



W. H. B., of N. Y.—It is not new to make springs in one piece, as you propose; nor is it considered specially advantageous.

T. J. L., of Va., and thirteen others.—You have probably noticed that in attributing the beneficial effect of dipping a razor in hot water to the softening of the beard by heat, you have been anticipated by the communication of Mr. Lewis, published on page 293.

D., of Pa.—If any one infringes your patent, your remedy is to notify them of the fact, and if the infringement is not stopped you can then commence legal proceedings.

F. K., of N. Y.—Your plan for making a vertical sundial, by inserting a rod perpendicularly in the side of a barn, with the arc of a circle divided in equal parts to receive the shadow, is very imperfect; it would give the hour at 12 o'clock always within sixteen minutes, but the other hours would be far from correct and the errors would vary every day in the year.

C., of Mass.—Wood naphtha is even a better solvent for gum shellac than alcohol. In England, acetic acid, for the manufacture of acetates, is made in large quantities by the destructive distillation of wood, and wood naphtha is one of the incidental products; but in this country, vinegar is generally made by fermentation, and in this process no wood naphtha is produced. Except alcohol and wood naphtha we know of no efficient solvent of gum shellac.

J. H. J., of Md.—Your improvement can, perhaps, be patented if it makes the churn better. But the mere addition of some trifling part, if you still use the other device, would not give you a right to use the prior patent. If your improvement results in the formation of a substantially different invention from that before claimed then you will have the exclusive right of use anywhere.

O. S.—There are several plans for rolling shades from the top and also bottom. But if you have any new arrangement, for the purpose you could obtain a patent.

A. E. A. M., Ill.—Toggle-joint presses, with right and left screw, substantially as you propose, were invented long ago. You will have to try again.

E. A. P., of Wis.—In Canada patents are only issued to inventors who are British subjects and resident there. The doors are closed against Americans. You cannot obtain a Canadian patent.

W. H., of Me., asks:—"Is there any fluid black ink which can be used successfully for drawing and tracing, as a substitute for India ink?" Ans.—We know of no good substitute; we wish we did. Can you not invent one?

S. B. S., of N. Y.—There are many improvements in paddle wheels in which the floats are made to enter and leave the water in vertical position. Your improvement, if new, can probably be patented. But, to enable us to judge of its novelty, you will need to send us a description.

S. P., of N. H.—Engines with double pistons, the steam admitted between them, as you propose, are old.

N. & M., of Ill.—We are glad to hear of the success of your improvements in making sugar from sorgho. The idea of supplying water to boilers from an elevated reservoir, with cocks operated by the engine, substantially as you propose, is quite old. Your arrangement of parts could, perhaps, be patented.

J. R., of Mass.—The best way to prevent unpleasant smell from new paint on inside work is, to keep the windows open till the paint is dry. No action yet in your patent case.

R. W. B., of Mass.—A column of water one foot in height exerts a pressure of 0.434 lbs. to the square inch; therefore, a column eighteen feet in height will give a pressure of 7.812 lbs. To get the area of the cross section of a pipe, multiply the square of the diameter by 0.7854. To get the number of cubic feet discharged per minute under eighteen feet head, multiply the area of the orifice in square inches by 95.

R. B., of Pa.—The patentee, under the circumstances, would be entitled to receive the Letters Patent. The assignee of certain rights under the patent could procure an official copy of the patent for his own use.

S. W., of C. W.—Sawing devices, for felling trees in the forest—the force being communicated to the saw by compressed air or steam, through a flexible pipe—are old. The general principle of your proposed mechanism cannot, therefore, be claimed, but any novelty in your construction of the parts thereof could be patented.

S. R. B.—If you will send to H. C. Baird, No. 406 Walnut street, Philadelphia, for the books you require he will furnish them.

A. F. C., of Mich.—There is no employment office in New York specially for civil engineers.

R. B. P., of Mo.—We believe there is no patent on one machine which will saw fire wood, rip up lumber for moldings, and grind sugar cane, all at one operation, either by hand power, horse power, water power, or steam power. You can probably obtain a patent on such a machine. The first thing to be done is to make a model.

C. S., of Pa.—We think it probable that a patent could be had on your improvement. There is a patent for turning on the gas, lighting, and shutting off, by electricity. This is Gardner's patent, and is in successful operation at the Capitol, Washington.

D. B. C., of N. Y.—When it is said that a turbine wheel has yielded 87 per cent of the whole power of the water, the meaning is that it has raised a weight equal to 87 per cent of the weight of the water employed to drive it, through a height equal to the head or fall of the water.

Exhibition Hall at the Patent Office—Important to Manufacturers.

MESSRS. EDITORS:—The present Commissioner of Patents has decided to throw open the old hall of the Patent Office to the manufacturers of the country, and permit them to place therein cases containing specimens of their manufactured articles. Already, the Douglass Ax Company have availed themselves of the privilege, and set up a beautiful black walnut case, containing over fifty specimens of their art.

This, to the manufacturers of our country, is a most important movement. Not only will the exhibition be highly creditable to the country—if generally participated in, as it doubtless will be—but it will be a standing advertisement of the skill of our artisans to the thousands of foreigners who annually visit the office, from all parts of the world. The products thus displayed, if properly done, will also be a standing proof of the benefits of our patent system; they will represent the results—as the models there deposited do the ideas of American inventions.

To render the exhibition a perfect one, and what it ought to be, we should have first the raw material, such as iron in the ore, cotton in the ball, wool in the fleece, etc., and then have it represented in all its stages of progress, up to the completed article or fabric, together with the machines or other inventions by which the process is carried on; but this cannot be done in the limited space of the present available room. It is to be hoped that at some future day, Congress may be induced to take hold of this subject, and assist to carry out the idea on a scale commensurate with its importance.

I desire to call the special attention of the manufacturers of fire-arms to this opportunity to display and advertise their arms. There is no other class of inventions which attracts the attention of citizens and foreigners so much as that of fire-arms; and surely no nation on earth can make so fine a display of improved weapons as we, if our manufacturers and inventors will only send on their specimens. This is the more important, for the reason that not one in ten of the models are perfect working arms—many being of wood, others only sectional or fractional parts of the arm, etc. I have on several occasions been called upon to show to officers sent out by European governments our improved arms. And I have found it impossible to give them any correct idea of many of them, because of the imperfection of the models. By depositing a perfect arm, they would be enabled to get a clear idea of it; and it would thus become a standing advertisement for the manufacturer and inventor, much to their benefit, I am certain.

As an evidence of the interest felt by foreigners in this class, I may state that when the Embassy from Tunis visited the office recently, and came to the case set up by the Douglass Company, the first question they asked, was—"Do they make guns also?" England and France both have their grand collection of arms—why may not we? With the skill of her inventors, and the heroism of her soldiers, America may defy the world in arms; and such a display as we can make of improved weapons, will have a most beneficial effect in a national point of view.

W. C. DODGE.

Washington, D. C. Nov. 6th, 1865.

[Our correspondent urges that Congress or some other power should aid in securing an exhibition of our industrial arts, such as shall be worthy of our people. Such an exhibition as he proposes ought to be established in New York, where it can be seen and appreciated, and not in Washington, where few, comparatively, will ever see it.—Eds.]

Fire-proof Paint for Bridges.

MESSRS. EDITORS:—In your valuable journal of the 11th inst., we notice your remarks about the destruction of the Coscob railroad bridge, and a suggestion about a fire-proof paint for such bridges. We give the following, and guarantee it to answer the purpose:—1 lb. best black lead; 1 lb. of fine gilder's whit

ing, and 1 1/4 lb. of Quarterman's patent dryer—the whole ground together finely with linseed oil, and then thinned for use with linseed oil alone, and applied like other paints. Wood thus covered will not take fire from sparks.

J. Q. & SON.

New York, Nov. 14, 1865.

The Pitch of Gears.

MESSRS. EDITORS:—A correspondent of the SCIENTIFIC AMERICAN, Nov. 4, on the subject of "Teeth of Wheels," states that "the pitch of a gear is the distance between the centers of two adjacent teeth, measured in a straight line; and these centers are all situated in an imaginary circle, called the pitch circle." He says, "In treating of gears it is customary to consider the pitch as an arc of this circle, instead of a line or chord, and the rules usually given for proportioning the number of teeth, and the diameter of the pitch circle, are based on this assumption. When the number of teeth in the gear is large, or where gears to be matched are the same, for nearly so, these rules are sufficiently accurate or practice, but every mechanic who has had occasion to make gears of different sizes mesh together, particularly if of coarse pitch, has found that teeth determined by circular pitch will not run well together, and he has been compelled in such cases to find the true diameter by a series of trials," etc.

Your correspondent seems to be well versed in mathematics, but labors under a mistake in gearing; and, as there is an important truth involved, please allow a few words in explanation: The pitch of a gear is the distance between the centers of the teeth measured on the pitch circle, not "on a straight line between two adjacent teeth," whether the gears differ in size or not. Now, it is a fundamental principle in gearing, that gears should be so made as to roll together like two rollers of the same diameters as the respective pitch lines of the gears; this is a fixed fact, which we must first understand. And, to obtain this result, the diameters of the pitch circles of the two gears working together must bear the same ratio to each other as their numbers of teeth. For instance, a gear of 50 teeth driving one of 100 teeth, the diameter of the pitch circle of the latter should be twice that of the former, thus: if they be four-inch pitch, then $100 \times 4 \div 3.1416 = 127.323$ inches diameter, and $50 \times 4 \div 3.1416 = 63.6615$ inches diameter.

When gears are of the same size and number of teeth it does not matter whether we consider the pitch a straight line between the centers of two adjacent teeth, or measured on the pitch circle; the diameter of the pitch circles are in ratio to the number of teeth, whichever way we consider it. But when the number of teeth differ, then is it important that the pitch of the teeth, or distance between their centers, should be measured on the pitch circles, if we would have our gears roll together like two rollers; and the very opposite result takes place from what your correspondent claims, if they are not so made, causing unnecessary sliding, crowding and friction of the teeth.

The pitch line of a rack is a straight line near the center of the teeth, and the pinion that moves it should be so made as if it moved the rack only by contact on the pitch lines; this causes the pinion and rack to roll together as a roll on a plain surface. Therefore, to work best together, the teeth being of a proper form, the pitch of teeth of gears should be measured on the pitch circle, whether the gear works into another of its same size or rack.

ORIS B. MORSE.

Chicopee, Mass., Nov. 5, 1865.

Smoke-consuming Stoves.

MESSRS. EDITORS:—I have lately thought of an improvement in stoves, theoretically calculated to save fuel and consume smoke. Fire is ordinarily the result of the combination of the oxygen of the atmosphere with the carbon of the burning substance. Smoke is carbon in a finely divided state, which escapes without undergoing this combination. Smoke, therefore, is so much carbon worse than waste, for it is now in such a state as to be highly opposed to cleanliness, injurious to clothes, and detrimental to health. If any man could devise a plan for consuming this smoke he certainly would confer a great boon upon society.

My plan for consuming a great portion of smoke seems to me a simple and a practical one. I would