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NEW YORK, SATURDAY, FEBRUARY 2, 1867.

Contents:

(Illustrated articles are marked with an asterisk,)

The SCIENTIFIC AMERICAN has always given prominent consideration to letters from its correspondents, and its columns are open to contributions from practical men upon all matters relating to the arts and sciences. Mechanics not accustomed to write for the papers are inclined to shrink from a task which they deem themselves unfit to perform. This ought not to be. All communications intended for our paper are carefully revised before publication, therefore mechanics need not fear to write to us on any subject that may interest them. We will see to it that their contributions are well prepared for the paper before publication. Send in the documents.

IMPROVEMENTS IN THE MANUFACTURE OF BOILERS.

The English and continental mechanics have directed considerable attention latterly to the improvement of boilers, in their material and method of manufacture. Cast steel has been tried as a material for boilers, particularly those of locomotives, with considerable success. Sixteen locomotives with boilers of cast steel were manufactured during the half year ending 1865 at the works of the Austrian Staatsbahn Railway Company: of these seven were for their own lines, and the rest were delivered for the use of the Ferdinand Northern Railway. All the tests applied to these boilers have given thoroughly satisfactory results, and no fault has yet been found with them. The Ferdinand Northern Railway also ordered last year nine goods-train locomotives with cast-steel boilers, from the engine works of Sigl, in Vienna. It was specified in the order that the engines were to be lightly but very strongly built, and were to be made suitable for burning small coal, the use of which necessitates the employment of boilers having a large heating surface and furnace. Besides these new locomotives, six old ones were reconstructed on the same principles and with cast-steel plates, in the works of the Northern Railway. Eighteen more locomotives for passenger and goods trains are also to be similarly reconstructed during this year at the same works.

Welded boilers are now made quite extensively in England. The Midland Railway Company build all their boilers on this plan. The plates are rolled with thickened edges, the ordinary thickness of seven sixteenths of an inch being preserved in the body of the plate and the edges being thickened to five eighths of an inch, the taper being gradual and extending from the edge back to about four inches. The longitudinal seams of each cylinder of the boiler iron is a lap weld, and the edges of the cylinders are squared up in a lathe, making flush joints, which are covered with welded hoops double riveted. Machinery not essentially different from that in ordinary use is employed to bend the plate, and the welding is accomplished by means of a crane and a curved anvil face, the convexity of which corresponds to the diameter of the barrel. A welding heat is taken on a portion of the seam, the edges of the plate being scarfed down, and the weld is perfected by repeated heatings of successive portions of the joint.

Corrosion of locomotive boilers is a prolific source of deterioration and also of explosions, and this corrosion is generally confined to particular localities, being found around the smoke-box end of the boiler and along the edge of the inside lap of the riveted longitudinal joints. This is to be attributed undoubtedly to expansion and contraction at the longitudinal seams, by which the joints are alternately opened and closed, continually cracking and removing the scale and exposing the iron to further corrosion. It is apparent that if these longitudinal joints could be dispensed with and the substance of the boiler barrel be of a uniform thickness and homogeneousness, the unequal expansion and contraction would be prevented. Such, in fact, has been the result on the Midland Railway, so far as the trials have extended. Experiments as to the strength, also, of the welded joints show that the plate is as strong at the weld as at any other part.

FRICTION WHEELS FOR DRIVING MACHINERY.

To the use of gears there are several objections. They are noisy, have considerable friction, and the cogs are liable to break. Therefore connections are preferably made by pulleys and belts, unless it is absolutely necessary that the connection between the parts and the ratios of motion should be arbitrarily exact. In changing the direction of motion "half-twist" belts or "turned" belts have been largely used; the first when the driver and driven occupy relatively vertical positions, and the latter when they occupy positions on the same horizontal plane. Bevel gears and crown wheels and pinions —the latter nearly obsolete—have also been used; but a recent device which works admirably is the friction wheel. These wheels may be called bevel gear blanks. They are cast in the form of bevel gears, lacking the cogs, and the face of one is turned and polished while that of the other is recessed to receive a smoothly fitted disk of oak-tanned sole leather, which is soaked and pressed to form. The surfaces of these two wheels are brought in contact, when mutual action is the result. One wheel runs in bearings which are suspended on pivots, so that it can, by a lever or any other suitable device, be brought in contact with or receded from the other wheel.

But not always does the mechanic who uses this device understand its proper construction. Not long ago we saw in a large manufactory two of these bevel friction wheels working, the leather covering of one of which had been renewed several times, and our advice was asked. On examination we found that the driver was the solid wheel and the driven the leather covered. The work required was rather too much for the area of the faces of the wheels, and while the driver continued to revolve the driven frequently stopped. Both run at a high velocity, and the result was that the iron-faced driver revolved under pressure against one spot of the stationary driven, cutting recesses across the face of the leather and destroying its perfect circularity. The remedy was simple. The driver should be the leather covered, and not the driven. Then, if the driver continued to revolve while the driven was stationary, the wear of the leather would be uniform, while it could make but little if any impression upon the polished iron. These matters should receive attention from mechanics. Such mistakes are not in any degree creditable.

THE HANDWRITING ON THE WALL.

Uneasy lies the head that wears a crown, and British commercial, manufacturing and maritime supremacy costs its adorers much needful sleep, as well as great annual subsidies from the national wealth. It is a sort of nightmare that gives them periodical gasping fits. Their navy, their coal mines, and now their iron exports, have caused successive spasms within a year or two. Belgium and France are looming up as rivals in iron so formidable as to cause certain well informed English writers to declare that "we are now face to face with the greatest obstruction British industry has ever been checked by. . . . Belgium and France have thrust us out of foreign markets to an extent which the trade will hardly credit." In the Russian market "the Belgian and the Frenchman hold the principal position, and are in a fair way of obtaining an absolute monopoly." Against this alarm a Birmingham paper takes ground by showing from trade returns that the annual export of British iron had more than doubled in fifteen years, and had increased at the rate of one half to three quarters of a million dollars per annum for three years, ending with 1865, when it amounted to $59,784,200. It shows that the export of iron to Russia in ten months of 1866 amounted to 65,211 tuns, being 8,526 tuns more than the average of the last six years; while it asserts that in 1864 France sent no iron to Russia, and Belgium but 3,844 tuns. But in the absence of any statistics of the recent vast growth of the foreign trade in which Britain has gained at the rate of but one per cent. per annum for three years past, or of the progress of her rivals since two years ago, it does not seem that the Birmingham organ has made out a very clear case against alarmists whose responsibility and competency to treat the subject it fully admits.

The truth seems to us to be, that the day when a single imperial city or a little island could sway the destinies of the world and draw all nations around her as dependent and subservient satellites, pertained to the infancy of man, and has forever gone by. Man has come into the rights of his majority, the rights of knowledge and power, in this western republic, and that full age is near at hand for the peoples of Europe. The world is to be a mighty commonwealth, and every sceptre must be broken, whether military, intellectual, manufacturing, or commercial. The drift our cousins are struggling against is irresistible. Britain must resign her extraneous possessions and pretensions, and content herself to subside gradually to the position of a peer, not a prince, among the nations. A fair share of the world for you, neighbor, and welcome; but no more lion's share, in the future.

A NEW FUEL.—At some of the towns on the Western lakes the sturgeons that get too stale for market are sold on the wharves to the steamboat stokers, who thrust them into their furnaces, and add greatly to the fierceness of the fire. Twenty of these large fish are said to be equal to a cord of wood in raising steam.

AMBITIOUS APPRENTICES.

Nothing relating to the management of apprentices is more vexatious to the master mechanic or foreman than the ambition some of them exhibit to be advanced to a higher quality of work than their experience and judgment will warrant. It is eminently proper that the apprentice should have a degree of pride in his occupation and an ambition to become a superior workman, but this is very different from a discontent and dissatisfaction with his proper position. The foreman should be a judge of the attainments of his apprentices as well as of the qualifications of his journeymen, and it is as much his interest to forward the apprentice as it is to the apprentice himself, as fast as it is safe to do so.

Even in the roughest and least delicate manipulations the mechanic's apprentice may learn something. In the work of operating a simple machine which may be almost entirely self-acting dexterity is acquired which can be readily turned to other objects as the novice advances. Experience in the use of the simplest hand tools is acquired only by practice. No amount of oral instruction can ever inform the apprentice as to the proper use of the common cold chisel and hammer. If, for instance, he is employed in dressing castings he must use great care not to mutilate the casting or break the chisel. The experience thus gained is of great value in his after progress. So with every other manipulation upon either wood, the metals, or other materials. Patient plodding, with the exercise of judgment and observation, will in time make the finished workman, and not attempts at fine work without the experience necessary to complete the job in a creditable manner.

GLASS FROM NATIVE ORE.

On the 27th of February, 1866, a patent was issued through the SCIENTIFIC AMERICAN Agency to Richard Washburn, of Monsey, N. Y., for the manufacture of glass from the native ore. This ore, which is really pure glass, or silicate of iron, in a crystallized and hence opaque condition, exists in abundance in many parts of the world, as in the columnar basaltic rock of the Palisades of the Hudson, of St. Helena, and of the famous "Giant's Causeway." But all efforts to utilize it for the manufacture of glass had proved singularly unsuccessful until the invention we have referred to. Messrs. Chance, Son & Co., the celebrated manufacturers of Birmingham, who export great quantities of plate glass to this country, are reported to have expended not less than a quarter of a million dollars, some years ago, for this purpose. It is gratifying to be able to add this important source of wealth to the list of those opened to mankind by American inventive genius, and to record the fact that the Newburgh (N. Y.) Glass Manufacturing Company, organized to work the ore of that vicinity under this patent, are already successfully turning out quantities of glassware with the two peculiarities of unequalled toughness and unapproachable cheapness. The artificial glass hitherto produced, requiring some thirty per cent. of soda or other oxides as a base, consuming much fuel, and losing much dross, evidently could never be cheapened sufficiently for many of the uses for which it is very desirable. The simplicity of this manufacture direct from the native article, the abundance and accessibility of the material, and the extraordinary tenacity of the product—common quart bottles of the Newburgh manufacture may be freely used in driving nails into solid timber without risk to their contents —must eventually extend existing applications of glass in a beneficent degree, and bring it into many uses from which it has hitherto been excluded. The native glass in this region, and in fact generally, being the silicate of iron, has a dark color, and it is yet to be seen how far it can be whitened by modification of the base and admixture of other bases, so as to become available for the finer purposes. That common window-glass may be produced at a great reduction of cost, seems not to admit of doubt, and this alone involves great improvement in the structure of houses, in common horticulture, and in many other respects which will occur to the reader.

We have thought it of interest to numerous readers who may not have turned their attention to the chemistry of glass, to take this opportunity for giving a popular sketch of its character. And first:

WHAT IS GLASS?—Most persons probably take for granted that glass is a simple mineral substance found in the earth, and would be surprised to learn that it is a *salt* formed by the chemical union of at least two and often three or four compound substances, and thus composed of from three to five very different and interesting ingredients. In fact, taking all the varieties of glass in actual use, it may be said to contain a dozen or more ingredients. Now, the popular notion of a salt is derived in part from the usual appearance of that class of substances in crystals, or small angular grains. Glass does not appear in that form, for the same reason that hot maple syrup, or any other melted sugar, "waxes" or candies when poured upon ice, as many of our readers may remember treating it in younger days in the maple orchards of New England. The reason is that, being cooled suddenly from the boiling point, the atoms are not allowed time to segregate and settle themselves into individual crystals, according to their natural disposition, but are overtaken by solidity as they are, in a single unitary mass. Suffer molten glass or any other salt to cool slowly enough, and its atoms will group themselves in multiplied units instead of one, forming a semi-opaque and crumbling mass: a striking instance and illustration in the lowest sphere, of that union of the kind and the individual which pervades the universe, from grains up to worlds and from cell-life up to that of immortal spirits. Another part of the popular notion of a salt is derived from the ready solubility of most salts, and their consequent pungent effect upon the

tongue. Glass is considered almost a synonym for insolubility; and yet it has all degrees of solubility according to its composition, and there is a kind of glass, differing from the common article only in the proportions in which the ingredients are combined, which will dissolve in water like any other salt, and not only yields a strong alkaline taste to the tongue, but will also wash the hands, if you please, of dirt and skin at once. It is sometimes used in making soap, but in Prussia this is prohibited, on account of its destructive effect upon textile fabrics. Hence we may understand the taste of a glass tumbler, although we can get at it only by imagination because the substance is too hard to dissolve on the tongue.

But again, more particularly, what is glass?—Silicon, oxygen, and any metal or metals the maker chooses, according to the color or hardness he wishes to produce: the metals being necessarily taken in their oxides—of which that of sodium (soda) and that of potassium (potash) are most used—and the silicon also in its combination with oxygen, with which its quick and tenacious affinity for that element keeps it always united, forming silicic acid. Most persons who have observed rock crystal or quartz, everywhere veining or specking the rocks, or gleaming in sand, wherever sand is washed clean, have as little suspected that this apparently tasteless because almost utterly insoluble substance is an acid, as that glass is a salt. It is silicic acid, or one part of silicon with three of oxygen. The base silicon, like boron (to the analogy of which to carbon we referred in an article on borax) becomes a wonderfully interesting substance under the light of "chemic fire." From what has just been said, it is apparent that silicon is the main characteristic constituent of the inorganic earth, as carbon is of the animal and vegetable kingdoms. It is capable of the three allotropic conditions of boron and carbon, described in a former article, and is only hardened by the action of heat, unless exposed to air or oxygen, in which it takes fire and burns superficially; the silicic acid formed on the surface protecting the mass from oxidization. Silicic acid, silica, or quartz, can be melted by nothing short of the oxy hydrogen blow pipe; but when heated with metallic oxides, the silicates resulting from union with those substances are melted at various temperatures, according to the metal involved, and the result is glass.

We might go on to describe numerous beautiful forms besides common quartz, in which silica presents itself in nature, such as opal, amethyst, chalcedony, cornelian, onyx, sardonyx, agate, and others, which owe their brilliant variety to various tinging materials, chiefly oxides of iron and other metals. Besides these, it is the stiffening in the framework of plants and leaves and animal cartilages. But as our object in setting out was merely to define the nature of glass, we close with a mere reference to the principal metals used in producing the usual varieties of that "salt."

What may be termed the highest variety of glass, is the *strass*, or "paste," used in imitation of precious stones. This is made with potassa and oxide of lead: the latter metal being remarkable for the high lustre, refractive power or brilliancy, specific gravity and softness, which it gives to the silicate. These qualities appear to be proportioned to the atomic weight of the bases employed, that of lead being among the greatest. Flint glass and crystal for optical purposes, are of like composition with strass. Common window glass and English crown, are silicates of potassa or soda, lime and alumina. Plate glass differs from this only in the purity of the materials. Oxides of gold, silver, copper and other metals, are employed to impart a variety of brilliant colors. The native glass which gives occasion to this article, as we have observed, is silicate of iron, with some added mixture of alkalies, alumina, or other "fluxes" (bases) of which we are not precisely informed, but which are among the usual elements of green bottle glass

FRICTION OF ROLLING STOCK.

A series of practical experiments of great importance to railroad men, were inaugurated on Wednesday, Jan. 16th, on the New Jersey Central Railroad. The trials were made by Mr. Wm. Loughridge, of Paterson, N J., under the patronage of some of the leading railways of the country, who have appropriated funds for the purpose of investigating the laws of friction in their practical relation to rolling stock. Many circumstances made it impossible on this occasion to obtain very accurate results, but the mode of operation was shown, and a report of careful experiments now being conducted, was promised at some future time.

The programme for the day's proceedings embraced the solution of nine problems, including the testing of wrought, cast and chilled iron and wooden shoes under the same pressure against the wheels, to determine which will produce the greatest retarding effect on the car. Applying different pressures on the several shoes and noting if the retarding effect is proportional to the weight of the car, and if the same at all velocities. Also whether the resistance is in proportion to the pressure on the brakes. Determining by means of a dynamometer the average strength of brakemen. The resistance of journals, or the power required to start a car, or several coupled together. Observing in a moving train whether a car or train has a retarding power with it, proportional to its weight, when the brakes are applied in proportion to the weight of the car. Lastly, the determination of the effect of using different sized journals. As intimated above, the results were not perfectly satisfactory, but we have been promised a full copy of the final report, and will then present to our readers a full solution of these important problems.

Mr. Loughridge is the inventor of a steam brake giving the engineer complete control over the train, which he can stop almost instantly even when under full head of steam. The locomotive has a small cylinder secured under the foot board, the piston of which works the brakes and steam is admitted directly from the boiler. The length of stroke is augmented by a combination of pulleys, and by a series of rods and chains under the cars all the brakes are operated simultaneously, and the braking up of the train is accomplished, by the movement of a lever. In case of any derangement interfering with the working of the steam brake, hand power can be applied and the train stopped as usual. In several trials made the other day, a full train of five cars running at the rate of thirty miles per hour, was brought to a dead halt in thirty seconds. By a simple contrivance, the amount of brake pressure which can be applied to the wheels is regulated. being greater in a heavy train, and so changed in a light train that the sliding of wheels is a thing absolutely impossible.

The experiments were witnessed by engineers and master mechanics from various parts of the country. Unavoidable delays, and the necessity of leaving the tracks open for the regular trains, prevented the completion of all the proposed trials at the time. The remainder were promised to take place upon the following day, but the severe storm caused an indefinite postponement of the public trial.

Science Familiarly Illustrated.

Under this caption we propose, occasionally, perhaps weekly, to publish facts well known to scientists and experienced mechanics but not familiar to the juvenile portion of our readers. We are daily in receipt of letters from young persons—mechanics' apprentices and workmen—soliciting replies to them which it is hardly appropriate to place in the column usually devoted to replies to correspondents. These requests imply a want of the information which is possessed by experienced mechanics and scientific students, and an ardent desire to understand those fundamental truths which lie at the foundation of philosophy. As our object in the issue of the Scientific American is to educate, elevate, and improve those who are to become the pioneers of material progress, as well as to note the improvements now being made in the domain of physics, we deem it but proper that a portion of our columns should be set apart for the instruction of the younger and less experienced of our readers.

Suction.

Suction is a common term applied to the force of the atmosphere, and is simply weight or gravitation. Air, however, unlike some more solid substances, acts equally in every direction, up or down having no influence on its action. By the way "up" and "down" are simply relative terms, having no absolute signification, but meaning simply toward or from the surface, or rather the center of the earth. The atmosphere which surrounds the earth exerts a pressure on it and every object upon it of about fifteen pounds to every square inch exposed to its action. Now, then, if the air can be kept from acting on the under surfaces of bodies they would adhere to whatever surface they were placed upon and would stick or "suck," so that the object, if not too heavy, could be lifted. Boys frequently cut out disks or circular pieces of leather and put a string through their centers by which to lift them. The leather being moistened with water can be pressed upon a smooth surface, and the edges adhering air-tight prevents the atmosphere from acting on the under surfaces. By this simple device we have seen a common bucket, full of water, lifted with a "sucker" of only about four inches diameter. It was done by the pressure of the atmosphere on the upper surface of the disk, amounting in the aggregate to over one hundred and ninety pounds, as the area of a disk four inches diameter is over twelve and a half inches, each inch sustaining the pressure of fifteen pounds.

So the water in the pump barrel is elevated by the pressure of the atmosphere on the surface of that on the outside of the pump. The upward movement of the plunger containing an upward lifting valve, draws or lifts the air out of the barrel between the plunger and the fixed valve near the bottom of the barrel. This creates a vacuum more or less perfect, and the pressure of the atmosphere on the outside water forces the liquid up through the fixed valve into the pump barrel.

The sucking of cider through a straw, which every boy who lives in the country has often done, is another exemplification of this same property in the atmosphere. The boy inserts one end of the straw into the cider, and with his lungs draws out the air, when the atmosphere at once lifts the cider up through the tube. If the straw was secured air-tight in the barrel and no atmosphere admitted, or if the pump well was so covered in that no air could have access to the water, "suction" would be merely a name without any reality.

Extension of Patents.

Many valuable patents are allowed to expire every year for the want of a little care on the part of patentees in not applying for an extension. The petition must be filed in the Patent Office at least ninety days before the expiration of the patent, which gives time for the preparation of testimony. Inventors who have patents dated in 1853 and who may wish to have them extended for seven years, can receive all necessary advice how to proceed by addressing Munn & Co., this office.

American Inventions in Europe.

American inventors are taking a renewed interest in patenting their valuable inventions in European countries. As an evidence of the fact we may state that since January 1st we have entered twenty-three foreign applications upon our records. Parties wishing to take foreign patents can, through our Agency, depend upon prompt and careful attention to their interests.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JAN. 15, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

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

61,133.—Mode of Finishing Tools, etc.—John Allen, New York City, and Gaston D. Smith, Washington, D. C.

First, We claim the finishing devices of machinery, engines, sewing machines, tools, etc., instruments of all descriptions, by the mode and means hereinbefore described, and for the purpose of preserving them from damage by oxidation or corrosion, as set forth.

Second, The restoration of damaged tools and machinery to good condition by the method and means set forth.

61,134.—Drill.—Leonard Andrews, Biddeford, Me.

First, I claim the combination of the tube, a, rod, b, ring and springs, e f f, horizontal cutters, g, as and for the purpose set forth.

Second, The combination of the double drill, fig. 5, constructed as described, with the tube, r, as and for the purposes specified.

61,135.—Turning Lathe.—Frantz A. Armbruster, New York City. Antedated Jan. 3d, 1867.

First, I claim the oscillating spindle, E, in combination with the chuck, I, carrying one or more tools, and with the longitudinally-sliding back center, F, constructed and operating substantially as and for the purpose described.

Second, Controlling the oscillation of the spindle, E, by means of the chain, c, and adjustable cranks, e, substantially as and for the purpose described.

Third, Giving the oscillating motion to the cutter head by means of two shafts, i i', carrying the cranks, e, and chain, c, substantially as and for the purpose set forth.

61,136.—Apparatus for Bundling Scrap Metal.—Lewis J. Atwood, Waterbury, Conn.

I claim the bundling or consolidation of scraps of sheet metal, by the means and substantially as set forth.

61,137.—Water Elevator.—W. E. Babcock, East Pembroke, N. Y.

I claim the drum, A, shaft, B, the head, C, the ratchet cone, c', and the spiral spring, o, when arranged and combined substantially as described for the purposes herein set forth.

61,138.—Cattle Tie for Stalls.—Cyrus M. Baker, Bingham, Me.

I claim the tie chain herein described, the same consisting of the bar, B, chains, D and E, and rings, G G, when all connected together, so as to be used for the fastening or hitching of cattle and other animals, substantially as described.

61,139.—Photographic Camera.—Thomas Barbour, Boston, Mass.

First, I claim the arrangement of the plate, f f, racks, g g, pinions, h h, rod, i i, wheel, k k, and adjustable arm, p p, as hereinabove described and for the purpose specified.

Second, Arranging a case upon a pivot so as to turn thereon, in combination with suitable stops, as herein described and for the purpose specified.

Third, The use of the lever, e e, for elevating and depressing the case, as described.

Fourth, The use of the movable plate or frame, f f, operating as described and for the purpose specified.

61,140.—Apparatus for Making Envelopes.—E. L. Barrett, Springfield, Ohio.

First, I claim the plates, e f and g, in combination with the slides, a a', substantially as and for the purpos set forth.

Second, The stop, c, gage, d, in combination with the slide, a', and plate, f, substantially as and for the purpose specified.

Third, Pivoting or hinging the plate, g e f, to the slides, a a', substantially as and for the purpose described.

Fourth, The stuffer, M, fig. 7, constructed and operating as and for the purpose substantially as set forth in the herein described process of making envelopes.

61,141.—Valves of Steam Engines.—Louis D. Bartlett (assignor to the Putnam Machine Company), Fitchburg, Mass.

I claim the arrangement of the casings, steam passages, and valves, within the steam chest, in relation to each other and operating substantially as described.

61,142.—Neck Yoke.—Alonzo Benedict, Jonesville, N. Y.

I claim the curved or U-shaped metallic bars, D D, attached to the neck yoke by means of clips, C C, and grooved at their inner parts to receive and clamp the chafing leather, E, substantially as herein shown and described.

61,143.—Mode of Protecting Armor Plates.—Mayeul Bernabe, Toulon, France.

I claim the herein described method or process of covering the steel, iron, or cast-iron plates, with an insulating and protective coating of copper for neutralizing the electric currents and rendering the plates inoxidizable.

61,144.—Apparatus for Charging and Drawing Gas Retorts, etc.—Sealy James Best and James John Holden, London, England.

We claim the apparatus and machinery, substantially as herein described.

61,145.—Wool Dryer.—Carl Beu, Dessau, Dukedom of Anhault Dessau. Antedated Jan. 2, 1867.

First, The arrangement of a series of drying boxes, placed one above the other, in a suitable case, A, in combination with a suitable mechanism, whereby an automatic downward motion is imparted to said boxes, substantially as and for the purpose set forth.

Second, The recesses, t, in the drying boxes, f g h, etc., in combination with the cams, q, constructed and operating substantially as and for the purpose set forth.

Third, The stop motion, a' b' c', in combination with the drying boxes, f g h, etc, constructed and operating substantially as and for the purpose described.

61,146.—Sprinkler for Clothes and Flowers.—Dana Bickford, Boston, Mass.

I claim the combination of the elastic bulb, A, the valve, B, the perforated nozzle, c, all constructed as and for the purpose specified.

61,147.—Rudder Bearing.—Joseph N. Bitting, Sr., Camden, N. J.

I claim the projection, c, on the rudder post, in combination with the plate, D, and its inclined recess on the edge, when the latter and the said projection are formed in relation to each other, as described.

61,148.—Apparatus for Storing Petroleum and other Inflammable Liquids.—Felix Bizard and Pierre Labarre, Marseilles, France.

We claim, First, An oil tank of ordinary or suitable construction, provided at the top thereof, with a pipe through which said tank is supplied with or discharged of oil, in combination with a pipe, also passing through the top, into and down to near the bottom of said tank, said pipe being branched and provided with cocks and level indicator for regulating the flow of water to and from the tank, in the manner and for the purpose set forth.

Second, The combination, in an oil tank or reservoir, of an elevated manhole and pipes connected therewith for supplying or drawing off the oil to or from the tank at a point higher than the top or dome of said tank, as herein shown and described.

Third, In combination with the arrangement claimed in the last preceding clause, we claim the level indicator, when constructed to operate in the manner substantially as described.

Fourth, The channel or depression formed in the bottom of the reservoir for receiving and collecting the sediment, and facilitating the entrance to the dome, substantially as specified.

61,149.—Brick Kiln.—George C. Bovey, Cincinnati, Ohio.

I claim a brick kiln entirely open at top and provided with folding covers, substantially as and for the purposes set forth.