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THE CAUSE OF STEAM BOILER EXPLOSIONS---THE BOWERY ACCIDENT.

One thing can be said of the verdict of the coronor's jury on the bodies of those killed by the recent explosion of a steam fire engine in this city, which cannot be said of all similar investigations. Much common sense was exercised by the jurors, and some intelligence. As usual in so-called investigations there were froth, foam, ignorance, brought before them, with a modicum of reason and educated intellect. The facts, aided by the statements of engineers, seem, in this case to have had some weight with the jury. We only wish their verdict could have more completely covered the ground.

Just here we wish to notice some of the nonsense which our journals published in relation to these occurrences; evidently written by anybody but a practical engineer. In this case one published statement was that the "steam gage was corroded;" another that the "tubes leaked;" another that only "sixty pounds pressure was on the boiler at the time of the explosion," and still another that the machine was a "perfect powder magazine." All such talk is not only sheer nonsense viewed from a professional standpoint, but it is really wicked, misleading old engineers and puzzling young mechanics. Not less to be deplored is the conflicting statements of men who should know whereof they affirm—not their opinions, but the results of their investigations. While one states that the rupture was caused or aided by a crack in the sheet, another says the sheet was perfectly sound. While one declares that the soot was burned off more than one half the fire-box, another knows there was no over heating of the iron. All this is nonsense, and there is more of the same sort shown in the reports of the testimony given before the jury.

The corrosion of a steam gage will strike our engineers as a new thing; that the leakage of tubes could produce an explosion will also interest them; that a boiler of the build of that which blew up could be even ruptured by a pressure of sixty pounds will amuse them, and that one of the Amoskeag fire engines is a perfect powder magazine under any circumstances would be believed only by those who have no knowledge of the excellence of material and perfection of work used and turned out by that concern.

In reviewing the testimony we cannot forbear a tribute to the straightforward and manly evidence produced by Messrs. Coffee and Powers. The former is well known as a competent engineer of large experience; the latter appears to be a thorough mechanic. No attempt has been made to impeach the testimony of either of these gentlemen. Both agree that the disaster was caused by an over pressure of steam, which a personal examination of the exploded boiler enables us to confirm.

The testimony of Mr. Bean, the superintendent of the Amoskeag works, Manchester, N. H., is somewhat of a curiosity if correctly reported in the daily papers. He says the boiler was braced from five to seven inches apart. Now if seven inches—area of forty-nine square inches—were sufficient, why put braces five inches apart leaving an area of twenty-five inches? But on an examination of the boiler we found a place on each side of the fire box that had nothing but "blind" stays in a space of eleven by eight inches, exposing a large space of three sixteenths iron without a support. In one of these places the rupture occurred. We cannot but think he is mistaken in saying that both the shells were of the same thickness. On our examination we thought the inner skin of the water leg was three-sixteenths, and the shell one-quarter, large. If Mr. Bean is correct then there may be some reason in Mr. Norman Wiard's statement that the shell was the weaker part of the boiler, a statement we take, however, *cum grano salis.*

To return to Mr. Bean; he says: "from the general appearance of the boiler I think the top part of the fire box and flues must have been nearly red hot." What reason has he for this statement? The morning after the explosion there was no reliable evidence of over heating or burning. The clinches or rivetings of the lower ends of the tubes had not started, the tube sheet bore a coat of soot, and the edges of the ruptured sheet were bright, which they could not have been had they been exposed to 400° of temperature.

Our conclusions are that the sheet that gave way was too thin to be stayed with screw stays; that the space between stays—eighty-eight square inches—was too great, and that the cause assigned by the coronor's jury for the explosion—over pressure of steam—is the correct one.

We cannot but suggest to the builders of these upright tubular boilers the insertion of a less number of tubes, giving more water space. It must be difficult to keep a sufficient quantity of water in a boiler built as this one was; probably but for the jarring and shaking of these machines while working, the flue plate and sheets surrounding the fire box would sometimes be bare.

VISCERA AND VITALITY VS. STEEL, CORD, AND WHALEBONE.

The devotees of fashion are no less abject in their worship at her shrine, no less willing to throw aside all considerations of reason, and to obey blindly her dictates, than the veriest slaves of heathen superstition are to sacrifice everything to the "gods which their own hands have made." We are struck with horror when we read of people prostrating themselves beneath the wheels of the car of Juggernaut, or of mothers throwing their children into the mouths of crocodiles, but such acts are tender mercies compared to practices in vogue at the present day among those who claim the highest degree of civilization as yet attained in the history of the world. How much better to die suddenly, all sense of pain being instantaneously crushed out of the body by brute force, than to suffer the prolonged misery of slow suffocation in croup, or the agonies of death by consumption.

The votaries of fashion do not scruple to impose these diseases upon themselves and their children, and although they refuse to believe it, and sin through ignorance, it is willful ignorance, and therefore all the more culpable. Parents who permit young children to go with bare necks, and almost bare legs, in the changeable climate of this latitude, are as heartlessly cruel as the heathen mother who immolates her child; and although the result is not so certain in regard to any particular victim, yet we believe that more children are thus annually sacrificed upon the altar of fashion, in proportion to our population, than are destroyed in the superstitious rites of people who are less culpable, because their ignorance is not the result of obstinate refusal to accept truth and obey its precepts. Not content with subjecting their offspring to the risks of exposure in early childhood above alluded to, fashionable mothers have revived the murderous practice of tight lacing. More than this, public journals have opened their columns to its defence, and books are beginning to make their appearance justifying it, and strongly asserting that it is essential to the attainment of both beauty and health.

It is of no use whatever to reassert facts which are patent to every physician, and which, if listened to, would speedily condemn the wearing of corsets to immediate and total extinction. People will not listen, and, to use the words of an English cotemporary, "so long as 'society' is ruled by women of fifty, who want to conceal the obesity which refutes their pretensions to thirty-five," there will be no lack of champions to defend, and examples to encourage the young to adopt the pernicious practice.

Neither is it of use to yield to the temptation which any sensible man must feel, no matter how little given he may be to profanity, to substitute u for the o, and insert an i before the t, in the word corset, whenever he hears the subject mentioned. To reason or to denounce is equally futile. The only way is to let Steel, Cord, and Whalebone "fight it out on this line," until Viscera and Vitality succumb. Let the "poor ghosts" of women now seen so frequently dragging themselves along through the streets, passionless, colorless (unless bedaubed), useless, listless, waistless, less every thing except pain, increase and multiply. Unfit for wives and mothers, they shall at last feel the weight of the disgust their unnatural practices excite; and as the number of old maids and consumptives increase, peradventure common sense may at last resume its sway.

SMALL PHILOSOPHERS.

The world is full of small philosophers, ready at a moment's notice to give you reasons "as plenty as blackberries" for anything whatever. They as a general thing believe that the changes of the moon have an important influence upon the weather, that if the new moon lies horizontally it is a "dry moon," and if it stands vertically it is a "wet moon." They will generally tell you that the moisture which gathers upon the outside of a pitcher of ice water in a warm day, is the "sweating" of the pitcher; and they believe that a wagon draws easier because the hindwheels are much larger than the others. They are men who believe implicitly in all the traditions of their fathers, and who carry with them through life the prejudices which they imbibe in their youth. Anything no matter how absurd it may be, provided it does not conflict with their preconceived opinions may be palmed off for truth; utterly innocent of logic, the form of a syllogism is sufficient to convince them, the truth of premises or the justness of an inference never being called in question so long as it leaves their prejudices undisturbed. They are fond of glittering generalities, and of high sounding assertions; and words, so long as they seem to mean something, are enough for them without sense.

Upon them charlatans thrive; and it is sufficient evidence that the mass of society is made up of just such people as we have described that so many imposters, in medicine and law, and in politics and religion, are enabled to fatten themselves upon it.

The tendency of mechanical study is to sweep away prejudice, to enlarge and liberalize views, and to induce men to subject to rigid and logical analysis, everything which demands belief. The vast interest which is now shown in mechanical science, is producing a set of hardheaded and determined thinkers, who are not likely to be deceived by such arts as have in past times, so to speak, led the world by the nose.

We see hope for the future in the developments of the present, and even in some of the vicious tendencies of the times we see agencies at work which will, we are confident, effect their own cure. Meanwhile let us all not only hope but labor for the speedy coming of the new era.

THE HAVRE EXHIBITION.

Punctually on the date first announced, the International Marine Exhibition, at Havre, France, was formally opened on the 1st ult., in the presence of the largest assemblage ever gathered in that city. So far as the display of goods was concerned, the exhibition, at last accounts, could not with propriety be called a success, the chaotic state which seems inseparable to the early records of all exhibitions, holding full sway. But if the first impressions were thereby rendered unfavorable, the committee seemed determined to make amends in the opening exercises, by rendering them of a character worthy of so important an event. The ceremonies consisted of the usual laudatory addresses, deemed indispensable on similar occasions, an ode on the history of navigation, and instrumental and vocal music, writen expressly for the occasion, and given by an orchestra and chorus numbering about five hundred performers.

The exhibition is of no mean size, the buildings and garden occupying a space of twelve and a half acres. The former consist of closed galleries one story in hight, having a more pretentious building at each corner of the square, formed by the galleries, for offices, etc. Inside the galleries, opening upon the gardens, is a covered promenade, monopolized by the representatives—either imported or improvised from native talent—of foreign nationalities, Jews, Turks, Arabs, and Hottentots, where they dispose of trinkets or refreshments, the latter being served in the style with which the representatives are supposed to be the most familiar. The garden boasts of a number of buildings of unique style of architecture. The leading attraction is probably the mammoth aquarium, situated in a grotto beneath what is designed to represent the Island of Fingal with its basaltic columns. The island is surrounded by a miniature sea, in which sport a variety of fishes and a small school of seals.

The number of exhibitors is about three thousand. The two groups of navigation and fishery occupy the front gallery of the building, the place of honor. Here are to be found the models and plans of vessels of every conceivable species and description, rigging for the same, fittings, stores, instruments and charts, systems of signals, boats and apparatus for saving life; also, the chief articles of exportation, the latter comprehending river and sea fishing, with all that appertains to both. These two groups include the goods of seventy-five per cent of all the exhibitors, a much larger proportion than was anticipated, so that nearly the whole of the gallery originally set aside for works of art has been taken for industrial purposes.

The United States is but sparsely represented in the exhibition, and the same may be said of Great Britain; but every thing sent is of first class character. As the exhibition develops we shall present further particulars of novelties displayed.

CHEMICAL NOMENCLATURE AND SYMBOLS.

The chemical nomenclature and symbols now in use were founded by the great Swedish chemist, Berzelius. His large work in six volumes is still a standard authority in chemical science, a remarkable fact when we take in consideration that it is nearly forty years old, and that it treats a modern science, not yet one century old, and which in late years has made enormous progress. Immense additions have been made to the total stock of our knowledge, but no change of any importance has been made in the principles laid down by the great Swede in regard to the facts stated by him, as far as inorganic chemistry is concerned. Organic chemistry was in Berzelius' time only in its infancy, and it required, in later time the genius of a Liebig to elevate this branch to the same level.

Berzelius considered it preferable to use for the chemical compounds the Latin names, as they would be the same for all nations. The idea, however, has not been carried out, but the chemical symbols which he founded on those Latin names have universally been adopted, and are now intelligible to all chemists, in all countries, no matter what language they speak, in the same way that numbers written in our Arabic numerals are equally well understood by the English, French, Germans, or others, and named by each in his own language. The reason is simply that the chemical symbols, like the numerals, do not represent the sounds of the names, but the substance, or objects themselves. They are not phonetic, but objective.

The first letter, or two letters of the Latin name which the elementary substances had at first received, have been adopted as the symbol representing not only the substance, but

also a definite amount in weight of that substance; thus, O stands not only for oxygen, which is the most common substance in nature, but it also stands for 8 parts of oxygen; H stands not only for hydrogen (water generator), but also for 1 part of hydrogen; and the formula H O, therefore, means 1 part of hydrogen combined with 8 parts of oxygen, the most common compound existing, and known as ice, water, and steam, according to the amount of heat it contains.

When two or more substances have the same initials, another letter of the name is added to the less frequent one; in the same way as we indicate the different States of our American Union, Mo. for Missouri, and Miss. for Mississippi. Osmium, one of the rare noble metals, is indicated by Os, and Mercury, after the Latin name Hydrargyrum, by Hg. Both symbols standing respectively for 100 parts of the substance.

Ag. stands for Argentum (silver), 108 parts.
Al. " " Aluminum (metal of alum), 14 parts.
As. " " Arsenium (metal of arsenic), 75 parts.
Au. " " Aurum (gold), 200 parts.
B. " " Boron (similar to coal), 11 parts.
Ba. " " Barium (similar to calcium), 68 parts.
Bi. " " Bismuth (similar to tin), 208 parts.
Br. " " Bromine (similar to chlorine), 80 parts.
C. " " Carbon (coal), 6 parts.
Ca. " " Calcium (metal of lime), 20 parts.
Cd. " " Cadmium (similar to zinc), 56 parts.
Cl. " " Chlorine (found in salt), 36 parts.
Co. " " Cobalt (a hard, rare metal), 30 parts.
Cr. " " Chromium (analogous to iron), 26 parts.
F. " " Fluorine (analogous to oxygen), 19 parts.
Fe. " " Ferrum (iron), 28 parts.
I. " " Iodine (analogous to chlorine), 127 parts.
Ir. " " Iridium (similar to platinum), 90 parts.
K. " " Kalium (potassium), 39 parts.
Li. " " Lithium (analogous to potassium), 7 parts.
Mg. " " Magnesium (metal of magnesia), 13 parts.
Mn. " " Manganese (very similar to iron), 27 parts.
Mo. " " Molybdenum (similar to lead), 18 parts.
N. " " Nitrogen (part of our atmosphere), 14 parts.
Ni. " " Nickel (metal), 29 parts.
Na. " " Natrium (sodium, found in salt), 23 parts.
P. " " Phosphorus (found in bones), 31 parts.
Pb. " " Plumbum lead), 104 parts.
Pd. " " Palladium (similar to platinum), 53 parts.
Pt. " " Platinum, 90 parts.
S. " " Sulphur (brimstone), 16 parts.
Sb. " " Stibium (antimony), 119 parts.
Se. " " Selenium (similar to sulphur), 40 parts.
Si. " " Silicon (found in silex, flint, etc.), 22 parts.
Su. " " Stannum (tin), 59 parts.
Sr. " " Strontium (similar to calcium), 44 parts.

The above numbers represent the quantities in weight by which the different substances will mutually combine. As, for instance, 27 parts of iron will combine with exactly 16 parts of sulphur, and the symbol Fe. S., expresses not only the compound of iron with sulphur, but also the above proportion of quantities. These numbers are called atomic weights or chemical equivalents.

Besides these forty elementary substances, there exist some thirty others, which, being very rare, are omitted here. The whole crust of our globe is made up of different combinations of these seventy elementary substances, of which, however, only fourteen or fifteen constitute the chief mass of the mineral and of the organic world. In regard to the last, the different products of the earth's crust, vegetable and animal, they are chiefly made up of only three or four of these substances, with the incidental combination of the remaining ten.

THE WEST SIDE ELEVATED RAILWAY.

On Friday last the members of the city press were invited to inspect the working of the new elevated railway on Greenwich street. As has been before noted in our columns, the section now completed, running between the Battery and Greenwich street, was built as an experiment, to test the practicability of the plan. On Thursday, the Legislative Commissioners and Governor Fenton examined the railway, and expressed their entire approval of its mode of working.

The road is about one half mile in length, is fourteen feet in the clear above street level, and is supported by cast-iron pillars placed from twenty to forty feet apart. An endless wire cable of three quarters inch diameter, carrying with it a series of small trucks every fifty yards, is put in motion by steam power below ground, midway between the extreme stations. Motion is imparted to the car on bringing a projecting lip below the car floor in contact with the swiftly moving trucks, but by means of a series of leafed elliptic springs, having india-rubber buffers between each, there is far less shock at starting than is experienced in ordinary horse-cars, being hardly perceptible. The car can be stoppod at any time by releasing the truck and applying the brake. The rails are of the ordinary pattern used on steam roads, and their wheels flanged so that no apprehension need be felt of the cars leaving the track. To make assurance doubly sure, each end of the car is provided with an extra axle and guide wheels with safety flanges. The speed attained on Friday was from ten to fifteen miles per hour. The projectors propose making the wire-cable larger, so that the rate can be considerably increased; other minor alterations and improvements, which the trials have suggested, will also be introduced.

Our city sadly needs increased traveling facilities within its limits. No more surface roads can be accommodated in our streets, and such as now exist are open to serious objections from which both the elevated and underground railways are free. Steam power can be safely applied on these, and increased speed be attained, a great consideration for those journeying morning and night from one end of the island to the other; besides, there is little liability on either road of travel being incommoded or stopped by track obstructions. The friends of the underground road are organized, and tunneling operations will soon begin, and with this section of elevated road actually in successful operation, the prospect surely brightens for a speedy improvement in city traveling accommodations.

Experiments with Dynamite.

Dynamite, the new explosive agent, manufactured by Mr. Alfred Nobel, of Hamburg, consists of porous silica, saturated with nitro glycerin to the extent of about 76 per cent, the compound forming a powder of reddish yellow color. It is, in fact, nitro glycerin, rendered safe to handle, without any diminution of its prodigious explosive force. As shown in the course of recent experiments, it is as safe as gunpowder against explosion by concussion. Nor does it, under ordinary circumstances, explode on the application of fire, but burns away quite quietly, leaving behind a whitish ash. To produce explosion by fire, the powder must be inclosed in a bore or vessel, perfectly air-tight. The portion brought in contact with the flame will simply burn, but when the gases produced by such combustion have accumulated to a certain pressure the remainder will explode. In actual practice the explosive pressure is supplied by a sort of percussion cap placed in contact with the powder, and connected with an ordinary gunpowder fuze. The force exerted by exploding dynamite is said to be about three times greater than that of gun cotton, or some twelve times greater than that of gunpowder. Whatever the exact proportion may be, the power of the new agent is unquestionably tremendous. A couple of tablespoonfuls laid quite loose on a thick beam proved sufficient, when fired, to break the timber right across, and project one of the fragments to a considerable distance. A charge of six pounds, exploded in a horizontal bore, brought down about 4000 cubic feet of whinstone rock. Four pounds, fired in a tough rock, produced results which, it is averred, could not have been obtained by any possible charge of gunpowder. In another experiment four tenths of a pound of dynamite were placed in a small bore in the center of a mass of malleable iron, measuring twelve inches by ten. The charge was not plugged in; but even without that advantage, the explosion sufficed to shiver the iron into half a dozen pieces. Still more remarkable was the force exerted in a subsequent trial. A block of wrought iron, measuring nine inches by eight, was placed vertically in the ground, and a quantity of dynamite, covered only with loose rubbish, exploded on its upper surface. The result was to convert what had been a convex surface into a concave one, the mass of iron being at the same time split in several places. A five-ounce cartridge laid on the top of a huge block of whinstone, and covered with a little clay, served, by its explosion, to shiver the block into workable pieces. In addition to the blasting experiments, trial was made of the powder as a means of signaling at sea. For this purpose it seemed highly recommendable—a one-lb. cartridge, suspended by a cord, producing a report like that of a 32-pounder cannon.

OFFICIAL REPORT OF

PATENTS AND CLAIMS

Issued by the United States Patent Office,

FOR THE WEEK ENDING JUNE 30, 1868.

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.*

79,293.—MACHINE FOR CLIPPING HORSES' HAIR.—Patrick Adie, of the Strand, England.

I claim the combination of the teethed plate, A and B, screws, I and I, handle, A H, with handle or lever, L K D H, the whole constructed and operated in the manner and for the purpose above set forth and described.

79,294.—HOT AIR FURNACE.—James Albee (assignor to Moses Pond and Company), Boston, Mass.

I claim the arrangement and combination of the flue, N, with either or both the pipes, M, the fire pot, A, the drum, F, the conduit, f, the escape pipe O, or its branch pipe, h', provided with a damper as described, the case, I, being furnished with a throat or opening for the passage of the evaporating pan, P, to and from the top of the flue, N, as set forth.

Also, the arrangement and combination of the deflector, H, with the case, I, the fire pot, A, the drum, F, the series of pipes, G, and their extensions, G', arranged with the drum and the fire pot, as specified.

Also, the combination of the damper, or the partition, n, having a hole, o, as described, with the two pipes, M M, and the flue, N, arranged with the fire pot, the drum, and the case, and combined with the conduit, f, and the escape pipe, O, as set forth.

Also, the arrangement of the evaporating pan and its throat with the flue, N, and the fire pot.

79,295.—KEYBOARD FOR PIANOS, ETC.—J. S. Allen and A. P. Wilkins, Allen's Grove, Wis.

We claim a keyboard to a pianoforte or other musical instrument, to which additional keys, whether one or more series, are employed or arranged for operation upon the ordinary keys of the keyboard, substantially as and for the purpose described.

79,296.—TREADLE FOR SEWING MACHINES.—A. Q. Allis, Dayton, Ohio.

I claim the arrangement upon the frame, A, of the spring, F, on shaft b, the ratchet wheel, c, pawl, d, and gear wheels, e g e1 g1 e2 g2, driving shaft, B, pulley, E, fly wheel, D, friction pulley, h', brake, b, rod, k, spring, m, treadle, n, and rack, p, as herein described, for the purpose specified.

79,297.—SPINNING MACHINERY.—Robert Atherton and Geo. Singleton, Paterson, N. J. Antedated June 19, 1868.

We claim in silk spinning machinery the combination of the stationary pin B, stationary thimble cap, K, and thread guide traveler, W, with the movable tube, E, and bobbin, H, constructed and arranged substantially in the manner described and for the purpose set forth.

79,298.—MANUFACTURING GLASS WARE WITH HANDLES.—J. S. Atterbury and T. B. Atterbury, Pittsburg, Pa.

We claim a glass lamp, or other article in glass, having a molded or cast handle and a blown body, produced substantially as described.

79,299.—WHIP.—Dexter Avery, Westfield, Mass.

I claim as a new article of manufacture, a whip having its covering woven with a weft and warp, as herein described for the purpose specified.

79,300.—HARVESTER.—Darius Babcock, Warsaw, Ill.

1 claim 1st, The dome-shaped frame, A', in combination with the dome, A, and in combination with any mowing and reaping machinery, substantially as shown and described and for the purposes set forth.

2d, The annular frame, P, in combination with the frame, A', and the axle, M, substantially as shown and described, and for the purposes set forth.

3d, The combination of the axle, M, gear wheel D pinion, C, shaft, B, crown wheel, a, pinion, E, and shaft, H, with the frame, P, all constructed arranged, and operating substantially as and for the purposes set forth.

4th, The frame, f, in combination with the lever, L', and chain, and arm, i, substantially as shown and described and for the purposes set forth.

5th, The hook, g, in combination with the arm, i, and any flexible bar, R, substantially as shown and described, and for the purposes set forth.

79,301.—BROADCAST SOWER.—Alfred B. Beaumont, Grand Rapids, Mich.

I claim, 1st, The adjustable disks, k" k"', for regulating the discharge of the grain, substantially as and for the purpose shown and described.

2d, The stop, s"', in combination with the disk, k"', substantially as and for the purpose shown and described.

3d, Arm, m'', substantially as and for the purposes shown and described.

4th, Arm, m"', substantially as and for the purposes shown and described.

5th, The slot, v, on the arm, m"', substantially as and for the purposes shown and described.

6th, The spring, v', on the arm, m"', substantially as and for the purposes shown and described.

7th, Operating the disk, k", by means of a rod, M, spring, S', lever, P, and hook, t, or other equivalent devices, substantially as and for the purposes shown and described.

8th, The guiding cone, K, substantially as and for the purposes hereinbefore shown and described.

9th, The arms, m and n, of the cone and hopper, substantially as and for the purposes shown and described.

10th, Constructing a scattering wheel, i, with a central opening, k, and channels, o, whereby the grain can pass into a portion of its said channels, substantially as and for the purposes specified and shown.

11th, The cylindrical slides p, of the disk, k", for the purpose of retaining the latter in the throat of the hopper, whereby the said disk is permitted to partially rotate, substantially as and for the purposes hereinbefore described.

12th, The bevel wheel, F, on the axle, x, and connected with an independent ratchet disk, f, substantially as and for the purposes hereinbefore shown and described.

13th, The hollow pulley, H, with its bevel wheel, G, within it, in combination with a grain sowing machine, substantially as and for the purpose shown and described.

14th, The coupling devices, f"' b', in combination with a grain-growing machine, substantially as and for the objects shown and described.

15th, The disk, k', attached to the cone, K, and provided with openings for dropping the grain or plaster, substantially as and for the purpose shown and described.

79,302.—BED SPRING.—Henry Beyrodt, Louisville, Ky.

I claim the combination and arrangement of the outer cylinder, No 3, the spiral spring and its covering, No, 4, and the presser, No, 6, constructed and operated in the manner as shown and described and for the purposes set forth.

79,303.—GILDING AND ORNAMENTING GLASS SIGNS.—J. B. Blair, Philadelphia, Pa.

I claim the production of duplicates in plain or ornamental gilding or painting, substantially as and for the purposes set forth.

79,304.—CULTIVATOR.—A. R. Blood, A. Hathaway, and V. R. Beach, Independence, Iowa.

We claim, The levers, J J, strips, a a, bar, L, and pivoted frame, I, when all are arranged and operating substantially in the manner and for the purpose set forth.

2d, The set screw, H, seed slide, b', levers, J J, strips, a a, bar, L H, pivoted frame, I, all combined and arranged as and for the purpose described.

79,305.—CRUTCH.—A. E. Bowen, Baltimore, Md.

I claim, 1st, An adjustable crutch, constructed in the manner and for the purpose herein set forth.

2d, The combination of the legs, A A and B B, the thumb-screws, i i, the elastic top or arm-rest, and the elastic bottom of the crutch.

79,306.—WRENCH.—Wm. Bradshaw and Charles Lyon, Delphi, Ind.

We claim the open-backed jaw, E, in combination with the links, b, and shanks, C, substantially as described for the purpose specified.

79,307.—NAIL EXTRACTOR.—J. D. Breathitt, Cooper county, Mo.

I claim the fulcrum, B, of the nail extractor, A, when pointed at its lower end, and adapted to be adjusted longitudinally of the extractor, A, to increase or decrease the leverage of the latter, as herein described for the purpose specified.

79,308.—DOOR BELL.—Asa T. Brooks, New Britain, Conn.

I claim, 1st, An oscillating arm, k', and vibratory cam, u, secured and oscillating both upon the same stud pin, n, in combination with the arms, d k, substantially as described.

2d, In combination with the above, the anglelever, v, oscillating upon the pin, v,' all arranged and operating substantially as and for the purpose described.

79,309.—RAILROAD RAIL.—R. M. Brooks, Griffin, Ga.

I claim the combination of the railroad rails, A and B, provided with corrugated flanges, a a and b b, and fitting together, substantially as and for the purpose set forth.

79,310.—WASH BOILER.—Stephen Buynitzky, St. Petersburg, Russia.

I claim a loose plate, C, provided with the guides, E, or their equivalents, substantially as described, to be placed on the top of the clothes in the wash boiler, for the purposes set forth.

79,311.—WAGON BODY.—Matthew M. Carr (assignor to himself and Thomas S. Carr), Ringwood, Ill.

I claim the combination of the hinged sections of the bottom, C D E, the bars, F, pivoted as described at H, the springs, J, latches, I, levers, K, cordsor chains, G and N, and levers, L and M, all arranged and operating in the manner set forth.

79,312.—STOVE GRATE.—Gardner Chilson, Boston, Mass.

I claim the square or rectangular grate, as arched or curved both longitudinally and laterally, and having its side bars trussed or made deeper at their middles than at their ends, as represented.

Also, the combination and arrangement of the elbow of the grate arm, with such arm and the grate, constructed and disposed relatively to each other, substantially as specified.

79,313.—APPARATUS AND PROCESS FOR MAKING STEEL.—T. J. Chubb, Williamsburg, N. Y. Antedated Dec. 30, 1867

I claim, 1st, The construction of a series of deoxidizing and carbonizing retorts or chambers, A A A, arranged so as to prevent the gases from the heat-producing fuel from coming in contact with the ore or the materials in the retort, in combination with a melting chamber for the purposes set forth.

2d, The arrangement of the melting chamber, B B', with openings and doors at both ends, in such a manner as to facilitate the manipulation of the ore or metal, under treatment from both ends, substantially as described.

3d, Making provision for feeding loose ore and metallic and other substances in at one end of the melting chamber or furnace, B', and tapping the molten metal at the other end, substantially as described.

4th, Making provision for conducting heated air and gases over the ore or molten metal, said air and gases entering at one side or end of the said melting chamber or furnace, and passing out at the sides or other end therefor, for the purpose of reducing said ore, metal, or metallic substances therein into a liquid or molten mass, substantially as described.

5th, Making provision for shielding the ore, metal, and other substances from the direct action of the gases of the fuel, by arches T.

6th, Making provision for shielding and protecting the molten metal in a melting chamber from the direct action of the air, flame, and gases of the fuel, by floating shields, or an equivalent refractory substance or substances floating on the top of the metal, as described.

7th, Making provision for skimming off the surface of molten metal by floating scrapers, or their equivalents, substantially as described.

8th, Effecting a separation of the cinder or upper layer of substances floating on molten metal by the means herein specified and described.

9th, The construction of a vessel or melting chamber of a furnace, so arranged that it may be heated solely from above, by which means the metal therein becomes fully melted into a liquid state previous to skimming, tapping, and drawing off the same, substantially as herein described.

10th, Making provisions for and effecting the melting of metals by heat applied solely from above the metal, when said heat is derived from a gas regenerative apparatus or furnace.

11th, The arrangement of a furnace or of a vessel or vessels in a furnace for melting metals therein, in combination with and heated by the flame produced by the mingling together of the air and gas rising from and having passed through an air heating and gas heating or reheating furnace, chamber, or apparatus, in separate currents.

12th, Providing for keeping the under side of the melting chamber, or chambers in which the melting chamber or vessel is placed, cool, or from melting or leaking, by the arrangement of a cold air chamber or space below the same, C.

13th, The employment of slats or arch pieces, T T, for the purposes set forth.

14th, The employment of scrapers or skimmers, S S, or their equivalent, for the purpose set forth.

15th, The employment of floating fire shields and heat conductors, S S, or their equivalents, for the purpose set forth.

16th, Constructing slabs, arches, and shields with an uneven or irregular surface on one or both sides thereof, for the purpose set forth.

17th, The method or process of refining metals, and separating the dross and other extraneous matter from the surface of melted metal by mechanical power and appliances, or of inserting of refractive or infusible colder substances than the dross and scum, cooling and congealing them that they may be skimmed or removed from off the surface of the molten metal, substantially as set forth.

18th, Making provisions in the construction of a melting chamber of a furnace for reducing iron into such a liquid state by igneous fusion that highly carbonized iron ore, or pig iron, cast or steel, and natured iron ore, or wrought iron, may fuse and mix with each other, and the impurities and surplus carbon, silicon, and other matter that is not essential to the production of good cast steel, may be flooded and removed from the surface of the molted steel, refining and running the same into vessels or molds, substantially as described.

19th, Obtaining cast steel, or products of any degree of malleability or ductility, by melting together in a vessel or chamber in a furnace, combinations of pig iron and wrought iron, or of natured or partly natured iron and cast iron, and fusing, mixing, refining, and running the same into molds, substantially as described.

20th, The production of cast steel by mixing together, in a fixed or stationary melting vessel, chamber, or furnace, cast iron and iron ore, when such iron has been previously reduced, or natured, or partly natured, or carbonized in a separate vessel, retort, or furnace, and when mixed with manganese or titanium, or the ores or compounds thereof, and fusing, mixing, and running the same into molds.

21st, The production of cast steel by first melting the iron or metal containing the most carbon in a stationary vessel, and adding the metal or ore containing the least carbon to the molten metal, and when the whole is reduced to the proper consistency of cast steel, running the same into molds.

22d, Effecting a continuous process or reducing or melting and refining ores and metals by mechanical appliances, and at one heating, and in one furnace chamber substantially as described.

23d, Effecting a continuous process of making cast steel from iron ore by submerging it into a bath of molten cast iron or highly carbonized iron, whereby the whole will be liquified and brought to the consistency of cast steel and refined and run into molds.