers understand this, and also that good feeding will correct the evil. If in purchasing a horse the existence of this fault is suspected, the truth may be found by sight or touch; for the hair never grows entirely straight upon a joint that has been badly cut, and the scar may be felt with the finger. The position of the haunches and "hang" of the hind legs, are subject to a similar criticism except of course as to the lungs. R. H. A.

Baltimore, Md., April 7, 1864.

The Drill and its Office.

Messrs. Editors:—Your articles entitled "The Drill and its Office" I have read with much interest. As your excellent paper circulates more generally among machinists than any other class of mechanics, I believe you would do the trade a service to devote a page in each number to articles of a similar character, embracing the different tools used in making metals. I, for one, hope to see the subject continued.

On page 229 the second illustration shows a drill in cross section, such as is used in some of our shops and armories. It will be seen that the greatest strength is where it is most needed, at the periphery. But I think the drill should be twisted after it is forged, like the illustration; it should have a *true* twist, not a *gaining* twist, which is more difficult to make. The drills should be twisted by hand, as near as possible, then made true by hammering in a die. After being thus forged they are turned to size in a lathe and then filed out or "milled" into shape. They are hardened the whole length, which for common size drills, say from $\frac{1}{4}$ inch to $\frac{3}{4}$ inch, is from 3 to 4 inches long. Drills for "standard" work should be left a little large, and ground in a lathe to fit the gage after hardening. These drills never require to be dressed, and with that careful usage which a good tool always receives among first-class workmen, will last a long time. They are used in most of our armories for drilling gun-barrels. A good driller can drill in solid steel 480 inches per 10 hours, of $44\frac{1}{100}$ caliber size, with one of them.

It was my attention when I commenced, to have given my attention more to the shank than the point of the drill. Of that relic of antiquity the square taper shank, I have nothing to say. You express a decided preference to the parallel or (as usually called) the straight round shank. I beg to differ from you, and prefer the *taper* round shank, when properly made. The shank should be $3\frac{1}{2}$ to four inches long with a taper of $\frac{3}{16}$ inch; the extreme end should be flatted to enter the key slot in the spindle, to prevent its turning in the socket. This form of shank requires no set screw; this needs a wrench to turn it, and by long use will loose its thread and become useless until repaired, and it will bruise the straight shank and cause it to stick in the socket, making it necessary to use the hammer to remove it at the expense of the drill. Furthermore, I find by experience that a man with proper appliances will finish up a taper shank, if properly forged, in as little time as a straight shank of equal length. For small drills of less than $\frac{1}{4}$ inch, which are usually made of drill wire, I would of course use the straight shank, and use a separate drill-holder, with a contracting nut to tighten the drill.

I might say more, but as your columns are not endless, I will close, hoping to hear from others who have read your articles on the drill, for much can be said profitably on the subject. Experience.

Colchester, Conn., April 10, 1864.

[Our modest correspondent writes very pertinently, and we can endorse his views most cheerfully, as they accord with our own experience and that of others acquainted with the science and practice of the workshop. It is possible that we are prejudiced, but we have a very strong feeling in favor of the round *straight* drill-shank, for the reasons mentioned in our article on the subject. There can hardly be any comparison between the cost of making a parallel shank and a tapered one, for in the first case if one drill is turned slightly less in diameter than another, it will make no difference, while with the taper shank it is worth nothing unless it is exact. However there are differences of opinion on every subject, and while some prefer a taper shank, others prefer a round one, and there are still others so hardened in their ways that they spurn with scorn any other than a square shank, because "it is so handy," and they have used it for years and don't want any better. We propose in future numbers to pursue the subject of boring metals, with illustrations of tools used on large and heavy work. These will be found, we trust, interesting to our readers. We cannot insert the diagram sent, for our artists have no time to execute it.—Eds.

The sum of nearly four millions of dollars was expended in New York State upon the education of children in the public schools last year.

Decoration of School-rooms.

MESSRS. EDITORS:—When it is considered how much of what we know has come to us through the eye, it seems matter of surprise that no effort should have been made to provide suggestive decorations for the walls of school-rooms. Beside the respect which a school edifice thus adorned would manifestly command, there can be no doubt that judiciously selected embellishments would serve as *eye-rests*, leading to a taste for the sublime and beautiful, while alleviating the more severe studies, and the still more wearisome intervals of unoccupied time incident to large school-rooms. But while so many American school-houses lack even their spring coat of white-wash, the community will scarcely be deemed ripe for frescoed walls. Suitably prepared wall-paper might, however, afford a comparatively inexpensive means of decoration, the designs being of course so disposed as to be capable of curtailment or extension to suit different-sized rooms, widths of panels, &c. For permanent ornamentation, panoramas illustrating natural phenomena would seem preferable to maps or charts, the latter highly useful class of illustrations being found most convenient in the form of separate boards or sheets. The walls of a large school-house might illustrate the aspects of nature in various countries, together with the typical races of men in their customary occupations and surroundings, and the characteristic forms of animal and vegetable life. The ceilings and upper parts of the walls might represent meteorological phenomena, with different kinds and groupings of clouds, auroral displays, &c. A blank wall might be somewhat enlivened by a tropical mountain with its exuberant diversity of life, in ascending zones to the eternal snow. Another void might be improved by a spherical projection of the earth sailing in mid ether; a degree of pardonable exaggeration permitting a relieved or topographical representation of such objects as mountains, plateaus valleys, rivers, icebergs, cities, &c. Appropriate subjects for decoration abound in the face of nature, whose pure and perfect beauties never fail to engage the susceptible imagination of youth.

G. H. KNIGHT.

Cincinnati, Ohio, April 12, 1864.

The Best Time to Paint.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN, No. 15, which has just come to hand, I read an article entitled "The best time to paint Houses." As a practical painter, of thirty years experience, I must disagree with that article. I have by actual tests proved to my satistaction that when paint has been exposed to a hard frost before it is fully dry, its lustre and durability is destroyed. I would paint a house outside not earlier than the middle of May nor later than the middle of September in this latitude. Boiled linseed oil should always be used, for various reasons, one of which is that it *dries qicker*, and consequently forms a cement upon the *surface*; is sooner out of danger from dust and flies, and will last longer. A little good coach-varnish in the last coat of paint, for outside work, will be found a very good investment.

JOHN A. M'NIEL.

Grand Rapids, Mich., April 14, 1864.

Tempering the Cutters of reaping Machines.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of April 9th, a correspondent "out West," engaged in repairing machines, desires to know what color he must let the cutters down to give them the proper temperature. In reply I would say a *mixed* yellow and red steel color, like the breast of a cock pigeon—*not too red*.

A. G. SHAVER.

New Haven, Conn., April 14th, 1864.

The Stomach's Appeal.

Who but an idiot or some unprincipled servant or recklessly wasteful spendthrift would think of building as large fires in their houses in the April springtime as in bleak December? And yet ladies and gentlemen, statesmen, philosophers, and scholars of every grade; the judge, the senator, the lawyer, and the clergyman, all commit the more unpardonable folly—unpardonable because it is against light and in favor of the lower instincts and propensities—of not only eating as much as the appetite demands, but of "taking something" to stimulate that appetite to call for more than nature really needs, as the warm weather approaches. The two objects of eating as to men and women are to give vigor to the body and to keep it warm; hence all food contains two principles in greater or less proportions, according to its quality—to wit, nutrition and warmth. We need nourishment all the year round, hence we must all the year round eat food which contains nourishment, that is, the flesh-forming principle; but in warm weather the food which contains the most mere fuel, should be to a certain extent curtailed, otherwise we will create too much heat within us, and that is fever, whose victims are counted by millions every year, this excess of heat, this fever, being generated by eating food which contains more warmth, more fuel, called carbon by chemists, than the season of the year requires. To a certain extent nature regulates the demand and supply by diminishing the appetite as the warm weather approaches; but many misinterpret her endeavors, and because they find, as spring comes on, their appetites are not as vigorous as they were a few weeks earlier, begin to take alarm, think they are going to get sick, and conclude they certainly will get sick, unless they can get up the appetite of kind winter; hence they begin to take Dutch gin, under the name of Schiedam schnapps; plantation bitters, or cheap whisky, with just enough of colombo root or any other bitter to give it "a trace" of bitter and rob it of the name of "rot-gut;" or dirty beer, or ale, or porter, all these things tending to cheat nature into a call for more food than she requires, to impose on the stomach more labor than it can perform, hence laying the ground for summer fevers and dyspepsias, which bring death to thousands every year who might have lived to a good old age had they simply let themselves alone, and like any other dogs, or donkeys, or wild beasts, had simply given the stomach rest, and waited for an appetite. The general lessons for the spring are, eat only when you are hungry, and to the extent of satisfying an unstimulated appetite; eat less of carbonaceous food, such as meats, fats, oils, sirups, &c., and more of cooling articles, such as green salads, vegetables, berries, fruits, and whatever has a natural tartness or acidity, there being little or no carbon or heat in them; but they contain as much nutriment as the system requires.—*Hall's Journal of Health.*

Household Knowledge.

Windows are kept free from ice by painting the glass with alcohol with a brush or sponge.

Odors from boiling ham, cabbage, &c., are prevented by throwing red pepper-pods or a few pieces of charcoal into the pot.

Percussion-caps are found to poison children, if swallowed.

Pigeons are hatched in eighteen days; chickens, twenty-one; turkeys, twenty-six; ducks and geese, thirty.

A cement which is a good protection against weather, water, and fire, to a certain extent, is made by mixing a gallon of water with two gallons of brine, then stir in two and a half pounds of brown sugar and three pounds of common salt; put it on with a brush like paint.

Put potatoes of equal size into water while boiling; when done, pour off the water, scatter in some salt, cover the pot with a coarse cloth, and return it to the fire for five minutes, when they are ready for the table; even watery potatoes are thus made mealy.

Common cut-nails are easily driven into hard wood if rubbed with a little soft-soap; saliva is better than nothing for that purpose.

Never condemn your neighbor unheard; there are always two ways of telling a story.

The best way to cook a potato is to bake or roast it in an oven; when done, crack the skins open and allow them to dry out for a few minutes before placing them on the table.

To avoid family quarrels, let the quarreling wretch have it all to himself; reply never a word.

CIDER VINEGAR.—Take the water in which dried apples have been soaked and washed, strain it well, and add a pound of sugar.

FRENCH ROLLS.—Add two ounces of butter and a little salt to a pint of boiled milk; while tepid, sift in one pound of flour, one beaten egg, one tablespoon of yeast; beat these altogether well; when risen, form the rolls with as little handling as possible; bake on tins.

The Ghosts at Union Square.

In connection with the great Metropolitan Fair is published daily a sprightly journal called the *Spirit of the Fair*. In a recent number we find the following:—

"It is a curious fact that one of the most remarkable objects of interest connected with the Metropolitan Fair has thus far attracted but little notice. The phenomena lately introduced in our city theatres and called 'ghosts,' are nightly reproduced in the fountain at Union square. A person standing on the south side of the fountain and looking north will behold, sometimes one and sometimes a whole procession of male and female ghosts rising from the center of the fountain and walking to the edge of the basinr where they disappear. Sometimes he will see one o, more ghosts returning and again plunging into the jet whence comes the water. The ghosts do not walk upon the water, but wade through it, and the female ghosts appears to do so with great difficulty. Hence these ghosts have all the appearance of mermaids and mermen, or perhaps they may be the veritable ghosts of mermaids and mermen, which of course gives them a double interest. The explanation is as follows:—There is on exhibition at the Fair buildings one of Dr. Smith's celebrated 'air lights,' which is directed upon the fountain every night by means of a parabolical silver reflector four feet in diameter. The light is produced by the combustion of lime by the concentrated jets of several blowpipes, in which common gas and air only are used.

"The spray of the fountain is so brilliantly illuminated that every object or person passing between it and the light casts a shadow on the cloud of spray, which is seen only on the opposite side, the person meanwhile being invisible. If a man walks from the building toward the fountain, his head is first seen, and his body gradually rises from the water until he reaches the basin. He must then turn either to the right or left to pass around it, when, of course, his shadow passes to the edge of the basin and disappears. The reason why the ghosts appear to be wading, is that the mound of earth around the fountain intercepts the shadow of the lower part of the body.

"On Saturday night, an astounding apparition appeared. A ghost armed with a mighty sword (a veritable Excalibur) rose up, beckoned to the crowd to come to him in the water; but as they would not approach, he threatened them, but tried in vain to advance. He gave vent to his rage by a pantomimic display of how he would cut every one to pieces if successful in catching them. Many other remarkable spectres appeared, but we have not room to describe them. No extra charge is made for seeing the ghosts, and visitors may return to the buildings (also without extra charge) after having satisfied their curiosity."

A Natural Curiosity.

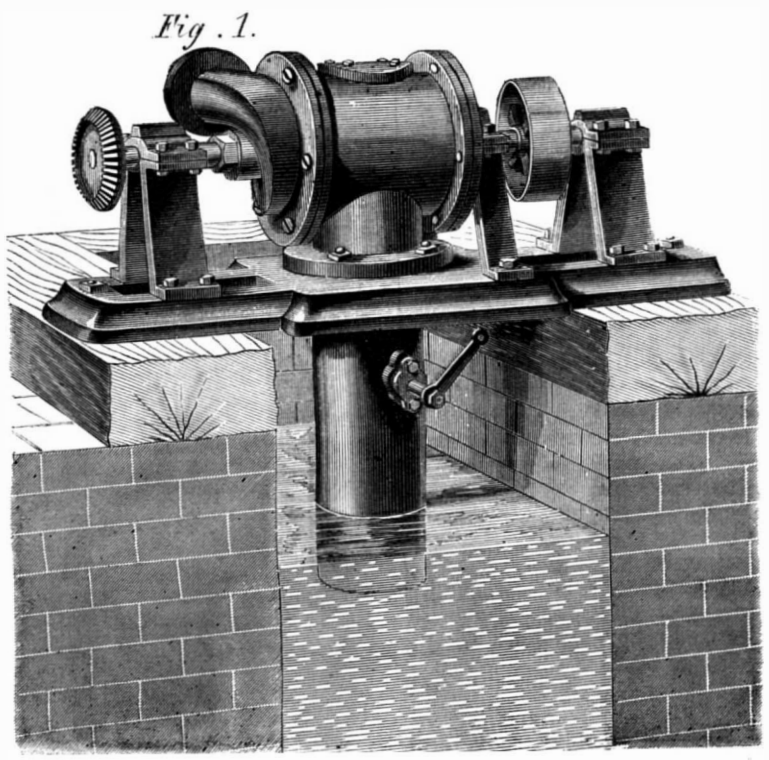
A natural curiosity, which completely puzzles naturalists and geologists, is now in possession of Isaac S. Josephi, the wholesale jeweler on Washington street, San Francisco. It is an irregular hexagonal quartz crystal, about one inch in diameter and two inches in length, pointed at one end and broken squarely off at the base. Within the body of the crystal, rising from the base like a miniature mountain, and occupying about half the entire length of the stone is a mass of beautifully crystallized gold, silver and copper, each metal distinctly defined, and all embedded in the stone—which is as clear as glass—in exactly the style of the flowers and other objects in a glass paper-weight. This curious specimen of the handiwork of nature, when in an eccentric tone of mind, was found by a miner at Gold Gulch, Calaveras county, some four years ago, and has been carried round in his pocket ever since, until some two months ago, when it was purchased by the superintendent of a copper mine, and sent to the present possessor as a curiosity. Geologists who have examined it declare that nothing of the kind has ever been seen or heard of before, and are utterly at a loss to account for its formation.

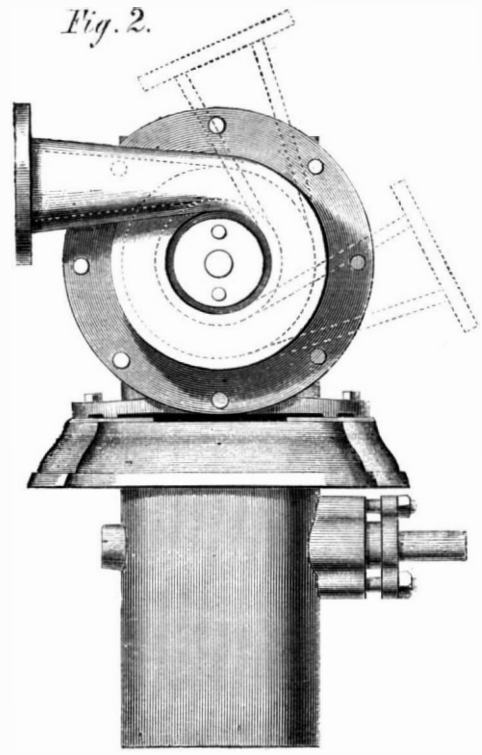
PARROTT GUNS.—A 30-pound Parrott gun, in Fort Putnam, Morris Island (off Charleston, S. C.), was recently tested by firing until it burst. The weapon threw 4,615 shells into Charleston, five miles distance, at regular intervals of five minutes, before it burst. Such endurance is unprecedented.

Improved Helical Turbine.

The annexed engravings represent a turbine wheel which combines the helix with the Jonval wheel proper on a horizontal shaft, with draft tube attached, thereby producing a cheap, effcient and durable turbine for all manufacuring purposes whatever. With high heads and falls for which it is especially adapted, the inventor assures us that it will yield 80 per cent. of the useful effect of the water. The adaption of the helical curve to the Jonval turbine was suggested to the inventor of this wheel by experiments at the Fairmount Water Works, Philadelphia, in 1860, where it was shown that water applied by means of a helix to an ordinary wheel produced good effects. From this it was inferred that with a superior wheel, such as the Jonval, still better results might be expected. Practice has proved this view to be a correct one.

This wheel is very nicely adjusted so as to run with as little friction as possible. The step or bearing for the end of the main shaft runs in oil and is so arranged as to be easily inspected and replenished when necessary. The machine always sets above tail water; this is accomplished by means of a short draft tube, attached below, and the interior of the case can be cleaned from above. This is much more convenient and expeditious than getting down into a wet and dirty wheel pit; by merely opening a manhole on the top, and moving the wheel over endwise which does not throw the wheel out of line) anything which may have been accidentally carried into the case can be speedily dislodged. The wheel can be set above the race to any height not exceeding 30 feet, by the use of the draft tube, mentioned before. This saves a great deal of expense in building costly frames of timber; the machine is also very compact and may be set in the same apartment with the machinery driven by it; the case is water-tight and cannot injure the walls or ceilings below by drift or leakage. Water may be led to the wheel at any angle and by merely turning the helix, as shown in Fig. 2, by the dotted lines, it can be introduced on either side; thus making a straight supply pipe available, and lessening the loss of effect which occurs in passing currents of water through crooked passages before it gets to the wheel. It will be seen that this wheel is a simple and compact one for all light manufacturing purposes where water is at hand. In cities, towns and villages where municipal water-works are in operation or where mountain streams run to waste, the power can be made to work at a small cost for a wheel for it to act on. Country printing offices, millers, machine and carpenter shops, in fact all mechanics and tradesmen will find these motors useful, safe and economical. They are furnished in sizes from 4 to 36 inches diameter of wheel, and all interested should address J. E. Stevenson & Co., the inventors, at 200 Broadway, New York. Steps are being taken to procure a patent.

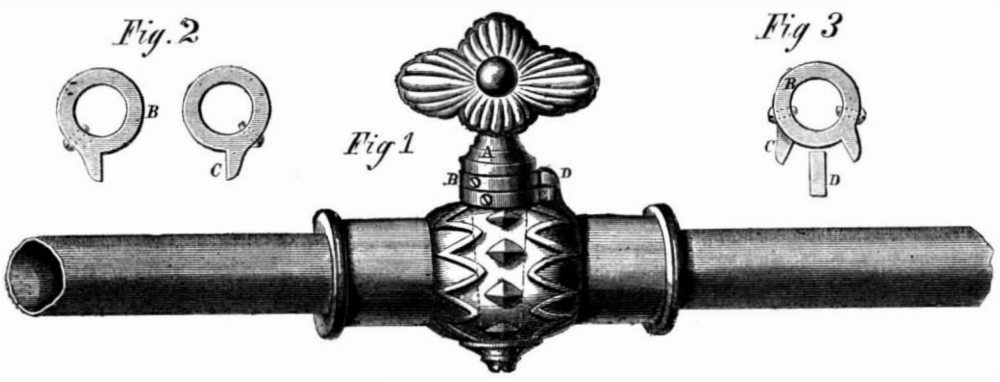




STEVENSON'S HELICAL TURBINE.

Improved Gas Faucet.

In lighting up public buildings, such as hotels or concert rooms, theatres, &c., it is a difficult matter to adjust the amount of gas admitted to the burners so that the glass-shades, or chimneys, which are sometimes used instead, shall not be broken with the excess of heat caused by the sudden ignition of a large flame. The faucet herewith illustrated by a very simple arrangement obviates this trouble, and permits the amount of gas which flows to the burner to be graduated with great nicety. It will be seen by referring to the engraving that the plug, A, has two rings, B, upon it, these rings are slipped over the plug before it is inserted in its seat. In these rings there are set screws, and one side is furnished with a lug, C, as shown in Fig. 2. The chamber the plug fits in is also cast with a shoulder, D, upon it, and when the rings are in place they appear as in Fig. 3, one ring on each side of the shoulder, D, on the chamber. The operation of this fixture is obvious, for when the key or plug of the cock is to be turned either on or off, it may be moved until the rings are in contact with the shoulder, D. From this it will be seen that a passage of a certain size is left open for the gas through the main pipes, and the light can thus be fixed, increased, or diminished at will. In the chambers of hotels, public halls, and also in street lamps, where servants or reckless persons are likely to waste the gas, this is a good fixture, and one that will work satisfactorily. The principle involved in this arrangement is in no way akin to the pin and stop generally used on gas fixtures, as that is not adjustable; where the pin is already in place, however, but one ring is needed on the key. This improved faucet can also be used to regulate the passage o liquids as well as gases, and would be a convenien appendage to the feed cock of a pump for supplying steam boilers with water. It can be applied to fixtures already in use at a small cost. It was patented on Feb. 16th, 1864, by Charles A. Shaw, of Biddeford, Maine. Further information can be had by addressing him as above.



SHAW'S GAS FAUCET.

SUPPLEMENT TO URE'S DICTIONARY.

"Ure's Dictionary of Arts, Manufactures, and Mines" has been regarded, ever since its publication, as a most complete and reliable cyclopædia of the industrial arts. But the progress of improvement is so rapid that the practice in many of the arts had advanced to a considerable departure from the descriptions in that work, and the enterprising English publishers determined to issue a supplement which should embrace the latest improvements. The editorship was undertaken by Mr. Robert Hunt, F.R.S., F.S.S., and the various articles have been written by the most eminent masters of the subjects which they severally treat. The work has been republished by Messrs. Appleton & Co., of this city. The "Supplement" is a large volume of 1,096 pages, profusely illustrated, and the whole work in three volumes contains 3,212 pages with 2,300 engravings. To all persons interested in manufactures or any of the industrial arts, it is of incalculable value.

THE *Waywayanda*, one of the new steam revenue cutters built in Baltimore, recently made a trial trip; she attained the speed of 16 knots an hour without extraordinary effort.

EXTRAORDINARY as it may appear, a piece of brown paper, folded and placed between the upper lip and gum, it is said, will stop bleeding of the nose.

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VOL. X. NO. 18..[NEW SERIES.].....*Twentieth Year.*

NEW YORK, SATURDAY, APRIL 30, 1864.

Contents:

(Illustrations are indicated by an Asterisk.)

SOCIAL CONDITION OF WORKING-MEN.

The social condition of the working-men of any country always excites the deepest interest in the minds of thoughtful people, for according to their elevation or degradation is the prosperity of the state or nation to which they belong. The truth of this statement is apparent to every one, and we have only to look at foreign countries to see illustrations. Men who are hard at work all day require some refuge—some quiet place to retire to, when their labor is over, so that both mind and body will be refreshed. In large cities temptations to vice abound on every side, and the wretched quarters provided for the accommodation of mechanics excite sympathy and call for improvement. Of late years an improved class of tenement-houses have been erected in this city; but these, although they add materially to the appearance of the city itself, contribute in a very small degree to the solution of the main question, which is—how to elevate the social condition of the working classes?

Quite recently attention has been given to this subject abroad; and it has been found that, by directing the attention of artisans of all callings to the provision of a home of their own, more can be done toward raising the social standing of the workmen than by any other means. It is only reasonable to expect that when a man of limited means, who has in fact, no capital whatever but his hands, is willing to run in debt, or to devote every cent that he can spare towards procuring and maintaining a home of his own, he will practice the most rigid self-denial, economy, and industry, and never tire in his efforts to accomplish his purpose. Upon these suppositions, or from similar motives, certain associations in England have been formed, which are called "Building Associations." These have for their object the procurement of comfortable homes for working-men, of which they are the sole owners and tenants. The practical operation of the scheme is as follows:—The capital is first secured by shares subscribed by moneyed men; a plot of ground is then bought and divided up into lots, which are sold to workmen at a fair advance, to cover expenses and the interest on the investment of stockholders. The price of lots is from $200 to $300 according to the nature of it, and on these the association puts up houses on credit, which are paid for by the workmen in weekly installments of almost nominal sums. In this way a mechanic—in Birmingham, England, for instance—is enabled to purchase a house and lot, costing from $600 to $900, in about ten or fourteen years. The popularity of this system of obtaining a home may be estimated by perusing the subjoined paragraph cut from an English newspaper:—

The success of these operations appears marvelous to the visitor, who may walk for hours up and down streets built by these societies, and either already the property of the inhabitants or in course of being paid for. From 8,000 to 9,000 houses and gardens have thus been acquired by the operatives of Brmingham! There are about fifteen societies in the town, some for buying land and others for building houses. Some men pay in 2s., others 3s., and some even 6s. a week. The average annual investment of the members of the societies—90 per cent. of whom are mechanics—is about £18 per annum. The enthusiasm of the workmen in making their weekly or fortnight payments is extraordinary; it has become, indeed, a kind of mania. Old indulgences are sacrificed, every effort is made to economize expenditure, and the most rigorous industry is exercised, so that the family may possess its own house. Altogether about £150,000 per annum is raised in Birmingham, collected by a few shillings a week from workingmen, and invested in these land and building societies. The acquisition of houses as their own property by workmen has entirely altered the character of the place. The magistrates say there will be no more riots—no more threats to march upon London. In Wolverhampton the same movement is going on. The land and building societies there number 4,794 members; they have purchased 150 acres of land, made 1,343 allotments for houses, 900 of which are built, and their gross receipts amount to £174,000. In Manchester there are between forty and fifty of these societies; in Liverpool not less than one hundred and eighty, but generally smaller than those of Manchester and Birmingham. There are numerous societies of this kind in the metropolis. Altogether, in England and Wales, there are said to be 2,000 land and building societies, comprehending more than 200,000 members. The money paid in is estimated at £11,000,000, about £8,000,000 of which has been invested in property, the overplus having been repaid to depositors with interest.

The history of building associations in this country has been rather unfavorable; and we might point out many instances where the most glowing expectations have been held out to working-men, which were never realized in the slightest degree. Building associations are a sore topic to many mechanics who have invested their little savings in certain well-laid-out (*on paper*) villages, and reaped nothing therefrom, except anguish of mind and bitterness of spirit; their pittance having been swallowed up in the transactions of rascally speculators. This is to be regretted and was solely the result of villainy, or at least mismanagement, and not any radical fault in the plan itself. There is no reason in the world why associations similar to those in England should not be started here with flattering success; but they must not set out with the idea that workmen are a set of "flats," eager and ready to be gulled. Where everything is fair and above-board—where no absurd conditions are imposed—where building on the lot in a certain time is made a condition of sale, instead of putting up the house for the mechanic—there is no ground for apprehension of failure. Of course, it is necessary to make the investment in such an enterprise pecuniarly profitable to share-takers; but there are plenty of benevolent men in this city and other large ones, who would be willing to invest in such a scheme as is here mentioned, solely from a philanthropic point of view; provided they could be certain that their money would fall into the hands of honorable men, and not be made the prey of swindlers or others devoid of principle.

WHERE THE FUNDS FOR THE WAR HAVE COME FROM.

In the course of the last three years our armies have worn out and destroyed a thousand millions of dollars worth of property. Where did it come from?

At the commencement of the war large numbers of persons were the owners of personal property; some owning horses, cows, sheep, wheat and corn; others, barrels of beef and hogsheads of sugar; others, bales of dry goods; and others tuns of iron and coal. The whole of this personal property in the country amounted in the aggregate to some eight thousand millions of dollars, and about one eighth part of it has been handed over by its owners to the officers of Government, and consumed in military operations. This portion of the wealth of the country has been destroyed.

Two powerful causes have operated to enable the community to contribute without inconvenience, this large proportion of its active capital to the government.

One of these is the change from a credit to a cash system of trade. When our commission merchants sold goods on eight months' time, and our jobbers gave a credit of eight and ten months, a whole season's stock was bought by the country trader at one time, and the tendency of the system was to cause large stock generally to be held on hand. A considerable portion of these goods belonged to the banks. The notes of the traders which the banks had discounted were simply certificates of an ownership by the banks of an interest in the merchandise for which the notes were given. When the credit system was abandoned the stocks of merchandise could be very largely diminished, and thus the Government found a great reservoir of unemployed capital from which to draw. The traders, having ceased to take notes for their goods, of course ceased to offer notes for discount. The banks, seeing no other safe way of employing their capital, invested it in Government notes and bonds. The merchandise which formerly constituted the capital of the banks has been passed over to the Government and consumed, and the bank capital now exists in the form of Government notes and bonds. A great deal of individual capital also, which was released by the abandonment of the credit system, has been invested in the same way.

But the funds contributed to the Government have not come wholly from the stock of capital on hand at the commencement of the war. Before the war the wealth of the nation was rapidly increasing. There were a great many persons in the community who did not expend the whole of their incomes, and the aggregate of these savings amounted to hundreds of millions annually. These were made partly in the form of merchandise and partly in railroads, houses, factories and other fixed improvements. Since the war commenced, these savings have been, to a considerable extent, passed over to the Government in exchange for notes and bonds.

CHEMICAL INVENTIONS.

The number of patents for chemical inventions taken out in this country is surprisingly small when compared with those obtained in France, or even in England. But there are signs that we are entering on a new era in this respect. One patent for a chemical invention, the vulcanization of india-rubber, has doubtless been of more pecuniary value to the parties in interest, than any other patent for an invention that was ever granted since the world began. On another page will be found a description of Prof. Everett's improved method of smelting lead ore, which he has secured by Letters Patent; and it is gratifying to see that we have to record the claims of these chemical patents more and more frequently.

It is difficult to understand how any intelligent chemist can resist the enticement to embark on the field of discovery and invention which is opened by this illimitable science. Before chemistry existed as a science, the accidental combination of two substances led to the discovery of glass, which performs so great and so varied a part in the affairs of life. Another mixture of three substances produced gunpowder, which has not only revolutionized the art of war, but which, according to Carlyle, has "made all men equally tall," and is therefore destined to overthrow nobilities and aristocracies, and to spread democracy over the whole earth.

Two elements, hydrogen and carbon, by their combination with each other, in different proportions and in different ways, produce hundreds of substances of very varied properties, many of these substances, as petroleum and illuminating gas, being of great pecuniary value. The 67 elements now known are capable, by their combinations, of producing an innumerable variety of substances. It is reasonable to suppose that, by the intelligent combination of these elements, substances will be produced more valuable than glass or gunpowder or illuminating gas. Indeed it is altogether probable that the progress of chemical discovery is destined to produce results more valuable than has entered into the imagination of man to conceive. Shall not the chemists of this country enter this field white for the harvest, and reap their share of profit and of fame?

ENGLISH ENGRAVINGS OF THE MONITOR TURRETS.

It has been seriously objected to, by a portion of the press, that foreigners should be allowed access to our iron-clads, it being asserted that they take advantage of this privilege and steal the plans for their

own Governments. If this course has been pursued in any case the success of the spies has not been flattering. In a recent number of the London *Artizan* we notice elaborate copper plate engravings which purport to be plans of the monitor turrets. They are incorrect in so many respects that they cannot be criticized; they bear not the most remote resemblance to the monitor turrets and their fixtures, except that they are round. To crown all, but one gun is shown in the turrets. If no better than this can be done we may as well open the doors at once and give every one free access to our ships-of-war.

SUBMARINE WARFARE.

We have from time to time chronicled the attempts of the Confederates to blow up our vessels-of-war with submarine torpedoes. Some of these efforts have been successful, while others have failed. The *Ironsides* was attacked off Charleston, but suffered little damage; while the *Housatonic*, a wooden ship, or sloop-of-war, was sunk by one of those machines. The close professional observer must have remarked the similarity which exists between the boats or whatever the craft is which conveyed the torpedoes to the vessels attacked. They are all mentioned in the reports as long and low, and almost indistinguishable; the time of attack is generally at night, when darkness is likely to favor the operation. The last assault of this kind was made upon the *Minnesota;* and the results are thus related by a correspondent of the Philadelphia *Inquirer:*—

At about 1:50 A. M. a boat was hailed by the sentry on post on the port gangway, but not receiving any answer, he fired several times at her. This did not have the effect of receiving any answer, when the officers of the deck hailed her and she answered *Roanoke*. She was then ordered off, or else she would be fired into. This warning she did not heed, for immediately she ran into our port beam, and at the same instant she exploded a torpedo, giving a great shock to the ship, and doing a great deal of damage. One of the forward guns was immediately trained upon her; but it did not check her speed. Several tug-boats were despatched after her, but they did not succeed in finding her. The damage done to the ship was somewhat serious. The deck and walls of the engineers' steerage were badly torn up. The paymaster's storeroom was also badly damaged. The shell room appeared as one mass of ruins, owing to the displacement of the shells. The shaft alley of the propeller was crushed in, and prevented the working of the machinery. Several guns were lifted from their positions and thrown against the ports, crushing them completely. The steamer which caused this excitement was of small dimensions, and was a propeller. She did not appear to be a steamer excepting the smoke-stack. The only time that she showed signs of life was when she was retreating, when she commenced to fire up and raise steam. She was capable of containing but a few men.

Another writer says:—

It seems exceedingly strange that the mysterious craft could come down the river past all the picket boats, and not be observed until almost alongside the flag-ship, which lay nearer the mouth of the river than any other vessel of the fleet. Where she came from is not known; but it is surmised that she ran out of the Chuckatuck. She must have been propelled by muffled oars as she neared the flag-ship; but as soon as the torpedo was attached she steamed rapidly away. The report made by the explosion was very heavy. It was heard very distinctly at Fortress Monroe. The torpedo was placed amidship, and was not properly adjusted. Had it been rightly fixed to the vessel, there can be no doubt that it would have been blown to atoms, and the hundreds of unconscious sleeping men hurled into eternity without the least warning.

It was stated at the time of the attack on the *Ironsides*, that the torpedo-boat went to the bottom; but this does not appear to have been any particular loss to the enemy, as the craft which assailed the *Minnesota* is evidently of the same construction. It is very plain that threats do not frighten these adventurers, and if the officer-of-the-deck on the *Minnesota* had fired into the rebel craft without ceremony, instead of parleying, he might have sent her to the bottom.

It will not do to dismiss this attack as a mere matter of chance. They are not chances; they are deliberate and well-organized schemes to blow up our large frigates. Having no ships of their own to lose in this way, the Confederates are perfectly secure in attacking ours; and they have shown that a submarine boat may be constructed which will, to all intents and purposes, destroy the finest vessel that floats. A little more practice will make them perfect, and the next attempt may be more successful. One remedy against disaster from this source appears to lie in providing booms, or out-riggers, armed with cables or chains that cannot be severed by a blow from a cutlass. These, extending at a distance of twenty feet or more, will prevent the torpedo-boat from approaching too near. Firing at these adventurers with muskets is rather uncertain work, and if no means can be provided to keep them off, the navy will have to record the loss of some of its finest ships, for the rebels have come too near success to be satisfied with anything less. However we may despise rebels as public enemies it is poor policy to underrate their capacity for mischief. If they do not move armies in heavy battalions against us, they are incessantly at work with bands of marauders. If they have no iron-clads or frigates fit to cope with ours, they have submarine boats which they use with great effect, as the results of their expeditions show. When the enemy plots, we must counterplot; and it would seem not impracticable or a waste of time for naval commanders to exercise more vigilance, and frustrate the attempts of the rebels before serious loss occurs to the navy.

NEW MODE OF SMELTING LEAD ORES.

Prof. A. H. Everett, of this city, has just brought to perfection a very neat improvement in the reduction of lead from galena, by which a considerable saving in expense is effected. One of the common methods of reducing this ore is to mix it with iron in a reverberatory furnace; the sulphur at a high temperature, having a stronger affinity for iron than for lead, leaves the lead and combines with the iron, forming sulphide of iron, while the lead is drawn off as a separate metal.

At the present time, however, the high price of even iron scraps (about $40 per tun) induced Prof. Everett to look about for some substitute, and it occurred to him to try the waste tin scraps of the tin plate-workers; in these he has the very best of wrought iron, and in a form exposing the largest surface for the action of the sulphur. The tin scraps, being a waste product, can be had at a nominal cost.

After a series of experiments the practical difficulties of the new process were overcome, and now several tuns of ore are being smelted by it daily at Prof. Everett's furnace, at the foot of Horatio street in this city.

The operation is extremely simple. Five hundred pounds of the sulphide of lead are mixed with 125 lbs. of tin scraps in a reverberatory furnace, and kept at an intense heat; the charge being stirred every 15 minutes. In from one to two hours the whole mass becomes fluid, and the reduction is complete. It is found best to introduce one half the charge of tin scraps, and allow it to become red hot, when the ore and the remainder of the scraps are added.

Besides the cheaper and more rapid reduction of the ore by this process, the tin of the scraps is mixed with the lead, increasing the yield, and for many purposes improving the quality. Prof. Everett has secured a patent for this valuable invention.

New Uses of Iodine.

From the specification, recently issued, of a patent by Professor Hofmann, of London, we learn that a new coloring matter, which dyes silk and wool of a beautiful violet, blue violet, or red violet tint, has been produced by the application of iodine extracted from sea-weed. It has long been thought that if iodine could be used as a coloring substance it would be one of the most powerful known. The patented process consists of mixing in certain proportion the substance called rosaniline with the iodides of ethyl, methyl, or amyl. This dye may be used in the same manner as the aniline colors, and is already in the hands of practical people in all the manufacturing districts, and bids fair to be the "color" of the season. The use of iodine as a disinfector has also been noticed by Dr. Richardson, who states that iodine, placed in a small box with a perforated lid, is a good means of destroying organic poison in rooms. During the late epidemic of small-pox in London, he has seen the method used with benefit.

THE "RE DE ITALIA."—The American iron-clad, *Re de Italia*, has arrived safely at Naples. She made an excellent passage; her time was 18 days and 18 hours. Nothing further has been heard from the *Galantuomo*, which went out with the iron-clad to see her safely over. A full description of the *Re de Italia* will be found in back numbers of the current volume.

DEATH OF A DISTINGUISHED INVENTOR.

Mr. Thomas Blanchard died at his residence, No. 109 Tremont street, Boston, on the 16th instant, of apoplexy. He was nearly seventy-five years of age. Mr. Blanchard was one of the most celebrated of American inventors, and his lathes for turning irregular forms such as musket stocks, also the arrangement for turning the octagon at the breech of the barrel are widely known, and have contributed largely toward perfecting the weapon and facilitating its manufacture. Mr. Blanchard was also the inventor and proprietor of a machine for bending timber, one for making envelopes, and another for mortising holes. The number of his mechanical inspirations is very great, and for 50 years he has given them to the world in various forms. We little thought when making some account of his lathe for turning irregular forms on page 264 of the present volume of the SCIENTIFIC AMERICAN, that we should so soon be called upon to chronicle his death. Mr. Blanchard was married recently, and we met him and his young bride in Washington. It is singular that two great inventors should have passed away at nearly the same time. Mr. Richard Roberts, an Englishman, the inventor of the iron-planing machine and others, recently died in England, and his loss is accounted a great calamity.

Lord Rosse, the Irish Mechanist.

The Earl of Rosse is the "Tubal Cain" of the Irish peerage—a noble Vulcan, a smith and an astronomer equally at home in the forge or among the stars. Most people have heard of his lordship, or if they have not heard of his lordship, they have heard of his great telescope, fifty-three feet long and six feet in diameter, through which the celebrated nebulæ of Sir John Herschel was first seen in its most distant aspect of a myriad of clustering stars; and last summer it was asserted that his lordship had an early private view, through the same monster instrument, of the approach of the hot weather, and was thereby enabled to erect sheds for his cattle. The great telescope stands in the middle of the demesne, and is slung between massive stone walls something like a pier of the suspension bridge, without the arch connecting the side masonry.

The first thing that strikes you, is that it is like a gigantic piece of wooded ordnance, being put together with tremendous staves like a cask. The instrument is pointed at a given angle towards the heavens and down in the bottom of the huge cylinder, or cask, if you choose to call it such, is the speculum or reflector, the largest that has ever been made, and the manufacture of which, under his own superintendence, was the triumph of Lord Rosse's mechanical powers. In this metallic mirror is reflected the heavenly body under observation, and on a stage near the opening at the top stands the observer, examining at leisure planet, fixed star, meteor, or nebulæ, just as the case may be. Here pigmy man reviews the heavenly host, but Lord Rosse is no pigmy. If his father had worn a blacksmith's apron instead of ermine or sables, the son would have risen from the cinders of the forge to be a Stephenson or a Herschel.

The Earl's residence, Rosse Castle, is a most amusing mixture of the forge and the feudal fortress. The greater part of the structure is comparatively new, but portions of the old castle, which in the Jacobin wars stood a brief siege, still remain, and bear upon them the traces of cannon balls. The present nobleman has surrounded the building with a rampart and fosse so that in a sudden emergency it might be turned to strategical account. Fortification is one of the many branches of knowledge to which he has turned his thought; but when you get within the line of defense, what a contrast to baronial or military force the objects that meet your eye afford! The genius of Watt triumphs over the imitations of Vauban.

Where cannon might have bristled a tidy steam engine worked; great lathes turned under the towers that frowned defiance at James's force; in the stable, where racing stud or war steeds might have been sheltered, an ingenious and powerful apparatus for polishing the great speculum was fixed; in the corner of the castle yard was a furnace, and close by stood the moulds in which the monster was cast by his lordship, with face and hands begrimmed with sweat and coal dust—an event more important, but not as worthily recorded, as the casting of Schiller's bell. Scraps of iron and smith's coal strewed the ground; and, instead of the

baying of hound, or the horn of hunter, you hear the sustained deep breathing of a pair of forge bellows, above which ring the measured clang of sledge and anvil, for his lordship is never idle. When he was Lord Oxmantown, he represented King's county in Parliament, and, when attending his duties in London, would sometimes escape from a dull debate to the forges of Birmingham or the ship-building walls of Blackwall.

THE BOILER EXPLOSION ON THE "CHENANGO."

On the 15th instant, while the United States gunboat *Chenango* was steaming down the harbor to Fortress Monroe, the larboard boiler exploded with terrible violence. A large number of persons were killed and several scalded, and, up to the present writing 22 have died of their injuries. Our account is taken from the statements of competent observers, but we were not able to obtain a view of the boiler personally.

The boiler was of the kind now in use in the Navy, and is known as Martin's patent. It was nearly square in form, had vertical water tubes, and was in all respects similar to others of its class. In regard to the circumstances attending the explosion but little is known. This is a stereotyped, most melancholy and unsatisfactory conclusion to arrive at, for boiler explosions have become almost infectious, and seem to rage at times like the epidemics which destroy nations. The point of rupture occurred on the top behind the uptake, and was a simple rending of the boiler shell in two parts from end to end, the fissure following the double-riveted seams, rending one row, so we are informed, but leaving the other by the side of it intact. The opening is from 6 to 10 inches in width.

The sheets that gave way were strongly stayed to the crowns of the furnaces in the usual manner by "crow feet" both on the shell and furnace arches. These crow feet were twelve inches apart and protected that area over every square foot of roof, so to speak, of the boiler. After the explosion some of these braces were found broken. The steam and water space of these boilers is contracted, the height from the crown of the furnaces to the shell is but 36 inches, and to the center of the stop valve on the steam pipe the distance is but 4 feet and 6 inches.

As usual in cases of boiler explosion the most conflicting reports are made respecting the cause of the disaster. The most plausible one appears to be that it was caused by a deficiency of water. This loss of water occurred from priming which, as every engineer knows, is a source of danger to say the least. We have seen the water in a boiler with a much greater amount of steam room than this one go from the top to the bottom and back again half a dozen times in as many minutes, the whole structure shaking and vibrating under the action like a man with the palsy, and it was with the greatest difficulty that the vessel was worked into port. It has been remarked to us that the *Chenango's* engine was stopped and then started again, and immediately after the boiler exploded. If it be reasonable to infer from this that the sudden starting of the machinery caused the water to rise as it always does, upon surfaces already over-heated by reason of the boiler's priming, we have one fact which may account for the disaster. Water rising upon intensely heated plates, however, assumes the spheroidal condition and does not instantly give off vapor, and further, if the furnaces were overheated it is more probable that the crowns would have come down, and a collapse have ensued instead of an explosion. These points will be made clearer when the commission of experts which are to examine the case make their report. At the present writing the accounts of different persons agree in some respects.

The braces or the rods, if we may so call them, which go from the shell to the furnace arches were of the best Ulster iron and 1¼ inches in diameter. It was stated to us by indisputable authority that these braces were much reduced in diameter, and that the quality of the iron was most excellent. In addition to these braces the shell was protected by heavy angle irons 12 inches apart. The boilers had been subjected to a cold water pressure of 60 pounds to the square inch, and were deemed perfectly safe.

The testimony before the Coroner's jury developed nothing satisfactory. A third assistant engineer testified that he tried the gage cocks on one of the boilers, he does not say which, whether the sound or exploded one, and was unable to find any water, and also that the steam gage indicated no pressure. His testimony threw no light on the case, and very little upon the circumstances previous to the accident, as he was not in the engine or fire room, and could not know what transpired. The engineer, Mr. Cahill, is spoken of as a very capable man, and his last words were that he had two gages of water at the time of the accident. Against the dead we say nothing, but if boilers foam (and they generally do when new) it is hard to tell whether there are two or ten cocks of water, and there may be solid water in one instant and a boiler full of seething foam in the next.

The committee appointed by Government to investigate the case, says that there was "a defective vein of iron" which caused the explosion.

It is also possible that this boiler exploded from the breaking of the rods attached to the braces, as the great area or shape of the shell, for the boiler was nearly flat on top, caused an enormous strain upon the shell and angle irons which they were unable to bear, and they consequently gave way. All witnesses agree in stating that the noise of the explosion was but slight; "a low rumbling noise," says the assistant engineer, and we may in infer that if the explosion had been the result of a mysterious and uncontrollable force, the ship would have been blown to fragments, as buildings and Western steamers are at times. The boiler was tested at 60 pounds on the square inch, and this may have been a positive injury instead of a benefit, since it tended to weaken the structure and render it less capable of withstanding a working pressure of only three-fourths that amount.

The Morgan Iron Works never spare pains to make their work first-class, and their reputation as steam engine-makers stand "A No. 1." This is the first explosion that has ever happened to any new boiler constructed by them. We shall endeavor to give further particulars in a future number.

RECENT AMERICAN PATENT.

Street-sweeping Machine.—This invention consists of a machine which, when drawn through the streets of a city or town, will automatically pound and level the surface of said streets and collect the dirt and dust by an oblique adjustable sweeper and brush and by means of scoops and leave it in heaps on the sides of the streets whence the same can be readily removed by the ordinary dirt carts. This invention will also roughen paving stones when so smooth as to endanger the injury of horses by slipping; it is also useful in winter for abrading ice; while in summer a reservoir is also attached to the machine for the purpose of laying the dust. An engraving and description of this machine will shortly appear in our columns. E. Hambujer, of 169 Broadway (room 6), New York city, is the inventor of this machine.

Fine Clay as a Dressing for Sores.

Dr. Schreber, of Leipzic, recommends the use of clay as the most "energetic, the most innocent, the most simple, and the most economical of palliative applications to surfaces yielding foul and moist discharges." He moreover considers that it has a specific action in accelerating the cure. Clay softened down in water, and freed from all gritty particles, is laid, layer by layer, over the affected part to the thickness of about a line. If it become dry and fall off, fresh layers are applied to the cleansed surface. The irritating secretion is rapidly absorbed by the clay, and the contact of air prevented. The cure thus goes on rapidly. This clay-ointment has a decisive action in cases of fœtid perspiration of the feet or arm-pits. A single layer applied in the morning will destroy all odor in the day. It remains a long time supple, and the pieces which fall off in fine powder produce no inconvenience.

THE SANITARY FAIR.—We have made no report of the Sanitary Fair this week, as our first article embodied the principal features of interest to our readers. The exhibitions will close on Saturday and the net receipts will be something over $1,000,000. At the present writing they reach $950,000.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING APRIL 12, 1864.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

42,263.—Manufacture of Shears.—John Abernethy & Wm. H. White, Woodbury, Conn.:

We claim the manner of making shears substantially as herein described, that is to say by first forming a blank by punching, by secondly shaping that blank by swaging and hammering into a form substantially as shown in the drawings, and lastly by uniting two shanks and blades by a steel bow riveted thereto, all substantially as described.

42,264.—Plow.—Samuel Aland, Rome, N. Y.:

I claim the combination of the mortised crop-bar, D, standard, B, brace, c, and lug, G, constructed and arranged to operate as and for the purpose herein set forth.

42,265.—New Manufacture from Hemp, Flax, &c.—Stephen M. Allen, Woburn, Mass.:

I claim, first, As a new article of manufacture, a cloth, felt or yarn, made from long-stapled fiber prepared in the manner herein set forth.

Second, I claim as a new article of manufacture cloth, felt, yarn, &c., made from long-stapled fiber prepared in the manner described and mixed with cotton or wool as set forth.

Third, I claim as a new article of manufacture cloth, felt, and yarn made from long-stapled fiber prepared as described, with or without admixture of cotton or wool, and dyed or printed as herein set forth.

42,266.—Lamp.—James R. Baker, Kendallville, Ind.:

I claim, first, So combining a wick-tube with a lamp-burner, that it may be turned outward by its thumb lever, h r g, for the purpose of trimming the wick, or be removed therefrom for the purpose of supplying a new wick, substantially as set forth.

Second, I claim so applying a wick-tube to a lamp burner, that the flame of the lamp, when the wick-tube is turned outward for the purpose of trimming the wick, will be in a direction opposite to the oil supply openings of the lamp, and with an interposing portion of the lamp-burner between the plane and the oil-supply openings, substantially as described.

Third, I claim the foot-piece, l, in combination with the wick-tube, I, for the purpose set forth.

Fourth, I claim the detent, l', in combination with the wick-tube, I, and foot-piece, l, for the purpose set forth.

Fifth, I claim the tabular portion, m, of the sliding half-tube, N, in combination with the wick-tube, I, substantially as and for the purpose set forth.

Sixth, In combination with the collar, D, having opening, e, therein, I claim the sliding half-tube, N, with opening, e', therein, said parts being arranged and operating substantially in the manner and for the purpose set forth.

42,267.—Self-acting Mule for Spinning.—Harvey S. Bartlett, Smithfield, R. I.:

I claim, first, The mode of operation substantially as described by means of which a disconnection is effected at stated intervals between the cam-bearing shaft, B, in a self-operating mule and the source of motion derived from the pulley, A'', when the mechanism to effect the same is combined and arranged in the manner substantially as specified.

Second, The combination of the spring, D, and the clutch, B', with the mechanism by which the position of the lever, E, with its stop, F, is shifted for the purpose of restoring the connection of the cam bearing shaft, B, with the main source of motion, substantially as shown and described.

42,268.—Packing Projectiles for Rifled Ordnance.—Wm. Boekel, Philadelphia, Pa.:

I claim, first, The described employment of a band, A, when embodied with the soft metal packing and drawn upon the body of the projectile, substantially in the manner and for the purpose specified.

I also claim the use of a cup, D, of any form equivalent to the one herein shown, when combined with the soft metal packing in the described manner and bearing upon the back end of the projectile, substantially as and for the purpose set forth.

42,269.—Lamp.—Wm. G. A. Bonwill, Dover, Del.:

I claim, first, The collar, C C c', constructed as described with a series of apertures extending completely around it, variable in capacity by the action of the register and adapted to admit a supply of cool air to the interior of the chimney immediately above the cone or deflector, from the medium outside (without first passing into the cup of burner), to prevent the chimney from being cracked or broken by sudden heat.

Second, I claim the specific combination and arrangement of the spring, F, spur wheels, f f, shaft, F', and slotted wick-tube, E, when the said spring is firmly secured by its lower part, f', to the floor of the shell, A, is formed with a double coil, f2 f2, and rises in two standards, f3 f3, embracing the shaft, F', in close proximity with the respective spur wheels, f f, as herein described.

42,270.—Coating and protecting the Silvering of Mirrors.—Diodor Briansky, St. Petersburgh, Russia. Patented in Belgium, June 27, 1863:

I claim the application in successive layers, to the silvered surfaces of mirrors in manner and for the purpose substantially as herein set forth, of plastic protective compounds combining, like those above enumerated, the essential qualities of elasticity, tenacity, impermeability, insolubility, and adhesiveness.

42,271.—Corn-sheller.—Jacob Brinkerhoff, Auburn, N. Y.:

I claim the cylinder, E, the ties, L and K, the regulators, H, the bed-piece, O, the spiral springs, a, the fans, s, and the platform, P, the whole being constructed, combined and arranged in the manner and for the purpose substantially as herein set forth.

42,272.—Tube Gear of Steam Engines.—Henry T. Carter, Portland, Maine:

I claim the arrangement of the cylinder, the fly-wheel shaft, and the rotary valve in manner so that the valve or its spindle shall be affixed to, and so as to be rotated with and by the said shaft, while such shaft may be in revolution.

42,273.—Coal-sifter.—Otis N. Chase, Boston, Mass.:

I claim, first, The rocking sieve, C, when attached to frame, B, with its sides curved in the line of the motion of the sieve, substantially as described.

Second, I claim the sieve, C, in combination with the inclined planes, f f, and the slide D, substantially as described for the purpose set forth.

Third, I claim the handle, E, when attached to the sieve, C, and fitted for the double purpose described, substantially as and for the purpose set forth.

42,274.—Numbering Machine.—John C. Clapp, South Boston, Mass.:

I claim, first, The pawl, J, constructed with the steps, a b c d, in

combination with the notches, Z, in the numbering wheels, substantially as set forth and for the purpose described.

Second, The friction plates, Y, in combination with the rod, Q, or its equivalent by means of which the numbering wheels are kept apart and prevented from revolving, except when acted upon by the pawl, J, substantially as described.

Third, The fender-arm, M, by means of which the pawl, J, is made to ride clear from the figures in moving backward, substantially as set forth.

Fourth, The employment of the nut, S, and elastic washer, R, for regulating the friction between the plates, Y, and the numbering wheels, in such a manner as to preserve a true register of the figures, substantially as described.

Fifth, The rod, Q, to prevent the friction plates, Y, from moving with the numbering wheels, substantially as described.

Sixth, The combination of the arms, G G, frame, E E, pawl, J, arms, C C, and spring, L, substantially as and for the purpose described.

42,275.—Churn.—Giles Cramton, Marshall, Mich.:

I claim the employment of the partially cogged wheel, W, in combination with the pinions, P1 P2, and shaft, E, of any churn dasher, connected, arranged, and operated substantially as and for the purposes herein specified.

42,276.—Saw-mill.—Jesse J. Deputy, Peoria, Ill.:

I claim, first, Combining and arranging the frame, C, or its equivalent at one end with the curved surface, c, and bar, O; and at the other end with the rack, G, and pinion, I, when arranged to operate substantially in the manner and for the purpose above set forth.

Second, The scale of bevels arranged on and operated by the endless chain, M, substantially as above set forth

42,277.—Saw-mill.—Jesse J. Deputy, Peoria, Ill.:

I claim, first, The arrangement of the upper feed roller, l, or the one that binds on the face of the timber so as to be in line, or nearly so, with the center of the wheel, B, horizontally, as and for the purpose above described.

Second, Combining and arranging the frame, M″, with the frames, M and M′, substantially in the manner described and for the purpose above set forth.

Third, Constructing and arranging the frames, M and M″, to turn on centers, substantially as described, so that the rollers, l′ and l″, may readily assume any required position, to suit any direction the stuff is required to take as it is sawed.

Fourth, Combining and arranging the sliding frame, P, with the frames, M′ and M″, substantially as described, for the purpose of canting the frame, M′, to adapt the roller, l′, to the timber when the edges are unequal in thickness to each other.

Fifth, Combining the pulley, G6, with the wheel, B, by means of the intermediate pulley, G7, shaft, F5, worm wheel, i, and rack, I, constructed substantially as described and for the purpose set forth.

Sixth, Combining the frame, H, with the wheel, B, by the means hereinbefore specified, for the purpose of preserving the parallelism of the shaft, F and F′, substantially as described.

42,278.—Tamping-bars.—Abner Dobb, San Francisco, Cal.:

I claim arming the end with, or attaching thereto in the manner herein recited, copper, or an alloy of copper, and any other metal or metals, substantially as and for the purpose herein set forth.

42,279.—Camera Stand.—R. B. Douglas, Cleveland, Ohio:

I claim, first, The table, B, standards, F F′ D and G, and cross-bar, H, when hinged together as and for the purpose specified.

Second, I claim the use of the hinged lever, C, for giving the table a vertical motion, substantially as described.

42,280.—Mode for the Purification of Salt Brines.—Samuel P. Duffield, Detroit, Mich.:

I claim the application of ashes treated as above for the purification of salt brines or re-solutions of salts and a precipitation caused thereby of the chlorides of calcium and magnesium and of iron, the same in order to secure success being first treated in a reverberatory furnace as above described, and subsequently boiled or bleached so as to secure a clear solution thereof, which is then applied or introduced into the brines or re-solution of salts, in the proportion and manner above described.

42,281.—Lamp Burner.—Horatio Fairbanks, Boston, Mass.:

I claim the combination of the adjustable air-supplying tube or conduit, D, with the wick-tube, A, the said conduit being movable vertically on the wick-tube and provided with air entrance openings, substantially as described.

I also claim the combination and arrangement of the air-supply tube, D, and its air injets with the wick-tube, A, and the circumscribing chamber, a, formed by the conical tube, B, extending down from the screw-cap, C, substantially as specified.

42,282.—Harvester.—Daniel D. Gitt, Arendtsville, Pa.:

I claim, first, In combination with the pitman, A, the rollers, C C, and guide-ways, D D, constructed, arranged, and operating in the manner and for the purpose set forth.

Second, I claim the rigid bar, G, constructed and applied in the manner described for preventing side draft.

12,283.—Bag-holder.—Freeman Godfrey, Grand Rapids, Mich.:

I claim, first, The hoop, B, attached by hinges, c, to a bench or suitable support, in combination with the bail, c, substantially as and for the purpose specified.

Second, The inclined bench, a, in combination with a bag fastening for holding the bag and distending the mouth of the same, substantially as described.

[This invention consists in the employment or use of an inclined bench provided with a fastening or clamp for securing the bag on the bench while the former is being filled, and also for keeping the mouth of the bag in a distended or open state, so that the substance with which the bag is to be filled may be readily thrown or poured into the latter.]

42,284.—Sewing Machine.—Wm. O. Grover, West Roxbury, Mass. Patented in England Aug. 22, 1862:

I claim the combination substantially as described of a slotted arm attached to a rock-shaft, a vibrating sector provided with pins, and a connecting rod acting in combination substantially as set forth to move a sewing machine needle, substantially in the manner described.

I also claim the arrangements of these devices as described at the rear end of a bracket in connection with the arrangement of a rock-shaft extending along the bracket and carrying an arm that actuates the needle stock, in the manner specified.

42,285.—Sewing Machine.—Wm. O. Grover, West Roxbury, Mass.:

I claim the connection substantially such as is herein described, by which one shaft of a sewing machine causes another to revolve with it, consisting of two crank pins, a connecting rod attached to both of them, and a fulcrum, all operating in combination substantially as specified.

42,286.—Faucet.—Joseph Grundy, Stoneham, Mass.:

I claim in combination with the plate, m, and screw-rod, d, the peculiar-shaped washer, o p, and chamber, z, in the screw-rod, d, as shown and set forth.

42,287.—Street-scraping Machine.—E. Hambujer, New York City:

I claim, first, The oscillating weighted box, F, in combination with the platform, A, crank-shaft, C, and pounder, I, constructed and operating in the manner and for the purpose substantially as herein specified.

Second, The application of the oblique adjustable scraper, K, and brush, L, in combination with the rising and falling scoops, M, and platform or car, A, all constructed and operating in the manner and for the purpose substantially as herein shown and described.

42,288.—Carriage Shaft.—James Hansen, Saugerties, N. Y.:

I claim the combination of the spindle, D, having a stud, E, thereon, with the socket, F, and cross-bar, G, as hereinbefore described and for the purposes set forth.

42,289.—Water Elevator.—S. Hemenway, Fond du Lac, Wis.:

I claim the swinging windlass by means of which the bucket is thrown forward and downward and emptied without the backward motion of the crank and reel, substantially as specified.

42,290.—Grain Drill.—Gideon Huntington, Norwichville, Canada West. Ante-dated March 28, 1864:

I claim, first, The combination and arrangement of the gear wheels, F F, lever, G, and connecting-rods, B B, when constructed and operating in the manner and for the purpose herein set forth.

Second, The seed roller, K, provided with the coarse brushes on one side, and fine brushes on the opposite side, as and for the purpose set forth.

Third, The cogged pivot standard, I, of wheel, H, when constructed and operating in the manner and for the purpose herein set forth.

Fourth, In combination with the standard, I, the lever, K, when arranged and operating in the manner and for the purpose set forth.

42,291.—Bag Filter for Sirups, &c.—Gustavus A. Jasper, Charlestown, Mass.:

I claim my improved arrangement and application of the bags, the cistern for containing the sirup, and the chamber for receiving it after it may have been passed through the bags, the same being such as to cause the sirup to first flow against the outside surface of each bag, thence through the sides or meshes of the bag and into the interior of the bag, and from thence out of the same or into the receiving chamber, as described.

I also claim the combination and arrangement of one or more hollow foraminous standards or tubes, D, with one or more filter bags, and a receiving cistern, A, arranged together in the improved manner, substantially as hereinbefore described.

I also claim the combination and arrangement of a steam-chest or receiving chamber, B, with the chamber, A, and one or more filter bags arranged therein in manner and so as to operate substantially as described.

I also claim the tubular bag-supporter or post, as made with the bag-securing neck and with a screw arranged at its lower part, substantially in manner and for the purpose set forth.

42,292.—Sewing Machine.—A. F. Johnson, Boston, Mass.:

I claim, first, Forming a seam or series of stitches by pulling in contradistinction to pushing a thread through the fabric by means of a hook-needle, and passing another thread through the loop of the former by means of a shuttle, or its equivalent, when used in combination with the feeding mechanism of a sewing machine.

Second, In combination with a sewing mechanism operating as described, I claim keeping the thread slack or free from tension while being drawn through the fabric by the hook-needle, substantially as described, so as to prevent the great friction and strain that would otherwise occur, as set forth.

Third, Such an arrangement of devices or "take-up" for tightening the stitch and supplying the needle as will operate independently of the hook-needle or of its motion, so as to avoid the necessity of drawing the thread through the fabric to tighten the stitch by means of the hook-needle itself, as set forth.

Fourth, Giving the needle both an eccentric and rotary movement, for the purposes specified.

Fifth, The combination of an awl or other device for puncturing the fabric, an open-eyed or hook-needle for seizing and pulling the thread through the fabric, and a shuttle or other device for interlocking one thread with another, the whole operating together substantially as described.

Sixth, The combination of an awl or perforating device, open-eyed or hook-needle, shuttle or other device, and such an arrangement of devices or "take-up" for tightening the stitch, as accomplishes its purposes by operating independently of the action of the hook-needle.

Seventh, The combination of the vibrating arm and guiding pulley, or their equivalents, the whole operating together so as to form a "take up" which acts independently of the needle, substantially as described.

Eighth, The arrangement of the pulley, W′, and swivel-box, V′, for the purposes specified.

Ninth, Placing the awl in a swinging arm of the awl-bar, in combination with set screws, m″ n′, or other equivalent adjustable devices, respectively for regulating the length of stitch and for feeding the fabric to the heedle.

42,293.—Balanced Valve for Steam Engines.—William Joslin, Cleveland, Ohio:

I claim, first, The combination of the flexible diaphragm, D, and valve plate, C, with the valve, B, as above described.

Second, I also claim working the slide valve steam tight on its upper and lower surfaces by means of steam pressure, without a steam tight box or chest, as herein set forth.

42,294.—Slide Valve for Steam Engines.—William Joslin, Cleveland, Ohio:

I claim the diaphragm, G G2, and plate, E E2, in combination with the valve, B, as above described.

42,295.—Composition for removing Paint, Varnish, &c.—Howard C. Kearny & Joseph W. Harrison, Philadelphia, Pa.:

We claim the use, substantially in the manner and for the purpose herein described, of a solution of sal-soda, potassa, or other equivalent alkali, in combination with hydrate or carbonate of lime.

42,296.—Harvester.—L. G. Kniffen, Worcester, Mass.:

I claim the combination and arrangement with the main driving wheels of a harvester, and the cutting apparatus thereof, of the parts marked a c and d, whereby when the machine is turned either to the right or left, the cutting apparatus will be operated without cramping either wheel, and whereby the machine can be backed without noise or operating the cutters, substantially as described.

42,297.—Link Motion for operating Valves.—Willard Knowles, Boston, Mass.:

I claim the connection of the link with its operative lever, the same being by means of the curved arc, k, and the swing block, i, or its equivalent.

42,298.—Truss-pad.—William K. Leach, Boston, Mass.:

I claim the fastening for a truss-pad herein-above described, the same consisting of a ball and socket joint actuated by a lever bar and having the surface of the socket or of the ball or both scored or roughened, as set forth.

42,299.—Clamp for holding Nuts and Bolts.—Wm. J. Lewis, Pittsburgh, Pa.:

I claim the levers, A A, furnished with jaws, D D, for griping the work, when operated by a wedge, N, and screw, T, in combination with the die, E, and frame, B, for supporting the parts, the whole being constructed and arranged in the manner shown and for the purposes herein set forth.

I also claim combining with the frame carrying the jaws the thumb-screw, L, supported by the projecting bracket, F, operating in the manner as herein set forth.

I also claim the use of the springs, P P, for forcing the levers against the wedge, in combination with the frame, B, the jaws, D D, and die, E, for the purposes herein-before shown and set forth.

42,300.—Machine for Manufacture of Shoe Binding.—Alfred O. Lindsey, Charlestown, Mass.:

I claim the machine or combination substantially as above described, such consisting of the endless series of carrying bands, B B B, the bed drum, 5, the series of rotary cutters, K K K, and the striping mechanism or rollers, R, and reservoir, C, arranged and so as to co-operate, and supplied with operative mechanism, substantially as herein-before explained.

42,301.—Mode of operating Car Brakes.—William Loughridge, Weverton, Md.:

I claim the swinging standards, D D, arranged with the main or continuous chain, G, and combined with the rods, J, and chain, K, of the hand brake, in the manner substantially as and for the purpose herein set forth.

42,302.—Shoe-blacking Apparatus.—Samuel Macferran, Philadelphia, Pa.:

I claim combining the reversible boot-jack, C, with the shoe-blacking apparatus, substantially as described, so that it may be used as a rest or support for the foot during the operation of blacking; and also as a jack for drawing off the boots, by detaching it from the case, as above set forth.

42,303.—Chopping Ax.—Truman Merriam, Waterloo, Wis.:

I claim, first, An ax having the lower part thicker and heavier than the upper part, in combination with the upper corner, D, projecting upward and outward longer in proportion than other axes.

Second, The slanting or oblique form of the edge of the ax, as above described.

42,304.—Siphon.—Joseph M. Naglee, Philadelphia, Pa.:

I claim a siphon having a reservoir, c, with an opening, a, below the bend, in the long leg, and a cock or valve, D, at or near the lower end of the same leg, all substantially as and for the purpose herein set forth.

42,305.—Manufacture of Scythe-rods or Bars.—Lucius C. Palmer, Winchester, Conn.:

I claim the arrangement of iron and steel, as in piles, Figs. 1 and 7; the rolling, drawing, slitting, and working the same, as and for the purpose herein shown and described.

42,306.—Sole-edge and Heel-shave.—Owen B. Parker, Hopkinton, Mass.:

I claim the improved sole-edge and heel-shave constructed substantially as above described, that is not only with the cutting knife and the adjustable gage, but with the cutting knife provided with the rounded edge notch arranged with respect to its cutting edge as specified.

I also claim the adjustable gage and its scale as made or provided with the locking stud and the series of countersinks or recesses arranged or applied with respect to such gage and scale, substantially in manner and so as to operate as described.

42,307.—Spinning Machine.—Martyn John Roberts, Pendarren House, Wales, Great Britain. Patented in England Dec. 15, 1862:

I claim, first, Constructing such apparatus with what I have hereinbefore termed a dead-plate, acting in manner and for the purpose herein before described.

Second, Constructing such apparatus with spindles fitted, as herein-before described, and capable of running within the flyers, as described with reference to Figs. 1, 2, 4 and 5, whether connected with the flyers by hooked arms, as shown at Fig. 5, or free as shown at Figs. 1, 2, and 4.

Third, The general arrangement and combination of the parts of such apparatus herein-before described and represented at Figs. 1, 2 4 and 5, of the accompanying drawings.

42,308.—Device for lubricating Spindles, &c., in Spinning and other Machines.—Martyn John Roberts, Pendarren House, Wales, Great Britain. English Patent dated May 25, 1863:

I claim the means of preventing the escape of the oil or other lubricant in the lubrication of vertical and inclined spindles, and other vertical and inclined parts of machinery by—

First, An upper chamber or cup to receive the oil or other lubricant made to rise from a lower oil cup or vessel by the revolution of the parts to be lubricated, substantially as herein-before described.

Second, A tube or tubular projection on or fixed to the cover of the cup containing the oil or other lubricant, substantially as herein-before described.

Third, Revolving cups fitted into a cover to prevent oil or other lubricant matter being thrown out, substantially as herein-before described.

Fourth, What I term a flash-plate, substantially as herein-before described.

Fifth, I claim the apparatus applicable to sliding collars, as shown at Fig. 3, and herein-before described.

42,309.—Horse Rake.—John Robinson, Lawrence county, Pa.:

I claim the use of the revolving rake-wheel provided with two sets of tines to operate alternately and attached to the carriage by a hanging frame, substantially as described.

I claim also the use of the lever for operating the catch bar in connection with the sliding bar for elevating and holding up the rake frame, when the rake is not in use, substantially as described.

42,310.—Apparatus for reducing Fish to Guano, &c.—Thomas L. Robinson, Boston, Mass.:

I claim, first, Combining in one apparatus such arrangements of mechanical devices as will accomplish the several operations of heating or boiling, disintegrating and expressing the oil from fish, as set forth.

Second, Keeping the fish in such position with regard to the cutters as to cause it to be uniformly acted upon thereby, by means of such feeding devices as will bring the cutters and body of the fish in proper relations to each, to accomplish the desired result as described.

Third, So constructing and operating the feeding plate, e, that it will serve both as a platen for the pressing devices to act against and also permit the material in the heating vessel to be delivered to the pressure chamber, as described.

Fourth, The combination of a heating vessel and disintegrating devices in the same apparatus, substantially as described.

Fifth, The combination of a heating vessel and devices for expressing oil from fish in one and the same apparatus, substantially as described.

Sixth, The combination in one apparatus of devices for both pressing and disintegrating fish, substantially as described.

Seventh, The use of serrated revolving cutters, operating as described and for the purpose specified.

42,311.—Composition for preserving and curing the Hair.—Helen Rose, Milford, Mass.:

I claim the composition, made of the ingredients, and in the manner and for the purpose substantially as specified.

42,312.—Fire-place Stove.—Marshall D. Wellman, Pittsburgh, Pa.:

I claim, first, The use, in the back and side fire-walls of fire-places, of flutes extending from a point about the ordinary level of the top of the fuel, and gradually increasing in size until they terminate at the level of the grate-bars of the fire-basket, the lower end of each such flute coinciding with an opening between the grate-bars, for the purposes herein-before set forth.

Second, The use of a series of horizontal strips or slats placed underneath or between the bars and independent thereof, and so arranged as to turn on their axis, closing or opening at pleasure the air spaces between the grate-bars.

Third, Sloping the back or fire-wall forward over the fire from a point at or below the level of the fire-bed, so that the coal or fuel will not be inclined to pack down against the back wall, and thus allowing the upward passage of the air between the back wall and the fire, substantially as herein-before described.

Fourth, The combination of the lattice or screen, t, with the air flue, m, and dust pipe or pipes, p, for the purpose of preventing the descent of dust or soot into the fire-grate, and collecting them in a separate receptacle, substantially as described.

Fifth, The use of the sliding cap, k, when so arranged in combination with the air flue and smoke flue as to close them simultaneously

42,313.—Machine for making Paper Bags.—Joseph Wells, Hoboken, N. J.:

I claim, first, The arrangement of the folding rollers, F F′, in respect to each other, in combination with the gage plate, E, as described.

Second, The combination of the folding rollers, Z Z′, with the folding rollers, F F′, and the gage plate, E, arranged as set forth, for the purpose specified.

Third, The carriages, b b′, in combination with gage plate, E, and the feed rollers, G H, substantially as set forth.

Fourth, The arrangement of the knives, O O′, in respect to each other, and in combination with the parallel bars, J, as set forth for the purpose specified.

Fifth, In combination with the gage plate, E, the parallel bars, J, arranged as set forth for the purpose specified.

Sixth, The combination of the vibrating shell, 1, with the paste-brush, T, folding rollers, c d, and the folding blade, S, substantially as set forth.

Seventh, The general arrangement of the parts of the machine described, for performing the various operations of making the bags in the order and manner set forth.

42,314.—Machine for pointing Spikes. Amos Whittemore, Cambridge Port, Mass.:

I claim, first, Pointing the spike by swaging each of its four sides, the swaging of two sides being simultaneous, and alternating with the simultaneous swaging of the other two sides, by means of rolling or turning devices, the spike being at the same time held stationary.

Second, Two or more pairs of rollers, or their equivalents, b b1 b2, arranged apart, on turning supports, and adapted and operated so as to swage two sides of the point of the spike simultaneously while the other two sides are unsupported, and thus alternately act upon respective pairs of the sides so as to finish the point without "fins," substantially as described.

Third, Arranging the segments, F F, or their equivalents, with respect to the taper end of the spike box, and with respect to the segments, D D, or their equivalents, by inclining the shafts, E E, substantially as and for the purpose described.

Fourth, The construction of the taper end of the spike box and the segments, F F, whereby the end of the spike rod can be acted upon by the first acting set of the rollers, d d, substantially as described.

Fifth, Making a "finless" spike by machinery constructed and operating substantially as described.

Sixth, The segments, D D′, carrying rollers or rolling surfaces for pointing the spikes, in combination with side segments, E E, and rolling surfaces, or their equivalents, for restoring the lateral width to the spike point, arranged and operating substantially as described.

Seventh, The combination of the cutter and guide, g g′, with the oscillating carriage, G′, substantially as described.

Eighth, The arrangement of a striker, p, on the segment, D, substantially as described.

42,315.—Construction of Ordnance.—Norman Wiard, New York City.

I claim, first, the within-described construction of guns, of two or more metals, having different rates of expansion by heat; a hard and slightly expansible metal, B, being within the other, or others, and so arranged that the external metal shall support and aid in resisting the mechanical force of the gases, and also allow the expansion of the several metals as they become heated by firing, substantially as above set forth.

Second, I also claim the employment in such guns of an exterior shell A2, connected with an interior shell A, by braces A′, with the intervals filled with a material, C, having less conducting power, the parts being arranged substantially in the manner and for the purpose above set forth.

Third, I further claim, in such guns, the mechanical condensation of the inner surface of the cylindrical shell, A, and the outer surface of the spherical shell, A2, in combination with the filling of the space between them, with a tightly compressed material, C, substantially as and for the purpose above set forth.

Fourth, I further claim in guns where a lining is applied within a strengthening shell, the employment of an intermediate bed of lead, or the like plastic material, D, substantially as above set forth.

Fifth, I further claim the wheel form of the exterior of a gun adapted for use in combination with armor substantially in the manner and for the purpose above set forth.

Sixth, I further claim in such guns the recess, a, arranged substantially as and for the purpose above set forth.

42,316.—Skate.—Daniel H. Shirley, Boston, Mass.:

I claim the construction and arrangement of the sliding box, k, with its lip, m, and screw d, d, the whole operating together as set forth.

42,317.—Toy Spring Gun.—William H. Stevens, New York City:

I claim the receptacle, O, constructed substantially as stated, when connected by the rod, F, with an archer's bow in the manner set forth, the whole constituting a toy spring gun.

I also claim providing spring guns for discharging projectiles, with a whistle or musical device, substantially in the manner and for the purpose set forth.

42,318.—Sewing Machine Table.—Nesbitt D. Stoops, Newark, N. J.:

I claim, first, In combination with sewing-machine tables, the rubber cushions or joints when interposed between the castors or other supporting part of the table next to the floor and the supporting frame or legs at a point or points below the treadles and crank shaft bearings, substantially as described, and substantially for the purposes hereinbefore set forth.

Second, The combination of a skeleton frame sewing-machine table with a flanged tray, and castors, when arranged with elastic cushions between the feet of the table and the tray, substantially as described, for the purpose of protecting the carpets from grease, and rendering the movement of the machine less noisy.

42,319.—Preparation of Vegetable Fiber.—Jacob Storer, Portsmouth, N. H.:

I claim the use of steam and vapor of water for conveying alkalies and other chemicals, in the manner and for the purposes substantially as described.

42,320.—Manufacture of Nuts.—Leopold Thomas, Alleghany City, Pa.

I claim forming nut blanks, by the use of beveled-edged bars previously prepared, substantially as described.

42,321.—Cooking Stove.—Marshall D. Wellman of Pittsburg, Pa.:

I claim the use, in the walls of the fire chamber of cooking stoves, of flues or air passages extending upwards from the spaces or openings between the grate bars, and diminishing in size from below upwards, in combination with movable slats or strips for closing and opening the air passages or spaces between the bars, and thus regulating the supply of air between the grate bars and into the flues, substantially as described.

Also the use, in cooking stoves, of a back wall, sloping from a point at or below the level of the grate bars, and extending upwards and forwards so as to overhang the fire, substantially as and for the purposes herein set forth.

42,322.—Grain-binder.—Samuel Jacob Wallace, Carthage, Ill.:

I claim, first, A rack, c, in combination with arm, D, or its equivalent, for giving motion to the fastener, substantially as described.

Second, The slotted wire-holder formed of bent plates, b, b, substantially as described.

Third, The bearing, e, or e and e′, for carrying the strand to the fastener and releasing the strand, substantially as described.

Fourth, The cutter, d, attached to the compressing arm, D, and operating in combination with the fastener substantially as described.

Fifth, Effecting the several operations, of carrying the strand around the sheaf, drawing up the block of strand, forming the fastening and severing the sheaf from the machine, in the manner described, by the action of the lever, D′, moved backwards and forwards substantially as described.

42,223.—Wood-splitting Machine.—William Wibirt, Buffalo, N. Y.:

I claim the combination and arrangement of the splitting knife, H, provided with the thin or acute sides, g, g, and edge, h, for entering the wood, and the central obtuse wedge, i, for cleaving it, with the adjustable sliding block, K, provided with the graduations P, q, substantially as and for the purposes herein set forth.

32,324.—Boot-crimping Machine.—Horace Wing, Buffalo, N. Y.

I claim a crimping plate, F, so constructed as to leave its front end open or free and unobstructed, and operated upon a fulcrum bolt, H, by gear segments I, and J, substantially as described.

42,235.—Cutting, Punching, and Bending Machine.—Charles Wright, Newark, N. J.:

I claim, first, The adjusting the punches by means of the loose ring and set screws substantially as shown.

Second, The cutting and punching rollers when constructed, combined and arranged substantially as herein above specified.

Third, The combination of the bending rollers with the cutting and punching rollers in the manner and for the purpose Specified.

42,326.—Manufacture of Vegetable Fur, &c.—Peter Baumgras, Syracuse, N. Y., assignor to himself and Charles E. Livingston, U. S. Army:

I claim, first, Making the seed tufts of the Typha Latifolia into vegetable fur upon an artificial skin by the process and in the manner which is substantially herein described.

Second, Separating the downy fibres of the seed spike of the Typha Latifolia from its stalk or culm by attaching an artificial skin around its exterior surface and then detaching the seed tufts as above set forth.

Third, Making two artificial skins of fur from one single spike in the manner above described.

Fourth, Uniting two or more smaller skins to make one larger one substantially as above shown.

Fifth, Spreading the vegetable fur so as to be less dense and to occupy more space in the manner described.

42,327.—Valve of Steam Engines.—George F. Blake, Medford, Mass., assignor to himself and Peter Hubbell, Charlestown, Mass.:

I claim, first, The combination and arrangement of the cylinder, A, tappet valve, F, slide valve, H, with their seats in the steam chest, G, plunger, J, and cylinder, K, in the manner and for the purpose described.

Second, Controlling the ports of the auxiliary cylinder by means of a tappet valve, which receives its motion from the direct action of the piston of the main cylinder without the intervention of intermediate parts, when the ports of the main cylinder are controlled by means of a slide valve attached to and operated by the plunger of the auxilliary cylinder, substantially in the manner set forth.

Third, The arrangement of the steam ports or valve seats, placed at right angles to each other, so as to allow of the working of two independent valves within the steam chest, in the manner and for the purpose specified.

Fourth, The combination of the ports, k, k′, with the ways l, l′, for the purpose of cushioning the plunger, J, after it has cut off the exhaust, in the manner described.

Fifth, The steam ways, m, m, in combination with the spring valves n, n, arranged and operating in the manner and for the purpose specified.

42,328.—A Cap to contract the Flame of a Night Lamp.—James Christison, New York City, assignor to Alfred W. Craven, as Trustee for the Metropolitan Fair, &c., for the U. S. Sanitary Commission:

I claim, as a new article of manufacture, the within-described perforated cap B, C, for the wick tubes of lamps, the same being adapted to fit snugly around and upon the ordinary wick tubes and to cling thereon substantially in the manner and for the purpose herein set forth.

42,329.—Cartridge.—Silas Crispin, New York City (U. S. Army), assignor to Thomas Poultney, Baltimore, Md.:

I claim the combination of thin pieces of sheet metal, with paper and a cup, to form, substantially in the manner described, a finished cartridge for breech-loaders, for the purpose set forth.

42,330.—Mule for Spinning.—Hiram Goff, Cumberland, R. I., assignor to himself and George D. Oatley, Smithfield, R. I.:

I claim the combination of the lever, N, dagger or arm, T, gear L, rack, M, weight, o, spring catch, T′, with its stud, k, the latch, V, the finger, U, the slotted inclined plate, X, and its movable stud or pin, u, the whole being applied to the cam shaft and the levers as herein before described, so as to operate substantially as specified.

42,331.—Harvester.—L. G. Kniffen, (assignor to himself Alzirus Brown, and Thomas H. Dodge), Worcester, Mass.:

I claim a scolloped reciprocationg sickle or cutter with its bar supported and working upon friction plates, f, and separate back guides to retain the former in place, in combination with open cap stolled guard fingers having contracted or bevelled wings or flanges, b, b to support the cutters above and permit of the free passage of dirt below and with the angles d, e, to fit the finger bar, all as shown and described.

42,332.—Machines for boring the Chambers of Cannon.—William McCleery of Pittsburgh, Pa., assignor to Seyfert McManus & Co., Reading, Pa.:

I claim the segment, D, of a worm wheel with its center, G, and the screwed shaft, E, the whole being combined with the boring bar, A, and applied to the finishing of the chambers of cannon substantially as and for the purpose herein set forth.

42,333.—Grain-dryer.—Frederick H. C. Mey, (assignor to himself, A. B. Nimbs, and J. C. Clifford, Buffalo, N. Y.:

I claim, first, the furnace A, provided with purifying chambers, B, for the purposes and substantially as described.

Second, The revolving perforated table, E, and reversible plows, F, in combination with either the drying or cooling chamber, D, constructed, arranged and operating substantially as described.

Third, The steam or water pipe, a5, in combination with a furnace, A, and grain-drying chamber, D, for the purpose of purifying the air, substantially as set forth.

Fourth, The combination and arrangement of the suction blower, P′, including the pipes, P2, P3, with the drying or cooling apparatus as described.

Fifth, I claim the application and use of purifying chambers interposed between the furnace and the dryer through which chambers the hot air of the furnace must pass on its way to the dryer substantially as described.

42,334.—Machine for shaping Heels for Boots and Shoes.—James Samuels (assignor to himself and William H. Gale), Lynn, Mass.:

I claim the improved machine as not only constructed with mechanism for supporting the leather and shaping it in the form necessary for a heel, but as having a treadle, U, and an auxiliary lever, T, arranged and combined together and with the table, A, and the movable standard, B, substantially in manner and so as to operate as described.

And also I claim the improved machine as not only constructed with mechanism for supporting the leather and shaping it in the form necessary for a heel, but as having its heel pattern cam stationary and its cutter, P, provided with adjusting devices all substantially as described, whereby such cutter may be adjusted not only for heels of different sizes, but in other respects as explained.

And I also claim the arrangement of the cutter-carrier spring, O, within the lever, N, and so as to bear by means of its head against and turn on the post, I, substantially in manner and under circumstances as specified.

I also claim the improved machine as not only constructed with mechanism for supporting the leather and shaping it into the necessary form for a heel, but as having its auxiliary cutter or chisel, R, so arranged and applied to the standard, B, that while being depressed it will make a slanting cut through the leather or a cut inclined to the upper surface of the block for supporting the leather.

42,335.—Loom for weaving Trimming.—Louis T. Valeton (assignor to H. W. Hensel), Philadelphia, Pa.:

I claim, first, One or more rods, K, and K′, or their equivalents, arranged and operating in conjunction with the warp and weft threads of a loom, substantially as and for the purpose set forth.

Second, The hooked rods, b, and c, arranged and operating in conjunction with the spindles, I, for distending the warp threads, substantially as described.

RE-ISSUE.

1,652.—Breech-loading Fire Arm.—The Spencer Repeating Rifle Company, Boston, Mass., assignees by mesne-assignments of Christopher M. Spencer, South Manchester, Conn. Patented July 29, 1862:

I claim, first, The compound breech, consisting of the pieces B, and C, constructed, operated and operating substantially in the manner described.

Second, The combination with the compound breech, B, C, of the guard lever, G, substantially in the manner and for the purpose set forth.

Third, The lever, G, arranged and operated substantially as described.

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Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.

Notes and Queries

W. L. L., of N. Y.—In charging the general acceptance of Newton's philosophy to undue reverence for his authority you forget that his theory of light is generally rejected. It seems to us that the positions of the "Principia" are either self-evident truths or absolute demonstrations. After the most candid and respectful examination in our power, your statement that a body may have an orbital motion under the influence of a single force, appears to us absurd, we therefore do not publish your article.

A. S. H., of Maine.—When a clean plate of iron precipitates copper from a solution of sulphate of copper, an equivalent quantity of iron is dissolved in its stead. Why a person cannot have a contagious disease more than once is one of the many unsolved mysteries of physiology. Shot are sometimes confined in cartridges to make them scatter less. The eye-stone is the operculum or mouth-piece of a certain shell. It is the carbonate of lime, and when put in acid the evolution of carbonic acid gas causes it to move about.

N. C. S., of N. C.—Your engine is what is known as the "atmospheric" steam-engine, and has been discarded for a century. The use of steam on both sides of the piston was the principal feature of the invention of James Watt, and was the greatest step ever made in advance in the progress of the steam engine.

J. W. H., of Iowa.—If the party purchased the patent hive of the rightful owner of the county at the time of purchase, he would have a right to continue its use in the absence of a deed. Having once paid for the hive, his right to use it would be undisputed by any subsequent purchaser of the territorial right.

G. W. S., of Conn.—A propeller wheel 7 feet in diameter ought to make as many revolutions as it can. Theoretically there is a limit at which the speed of a screw is too great, but no such velocity can possibly be attained in practice. Run your wheel 150 turns per minute if you can.

W. W. B., of N. Y.—The description of the new mode of engraving contained all of the details received by us. We have since seen a remark that crayons were used in making the drawings. Perhaps the lithographers might give you instructions in regard to the transfers.

C. H. R., of Va.—We agree with you that in a republic like this, all officials should treat citizens who suggest valuable improvements with courtesy.

C. W., of Minn.—Pitch is gathered by chopping a box-like receptacle in the trunk of the tree, and scooping out the gum as it collects.

E. D., of Mass.—Lenoir's gas engine was described in the SCIENTIFIC AMERICAN, Sept. 20, 1860—Vol. III. page 193. One precisely similar had been previously exhibited at the Crystal Palace, by Dr. Drake of this city. The practical objections to it were the jerks of its motion, and the accumulation of heat.

A., of N. Y.—It must be a satisfactory reflection to know that you have so convincingly settled the cause of boiler explosions. If you could only reduce your principle to practice and prevent the dangerous gases you mention from exploding the boiler, you would achieve an undying fame and a colossal fortune. Instead of being purely a chemical result one would think that the mightiest mechanical force known could scarcely cause the ruin that a regular steam boiler explosion does.

B. F. S., of Ill.—In reply to your question, "Does any insoluble matter remain at rest in still, deep water, and neither sink or swim, such as sunken ships or any other hard substance that has a specific gravity of water?" We should say that theoretically, of course, it would remain stationary. In practice it may be doubted whether any body ever did thus continue without motion for any considerable length of time, as a movement in the water, however slight, or any change in the specific gravity of the body would produce a motion.

J. C. H., of Ind.—You say that you have two flue boilers 28 feet long and 42 inches in diameter, and intend using another of the same diameter two feet shorter, but do not like the arrangement. If you will tell us what your objections are we can answer your question; we do not give information at hap-hazard, and it is impossible for us to know what the difficulty is without further information.

J. L. J., of Mo.—The subject of target practice in the Navy has already been fully discussed in our paper, and we do not wish now to re-open it. If you had written to us at an earlier date your communication would have been acceptable.

B. J. H., of N. Y.—You write to us complaining of the omission of an *s* before the word "tables," in our paper, and yet you spell "Scientific American"—*Sc*ientific. You should be more careful when criticizing others, and be sure that you are not hypercritical. Common sense is a great virtue.

J. L., of Ky.—We cannot suggest any relief in the case to which you refer, but Dr. Charles F. Taylor, of 159 Fifth avenue, this city, treats shortened limbs by mechanical means. We have some doubt about a cure in the case, but it will be no harm to correspond with Dr. Taylor on the subject.

J. McK., of Ind.—There are no architectural journals published in this country. You can get English journals devoted to this subject by addressing Willmer & Rogers, 47 Nassau street, this city.

E. L., of Ohio.—The only way to get into the navy is to make your application and present your credentials to the Secretary of the Navy, Hon. Gideon Welles. Any one who advertises to get you a place in the navy for a certain fee you may safely regard with suspicion.

J. B.—The first steamship which crossed the Atlantic was an American vessel "The Savannah," Captain Rogers. This ship was built in New York, but sailed from Savannah, Ga., direct to Liverpool, where she arrived in July, 1819, after a passage of 18 days. She had paddle-wheels with an inclined e

Money Received.

At the Scientific American Office, on account of Patent Office business, from Wednesday, April 13, 1864, to Wednesday, April 20, 1864:—

B. & S., of N. J., $25; C. A. S., of N. Y., $41; B. W., of N. Y., $45; Mrs. S. A. M., of N. Y., $20; D. & K., of Cal., $20; A. T., of Pa., $69; J. H., of Maine, $22; S. G., of N. Y., $15; J. G., of N. Y., $16; W. A. O., of N. Y., $16; H. L., of N. J., $16; W. B., of N. Y., $20; J. B., of N. Y., $12; E. S. J., of Mich., $25; T. & J. W. W., of Ill., $16; B. B. & Co., of Conn., $41; E. W., of N. Y., $25; E. H. C., of Mich., $16; L. C., of Minn., $26; R. & C., of Ill., $16; J. B. W., of N. J., $10; S. H., of Mass., $25; J. M. G., of Ill., $16; W. H. S., of Conn., $16; Z. W., of Cal., $30; A. A. H., of Pa., $16; J. C. O., of Wis., $15; J. N., of Ill., $25; H. B., of N. Y., $30; J. T., of N. H., $16; J. H. S., of N. Y., $25; L. S. M., of N. Y., $16; I. G., of R. I., $20; A. W., of Scotland, $25; J. K. U., of N. Y., $25; D. H., of N. Y., $16; S. & A., of N. Y., $16; F. J. T., of Conn., $20; J. L., of N. Y., $16; J. B., of N. Y., $20; J. B. of N. Y., $10; C. R., of N. J., $16; M. B. D., of N. Y., $20; J. W., of Canada, $500; W. M., of N. Y., $25; S. & A., of N. Y., $25; F. & T., of Del., $30; W. B. S., of Ill., $16; D. C. H., of Pa., $25; A. W., of N. Y., $25; W. S. N., of Conn., $16; D. K., of Pa., $20; B. F., of Maine, $25; J. S. B., of N. J., $25; T. D., of N. Y., $16; W. B., of Iowa, $16; R. K., of Tenn., $17; C. H. S., of Mass., $16; R. G., of Mo., $15; E. C., of Iowa, $15; W. H. R., of Ky., $16; L. P. & N., of Pa., $16; S. D., of C. W., $25; H. & R., of Ohio, $25; A. W., of N. J., $16; H. M., of N. Y., $20; C. H. H., of N. Y., $25; J. B., of N. Y., $25; E. B. R., of N. J., $16; G. W. W., of N. Y., $16; J. A. H., of Vt., $20; W. W., of N. Y., $20; C. & F., of N. Y., $41; G. R., of N. Y., $20; W. E. R., of Iowa, $20; J. T. W., of N. J., $20; J. S. C., of N. Y., $16; G. W. B., of N. Y., $43; S. B., of Ind., $16; J. Y., of Maine, $25; J. H. M., of N. Y., $16; C. M. J., of Ill., $25; J. S., of Ohio, $25; A. P. K., of Mass., $16; A. P. A., of Ill., $16; J. L., of Pa., $25; S. J. F., of Cal., $20; A. B. B., of N. Y., $10; W. L., of Md., $350; W. & F., of Pa., $16; J. P., of Canada, $30; J. F., of Pa., $20; P. C. R., of Mass., $16; J. J. A., of Mich., $16; J. G. T., of N. Y., $16; H. & B., of Conn., $31; A. H., of Conn., $16; H. P., of N. Y., $20; C. A., of N. Y., $20.

Persons having remitted money to this office will please to examine the above list to see that their initials appear in it and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, stating the amount and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office, from Wednesday, April 13, 1864, to Wednesday, April 20, 1864:—

B. & S., of N. Y.; J. K. U., of N. Y.; C. & F., of N. Y.; A. McP., of N. Y.; S. D., of Conn.; C. A. S., of N. Y.; J. R. J., of N. Y.; H. & R., of Ohio; S. G., of N. Y.; S. & A., of N. Y.; J. B. of N. Y.; W. M., of N. Y.; G. W. B., of N. Y.; C. H. H., of N. Y.; S. H., of Mass.; J. N., of Ill.; S. L. S., of Ohio; S. K. K., of Pa.; J. C. J., of Mass.; J. H., of Maine; E. W., of N. Y.; A. W., of N. Y.; J. L., of Pa.; J. S., of Ohio; D. E. B., of Ohio; L. C., of Minn.; C. M. J., of Ill.; D. G. H., of Mass.; B. F., of Maine; A. A., of N. J.; D. C. H., of Pa.; Z. W., of Cal.; A. W., of Scotland; F. & of Maine; J. S. B., of N. J.; J. B. H., of N. Y.; E. S. J., of Mich.; H. B., of N. Y.; W. L., & T. W., of England (9 cases); H. J. V., of Germany.

RATES OF ADVERTISING.

TWENTY-FIVE CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns, and, as heretofore, the publishers reserve to themselves the right to reject any advertisement they may deem objectionable.

TO MANUFACTURERS OF WAGON AND CARRIAGE Axles.—For sale, the right to use a recently patented machine for turning axles. Will do as much work as twelve engine lathes. Address A. B. LAWTHER, Providence, R. I. 18 4*

LARGE LATHE FOR SALE.—WE HAVE ONE second-hand Lathe, swings 6 feet, will turn shaft 15 feet long. Price $950. FAIRMAN & WILLARD, 58 John street, New York. 1*

TO CANDLE MANUFACTURERS.—THE UNDERSIGNED offers for sale, on reasonable terms, two hydraulic presses, one for cold and one for hot pressure; both in perfect order and of best workmanship. Address EDWARD RING, Post-office Box 1,720, St. Louis, Mo. 18 2*

FOR SALE.—ON ACCOUNT OF FAILURE IN THE Proprietor's health he offers for sale his Foundry and Machine-shop at low rates. A desirable location with a good business. Address F. M. ROBINSON, Conneautville, Crawford county, Pa. 18 3*

ENGINEERS AND MACHINISTS ARE SCIENTIFICALLY prepared for all the duties of Marine Engineering for the United States Navy or Merchant Service. Address, with a stamp, J. HARRIS, 355 North 10th street Philadelphia, Pa. 18 3*

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SHIMER & MILLER, AGRICULTURAL AND COMMISSION Dealers, Hillsboro, Ill., give personal attention to the introduction and sale of all kinds of Machinery. Business solicited and references given. 18 9*

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The prices to be marked in United States gold, the articles to be delivered in the city of New York, and to be there paid for in said coin, or its equivalent in currency on delivery.

The wheels of the cars to be 26 inches diameter, and to not weigh over 200 lbs.; to have 3¼ inches tread, with ¾ flange; the wheels to be bored and slotted for keying; the axle to be 2¾ inches diameter in the wheel; to be slotted for a key also. Address

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Agent in New York, HENRY F. FALLON, 142 Pearl street.
17 2

THE EVANS & BURGESS PATENT WATER FRONT FORGE is the best for using Lehigh or other hard coal now known to the public. Will save 33 per cent of fuel over any other forge now in use. Besides will so protect the workmen from the gas and heat as to remove all objections whatever. They are being extensively adopted in many of the first armories and workshops in the country. Please send for a circular and price list. G. W. BIGELOW, sole proprietor, 28 Whitney ave., New Haven, Conn. 17 3*

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CIVIL AND MECHANICAL ENGINEERING.—F. W. EVANS, Ancien Eleve de l'Ecole Imperial Centrale des Arts et Manufactures, de Paris, gives particular attention to the construction of Iron Roofs, and Stone, Iron and Wooden Bridges. 103 State street, Boston, Mass. 16 10*

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SEALED PROPOSALS WILL BE RECEIVED AT this Office until 12 o'clock, M., on Monday the 25th instant, for furnishing by contract, at the Depot of Army Clothing and Equipage in this city,—

1,000 Uniform Jackets of the New York State pattern, but with the United States Infantry Button.

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Guaranteed to effect a great saving in fuel and give the most perfect regularity of power. For sale by the subscribers, who have established their exclusive right to manufacture damper regulators, using diaphragms of flexible vessels of any kind. CLARK'S PATENT STEAM AND FIRE REGULATOR COMPANY, No. 5 Park Place, New York 24 26*

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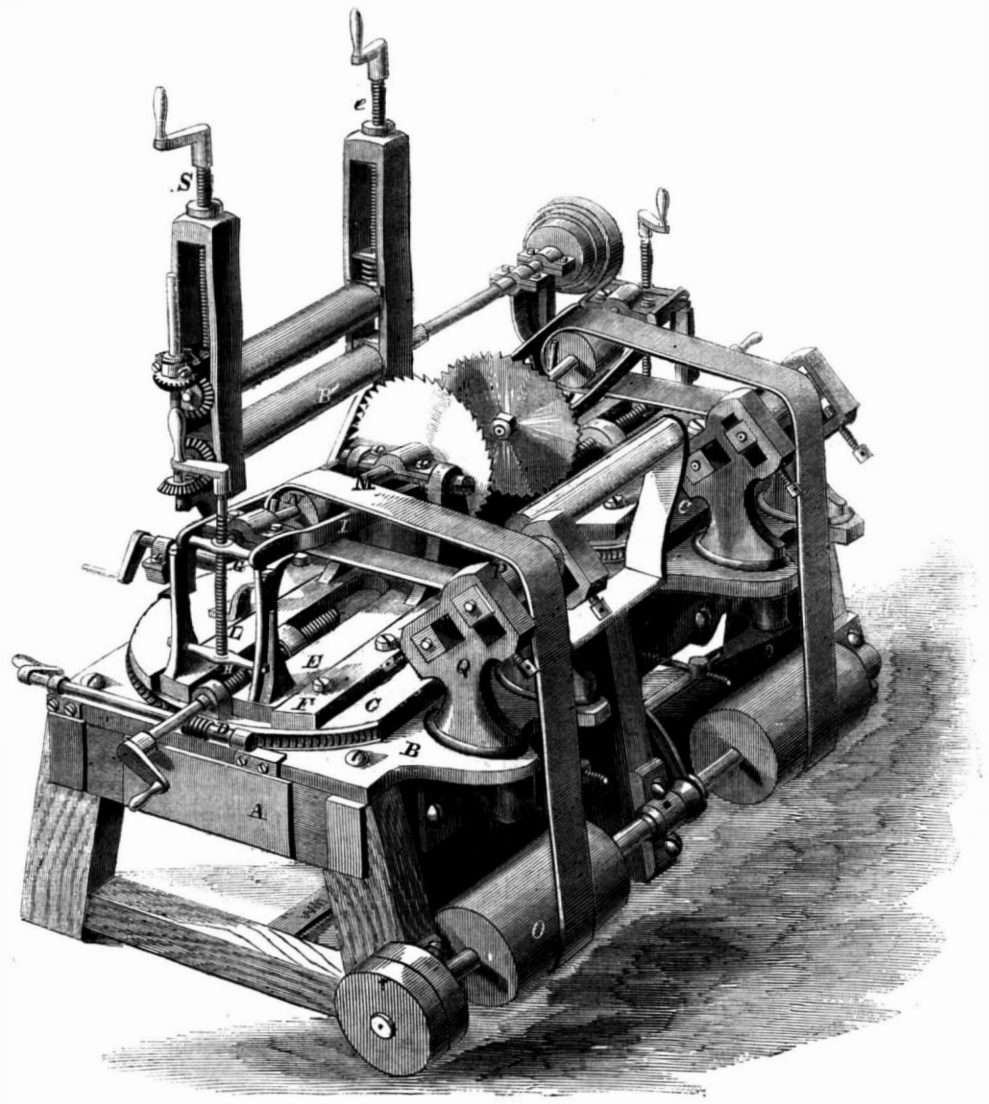
Improved Universal Sawing Machine.

The saw-mill which we illustrate herewith is remarkable for its ingenious adaptation to the uses such machines are put to. It is compact and simple, although at the first glance it appears complex, and it might easily be made portable by placing it upon wheels, if there were any occasion for such an arrangement. This machine will cut timber for all purposes to any angle or curve required, and the saws can be adjusted while in operation to follow any given line marked out upon the work. In the engraving the machinery is shown mounted on a long wooden frame, A. Upon this frame there is an iron bed-plate, B, which carries a metallic disk, C, on each end. This disk is rotated by an endless screw, D,



VANCE'S UNIVERSAL SAWING MACHINE.

gearing into a thread cut on the edge of the disk. The disks have, further, a slide rest, E, working in the jaws, F; upon this rest the saw frame, I, sits. The frame works in bearings at one end, and is moved up and down through two vertical standards having graduated indices so that the saw can be set to any required angle by simply running the free end up and down by means of the screw, L, one end of which is confined by the crossbar, H, at the bottom while the other bar, G, constitutes the nut.

The saw mandrel, M, is carried in the frame just described and it has a pulley, N (which slides, but does not turn on the shaft), over which a belt runs. This belt passes over rollers, P, carried in the frame, Q, which sits on the plate, B; these rollers can be set up by set screws so as to tighten the belt, and the frames in which they set can be turned so as to accommodate themselves to the varying position of the saw mandrel. There is also a small guide by the side of the pulley on the saw arbor which keeps the belt on and the pulley in its place. The feed rollers, B', are set at one side of the machine in a frame which has a slight motion on a vertical axis, not shown in the engraving, and are driven by friction gearing placed underneath the bed-plate; motion is communicated from the lower to the upper set by means of bevel gears on one end, and the distance of the rolls apart, from center to center, is regulated by the screws, S.

By these arrangements the angle of the saws may be varied, as set forth previously, without materially altering the tension of the belts, for the pulley, N, is directly over the center of motion of the disk and is not disturbed, laterally, by the alteration of the frame in which the mandrel sets. The feed rollers are also unaffected by the change of position which the frame they work in assumes, for they are connected by universal and extension joints which permit them to operate effectually in all cases.

This is a most ingenious and useful machine and one that will give good satisfaction if properly managed. It was patented on March 8th, 1864, by Lorenzo Vance, of Philadelphia, Pa. For further information address the inventor as above.

India-rubber Shirt Collars.

Linen, cotton, paper and steel collars are now made, and to these vulcanized india-rubber collars have been added by W. J. Smith of Sale, England, who has taken out a patent for them as a new article of manufacture. He states that suitable patterns may be painted or printed on the collars, either before or after they are cut from the sheet; and they may be made white, or colored, or embossed. Cuffs and wristbands may be made also of the same material. Paper collars are now extensively used in this country, and some steel collars are worn by other than canine quadrupeds; but rubber collars are "something new." There is nothing like rubber!

The Lake Tunnel at Chicago.

A Chicago paper says that the recent heavy rains have partially stopped the workmen engaged in sinking the shaft of the Lake tunnel at the water-works, owing to the consequent large amount of surface water, which has soaked down through the quicksand and forces its way up from beneath the cylinder. A steam pump has been rigged and the water pumped out, but, until the head of surface water is all removed, no further excavation will be made. The workmen have reached a depth of sixteen feet and two of the cylinders have been placed in position. The contractors say that by excavating some four feet more, they will come to a strata of thick blue clay, and when once the excavation is completed in this, there will be no further trouble to contend with. The cylinders are bolted together in a cement formed of iron filings, sulphur and other chemicals, forming a joint perfectly impervious to water.

A New Car needed.—A writer in one of the religious papers, in alluding to the comforts now afforded to the various classes of railroad travelers, in the shape of sitting, sleeping, and smoking cars, calls loudly for a *swearing* car. He thinks that one of these cars on two trains, daily running over our leading roads, would be well filled, provided companies would positively forbid swearing on the other trains. We have observed, of late, that this ungentlemanly practice is becoming more prevalent.

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