ANSWERS TO CORRESPONDENTS

Two slight corrections are necessary to our answer about horizontal sun dials, on page 409 of vol. 29. In line 29, T W should be T U; and in line 58, for "from" read "upon."

J. B. H. can make green ink by dissolving binacetate of copper in water, or verdigris in vinegar; or better still, dissolve freshly precipitated hydrated oxide of chromium in ammonia, and add sufficient distilled water.—G. S. T. will find that drying kilns are described in our advertising columns.—J. N. C. is informed that our index of patents contains a list of all the patents issued in each week.—G. B. can probably fasten paper to steel by painting the steel with metallic paint, letting it dry, and then using mucilage or glue.—B. D. can produce a crystallized appearance on tin plate by applying to it in a heated state some dilute *aqua regia* for a few seconds, then washing it with water, drying, and coating with lacquer.—C. E. W. proposes an impossibility.—D. C. does not send data sufficient to explain his meaning.

J. P. asks: Will your directions, on page 283, vol. 29, for making plastic rubber, do for sheet vulcanized rubber, and will it be flexible after it is finished? A. The vulcanized cannot be dissolved as easily as the pure rubber.

E. J. M. asks: What is the proper solder and flux for soldering Britannia metal? A. 100 parts, by weight, of tin, 1 one thousand six hundredth of copper, and 1 one thousand six hundredth of lead. Apply with sal ammoniac.

E. D. S. asks: Will a vessel, sinking in mid ocean, go to the bottom? If not, what is the reason? A. It depends on the weight of the vessel. Water is slightly compressible, and hence becomes heavier as the depth is increased. The vessel will continue to sink as long as its weight is greater than that of an equal bulk of water.

O. H. P. says: 1. I see that petroleum is recommended for removing scales in steam boilers? Is it any good? 2. What are the proper dimensions for a bolting reel to bolt 15 bushels per hour? A. 1. We do not recommend it. 2. We advise you to correspond with a manufacturer.

F. H. K. asks: How can I temper spiral springs of very thin steel wire? A. Heat over a charcoal fire and harden in oil.

J. T. D. asks: In re-boring a cylinder, is it best to make new heads? If not, how are the old ones best packed? Is it necessary to make a new piston? If an engine uses 60 lbs. of steam where it should take but 30, what am I to do? Shall I bush the exhaust? A. Ordinarily the old heads and piston can be used. It would probably be better to bush some of the leaks than to contract the exhaust.

C. A. B. asks: How are direct acting hydraulic elevators balanced so as to have the same power when 50 feet high as when 2 feet high? A. They are generally balanced by increasing the pressure, as by means of a pump.

C. T. H. asks: 1. Will cotton do as well as silk to wind the wires of an electro-magnet? 2. How can I prepare the impression of a medal in wax for plating with copper? I succeed with the medal itself, but not with the impression. A. 1. Cotton answers very well, but silk is considered the better. 2. The wax impression must be dusted with the finest plumbago and the wire made to connect with the plumbago surface.

G. F. A. J. asks: Is there any known chemical, or combination of chemicals, which would be effectual in counteracting the smell of wood alcohol when used for the manufacture of varnish? A. Wood alcohol is distilled from crude pyroligneous acid or wood spirit Berzelius recommends the crude spirit to be agitated with a fatty oil to remove empyreumatic matter, and then to rectify it, first from recently burnt charcoal and next with chloride of calcium.

C. A. C. says: 1. What is coal tar naphtha? 2. What is a good recipe for starch polish? 3. What cement is used in uniting glass brackets? A. 1. Coal tar naphtha is a mixture of various volatile hydrocarbons obtained from distilling coal tar. By repeated purification and fractional distillation, benzole, the chief and most important constituent of coal tar naphtha, is obtained. 2. Put a small piece of paraffin about the size of a hickory nut into a bowlful of starch. This is said to give a polish to the starched articles. 3. Soak isinglass in water and then dissolve it in alcohol 3 ozs., add the bottoms of mastic varnish (thick but clear) 1½ ozs.; mix well. Set the phial in boiling water when the cement is to be used.

R. S. B. says: If the moon looks larger when near the horizon because of the peculiar condition of the atmosphere, the angular size would be greater near the horizon; but with an accurate instrument, if any difference were found, it would be that the moon is larger when near the zenith. The cause, instead of being in the atmosphere, is in the eye, being an unconscious greater allowance for distance in one case than in the other. A. The moon at the zenith is 4,000 miles nearer to the earth than at horizon, one sixtieth of the whole distance.

C. M. B. asks: 1. Would a sheet of india rubber, pure or vulcanized, ⅛ inch thick, be impervious to mercury under a pressure varying from 5 to 15 lbs. per square inch, at a temperature of 110°? Would the nature of the rubber be in any way affected by being subjected to this action for several months? 2. When mercury is kept in an iron vessel, is the nature of either metal affected by the contact? A. 1. We do not think pure rubber will be affected. 2. Not under ordinary circumstances.

A. B. H. asks: How can I dry glue in winter without having it frozen? Could you tell me the name of a work on the manufacture of glue and sand paper? A. Glue is dried on the large scale by exposing it to the air for 2 or 3 days, and, when sufficiently firm, completing the process by drying in a stove. See article on glue in Ure's "Dictionary."

W. McK. asks: Is there a premium offered by any railroad company for the invention of a railway gate to close fields, etc., through which they pass? A. No.

C. M. says: We use water from the water works, in a mill which has 150 feet or more fall from the reservoir, and we have a great deal of trouble with the pipes bursting from so great a pressure. Will the pressure be as great on the pipes if the gate or valve half way between the mill and reservoir is partly closed, supposing we are not drawing water below the gate? A. We think the pressure will be just the same, in this case. Your best plan will be to use a stronger pipe.

G. E. asks: Why do veneers, which seem firm and solid when first put on, peel off when they have lain a few weeks? The stock and veneer is perfectly dry, the glue is properly soaked and cooked; we think something is put into the glue stock, to cleanse it when the glue is manufactured, which destroys the life of the glue, or else the glue is adulterated to make it heavy. It has every appearance of being good glue. A. If the veneer and stock are as described, we know of no reason why glue properly prepared and applied should not adhere, unless it is of poor quality or has been adulterated. There is a prejudice among some workmen in favor of a dark colored glue, with somewhat of a strong odor. These properties, however, are indicative of impurity and bad preparation. The best glue is pale colored, hard and solid, and has a brilliant fracture. It should merely soften in cold water, not dissolve; and the more it swells without dissolving the better generally it is. For use, it should be broken into small pieces, allowed to soak for some hours in cold water, and then put into a boiling water bath, but never boiled itself. It is often injured by the use of too much lime in its preparation, and too long boiling, and can be adulterated with lime and phosphate of lime.

M. W. H. asks: Would any given load require more pounds pressure to push it 60 miles per hour than it would 30 miles, provided there were no resistance from the atmosphere? 2. How many pounds pressure (*minus* resistance of the atmosphere) will it require to propel a light car, weighing a tun, on a smooth level track? 3. If steam be confined, what will be its pressure at 300°, at 400° and at 500° Fah.? 4. What speed should the rim of a 6 inch circular saw (driven by foot power) run, to saw the fastest? 5. The fast motion of my foot lathe will not saw as fast as the slow motion; why is this? A. 1. Yes, under the circumstances stated. 2. About 8 lbs. 3. You will find rules, by which you can answer this question, on page 81, volume 29. 4. 9,000 feet per minute is the speed generally recommended for the rims of circular saws of all sizes. This would give about 6,000 revolutions per minute as the speed for your saw. 5. We cannot tell, from your meager statement, why you do not get good results by increasing the speed.

P. T. R. asks: 1. May any one make copies in white metal of United States and continental copper coins, and of all kinds of ancient coins and medals, and be on the safe side of the law? 2. What is the best method of making copies of coins and medals in soft metal? 3. May anyone make copies of any kind of medals that do not show on their face that they are copyrighted? A. 1. We do not think there is any law against making such copies. Much expense is required to enable one to make fine castings of coins and medals. 2. A fusible alloy, which melts at a low temperature, is used. This can be made by melting together 8 ozs. bismuth, 3 ozs. tin, 5 ozs. lead. To obtain a sharp casting, the alloy should first be poured into a box, of the size of the coin, and the latter is to be pressed upon it just before it solidifies. 3. Unless the fact that an article is copyrighted is marked thereon, the owner has no claim against an infringer.

R. H. W. A. asks: 1. How can I cement glass to metal? 2. How can I dissolve enamel, used in enameling jewelry, so that when applied it will harden? 3. How can I remove tin solder from gold or silver? 4. How can I amalgamate the zinc plates in a Smee's voltaic battery? A. 1. Mix together equal weights of white lead and red lead, for the cement required. 2. Metals are enameled by covering them with vitrifiable compounds, that is, such as form a glass by exposure to heat. You cannot dissolve this enamel or apply it in any other way. 3. You can melt it, and scrape it off without injury to the other metals. 4. Wet them with dilute sulphuric acid, and at the same time rub mercury over them till a bright coating is produced.

C. says: I am running an engine, of which the governor does not work well. There is no place to oil the valve, and it sticks. I say that it would help it to put a lubricator in the pipe to oil the valve. Another man says that it will do no good. Which is right? A. We do not think the trouble is in the valve. It is probably caused by having the valve stem packed too tightly, or by some imperfection in the connections.

J. H. P., of Pa.—Minifie's "Mechanical Drawing," price $4.00, and Joynson's "Machine Gearing," price $2.00, are the two works you need. They may be had of Baird, Philadelphia, Pa., or of Van Nos. trand, New York city.

D. E. B. says: Having read of the primeval copper tools found in the old and new world, I should like to ask: 1. Is it true that they will cut hardened steel? 2. What is the texture of the hardened part? 3. Is the tool hard all along, or is it like our cold chisels, only tempered at the point, or where needed? 4. Does heat destroy the temper? 5. What are the electric and magnetic powers? A. We are not able to give you much information on this subject. It is true that the ancients made tools and instruments of bronze, which seemed to possess all the hardness of those made of steel, but the process of manufacture is purely a matter of conjecture.

A. F. asks: Is there any process by which nitrogen can be separated from the oxygen in atmospheric air, and if so what is it? Is the oxygen thus separated lighter than common air? A. Nitrogen can be separated from oxygen in the atmosphere by burning the oxygen out of the air. This is accomplished by setting fire to a small piece of phosphorus contained in a small vessel floating on the surface of water, and inverting a bell glass over it. The phosphorus will burn out or chemically combine with nearly all the oxygen contained in the jar, leaving the nitrogen behind. This can be afterwards freed from impurity and dried by passing it first through water and afterwards through concentrated sulphuric acid. Nitrogen is lighter than the air, its specific gravity being 0·9713, while free oxygen is a little heavier, weighing about one tenth more than the atmosphere.

O. S. says: I am trying to heat my house with a hot air furnace; and in order to avoid the trouble and mutilation of plastered walls, incident to conveying heat by separate and distinct flues to every room, I purpose to have one large register directly over the furnace, which is in the cellar. Then three ventilating registers overhead are to warm three rooms which are right above. Can I do this successfully? A. Experiment shows that the most satisfactory results are obtained in the operation of a hot air furnace, by keeping the ascending current of air as independent of one another as possible. Heated air is sometimes conveyed from a furnace to a third story room through a pipe which also supplies a portion thereof to the first and second story rooms by means of a separate register in each of these stories; but this arrangement is seldom satisfactory. We understand the plan of our correspondent is to receive the whole volume of warm air into a first story room, and then by three openings in the ceiling of this room admit the same air into three rooms in the second story. If the upper rooms are perfectly tight, very little air will pass through the openings in the ceiling; but if open, and provided with open ventilators in the fire flues, a capricious supply may be obtained. The passage of sound, however, through these openings will make them very disagreeable. If ventilation is provided for the first story room, the warm air may pass out in this way and not ascend to the upper rooms; but without ventilation, all the foul air of the first story must ascend to contaminate the air in the second story. Probably the furnace illustrated on page 295 of our volume 29 is one that is planned more strictly in accordance with this view than any other. In this furnace, the cold air itself is divided into separate pipes before it enters the furnace; and the air, warmed in the pipe, is kept separate from the other currents until discharged at its destination. Our correspondent will find it best to have separate pipes to each room if possible; and these he may be able to insert in his chimney flues, and so avoid cutting away his partitions.

J. H. B. asks: How can rubber be reduced to a liquid state, so that it will always remain so? I have tried benzine and wood alcohol; the latter I find to work the best, but it will only dissolve a very little. I have tried linseed oil, setting it in the sun. I wish to dissolve the rubber without heat. A. The difficulty is that most of the solvents of caoutchouc are volatile, and those that are not, like linseed oil, require heat. We would suggest dissolving the rubber first in caoutchoucine, a liquid distilled from india rubber, and while liquid adding linseed oil, and stirring until a homogeneous fluid is obtained, as the oil is also dissolved by caoutchoucine. As the latter evaporates, add the oil, with frequent stirring until thick enough.

J. S. S. says: Please answer through your invaluable paper: 1. Where can I get a permanent magnet that will lift 8 lbs., and what will be its probable weight? 2. What force would it exert at a distance of one sixteenth of an inch from the poles? A. 1. From any good maker of physical apparatus. Horse shoe magnets of 1 lb. weight have been made to sustain more than 26 lbs. 2. You had better determine this by experiment.

J. P. C. says: I have a engine house some sixteen feet from a well. The well has a cucumber pump in it, and is 26 feet from platform to bottom. If I tap a pipe into the pump stick, either above or below the stationary tube or box, and carry the pipe into the engine house, and there attach a lift and force pump, will it work satisfactorily? A. We see no reason why the proposed plan will not work satisfactorily. We never recommend any particular make of machinery in these columns.

B. asks: How can I make alloys of metals that will melt at 315° and 325° Fah. respectively? A. The rule for making these alloys is as follows: Melting point of alloy = per cent by weight of first metal × its temperature of fusion + per cent of second metal × its temperature of fusion, + etc., if more metals are used. It is found, in practice, that this rule does not always give the melting point with accuracy; and it will probably be necessary for you to experiment a little, using the rule as a starting point.

S. A. says: A dispute has arisen between a friend and myself as regards the heat of water in a boiler when under a steam pressure. A says that water boils at 212° at the pressure of the atmosphere, and the higher the pressure the higher is the boiling point of the water. B. says that the boiling point does not rise, that it is always 212° Fah. Which is right, and what is the ratio of the increase, if any? A. A is right. You will find the rate of increase given in a formula on page 81 of volume 29.

H. A. S. asks: How can I make a soft solder for cans, that can be easily cut with a knife? A. The usual plan, when it is desired to fasten on a cover that can be easily removed, is to use very thin plate for the cover, and fasten it with a small amount of common soft solder.

J. G. says: I am running a 8 x 12 inches engine at 100 revolutions per minute. Steam varies from 35 to 70 lbs. on the gage. The boiler is an upright, 42 inches diameter and 7 feet high, with 36 three inch flues. In the month of September I burned 190 bushels of soft Illinois coal in 26 days of 10 hours each (80 lbs. to the bushel). How many lbs. of coal per horse power per hour am I burning? Is the engine doing good duty? It is a plain slide valve engine with lap cutting off at about ⅛ of the stroke. Answer: From the data sent, we are unable to make the calculation you desire, as we have no way of determining the mean and back pressure. Send us a sketch of your valve and ports, with note of dimensions. If the point of cut-off is as stated, you must have a very large exhaust port, or a distorted action.

M. asks: Given a rotary air pump of ordinary construction, by what simple rule can I calculate how to increase or diminish the size, keeping the different proportions correct? A. We do not think there is any safe rule by which you can calculate the details of a pump of larger or smaller size, from another of given dimensions and different size.

E. A. says: Sheet iron pans are used for the evaporation of sap; a pan 8 feet long x 3 feet wide would give 24 feet heating surface. How much would it add to its evaporation to put in 14 three inch flues and let the fire pass through them and over the 24 feet heating surface? Would it make any difference how close together the flues were? Would smaller or larger flues be any better? A. The proposed plan would work well, if it did not heat the sap too much. It will make little difference what size and number of flues you employ, if you are careful to give them sufficient area to ensure a good draft.

E. S. A. says: 1. The atmosphere at the equator has a velocity of rotation less than the earth, equal to the velocity of the trade winds. Let us assume, however, that it is the same. The force of gravity at the surface of the earth is 289 times greater than the centrifugal force, and decreases as the square of the distance from the center of the earth. The centrifugal force increases as the distance from the center of rotation. Is there then any reason why the atmosphere may not attain a hight (from the surface of the earth) of 6¼ times the semi-diameter of the earth? 2. If the atmosphere were influenced solely by the two forces above mentioned, the highest part would be over the equator, that is, the plane of the greatest diameter of the atmosphere would coincide with the plane of the celestial equator. But when we consider the influence of the attraction of the sun and moon, and the extremely mobile character of the molecules of the atmosphere, would not the plane of the greatest diameter be inclined from the plane of the equator towards the plane of the ecliptic, so as to almost coincide with it? 3. What is the average velocity of the trade winds? I do not find it stated in any of my books. 4. In what work will I find these subjects most thoroughly discussed? A. The earth, when fluid, assumed its present form of equilibrium, an oblate spheroid. Therefore the atmosphere would be of uniform depth, as regards centrifugal force, if the earth

continued to turn uniformly, 2. The Signal Service will decide the question of aerial tides. 3. We do not know. 4. The "Physical Geography of the Sea" is a superficial work, though interesting.

S. S. asks: How can I calculate the torsional strain, or ultimate resistance to rupture, of a wrenching or twisting force applied to rectangular bars of cast and wrought iron, the length of the lever to which the force is applied being known? A. Let S = one side in inches, s = other side in inches, L = leverage in inches.

For cast iron: Torsional strength in lbs. = $\frac{12,000 \times S^2 \times s^2}{\sqrt{S^2 + s^2} \times L}$

For wrought iron: Torsional strength in lbs. = $\frac{15,000 \times S^2 \times s^2}{\sqrt{S^2 + s^2} \times L}$

The constants given are average values.

E. A. S. asks: How can I make ink that will write with a "greenish" color, at first, and afterwards change to a deep black? Answer: There are various formulæ for making ink. We can recommend this on good authority: Aleppo galls (well bruised) 4 ounces, clean soft water 1 quart; macerate in a clean corked bottle ten days or two weeks, with frequent agitation. Then add gum arabic (dissolved in a wineglass full of water) 1¼ ounces, lump sugar ½ ounce, mix well and afterwards furth r add sul hate of iron (green copperas) crushed fine, 1½ ounces; agitate occasionally for two or three days; then decant for use, but it is better to let the whole digest together two or three weeks. Product one quart, pale at first but soon turning intensely black.

J. E. A. asks: Are tables ever moved in the presence of so-called mediums, without contact with any person or mechanical device whatever? A. Statements to that effect have frequently been made, but we should require stronger evidence than has yet been presented to induce us to credit them.

A. M. S. says: A. H. on page 363, inquires how he can remedy the lack of power in a 25 feet breast wheel. The only remedy is in running it faster, not slower, using as much (and a little more) water in proportion as it runs faster than before. Let him reduce the 8 feet drum so as to give the wheel a little advantage over the present arrangement. He will not get so good a result from the water as formerly, and will consequent ly need to make a little allowance for that. I should say that if the 8 feet drum was reduced to 7 feet, or if the pulley driven by the 8 feet drum was lagged in proportion, he would be enabled to get speed. There might be a question of supply of water in the latter case.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined with the results stated:

J. R. E.—From our recollection of the small specimen of blue clay sent, it contained no graphite. Although graphite is sometimes contaminated with clay, it generally occurs in quartz, granite, gneiss, or carbonate of lime. Many clays take a polish from the finger nail; and when dark, as blue clay, the luster is metallic like that of plumbago, although none of the latter be present. Graphite, again, when disseminated in primitive or transition rocks, occurs in minute scales or nodules of different sizes not difficult to distinguish. Should it occur in small masses with clay, it could be separated from the clay by washing and running off the suspended clay, the plumbago sinking to the bottom of the vessel.

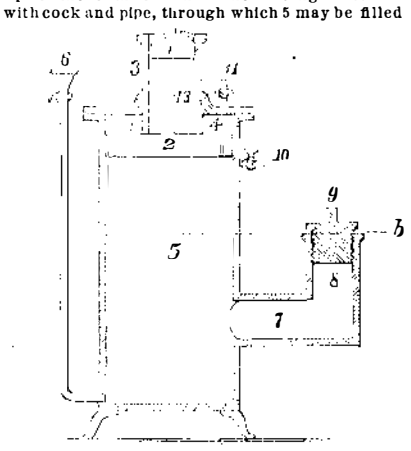
J. H. S.—The tar enclosed is a hydrocarbon of the nature of liquid bitumen, and the substance from which it has been obtained is probably (judging from the mineral enclosed) a limestone impregnated with bitumen. The mineral is limestone, containing a small quantity of iron pyrites. From the indications disclosed, and the fact that oil is found floating on the surface of ponds in the vicinity, we should judge that petroleum might be found at a sufficient depth.

J. H.—This ore is micaceous oxide of iron, so called from its being easily broken and reduced to small shining scales like mica. It is often found in connection with common specular iron, and is sometimes associated with the red oxide of iron, but is rarely in sufficient quantity to be explored by itself. It yields about 70 per cent of good iron.

W. M. L.—Selenite, a pure variety of crystallized sulphate of lime or gypsum.

A. M. B.—Carbonate of iron, or sparry iron, a compound of carbonic acid and iron.

A correspondent sends us the following problem: 1 is a piston, 6·25 square inches in area, moving airtight in cylinder 3. 2 is a piston, 12·56 square inches in area, moving airtight in cylinder 5. 3 3 is a cylinder 6·25 square inches in area and of at least 3 inches stroke. 4 4 is an annular space 1 inch deep between the head of the cylinder, 5, and the piston, 2. 5 is a cylinder 12·56 square inches in area and 12 inches long. 6 is a funnel with cock and pipe, through which 5 may be filled with



fluid by opening the cock 10 to let air out—filling first by removing plug. 9, and filling up to dotted line *b*, then replacing plug. 7 and 8 is a bent tube of 6·25 square inches area, attached to cylinder 5. 9 is a plug to stop mouth of 8 airtight. 10 and 11 are ordinary cocks. 12 and 13 are ordinary piston rods. If 3, 4, 5, 6, 7 and 8, being full of water or mercury and all the cocks closed, pistons being in position shown in the figure, if the plug 9 is removed and weights are so placed as to overcome the friction of the piston, will they fall? If so, with what velocity, and how far? [We think our readers will have no difficulty in solving this question, as it is capable of rigid demonstration, if weights of the moving parts and the liquid are given. We shall be glad to have replies.—EDS.]

F. C. L. asks: How can I make an emery wheel?—S. H. N. asks: Is the superheating attachment placed in the Great Eastern steamer still in use?—C. A. B. asks: Is there published a book of instructions on newspaper and job printing?—S. A. T. asks: How did the old Romans calculate sums by numeral letters? For example, how did they divide MDCCCLXXII by XXIV, or multiply DCCLII by XXIV?—R. C. C. asks: How can I make colored transparent pictures for the magic lantern? I cannot make water colors transparent.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On Magic Squares. By G. B. M.
On Sewage. By G. H. T.
On the Diameter of the Earth. By A. F.
On the Percentage of Work. By E. W.
On the Nickel Mines in the United States. By N.
On Coal Tar Products. By J. T. P.
On the Labor Question. By N. A. W.
On Ramming the Mold. By B. W.
On Magnets. By C. H. M.
On Solar Heat. By J. G.

Also enquiries from the following:

Q. X. P.—J. M. C.—C. L.—A. L. B.—A. B.—H. & Co.—C. C.—J. H. W.

Correspondents in different parts of the country ask: Who makes the best foot power jig saw? What is the best work on short hand writing? Who sells the best post hole augers? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal" which is specially devoted to such enquiries.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States

WERE GRANTED IN THE WEEK ENDING

December 9, 1873,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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Equalizer, draft, Collins & Stiles	145,474
Explosive compound, C. Dittmar	145,403
Eye and lung protector, G. A. Crofutt	145,337
Faucet, bung, G. D. Lee	145,432
Filter for wine, C. W. Farciot	145,288
Fire brick stove linings, etc., E. H. Richter	145,448
Fire extinguisher, W. L. Drake	145,405
Fire extinguisher, W. L. Drake	145,406
Furnace for reducing iron ores, J. Wilson	145,471
Furnace, zinc, E. H. and F. G. Richter	145,450
Furnaces, etc., lining, A. E. Bates	145,852
Game apparatus, R. E. Bean	145,385
Game board, A. F. R. Arndt	145,271
Gas, water, E. J. Jerzmanowski	145,350
Gate, M. Loomis	145,434
Gate fastener, J. H. Nichols	145,362
Generator, steam, E. Goddard	145,293
Glue, manufacture of, B. F. Shaw	145,454
Grain cleaner and crusher, N. Thielen	145,314
Grate, stove, G. R. Moore	145,360
Harness loop, F. Hickman	145,299
Harvester dropper, A. J. Hodges	145,419
Hat linings, label for, T. W. Bracher	145,391
Hay loader, C. E. Warner	145,321
Heater, water, A. Spence	145,457
Hides or skins, sweating, W. M. Mason	145,436
Hinge, stop, G. C. Thomas	145,315
Hoop bending machine, E. Coapman	145,398
Horse power, D. Woodbury	145,273
Horses, device for detaching, E. P. Jones	145,426
Horseshoe, G. H. Todd	145,403
Horseshoe nails, H. D. Cowles	145,336
Hose, flexible play pipe for, J. Greacen, Jr	145,415
Hydrant, W. H. Graham	145,294
Ice creeper, R. H. Earle	145,340
Indicator, low water, F. Steele	145,369
Ingot mold, N. Churchman	145,278
Inkstand, A. D. Judd	145,352
Iron and steel, welding, J. Popping	145,445
Iron, manufacture of, W. J. Taylor	145,461
Iron, manufacture of, W. J. Taylor	145,462
Joint, ball and socket, M. W. St. John (r)	5,679
Journal and bearing, J. Whitaker	145,467
Journals, etc., packing, S. Baxendale	145,384
Key, door, J. Collins	145,401
Knife, shoe, A. J. Hall	145,295
Latch, gate, G. N. Sharp	145,363
Lathe chuck, sleigh bell, W. E. Barton	145,383
Liquid measure, Wever & Johnson	145,377
Lithographic press, B. Huber	145,420
Lithographic prints on glass, etc., O. P. Wolff	145,472
Lock, H. Stein	145,370
Loom, S. T. Thomas	145,316
Lounge, A. Heyer	145,418
Lounge and chair, M. P. Rogason	145,452
Lubricator for car, wheels, W. A. Bullard	145,395
Marble, etc., artificial, F. H. Hall	145,345
Meat holder, S. Beissel	145,329
Mechanical movement, J. S. Crapston	145,402
Medical compound, W. F. Staten	145,313
Metals, compressing cast, H. W. Barnum	145,325
Mill, clay, Vaughn, Camp & Merrill	145,373
Mitering machine, C. Loetscher	145,354
Mop head, C. B. Clark	145,397
Muff stand, L. Bergtold	145,330
Nut lock, E. Kaylor	145,427
Organ valve, pipe, W. Schulke	145,453
Oil cloth, printing, W. E. Worth	145,379
Ore washer, R. Solliday	145,455
Paper, designer's, A. Akeroyd	145,269
Paper cutting machine, G. A. Walker	145,464
Peg cutter, A. Whittemore	145,469
Pianoforte action, A. K. Hebard	145,417
Plane iron, E. Quast	145,311
Planing machine shaving conductor, W. Weaver	145,375
Planter, corn, J. Case	145,396
Plastering machine, Stevens & Watson	145,459
Plow, subsoil gang, C. Myers	145,361
Press, copying and folding, S. W. Odell	145,306
Printer's perforating rule, C. W. Ames	145,380
Printing inking apparatus, M. England	145,241
Propeller for vessels, J. D. Fraser	145,342
Railway rail joint, W. G. Dunn	145,339
Railway rail joint, W. Thompson	145,372
Railway signal, pneumatic, W. E. Prall	145,309
Railway tracks, repairing, Warfield & Elmer	145,465
Railway electric signal, F. L. Pope	145,308
Refrigerator, R. Thomson	145,317
Roller, sand paper, H. W. Brett	145,392
Sash balance, R. Faries	145,289
Saw gumming machine, H. Baughman	145,327
Screw, J. Frearson	145,411
Separator, ore, H. P. Minot	145,441
Sewing machine, Fanning & Nugent	145,287
Sewing machine shuttle, G. W. Hunter	145,348
Sheet metal ware, handle for, J. Fallows	145,286
Shirt, S. S. Gray	145,414
Shutter and window fastener, W. T. Fry	145,343
Sifter, flour, F. G. Ford	145,410
Signal, pneumatic railway, W. E. Prall	145,309
Signal, switch, C. W. Spayd	145,456
Skate, C. W. Jenkins	145,349
Skirt protector, G. E. King	145,429
Sleigh, A. A. Abbott	145,323
Smoke stack, T. F. Conklin	145,279
Soap cutting machine, J. B. Ultsch	145,319
Spinning machine, C., S. M., & H. M. Williams	145,322
Spool stand, W. Harris	145,297
Steering apparatus, C. W. Buffington	145,394
Stone, artificial, T. Chrimes	145,277
Stone cutting machine, West & Fish	145,376
Stone, artificial, E. L. Ransome	145,363
Stove, cooking, L. E. Clow	145,276
Stove, cooking, S. Long	145,255
Stove, heating, J. Johnson	145,424
Stove, subaqueous gas, S. H. Starr	145,458
Sugar, etc., cleansing, A. H. Tait	145,460
Table and desk, drawing, J. A. Wilkens	145,378
Thill coupling, W. R. Bowman	145,390
Ticket case, L. J. Blades	145,386
Tobacco package, G. Robinson	145,451
Towel rack, C. Schermerhorn	145,367
Trap, steam, J. Bishop	145,387
Truck, hand, N. Adams	145,268
Trunk, J. L. Lowman	145,435
Tubing, making metallic, J. Huggins	145,421
Umbrella, G. W. Pressey	145,310
Umbrella supporter, W. A. Brown, Jr	145,408
Urinal, J. C. Garnsey	145,344
Vehicle, Gorman & Thiel	145,413
Vessels, construction of, H. Hirsh	145,347
Water wheel, M. H. Heyiman	145,346
Water wheel, J. Taney (r)	5,682
Weaver's harness, making, J. H. Crowell	145,282
Wells, constructing, A. Curtis (r)	5,677
Wheel, vehicle, A. Buchholz	145,393
Wheel, vehicle, D. B. French	145,291
Windmill, M. T. & M. C. Chapman	145,335
Wire, G. D. Dudley	145,285
Wire stand or holder, G. D. Dudley	145,283
Wood bending machine, H. Hanna	145,416
Wrench, ratchet, I. C. Colbert	145,399
Yokes, bow pin for ox, W. J. Ives	145,422
Yoke bow fastener, etc, ox, E. N. Bacon	145,381
Zinc, apparatus for granulating, E. H. Richter	145,449

APPLICATIONS FOR EXTENSIONS.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

27,438.—BLACKWASHING MOLD.—W. Ferguson *et al.* Feb. 25
27,447.—TIMBER BENDING CHAIN.—L. Heywood. Feb. 25.
27,478.—TURNING LATHE.—W. Sellers. Feb. 25.
27,485.—LANTERN.—A. Tufts. Feb. 25.
27,515.—FITTING SINKS.—J. Ingram. March 4.
27,594.—SEWING MACHINE.—L. W. Langdon. March 4.
27,655.—HORSESHOE NAIL MACHINE.—W. Tallman. Mar. 11.

EXTENSIONS GRANTED.

26,408.—FIRE KINDLER.—E. Bellinger.
26,410.—SEED PLANTER.—W. Blessing.
26,451.—RAILROAD SWITCHES.—W. Wharton, Jr.

DISCLAIMER.

28,244.—RUFFLE.—G. B. Arnold.

DESIGNS PATENTED.

7,018.—BUTT HINGE.—W. Gorman, New Britain, Conn.
7,019.—DOOR KNOB ROSE.—W. Gorman, New Britain, Conn.
7,020.—DOOR KNOBS.—W. Gorman, New Britain, Conn.
7,021.—ESCUTCHEON.—W. Gorman, New Britain, Conn.
7,022.—GRINDING MILL FRAME.—J. G. Lane *et al.*, Millbrook, N. Y.
7,023.—LAMP SHADE.—W. L. Libbey, Boston, Mass.
7,024.—FLY WHEEL.—J. G. Baker, Philadelphia, Pa.
7,025 to 7,033.—CARPETS.—H. Horan, East Orange, N. J.
7,034.—CARPET.—H. Knight, Philadelphia, Pa.
7,035 to 7,037.—FLOOR OIL CLOTHS AND CARPETS.—C. T. Meyer *et al.*, Bergen, N. J.
7,038 to 7,043.—CARPETS.—E. J. Ney, New York city.
7,044 & 7,045.—CARPETS.—H. Nordmann, New York city.
7,046.—BADGE.—J. Seymour, Syracuse, N. Y.
7,047.—SHOW CASE CORNER.—T. Vaughan, Boston, Mass.
7,048.—COOK STOVE.—N. S. Vedder, *et al.*, Troy, N. Y.

TRADE MARKS REGISTERED.

1,565.—SOAP.—R. M. Bishop & Co., Cincinnati, Ohio.
1,566.—CURED MEATS.—W. H. Davis & Co., Cincinnati, O.
1,567.—CORSET SPRINGS.—F. L. Egbert, Waterbury, Conn.
1,568.—WHISKY.—E. A. Fargo & Co., San Francisco, Cal.
1,569.—FERTILIZER.—J. M. Rhodes & Co., Baltimore, Md.
1,570.—COTTON GIN.—Brown Gin Co., N. London, Conn.
1,571.—CARPETS.—J. Dornan, Philadelphia, Pa.
1,572.—WHISKY.—E. Howe, New York city.
1,573.—OYSTERS.—O. W. Miller & Co., Baltimore, Md.

SCHEDULE OF PATENT FEES.

On each Caveat	$10
On each Trade Mark	$25
On filing each application for a Patent (17 years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
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 an application for Design (3½ years)	$10
On application for Design (7 years)	$15
On application for Design (14 years)	$30

[Specially reported for the Scientific American.]

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA DECEMBER 15 TO DECEMBER 17, 1873.

2,933.—J. H. Smith, Arlington Square, Middlesex county, Eng. Improvement on shuttle sewing machines, called "Smith's Combination Sewing Machine." Dec. 15, 1873.
2,934.—Edward Gurney, Toronto, Ontario. Improvements on heating stoves, called "Gurney's Improved Base Burner." Dec. 15, 1873.
2,935.—J. L. Thurston, Douro township, Peterborough county, Ontario. Improvement on corsets, called "Thurston's Improved Elastic Corsets." Dec. 15, 1873.
2,936.—A. A. Herriman, Greensborough, Guilford county N. C., U. S. Improvements on turbine water wheels called "Herriman's Acme Turbine Water Wheel." Dec. 15, 1873.
2,937.—G. M. Stevens, Portland, Cumberland county, Me., U. S. Improvement in mitering machines, called "Stevens' Mitering Machine." Dec. 15, 1873.
2,938.—F. Jessop, York, York county, Pa., U. S. Improvement in rotary steam motors, called "Jessop's Rotary Steam Motor." Dec. 15, 1873.
2,939.—N. Phaneuf, Montreal, P. Q. *Machine a presser et a polir les talons des chaussures*, called "*Une Roue Brunissoir*." Machine for pressing and polishing heels of boots and shoes. Dec. 15, 1873.
2,940.—D. E. Rice and A. W. Mitchell, Detroit, Mich., U. S. Improvements on water gages for steam boilers, called "Rice's Boiler Gage." Dec. 15, 1873.
2,941.—M. T. Boult, Battle Creek city, Calhoun county, Mich., U. S. Improvements on wood working machines, called "Boult's Wood Working Machine." Dec. 15, 1873.
2,942.—C. W. Palmer, Cleveland, Cuyohoga county, O., U. S. Improvements on portfolios, called "Palmer's Novelty Music Rest and Portfolio." Dec. 15, 1873.
2,943.—M. Stephens, Brooklyn, Kings county, N. Y., U. S. Improvements in cement lined metal pipes, called "Stephens' Cement Lined Metal Pipes." Dec. 15, 1873
2,944.—J. H. Thorp, Chicago, U. S. Improvements on portable burglar alarms, called "Thorp's Portable Burglar Alarm." Dec. 15, 1873.
2,945.—I. Erb, Buffalo, Erie county, N. Y., U. S. Improvement on washing machines, called "Erb's Improved Washer." Dec. 15, 1873.
2,946.—Jas. Foley, Montreal, P. Q. Extension of a provincial patent, being No. 2,614, old law, for the manufacture of the extract from hemlock, oak and other barks, for tanning purposes and as a mordant for printers' and dyers' use, called "The Non-Atmospheric Process." Dec. 17, 1873.
2,947.—O. Meijh and H. Voelter, Paris, France. Process of preparing wood or other ligneous or vegetable matter for the manufacture of paper, card board and other analogous products, called "Meijh and Voelter's Process for Preparing Wood for the Manufacture of Paper, etc." Dec. 17, 1873.
2,948.—G. Lowden, Brooklyn, Kings county, N. Y., U. S. Improvement on portable gas apparatus, called "Lowden's Portable Gas Apparatus." Dec. 17, 1873.
2,949.—C. K. Knowlton, Rockland, Me., U. S. Improvements in car couplings, called "Knowlton's Car Coupling." Dec. 17, 1873.