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 RUHMKORFF 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.

Correspondence.

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

$$100\div175\times20=11\tfrac{3}{7}$$
$$100\div250\times20=8$$
$$100\div325\times20=6\tfrac{2}{3}$$
$$100\div400\times20=5$$

$$75\div175\times20=8\tfrac{4}{7}+11\tfrac{3}{7}=20$$
$$150\div250\times20=12+8=20$$
$$225\div325\times20=13\tfrac{11}{13}+6\tfrac{2}{13}=20$$
$$300\div400\times20=15+5=20$$

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 21504 for the number of bushels.

To measure grain in heaps:—Multiply the sum of the perpendicular and slant hights, their difference, and the perpendicular hight 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 hight, and b the perpendicular hight. Then a^2-b^2 equals the square of radius of base of heap, and $(a^2-b^2)3{\cdot}141592$ equals area of base of heap, and $(a^2-b^2)3{\cdot}141592\times b\div3$ equals the solid contents of heap in inches, which being divided by 2150·42 and reduced, equals $(a^2-b^2)b\times{\cdot}00048$, which, since $a^2-b^2=(a+b)(a-b)$, becomes $(a+b)(a-b)b\times$ ·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 } Razors }	
Straw	450°		
Darker straw	470°	Penknives }	All kinds of wood tools
Yellow	490°	Scissors }	Screw taps.
Brown yellow }	500°	Hatchets, Chipping Chisels. Saws.	
Slightly tinged purple }	520°		
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 Works, Cardiff. They are barely the 1,000 part of an inch in thickness. A piece 8 in. long by 5¼ 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.