from a wheelbarrow to a steam engine, and then to go into a first class shop and learn the niceties of the business.

## ORDNANCE AT THE EXPOSITION.

A tour through the Ordnance Department of the Great Exposition furnishes the opportunity, though scarcely the material, for a comparison of the relative progress of the several Christian nations in the science of destruction, as applied to modern warfare. The display is a very unequal one. England takes the lead in the completeness of her exhibition, and America follows after all her rules in this respect. The French, who make so imposing a display in other departments, were at first strangely behind here. In July, however, they brought out their largest and best guns, and fine specimens of workmanship they are, whatever they may be in other respects. Most of them are manufactured at Ruelle, on the Louvre, near Angoulême. This site for the Government manufactory was originally selected in 1776, on account of its not only affording good water power, but because of its proximity to mines furnishing ores best adapted for the manufacture of iron having that peculiar quality of tenacity which is so essential in the metal used for ordnance. The extensive forests in the vicinity also furnish an ample supply of charcoal. Thus most of the material used at Ruelle is obtained near, though some gray pig iron, of a peculiarly tenacious quality, has recently been imported from Alelich in Algeria. The system adopted at Ruelle for securing the most perfect material for casting cannon, is worthy of notice. After testing the pigs by breaking them, they are cast into a cannon, which is tested to the bursting point, the contractor paying the expenses of the trial if his ore is not accepted. The ore is then broken into small pieces, and the extraneous matter carefully removed. It is next exposed to the air, until the sulphur and magnesia contained in it are dissipated, after which the ores from the different mines are carefully mixed, so that every casting shall contain a due proportion of each.

The heavy guns exhibited by the French are cast upon the core system, and are all breech-loaders and reënforced. Their rifle guns are uniformly made with six grooves. All of their siege and battery guns are made of gun metal. This is less enduring, and not so good for securing a perfect range as a harder material, but it has the merit of economy, as it can be cast over and over again. The bore of the French gun is larger, in proportion to weight of metal, than the steel guns exhibited by Krupp, Whitworth & Armstrong. One French gun in the Exposition is 18 feet long, 16 inches bore, and weighs 85,000 lbs. It throws a shot of about 700 lbs., with a charge of 100 lbs. This the first and only gun of its size yet made in France. has only been fired twice with ordinary charges. In size it is excelled by a gun exhibited by Krupp, which weighs 112,000 lbs, and with its steel carriage and turntable 200,000 lbs. It is a rifled breech-loader, intended for harbor defence, and will prove a most formidable weapon if it answers expectation. Thus far it has never been fired, having been put on a car, built especially for its transportation, and brought direct from the foundry to the Exposition building. The diameter of the bore is 14 inches; weight of steel shot, 1,212 lbs.; shell, 1,080 lbs., with a bursting charge of only 17 lbs. The charge of the gun is 110—130 lbs. Length of gun, 17½ feet. The insignificance of the bursting charge is explained by the fact that the deep grooves required for the lead case leave no room for a heavier charge. The cast-steel in the shell weighs 843 lbs.; the lead jacket, 220 lbs.; the bursting charge, 17 lbs.: total, 1,080 lbs.

The inner tube of the gun weighs twenty tuns. It was forged under the fifty-tun hammer, at Krupp's foundry, from a massive ingot of forty and a quarter tuns. The waste was over twenty tuns, or fifty per cent. There are three sets of cast-steel rings at the breech, and two at the muzzle. These weigh altogether thirty tuns, and are manufactured without welding from rectangular pieces of metal split down the center, opened with wedges, forged under the hammer, and finished in the rolling mill. This gun is an admirable piece of work, and is a remarkable evidence of what is possible in the manufacture of heavy guns. Sixteen months of constant work, day and night, were expended upon it. It is claimed that the machinery for working it enables two men to handle it with ease, elevating, depressing, and turning the gun so that it can be brought easily and rapidly to bear upon an object

Besides this mammoth gun, Krupp exhibits a 9-inch breech-loader, weighing twelve tuns, forged as described, without welding, and all from one piece of steel, with the exception of the trunnions. This gun has been fired one hundred and twenty times, with forty-five pounds of powder, the service charge being from forty to forty-five pounds. It carries a solid shot weighing three hundred and thirty pounds, and a shell of two hundred and seventy-five pounds. A smaller gun of Krupp's manufacture is a rifled, breech-loading field piece of crucible steel. It is a 4-pounder, seventy-four inches in length, weighs six hundred and five pounds, with a 3-inch bore, and carries a charge of one pound, throwing an eight-and-a-half-pound shell. Another German firm, Berger & Co, of Westphalia, exhibit some guns of large caliber. The largest is an 8-inch gun, with a breech-loading arrangement similar to Krupp's, though more simple in action. Berger & Co. have made many guns for the Prussian and Russian Governments. Their chief reputation, however, is for steel gun barrels; nearly all of the barrels of the needle gun being drilled out of the solid bar, at their manufactory. Petin & Gaudet, a French firm, exhibit a hooped soft-steel gun, of sixteen tons weight, 9½ inch bore, and carrying a three-hundred-pound solid shot. This firm is best known as the manufacturers of cannon rings or hoops. Up to this year they have supplied rings for eight hundred cannons to Italy, for five hundred to Spain, one hundred and thirty to Russia, one hundred and eighty to Denmark, twenty-five to Turkey, forty to Sweden, and one hundred and twenty to England, besides those furnished to the French Government.

The Swedish Government exhibits two cast-iron Finsburg guns, nearly like our fifteen-inch gun in shape and general character. One is an eleven-inch smooth-bore, without reënforce, and the other a four-grooved nine-inch rifled gun, with a steel reënforce at the breech. Both of these guns are muzzle-loaders. They have been severely tested; first with two rounds of thirty pounds and one-hundred-and-sixty-pound shot, then with forty-pound charges and shot, increasing in weight at each round, from two shots weighing three hundred and twenty pounds to eighteen, weighing altogether 2,880 pounds, and filling the gun to the muzzle. Sweden is striving hard to regain her old reputation as a manufacturer of guns, and recall the days when most of the states of Europe came to her workshops for their heavy ordnance. Russia, Austria, and Belgium exhibit a few guns, but nothing worthy of note.

Coming now to the English department, we find the rival systems of Whitworth and Armstrong fully presented. The largest gun shown by Sir William Armstrong & Co. is a nine-inch wrought-iron muzzle loading gun, rifled, and weighing twelve and a half tuns. Whitworth's heaviest is a 150-pounder, besides which he shows a 70-pounder and 32-pounder, with specimens of shot and shell. Major Palliser exhibits a 9-inch gun, weighing thirteen tuns, manufactured at the Elswich ordnance works. It is a coiled, wrought-iron tube, two inches thick, over which is cast an ordinary cast-iron cannon. A Fraser gun is also exhibited. It is a 12-inch, weighing 52,640 pounds, and is made in four pieces, instead of Armstrong's eight, which is the only difference between them, the Fraser gun being nothing but the Armstrong, with improvements introduced by Mr. Fraser. The length of bore in this gun is twelve feet, one inch; the outside measurement fourteen feet, three and a half inches. It is rifled, with nine grooves, spiral, increasing from one in one thousand two hundred to one in six hundred, or fifty calibers. Its elongated projectile weighs six hundred pounds, and is thrown by a charge of seventy pounds, with an initial velocity of 1,240 feet per second. The *Captain*, a new English turret ship, is to have two of these guns in each of her turrets.

A 9 inch, twelve tuns, and a 7-inch, six and a half tuns, the usual British naval guns, are also exhibited; besides a 7-inch breech-loading, polygrooved gun, on Armstrong's vent system. The British Government exhibit, in addition to the display of private manufacturers, ten pieces in all. On the whole the British department is the most complete of all in the way of ordnance.

America makes a poor show, though the peculiarity of the few guns exhibited has attracted much attention to them. One is the Gatling battery gun, of which two specimens are presented, both six-barrel guns, one 5-8 inch bore, the other 1-inch bore. Then we have the Ferris gun, with its claim of a nine mile range, and its enormous charge in proportion to its size. The one shown is a chamber gun of one and three-fourths inch bore, carrying a ten ounce sperical and a twenty-seven ounce conical ball. The chamber is cone shaped, with an average diameter of two and seven-eighths inches, and an average length of seven and a half inches. The depth of bore is thirty-one and a half inches. This gun has been fired one hundred and forty-seven rounds, and has attained a range of nine miles, with an initial velocity of 2,200 feet.

Though we have so slim an exhibition of American ordnance, the deficiency is in a measure compensated for by the trial our favorite 15-inch gun is receiving in England. We need have no fear as yet in regard to its capacity to cope with anything this Exposition affords in the way of heavy guns. The huge guns exhibited by the French Government, and by Krupp, are formidable in appearance, but their enormous dimensions are serious objections to them. Our 15-inch gun weighs 43,000 pounds, but one half the weight of the French 16-inch gun, and scarcely more than one-third of Krupp's untried monster. Beside, this gun has endured the test of actual service, while there are grave doubts of the reliability of these heavy French and Prussian guns. No gun is stronger than its weakest point, and the weak point of these guns is their breech-loading arrangement, which the English are discarding, and which we have never tried. Krupp's gun is the least objectionable in this respect, but I hardly think even Mr. Krupp himself would be willing to put it through the test to which the Swedish guns are subjected, as above described. All the heavy French guns are breech-loaders, as are all the guns exhibited by Krupp, with the exception of the small mountain cannon. Thus far Krupp has manufactured 3,500 steel guns, and has orders for 2,200 more. Of these 5,700 guns 19 in 20 are rifled breech-loaders, in caliber from 4 lbs. to 300 lbs., with a few of 600 lbs. and 1,000 lbs. In value they amount to a total of nearly $12,000,000. The admirable character of Krupp's light steel guns is well known, and their longevity is remarkable. How he is succeeding with heavier ordnance remains to be proved. He has certainly demonstrated his ability to handle metal in masses large enough to forge guns of the most extraordinary dimensions, but the breech-loading apparatus he has invented is yet to be proved in these large guns. In the large gun I have described the charge is introduced at the side of the breech and not at the rear. In the heavy French gun, on the contrary, the shot is introduced from the rear, and the breech closed by a screw, with a cap of soft steel, which expands and tightens the joint. In both guns, however, the opening made at the breech must seriously weaken the gun. It is not long since the breech was blown out of one of the French guns on board the *Montebello.—Cor. Army and Navy Journal.*

## PLATING OR COATING METALS WITH METALS.

Not very long ago, and quite in the remembrance of most who are likely to read this journal, the principal manufactures that might have been described under the above title were the manufacture of tin plates, of tinned culinary utensils, and the operation of Sheffield plating. The process of "galvanizing" (coating iron with zinc by immersion in the molten metal) has materially interfered with that of tinning, and the introduction of the principles of electro-deposition, to produce articles of beauty at a cheap rate, and to serve many useful purposes, has altered the condition of the Sheffield plating trade to such an extent that it only exists to produce certain articles of large consumption and well-defined form.

Great changes can also be traced in the theory and practice of electro-deposition itself. Smee, in his admirable work, laid down the "laws" of electro-metallurgy, as he was pleased to term them, in which the evolution of hydrogen during the time of deposition was made to determine the character of the deposit obtained; he also put forward certain views relating to the deposition of alloys in which the use of intense battery power was pointed out as a possible means of accomplishing that purpose. Now, it is found that, by the use of alkaline solutions, many deposits can be obtained in a reguline form during the evolution of hydrogen, and that, also, from certain alkaline solutions, brass and other alloys can be electro deposited in a reguline form without the use of more battery power than is necessary to compensate for the want of electric conduction in the solution employed.

In the five years that are comprised between the years 1861—1865, inclusive, the increase of knowledge (practical and theoretical) does not appear to have been very great in relation to the subject at the head of this paper. The chief attempts at improvement have been made in the practical details of the tin-plate manufacture. The use of ordinary resin as a flux, above the molten metal, is provided for by special arrangements by Messrs. Banks and Morgan, in their patent specification: Messrs. Morewood and Whytock employ ordinary resin, in conjunction with tallow, by using a plurality of coating baths worked in connection, by the aid of machinery. With a view to economy of material and of working, rollers, guides, and other machinery, are employed in certain inventions. Some inventors set forth improvements in the fluxes used (independent of the above-mentioned resin), comprising potassium, ammonium, zinc, tin, and cadmium chlorides. H. J. Madge manufactures a cheap alloy for coating iron plates, by using lead and antimony, with perhaps, a small quantity of tin, instead of tin alone Messrs. Nurse use an annealing pot with a double case. Lastly, George Tomkins coats lead and terne plates by pouring the melted metal over the plate, and uses an alloy of nickel, zinc, and lead.

Electro-gilding has made but little practical progress during this time. The ordinary solution of gold trichloride in potassium cyanide is used by Martin Miller to gild wire, and by Kuhlmann to ornament metal. The depositing solution employed by Moore contains potassium ferro-cyanide, "pearl potash," potassium iodide, sodium carbonate, copper cyanide, silver cyanide, and "fine gold;" it is said to give a rapid, durable, and richly colored deposit J. B. Thompson prepares iron or steel articles for electro-deposition by tinning, and then pickling and washing them; he also ornaments silver surfaces by electro-gilding them with a polarized paint brush containing the electro-depositing solution.

In electro-silvering, the following are the principal points that appear:—Martin Miller employs a solution of silver chloride dissolved in potassium cyanide to coat wire. Moore uses electro-magnetic force, but does not state his silvering solution. Weil's solution for previously coppered articles is made by means of silver nitrate, hydric tartrate, ammonia, and potassium cyanide; this solution gives an adherent and either brilliant or dead coating.

All the solutions for electro-coppering are evidently intended to coat iron or other easily oxidable metals Miller uses a mixture of copper carbonate, potassium cyanide, and potassium or sodium carbonate, to coat wire; the alkaline portion of the solution is first boiled, and then the copper carbonate is added, the mixture being kept boiling until ammonia is freely given off. Walcott charges a strong potassium-cyanide solution with copper by electrolysis. Weil's electro-coppering solution is formed by adding a solution of cupric sulphate to a solution containing sodic potassium tartrate and sodium hydrate Thompson deposits copper (on an article already electro-coated with iron) by means of a solution of hydrated cupric oxide in sodium hyposulphite.

Among the other inventions that may be mentioned are the following:—Marshall prevents the fracture of metals, owing to their crystallization, by coating their bearings with soft metal, by running the molten metal on to the inclosed bearing. Le Chatelier deposits aluminum by electrolysis of fused sodic aluminum chloride. Bennett tins lead pipes, that are made by hydraulic pressure, by the overflow of the melted metal. Beslay electro-coats iron with tin preliminary to the final electro-coating. Holley coats iron with aluminum, in the fire, by means of a frit that contains felspar, silex, china clay, and a potash clay, when an external vitreous coating is required. When only a coating of aluminum is wanted, boracic trioxide is added to a potash clay; the slag throws itself off as the iron shrinks.

Owing to the trouble of arriving at the history of patented inventions prior to the year 1852, many important improvements have been repatented. This difficulty, however, has been much lessened by the printing of the specifications, superintended by Mr. Woodcroft, in his successful endeavor to carry out the amended patent laws. Lately, and more especially since the year 1857, his attempts have received great accession of strength by the publication of "Abridgements of the Specifications," in series chronologically arranged, and drawn up by competent men acquainted with the subject to which each series refers.

Nothwithstanding this, the number of inventions still re-patented may be drawn from the following analysis of those relating to our subject between the years 1861–1865, inclusive:—

Resin was used on the surface of melted metal as early as A. D. 1786. Silvering glass with silver, which is afterwards electro coated with copper, is referred to in the year 1852. Apparently, the first patent in which machinery was used for tinning iron or steel plates was secured in 1852. A solution of copper carbonate in potassium cyanide was used to electro-deposit copper in 1853. Although Smee sets forth the deposition of copper from its electro-solution in potassium cyanide, it forms the subject of Walcott's patent. Smee, in 1851, and Alexander Watt, in 1860, electro-deposit silver from a solution of its chloride in potassium cyanide. Smee points out the electro-deposition of gold from a solution of its chloride in potassium cyanide. The combination of hydric tartrate, ammonia, and potassium cyanide, was used in 1857 to electro-deposit silver.—*Ironmonger (London).*

## STEAM FIRE ENGINES AND THE PETROLEUM FUEL.

In our issue of Oct. 26th we copied from the Boston *Traveler* an account of the performances of a steam fire engine in that city using petroleum for fuel. The report was quite favorable to the performance of the engine and to the value of petroleum as a means for generating steam. By reference to that notice on page 265, current volume, our readers will understand the force of the criticism which we have received from a "Looker-on," who is evidently a practical man. He says: The engine had but one stream on and the hose could be compressed by the foot. He stood by the engine half an hour, and during that period it was stopped several times to get up steam. The gage never showed over 60 pounds pressure. If the experiment was as successful as the *Traveler* represents, our correspondent inquires why was it taken off the next morning.

We have yet to learn of any experiment made with this fuel where its advantages over coal were undeniably demonstrated.

# OFFICIAL REPORT OF PATENTS AND CLAIMS

## Issued by the United States Patent Office,

FOR THE WEEK ENDING OCTOBER 29, 1867.

*Reported Officially for the Scientific American*

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

| | |
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| 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.*

70,148.—MOLD FOR ARTIFICIAL TEETH.—A. M. Asay, Philadelphia, Pa. Antedated Oct. 15, 1867.
1st, I claim constructing the mold with oblong depressions, c, for receiving and retaining the bowed end of the staples, b, or end of plates which project from the lingual surface of the teeth for confining them to vulcanite or other plates.
2d, The depressions, d and e, constructed and arranged substantially as described, for giving increased strength to the rim, f, substantially as set forth.

70,149.—SPRING BOLT FOR DOORS.—George F. Atkinson, Seymour, Conn.
I claim the bolt, A, moving in casing, B, in combination with spring, C, and screw bolt, F, and nut, G, when all are combined and arranged together substantially as and for the purpose described.

70,150.—CONSTRUCTION OF MILK CANS.—Silas O. Avery, Brewster's Station, N. Y.
I claim the making of a can or vessel to contain milk or other fluid substances from one piece or strip of tin or other metal so constructed in the manner and with the devices described as to have between the inner and outer surfaces an air chamber perfectly sealed and impervious to the external effects of atmospheric heat or cold, and which may be applied to any cylindrical vessels composed of tin or other metals and designed to contain fluid substances.

70,151.—TREENAIL.—John Baird, New York City.
I claim the new fastening herein described namely a treenail combined with a metallic socket and wedges applied thereto, substantially as specified.

70,152.—SEWING MACHINE.—George W. Baker (assignor to himself and Warren E. Eason), Hinsdale, N. H.
1st, I claim the combination of the gear wheel, s, and crown gear, K, needle feeding bar, L, carrying the looper, N, and pin, p', as herein described for the purpose specified.
2d, Regulating the lateral or feeding action of the needle feeding bar, L, carrying the looper, by means of a cam or lever, M, made substantially as herein shown and described.
3d, Combining the looper bar, L, and looper, N, with the slotted or adjustable plate, m, spring, o, and lever, M (or its equivalent), all made and operating substantially as and for the purpose herein shown and described.
4th, The take-up device, J, constructed as described when arranged as set forth on the needle bar, D, and when operated by the motions of the same and by the stationary pin, j, in combination with the hinged bar, H, needle, e, and looper bar, L, all made and operating substantially as and for the purpose herein shown and described.

70,153.—FIELD FENCE.—T. H. Bellard, Colbrook, Ohio.
I claim the special arrangement of the boards, A, stakes, B, yoke, C, and rails, E, in the manner as and for the purpose set forth.

70,154.—SINKING WELL TUBING.—R. N. Bennett, Branchport, N. Y.
1st, I claim the point, C, with its shank, B, provided with the cylindrical portion, a, the channel, b, [illegible] and pin, f, when combined with the tubing, A, in the manner and for the purpose herein set forth.
2d, The combination with the shank, B, of the star-shaped diaphragm, g, arranged and operating in the manner and for the purpose specified.

70,155.—WINDOW SCREEN.—J. G. Bicknell, Cambridgeport, Mass.
I claim the combination of the outer frame, A, with the inner netting covered frame, B, fitted into the slots, and as and for the purpose described.

70,156.—PLATED WARE.—J. C. Blackman, West Meriden, Conn.
I claim in the manufacture of plated ware or articles, providing such articles at their points of rest or contact with a thickness of the same metal as that with which they are plated, substantially as and for the purpose described.

70,157.—BOOT AND SHOE SHIELD.—G. P. Bradley, Lawrence, Mass., assignor to himself and E. E. Allen, Boston, Mass.
I claim the boot shield or plate, a, provided with the metal strap, b, and flexible strap, c, all relatively arranged to secure the shield in position to protect the side of a boot in coasting, substantially as set forth.

70,158.—LEATHER QUILTING MACHINE.—Albert G. Brewer, Washington, D. C.
I claim the combined arrangement of the spindle, c, adjusting slide, N, and plate, d, the adjusting bolt, y, and adjusting stud, h, arranged substantially as and for the purpose described.

70,159.—GANG PLOW.—G. T. Brewer, Prairie du Rocher, Ill.
I claim the combination and arrangement of the plows, B B1 and B2, with the beams, A A1 and A2, as described and set forth.

70,160.—MACHINE FOR BRAIDING OPEN-WORK BASKETS.—Franklin H. Brown (assignor to himself, Edward F. Pengest and Lemuel H. Florsheim), Chicago, Ill.
1st, I claim the dies, R and S, in combination with lever, M, as and for the purposes set forth.
2d, Slides P, having an opening or hole 7, and a groove, 11, as and for the purposes set forth.
3d, Combination of the shaft, E, disk, D, and disk, N, as and for the purposes specified.
4th, Plunger, F, in combination with pieces, R and S, and lever, G, as and for the purposes set forth.
5th, Crank pin, L, piece, K, and rods, k k', in combination with rods, 3 and 4, shaft, E, and sleeve, 9, as and for the purposes specified.
6th, In a braiding machine the movable platform, U, as and for the purposes set forth.
7th, Cam, B, in combination with lever, G, and standard, J, as and for the purposes set forth.
8th, Spring, Q, in combination with lever, M, as set forth and for the purposes specified.
9th, The general construction and arrangement of mechanism, substantially as shown and for the purposes specified.

70,161.—BRUSH.—John Buercky (assignor to himself and Michael Wehr), Overlock's Station, Ohio.
I claim the plate, F, with its arms or guards, f f, and plate, F, with ledges, e e, in combination with plate, b, arms, a a, and adjustable handle, c, constructed, arranged and used in the manner and for the purpose described.

70,162.—PORTABLE FENCE.—G. W. Campbell, Pendleton, Ind.
I claim the connecting together of the upper parts of the panels, A, by means of the hooks, j, and the slots, h, in the upper ends of the braces, c, with the rods, k, passing through said slots for the hooks, j, to catch over in combination with the slots, i, in the upper edges of the centers of the base strips, g g, of the braces to receive the over ends of the end bars, b, of the panels, substantially as shown and described.

70,163.—CHENILLE.—William Canter (assignor to J. Henry Vogt and J. Jacob Gass), New York City. Antedated Oct. 16, 1867.
I claim the partially uncut chenille made in the manner specified as a new article of manufacture.

70,164.—PICKER FOR LOOMS.—William E. Card and Pardon Andrews, Phoenix, R. I.
1st, We claim the combination of the staff, A, having recesses, E G, of unequal diameters in its end, a, the loop [illegible] piece, D, elastic cushion, F, and plate, J, as constructed as herein, and for the purpose specified.
2d, So securing the pad to the staff as to have a side or lateral play, substantially as and for the purpose set forth.

70,165.—CLOTHES DRYER.—R. D. Chandler, Fairhaven, N. J.
I claim the combination of the center post, A, having shoulder plates, E, in combination with the clothes frames, C, having slide spring bolt, D, substantially as and for the purpose specified.

70,166.—METHOD FOR REMOVING CARBON FROM GAS RETORTS.—B. E. Chollar, Leavenworth, Kansas.
I claim the use of a jet of steam in the stand pipes of gas retorts to cause a draft of air through the retort for the purpose of burning or consuming the deposit of carbon, substantially as described.

70,167.—BEEHIVE.—John Coats, Camden, Ohio.
I claim the herein-described extension beehive when constructed and arranged in the manner and for the purpose substantially as set forth.

70,168.—STOVE DRUM.—J. L. Collins and H. C. Burgie, Chicago, Ill.
1st, We claim the reversible partition, F, when provided with lateral flues and bent at the lower end so as to close one half of the lower opening into the drum, substantially as specified.
2d, The combination and arrangement of the outer case, A, and the movable partition, F, with the collars, E, substantially as and for the purpose specified.

70,169.—DEVICE FOR TRUSS SPRINGS.—Geo. A. Colton, Adrian, Mich., and Albert D. Angell, Coldwater, Mich.
We claim the plate, B b b', and adjusting screws, C C', in combination with the hinged sections, A A' a a', of the truss spring, substantially as described and for the purpose specified.

70,170.—WASHING MACHINE.—Thomas Coursen, Burlington, Iowa.
1st, I claim the combination of an elastic yielding box, B, carrying a concave, b, with a plunger, C, which receives motion from a crank shaft, D, substantially as described.
2d, The combination of a washboard, E, pressure board, G G', and plunger, C, with the concave bed, b, arranged to operate substantially as described.
3d, So constructing and arranging the plunger, C, and combining it with a concave bed, b, that the clothes are raised out of the water and compressed at every forward stroke of said plunger, substantially as described.

70,171.—SHUTTLE.—George L. Crandal, Pitcher, N. Y.
1st, I claim the curved tension spring, a, in combination with the curved fixed wire, c, when arranged and operating in a shuttle, substantially as and for the purpose herein specified.
2d, The inclined groove, m, in the shell of the shuttle opposite the eye, c, for guiding the threading wire, p, as set forth.

70,172.—CONNECTING LINK.—Robert Creuzbaur, N. Y. City.
1st, I claim an O connecting link having a closing piece pivoted to it substantially as described.
2d, Adapting the pivoted closing piece of the O-link to serve as a means for strengthening the main portion of the link, substantially as described.
3d, The combination of the pivoted closing piece, B, spring, E, and link portion, A, constructed substantially as described.

70,173.—SHUTTER BOWING BOLT.—J. M. and M. L. Cummings, Philadelphia, Pa. Antedated Oct. 15, 1867.
1st, We claim a shuttle bolt having slotted to fit the end of its slide, C, an T-piece, c', so as to operate in combination with the case, A, substantially and for the purpose described.
2d, We also claim in combination with the slide, C, having a jointed end and operating in the case, A, substantially as described, the adjustable thumb and finger piece, c'', and the slotted hole, b5, in the plate, B, substantially as and for the purpose set forth and described.

70,174.—BUNK FOR LOGGING SLEIGH.—James P. Davis, Stiles, Wis.
I claim an improved [illegible] bunk, A, the ends of which are slotted vertically, [illegible] chains, B, attached to it within the said slots and at or near their inner ends, substantially as herein above described and for the purpose set forth.

70,175.—LEATHER SPLITTING MACHINE.—Alfred Dawes, Hudson, Mass.
I claim the leather splitting machine constructed, arranged, and operating substantially as described.
Also, the compound roll consisting of the central roll or shaft, the sleeve of yielding elastic material covering said roll or shaft, and the outer rings of hard material arranged to operate as set forth.
Also, the construction of a cylinder cam in two separate pieces, adjustable with respect to each other substantially as and for the purpose specified.

70,176.—MANUFACTURE OF ENAMELED AND JAPANNED LEATHER.—Ichabod W. Dawson, Newark, N. J.
I claim leather the Japan or composition of which is applied after the same has been subjected to a powerful stretching action, as a new article of manufacture.

70,177.—PNEUMATIC SPRING.—W. A. Dripps, Fort Wayne, Ind.
I claim the construction of the pneumatic spring consisting of the cylinder, A, and having an eccentric cylinder, B, and cover, J, said cylinder containing the piston, D, having the rings, c d e, and perforated upon its under side at f, and provided with the rod passing through the cover, J, as herein set forth, for the purpose specified.

70,178.—WASHING MACHINE.—H. W. Driver, Havana, Ill.
I claim the drum, B, rollers, I I, and rubbing board, N, when arranged in connection and combination with each other, substantially as and for the purpose described.

70,179.—CRADLE.—D. A. Dunham, Pilatka, Fla.
I claim a child's cradle, A, formed of a barrel with the hoops, b b, projecting over the ends, and the rib shaped rockers, c c, lying close underneath, arranged substantially as described.

70,180.—HOISTING MACHINE.—Jacob Edson, Boston, Mass.
I claim the arrangement and combination of the lever pawl, G, the brake, H, the windlass barrel, A, the brake pulley, I, the ratchet, D, the shaft, B, and the train of gears, c d C, or the equivalent thereof, such gears being applied to the shaft, ratchet, and windlass barrel, substantially as specified.
I also claim the combination of the screw [illegible], I', and its nut, J, or nuts, k l, with the brake, H, and the lever pawl, G, substantially as described.

70,181.—CLOTHES WRINGER.—T. B. Emerson, Seville, Ohio.
I claim the shaft, A, collars, C, provided with notches, D, when said collars and shaft are constructed in one single piece, in combination with the rod, E, canvas, F, and timber, G, substantially as described.

70,182.—PAINT BRUSH.—Joseph M. Estabrook, Milford Mass.
1st, I claim the arrangement of the rings, D and E, having flanges or studs on [illegible] handle, A, having the ferrule, B, [illegible] pin, C, all made and operating substantially as herein shown and described.
2d, Making the ferrule, B, [illegible] of one piece of sheet metal, substantially as herein shown and described.

70,183.—SETTING TIRES ON WHEELS.—Anders Fagerstrom, Wyoming, Pa.
I claim the notched bars, F F, in combination with the hooked or bent ends, a a, of the tire, B, and the bar, G, fitted between the bars, F F, all being arranged and adapted to the wheel substantially in the manner as and for the purpose set forth.

70,184.—GAS GENERATOR.—Mathew Falcon, Bloomington, Ill.
I claim the combination of the fountain, C, connected to the generator, B, by means of the tube, d, with the sack, [illegible], provided for different [illegible] of nozzles, substantially as herein shown and described and for the purposes set forth.

70,185.—ANTI-KICKING ATTACHMENT FOR HORSES.—O. H. P. Fancher, New York City.
I claim the strap, C, applied to the thills, A, and bit rings, a', as shown, in combination with the straps, b, bit rings, a, and rings, C', all arranged to operate substantially as set forth.

70,186.—HAND LOOM.—G. W. Firestone, Fredericksburg, O.
I claim the combination of the lathe, E, with the sweeps, F F, shaft, G, treadles, H, cords, K K, and pickstaves, M M, substantially as and for the purpose specified.

70,187.—RAILROAD SWITCH.—Thomas Fogg, Detroit, Mich.
I claim the switch composed of the three rails, C D E, at each side, in connection with the rigid tongues, I J, yielding main rails, A' A', and guard rails, K, arranged to operate in the manner substantially as and for the purpose set forth.
I further claim the combination of the springs, L, with the rails A' A', when the latter are used in connection with the tongues, I J, and the switch, substantially as and for the purpose specified.

70,188.—MACHINE FOR OPENING CANS.—Wm. H. Forker, Meadville, Pa.
I claim the handle, A, with the base, R, and the handle or lever, B, constructed as described, when the same are in combination with the knife, C C, and the point, F, as described and for the purpose set forth.

70,189.—HAY STACKER.—J. Forsher and J. C. McCland, Unionville Center, Ohio.
We claim the shaft, a, supported by standard, b, upon the carriage, c, and having at its top the revolving cross piece, d, with sheaves, e, over which latter pass ropes, h, attached to windlasses, k, and forks, i, the whole being constructed and arranged as and for the purpose described.

70,190.—CARDS FOR HOOKS AND EYES.—Maltby Fowler, Northford, Conn.
I claim the card, A, provided with two or more series of punctures, a, the convex side of each series facing each other, and provided with the tongue piece, b, fitting over the hooks and eyes, as herein set forth for the purpose specified.

70,191.—SEAT FOR CHAMBER VESSELS.—Isaac Freed, Harrisburg, Pa., assignor to Wm. Getty, Camden, N. J.
I claim the arrangement of the springs, C, the boards, A B, and the rims, D E, as and for the purpose specified.

70,192.—MACHINE FOR CUTTING WOOD GEAR.—Thomas F. Freeman (assignor to himself and Wm. H. Abbot), Brooklyn, N. Y.
I claim, 1st, A pair of revolving cutters set upon the same axis of rotation, but capable of being moved toward or away from each other, in combination with guides or slides, substantially as specified, for directing the cutters in forming gear teeth, as set forth.
2d, I claim the arrangement of the slides, q r, arms, n p, frame, m, slide, c, and bed, b, in combination with the rotary cutters, b b, mounted and actuated as set forth.

70,193.—CAPPING SCREWS.—John Gardner, New Haven, Ct.
1st, I claim the combination of the cap, and screw stem fast to the cap, with the screw head and socket or orifice formed therein for the reception of the said stem, under the arrangement and for operation as set forth.
2d, In screws in which the cap and its central screw stem are combined with the head of the screw as described, I claim making the under surface of the said cap concave, substantially as and for the purposes set forth.

70,194.—HAIR BRUSH.—J. N. George, Boston, and Jacob R. Sanborn, Waltham, Mass.
We claim the combination with a hair brush of a sponge, C, or equivalent absorbent material, substantially as and for the purpose specified.

70,195.—CORN SHELLER.—George Goeway (assignor to himself and Howard Eaton), Philadelphia, Pa.
1st, I claim the ribs, i, for the purpose of enabling the ears of corn, while being shelled, to revolve freely and not clog.
2d, The longitudinal flanges, k, for the purpose of compelling the ears of corn to revolve and prevent their getting crosswise in the machine while being shelled.
3d, The concave, c, formed in sections with diagonal toothed bars, each section acting independently of the other sections and corresponding in width with the spaces between any two of the longitudinal flanges, k, at their outer edges, substantially as set forth.
4th, The combination of the cylinder, b, concave, c, and springs, d, in the manner and for the purpose substantially as set forth.

70,196.—PORTABLE DUMPING AND LOADING MACHINE.—William Goff, Big Flats, N. Y.
I claim, 1st, The spring guides, d, operated by lever, K, and system of levers, L, substantially as described, in combination with an incline or inclined track, D, and rest, f, and their respective equivalent, substantially as herein shown and described.
2d, The folding apron, C, hinged at c, in combination with a device for dumping and loading, substantially as above set forth and described.
3d, The folding apron, H, hinged at h, also in combination with a device for dumping and loading, substantially as above set forth and described.

70,197.—WHIFFETREE, TRACE CATCH, OR COCKEYE.—Wm. W. Gordon, Delhi, N. Y.
1st, I claim the stud, key, or pin, a, Figs. 1, 2, 3, and 4, in combination with a whiffletree tip or trace catch, substantially as set forth.
2d, I claim the slot, e, in combination with the cockeye, c, Figs. 1 and 5 when constructed in the manner and for the purposes set forth.
3d, I claim the combination of the stud, 2, and slot, e, Fig. 1, when constructed in the manner and for the purposes set forth in the above specification.

70,198.—VENTILATING MILLSTONES.—John Gray, Dubuque, Iowa.
1st, I claim the fan blower, E, arranged in relation with the box, D, constructed as described, spouts, C C, and millstones, as herein set forth, for the purpose specified.
2d, The box, D, constructed as described, provided with the discharge spouts, G G, at each end, and having the cleaning sweep, g, operated by means of the cord, h, as herein set forth and for the purpose specified.
3d, The oblong box, D, inclined spouts, C, and fan blower, E, arranged in relation with each other and with the millstone, as herein set forth for the purpose specified.

70,199.—RATCHET DRILL.—John Gray, Litchfield, Ill.
I claim the combination of the feeding screw, C, with its head, C2, the sliding head, C1, the yielding cushion, C3, the drill spindle, A, with its dowel, a and the cylindrical head D, with its flange, d', substantially as described.

70,200.—FURNACES FOR STEAM BOILERS.—Jacob Green, Norristown, Pa.
1st, I claim the ash pit, A, with its arched top composed partly of brick and partly of a cast iron key, when the latter is constructed to form a bearer for the grate bars, all substantially as herein set forth.
2d, The cast iron key, F, its side pieces, a a, and notched ribs, i, in combination with the movable bars, m, for the purpose described.

70,201.—BAG TIE.—Joseph Grimes, Alexandria, Va., assignor to himself and F. A. Reed.
I claim the combination of the lever, c, provided with the teeth, c', with the links, a a', and clevis, b, arranged substantially as described.

70,202.—SAFE.—Joseph L. Hall, Cincinnati Ohio.
1st, I claim the jointing together two or more metallic plates by means of dovetails, grooves, and tenons at their edges or otherwise, as herein described, when the said plates are used in the construction of burglar proof safes, vaults, and other secure receptacles.
2d, The dovetailed, grooved, and tenoned angle irons, G, when the same are used for securing together the corners of safes, vaults, or other secure receptacles, as herein described and for the purposes specified.
3d, The dovetailed plates, B D, or their equivalents, in combination with the dovetailed, grooved and tenoned angle irons G, and the tapered arbors, c, when the same are constructed and arranged for burglar proof safes, vaults, and other secure receptacles, substantially as and for the purpose herein described and set forth.

70,203.—LIGHTNING ARRESTER FOR TELEGRAPHS.—Wm. H. Hall, Chicago, Ill.
1st, I claim supporting the connecting plate, G, over the ground plate, A, without any non-conducting substance between them, by means of the plate B, substantially as specified.
2d, Connecting the plate, B, to the ground plate, A, adjustably by means of the posts, E, and slides, D, substantially as and for the purposes specified.
3d, The non-conducting plate, B, when surrounding and supporting the connecting plates or disks, G, substantially as specified and shown.
4th, The non-conducting supports, a, substantially as and for the purposes specified.
5th, The combination of the ground plate, A, and posts, E, with the non conducting plate, B, non-conducting supports, a, and collars or slides, D substantially as specified.
6th, The combination of the ground plate, A, posts, C, and standards, E with the plate, B, connecting plate, G, post or posts, F, and slides or collars D, substantially as and for the purposes specified.

70,204.—TRY SQUARES.—Nelson Hamblin, Flatbush, N. Y.
I claim the combination of the plates, C and D, with the blade or plate, B, and handle, A, of an ordinary try square, substantially as herein shown and described, and for the purpose set forth.

70,205.—MACHINE FOR CUTTING SOAP.—Cyrus H. Hardy, Charlestown, Mass.
I claim a machine for cutting soap, provided with ways, a, for receiving the soap from and delivering it upon the "truck," substantially as described.
I also claim one or more screws, b, operated as described, for lifting the block of soap from the truck to the ways of the machine, substantially as set forth.
I also claim pivoting the rectangular frame, O, to one side of the center of vibration of the segmental disks, M, in order that the position of the wires, V, when cutting the block of soap, may be nearly horizontal, substantially as and for the purpose described.
I also claim the rod, s, with its screw nut, u, in combination with the guide bar, t, and shoe, r, for adjusting and tightening the wire in place, substantially as described.

70,206.—WATER RESERVOIR FOR COOKING STOVES.—Conrad Harris and Paul W. Zoner, Cincinnati, Ohio.
1st, We claim a stone reservoir, consisting of two or more covered pots or vessels, A [illegible], A' B', formed and combined substantially as and for the purpose set forth.
2d, A stove reservoir composed of two pots or vessels, A A', having covers B B', on their opposing sides, in combination with closing strips, C C', top plate, D, and bolts, F F', with their described or equivalent accessories, substantially as set forth.
3d, The mode of hinging the lids of the reservoir by gudgeons, N, occupying indentations, M, in the vessel, and secured by the top plate, D, in manner substantially as represented.

70,207.—GAS COOKING STOVE APPARATUS.—David G. Haskins, Cambridge, Mass.
1st, I claim a gas cooking apparatus, formed with the double casing, a, c, fitted as described, with wire netting in combination with the combustion chamber, b, and exit flue, f, the inner casing being provided with a hole for the reception of a kettle, or other culinary vessel, and with openings and covers, h, for the escape of steam, etc., substantially as specified.
2d, I claim the combination of the metal plate, or cover, e, provided with the diaphragm, e', with the perforated inner casing, c, and the combustion chamber, b, as set forth.

70,208.—PLANING MACHINE.—Warren D. Hatch, South Antrim, N. H., assignor to himself and Lewis Babbitt, Worcester, Mass.
In a machine for reducing a board to a series of cylinders, I claim the rotary cutter carriers, B C, cutters, D, in combination with the feed rollers, I, I', and K, K', fluted guide bar, L, and fluted guide rollers, O, O, P, P, M, all arranged and adjusted to operate in the manner and for the purpose described.

70,209.—CONSTRUCTION OF CRUET-CASTERS.—Westel E. Hawkins (assignor to Joshua B. Graves), New York city.