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French Society of Acclimation.

This Society offers prizes for the introduction into France of new species or useful varieties of animals or vegetables; improvements of the breeds of animals, and the bettering of agriculture generally. They report that a new kind of silkworm has been introduced into Switzerland, and that in Cevennes a hectare of mulberry trees yields a revenue of from 25,000 to 30,000 francs a-year. The *sorgho sucre* is flourisbing in the south of France and Algiers, and fully answers expectation by its produce of sugar, alcohol, and forage. They have also a new yam from New Zealand. We notice with satisfaction that the Society head with 500 francs the subscription list for the widow and children of Joseph Remy, the poor fisherman who introduced the pisiculture which has since been so successfully carried out in France.

Canadian Railroads.

Canada is rapidly progressing in solid prosperity, judging from her railways. Five years ago, there were about 100 miles constructed, now there are nearly 2000 miles. There is one Grand Trunk Line—670 miles—completed; and two weeks ago there was a grand celebration at Montreal of this important event. A *system* of railroads is laid out for Canada, with the Grand Trunk Line for a heart, and we think this is good policy.

Cast-Iron Sleepers for Railroads.

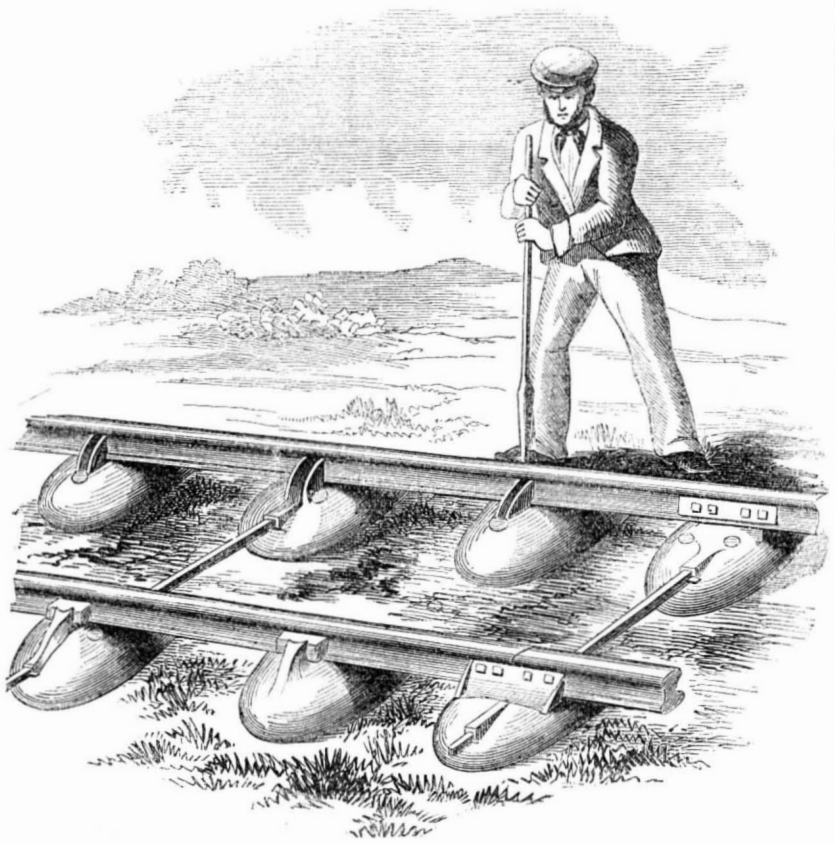
The annexed figure represents the cast-iron sleepers for railroads, invented by H. Greaves, of England. About 400 miles of it have been laid down on various roads in France, Belgium, and England, and the inventor states they have been perfectly successful.

A permanent way of cast-iron has been attempted a number of times, and by various persons, always resulting in failure; one, therefore, said to be successful, must be of interest to every railroad company in the world, because the material is almost indestructible, as it does not decay like wood, and therefore does not cost such immense sums for constant repairs.

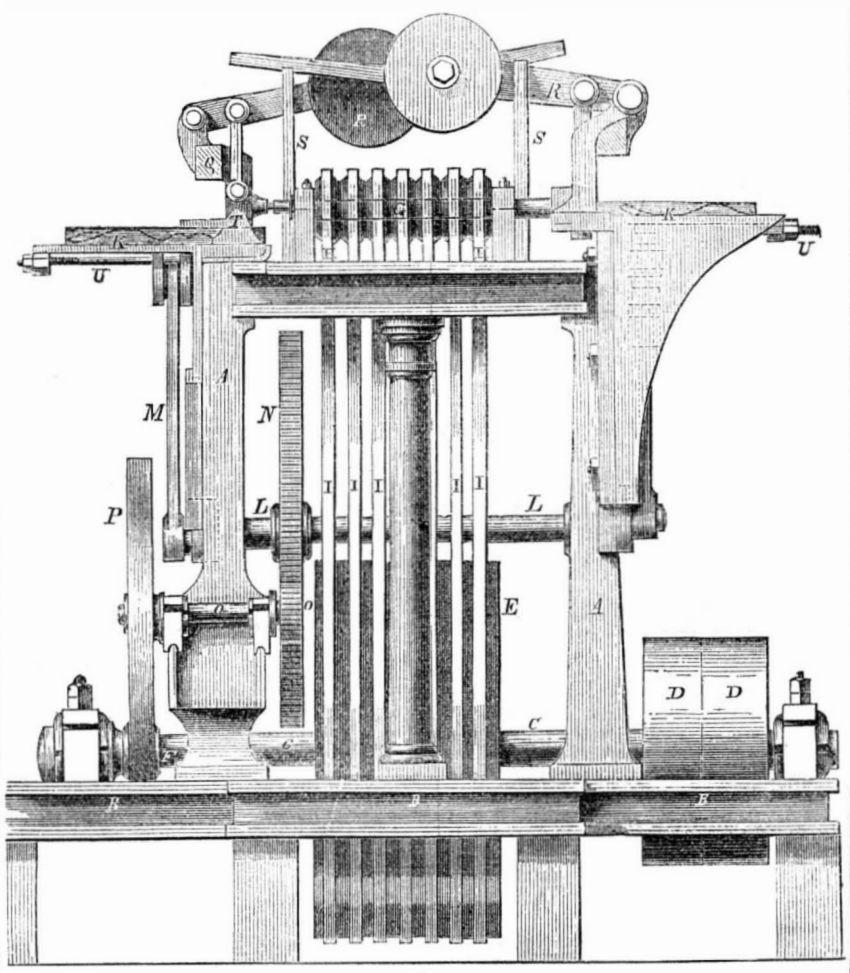
The form of the sleepers is semi-spherical, which thus admits of the smallest amount of metal for a given strength. Those intended to receive the tie-bars are cast with an opening through them, and the ties have but to be keyed to secure the rails firmly at the proper distance apart. These sleepers, by this method of tying them are suitable for any gauge, and allow of the rails being laid with remarkable facility. The chairs to receive the rails are so formed as to allow of the removal of a defective or worn out rail without disturbing the sleeper. The oscillation of rails causes the wear and tear of locomotives and cars, but these sleepers are stated to preserve the rails perfectly firm, and as not liable to spring like wooden ones. As these sleepers have a broad base, they tend to impart solidity to the whole track. The rails are fastened in the chairs with wooden keys; each sleeper weighs 100 lbs., and is buried a considerable distance in the ground, which, with its great breadth of surface tends to prevent all lateral motion

The above figure is copied from the London *Engineer*; it was accompanied with a communication from the inventor, Mr. Greaves, who, naturally, extols his invention highly. Railroads form a great institution in our country, and we have reason to know that we have presented from time to time much valuable information, which has been acted upon by those who manage them, and which has tended to great improvements, both in their permanent-way, rolling stock and management. The information presented on another page respecting the preserving of railway timbers, and the information here given regarding cast-iron sleepers, will be appreciated by those interested as engineers and managers on all our railroads.

RAILROAD CAST-IRON SLEEPERS.



MACHINE FOR CUTTING DOVETAILS AND TENONS.



Cutting Dovetails and Tenons.

This invention relates to a new arrangement of machinery designed to facilitate the cutting of dovetails and tenons, and specially applicable to the manufacture of packing cases, and other boxes.

The accompanying figure is a side elevation; the machine consists of a series of spindles, fitted at their opposite ends with chisel-edged cutters, and mounted horizontally in a fixed frame. These spindles are each provided with a pulley, which receives a driving band from a common drum, the rotation of which gives a rapid rotary motion to the cutters. The wood to be dovetailed or tenoned is fed up to the two rows of cutters by means of ascending tables, fitted one at each side of the machine, and self-acting nipping apparatus is provided for retaining the wood in position on the tables while the cutting is proceeding. A A is the main framing, and B the bed plate to which it is bolted. This bed plate is fitted with bearings which carry the main driving shaft C. D D are the fast and loose pulleys on the shaft C, and keyed to the same shaft is a large drum, E, and a small pulley, F. The cutter spindles are shown at G G, arranged all in the same plane, and lying paralliel with each other in bearings provided for them in the upper part of the framing A. For cutting dovetails, these spindles are provided at their opposite ends with cutters of different forms, which forms bear a certain ralation to each other, in order that the dovetails made by the one set of cutters may exactly correspond with the dovetail recesses made by the other set to receive the dovetails. The cutter is formed and operated so as to make a cut corresponding to the segment of a cylinder, the wood not being permitted to pass or come up to the axial line of this cutter. To form a dovetail which shall correspond in figure with this cut, a hollow or concave-faced cutter is employed, and it is operated so that its largest diameter shall act upon and pass through the wood; counterpart recesses are by this means formed in the edges of the wood under operation, so that when put together a firm dovetail joint is produced. The cutters are tapped into the ends of the spindles, G, and they therefore admit of being readily removed to be sharpened or replaced by others of different dimensions as required. As the cutters are attached to opposite ends of the spindle, it will be necessary to tap one set with a right and the other with a left-handed screw, to insure the cutters retaining their places in the spindle ends. Keyed to each spindle, G, is a pulley, H, which receives motion from a strap or band, I, proceeding from the large drum, E. The wood to be dovetailed is placed on the tables, K, at either side of the machine, where it is held fast by an arrangement of nipping apparatus, and presented to the cutters. These tables slide up and down in vertical guides made for them in the main framing. Their vertical motion is obtained by the rotation of a crank shaft, L, which has its bearings in the main framing, A, and is connected to the tables by crank rods, M M, Keyed to the crank shaft is a large spur wheel, N, which gears nto a pinion on a stud axle, O, supported in bracket bearings. This stud axle carries a pulley, P, which receives a band or cord from the pulley, F, on the main driving shaft, C. As the shaft, C, revolves, a slow reciprocating motion will be given to the tables the amount of which will be determined by the throw of their respective cranks. Affixed to the upper part of each table is a cross-head, Q, to the middle of which a weighted lever, R, is jointed. This lever rests upon an adjustable plate, S, standing up from the main framing, A, and this lever serves to carry, by means of links, a sliding presser plate, T, which, when in action, holds down the wood firmly on the table, and is capable of moving up and down in guides in the sides of the cross head, Q. The hight of each plate, S, (which serves as a fulcrum for the rocking lever,) is so adjusted that, as the table rises to bring the wood up to the cutter, the weighted end of the lever, R, will be depressed, and will carry with it the presser plate, T, and keep it in close con-

tact with the wood on the table. When the table has risen to its highest position the cut will have been completed, and the table will then immediately (by reason of the continuous motion of the crank by which it is actuated) commence its descent. This downward movement will cause the rise of the weighted end of the lever, and consequently the release of the dovetailed wood from the pressure of the plate, T. The attendant now removes the wood from the table, and replaces it by a fresh piece, which is in like manner operated upon.

As the series of concave cutters pass through the whole thickness of the wood, it is desirable, in order to insure a clean cut, to provide a support for the lower edge of the wood. This is done by shaping an underlying bar (affixed to the edge of the table,) with slots at its edge, corresponding to the form and position of the rotary cutters. As, therefore, the table rises, the cutters will pass through the wood and through the slots in the plate. In preparing wood in great quantities with dovetailed edges, it is proposed to pile up several boards one upon the other, and submit them in a pile to the action of the concave surface cutters. The cutters will then, as the table rises, pass through the mass of boards and form dovetail recesses therein. But as it is impossible to act in like manner on a pile of boards with the other cutters, it may be convenient to fit up machines specially for each operation, one machine being fitted solely with the hollow or concave-faced cutters, and two or more machines being employed to produce the segment cut; the fact of having to present the boards singly to the action of the cutters which produce the segment cut rendering this operation more tedious than the cutting of the dovetails by the hollow-faced cutters. In order to insure the proper depth of segment cut in the boards, the rod which connects the crank shaft with the table that carries the boards up to the segment cutters is made adjustable in its length, as shown by dots, and the exact lift desired is thus obtained.

It will be seen that the screwed end of a forked piece which is jointed to the connecting rod passes through a lug attached to the table, and by means of two nuts, one on either side of the lug, the lift of the table may be adjusted with the greatest nicety. When cutting tenons with this machine, the adjustment of the connecting rod must be such that the table will, in rising, carry the wood past the axial line of the cutter. For adjusting the wood on the tables, shifting stops, U U, are provided, which, by a similar arrangement of double nuts, permit of the wood being set to any required position with respect to the cutters.—[Engineer.

Coal as a Source of Nitrogen.

It appears that bituminous coal, on an average, contains two per cent. of nitrogen.—Professor Way suggests that, though manufacturers of coke and consumers of coal will do nothing, and manufacturers of gas but little, to save this ammonia, yet that it might be possible, in certain cases, to conduct the distillation of coal profitably, with ammonia as the principal end in view, and coke and gas as subsidiary considerations.

Railways in Texas.

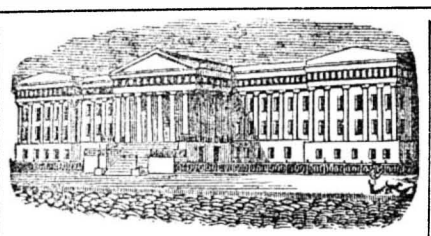
The President of the Houston and Red River Railway informs the Galveston *News*, that he expects that road to be completed, so as to connect with the Memphis and El Paso Railroad, within three years from the 1st of next January. A portion of the line is already built and in use, and at Houston it connects with a railroad also in use, running to Galveston.

Another American Press for England.

Another of Hoe's Lightning Presses was despatched to London on the 27th ult. in the packet ship *Southampton* for one of the London weekly papers.

Sulphate of lead, black oxyd of manganese and linseed oil, make an excellent cement for luting the joints of steam apparatus.

The Philadelphia *Ledger* describes in glowing language a lecture delivered in that city last week by Lieut. Maury on the physics of the sea.



Advice to American Patentees Concerning Foreign Patents.

It is generally much better to apply for foreign patents simultaneously with the application here. If this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any one who first makes the application, and in this way many inventors are deprived of their right to take patents for their own inventions.

Many valuable inventions are yearly introduced into Europe from the United States,—by parties ever on the alert to pick up whatever they can lay their hands upon which may seem useful.

It is a part of our business to secure European patents—in fact three-fourths, and probably more, of all the patents granted in Europe to American citizens, are solicited through this office. We have faithful agents in the chief cities in Great Britain and on the Continent, and through them we can not only solicit patents, but often effect their sale upon advantageous terms. We can give the names of many of our patrons who have realized fortunes out of their European patents through our Agents abroad, if it is desired

We are prepared at all times to furnish advice in regard to Foreign Patents, and will cheerfully do so on application personally at our office or by letter.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of the case.

Almost every invention that is of value in this country is of equal value abroad, and we would recommend patentees to pay more attention to securing their inventions in foreign countries than they have heretofore done.

All particulars in regard to the modus operandi of obtaining patents in any country where patent laws exist, may be had by addressing the publishers of this paper.

MUNN & CO.,
128 Fulton street, New York.

[Reported Officially for the Scientific American.]

LIST OF PATENT CLAIMS

Issued from the United States Patent Office

FOR THE WEEK ENDING NOVEMBER 18, 1856

Smelting Iron Ore—Henry Bessemer, of London, Eng. Patented in England Aug. 25, 1856: I am aware that it has been heretofore proposed to force into blast furnaces carbonaceous gases or solid carbonaceous substances with the blast, for the purpose of adding to the effect of the fuel otherwise supplied to such furnaces, or for the purpose of assisting in the reduction of ores containing oxyd of iron, and I mention this fact in order that it may be fully understood that I lay no claim thereto Nor do I confine myself to any particular form of furnace or apparatus for carrying into practical operation my said invention, provided that the peculiar features thereof be retained.

I claim the described new process of obtaining iron from a charge of ore in a furnace; viz., by means of molten iron underlying such charge, and by air, oxygen, steam, or a gas containing oxygen forced into the molten iron to such extent as to effect the reduction of the charge or the abstraction of the metal therefrom without the employment of ordinary carbonaceous fuel.

Attaching Center Boards to Vessels—Geo. S. Burrows, of Mystic River, Conn.: I claim the hanging of the center-board to a movable post, D, or other sliding piece of similar character, which admits of its being easily and readily removed from the trunk for repairs, or any other purpose as described.

[The common center boards are so arranged that when attached to a vessel they cannot with facility be taken out for repairs at sea, when there is a full cago aboard. This improvement allows of the center board being removed from its trunk and broughton deck at any time atsea or in port, and is therefore a very useful improvement.]

Polishing Glass—Phineas Burgess, of New York City: I do not claim the grooving of the beds for polishing glass.

But I claim an improvement on Alfred Broughton's patent of November 7th, 1854, and re-issued February 12, 1856, viz., the employment and use of grooves arranged eccentrically upon the polishing bed, B, in combination with the cranes, D, and frames E, as set forth.

[In polishing plate glass by the common method, air is entirely excluded between the glass to be polished and the polishing surface; this causes a pressure of 15 lbs. on the square inch on the back of the polisher, producing so much unnecessary friction. This improvement consists in grooving the polishing bed, whereby the air finds access under the polishing surface, thus counteracting its pressure on one side, as in the balance valves of steam engines. The improvement is sensibly good, scientific, and simple, saving a great amount of power in the act of polishing.]

Sawing Marble—William D. Gallaher, of Bensalem Township, Pa.: I claim the frames, H H, and the mechanism connected therewith, when constructed and arranged to operate in relation to each other, in the manner and for the purpose set forth.

Burglar-Proof Safe—R. G. Holmes & W. H. Butler, of New York City, (assigned to Valentine & Butler): We claim the loose fitting pieces, K, applied substantially as described, to be received partly in a rebate in the door, and partly in a groove in the door frame, substantially as and for the purpose set forth.

[This invention consists in a novel mode of constructing the walls and doors of safes; also in a novel method of securing the doors to prevent wedging open. By this improvement the doors are also fitted in a manner which greatly reduces the labor and cost of fitting them, as well as affording greater security against wedging open. The improvement is a good one in every respect for the purposes specified in the claims.]

Cleaning Grain—C. B. Horton, of Elmira, N. Y.: I claim, first, the double acting V-shaped distributor, in combination with the concentric ring guard, constructed as described for the purposes of distributing the grain to the periphery of the cylinder while falling, and preventing its return in the blast.

Second, I claim the construction and arrangement of the double blast head E, in the manner and for the purpose described.

Third, and I also claim the combination of the spring partition, R, with the spring valve K, so arranged that the expansion of the blast tube by means of said partition, shall cause the valve, K, to open and thereby admit air above the mouth of the tube.

Bedstead Fastenings—Spencer Lewis, of Tiffin, O. I claim the inclined pin passing through the post and tenon, as described, in combination with the segmental guard, G, and stud b, operating substantially as specified.

Spring Latch and Lock—Wm. A. Ives, of New Haven, Conn.: I claim the securing the bolt on the inside, when the same key serves to turn back the bolt, and also to hold it back when desired, and when the said key or any additional key used, is so constructed and arranged that it will swing or turn entirely within the tube or cylinder, and be made to operate substantially as described.

Lee-boards for Vessels—Augustus Jouan, of San Francisco, Cal.: I claim the elastic metal blade lee-boards, which I call ship fins, to the sides of ships, vessels, and boats, in a position nearly vertical, as described and shown for the purpose set forth.

Propeller Shafts—Augustus Jouan, of San Francisco, Cal.: I claim a propeller shaft which, in its construction, is circular, conical, and angular, with these three conditions combined, or otherwise, and to be applied vertically, as described and shown, and for the purpose set forth.

Combined Steam Boilers and Kettles.—Allen Lapham, of Brooklyn, N. Y., assignor to himself and Stephen Wilkes; I do not claim surrounding the kettle with steam, as that has been done before.

But I claim the use of the kettle, C, surrounded by steam, as set forth, in connection with the boiler, B, the reservoirs, D D, with valves F F and G G, or their equivalents, on the upper and lower sides, and the induction pipe, f, arranged, constructed, and operating in the manner and for the purpose set forth and described.

Melodeons—La Fayette Louis, of Boston, Mass.; I claim, first, the use of a long valve or valves placed over the reeds and under the swell, and vibrated in such a manner by any proper arrangement of mechanical devices as to break and vary the force of the air passing through the reeds, thereby producing a sound similar to the tremalo in the human voice.

Second, I claim actuating the tremalo valves, so as to impart to them a vibratory movement by means of the fan wheel and crank, or their equivalents, made to revolve by a current of air passing through the box, f f, to the bellows, as described.

Stave Jointer—Barnet McKeage, of Accotink, Va.: I claim the device described for automatically jointing staves of different widths to the proper bulge, consisting essentially of the pattern plates, m m m m, and the guiding slots, n n, p p, or their equivalents, respectively set at such different angles as to separate the two ends of said patter plates unequally and exactly in proportion to the bulge required, arranged and operating substantially as specified.

Binder for Grain Harvesters—C. A. McPhetridge, of St. Louis, Mo.: I claim the combination of the reciprocating arm, G', with spring pliers, G, attached with stationary arm, M, revolving twister, r, cutting plate, q, friction brake q', spring, u, and movable plate, o, when the same are constructed and arranged to operate in relation to each other, and the main frame and driving wheel, for the purpose of binding grain from a continuous coil of wire, in the manner described and set forth.

Cotton Gins—C. A. McPhetridge, of St. Louis, Mo.: I claim, first, the friction spools, N, arranged as described, in combination with the saw for the purposes described.

Second, the breast plate, as described, in combination with the spools, N, as set forth.

Softening Cork by Steam—Bennet Potter, Jr., of Charlestown, Mass.: I claim subjecting the cork to the action of steam, for the purpose set forth.

Lubricating Car Axle and Other Journals—Pierre E. Proust, of Orleans, France. Patented in France April 15th, 1853: I do not claim the mere introduction of steam or water into the lubricating chamber.

But I claim the application to greasing or lubricating apparatus of axles, shafts, and other rotating portions of carriages and of machinery of an air tight reservoir containing water, which being heated by the friction of the rotating portion, is caused to pass through a syphon into the box containing the lubricating matter, and there to mix it, for the purpose described, and in the manner exemplified.

Bleaching Process—Julius A. Roth, of Philadelphia, Pa.: I claim aiding the action of the usual bleaching agents by the application of atmospheric air, in the manner and for the purpose substantially as described.

Boring and Mortising Machine—G. H. Stevens, of Lowell, Wis.: I am aware that the hollow chisel and bit have been previously used, and I therefore do not claim those parts irrespective of the mode of arranging and operating the same.

But I claim attaching the auger or bit, K, chisel, N, and hammer, H, to the sliding frame, B, and operating the auger or bit, hammer, and frame, as shown and described, for the purpose specified.

[In this mortising machine an auger and a hollow chisel are arranged and operated in such a manner that as the auger bores into the timber the hollow chisel is driven down by a hammer, which makes a square mortise. A hollow chisel and auger combined is not new, but the manner of arranging and operating them in this machine, is an improvemeut on those in use, very simple, not liable to get out of repair, and capable of being manufactured at a moderate cost.]

Tail Piece for Violins, &c.—Charles M. Zimmerman, of Philadelphia, Pa.: I claim, first, the tail piece, K, with its recess, f, and loose cover, h, constructed substantially as described and for the purpose specified.

Second, the employment of the pins, M, for securing the strings by a single fold to the tail-piece, in the manner set forth.

Grain Separators and Conveyors—Jos. Lyndall, of Santa Clara, Cal., assignor to Cyrus Roberts, of Bellevville, Ind.: I claim, first, suspending the conveyer on vertical radius bars or pendulum bars, which swing it forward, first in a nearly horizontal, and next in an upward direction, and then swing it back, first moving it suddenly downwards, and next horizontally or thereabouts, until it reaches the place where it started, substantially as set forth.

Second, swinging and rocking the conveyer, as described, on radius bars of unequal lengths, which raise its rear end somewhat further and faster than its front end, in the manner and with the results set forth.

Third, arranging the head of the vibrating shaking fingers in a recess in the bottom of the conveyer, substantially as described. But I make no claim to the arrangement of the vibrating fingers below the conveyer, so that the straw and grain after leaving the conveyer will pass on to the fingers.

Fourth, the combination of an adjustable bar or guide with an arm projecting from the head of the vibrating fingers so that the upward throw of the fingers may be varied while the limit of their descent remains unchanged, as set forth.

Fifth, constructing the screening apertures in the bottom of the conveyer, with channels on the front sides of the tops thereof, to facilitate the separation of the grain and chaff from the straw, and the passage of the straw through the conveyer, as set forth.

Paring Apples—Charles P. Carter, of Ware, Mass., assignor to Leonard Harrington, of Worcester, Mass.: I claim the semi-cylindrical holder, constructed and operating in the manner substantially as described, for the purpose of holding and coring the apples, as set forth.

Second, the peculiar form and arrangement of the spring, o, for the purpose of throwing back the carriage and operating with an equable pressure during the whole of the progress of the knife.

Governing the Parallel Yielding of Lumber Feeding Rollers—Josiah B. Pomroy, of Chicago, Ill.: I do not claim in general causing the feeding rollers to yield and adapt themselves to the shape of the board so as to remain always in parallel positions.

But I claim the arrangement and combination of the parallel arm, S S, central guiding rod, T, and spring, u, in connection with the yielding feeding rollers, mounted on sliding carriages, substantially in the manner and for the purposes specified.

Tailor's Pressing Machines—C. W. Williams, of Boston, Mass.: I claim suspending the iron or goose from a convex disk, which turns freely upon a ball and socket joint, or its equivalent, and which forms a bearing for the lever to act against, as set forth.

The chloride of zinc is manufactured by dissolving fine pieces of zinc in muriatic acid.

Signals of Vessels.—Collisions at Sea.

Collisions between vessels have become frequent, and, next to fires at sea, they are the most appalling and heart-rending. The new French steamer *Lyonnais*, noticed by us last week, was run into on the night after she left this port by the bark *Adriatic*, of Maine, which cut her through the middle, and it is believed that all on board—one hundred and fifty persons—with the exception of sixteen who escaped in a boat, have perished. The Captain of the *Adriatic* reports that he saw the steamer twenty minutes before his vessel struck her and that the collision was caused by the steamer *suddenly* altering her course. He also states that there was a slight haze in the atmosphere, but it was not foggy. Those who escaped from the steamer report the weather as being foggy, and that the *Adriatic* was unseen by those on board the *Lyonnais*. Those in the bark might well have seen the light of a steamer through a slight fog, while the *Adriatic* without lights could not be seen by the watch on the steamer.

Whoever is or was to blame for this accident we do not know, but it is our deliberate opinion that such accidents can be prevented. The collision which sent the *Arctic* to the bottom of the ocean occurred in a fog, and the late one while the weather was confessedly hazy. It appears, from all the evidence gathered, that each of the vessels in both cases was driving on its course with inexcusable speed, under the circumstances, and that common sense precautions were not made use of. By the use of *light* signals for visual observations, and sounding signals for hearing, the position of vessels at sea and their courses in darkness and fogs could be made known to one another with accuracy. All vessels—steamers and sail ships—navigating the ocean should be compelled to carry colored signals at night. The ocean has now become like a great highway, by the astonishing increase of commerce, and as it was long ago found necessary for all our river steamers to carry signal night lights for safety, it has now become imperative that all vessels navigating the ocean should carry light signals also. In dark nights but clear weather such signals would prevent collisions at sea.

On the Mississippi river, since all steamboats have been compelled to use steam whistles, collisions have become less frequent, and so it would be with all steamships navigating the ocean. If they would use them in fogs, and run at a low speed, we would expect that collisions between them would be prevented. It may be said that a steam whistle could not have prevented the collision between the *Adriatic* and *Lyonnais*, because it was the former which ran into the latter. This is true in this sense, but if the *Adriatic* had been carrying light signals, the case would have been different, and, besides, we see no reason why powerful auricular signals could not be employed on sailing vessels as well as steamships. They employ bells now, but they are so small that they can be heard only at a short distance, whereas a small steam whistle can be heard at thrice the distance of these bells. An air whistle operated by hand like a pump, could be used on sailing vessels, and it could be constructed to send forth its screams to a distance of some miles. We are therefore of opinion, that if all vessels were compelled to carry and use visual and auricular signals, at night and in fogs, that collisions at sea might be completely prevented.

Vermont Gold Again.

The Rutland (Vt.) *Herald* again calls attention to a piece of gold found somewhere among the Green Mountains about the size of a dollar. It states that there are plenty more specimens where this one was found. Some of our Vermont contemporaries have talked of the golden treasures of that State for the last three years, but nobody seems to believe a word of what they have said.

85 parts of lead and 15 of antimony, make good bearings for axles and shafts when enclosed in an iron shell.

No less than seven large steamships have been lost on the Pacific coast in six years.

Electrical Motion and Magnetism.

MESSRS. EDITORS—The causes of electrical motion are said to be various, but electricians have classified and reduced them to a few heads, as friction, change of temperature, chemical action, and change of form. My object now is to suggest a still further simplification of these causes. And with this object in view let it be asked can we not detect a single principle underlaying all these causes, to which alone may be referred the phenomena of electrical motion?

Friction: In what does this consist but in the forced motion of one body along the surface of another with which it is in apparent contact?

Now no surface can be made absolutely smooth, and the nearer it comes to being smooth the less friction can be effected with it. The surfaces, then, between which friction is produced, are bestudded with projections or molecules. When these surfaces are brought together their molecules will mutually settle in between each other, and while in this position one surface is to be forced along the other. But the force thus exerted is evidently expended in pressing the molecules of one surface against those of the other which resist its free motion. This must obviously compress the resisting molecules, and hence, in friction we have condensation among particles. In illustration, rub one rasp upon another, and the teeth of the two will assume a precisely similar relation to each other, as do the molecules of the two surfaces employed in friction.

Change of temperature: This consists in the diffusion of heat through a body, or its abstraction from it. But one principal effect of heat is its repulsion. Therefore the increase of heat separates particles from each other, and its diminution allows their cohesion to bring them nearer together. Hence condensation (or expansion) among particles is the result of change of temperature.

Chemical action: What is this but the formation or the breaking up of compounds? To form a compound we have simply to bring together particles of matter under such circumstances that their attraction for each other shall be greater than their attraction was for the particles by which they were before surrounded. But their attraction being greater, they must come nearer together or be condensed. In breaking up a compound we must pursue an opposite course, and expansion among particles results.

Change of form: In solidification or liquefaction the presence of condensation or expansion among particles is too obvious to need comment. But mark here, that condensation may take place among the particles of a body, while the body itself may be spread over a larger space than before, and *vice versa*. Thus steam escaping from great pressure is at first transparent, but, on being condensed by the cold air, it is opake, notwithstanding it occupies a larger space than before escaping; the explanation of which I apprehend to be, that the particles of steam are condensed into minute drops of water separated from each other, and their interstices occupied by air. I would suggest, then, that electricity exists in *sita* only between the particles of which substances are composed, that when, by condensation, the particles are brought nearer together, the electricity is forced to the surface and is called positive, and there remains until, by expansion, the body regains its original capacity, or until a conducting medium takes it away to form an equilibrium among other substances. On the other hand, if a body is subjected to expansion among its particles, its capacity is increased, and it is negative until a conducting medium supplies it with electricity from surrounding surfaces.

If by any means we crowd more than an equivalent of electricity into a body, we render the body magnetic; thus soft iron becomes a temporary magnet; but if we surround each particle in the soft iron bar with an atmosphere of carbon (a non-conducting medium) as it exists in steel, the bar becomes an electrical battery, each particle of which—with its atmosphere of carbon—is a Leyden jar. By charging the bar, but not too strongly, with electricity, it will retain its charge and become a permanent magnet.

In applying this theory to account for lightning, we should say, water at the earth's surface has its own equivalent of electricity—it is changed to vapor. This expansion increases its capacity for electricity which it receives from surrounding objects, and thus laden, it floats in the air, a cloud, rises to a colder stratum of air, is condensed back to water, and thus, losing its increase of capacity, electricity is evolved. When this condensation takes place gradually, as in a mild storm, the air between the cloud and the earth becoming moist, and consequently a better conductor, the electricity passes back to the earth as fast as it is evolved, and we witness none of its phenomena. When the vapor is frozen with little or no condensation, as in a snow-storm, little or no electrical excitement is exhibited. When, as in a hail shower, the vapor is condensed to drops, and then expanded a little by freezing, the electrical excitement is probably less intense than it would otherwise have been. But when the vapor is condensed so suddenly that the air remains dry until enough electricity shall have been evolved to acquire the requisite intensity, it then leaps through the air to a less electrified body, forms an equilibrium, and is again at rest.

W. A. G.

Cheap Electrical Machine.

MESSRS. EDITORS—In making some experiments with electricity, and not being able to procure the necessary apparatus—such as are generally used—I found that by a combination of the principles of the Leyden jar and electrophorus I could construct an electric machine cheaper, simpler, more compact, &c. Take a piece of india rubber or gutta percha, say sixteen inches square, cover it on both sides with tin foil, in the manner of constructing a Leyden jar; this I call a Leyden plate; place it on a table or other suitable place, and put another piece of india rubber on the top of the first, rather larger than the surface of the tin foil. Next place a circular piece of tin or other metal with an insulating handle on the uppermost piece of india rubber, and connect a slip of tin foil with the surface of the tin foil on the upper side of the leyden plate, and double it over so that when the circular piece of tin is placed on its place it will come in contact with it. By exciting the upper piece of india rubber with a piece of fur, and then putting the tin plate on it, a spark will pass from the upper surface of the leyden plate through the slip of tin foil to the tin plate, which, on being raised by its insulating handle, will give a spark like a common electrophorus. This being repeated several times, the electricity is literally pumped out of the upper surface of the leyden plate. On making connection with the hands or otherwise with the tin plate and the under surface of the leyden plate, a shock will be received in power according to the size of the machine. This is a brief description of the method of constructing a new electric machine, &c.

Machines constructed on this plan, and of materials like those mentioned, combining simplicity, compactness, and durability, would be suitable instruments to introduce into common schools.

WILLIS KNICKERROCKER.

Webster City, Iowa, Nov. 2d, 1856.

Improvements in Stereotyping.

A paragraph of a very unintelligible character was recently published in several papers, purporting to be a description of an improved process of stereotyping invented by Messrs. Hogg & Napier, of Edinburgh. As any improvement relating to the art of printing is of great importance, and as an untrustworthy account of it does more harm than good we present the following account of this invention from the *London Mechanics' Magazine*, which, it says, "is perfectly reliable."

"The first part of it relates to the formation of the matrices, and is as follows:—Firstly, a thick viscid plate is to be prepared by the intimate admixture, in about equal quantities, of red ochre and fine whiting, together with a sufficient quantity of prepared thin glue, starch, and wheaten flour (also in about equal proportions) made up into a paste, a little alum being included in the latter compound. Of the glue and paste there is to be employed just as much as is necessary, when all the components have been properly mixed to make the compound a stiff paste. A quantity of this is then to be spread upon the surface of a piece of stout packing paper, cloth, or other suitable fabric, and a straight edge of any convenient kind passed over it, so that the coating of paste may be rendered uniform in thickness. The amount of paste spread on should be about equal to the thickness of a three-penny piece, as at present issued from the mint. This combination of paste and packing paper (or other substance) is now allowed to stand under the influence of the atmosphere for about half an hour, until the surface becomes nearly dry. The "page" or "form" of which a cast is required to be taken is next laid down with the face uppermost, a slight coating of lard or other oil being brushed over it, and the flat matrix laid down upon the face of the types or "form," that surface upon which the paste or composition had been spread being next the oiled face of the "form." In this condition the whole is to be subjected, in a printing press or other convenient apparatus, to slight pressure, sufficient to press firmly and evenly the matrix into the face of the types upon which it has been laid. A single and very light "soaking" pull at a printing press is sufficient for the purpose, or the impression may be taken by the implements known to printers as a "planer and mallet," used in the same way as when "planing over" a form of types. After the impression is obtained, the matrix must not be moved from contact with the "form" until it has been partially dried, and while this is going on, it is necessary to place a weight of some sort upon the back of the matrix. The best way is to place the bottom of the "form" or "page" upon a plate of heated metal, keeping at the same time some flat heavy weight upon the back of the matrix. In a short time (varying according to the amount of heat employed) the matrix will have partially dried, whilst lying upon the face of the "form," and when withdrawn therefrom will be found to afford an exact reverse copy and mold of the "form" or "page," operated upon."

Color Phenomena of Certain Solutions.

Sir John Herschel first brought publicly into notice the fact that certain solutions appear of a different color according to the quantity seen through. The water of the ocean, for example, when lifted in a common tumbler, is clear and transparent—colorless; but looking down into a great body of it, as in the Gulf stream, it appears of a deep indigo color.—There are also certain varnishes, one coat of which is of a light brown color, but successive coats laid on the top of one another assume a black appearance. Dr. Gladstone read a paper on this subject before the late meeting of the British Scientific Association, of which the following is an abstract:—

"A dichromatic solution was examined by placing it in a wedge-shaped glass trough, held in such a position that a slit in the window shutter was seen traversing the varying thickness of the liquid. The diversely colored line of light thus produced was analyzed by a prism; and the resulting spectrum was represented in a diagram by means of colored chalks on black paper, the true position of the apparent colors being determined by the fixed lines of the spectrum. In this way the citrate and comenamate of iron, sulphate of indigo, litmus in various conditions, cochineal and chromium, and cobalt salts were examined and represented. Among the more notable results were the following:—A base, such as chromic oxyd, produces very nearly the same spectral image with whatever acid it may be combined, although the salts may appear very different in color to the unaided eye. Citrate of iron appears green, brown, or red, according to the quantity seen through. It transmits the red ray most easily, then the orange, then the green, which covers the space usually occupied by the yellow; it cut off entirely the more refrangible half of the spectrum. Neutral litmus appears blue or red, according to the strength or depth of the solution. Alkalies cause a great development of the blue ray; acids cause a like increase of the orange, while the minimum of luminosity is altered to a position much nearer the blue. Boracic acid causes a development of the violet. Alkaline litmus was exhibited so strong that it appeared red, and slightly acid litmus so dilute that it looked bluish purple; indeed, on account of the easy transmissibility of the orange ray through an acid solution, the apparent paradox was maintained that a large amount of alkaline litmus is of a purer red than acid litmus itself."

Screw Propeller Experiments.

Screw steamers have become great favorites during the past few years, on account of their greater economy than paddle wheel steamers. Any information relating to them is, therefore, of deep interest to our marine engineers and steamship owners. The following account of exceedingly valuable and interesting experiments is from the London *Artizan*:—

"The experiments which have been going on for some time on H. M. S. *Flying Fish*, Commander Dew, which is about 900 tuns measurement, and 350 nominal horse-power, and constructed on beautiful lines, have now terminated. When first tried (May 13th,) she had on a common screw of 11 ft. diameter, and 21 ft. 4 inch. pitch, which gave her a speed of 11 1-2 knots, with 82 revolutions of engines. This result not being considered satisfactory, such alterations were made as to get in a 12 ft. 2 inch. screw, with 20 ft. pitch, which gave her a speed of fully 11 1-2 knots with 75 revolutions, and when reduced to half power (60 revolutions) 10 knots. The Lords of the Admiralty having ordered a Griffiths' screw for her and the gun-boat *Bullfinch*, Mr. Griffiths requested to be allowed to supply these screws with an extra set of blades, constructed so as to incline at an angle of 18 degrees towards the ship, which could be shipped into the center part of his screw, for trial instead of the ordinary blades. This was acceded to, and these blades were first tried on July 14th, with a pitch of 19 ft., the diameter, same as the common screw, 13·2, which gave a speed of 11 1-4 full, with only 71 revolutions. It was then perceived that by inclining the blades of the screw it had considerably more hold on the water, and consequently reduced the slip. The pitch was afterwards reduced to 15 ft. (July 30) when a speed of nearly 12 knots was obtained, and with half power (60 revolutions) about 10 knots, the screw making a negative slip of about 3-4 of a knot.

It was then ordered by the Lords of the Admirality that a temporary bow should be put on her of about 30 ft. long; and a trial was made September 12th, first with the common screw of 13·2 diameter, 20 ft. pitch, and a speed of full 12 1-2 knots was obtained; and with half power (40 revolutions) 10 knots—the temporary bow giving the ship a knot more speed at full power, but no increase of speed at half power—on September 30th. She was then tried with Griffith's screw of 13·2 diameter, and 19 ft. pitch, when a speed of nearly 13 knots was obtained. In consequence of an experiment that was tried on the *Bullfinch*, by reducing Griffiths' enclosed blades from 6 ft. to 5 ft. 4 inch. diameter, and setting it at the same pitch as the common screw of 6 ft. diameter, which gave the vessel nearly half a knot more speed with the same amount of power, it was decided to try the same experiment on the *Flying Fish*. Her screw, with the enclosed blades, was reduced from 13·2 to 12 ft. and 20 ft. pitch (October 18th) which gave her a speed of 12 knots, the engine only making 70 revolutions. The pitch was then reduced to 17 ft. (in October 22), the engines then made only 75 revolutions, the ship 12 1-4 knots barely."

Louisville Mechanics' Institute Fair.

The Mechanics' Institute Fair at Louisville, Ky., has just closed. The *Democrat* of that city says it had a most successful career.

The attendance was very large, and, in an eminent degree, complimentary to the officers of the Institute and the contributors.

The closing Address, by R. T. Durrett, Esq., was chaste, practical, and elegant. Its appropriateness to the occasion was remarkable and the speaker's subjects were discussed with ability.

New Inventions.

Breech-Loading Firearm.

The accompanying figures represent the improved breech-loading gun of Frederick D, Newbury, on which patents have been granted at various times. Mr. Newbury is the inventor of eight distinct improvements in fire-arms, on which he has secured as many patents, all of which are consolidated and in the hands of a company; one-fifth of the stock in which is offered for sale for $10,000.

This firearm has a peculiar breech-closing arrangement, and it cocks itself when the breech closer is moved to load the piece. It has a perfectly close self-adjusting gas-tight breech. It is a self-primer, the priming tape being moved forward for every new charge, by the motion of the breech closer.

Figure 1 is a side elevation of the gun; fig. 2 an enlarged vertical longitudinal section. and figs. 3 and 4 parts of the breech-closing cone.

The breech closer is a movable hollow metal arm, A, hinged to a hollow box, B, which has vertical sides, so that the arm can he snugly shut up within it; to the front end of which box, the barrel of the gun is screwed. To the front end of the arm is attached a metal cone, C, turned so as to fit the conical or taper bore of the rear end of the barrel, which is made conical for that purpose. This cone is continued by a soft copper ring, upon which again lies a thin cup-shaped valve of finely tempered steel, D, (figure 4,) with its concave face outward. This valve is the proper breech closer, and is called the concave breech seat. It is a segment of a sphere, and may be either a single cup, or of two cup-shaped pieces of metal (fig. 3) with radial cli·s in the edges, placed one over the other, and breaking joints. The object of this cup-shaped terminal is to furnish an elastic stop, which, if not perfectly tight when in position, may, by the pressure of the gas in firing, have its edge forced up against the surface of the charge chamber, so that the more violent the recoil the tighter the valve will fit.

The hammer, trigger, and the springs lie within the hollow metal arm. to which the breech closer is attached; the hammer being placed in reverse, and lying in front of the trigger striking upward upon the cone, which is placed under the barrel for that purpose.

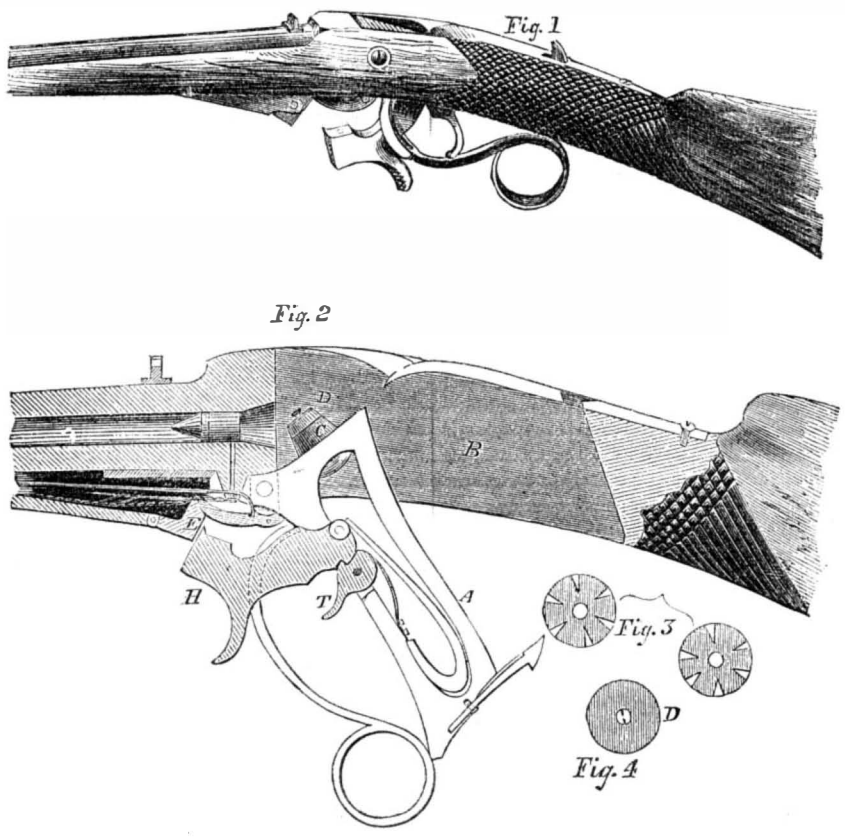
The apparatus for cocking the hammer, H, by the movement of the arm, is simply a stud, E, which projects downward from the barrel, beyond the cone, its back edge having a forward curve or slope so adjusted, that when the arm is thrown down for the purpose of loading, the extreme point af the hammer being pressed against it, shall, by its inclination, be thrown downward, that is, back on its own axis, and thereby locked into the trigger, T, so that when the arm is brought back into its box, the piece will be cocked for firing.

The priming apparatus is a groove in the under part of the stock, forward of the stud which is covered by a thin metal cover, or else a metal tube attached to the under side of the barrel; within this tube, a piece of tape priming (known as "Maynard's Tape Priming,") lies the end of the tape projecting through a slot in the stud, with one of its priming over the cone. It is held in position by a small spring attached to the stock, and projecting backward, so as to press the tape slightly against the bottom of the slot in the stud. To the lower end of the hinge of the arm, A, by a small pin, a sliding rod, lying above the tape, so hooks, that with every movement of the arm the rod is moved back and forth. To the front end of the rod is fixed a spring piece, projecting downward and backward, acting as a pawl or ratchet upon the tape priming, when moving forward, sliding over the tape which is kept from receding by the spring in the stud, and when moving backward, slipping the tape forward in proportion to the distance of the pin from the hinge of the arm. This proportion being arranged to meet the distance of the pelicles of priming in the tape from each other; it will be seen that every movement of the arm, which cocks the hammer, will bring a fresh priming over the cone, and it will be noticed, that this apparatus does not prevent the use of percussion caps for priming. To prevent explosions and clear away the successive portions of the tape as they are exploded, the arm A, is thrown out of catch, and drawn down to the position shown in figure 2, by its swinging on its swivel or axis pin; the cartridge is now thrust in, as shown, the arm pushed up again, when it locks itself, and it is ready to be discharged, as it both caps and cocks itself automatically, by the simple acts of pulling down and up the arm, A.

point of the hammer, H, is formed with a chisel edge.

This improvement in fire-arms is applicable to carbines, rifles, shot guns, and pistols. To load this gun, the spring button at the end of

NEWBURY'S BREECH LOADING GUN.



This is a valuable improvement in breech-loading arms, allowing them to be loaded with great ease and rapidity; and all the parts are simple, and not liable to get out of order.

More information may be obtained by letter (or otherwise) addressed to the agent of the company, Richard V. Dewitt, 56 State st., Albany, N.Y.

Improvement in Gas Retorts.

The accompanying engravings represent an improvement in gas retorts, for which a patent was granted on the 20th of last May. One object of the improvement is to enable the head of the retort to be easily attached and detached to allow the retort to be quickly charged and discharged. Another object is to allow the fastening of the head of the retort to be readily attached from a worn out retort and applied to a new one.

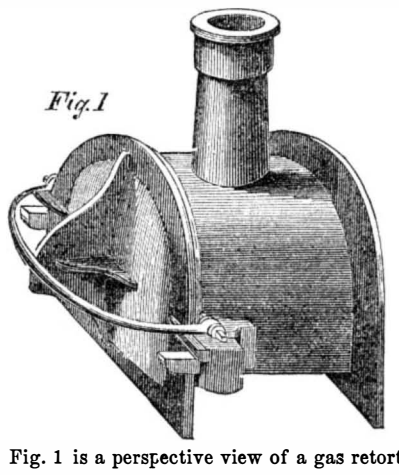
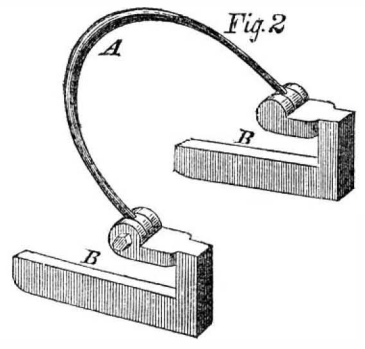


Fig. 1 is a perspective view of a gas retort with its head secured tight by the fastener; fig. 2 is a perspective view of the fastener, composed of the bail, A, and the side hooks, B. On the neck of the retort, a lug is cast on each side close to the mouth; each lug has a square hole in it, and the hooks, B B, are passed through these holes. The head of the retort is cast with a center wedge rib on it, and a short arm at each side. The hooks are thrust through the holes of the lugs from the back side, to project in front, and the side arms of the retort head rest upon them as in fig. 1. The bail or handle, A, being jointed, is then forced down over the central wedge rib, and thus the head is firmly secured to its seat.

When a charge is distilled in the retort, the handle or bail, A, has but to be driven upwards over the neck of the retort, when the head may be easily taken off. When the contents of the retort are taken out, and a new charge put in, the head is put on, and the bail, A, driven down over the wedge rib, and the retort is ready for another operation. This improvement is simple, convenient and beautiful. The bail is made of wrought iron; the hooks, B B, may be made of malleable iron. To detach this fastener from a retort when the latter is burned out, all that is required is to throw the bail upon the neck of the retort, and drive back the hooks, B B, out of the side lugs with a hammer, and then apply it to a new retort.



This is an economical device. This kind of fastening may also be applied to the man-hole covers of boilers. The patentee, John G. Hock, of Newark, N. J., has also taken out patents in Europe for this invention, and also for an improvement in Gas Retort Benches. Being engaged in the business of manufacturing illuminating gas, he is well acquainted with the defects of common apparatuses, and knows what improvements are required.

More information may be obtained of him by letter (or otherwise) addressed at Newark, N. J.

Deodorizing Bilge Water and Foul Drains.

On board of some vessels virulent fevers and cholera have broken out, and have been traced to the foul effluvia arising from bilge water. The most effectual disinfectant for the removal of this effluvia is a salt to decompose the foul liquid. The chloride of zinc—the solution described on another page for preserving wood—has been found to be a most simple and effectual disinfectant of liquids.

In a letter of Sir Wm. Burnet to the Chief of the Medical Department in the British Navy, he describes the beneficial effects of this solution in various vessels. He asserts that, "Its value as a sanatary agent has been established by the most unequivocal proofs."

It is well known that by the leakage in vessels of salt pork, beef, &c., used as provisions, that the bilge water oftentimes becomes very offensive, and whenever a foul odor exists there is danger of disease of some kind. The matter which causes the foul odor should be at once removed or neutralized.

The chloride of zinc is a salt which enters into combination with animal and vegetable fibrine, and forms an insoluble compound which is odorless, therefore this solution is truly a sanatary agent for vessels, and no less so for foul drains in buildings. It is our opinion that every passenger ship should be compelled to carry and use it from time to time. Recently a great number of vessels which have arrived at this port from Europe have been affected with cholera, small pox, and other diseases, and on some of them 20, 30, and 40 passengers have died. With a better system of ventilation, like that recommended in another article, (and the use of chemical sanatary agents) as deodorizers, ships would be perfectly healthy—ship fever and other diseases which oftentimes break out on the short voyages from Europe would be unknown.

Skin Diseases in Animals.

Scabies is a pestiferous disease, whether it affects the horse, the ox, the sheep, swine, or poultry, inflicting a loss not easily estimated; hence the maxim of every intelligent farmer is to avoid it. With him "prevention is better than cure," and therefore his grand desideratum is to guard against contagion. Sheep are, perhaps, more subject to it than any of the other animals, arising as much from the nature of their skins and coats as from the fecundity of the *acarus ovis*, and the greater vicissitudes of the weather to which they (sheep) are exposed. Certain parts of the body are more liable to be affected than others; and so is an unhealthy skin than a healthy one. Indeed, it has been said that an unhealthy skin will itself produce *scabies* (?), but this conclusion does not appear to be well founded, for a disease dependent upon the presence of living parasites can never arise spontaneously, but must be effected by contagion, either by means of their eggs, or the insect in some other stage of its existence.

Now, from what has just been said, it will appear obvious that cleanliness, a healthy skin and state of the body, and a separation from foul animals and ground, are the means necessary to avoid contagion.

[The above is from the *American Veterinary Journal*, and it is a useful injunction to our farmers at this season of the year. During the summer and the season when animals have plenty of grass for food, they are not generally troubled with cutaneous diseases—it is during winter that they prevail. The above hints, we hope, will not be forgotten, because they are important truths.

American Dentists in Europe.

It is formally announced in *Galignani's Messenger* that Dr. T. W. Evans, the American dentist to the Emperor and Empress, has returned to his residence in Paris from a journey to Moscow, where he had been summoned to attend the Emperor Alexander II. and the imperial family of Russia, all doubtless with disordered teeth, after so much good living at the coronation.

Scientific American.

NEW YORK, NOVEMBER, 29, 1856.

Preserving.—Burnetizing Timber.

Since the publication of the articles on preserving timber, in our last volume, and the description which we gave of Boucherie's process, we have received a number of letters making inquiries regarding the cost, and other particulars relating to the process, and whether the preserving of timber is now conducted in any part of our country.

The preserving of timber with a solution of the chloride of zinc—Sir Wm. Burnet's process—is now carried on at Lowell, Mass., and a pamphlet recently published on the subject by J. B. Francis, Esq., gives some very useful information, which will be of interest to many of our readers.

Sir William Burnet secured a patent for his invention in England in 1838, but no American patent was ever taken out for it. It consists, as stated in the patent, "in destroying the tendency of certain vegetable and animal substances to decay, by submitting them to the action of a solution of chloride of zinc. In preparing wood by this process, a suitable tank is provided, and filled about two-thirds full with the solution, composed of 1 lb. of the chloride of zinc to every five gallons of cold water." The timber, (by the plan first proposed by the inventor) was steeped in this for about twenty days, when it was taken out and dried under sheds. This process was first introduced into Lowell in 1850, by the proprietors of the locks and canals on the Merrimac river, at the joint expense of the manufacturing companies. The original intention simply was, to prepare timber for their own purposes, but the apparatus erected was found to be capable of preparing more than they required, and accordingly tbey have also prepared considerable quantities of lumber for other parties. The price charged is for spruce lumber $5 per 1000 feet board measure; for all other kinds of lumber, $6; shingles 75 cents per 1000. Spruce, it seems, does not take up so much of the solution as other kinds of timber, and this is the reason why it is cheaper. About one million feet, board measure, have been Burnetized annually since the year the apparatus was erected. This apparatus consists of a cast-iron cylinder an inch thick, in which the timber to be prepared is placed; it is 60 feet long, 7 feet diameter inside, with one head movable. A pair of rails of about 2 feet gauge are laid on its bottom. A heavy truck is loaded with timber, which is chained down to prevent it floating, and it is then run upon a railroad into the cylinder, and its movable head put on perfectly tight. A wooden cistern containing the chloride solution lies below the iron cylinder. An air pump of 12 inches in diameter and 3 feet stroke, and a force pump 4 inches in diameter and 2 feet stroke are employed and worked by a small steam engine, which also warps the timber in and out of the cylinder. The air pump exhausts the air from the cylinder and timber, when the solution flows in by atmospheric pressure, from the cistern. The air pump then gives place to the action of the force pump which forces in the solution until it attains to a pressure of 130 lbs. on the square inch, at which point it is maintained for two hours, when the process is completed. The surplus of the solution not taken up by the timber is then run off, and the prepared timber run out, to make room for another batch.

The time required in performing all the operations and operating on 7000 feet—board measure—of timber, is seven hours; but two batches can be prepared every day, by allowing one batch to drain off during night. The strength of the solution employed at Lowell is one and a half measures of the dry chloride of zinc to a hundred measures (gallons it may be) of water; but the chloride used is obtained from manufacturers in the condition of a concentrated solution, containing 45 per cent. of water. The apparatus described is the same as that employed at Gloucester, Eng., under Brunel, for preparing railroad timber, which establishment was visited by Mr. Francis in 1851.

A thousand feet of timber—board measure—if it is dry, will take up nearly 40 gallons of the solution; wet timber takes up less.

Since the time this company commenced to preserve wood in this manner, sufficient time has scarcely elapsed to test the timber so treated, fairly. The timber on the Charles River Bridge, over an arm of the sea near Boston, was so prepared in 1850, but it has now decayed to a considerable extent. It was young pine, second growtb, and contained a great quantity of sap. On the other hand, the timber prepared for the Lowell Bleach Works has been perfectly successful. F. P. Appleton, Esq., the agent of the Works, in a letter to Mr. Francis, states, that a plank road of Burnetized timber, 200 feet long, was laid down in 1850, and alongside of it, a portion of the same lot of timber, not so treated, was also laid down. The latter is now wholly decayed, while the prepared timber is as sound as the day on which it was obtained. The ground walks around the Works, laid with spruce plank unprepared, did not last over two years, but Burnetized spruce used for the same purpose has stood six years, and is still sound. The shingles, clapboards, and other timber used in these works have all been Burnetized, and the advantages have been very great. Saml. L. Dana, chemist, at the Merrimac Calico Print Works, also adds a favorable testimony to the value of Burnetizing timber for some purposes.

As this process is common property, it appears to us that it ought to claim the attention of our railroad companies, for the preserving of the timber which they require in such immense quantities. We believe that the New York Central, the New York & Erie, the Illinois Central, and other great railroads, would each find it to their advantage to erect such an apparatus as that described, and thus treat all their sleepers, and other like timber. The same process and apparatus will answer for a different solution, such as the sulphate of copper, which is employed by Dr. Boucherie for railroad timber in France, and which has been asserted to be superior to the chloride of zinc. At any rate, it cannot be doubted but that timber so prepared with either of these solutions will endure much longer exposed to the weather than unprepared timber, and thus be the means of saving large sums of money annually.

Timber can be prepared for bridges, houses &c., (without the use of the apparatus described) by simply immersing it in the solution in a tank for about twenty days. Owing to the rapid consumption of timber in our country since railroads became so numerous, thus causing a great rise in its price, it will be short-sightedness we think, on the part of those companies who expend so much for it every year to neglect this subject much longer

Lectures for Mechanics' Associations.

As the Lecture season is approaching, a word on the subject will not be out of place to our Mechanics' Associations. As these Associations have committees appointed to procure suitable persons to lecture, we advise them to be as careful of the subjects of the lectures as of the lecturers. There has been for a few years past a fashionable furor for lectures, no matter what were the subjects, if the men who delivered them were popular characters. Mechanics Associations, as well as mere literary societies have been tainted with this *fever*, hence lectures quite foreign to the nature of the objects for which they were founded have been altogether too common.

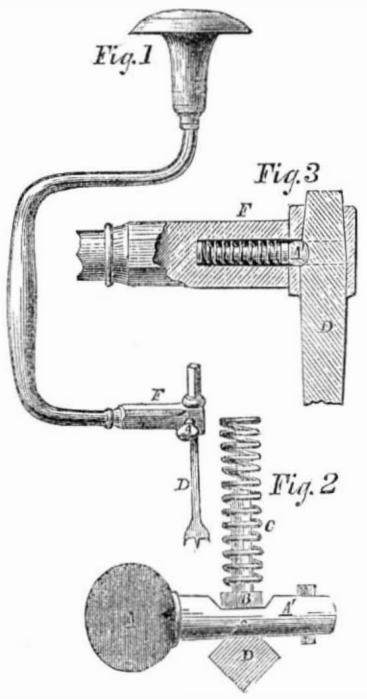
We advise all our Mechanics' Associations to organize for regular courses of useful lectures on the Arts and Sciences especially—such as chemistry, mineralogy, engineering, botany, photography, &c. We do not object to a few literary lectures; they are like seasoning to food; they will give the others a better relish, but they should be the seasoning only, not the food of the lecture season in our Mechanics' Associations.

The Frigate Niagara.

The new steam frigate *Niagara*, the hull of which was built by the lamented George Steers, is an index of the slow-coach system pursued at Government Yards, in comparison with private enterprises. The work of putting in the machinery and fitting up the whole vessel goes on so slowly, that it is not now expected she will be ready for sea before next spring.

New Bitt Stock.

Our engraving illustrates the invention of Horace Lettington, Norwich, N. Y., to whom Letters Patent were granted, May 13, 1856. Fig. 1 gives the general appearance of the stock, which is of the usual form. The improvement relates to the button for holding in the tool. Figs. 2 and 3 are enlarged sectional views of the improved parts.



The button, A, is applied at one extremity of the crank bow, as usual. The shank of the button, A′ (fig. 2,) is flattened on one side, and against this flat surface, a dog, B, is pressed by means of the spiral spring, C. The dog and spring are hidden from sight in a cavity made in the extremity of the crank at F. The dog and spring serve to hold button A, in a given position, preventing it from moving out of place by accident; figs. 2 and 3 show the button as turned to fasten the tool, D, to the stock, the round side of A′ fitting into a corresponding cavity of tool D, and preventing its removal. By turning the button A half round, its flat side will be presented to the tool, which may then be removed.

This is a very neat and cheap fastener for bit stocks, and operates with much satisfaction. It securely fastens the tool, and yet permits its easy removal. Address the inventor as above for further information.

Exhibition of the Franklin Institute.

The Annual Exhibition of American manufactures by the Franklin Institute of Philadelphia, Pa., is now open in that city, and is attracting much attention. The premises occupied comprise the large and splendid hall in Dr. Jayne's new building on Chestnut street near Seventh, together with several adjoining apartments and basements.

The articles displayed consist of American cloths, silverware, hardware, chemicals, perfumes, furniture, new inventions, and, in fact, samples of all the various goods that are generally seen in industrial exhibitions.

The display is very creditable to the Franklin Institute, although, compared with that lately made by the American Institute at the Crystal Palace in this city, it is a minature. The truth is, there is no suitable edifice in Philadelphia for such exhibitions, and therefore it is not to be expected that much can be done.

The Mechanical Department of the Franklin Institute Exhibition does not embrace a very extensive assortment. Among the principal novelties we notice the Rotary Pumps and Rotary Engines of Messrs. Silsby, Mynderse & Co., of the Island Works, Seneca Falls, M. Y., (Holly's patent.) The principles involved in the construction of these pumps and engines will be seen by reference to the engraving and description, which we published in the Scientific American of Nov. 15th last.

John Tremper, of No. 1 Sixth street, Philadelphia, Pa., exhibits his patent Pneumatic Governor for marine, locomotive, and stationary steam engines. This invention was illustrated and described on page 244, Vol. 8, Scientific American, to which the reader is referred. It is very highly spoken of and is, undoubtedly, a good improvement. The inventor alleges that this governor is so sensitive that it never allows the engine to change its speed, no matter how unequal the work. Price $45 and upwards.

Thomas Silver, of Philadelphia, exhibits his patent Marine and Stationary Engine Gover nor. We have before spoken of this invention in high terms, and on page 356, Vol. 12, Scientific American, it is fully described and illustrated by engravings. This governor is in use at the U. S. Mint, Philadelphia, on the Collins' steamers, and elsewhere, giving great satisfaction in all cases.

J. P. Ross, of Lewisburg, Union Co., Pa., exhibits, on a small scale, his patent Blowing Engine for iron and other furnaces. A striking feature of this invention is that the blowing piston is attached directly to the piston rod of the steam cylinder, the piston rod being elongated for that purpose. In appearance, therefore, it looks like an engine having two cylinders, one at each end of the same piston rod. An ingenious device is employed for operating the valves and regulating the cut-off. This engine requires no fly wheel, works with the utmost ease, is much less expensive both in original construction and use than ordinary engines, and has still other advantages. For an engraving and description see Scientific American of Oct. 18th last.

Griffin & Ryan, of Wilmington, Del., exhibit Ryan's patent Self-acting Car Coupling, by which cars may be connected by merely pushing their buffers together. The connection is effected by means of a peculiar hook-shaped bar, weighted at one end, and so made that when the buffers come together the bar turns slightly upon its side, which allows the hook to enter the buffer, and then assume its first position, thus hooking the cars together. No springs are used. This is a very cheap and effective improvement. The uncoupling is done by merely turning the bar sidewise. For description and engraving see Scientific American of Oct. 4th, last.

Richard Kitson, of Lowell, Mass., exhibits his patent machines for picking and opening fibrous materials. They are applicable to cotton, wool, flax, etc., and open the fiber without injuring the staple. They are also self-cleaning and self-sharpening.

The Aubin Gas Co., of Albany, N. Y., exhibit N. Aubin's patent portable gas apparatus in operation. This invention consists of a stove-like looking contrivance, in which a small coal fire is kept burning. The gas is obtained by the distillation of common rosin. 300 cubic feet of gas are made from 30 lbs. of rosin. Price of apparatus, with gasometer capable of holding 100 feet, $150.

Pierson's patent Hoop Sawing Machine, Philadelphia, attracts considerable attention. It was stated to be capable of sawing 1000 hoops per diem.

John A. Roebling, of Trenton, N. J., exhibits splendid specimens of his patent wire ropes of various sizes. They are superior to any articles of the kind that we have seen. Mr. Roebling is well known as an eminent civil engineer, and constructor of the great Railroad Suspension Bridge at Niagara Falls.

Silsby, Mynderse & Co., Seneca Falls, N. Y., exhibit some improved Carriage Axles, of excellent workmanship.

H. Diston, Philadelphia, exhibits several noble specimens of circular saws and other articles in steel.

Wm. H. Harrison, of Philadelphia, exhibits an improved double-action Force and Lift Pump, so arranged as to lift the water almost in a straight column from the bottom of the well to the discharge. It is alleged to be very simple and effective.

A. L. Archambault, of Philadelphia, exhibits a portable Steam Engine for farming purposes. Strength and compactness are its prominent characteristics.

L. Wright, of Newark, N. J., exhibits his patent scroll saw. It is remarkable for the ease and steadiness with which it runs, al-

though working at a very high velocity. The finest work can be executed with the utmost facility. The construction is peculiar, and such as to insure durability. For an engraving and full description, see last volume of the SCIENTIFIC AMERICAN, page 353.

King & Hyneman, of Philadelphia, exhibit their patent Street Sweeping Machine. This is a two-wheeled vehicle, much resembling a common cart. Rotating brushes below are put in operation by the wheels, and the dirt is swept against an oblique dash-board, and thus turned so that it falls in a winrow at the side of the machine, upon the pavement. The apparatus is simple, and is said to work extremely well.

Denison & Bradley, of New York, exhibit their improved elastic tube Rotary Pumps; they consist of a strong rubber tube bent into circular form. A friction roller attached to a rotating shaft is made to press against the tube and collapse it, thus producing a vacuum and causes the water to rise. A full description of this invention, with engraving, was published in the last volume of the SCIENTIFIC AMERICAN, page 324.

Horatio N. Black, of Philadelphia, exhibits his patent Grain Cleaning and Drying Machine. It is said to be very effective for the purification of all kinds of grain, and for the separation of the worthless seeds that are intermingled, such as chess, garlic, etc. It will also scour buckwheat and hull rice with great expedition.

James. Wilcox, of Philadelphia, exhibits Hunt & Webster's improved Sewing Machines. They make strong stitches, are simple, run without noise, and are very rapid. The samples of work that we examined were done in the very best manner. Price $75 and upwards.

John N. Gould, of Philadelphia, exhibits his patent self-acting Turning Lathe, for turning ornamental and other kinds of work, such as balustrades, table-legs, bed-posts, wagon-hubs, tool handles, etc. The machine is extremely simple, and operates well.

A. Barker, of Philadelphia, exhibits his patent double-action Force and Lift Pump. It is alleged that it causes a constant flow of water towards the discharge orifice, and therefore, that it has important advantages in power over those pumps where the column of water starts and stops alternately at each stroke. For an engraving and description see SCIENTIFIC AMERICAN Vol. 7, page 260.

Chemicals.—H. W. Worthington, of Philadelphia, exhibits some fine specimens of crystalized prussiate of potash, sulphur, etc.

The Oldest Inhabitant, a rustic statue of an old Quaker gentleman, composed of grain, seeds, corn husks, vegetable skins and the like, attracts much attention. It is, really, quite a work of art and its fair originator, Mrs. Thomas H. Fergus, of Westchester, Pa., is entitled to much credit for her skill. We are certain that no sculptor, working with the same materials, has ever surpassed this production.

The arrangement of the articles in the exhibition is bad. Where the goods could not be sufficiently crowded together, rails are nailed, so as to form narrow lanes, leading, like a labyrinth, one into the other up and down the rooms, with no cross communications. This is extremely inconvenient for visitors. If intended to enhance their ideas of the magnitude of the exhibition by compelling them unnecessarily to travel over a lengthy path, it was a poor ruse. The basements in which the machinery is exhibited are damp, unwholesome, and dangerous to health.

The Mississippi Suspension Bridge.

This bridge—projected to be built over the Mississippi at St. Louis—it is stated, will cost $2,000,000, and will be a mile long. The cost of the Niagara Falls Bridge was not quite one-fifth this sum.

Fat salt pork is employed in some of the journal boxes of locomotives, as a lubricator, and is stated to be excellent for the purpose. We used to apply it to the bearings of the old grindstone we had to turn when some years younger, and the result of its application was equally satisfactory.

Ancient and Modern Chemistry.

The great difference between the ancient and modern chemists consists in their entirely antipodal views entertained in pursuing their investigations. The old alchemists entertained the idea (and some modern casual observers sometimes broach it yet) that all the varied materials of creation were made of one or two substances, and that could they but hit upon the particular process, they believed that they could manufacture gold from iron, and change one metal to another. This idea pervaded Europe for some centuries, and many an impostor deluded kings and nobles with the imposition that they could manufacture gold for their empty coffers if furnished with certain considerations.

The old alchemists or transmuters of metals were believed to be in league with Satan, and no doubtmany of them truly were—the cheats and knaves—still some lovers of the mysterious science, pursued their investigations honestly and in obscurity. The sulphuret of iron and the sulphuret of lead were held to be semi-metals, and as the iron pyrites had the color of gold, and as they had extracted sulphur from them both, leaving lead and iron behind, they naturally concluded that sulphur was an ingredient of all the metals, and that the amount of sulphur in them determined their properties. They thought that they could make silver out of lead and gold out of iron. The old chemists believed in the generality of metals, the modern chemists believe in the singularity of them. As chemistry has progressed, instead of contracting the number of known substances, they have been increasing in number, and many of them now held to be simple, it is believed, will yet be found to be alloys—compounds of two or more substances. It is believed by some chemists that hydrogen gas is a metal, and that oxygen gas is a compound, but at present they stand out as simple substances.

In Gregory's Inorganic Chemistry—the most recent work on the subject published in our country—we find that there are now sixty-one simple substances (elements) known to chemists, and of these fourteen constitute the great mass of our earth and the atmosphere; the remainder occur only in small quantities, and some are very rare.

The science of chemistry stands now at the head of all others; prior to 1740 it was but little more than the art of preparing medicines—most of them nostrums. The number of simple substances then known was eight. There was a general ignorance of the existance of the gases—oxygen, carbon, hydrogen, and nitrogen—which play the most important parts in the operations of nature. It is true, the old chemists believed there was a peculiar body in nature which caused combustion, and which they named *phlogiston*, but it was like a mysterious fairy land. This great agent, to them such a wonder, is now known as oxygen, and a school boy can manufacture it from the scales of a blacksmith's forge, with an old gun barrel for a retort, and the kitchen fire for a furnace. It is the agent which causes our fires to burn, and which enables man and all organic creation to live and breathe. Still there is one general principle in modern chemistry, and the most wonderful of all, of which the ancients had dreams, or rather bright visions. That principle is the production of new compounds possessing peculiar properties belonging to themselves, by the combination of two or more substances in various proportions, and by peculiar processes. It is to this fact in chemistry we wish to direct particular and general attention.

This science is one of experiment entirely, and the field for experiment is boundless.—Every man can pursue investigations for himself, if he has time and apparatus, therefore it is a field in which there is room for an unlimited number of all kinds of experimentors. They cannot manufacture gold out of cheap materials, but they may discover methods of manufacturing articles now comparatively dear, out of materials comparatively cheap, and thus add as much value to the useful arts as by the discovery of rich gold "placers." For example, alcohol is composed of 4 equivalents of carbon, 5 of hydrogen, 1 of oxygen, and a little water. Well, sugar is composed of the same elements, but combined in different proportions, namely, twelve of each. There are also isomeric compounds, such as acetic ether, and aldehyde, two entirely different liquids, which contain exactly the same relative proportions of carbon, hydrogen, and oxygen; their atoms are supposed to be differently arranged, thus producing quite different substances. Isomerism is of frequent occurrence among organic compounds, and Gregory says:—"Doubtless this principle plays an important part in the processes of organic life as well as in decay." Chemists have been very successful in analytic chemistry, that is, in resolving substances into their elementary parts, but not quite so successful in synthetic chemistry, that is, in manufacturing substances found in a state of nature, by endeavoring to combine their known elements. There have been some splendid achievements, however, in synthetic chemistry, but not a tithe of what must and shall be attained. Why cannot many articles, now very dear, be manufactured by synthetic chemistry from cheap materials? Two weeks ago we directed attention to the manufacture of a cheap substitute for leather, but there are hundreds of other articles of importance to mankind to which similar attention should be given. Thus fine stearine candles, for example, are dear, being from thirty up to sixty cents per pound. Could not a cheap substitute for them be manufactured from cheap materials? Stearine is composed of carbon, hydrogen, and oxygen, and so is common resin, which is sold for a few cents per pound. Here is a field for chemical investigation; and as every new chemical experiment—no matter by whom performed—leads to a new result, we trust that more of them will be made, and a new and great impulse given to practical chemistry.

The Honolulu Dredging Machine.

Since we published the extract in our last number taken from the Honolulu *Advertiser*, we have received a letter from a correspondent explaining why the dredging machine which they have obtained for that harbor has not operated successfully.

At the entrance of the harbor there is a bar of sand about 600 feet wide and 1320 feet long. About fourteen months ago the Hawaiian government took measures to deepen the entrance to the harbor from 22 to 30 feet deep, and for this purpose they procured one of Carmichael & Osgood's Excavators, which, upon trial, has been found to work well inside of the harbor in smooth water, but for the main work of removing the bar where there is a roll or swell of the sea from two to six feet, it has been found impracticable to work, because it is operated by a swinging crane and single bucket. The swell of the sea raises the hull of the vessel up and down, and throws out the contents of the scoop after it is raised up. Inquiry has been made of us by those in authority about the best method of removing the bar, and how to make the dredger operate in the swell successfully.

We have never seen any of our dredging machines operating in such a swell as that which takes place in the harbor of Honolulu, but the endless chain bucket dredgers may be able to operate in such a situation. It is customary to stake down dredging machines by long stakes driven down at the bow, sides, and stern, to keep them steady while operating in a slight swell, but none of our dredgers, we think, could be staked down in a six feet swell. Those engaged in the business of dredging in our rivers and harbors may be able to give us some information on this subject that will be beneficial to the government of Hawaii. The port of Honolulu is frequented by a great number of American ships, therefore the improvement of its harbor is of kindred importance with the improvement of our own harbors. Our people have a self-interest in this matter.

Removing Large Boulders.

A correspondent, writing to us from Quebec, asks if there is any steam machine in the United States for removing large boulders from land. He thinks that such a machine would pay well in some places; his attention having been directed to the subject by his own wants. He has lately come into the possession of extensive property in the vicinity of that city, on the river side, which is covered with boulders that have to be removed for the purpose of flagging. He therefore thought that if there was any machine for this purpose in the United States, it might save him and others like him, a large amount of money for labor.

There is no such machine in use in our country, to our knowledge; machines for gathering small stones (boulders) from land, have been invented, but manual and animal labor alone are employed for removing large boulders on land. The common method of removing them is by blasting them by hand labor, then removing them on carts and sleds. A steam machine for removing large boulders might be profitable for special work in certain localities.

To Dye Ivory a Red Color.

A correspondent requests information respecting the method of coloring ivory billiard balls red. As the information may be useful to others as well as him, we give it as follows:—

First wash the balls in strong cold soapsuds, to remove all grease from their surface, then rinse them in cold water. Then place on the fire a tin or copper ladle containing ground cochineal, a little cream of tartar, and about a thimble full of the muriate of tin to four quarts of water in the ladle, and boil the balls in this for about five minutes; then take them out, dip them in cold water, and boil them in the coloring liquor for about five minutes longer, and they will be colored. Now take them out, wash them in cold water, and they are finished. Half an ounce of good cochineal boiled in three quarts of soft water, with one-fourth of an ounce of cream of tartar and a small thimbleful of the muriate of tin; or, as a substitute, *alum*, will color six ivory balls a good full red. This method of coloring ivory was given in our columns about four years ago, but the new subscriber, who has requested this information cannot refer to the previous receipt.

Effects of Indian Hemp.

The natives of the East Indies make a preparation of the above-named hemp, which produces a peculiar kind of intoxication. The sense of hearing becomes so exaggerated that sounds scarcely beyond a whisper, appear like loud explosions of artillery. M. Gaultier, of France, who partook of it, thus describes its effects:—

"A glass overthrown, the crackling of a foot-stool, a word pronounced low, vibrated and shook me like peals of thunder; my own voice appeared to me so loud that I dared not speak, for fear of shattering the walls around me, or of making me burst like an explosive shell; more than five hundred clocks sang out the hour with an harmonious silvery sound; every sonorous object sounded like the note of an harmonica or the Æolian harp. I swam or floated in an ocean of sound."

A Substitute for Leather.

MESSRS. EDITORS—In reading the article in the SCIENTIFIC AMERICAN, No. 10, on the above subject, I thought your suggestions well-timed and appropriate. I have remarked that quite a number of excellent inventions have been developed by the attention of inventors being directed to the things wanted through your columns, and I do not doubt but, that following your suggestions, some new substitute for leather will yet be discovered.

I would suggest to inventors—I have no time to make experiments myself—that some preparation of hemp made up like *papier machie* might be made effectual as a substitute for sole leather. A cement of india rubber mixed with other adhesive substances, may be employed to unite the fibers together. Sole leather is fibrous, as can be witnessed by tearing a piece of it lengthwise. Its appearance when thus riven is like that of oakum felted. R. R.

New York, 1856.

The screw of the frigate *Niagara*, made by Pease & Murphy, of this city, weighs 31,000 lbs., and is said to be the largest in the world. It is composed of brass, but iron would have answered just as well, and would not have cost one-third as much.

F. N. B. of Wis.—Napier's Electro Metallurgy, published by H. C. Baird, of Philadelphia, will answer your purpose, we think.

G. F. H. of N. J.—We have been informed that alcohol will not affect india rubber, if contained in a bottle of that substance. You can make india rubber liquid by dissolving it in naptha or turpentine. Cut it in fine shreds, and let it steep for about ten days in a close vessel, stirring it occasionally. You can use it to unite the edges of india rubber.

G. T. of Pa.—Our common sumac should be dried thoroughly before it is ground. Bogardus' mills will grind it as fine as you desire. The sumac employed by dyers and morocco dressers, is not our common kind, but the Sicily sumac, which is imported. Quercitron bark is the inner rind of the tree, and must be thoroughly dried for exportation. It is ripped or rasped in mills suited to the purpose, not ground fine. There is no published work on the subject of preparing dye drugs. Oliver Evans' Millwright's Guide is a good work on the subject of mills.

R. C. of Md.—If you had submitted your sketch to us at the proper time, we should have advised you that the propeller was not new. We published the same thing in Vol. 5 of the Sci. Am. See "History of Propellers and Steam Navigation." We are surprised that any agent at all familiar with the subject should have encouraged you to believe it to be new and patentable. We cannot do anything for you in the matter.

S. L. G. and others.—We regret that we are no longer able to supply Nos. 1, 6, and 9 of this volume.

E. H. D. of Mass.—We have read your letter—it is somewhat long—and have examined your sketch of a perpetual motion water-wheel. The machine will not operate. Of this you can easily satisfy yourself. Your calculations are based on wrong premises. You can easily test them by an experiment.

A. B. of Cal.—From your description we cannot understand how your electric engine is made. Rotary electro magnetic engines are the most common. We have seen a number of them, and have illustrated and described them in former volumes of this paper.

E. C. of Mass.—We think your improvement in pumps embraces novelty of a patentable character, as we have no recollection of anything like it. You must bear in mind, however, that this is a very difficult class of cases. An invention of general utility usually calls out a great amount of genius. This is especially the case with pumps. There are many patents on them, hence the chances are less encouraging.

C. Y. H. of Va.—Air doubles its volume by 491 degrees of heat.

A. M. S., of Pa.—You should examine Parker's patent and then judge if your wheel infringes it. His patent for giving the water a whirling motion before entering the wheel, expired in 1350.

J. B. D., of Ohio.—If an invention has been in public use for more than two years previous to the application for the patent, the law declares the patent to be invalid. A court would so decide in case the evidence clearly established the fact of prior use.

B. F. S., of Ind.—A saw having teeth on both edges for the purpose of cutting both ways, is not new. Such saws are well known. It would be no more patentable to cut teeth on both edges of a saw blade than it would to grind two edges on a knife blade.

J. E. C., of N. Y.—Wood at two dollars per cord is certainly cheap, and steam power would be economical for your purpose with such fuel.

E. H. McA., of Iowa.—In our last number there was a brief description of an engine operated by compressed air which has been in successful use for six years, but it requires a steam engine to compress the air.

G. D. W. of Iowa.—Burning fluid is made with alcohol and camphene; we do not consider it very safe to use in a family. Liquid india rubber is the best substance with which we are acquainted for rendering boots and shoes water tight. Several coats of linseed oil varnish will render leather water-proof; each coat must be allowed to dry before the next is put on. Mahan's Civil Engineering, published by J. Wiley, this city, is a good work.

A. Z., of Ill.—India rubber dissolved in naptha or turpentine makes an elastic cement. You can combine it with chalk, and white lead. It may suit your purpose.

E. H. P. & Co., of Ohio.—A first rate work on Grist Milling containing full information written up to the present day, would be a desideratum. The only work in print on the subject is the Miller's Assistant, published by H. C. Baird, of Philadelphia.

F. G. R., of Va.—We are not acquaintod with any peculiar machine or furnace to make charcoal from corn cobs, but a common retort for making gas will answer the purpose. It will not be easy to kyanize yellow pine plank, because it contains so much resin. We cannot spare the numbers to which you refer.

L. P., of N. Y.—Carriage brakes operating in the manner you describe are not new. If you have access to volume 4 of the Sci. Am. you will find an engraving of one substantially like yours. We have frequently had sketches of the same thing.

Money received at the Scientific American Office, on account of Patent Office business for the week ending Saturday, Nov. 22, 1856:—

J. S. B. of N. H. $100; H. K. of Mass. $25; G. F. S. W. of S. C. $30; J. D. S. of O. $30; W. L. V. of N. Y. $10; W. S. of L. I. $30; E. G. A. of Mass. $50; R. J. N. of Ga. $30; E. G. of La. $280; J. J. L. of Pa. $30 G. B. McC. of Me. $25; G. W. R. of O. $5; T. C. of Mass. $27; C. T. W. of O. $20; W. T. of Tenn. $30; D. P. F. of Wis. $30; J. B. of Wis. $110; D. L. J. of Mich. $5; N. R. of Pa. $30; C. W. of Me. $55, M. W. of N. Y. $30; J. B. of Pa. $10; F. J. H. of N. J. $30; W. F. of Mass. $30; E. F. F. of Vt. $55; G. W. B. of Vt. $25; J. P. C. of Tenn. $30; J. C. of N. Y. $57; J. A. of N. Y. $25; A. F. W. of N. Y. $25.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Nov. 22:—

L. K. S. of Conn.; T. M. of Pa.; M. C. R. of Ohio; W. L. of N. Y.; J. A. of N. Y.; H. K. of Mass.; E. S. S. of Conn.; G. B. McC. of Me.; T. C. of Mass.; J. W. R. of O.; D. L. I. of Pa.; J. B. of Wis.; D. W. of N. J.; A. F. W. of N. Y. G. W. B. of Vt.; J. C. of N. Y.

Important Items.

Complete Sets of Volume XII Exhausted.—We regret that we are no longer able to furnish complete sets of the present volume. All the back numbers except 1, 6, and 9, we can yet furnish, if new subscribers desire to commence back to the beginning of the volume; but unless they specially request to the contrary when making their remittance we shall commence their subscription from date of receipt of the order.

Subscribers to the Scientific American who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can usually have them supplied by addressing a note to the office of publication.

Inventors Sending Models to our address should always enclose the express receipt, showing that the transit expenses have been prepaid. By observing this rule we are able, in a great majority of cases, to prevent the collection of double charges. Express companies, either through carelessness or design, often neglect to mark their paid packages, and thus, without the receipt to confront them, they mulct their customers at each end of the route. Look out for them.

Patent Laws and Guide to Inventors.—This pamphlet contains not only the laws but all information touching the rules and regulations of the Patent Office Price 12 1-2 cents per copy. A Circular, giving instructions to inventors in regard to the size and proper construction of their models with other useful information to an applicant for a patent, is furnished gratis a this office upon application by mail.

Receipts—When money is paid at the office for subscription, a receipt for it will always be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a bona fide acknowledgment of the receipt of their funds.

Patent Claims—Persons desiring the claim of any invention which has been patented within fourteen years can obtain a copy by addressing a letter to this office stating the name of the patentee, and date of patent when known, and enclosing $1 as fees for copying.

Give Intelligible Directions—We often receive letters with money enclosed, requesting the paper sent for the amount of the enclosure but no name of State given, and often with the name of the post office also omitted. Persons should be careful to write their names plainly when they address publishers, and to name the post of fice at which they wish to receive their paper, and the State in which the post office is located.

Literary Notices.

Westminster Review—The number of this able review for the present quarter contains eight original essays, besides the usual criticisms on "contemporary literature." The review of the life of George Forster, the famous German naturalist, is full of touching incidents and thrilling interest. Emerson's English Traits are reviewed with a gentle hand. All the articles are good.—Published by Leonard Scott & Co., No. 54 Gold street, this city.

Gregory's Inorganic Chemistry — The fourth edition of Prof. Gregory's Handbook of Inorganic Chemistry has just been published by A. S. Barnes & Co., John street, this city. It is the most complete work on the subject now published, containing as it does the Physics of Chemistry, by Prof. Sanders, of Cincinnati. It is written up to the present state of chemical science, and is a most valuable acquisition to our scientific literature. It contains treatises on heat, light, and photography. No student can do without it. It is written in a vigorous style, comprehensive and brief. Dr. Gregory possesses the power of saying a great deal in a very few words.

Terms of Advertising.

Twenty-five cents a line each insertion. We respectfully request that our patrons will make their advertisements as short as possible. Engravings cannot be admitted into the advertising columns.

☞ All advertisements must be paid for before inserting.

Science and Art.

Milk.

Extract from Liebig and Kopp's Annual Report upon the Progress of Chemistry, etc. Translated for the SCIENTIFIC AMERICAN:—

From the investigations of Struckmann under the direction of Bodeker upon the normal changes in cow's milk, it is found that the quantity of fat contained in milk increases (according to the hour it is drawn) from morning till evening, whilst the whole amount of protein substances remains constantly about the same; the quantity of sugar appears to reach a maximum at midday. The specific gravity was always nearly the same, and from that no conclusion can be drawn about the constitution of the milk.

Herpin has made a favorable report upon Mabru's method of preserving milk. This method consists in putting milk into a metallic vessel, which terminates at the top in a tunnel-shaped leaden tube; above the milk, (in the tunnel-shaped expansion,) is poured a thin layer of oil, to prevent contact with the air; the milk in the vessel is then heated from 167° to 176° Fah., during about an hour, to expel the air, and after cooling, the leaden tube is pressed together air-tight, then cut off above the point of compression, and soldered together.

NOTE.—The chemical facts above mentioned the SCIENTIFIC AMERICAN considers very important, and also in regard to the best hours for milking. If more butter can be made from a cow by milking her at one hour instead of another, dairymen should know the fact. Milkmen should also ascertain by experiment what are the best times for feeding the cow, for it will doubtless be found that more and richer milk will be obtained at a particular stage of the process of digestion of the cow's food than at any other time.

The Ventilation of Ships.

Dr. Reid of Edinburgh, who has devoted so much attention to ventilation, and who has written and lectured upon it, and who was employed to ventilate the New Houses of Parliament, in London, has been residing for some months in this city, neglecting no opportunity of bringing his favorite subject before the people. On the 18th inst. he appeared before the Commissioners of Health, at their room in the City Hall, and explained his apparatus for the purification and cleansing of vessels, with suggestions as to the general improvement of health in the city of New York. He recommends the use of a special ventilating power on ship board, and the destruction of all noxious effluvia by the action of heat and chemicals.

In all ships, hospitals, and public buildings, the means of perfect ventilation are cheap and simple. It requires no elaborate nor complicated machinery, the chief source is steam as a positive power, and hot air as a disinfecting agent. A small steam engine on board of any ship could be made to work a ventilating trunk, to draw in fresh air and expel all the foul air, and thus keep the air in every part of the vessel perfectly pure. The expense would not be much,—a steam engine of a few horse power could do all this; and it could be used for hoisting and lowering cargo while in port. We believe that every large ship would find it profitable to employ a small steam engine on board. There is no excuse for imperfect ventilation on any steamship. Hospitals can be vntilated on the same principle,—any room therein containing contagious effluvia, can be completely purified by hot air driven through it. If air is driven through a series of air tubes in a furnace and heated up to about 300°, and forced into infected rooms, or among infected clothes, it completely destroys all contagious malaria matters, and is an effectual deodorizer. A small steam engine and a hot-air blowing apparatus should be employed in every hospital in the world. These are our views on the subject of ventilation for passenger ships and for hospitals.

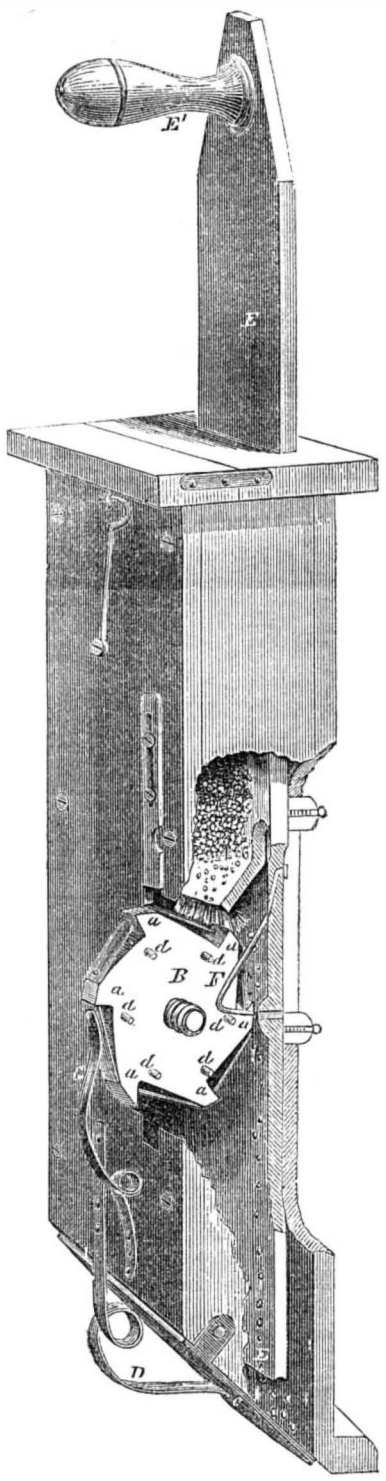
A Great Shot and a Great Pistol.

The following extract is taken from the New York *Tribune*, and has been published in several other papers. We are well aware that some wonderful American pistols have been invented, but we do not believe that such shooting was ever executed:—

"Col. Hay, of the British army, recently tried his hand with the 'Volcanic Repeating Pistol,' a Yankee invention. The pistol used an the occasion was an eight-inch barrel which discharges nine balls in rapid succession. The Colonel fired the arm 27 times, making a number of shots which would do credit to a rifleman. He first fired at an eight-inch diameter target at 100 yards, putting nine balls inside the ring. He then moved back to a distance of 200 yards, and fired nine balls more, hitting the target seven times. He then moved back 100 yards further, a distance of 300 yards from the mark, and placed five of the nine balls inside the ring, and hitting the 'bull's eye' twice. The man who beats that may brag."

New Hand Seed Planter.

In most of the hand corn planters the grain is taken from the seed box by means of a float slide, which has slots or pockets in its surface. In the machine here illustrated, A is the seed box, and B a many-sided wheel, which is employed instead of a slide.



The periphery of wheel B is notched at intervals, so as to form pockets, *a*, which receive the seed. By the revolution of wheel B, the seed contained in said pockets is discharged, and falls to the lower part of the machine, below slide E, upon the plate C; this plate is hinged at *c*, but is kept closed, except at the moment of planting, by the spring D.

In planting, the operator places the lower extremity of the instrument upon the ground, and pushes down the slide, E, by means of its handle, E'. In its downward movement slide E opens plate C, and forces the seed which had previously fallen into the space below the extremity of the slide, into the ground. By lifting on the handle, E', the slide E is withdrawn, and plate C again closes.

Wheel B is rotated by the descent of slide E, through the medium of a spring dog, F, the lower end of which strikes the pins, *d*, and drives wheel B around, something after the manner of a ratchet wheel. G is a spring which serves as a ratchet and prevents wheel B from turning backwards. Wheel B projects through one side of the case, the spring being made tight by the plate, whose lower end rests on the periphery of wheel B, and rises and falls by its own gravity, in accordance with the formation of B. There are yielding face plates on the surface of the pockets, *a*. These face plates spring slightly, and throw off the grain, so that none can adhere. They also serve as regulators of the quantity of grain received in the pockets, *a*; for, by means of a set screw, they are readily adjusted so as to fill more or less space in the pocket.

This planter is extremely simple in all its parts, durable, and not liable to get out of order. It is adapted to the planting of corn, cotton seed, pumpkin seed either mixed or not, with corn, and to all other kinds of seeds that require to be deposited in hills. The construction of the machine is such that it cannot clog up, no matter what kind of seed is to be planted. It works equally well whether the ground be dry or moist. We regard it as an excellent improvement. For further information address the inventor, Heman B. Hammon, Bristolville, Trumbull Co, Ohio. Patented Sept. 9, 1856.

The Mammoth Steamship.

The monster steamer, *Great Eastern*, the greatest marine enterprise ever attempted, is progressing towards completion. It was feared at one time that the failure of her builders, Scott Russell & Co., would arrest its construction, but this has not been the case. We learn by the *London Artisan*, that there are now 1500 men employed on the hull, and the engines at Milwall; and that the work proceeds with alacrity. It is now ascertained that the weight of this ship, when ready for launching, will be about 12000 tuns. In England, they often put in the engines, and finish steamships entire while on the stocks, then launch them ready for sea. The custom with us is to launch the hull when completed, and put in the engines and all the other adjuncts—rigging, &c., in the vessels while afloat—the best plan.

As it is intended that this great ship will make her first voyage to our shores, it is a matter of general interest to know how it is progressing. It will be a long time yet before it is completed. Although such a crowd of mechanics are employed on it, the quantity of work to be executed is so great that we must not estimate its progress comparatively with such *pigmy* steamers as those of four and five thousand tuns burden.

Curious Effect of a Powder Explosion.

A correspondent of the Philadelphia *North American Gazette* states, that by the late powder mill explosion which took place at the Acton Powder Mills, many houses, at a considerable distance, had their windows blown *out*, also their clap-boards thrown off outwardly. This effect would go to prove that the explosion caused a great vacuum in the atmosphere, and thus a pressure of the atmosphere, at perhaps ten pounds on the square inch, was exerted from the inside of the houses in the neighborhood, thus smashing their windows and ripping off their clapboards.

The Illinois Central Railroad.

The Chicago, Ill., *Tribune* says:—"Of the 2,700,000 acres of land granted by the State to aid the construction of the Illinois Central Railroad, over 2,000,000 acres yet remain unsold. Taking the sales made since the land office of the company opened in this city as a test, the fund realized from the lands alone will not fall short of $45,000,000! It is thought that the road, completed and fully equipped, will be clear profit to the company, to say nothing of the $20,000,000 that will in due time be piled up in their treasury. This great work promises to be the most successful speculation of the age."

Luxurious Railroad Cars.

The Detroit *Advertiser* says the cars on the Illinois Central Railroad for comfort and convenience, excel those on any other road in the west. One of them contains six state rooms, each room having two seats, with cushioned backs, long enough to lie upon. The backs of the seats are hung with hinges at the upper edge, so that they may be turned up at pleasure, thus forming two single berths, one over the other, where persons may sleep with all the comfort imaginable. In one end of the car is a small washroom, with marble washbowls, looking glasses, etc. On the opposite side of the car from the state-room is a row of seats with revolving backs, similar to barbers' chairs, so arranged that the occupant may sit straight or recline in any easy attitude at pleasure. Other five cars have each two or three similar state-rooms.

The Newfoundland Fishery.

The banks of Newfoundland may be regarded as one of the wonders of the world, in fact, they are vast alluvial tracts on the breast of the ocean, which allow men to reap without the trouble of sowing, great finny harvests. The fish caught on these banks find their way to the most distant parts of the earth. The annual value of the Newfoundland fish trade amounts to $10,000,000

It is estimated that on the good roads of England, bullocks lose 20 lbs. weight when driven 100 miles, sheep 8 lbs., and hogs 10 lbs. each. It has therefore been found that the transporting of them by railway is by far the most economical method—saving meat, time, and trouble to the owners.