

men and women are here employed, and many millions of bonds and currency have passed through their hands, thus far without the loss of a dollar. There were at the time of my visit upward of one hundred and thirty millions of dollars in the iron vaults.

PROFESSOR PAGE THE INVENTOR OF THE RUHKORFF COIL.

(For the Scientific American.)

In the SCIENTIFIC AMERICAN of Jan. 2d, 1865, you have described the Ruhmkorff coil to consist of the following parts:—a primary coil of insulated wire surrounding an electro-magnetic case consisting of a bundle of wires of soft iron, a secondary coil of fine wire of great length and carefully insulated, surrounding the primary coil, and a vibrating hammer or automatic circuit breaker. On connecting a small galvanic battery with the primary coil, the hammer is immediately set in motion, and the rapid breaking of the circuit caused by its motions produces currents of high intensity, and some of the brilliant appearances of statical or frictional electricity. It might have been added that Fizeau suggested the use of a peculiar condenser with the Ruhmkorff coil by which its electrostatic properties were displayed with great splendor. Having been informed that the instrument thus described as Ruhmkorff's was the invention of Prof. Page of Washington, I have taken some pains to inquire into the facts, and find that the entire instrument was made by him in 1838. The following facts appear in the public records of the Patent Office:—

"On the 2d of February, 1854, Prof. Page applied for a patent for an instrument identical in all its parts with that described as the Ruhmkorff coil. The Patent Office, upon a hasty examination, at first refused the claim upon the ground that the automatic circuit breaker, in connection with the induction coil, was described by D. Golding Bird, in the *London, Edinburgh and Dublin Philosophical Magazine*, for January, 1838. It so happened that the office had failed to notice the conclusion of Golding Bird's communication in which he says, "the credit of the invention must be given to Dr. Page." Attention having been directed thereto the Patent Office admitted Prof. Page's claim to originality, but subsequently refused the patent upon the ground that the invention had been dedicated to the public. How far this invention anticipated the Ruhmkorff coil will be seen from the descriptive catalogue of Daniel Davis, of Boston, published in 1840, in which he says that this induction coil affords a "light between separated charcoal points," and "charges the Leyden jar." The instrument is there called the "compound magnet and electrotome," and was subsequently made and sold under various names, such as "Page's Analysis of Shocks," "Separable Helices," etc. The identical instrument I find described in *Silliman's Journal*, Vol. XXXV., Jan., 1839. The electrostatic powers of this instrument as described are fully equal to the past editions of the Ruhmkorff coil, and I have been shown a programme of experiments recently made at Public School, No. 11, Brooklyn, N. Y., in which occurs the following announcement, "Page's Analysis of Shocks same as Ruhmkorff's Coil." These experiments were conducted by N. B. Chamberlain, of Boston. Mr. Chamberlain exhibits the sparks, the charging of the Leyden jar and all the beautiful experiments with the vacuum tubes with Page's coil, precisely as they are performed with the Ruhmkorff, the only difference being that the Page coil is on a smaller scale and much less expensive.

The intensifying power of the bundle of iron wires in the coil was discovered by Prof. Page and published by him in *Silliman's Journal*, Vol. XXXIV., for July, 1838, and the first application of it within the induction coil led to the development of its electrostatic properties.

With all these facts before us it is evident that the so called Ruhmkorff coil was the invention of Prof. Page, and the Imperial award of 50,000 francs to Ruhmkorff by the French Commission must have been made in entire ignorance of Prof. Page's claims, an oversight of American achievements by European savans already too common.

New York, Jan. 16, 1865.

S. H. W.



Cone Pulleys for Given Velocities.

Messrs. Editors.—In a late number of the SCIENTIFIC AMERICAN is a method of ascertaining the diameters of cone pulleys, which will do when definite velocities are not required, but as that is sometimes a desirable end I send the following rule:—Suppose the velocity of the upper or driving cone to be 100, the joint diameter of the two cones 20 inches, and the velocities required 75, 150, 225, 300. Write down the velocities required as above, and under each write that of the upper cone; add them together, and set the amounts under, as in addition, and make each amount the denominator of a fraction, of which the velocity of the upper or driving cone, say, is the numerator. Multiply the joint diameter, 20, by each of the fractions so found, and the products will be the several diameters of the pulleys upon the driving cone. The same operation, repeated with the velocities sought, as denominators, will give the diameters of the driven cone. Example:—

75	150	225	300
100	100	100	100
175	250	325	400

$$100 \div 175 \times 20 = 11\frac{2}{3}$$

$$100 \div 250 \times 20 = 8$$

$$100 \div 325 \times 20 = 6\frac{2}{5}$$

$$100 \div 400 \times 20 = 5$$

$$75 \div 175 \times 20 = 8\frac{4}{7} + 11\frac{2}{3} = 20$$

$$150 \div 250 \times 20 = 12 + 8 = 20$$

$$225 \div 325 \times 20 = 13\frac{1}{3} + 6\frac{2}{5} = 20$$

$$300 \div 400 \times 20 = 15 + 5 = 20$$

It may be objected to this method that it does not make allowance for the angle of the belt; but in the above example I find the variation to be but .1 in a distance of 6 feet between shafts—a difference which would scarcely be perceptible in the tension of the belt. If, however, the distance at which the shafts are known are to run is known, and it is desirable to be accurate, one of the cones may be set back of the lathe the proper distance, and the others may be turned by a tape line until the tension is equal upon all the pulleys. I have found this to work well in practice, and it is simple enough to be within the reach of any mechanic who is likely to have cones to make.

S. H. WILDES.

Central City, Col. Ter., Dec. 21, 1864.

Rules for Measuring Grain.

Messrs. Editors:—I venture to offer you for publication the following rules for measuring grain. Dimensions are taken in inches, and the Winchester bushel—the standard of the United States—contains 2150.42 cubic inches:—

To measure grain in a bin, multiply the product of the length, breadth and depth by 10, and divide by 2150.42 for the number of bushels.

To measure grain in heaps:—Multiply the sum of the perpendicular and slant heights, their difference, and the perpendicular height together, and the product by .00048 when it is heaped in the middle of a floor; by .00024 when heaped against the sides of a barn; by .00012 when it is heaped in the corner of a barn; and in each case the last product will be the answer in bushels.

The second statement may be demonstrated thus:—Let a equal the slant height, and b the perpendicular height. Then $a^2 - b^2$ equals the square of radius of base of heap, and $(a^2 - b^2) \cdot 3 \cdot 141592$ equals area of base of heap, and $(a^2 - b^2) \cdot 3 \cdot 141592 \times b \div 3$ equals the solid contents of heap in inches, which being divided by 2150.42 and reduced, equals $(a^2 - b^2) \cdot b \times .00048$, which, since $a^2 - b^2 = (a+b)(a-b)$, becomes $(a+b)(a-b) \cdot b \times .00048$. Q. E. D.

M. V. B. P.

Danville, C. E., Dec. 1864.

Hand Carding, Spinning, and Weaving.

Messrs. Editors:—I have been a constant reader of your valuable Journal for many years, and have come to regard it as the fountain of knowledge.

This island is very much in need of a hand carding, spinning, and weaving machine for working up the

cotton grown here. As labor is very cheap, many girls who are unable to do field work might make a livelihood at this branch of business. Can you inform me where such a machine can be purchased, and at what price, or with whom I can correspond in regard to the matter?

JOHN McDONALD.

Kingston, Jamaica, Jan. 6, 1865.

HARDENING AND TEMPERING STEEL.

Steel is hardened by being heated a bright cherry-red, and plunged in cold water. The brittleness and hardness are then modified by gradually warming the metal, either over a fire, or by placing it on a hot metal plate, or in an oven, or in an oil bath. Some large manufacturers of cutlery use a tempering oven, the temperature of which is regulated by a thermometer. This saves a great deal of high-priced labor, and secures a uniform result. The following degrees of temperature and corresponding colors of the steel, for different purposes, are given in many books:—

Corresponding Temperature.

A very pale straw 430°	Lancets }
Straw 450°	Razors }
Darker straw 470°	Penknives }
	All kinds of wood tools
Yellow 490°	Scissors }
Brown yellow 500°	Hatchets, Chipping Chis-
Slightly tinged purple 520°	els. Saws.
Purple 530°	All kinds percussive tools.
Dark purple 550°	Springs.
Blue 570°	
Dark blue 600°	Soft, for saws.

GUNS BURSTING IN ACTION.

At the first attack on Wilmington no less than six 100 pound Parrott guns are said to have burst. These guns are the best service guns in the world, and are acknowledged as such by unprejudiced persons. At the last attack on Wilmington, two fifteen-inch guns burst, doing but little injury, fortunately, to those in their vicinity. This will be hailed by those who condemn cast iron ordnance as proof positive of the correctness of their assertions, but it is no more evidence of the unfitness of cast iron for artillery than the explosion of a boiler shows wrought iron to be unfit for generating steam. In the excitement of battle very many exigencies arise, and omissions occur which frequently result in disaster, and it is mainly to such causes that we attribute the recent failure of the Parrot rifles and the large guns.

The official investigation at Washington into the explosions in question will, we hope, result in some specific verdict and make the true cause public.

Another Iron Letter.

In our impression for Dec. 2nd we described an iron letter, the pages of which were rolled at the Sligo Ironworks, Pittsburgh, Pennsylvania. The makers claimed that this iron was the thinnest ever produced. During the present week we have had some specimens of sheet iron brought under our notice which are nearly one-tenth thinner than the iron of the American letter. The plates were rolled by Messrs. T. W. Booker & Co., Mellingriffith Werks, Cardiff. They are barely the 1,000 part of an inch in thickness. A piece 8 in. long by 5½ in. broad, weighs 62½ grains only. The quality of the plates is admirable. They possess toughness and flexibility in no ordinary degree. We have very little doubt that these plates are the thinnest ever produced.—*London Engineer*.

THE enormous demand that has sprung up for the series of dyes that are prepared from coal has probably no parallel in the history of color manufactures. Mauve, magenta, girofla, and other popular colors are all produced by scientific treatment of certain substances that are produced during the distillation of coal. It is said the discoverer of these dyes was a lad in the City of London School, now grown to man's estate, and enjoying an income of several thousands a-year as his share of the profits of the manufacture of these dyes.

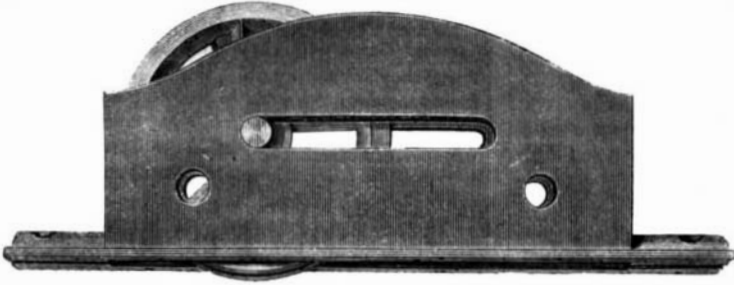
In Hitchcock's "Method of Forging Cannon," published on page 50, current volume SCIENTIFIC AMERICAN, some typographical errors occurred which changed the sense; the rings are said to be formed in a modification of the tin rolling machine. It should read tire rolling machine.

Sliding Door Roller Sheaves.

The accompanying illustrations exhibit an important and simple improvement in sliding door sheaves. The wheel instead of revolving in a confined socket, rolls along a horizontal plane; the axle of the wheel moving the length of the slot in the same time that the wheel travels the length of the track.

By this arrangement the superior advantages of a roller over those of a wheel are secured in moving a door, the bed of a printing press, or any other burden which has a reciprocating motion. In the ordinary form the roller is inapplicable to a sliding door; but, by a modification, as exhibited in this sheave (Fig. 1), where the burden presses upon an axle instead of upon the periphery of the roller; the distance traveled by the roller is so much lessened that its application to the sheave is quite practicable.

Fig. 1.

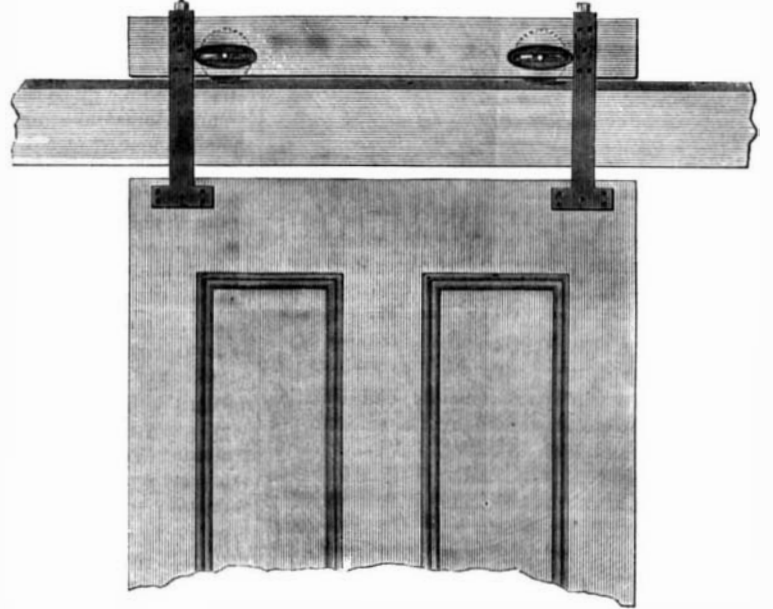


door has been found advantageous in adjusting the joint between the two doors when they are in pairs; also the joint at the bottom where it meets the floor.

These sheaves are manufactured by Messrs. Newman, Onderdonk and Capron, No. 1,172 Broadway,

but it is nevertheless true, and a machinist that has the hang of his hammer, the carpenter of his saw, or the miller of his pick, will miss the familiar feeling, and work awkwardly if he is continually changing one for another. The weight can be added to or taken

Fig. 2.



SLIDING-DOOR ROLLER SHEAVES.

The length of the slot is dependent upon the distance the door is required to travel; also upon the relation between the circumference of the wheel and that of the axle. In ordinary doors the length of the slot is about three inches long.

One advantage obtained by this improvement, as above shown, is the diminished friction and consequent ease of motion, but this is not the principal advantage. In common sliding door sheaves it has been found difficult to lubricate the working parts, and in consequence it is found after a year or two that the axle is ground away. This is so serious that the door settles gradually until it comes in contact with the floor or with the track and thereby prevents the moving of the door except by great exertion. The roller sheave most effectually prevents the occurrence of this evil, and herein is its principal advantage; for, there being no friction between the axle and the plane upon which it rolls, neither of them can wear away; hence the door must remain at the height at which it was at first placed, and continue to move with ease for any length of time.

It is sometimes desirable to have the sheaves placed at the top of the door, in order to have the floor free from the track for the extension of a carpet beneath or for other reasons.

Doors may be hung at the top by this sheave, as shown in the engraving (Fig. 2), where two sheaves are inserted in a plank and placed above a beam carrying the track, over the door. The door is suspended by iron straps on either side of the beam, passing over the plank as an inverted stirrup. A screw inserted in this strap on top of the plank, raises or lowers the door at pleasure. The straps or stirrups slide up and down in a slight groove on the sides of the plank. In some cases, where it may be difficult to get at the screw so located, it is placed just above the door, the stirrups being secured, in this case, to the plank and made movable on the door. This arrangement for raising and lowering a

New York. The invention was patented May 5, 1863, and June 21, 1864. Any information may be had by addressing the manufacturers.

Improved Mill-Stone Pick.

The inventor of this implement claims to have had long experience in this department of manufacture, and for a number of years past has been experimenting with a view to the production of an edge that would stand. The edges are hardened on a peculiar plan, and, compared with the old-fashioned pick, are

from at will by simply increasing the dimensions of the box. The details of the pick are merely a solid box head, A, having the pick or cutter, B, confined in it by means of the teeth, C, and wedge, D. The teeth prevent the tool from moving up, and the wedge holds the same firmly in its place. It is also quickly detached for grinding, and in many other respects a most convenient tool, and desirable improvement over those generally used. The cutters are furnished by the manufacturers, D. C. Stone & Co., by whom this invention was patented through the Scientific Am. Patent Agency. The patent has been ordered to issue, and the claim will appear next week. For further information address the patentees at Kingston, N. Y.

Fig. 1

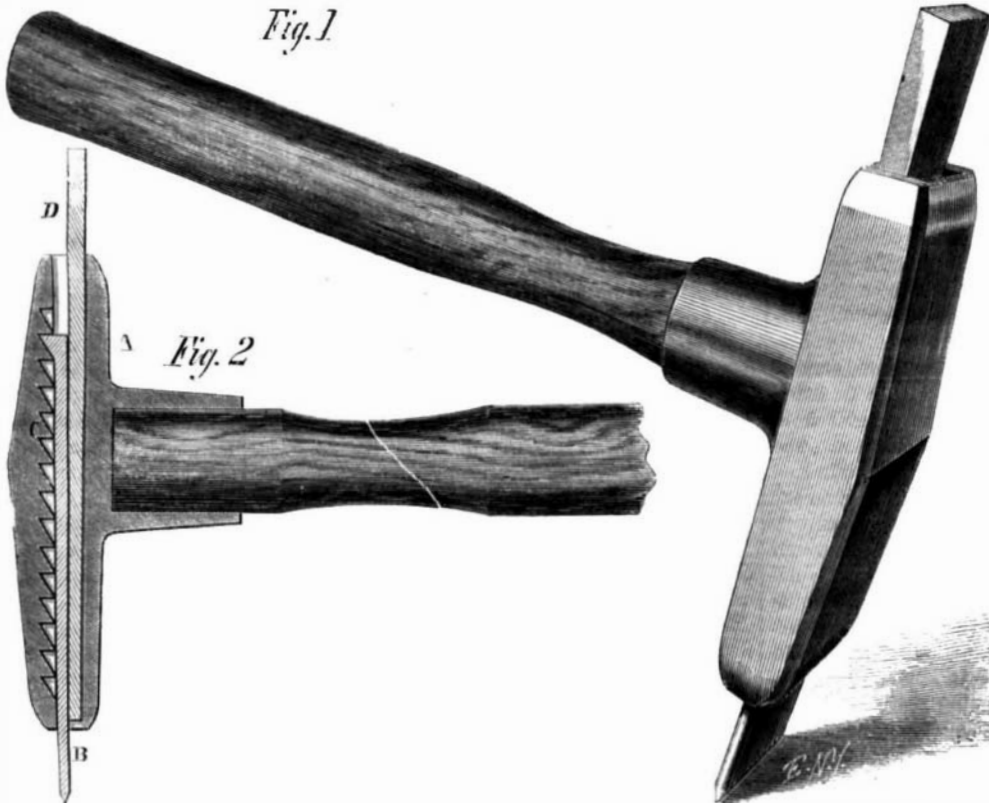


Fig. 2

Crystallized Tin-plate.

Crystallized tin-plate is a variegated primrose appearance, produced upon the surface of tin-plate, by applying to it in a heated state some dilute nitromuriatic acid for a few seconds, then washing it with water, drying and coating it with lacker. The figures are more or less beautiful and diversified, according to the degree of heat and relative dilution of the acid. Place the tin-plate, slightly heated, over a tub of water, and rub its surface with a sponge dipped in a liquor composed of four parts of aquafortis, and two of distilled water, holding one part of common salt or sal ammoniac in solution. Whenever the crystalline spangles seem to be thor-

STONE'S MILL-STONE PICK.

oughly brought out, the plate must be immersed in water, washed either with a feather or a little cotton (taking care not to rub off the film of tin that forms the feathering), forthwith dried with a low heat, and coated with a lacker varnish, otherwise it loses its luster in the air. If the whole surface is not plunged at once in cold water, but if it be partially cooled by sprinkling water on it, the crystallization will be finely variegated with large and small figures. Similar results are obtained by blowing cold air through a pipe on the surface in passing from a fused to a solid state.

This fact may appear singular to impractical men,