mined by a specific gravity test, weighting the ice with platinum, and using mercury as a means of making the test, that substance remaining fluid at low temperatures, and having no solvent power on ice. It would be easy to make a proper allowance for the increased specific gravity of the mercury as the temperature diminishes.

TRANSPORTATION OF CATTLE---REID'S PATENT CATTLE WAGONS.

Some years since, while we were standing in the depot of the New York Central Railroad, at Amsterdam, awaiting the arrival of an express train from the East, there passed the station two enormous trains from the West, each requiring two locomotives to draw them, and laden with live cattle for the New York market. Live cattle, did we say? We must qualify that statement, for, on either train, there were some dead, others in a dying state, while all were greatly distressed, as was evident by their violent panting and protruding tongues. Some were prostrate under the feet of the rest, powerless to rise. The causes for this state of things was obvious. The weather was intensely hot, and the cattle crowded together as close as they could possibly stand, and not having been allowed to drink since they left Buffalo, were dying of thirst. We remarked, at the time, that it seemed an easy task to provide water for cattle thus transported, but a fellow traveler remarked that, were a proper apparatus constructed, no railroad in this country would adopt it unless compelled to do it. We, however, hoped, and still hope, that the greed of railroad corporations will not prevent the universal adoption of any simple method for securing such a humane object.

Our attention has been called to a simple and effective mode of supplying cattle with water while being transported in railway cars, invented by Wm. Reid, of Granton Harbor, near Edinburgh, Scotland, which seems admirably adapted to the purpose. The cars are provided with troughs, to which water can be readily supplied while the trains are stopped for taking in water for the use of the engine.

There is no doubt that many cattle become diseased by confinement without water during transportation, and that their meat, rendered more or less unwholesome by it, is sold and eaten, to the detriment of public health. The knowledge of this fact will do more toward correcting the evil than an appeal to the humanity of individuals. If railroad corporations refuse to correct it, they should be compelled to do so by legislation.

NEW MEXICO, ITS NATURAL WEALTH.

The Honorable W. F. M. Arny, ex-governor of New Mexico, has presented to the geological and mineral museum of the United States Department of Agriculture, a collection of specimens of minerals, fossils, agricultural products, etc., from which an idea of the natural resources of that territory may be obtained.

Among these specimens are native copper from the Tijeris mountain, a short distance from Santa Fe; bituminous shale from Placer mountain; iron ore from the San Juan country; brown copper ore from the San Dio range, also but a short distance from Santa Fe; limonite from the vicinity of Placer mountain; purple copper and native copper from the Nacimento mountains; iron pyrites, drusic, quartz, felspathic trachyte, pumice, and trachyte from the San Juan. Indian country; argentiferous galena from Stevenson's mine in Dona Anna county, native copper from Hanover mine near Gila river; marble from near Santa Fe; argentiferous galena from Valencia county; dentritic manganese in felspar paste containing gold. from Placer mountain; gold bearing quartz and native copper from the vicinity of Abiqui, Rio Arriba county; conglomerate containing gold from the Ute creek on Maxwell's ranch stated to be unsurpassed in richness, various grades of wool, corals, and so forth.

Striking as is this exhibit of mineral wealth, there is little doubt that much remains yet to be discovered. The rapid development of these resources is however interfered with by the depredations of Indians who render mining operations, except in places near centres of white population, extremely hazardous. Governor Arny asserts his belief that the mineral wealth of the mountains of New Mexico would pay twice our national debt, if miners could be permitted to develop it in safety. His opinion is that "is is cheaper to feed than to fight Indians, and that the Indians of New Mexico can all be placed on reservations without a war, if Congress will make sufficient appropriations to feed them, and furnish the necessary machinery to enable them to make their own clothing and establish industrial schools, to be kept up at the expense of the Government till the Indians are made self sustaining, which, by faithful agents, can be done in a few years."

With these Indians such a plan might prove successful, as they are said to be already partially civilized, but so far as our knowledge of Indian reservations extends they are generally constant bills of expense to the Government; the Indians are not self-sustaining and the agents are far more interested in making money for themselves, than in caring for the trusts imposed upon them. We have always held the opinion that a race who will not become civilized, and who at the same time resist the onward sweep of civilization, must not only be inevitably swept before it to extinction, but that they deserve scarcely more sympathy than the other savage beasts of the forest whose ferocity they not only imitate, but surpass. We believe that although feeding may be cheaper—so far as money goes—than fighting, the only effectual remedy for Indian outrages on our frontiers, is the strong hand. The only way to conquer the American savage is to punish such outrages by almost total extermination of the tribes that perpetrate them. To exhibit mercy to these butchers is to waste powder.

ON A PROBABLE CONNECTION BETWEEN THE RESISTANCE OF SHIPS AND THEIR MEAN DEPTH OF IMMERSION.

By W. J. MACQUORN RANKINE, C.E., LL D., F.R.S.

1. It was pointed out some time ago, that when a wave in water is raised by a floating solid body which is propelled at a speed greater than the natural speed of the wave, the ridge of the wave assumes an oblique position, and the wave advances obliquely; so that while it travels at its own natural speed in a direction perpendicular to its ridge line, it at the same time accompanies the motion of the solid body at a greater speed. The angle of obliquity of the advance of the wave is such that its cosine is the ratio of the natural speed of the wave to the speed of the solid body. It was at the same time pointed out that under those circumstances there is an additional breadth of wave raised in each second, expressed by the product of the speed of the solid body into the sine of the obliquity; or, in other words, by the third side of a right-angled triangle, of which the speed of the solid body is the hypothenuse, and the natural speed of the wave the base; that in raising that additional breadth of wave per second, energy is expended; and thus that a rapidly increasing additional term is introduced into the resistance to the motion of the solid body, so soon as its speed exceeds the natural speed of the waves which it raises.

2. The waves taken into account in Mr. Scott Russell's theory of the resistance of ships, are waves whose speed depends on their length alone; and that theory accounts for a rapid increase in the resistance of a ship, when her speed exceeds the natural speed of certain waves of lengths depending on her length.

3. In a paper read to the Royal Society in May, 1868, it was shown that for all waves whatsoever, there is a relation between the natural speed and the virtual depth of uniform disturbance, that is to say, the surface particles would have to extend in order to make a total volume of disturbance of the water equal to the actual volume of disturbance. That relation is, that the speed of advance of the wave is that due to a fall of half the virtual depth. In a paper read to the Institution of Naval Architects in 1868, it was pointed out that every ship is probably accompanied by waves, whose natural speed depends on the virtual depth to which she disturbs the water, and that, consequently, when the speed of the ship exceeds that natural speed, there is probably an additional term in the resistance depending on such excess.

4. The object of the present paper is to call the attention of the British Association, and especially of the committee on Steamship Performance, to the probable existence of this hitherto neglected element in the resistance of ships; and to suggest that suitable observations and calculations should be made in order to discover its amount and its laws. Among observations which would be serviceable for that purpose may be mentioned the measurement of the angles of divergence of the wave ridges raised by various vessels at given speeds, and the determination of the figures of those ridges which are well known to be curved; and among results of calculation the mean depth of immersion, as found by dividing the volume of displacement by the area of the plane of flotation; and that not only for the whole ship, but for her fore and after bodies separately, for it is probable that the virtual depth of uniform distutbance, if not equal to the mean depth of immersion, is connected with it by some definite relation.

Results of Observations.—In an appendix are given the results of the only three observations which I have hitherto found it practicable to make, of the speed of advance of the obliquely diverging waves raised by ships. The waves in each case were those which follow the stern of the vessel; the vessels were all paddle steamers, but care was taken to observe the positions of the wave ridges where they were beyond the influence of the paddle race. The virtual depth corresponding to the speed of advance of those waves is calculated in each case, and it is found to agree very nearly with the mean depth of immersion. It is to be observed, however, that the mean depth of immersion of one vessel only. viz., the *Iona*, has been measured from her plans. For each of the other vessels, a probable value of the mean depth of immersion has been obtained, by assuming that it bears the same proportion nearly to the total draft of water in them as the in the *Iona*. That assumption cannot be very far from the truth, for the three vessels belong to the same class of forms, being of shallow draft, and very flat bottomed amidships, but having very fine sharp ends. Few as those observations are, they seem sufficient to prove the existence of waves whose speed of advance depends on the depth to which the vessel disturbs the water. The connection between those waves and the resistance remains as a subject for future investigation.

Glasgow University, 15th August, 1868.

APPENDIX.

1. *Steam Vessel "Iona."*—Speed of vessel at time of observation. 15 knots=25·35 ft. per sec.; angle made by ridges of stern waves with course of vessel, $22\frac{1}{8}°$; sine of that angle, 0·383; product, being velocity of advance of stern waves, 9·71 ft. per sec.; virtual depth corresponding to that velocity $9{\cdot}71^2 \div 32{\cdot}2 = 2{\cdot}93$ ft.; mean depth of immersion of vessel as measured on her plans, 3 18 ft. N B—The draft of water was 5 ft., so the mean depth of immersion was 0·64 of the draft, nearly.

2. *Granton and Burntisland Ferry Steamer.*—Speed of vessel at time of observation, 10 knots=16·9 ft. per sec; angle made by ridges of stern waves with course of vessel, 45°; sine of that angle, 0·7071; product, being velocity of advance of the stern waves, 11 95 ft. per sec.; virtual depth corresponding to that velocity, $11{\cdot}95^2 \div 32{\cdot}2 = 4{\cdot}44$ ft.; draft of water of the vessel, 6·67 ft; probable mean depth of immersion on the supposition that it is 0·64 of the draft, 4·3 ft.

3 *Steam Vessel "Chancellor."*—Speed of vessel at time of observation, 12·64 knots=21·36 ft. per sec.; angle made by ridges of stern waves with course of vessel, 22°; sine of that angle, 0·375; product, being velocity of advance of the stern waves, 8 01 ft. per sec.; virtual depth corresponding to that velocity, $8{\cdot}01^2 \div 32{\cdot}2 = 2$ ft.; draft of water of the vessel, 3·5 ft.; probable mean depth of immersion, on the supposition that it is 0·64 of the draft, 2 24 ft.

TABLE OF VIRTUAL DEPTHS CORRESPONDING TO DIFFERENT VELOCITIES OF ADVANCE.

Velocity of Advance. Knots.	Feet per second.	Meters per second.	Virtual Depth. Feet.	Meters.
1	1·69	0·515	0·09	0· 27
2	3·38	1·03	0 35	0 ·08
3	5·06	1·54	0·80	0·243
4	6 75	2 06	1·41	0 433
5	8·44	2·57	2 21	0·676
6	10·13	3·09	3·18	0·973
7	11·8	3·60	4·33	1·325
8	13·5	4 12	5·66	1 73
9	15·2	4·63	7·16	2·19
10	16·9	5·15	8·84	2·70
11	18 6	5 66	10·7	3·27
12	20 3	6 18	12·7	3·89
13	21·9	6·69	14·9	4 57
14	23·6	7·20	17 3	5·30
15	25 3	7·72	19·9	6 08
16	27·0	8·24	2 ·6	6·92
17	28 7	8 75	25 6	7·81

—*The London Artizan.*

CHEMICAL NOMENCLATURE.

[Continued from page 50.]

The combination of the different elementary substances takes place by a certain attractive power of their smaller particles (atoms or molecules), which is called chemical affinity. As may be expected *a priori*, it differs greatly in different substances, and even differs in the same two substances when the circumstances are changed. The principal modifying circumstance is heat.

Carbon and oxygen, at the common temperature, have no affinity, that is to say, they will not combine. A piece of carbon may lie for a century in oxygen gas without combination taking place, but when sufficient heat is applied the two substances combine with great energy. However, the amount of heat necessary to cause this combination differs according to the form of carbon used. Thus, lamp-black requires much less heat than charcoal, more heat will be required to ignite coke, more still for anthracite coal, yet more for diamond, and, as regards graphite, we can scarcely produce heat enough to ignite it. The comparative incombustible nature of the last named substance, renders it suitable for crucibles for melting brass and other metals or alloys. All these substances are only carbon in different states, called allotropic conditions.

At the same time that the combustion commences to take place, it develops new heat in abundance, heating up the adjacent parts to the temperature required for combination in their turn, and so keeping up the heat to cause the final combustion of any amount of carbon and oxygen present. In the place of carbon, sulphur or any other so-called combustible substance may be substituted.

Combustion, therefore, is nothing but a chemical combination of a so-called combustible substance (carbon, sulphur, hydrogen, phosphorus, etc.), usually with the oxygen of the atmosphere; all that is required to start it, is a sufficient rise of temperature, and any large conflagration gives a striking illustration of the considerable development of heat, which is the result.

By the combustion of carbon, every six parts thereof will unite with sixteen of oxygen, when plenty of oxygen is present; by a limited supply of this last substance, it will only combine with eight parts; and, as the symbol C stands for six parts of carbon and O for eight of oxygen, the product of this combustion is expressed in the first case by CO_2, in the last by C O; and as the first possesses acid properties it is called carbonic acid, and the last possessing no such properties is called carbonic oxide; the last being the generic name for all combinations with oxygen which possess no acid properties.

The combustion of sulphur has for result, the combination of sixteen parts of sulphur with sixteen of oxygen; formula, SO_2, named sulphurous acid.

Selenium and tellurium combine after the same law and with similar results as sulphur, except that the respective numbers of combination are 40 and 64, respectively with sixteen of oxygen; formulæ, $Se\,O_2$ and $Te\,O_2$.

The combustion of hydrogen has for result a compound of one part of hydrogen (always by weight) with eight of oxygen, forming water; formula, H O.

The combustion of phosphorus forms phosphoric acid; formula, $P\,O_5$, which means thirty-one parts of phosphorus and forty of oxygen.

The combustion of potassium forms potassa; formula, K O, which means thirty-nine parts of the metal and eight of oxygen.

Magnesium burning forms magnesia; formula, Mn O, or thirteen parts of magnesium and eight of oxygen.

Zinc burning forms oxide of zinc or zinc white; Zn O containing thirty-two parts of zinc and eight of oxygen.

Of all the substances mentioned above, there is none that has more affinity for oxygen than red hot carbon; for this reason carbon is used as the great reducing agent, and almost any oxidized substance mixed with carbon and heated, will give its oxygen to the carbon, and carbonic acid will be formed. On this principle depends the reduction of iron from its ores, the manufacture of potassium, sodium, etc.; and it shows that also in chemistry the law of the strongest prevails, just as in all nature, not excepting the human race. In savage nations, brute strength only prevails, but among civilized people, the strength of mind and knowledge subdues the mere material brute forces, and illustrates the superiority of mind over matter.

The Great Chaudiere Dam on the Ottawa.

The Ottawa *Times* gives an account of the great Chaudiere dam on the Ottawa river, which was formally opened Oct. 16th. It states that it has been ascertained that for years past the water in the Ottawa during the autumn months has been gradually decreasing in volume, and never before has it been so low as this season. The cause will doubtless remain a mystery until the end of time. In fact so low had the water fallen, that for a time apprehensions were entertained that the great mills and factories at this place would be compelled to shut down in consequence. This would have been almost a calamity, had the necessity for it arisen, as many thousands derive their livelihood from their constant operation. However, human ingenuity came to the rescue, and provided a certain and lasting remedy.

An arrangement had been effected sometime since between the mill-owners here and the Government, that the former might construct a dam in the bed of the river, just above the Chaudiere Falls, for the purpose of raising the water in the rear, with a view to augmenting the supply in the ponds and "flooms" connected with the mills. Then arose the difficulty about drowning the adjacent country on both sides. This was provided against by the removal of an island, in the immediate vicinity of the dam, to low water level, so as to admit of its escape when high. This part of the work has been so managed, that the obstruction caused by the dam in low water will be equaled by its facility for escaping during high water—there being an exact quantity of high water obstruction removed to equal that put in to affect the low

It was no ordinary undertaking to control the impetuous waters of the great Ottawa, and subject their powers to the manipulation of man—to obey his will, and to be obedient to his wishes and desires; but with all old Ottawa's greatness it has been brought down to usefulness, and compelled to exercise a certain amount of industry before taking its departure for its final home in the bosom of the Atlantic.

The entire length of the dam is nearly 400 feet, built of framed beams strongly bolted, and securely fastened to the solid rock in the bed of the river. Its width at the base is 74 feet and 62 feet at the top, with a secure bed of stone presented to the current. The island which was removed was about two acres in extent, and stood about 5 feet 6 inches above the water level. This furnished 9,0.0 yards of stone which were used in filling in the dam.

The New Metals.

The Boston *Journal of Chemistry* says:—We presume but comparatively few of our readers have had opportunities of examining the new metals brought to light by spectrum analysis. The two most remarkable, *cæsium* and *rubidium*, are strikingly like the metal potassium; and so greedy are they for oxygen, it is necessary to keep them constantly immersed in pure naphtha. The expense of eliminating these rare and sparsely disseminated metals is so great, their cost is marvelously high. A specimen of rubidium in our possession cost us at the rate of more than seven thousand dollars a pound, or one dollar the grain. These two new alkaline metals were discovered by Bunsen, a few years ago, while experimenting upon some mineral waters with the spectroscope. By no other method of analysis could they have been discovered. In examining the waters, he observed some bright lines he had not seen in any other alka'ies which he had investigated. He felt certain that these lines indicated a new metal or metals, just as Adams and Leverrier, from the perturbations of the planet Uranus, were convinced of the existence of Neptune. The amount present in the substance examined could not exceed the one thousandth part of a grain; hence, the quantity held in the water was infinitesimal. To obtain a manageable quantity, Bunsen evaporated forty tuns of the Durkheim Spring water, and from this vast amount obtained of cæsium only 105 grains of the chloride, and of rubidium 135 grains! How few know anything of the magnitude of the labors of chemists engaged in research. Since the discovery of the new metals, in the spring water of Durkheim, they have been found in many other springs, in mica, and other old plutonic silicates; also, in the ashes of beetroot, tobacco, coffee, and grapes. The mineral lepidolite contains considerable rubidium, and most of the specimens in the hands of chemists were obtained from that mineral. We cannot predict for the new alkaline metals any very great practical use in the arts.

The other new and interesting metals which we find in our collection are *lithium*, *thallium*, and *indium*. The first of these is of white color, and fuses at 180°. It is the lightest metal known, being almost as light as cork. Before spectrum analysis was discovered, it was supposed the lithium salts were very rare; but the wonderful spectroscope reveals their presence in almost all waters, in milk, tobacco, and even in human blood. A very strange plant is the tobacco plant. How singular, that atoms of the rarest and most remarkable of all the metals—cæsium, rubidium, and lithium—should be found in this pungent weed! When volatile lithium compounds are heated in flame, they impart to it a most magnificent crimson tinge; nothing in ordinary pyrotechny can compare with it. If one six-thousandth part of a grain of lithium be present in a body, the spectroscope shows it when it is volatilized, or burned.

Sumac.

Considerable inquiry having been recently made for information upon the subject of sumac, the commerce in which seems to be growing in this country, the following from the New York *Mercantile Journal* will be of interest:

"The sumacs belong to the Rhus genus of the order of Anacardiaceæ of plants. Gray, the botanist, makes six varieties of sumac found in America from Virginia northward; namely, the Staghorn sumac, Smooth sumac, Dwarf sumac, Poison sumac, Poison ivy, and the Fragrant sumac. The sumacs have a resinous, milky, acrid sap, and several varieties are poisonous. Several kinds, among which are the most common varieties in this country, namely, the Staghorn and Smooth sumac, contain tannin and yellow coloring matter, and are considerably used for tanning light colored leathers and in dyeing. It is also used in calico printing for producing yellow, grey, or black or brownish yellow, according to the mordant used in the operation. A number of varieties grow in different parts of Europe, which are used for the purposes above specified. The cultivation of this tree for its marketable products has largely increased in some parts of the United States during the past four or five years The parts of the tree which are gathered are the leaves, the peduncles, young branches, and panicles, of which considerable quantities are exported."

The Richmond *Enquirer* says: "Large quantities are gathered in the counties of Eastern Virginia, and sent to Richmond, Alexandria and Fredericksburg for sale. It is dried and packed in bags, and sells readily for from $1.75 to $2 per 100 pounds. It grows spontaneously, and the crop of next year is improved by breaking off the growth of the present year."

The mordants used in dyeing with this substance are either tin, acetate of iron, or sulphate of zinc. The first gives yellow, the second grey or black, according to strength, and the third brownish yellow.

A Challenge from a Lady.

NEW YORK, Oct. 20, 1868.

Messrs. WHEELER & WILSON, No. 625 Broadway:

Gentlemen:—Referring to the challenge of Mr. Pratt, whose Wheeler & Wilson Sewing Machine has been in use ten years without repairing, I beg to state that I have used my Wheeler & Wilson Sewing Machine, in family sewing, *fourteen years*, without even the most trifling repairs, and it is now in so good condition that I would not exchange it for your latest number (now upward of 350,000). One needle served me more than a year for fine sewing.

Can any one beat this?

Yours truly, Mrs. ANNE WARNER.

Any one who can give a better report than this will be entitled to one of our new tucking gages.

WHEELER & WILSON MANUFACTURING Co.

CHILIAN AGRICULTURAL EXPOSITION.—With reference to the Agricultural Exposition to be opened at Santiago, in Chili, South America, on the 1st of April next—the particulars of which appeared in our issue of the 22d July—we have to state that the Chilian Minister expresses the hope that manufacturers throughout the country are preparing the contributions they intend to exhibit. We learn that liberal and extensive preparations are being made by that Government for the accommodation of all.

OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING OCTOBER 27, 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.*

83,355.—HARVESTER RAKE.—Philip Ammerman, Cynthiana, Ky.

I claim the guide bar, k, and beveled block or cap, t, in combination with rake, A, and endless chain, C, substantially as and for the purpose described.

83,356.—SUGAR PAN DERRICK.—Joseph D. Ayers, East Greensborough, assignor to J. O. Cutter, and William Wallace Goss, Greensborough, Vt.

I claim, 1st, The combination, in a sugar pan derrick, of the guide beams, B B', guide post, G, rotating upright, A pulley, k, cords, a b, derrick beam, C, drum and crank handle, l, all constructed and operating substantially as shown and described, and for the purpose set forth.

2d, The frame, m m o o, hook rods, h h h h, and braces, q q, with the parts specified in clause first of the claim, all substantially as shown and described, and for the purpose set forth.

83,357.—MANUFACTURE OF PIGMENTS FROM THE SULPHURETS OF ZINC AND LEAD.—Nathan Bartlett, Centerville, N.J., assignor to himself and Franklin Osgood, Richmond County, N. Y.

I claim, 1st, The manufacturing of pigments from the sulphurets of zinc and lead, combined in the manner and by the means substantially as herein described.

2d, Also, the pigment made from the sulphurets of zinc and lead, as a new article of manufacture.

83,358.—AUTOMATIC CAR COUPLING.—Wilson Bragg, Connersville, Ind.

I claim the combination of the chain, E, sliding block, C, and coupling pin, F, substantially as and for the purposes specified.

83,359.—HOT AIR REGISTER.—Thomas W. Brown, Reading, Pa.

I claim the improvement of having the sectoral lever fixed directly to the slat journal, when the slats are pivoted to the frame, and to a connection bar having no pivoted connection with the sectoral lever, as set forth, the whole being substantially as described and represented.

83,360.—SPRING.—Frederick Cajar (assignor to himself and James Anderson), New York city.

I claim elliptical or arched springs, made of corrugated sheets or plates, arranged as herein shown and described, substantially as and for the purpose set forth.

83,361.—MILL FOR TEMPERING CLAY.—George Carnell, Samuel Williams, and William Ellis, Philadelphia, Pa.

We claim the inverted double rack, H, cast with a cover, h2, and internal web, h3, in combination with saddle, M, and pinion, E, for operating the wheel, B, of a clay mill, in the manner substantially as shown and described.

83,362.—JIG SAW.—Joseph E. Chamberlin, Wilmington, Del.

I claim the circular timber, b, with its vernier plate and index, iron band, d d, sliding head blocks, c c, braces, e e, and saw, s, in combination with the semi-circular ways, y y, carriage, s, segment, f, plates, g g, h h, pulley, i, and their connecting or reciprocating appliances, constructed, arranged, and operating substantially as and for the purposes set forth.

83,363.—FOLDING PERAMBULATOR.—Andrew Christian, New York city.

I claim, 1st, Extending the front uprights, D, of a folding perambulator downward, to form supports for the front axle, J, as set forth.

2d, Extending the rear uprights, E, of a folding perambulator upward, to form supports for the handle, I, as set forth.

3d, Constructing the jointed arm supports, H, of a folding perambulator, of two parts, a b, which are pivoted together, as set forth, the narrow part, b, fitting into a groove in the underside of the main part, a, as shown.

83,364.—SEEDING MACHINE.—N. A. Clopton, and John S. Clopton, Fauquier County, Va.

We claim the combination and arrangement of the reciprocating slides, k l, vibrating arms or levers, h, connecting pipes or links, j, pivoted arms, g f, and springs, i, or their equivalents, constructed and operated in the manner substantially as shown and described, and for the purpose set forth.

83,365.—MACHINE FOR EDGING METALS.—William Crossley, Chicago, Ill.

I claim the combination of the slotted guide, C C', carriage, B E, clamp A, track, G G, slides, M M, crank screw, and slides, F F, constructed as and for the purpose set forth.

83,366.—DRILL PRESS.—John M. Cullen, and Andrew J. Baird, Pittsburg, Pa.

We claim, not any of the specified parts in severalty, but the improved tool, consisting of the several parts specified, all combined, constructed, and arranged as described.

83,367.—FRUIT JAR.—Edward M. Davis (assignor to Henry M. Collins, Benjamin F. Collins, and Homer Wright), Pittsburg, Pa.

I claim, 1st, The method, substantially as described, of labeling preserve cans and other similar vessels, in the act of sealing the covers of such vessels upon them.

2d, The cover, B, constructed with names radiating from its center, and adapted for use upon a preserve vessel, having an index of a suitable description upon it, substantially as and for the purposes described.

83,368.—ATTACHING STRINGS TO TAGS.—Benjamin L. Dennison, Boston, Mass.

I claim, 1st, The combination of the metallic clasp, a, with the string and label card, substantially as and for the purposes described.

2d, The metallic clasp, a, figs. 2 and 5, constructed so as to operate as a clasp, a needle, and a bar, at the same time, substantially as and for the purposes described.

83,369.—COMBINED HINGE AND FASTENER.—Leonard Felker, Tewkesbury, Mass.

I claim the combination and arrangement of the support, e, with its stem, c, and plate, d, latches, h and i, and catches, b and b', and wings, f f, with or without the plate, a, when arranged to operate as and for the purpose described and set forth.

83,370.—FEED WATER HEATER FOR STEAM GENERATORS.—R. R. Fenner (assignor to himself and Eli Halberstadt), Urbana, Ill.

I claim the arrangement of the supply pipe, E, exhaust pipe, C, ingress pipe, B, water delivery pipe, G, filter, I, and vessel, A, substantially as herein set forth.

83,371.—SCREW TAP.—Walter K. Foster, Cambridgeport, Mass.

I claim the arrangement of the main and lateral oiling passages, a b, and the groove, d, in one of the ranges, of screw cutters, the whole being substantially as described.

83,372.—PROCESS FOR THE MANUFACTURE OF IODINE.—Jules Fougerat and Lucien A. Tartierè, Quogue, N. Y., assignors to "The Alga Chemical Works," New York city.

We claim, 1st, Filtering the calcinized and boiled mussels, preparatory to their distillation, as set forth.

2d, The application of peroxide of manganese to the making of iodine from mussels, as set forth.

3d, The process herein specified of producing iodine from mussels.

83,373.—SPRING BED BOTTOM.—Thomas J. Gaffney and Charles H. Ducks, Detroit, Mich.

We claim the leather strips, H, in combination with the longitudinal top slats, G, and transverse steel bars, E, whereby the slats are secured to the bars, as herein shown and described.

83,374.—VULCANIZED INDIA-RUBBER BELTING.—Dennis C. Gately, Newtown, Conn., assignor to New York Belting and Packing Company. Antedated October 2, 1868.

I claim, 1st, Belting or banding for driving machinery, composed of paper or other pulped and calendered material, combined with india-rubber or other vulcanizable material, substantially as herein set forth.

2d, The use, in combination with paper or other pulped and calendered material, of a vulcanizable cement, applied either externally as a coating, or both internally, as a cement between several layers of paper, and externally, substantially as and for the purposes set forth.

3d, The vulcanizing of paper belting, with rubber or other material or compound capable of vulcanization, between metal plates or otherwise, as herein indicated, so as to produce a smooth surface on the belts, substantially as set for

83,375.—SPINNING MACHINE.—John Goulding, Worcester, Mass.

I claim, 1st, The combination of the segment cam, k, in two parts, elastic roller, j, brake lever, s, with its pin, u, and disk, v, or their equivalents, for giving an intermittent feed to the roving, and so that the quantity of roving given out for each revolution of segment cam, k, can be regulated substantially as set forth.

2d, The segment cam, k, in two parts, elastic roller, j, brake lever, S, with its pin u, disk, v, drum, G, rollers, J I, and spool c, in combination with the twisting tube, K, provided with a staple b', or their equivalents, to produce a counter twist to the roving, substantially as set forth.

3d, The segment cam, k, in two parts, elastic roller, j, brake lever, S, with its pin, u, disk, v, drum, G, roller, J I, spool, c, twisting tube, K, with a staple, b', in combination with drawing rollers, c' e' d', flyer, F, spindle, F', bobbin, g', or their equivalents, to produce yarn from roving, substantially as set forth.

4th, The conical cam, R, or its equivalent, mounted on the traversing shaft, N, in combination with the tappet arm, j', lever, k', sliding wedge, n', chain wheels, T, and chain, l' which support the spindle rails, M', substantially as set forth.

83,376.—BOLT-HEADING MACHINE.—Robert Gracey, Pittsburg, Pa.

I claim, 1st, The weighted lever, F, link, G, and toggle arms, K K, in combination with the header, N, and steam cylinder, A, arranged and operating substantially as described.

2d, An adjustable spring bumper head, J, arranged in relation to the weighted drop beam, F, toggles K K', and piston in steam cylinder, A, for regulating the throw of bolt-heading dies, substantially as and for the purposes hereinbefore set forth.

83,377.—DIE FOR BOLT-MAKING MACHINES.—Robert Gracey, Pittsburg, Pa.

I claim, 1st, The combination of the dies, a a', die blocks, b b' and plunger, f, with or without the socket, o, said parts being arranged substantially as described.

2d, The griping dies, a a', with raised projection, d, in combination with the die blocks, b b', having water passages, n n', when so arranged, substantially as hereinbefore described, as to form an enclosed space for the passage of water around the raised portion of the dies whenever the heading tool is withdrawn.

83,378.—INDEX.—Henry H. Hall, Boston, Mass.

I claim the within-described index or tabular guide to indexes, consisting of the combination of letters and figures, substantially as and for the purposes set forth.

83,379.—IRONING TABLE.—L. Harrington, Saugatuck, Mich.

I claim a folding table, made with a three part top, A B C, in combination with flat iron holder, H I, hinged leg, G, supporting a pivoted bearer, S, and bearer, T, constructed and arranged to operate substantially as and for the purpose set forth.

83,380.—CHECK-VALVE FOR STEAM AND OTHER ENGINERY.—Joel Hayden, Jr., Haydenville, Mass.

I claim the combination of the valve, J, cup, F, connecting rod, G, outlet, D, and inlet, C, with a partition, A, and valve seat, B, between them, whereby the fluid or liquid is enabled to close the valve by its pressure against the cup, when the valve is relieved from outside force, substantially as herein described and shown.

83,381.—BUCKLE.—Henry Herbert, Jersey City, N. J.

I claim the self-fastening buckle, consisting of a frame and two slotted slides, for the purpose substantially as described.

83,382.—HOT BLAST APPARATUS FOR PUDDLING AND OTHER FURNACES.—P. Hoop, Jr., and R. Hoop, Berlin Cross Roads, Ohio.

We claim, 1st, The rings, C, provided with the lugs, e, in combination with the foundation plates, c, as and for the purpose described.

2d, The rings, C, in combination with the pipes, D, made in three or more sections, and having their middle portions outside the chimney, as and for the purpose specified.

83,383.—DEVICE FOR SHARPENING SAWS.—David Huffman, Luray, Va.

I claim the block, A, jaws, B B, and screws, c c, when constructed and arranged as described, and for the purpose set forth.

83,384.—STEAM GENERATOR.—R. W. Humphreys, Clarksville, Tenn.

I claim a steam boiler, in the form of a hollow cylindrical annular ring, with fire box and fire flues, and smoke stack, attached substantially in the manner herein shown and described.

83,385.—ELEVATOR.—Amos B. Hunt, Matteson, Mich.

I claim, 1st, The crane, B, crane post, A, sheaves or pulleys, arranged at the points d f u and i, rope or cord, C, arranged on the sheaves and passing down through the axis of the crane, in combination with a sweep bar, G, all substantially as set forth.

2d, The swivel hook, l, and its accessory parts, m j n, in combination with the pin, o, and tripping device, r q, all substantially as herein set forth.

3d, The crane, B, when constructed of planks and parts, a a g g c b d, substantially as described, in combination with the crane post, A, bearing blocks, h b, sweep bar, G, cord or rope, C, and pulleys at the points, d f u and i, all as set forth.

83,386.—PLANT PROTECTOR.—J. M. Hurt, Blacks and Whites, Va.

I claim, as a new article of manufacture, the plant protector, consisting of the cylinder, A, adapted to rest upon the ground over the plant, perforated circumferentially near its top, a B, and provided with the horizontal glass top, C, as herein described for the purpose specified.

83,387.—SHOULDER BRACE AND SUSPENDER.—Ebenezer Jennings, Jr., New York city.

I claim, 1st, A combined shoulder brace and suspender, consisting of two straps crossing each other at both ends in adjustable slides, substantially as described, either with or without an adjustable slide at the back crossing.

2d, The adjustable double slide, cut from a single piece of sheet metal, or other suitable material, substantially as described.