



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

construct a stove with two grates—the one immediately above the other. First, make a glowing fire in the upper grate, and then start a fire in the lower grate. Now, theoretically, all the smoke arising from the lower grate will have to pass through the upper fire, and, in so passing, will be consumed. Live coals, when necessary, from time to time, may be taken from the lower to the upper grate. Fresh fuel should always be put upon the lower grate. Thus, I should think, a continual fire might be kept up, and nearly all the smoke consumed.

W. H. B.

Baltimore, Nov. 1, 1865.

[We should suppose that this plan might consume the smoke of the lower fire, but would increase that of the upper fire. Still, this could be ascertained only by trial.—Eds.]

#### PATENT-LAW TRIALS.

##### Infringement of a Design Patent.

U. S. CIRCUIT COURT.—Before Judge Benedict.

*Emma C. Wooster vs. Jason Crane, et al.*—This is a bill in equity filed to recover damages for an alleged infringement of a patent issued Oct. 20, 1863, for a design for a reel.

The article in question is a reel for containing ruffles, ladies' dress trimmings, and other goods; and consists of two parallel disks of pasteboard connected by four bits of wood, on which the ruffle is wound between two pasteboard sides. The pasteboard is cut in the form of a rhombus, with the angles rounded, and what the patentee claims is "the design and configuration of the reel."

The statute relied on as giving to the complainant the right sought to be enforced is the act of March 2, 1861. The eleventh section of this act is as follows:—

"SEC. 11. And be it further enacted that any citizen or citizens, alien or aliens, having resided one year in the United States and taken the oath of his or her intention to become a citizen or citizens, who by his, her or their own industry, genius, efforts and expense, may have invented or produced any new and original design for a manufacture, whether of metal or other material; \* \* \* or any new and useful pattern or print or picture, to be either worked into or worked on, or printed, or painted, or cast, or otherwise fixed on any article of manufacture; or any new and original shape or configuration of any article of manufacture not known or used by others before his, her, or their invention or production thereof, and prior to the time of his, her or their application for a patent therefor; and who shall desire to obtain an exclusive property or right therein, to make, use, and sell and vend the same, or copies of the same, to others, by them to be made, used, and sold, may make application in writing to the Commissioner of Patents, expressing such desire, and the Commissioner, on due proceedings had, may grant a patent therefor, as in the case now of an application for a patent."

I am not aware that any judicial construction has been given to the portion of this act considered applicable to this case. No authorities were cited on either side showing any adjudication upon the question involved. There seems to me, however, little doubt as to what should be the construction to be put upon it, when sought to be applied to a case like the present.

In this case the reel itself is an article of manufacture, is conceded to be old, and not the subject of a patent. The shape applied to it by the complainant is also an old, well-known mathematical figure. Now, although it does not appear that any person ever before applied this particular shape to this particular article, I cannot think that the act quoted above was intended to secure to the complainant an exclusive right to use this well-known figure in the manufacture of reels. The act, although it does not require utility in order to secure the benefit of its provisions, does require that the shape produced shall be the result of industry, effort, genius, expense, and must, also, I think, be held to require that the shape or configuration sought to be secured shall at least be new and original, as applied to articles of manufacture. But here the shape is a common one in many articles of manufacture, and its application to a reel cannot fairly be said to be the result of industry, genius, efforts, and expense. No advantage whatever is pretended to be derived from the adoption of the form selected by the complainant, except the incidental one of using it as a trade-mark. Its selection can hardly be said to be the result of effort even. It was simply an arbitrary, chance selection of one of many well-known shapes, all equally well adapted to the purpose. To hold that such an application of a common form can be secured by Letters Patent, would be giving the act of 1861 a construction broader than I am willing to give it.

The decree must, therefore, be for the defendant.

##### Validity of a Reissued Patent.

U. S. CIRCUIT COURT.—Before Judge Nelson.

*Samuel H. Doughty vs. James J. West et al.*—This was a motion for a preliminary injunction in a suit brought to prevent an alleged infringement of a patent belonging to the plaintiff.

This motion is founded upon a reissued patent to the plaintiff for a new and useful improvement on skeleton skirts, on the 1st of August, 1865, as assignee of James Draper, the inventor and original patentee; and also, upon affidavits in support of the alleged infringement of said patent by the defendants. The original patent was issued October 4, 1859, and surrendered and reissued on the 27th of December of the same year, and again surrendered when the present patent was issued in 1865.

The claim of the present patent is "for a new manufacture of skeleton skirts, substantially, as described,

consisting of a series of tapes woven in the direction of their length in alternate sections, as single and double tapes, with hoops inserted in the loops formed by weaving the tapes, as double tapes, and there secured to prevent the tapes from sliding latterly on the hoops."

None of the previous issues of October and December, 1859, contained this claim. And it is now, for the first time, put forth as the original invention of the patentee prior to the date of the first patent. This the plaintiff must sustain in order to uphold the present patent.

It appears from the affidavits, on the part of the defendants, that a patent had been issued for this same improvement as early as Jan. 6, 1863, or rather for this improvement with the addition of metallic fastenings; and that the defendants are manufacturing their skeleton skirts under this patent; and which will make it necessary for the plaintiff to overcome the inference against him, *prima facie*, that his subsequent reissue, in August, 1865, was suggested by this patent; for, it seems clear, as stated in the affidavit, that this patent of 1863, embraces the whole of the improvement of this last reissue of plaintiff.

Nearly six years have elapsed since the original patent was issued to Draper, and before he has described and claimed his real invention, according to the theory of this suit. Of course, this delay has had the effect, doubtless, to lead persons engaged in this business to conduct it as if no such claim belonged to him, and may, if his patent is now sustained, work hardship and loss. We agree, however, if he can clearly show that he was the inventor of the skirt previous to the date of the first patent, and was the first and original inventor, his patent must be upheld. We say clearly, because the lapse of time cast suspicion upon the case, and courts and juries will require the fullest and most explicit proof of the fact. Of course the case is not one for a preliminary injunction, and the plaintiff must go to his proofs.

Motion for preliminary injunction denied.

##### Extraordinary Endurance of a Steel Ship.

The London papers publish the following extract from the log of the *Clytemnestra*, a clipper ship of 1,250 tons register, built of three-quarter inch steel plates:—

"The morning of October 5, 1864, commenced with strong winds and thick, drizzling rain. 8 A. M., had gale and tremendous squalls, with thick, constant rain. From 8 A. M. until noon gale rapidly increasing, and barometer falling fast, with very threatening appearance. 2 A. M., tremendous gale and most terrific squalls, with thick rain and dismal appearance. The ships attached to the same moorings below us began to break adrift, with sails blown from the yards and topgallant masts gone. 3:30 P. M., hurricane at its height, blowing so terrifically hard that it was impossible to stand on deck without holding on. At this time our inshore bower chain parted, our sails were all blown from the yards, and the topgallant mast went with the foretopmast. When the bower chain parted we swung out stern on to the gale, and held on for a few minutes, when in a tremendous burst of wind our stern chain parted, and away we drove across the river, before wind and tide, at a frightful rate, smashing into several ships on our way. Finally, we were brought to a standstill on the opposite side of the river, and became a target for one half of the ships in Calcutta. One wooden ship driving up struck upon our starboard quarter, walking right through the upper part of our stern, and raising the poop deck. Three or four ships were constantly pitching into our main rigging, being all fast together, and smashing and tearing away at everything thenceforward. At 4:30 P. M., two iron ships and one wooden one drove right into us abaft the fore-rigging, carrying away chain plates and rails. One of their bowsprits struck the foremast, and, with a fearful crash, the foremast fell over the port side, almost burying a small vessel that was fast to us. The rigging of the foremast was totally gone. Some time before the mast went it broke tween decks, tearing up the main deck, and breaking two beams. 5:30 P. M., wind abating very fast, and barometer rising, with fine weather. Ship laying almost a helpless wreck."

##### Ventilation.

General Morin lately read a paper before the French Academy of Sciences on the ventilation of public buildings. The fundamental principle of good ventilation, he observed, was this:—To draw off the vitiated air from the stratum nearest the floor—that is, in the immediate vicinity of the persons in the room, and to admit pure air through the ceiling or apertures made in the walls close to it. In winter the air to be introduced, may be previously warmed by an apparatus placed under the roof; but in summer considerable difficulty is encountered in lowering the temperature of the air to be admitted, since the sun having darted its rays upon the roof during the

day, the space under the roof is so hot that, instead of admitting cool air, it penetrates into the building at a much higher temperature than that of the interior. General Morin has tried four different plans for cooling the air. The first consisted in making it pass through a space filled with pulverized water—that is, reduced to a sort of dust, as it were, by making two jets of water strike against each other with great violence. By this method, the temperature is only lowered by two degrees, and moreover it would require a considerable quantity of water and costly machinery to effect it, unless ample water power were at command. The second plan consists in making the air pass along the sides of metallic vessels containing water, which may, if necessary be cooled with ice; but here again there is the difficulty of giving the cooling surfaces a sufficient development—a condition which cannot easily be complied with, and which therefore, in point of fact, renders this method impracticable. The third consists in making openings on that side of the building which is never exposed to the action of the sun, while the vitiated air is drawn off through metallic tubes, the draught of which is increased by the action of the solar rays to which they are exposed. On the side exposed to the sun, the windows should be closed with blinds, or, in case of skylights, the glass panes may be watered outside. The fourth process will be easily applicable as soon as Paris can command abundance of water by the new aqueduct of the Dhuis. It imitates the natural effect of rain, and is very efficacious, since one cubic metre and a third per hour will suffice to water 100 square metres of roofing, which will thus be prevented from being overheated by the sun. Applied from an early hour in the morning, and continued as long as the sun shines on the building, it not only prevents the roof from getting hot, but will reduce the interior temperature of the building very considerably, and cool the air admitted into the garret or space under the roof. As this operation of watering need not be performed for more than 60 days every year, the cost for a large railway station like the Orleans one, for instance, would not exceed 1,000*fr.* each season.

##### Headless Screws for Boots.

We have all heard of pegged boots and sewed boots, but the last novelty is "screwed" boots. It may be asked, where is the superiority of "screwed" soles over nailed? It is here: the thread of the screw holds the sole upon the bottom of the boot or shoe, as long as enough of the metal is left to retain this thread. It will be understood that an iron, copper, or a steel nail, or wooden peg, may drop out, or so far wear off, that the sole will work through these fastenings, and part company from the upper; but not so when the screw takes the place of the nail. As long as the thread of the screw remains—and it will so remain as long as a particle of the screw is left—the leather sole will be held to its place, and wear till it is worn through. We understand that the French army shoe is manufactured in this manner; good stout soles put on with the headless brass screw. This screw is all thread, and by a peculiar kind of a machine is twisted through the outer sole, and into the inner sole, when it is riveted at each end. The metal being brass is not affected by water, and the wear of one of these soles is equal to four of the kind which are sewed or pegged.—*Shoe and Leather Reporter.*

[A screw will not hold unless there is some substance for it to catch in. The wretched leather in boots and shoes now-a-days would seem to be very poor stuff in which to make a thread.—Eds.]

**BESSEMER STEEL.**—Recently a cubic block of steel, of the enormous weight of 100 tons, was successfully cast at the new works of Messrs. Bessemer and Sons, at East Greenwich. At Bolton, Lancashire, a block of similar steel, weighing 250 tons, was cast by the aid of Messrs Ireland and Sons' patent upper-tweezer cupola furnace.

**GEN. BURNSIDE** is building a railroad in the oil regions, ten miles and a half long, which is to be completed in ninety days. Seven hundred men are employed in the construction.

It has lately been found that sulphuric acid attacks pure lead more quickly than the same metal in an impure state—a result quite contrary to expectation.