H. P. M. asks: 1. In building a chimney 75 feet in hight, which would create the most draft, one started at 2 feet square on the inside at the base, and spreading out to 3½ or 4 feet at the top, or one 2 feet square all the way up? What is the theory? 2. What is the best method of brightening up small castings in a mill? Answers: 1. Probably it would do better if made of the same size all the way up. 2. The castings may be dipped into sulphuric acid, and then placed in a revolving cylinder, or polished on a wheel.

W. S. asks: Which will sustain the greater weight, a solid stick of timber sawn 10 inches square and 30 feet long, with the ends resting upon blocks without any other support, or the same amount of timber in three separate pieces, each of 3½ inches in thickness, set up edgewise, side by side? If there is any difference, please give the principle. Answer: If all the sticks are of the same quality, the same amount of weight can be sustained in both cases.

F. E. P. says: In electroplating sewing machine attachments, I find it very difficult to deposit the silver on the solder at the joints. I have tried several dipping compounds, but with poor success. I have tried copper plating; but the copper will not stick firmly enough. Can you give me any information on the subject? Answer: To prepare your articles for plating: first boil them in a solution of caustic potash to free them from grease. Then dip quickly in red nitrous acid to remove any oxide from the surface, and afterwards wash well to remove every trace of acid. Then dip into a solution of mercury in cyanide of potassium (not too long), and afterwards wash in water as before. The amalgamation of the surface effected promotes the adhesion of the film of silver.

M. A. P. asks: What can I use to cement the joints of vitrified pipe for conveying strong acetic acid? Answer: Mix equal parts of pitch, resin, and well dried plaster of Paris. This is used for the masonry of chlorine chambers and vitriol works.

H. F. asks: Are there three rails used on the track of the Rigi railway? Answer: Yes, and the central rail is a rack into which a toothed wheel of the locomotive gears.
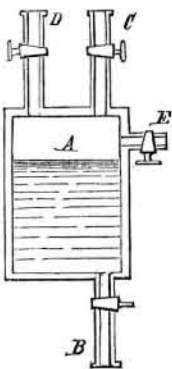
T. H. asks: What is an anemometer? Answer: The usual instrument for measuring the velocity of the wind is formed of two wires crossing at right angles, at each end of which is a cup-shaped vane, placed with its concave side to receive the current. A counter is employed to register the number of its rotations; and it must be nearly free from friction, or its indications will be valueless.

J. H. M. asks: Can you give me a recipe for staining butternut wood in imitation of black walnut? Answer: The following is highly recommended: Water 1 quart, washing soda 1½ ozs., Vandyke brown 2½ ozs., bichromate of potash ¼ oz. Boil for 10 minutes and apply with a brush.

L. C. asks: 1. What book contains the most accurate tables of the number of bricks required for walls and cisterns; the quantity of lime and sand for a certain number of bricks; the day's work for bricklayer; and the cubic yards to be excavated for a cistern, tank or cellar? 2. How is puddling for bottom of water reservoir made, and how thick should it be? Answer: We know of no book that can be relied on to give you this information. Consult a good mason, or builder. 2. Read our article on page 240, current volume.

U. T. K. asks: Can a low pressure single cylinder marine beam engine be worked with one cylinder head broken out? If it can, what course can be taken to form a vacuum in the condenser? Would it be necessary to take any buckets off the wheels? Answer: In King's work on the steam engine, page 98, this matter is referred to as follows: "Disconnect the steam and exhaust valves from the damaged end of the cylinder, if the engine be fitted with poppet valves, and let the atmospheric pressure force the piston in one direction, the steam being used for the opposite direction. Should the engine be fitted with a slide valve, close up the opening into the damaged end of the cylinder by fitting in, steam tight and in a substantial manner, a block of soft wood." In such a case, it would probably be necessary to remove some of the paddle floats, or to reef them.

T. L. B. says: In answer to my inquiry as to how I could supply a small boiler with water, you say: By the direct pressure of the steam, using an arrangement like an equilibrium oil cup. Will you please give a more definite description of the article? Answer: The appended sketch will probably enable you to understand the arrangement. A is a vessel of suitable size, connected by a pipe, B, to the check valve of the boiler, by C to the steam space, and by D to the water supply—each of these pipes having a cock or valve, so that it can be closed at pleasure. E is an escape pipe and valve, opening into the air. The operation is as follows: Close valves in pipes B and C, and open those in pipes D and E. The water will then run into the vessel A. When it is full, close valves in pipes D and E, and open valves in pipes B and C. The vessel A being above the boiler, the water will run into the boiler, as the steam pressure on top of the water in A is the same as the pressure on top of the water in the boiler.

H. C. P. asks: What weight will a flat bottomed boat, with perpendicular sides, 16 feet long x 3 feet wide x 14 inches, carry? The weight of the boat is 200 lbs. How much weight will it carry when drawing 6,8 and 10 inches of water respectively? Can you give me a formula for it? Answer: You do not send enough dimensions to enable us to make the calculations, but we will give you the method and you can apply it. Find the area of the bottom of the boat, in square feet. Suppose that it is A square feet. Then the boat, when drawing 6, 8 and 10 inches of water, respectively, will carry the following loads: When drawing 6 inches, A×⁶⁄₁₂×62·5 −200. When drawing 8 inches, A×⁸⁄₁₂×62·5 − 200. When drawing 10 inches, A×¹⁰⁄₁₂×62·5 −200.

G. S. T. asks: Will sulphur water affect a boiler injuriously, and to what extent? Is there any way of counteracting its effect, or of purifying the water? Answer: We do not think the sulphur water will injure your boiler; and we do not know of any method you can employ, to purify the water, that is sufficiently practicable for general use.

A. B. asks: How can I dissolve rubber so as to mold it into any required form? Answer: Immerse the rubber in a mixture of bisulphuret of carbon 95 parts, and rectified spirit 5 parts, until it swells into a pasty mass. It may then be molded into any desired form.

H. J. W. says: 1. Are the fumes from hot aniline dyes injurious? 2. Where can I find some account of the manner of preparing aniline colors? 3. I want small steel wire in the coil, cut into lengths of three inches; what is an ordinary and cheap process for straightening the latter? Answers: 1. We think not. 2. Reimann's work on "Aniline and its Derivatives," will give you the desired information. 3 Draw the pieces through an opening in which they bear at three points. Such an arrangement can readily be made with three nails.

E. A. P. asks: 1. Is there any known law by which to determine the amount of pressure per square inch required to compress common atmosphere to any desired volume: that is, to reduce two volumes to one, three to one, etc.? Answer: Mariotte's law is: The temperature remaining the same, the volume of a given quantity of gas is inversely as the pressure which it bears. Therefore a pressure of two atmospheres will reduce the volume to one half, of three to one third, etc.

J. M. B. says, in reply to R. A. C., page 27, current volume: "I have made an entire destruction of willow swamps by chopping the trees around at any convenient hight, and stripping the bark to the ground and letting it remain; when the sap is in flow, in July or August, is as good time as any. Do not chop them down for a year or two. 4. A certain cure for nose bleeding is to extend the arm perpendicularly against a wall or post or any convenient object for a support. The arm on the side from which the blood proceeds is the one to elevate."

C. A. D. says: C. M. N. can precipitate nitrate of silver and sal ammoniac by adding to a solution of the former salt a solution of chloride of sodium or hydrochloric acid, which immediately precipitates the silver as a white flocculent precipitate, the new compound being, in the language of the chemist, Ag Cl (chloride of silver). Sal ammoniac can be precipitated by bichloride of platinum; the precipitate is of a light yellow color. These are also characteristic tests for the above named salts.

J. B. W. says: C. H. A. (page 87 of your current volume) can find the solution of his problem in Smith's "Mechanics." Of course the surface of the revolved fluid may be replaced by a rigid paraboloid, and a material particle without friction will remain at rest upon any part of the surface. The case of a ball rolling on a surface is, however, different. I will assume (and afterward prove) that the centrifugal force generated by a revolving ball is the same as if the mass were concentrated at the center of the ball. This true, the ball will be at rest when its center is confined to a parabola, whose equation, referred to the axis of revolution and a tangent at the vertex, as the axis of x and y, is $x^2 = \frac{2g}{w^2 W} y$, where g = force of gravity = 32· +, w = no. of feet per second passed over by a point one foot from the axis, x = the abscissa and y the ordinate of the curve: Proposition: If the center of the sphere S is confined to the parabola AB

by means of the curve MN, on which the sphere rolls, the curve M N is not a parabola. Let F be the focus of the parabola and draw F B its semi-principal parameter. Draw also NBY, a normal. From the nature of the parabola, we shall there have: FB = 2FA and angle NYM = 45°. When the sphere has its center at B, the resultant pressure of the centrifugal force and gravity is in the direction BN; BN is therefore a normal not only to the parabola but also to the curve MN. But the curve at N being perpendicular to the normal, it makes an angle of 45° with YM, ∴ if it is a parabola, NE, perpendicular to YM, must be its semi-principal parameter, and E, its focus; and we must have EN=2EM. But EN = EC + CN = EC + ½ √2 BN = FB + ½ √2 AM, and 2 EM = 2(FA − FE + AM) = 2 (FA − ¼ √2 AM + AM) = 2FA + 2AM − √2 AM ∴ FB + ½ √2 AM = 2FA + 2AM − √2 AM. But FB = 2FA. Substituting, ½ √2 AM = 2AM − √2 AM. Dividing by √2 AM, we have ½ = √2 − 1, or 1½ = √2, which is not true. ∴ MN is not a parabola. Proposition: The centrifugal pressure of a revolved sphere is the same as if its mass were concentrated at its center. Let S be a sphere revolved around AY,
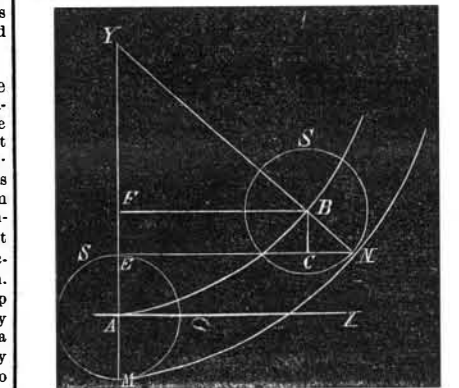

and consider 8 particles at its center. Let OA be the distance to the axis. Remove 4 of the particles to C and 4 to C′, so that AC − AO = AO − AO′. Then place 2 each at D D′ D″ D‴, equally distant in front and behind AX. Finally separate each pair by raising one particle and lowering the other a certain distance. We have now taken the 8 particles from the center and placed them in correct position in the sphere, and as this figure is symmetrical with respect to a line parallel to A Y through its center, all the particles, us pposed to be concentrated at the center, may be removed

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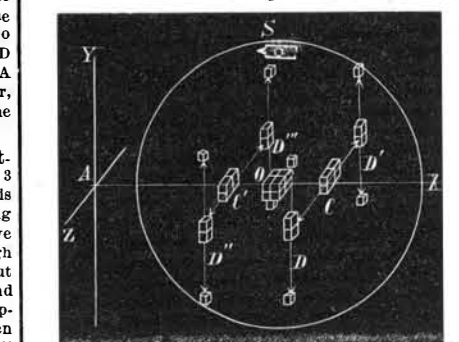
by 8s and placed in position to make a homogeneous sphere. We will now show that such a change produces no change in the centrifugal pressure. Let a be the weight of a particle.

Elevation or vertical projection.

cle, ao=b, the distance to the center of sphere. co = c′o = c, the distance of removal. The centrifugal pressure of 8 particles at the center will be $8w^2 b \frac{a}{g}$, of 4 at c it will be $4w^2(b+c)\frac{a}{g}$, and of 4 at c′ it will be $4w^2(b-c)\frac{a}{g}$. Adding these, we have, for the 8 particles after removal Centrifugal pressure = $P_c = 4w^2 \frac{a}{g}(b+c+b-c) = 8w^2 b \frac{a}{g}$, the same as when they were at the center. Taking now a ground plan and letting cd = cd′ = d, also ad = e, we have,

Ground plan or horizontal projection.

for the centrifugal pressure of 2 particles at d: $P'_c = 2w^2 e \frac{a}{g}$, but this pressure is in the direction ad, and we must resolve it into 2 parts, one in the direction cd, which will be destroyed by the opposite component of the pressure produced by the 2 particles at d′, and the other in the direction d″d, which, combined with the corresponding component of d′, will result in a pressure in the direction ac, the same as if the particles were at c. Resolving, we have for the pressure in d″d: $P''_c = 2w^2 e \frac{a}{g}$ cos. cad $=2w^2 e \frac{a}{g} \frac{b+c}{e} = 2w^2 (b+c)\frac{a}{g}$; and as there are 2 pairs of particles the whole pressure is $P'''_c = 4a^2(p+c)\frac{a}{g}$, the same as if the 4 particles were at c. Lastly, it is evident that there can be no change of centrifugal pressure produced by moving the particles parallel to the axis, and therefore the pairs may be separated in this manner. Therefore the particles being moved from the center of the sphere into position in its body, no change is produced in centrifugal pressure.
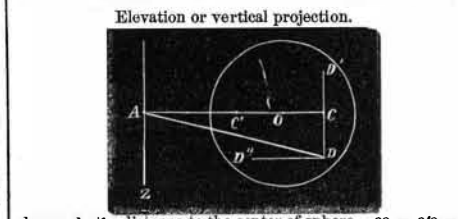
P. K. D. says, in answer to C. C.'s query as to press power: I would suggest that to give the amount of pressure exerted upon W, it will be necessary to know the distance from B to the center of track roller. If the power was applied at the center of the track roller, then the amount would be obtained thus: Divide the length of lever E (measuring from center) by the distance from center of track roller c to a perpendicular line drawn from the point of lever attachment (to W) to the track. Multiply this by 8 (the power obtained by the line) and the result thus obtained by the 1600 lbs. This will give about 75024 lbs. Now to solve the problem given: Diminish this result in proportion to the distance that B is moved up the lever from center of track roller.
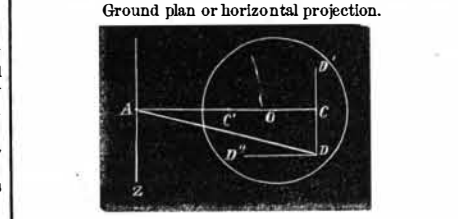
F. A. W. says, in reply to P. T.'s query as to the consumption of water by engines in cold as compared with that in hot weather: A few years ago three boilers were situated on the higher floor of a building, and were heated by gas that would otherwise escape. This gas was admitted to the boilers and regulated by means of sliding gates. The speed of the blowing cylinders was governed of course by the velocity of the engine, and the latter by an ordinary governor; but this not being sufficiently accurate, it was necessary to throttle the engine to drive it at the required number of revolutions per minute. Much practice enabled us to admit just sufficient gas to the boilers to maintain a pressure of 60 lbs. with, hardly the variation of a pound in a week, and sometimes in a longer period. Nearly a year of such experience showed us that, in cold, damp weather, it was necessary to admit more gas, and in warm, pleasant weather to admit less. Of course, difference in charging would make a change in the quantity and quality of the gas, and perhaps augment the resistance of the air that was being forced into the furnace; but a long continued series of experiments, such as we were obliged to make, eventually established the fact. The boilers were supplied with a constant stream of water, regulated arbitrarily by a cock, and so accurately as not to require moving sometimes for days together. " I do not apprehend that the cold damp weather had any appreciable effect in requiring the admission of more heat to the boilers, except by the increased condensation of steam, which was not more than in ordinary engines. This same condensation will undoubtedly account for the difference, if there is any, between the effect of steam and air in a locomotive."

D. M. says, in answer to the question proposed by C. H. A. (page 187, vol. XXIX): Let there be a system of rectangular axes, having c for their origin, b c being the axis of X. Since the number of revolutions of the ball is constant, a line equal to its distance from the axis of X and perpendicular to the same axis, may be taken to represent the centrifugal force, the force of gravitation being represented by a constant line parallel to the same axis, and which I denominate by g. Therefore at any point, x' y', of the curve, the resultant of the two forces will pass through the point, x' y', and also through a point whose equations are $x=x'$ $−g$, and $y=2y'$. Therefore the equation to the resultant is $y−y' = −\frac{y'}{g}(x−x')$ which is evidently the equation to the normal of a parabola having 2g for its parameter. (See Davies' "Analytical Geometry.")

G. W. says, in reply to H. H. J., who asked as to making a combined reaper and thresher: It cannot be done. At the time grain ought to be cut, it is not dry enough to thresh; and if left standing until it is dry enough to thresh, it will shell out so as to lose half the crop, especially if the grain be oats. It was this which made useless a harvester in the western states. It cut the heads off and left the straw standing; the heads were to be stored in cribs or bins, like corn. But the heads proved to contain so much moisture as to cause mold and rot.

W. W. H. says, in answer to T. M. Jr., who asks how to preserve grapes in the bunch, fresh as when taken from the vines: When the grapes are fully ripe, clip the bunches from the vines carefully, and get a water tight keg or box. Place in the bottom of the box a layer of dried grape leaves, half an inch thick, then layers of grapes and leaves alternately until the vessel is filled; nail a board on top, and bury the vessel in the ground, where water will not stand, out of reach of frost. Grapes put up in this way will keep fresh and sound until April.

J. W. H. says, in reply to C. P. T., who wants a heavy foam on a tonic beer: Use the whites of a dozen or more eggs in a 10 gallon keg.

J. M. B. says: " I think the blistering of varnished cement tiles, which D. U. B. complains of on page 171, current volume, is caused by the expansion of the moisture contained in them when varnished. A remedy would be to drive the moisture out."

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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:

26,674.—CLOTHES DRYER.—B. B. Hawse. Dec. 17.
26,699.—PIVOT BEARING.—F. C. Lowthrop. Dec. 17.
26,785.—WASTE COCK.—G. W. Robertson. Dec. 24.
26,803.—BOXES, ETC.—F. D. Ballou. Dec. 24.
27,451.—SPRING COVERING MACHINE.—J. T. Loft. Feb. 25.

EXTENSIONS GRANTED.

25,640.—STEAM BOILER.—J. Harrison, Jr.
25,662 —CONSTRUCTION OF PRISONS.—E. May.
25,673.—LASTING BOOTS, ETC.—J. Purinton, Jr.
25,683.—HYDRANT.—C. L. Stacy.
25,692.—SEWING MACHINE.—K. Vogel.
25,701.—SKELETON SKIRT.—J. Draper.

DISCLAIMER.

25,683.—LASTING BOOTS, ETC.—J. Purinton, Jr.

DESIGNS PATENTED.

6,895.—CALL BELL.—C.S. Barnard et al., W. Meriden, Conn.
6,896.—BOOT JACK.—U.F. Fogelstrand, Kensington, Conn.

6,897.—LAMP SHADE.—W. Maevers, New York city.
6,898.—TEA POT BASE.—E. B. Manning, Middletown, Ct.
6,899.—LAMP FOOT.—N. L. Bradley, West Meriden, Conn.

TRADE MARKS REGISTERED

1,473.—WINDMILL.—Atwood et al., San Francisco, Cal.
1,474.—PACKED OYSTERS, ETC.—Barnes & Co., Balt., Md.
1,475 & 1,476.—FERTILIZERS.—G. Dugdale & Co., Balt., Md.
1,477.—AGUE CURE.—H. Van Kiper e al., New York city.
1,478.—PREPARED FISH.—Dodd & Co., Gloucester, Mass.
1,479.—BRANDIES.—M. Doherty & Co., Boston, Mass.
1,480.—CHEESE.—Webb & Co., New York city.

SCHEDULE OF PATENT FEES:

On each Caveat..$10
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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 Desig (3½ years)............$10
On an application for Desig (7 years).............$15
On an application for Design (14 years)..........$30

VALUE OF PATENTS,
And How to Obtain Them.

Practical Hints to Inventors.

PROBABLY no investment of a small sum of money brings a greater return than the expense incurred in obtaining a patent even when the invention is but a small one. Large inventions are found to pay correspondingly well. The names of Blanchard, Morse, Bigelow, Colt, Ericsson, Howe, McCormick, Hoe and others, who have amassed immense fortunes from their inventions, are well known. And there are thousands of others who have ¡ealizedlarge sums from their patents.

More than FIFTY THOUSAND inventors have availed themselves of the services of MUNN & Co. during the TWENTY-SIX years they have acted as solicitors and Publishers of the SCIENTIFIC AMERICAN. They stand at the head in this class of business; and their large corps of assistants, mostly selected from the ranks of the Patent Office: men capable of rendering the best service to the inventor, from the experience practically obtained while examiners in the Patent Office : enables MUNN & Co. to do everything appertaining to patents BETTER and CHEAPER than any other reliable agency.

HOW TO OBTAIN *Patents.* This is the closing inquiry in nearly every letter, describing some invention which comes to this office. A *positive* answer can only be had by presenting a complete application for a patent to the Commissioner of Patents. An application consists of a Model, Drawings, Petition, Oath, and full Specification. Various official rules and formalities must also be observed. The efforts of the inventor to do all this business himself are generally without success. After great perplexity and delay, he is usually glad to seek the aid of persons experienced in patent business, and have all the work done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them: they will advise whether the improvement is probably patentable, and will give him all the directions needful to protect his rights.

How Can I Best Secure My Invention?

This is an inquiry which one inventor naturally asks another, who has had some experience in obtaining patents. His answer generally is as follows, and correct : Construct a neat model, not over a foot in any dimension—smaller if possible—and send by express, prepaid, addressed to MUNN & Co., 37 Park Row, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patentability, free of charge. Or, if you have not time, or the means at hand, to construct a model, make as good a pen and ink sketch of the improvement as possible and send by mail. An answer as to the prospect of a patent will be received, usually, by return of mail. It is sometimes best to have a search made at the Patent Office ; such a measure often saves the cost of an application for a patent.

Preliminary Examination.

In order to have such search, make out a written description of the invention, in your own words, and a pencil, or pen and ink, sketch. Send these, with the fee of $5, by mail, addressed to MUNN & Co., 37 Park Row, and in due time you will receive an acknowledgment thereof, followed by a written report in regard to the patentability of your improvement. This special search is made with great care, among the models and patents at Washington, to ascertain whether the improvement presented is patentable.

To Make an Application for a Patent.

The applicant for a patent should furnish a model of his invention if susceptible of one, although sometimes it may be dispensed with ; or, if the invention be a chemical production, he must furnish samples of the ingredients of which his composition consists. These should be securely packed, the inventor's name marked on them, and sent by express, prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by a draft, or postal order, on New York, payable to the order of MUNN & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000; Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000, and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, when business is dull at home, to take advantage of these immense foreig fields. Mechanical improvements of all kinds are always in demand in Europe. There will ne verbe a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the

patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished free.

Rejected Cases.

Rejected cases, or defective papers, remodeled for parties who have made applications for themselves, or through other agents. Terms moderate. Address MUNN & Co., stating particulars.

Reissues.

A reissue is granted to the original patentee, his heirs or the assignees of the entire interest, when, by reason of an insufficient or defective specification, the original patent is invalid, provided the error has arisen from inadvertence, accident, or mistake, without any fraudulent or deceptive intention.

A patentee may, at his option, have in his reissue a separate patent for each distinct part of the invention comprehended in his original application by paying the required fee in each case, and complying with the other requirements of the law, as in original applications Address MUNN & Co., 37 Park Row, New York, for full particulars.

Caveats.

Persons desiring to file a caveat can have the papers prepared in the shortest time, by sending a sketch and description of the invention. The Government fee for a caveat is $10. A pamphlet of advice regarding applications for patents and caveats is furnished gratis, on application by mail. Address MUNN & Co. 37 Park Row New York

Canadian Patents.

On the first of September, 1872, the new patent law of Canada went into force, and patents are now granted to citizens of the United States on the same favorable terms as to citizens of the Dominion.

In order to apply for a patent in Canada, the applicant must furnish a model, specification and duplicate drawings, substantially the same as in applying for an American patent.

The patent may be taken out either for five years (government fee $20), or for ten years (government fee $40) or for fifteen years (government fee $60). The five and ten year patents may be extended to the term of fifteen years. The formalities for extension are simple and not expensive.

American inventions, even if already patented in this country, can be patented in Canada provided the American patent is not more than one year old.

All persons who desire to take out patents in Canada are requested to communicate with MUNN & Co., 37 Park Row, New York, who will give prompt attention to the business and furnish full instruction.

Value of Extended Patents.

Did patentees realize the fact that their inventions are likely to be more productive of profit during the seven years of extension than the first full term for which their patents were granted, we think more would avail themselves of the extension privilege. Patents granted prior to 1861 may be extended for seven years, for the benefit of the inventor, or of his heirs in case of the decease of fomer, by due application to the Patent Office, ninety days before the termination of the patent. The extended time inures to the benefit of the inventor, the assignees under the first term having no rights under the extension except by special agreement. The Government fee for an extension is $100, and it is necessary that good professional service be obtained to conduct the business before the Patent Office. Full information as to extensions may be had by addressing MUNN & Co. 37 Park Row, New York.

Trademarks.

Any person or firm domiciled in the United States, or any firm or corporation residing in any foreign country where similar privileges are extended to citizens of the United States, may register their designs and obtain protection. This is very important to manufacturers in this country, and equally so to foreigners. For full particulars address MUNN & Co.. 37 Park Row, New York.

Design Patents.

Foreign designers and manufacturers, who send goods to this country, may secure patents here upon their new patterns, and thus prevent others from fabricating or selling the same goods in this market.

A patent for a design may be granted to any person whether citizen or alien, for any new and original design for a manufacture, bust, statue, alto relievo, or bas relief any new and original design for the printing of woolen silk, cotton, or other fabrics, any new and original impression, ornament, pattern, print. or picture, to be printed, painted, cast, or otherwise placed on or worked into any article of manufacture.

Design patents are equally as important to citizens as to foreigners. For full particulars send for pamphlet to MUNN & Co., 37 Park Row, New York.

Copies of Patents.

Persons desiring any patent issued from 1836 to November 26, 1867, can be supplied with official copies at a reasonable cost, the price depending upon the extent of draw ings and length of specification.

Any patent issued since November 27, 1867, at which time the Patent Office commenced printing the drawing and specifications, may be had by remitting to this office $1.

A copy of the claims of any patent issued since 1836 will be furnished for $1.

When ordering copies, please to remit for the same as above, and state name of patentee, title of invention, and date of patent. Address MUNN & Co., Patent Solicitors 37 Park Row, New York.

MUNN & Co. will be happy to see inventors in person, at their office, or to advise them by letter. In all cases they may expect an *honest opinion.* For such consultations, opinions, and advice, *no charge is made.* Write plain ; do not use pencil or pale ink ; be brief.

All business committed to our care, and all consulta tions, are kept *secret and strictly confidential.*

In all matters pertaining to patents, such as conducting interferences, procuring extensions, drawing assignments, examinations into the validity of patents, etc. special care and attention is given. For information and for pamphlets of instruction and advice

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