

86. DIAPHRAGM FOR PHOTOGRAPHIC CAMERAS; Felix Miller and Alois Wirsching, Assignors to Felix Miller and H. H. Hayden, City of New York.

Claim—The arrangement and combination of the plates, the notched plate, and springs, as described.

[A number of curved plates are placed in a tube in front of the lens, so as to form apertures of different sizes for increasing or diminishing the intensity or sharpness of the light into the camera from the object, in taking photographic pictures.]

87. POWER PRINTING PRESSES; Jedediah Morse, Canton, Assignor to the S. P. Ruggles Power Press Manufacturing Company, Boston, Massachusetts.

Claim—The improvement in the construction of each of the platen rails, the same consisting in the chute and a notch or depression arranged therein, and with reference to the rollers or tapes, in manner as specified. Also, the arrangement and combination of the slider with the operating cam and the pin or stud on the rocker toggle, such slider being actuated by a foot-treadle, a spring, and the cam of the toggle. Also, the mode of insuring the return movement of the toggles, and their gradual forward motion, after each impression has taken place, the same being accomplished by the notched wheel or its notch. Also, the mode of constructing the gears for operating the frisket-carrier, viz: with the toothed arcs, and the concave and convex arcs, unprovided with teeth. I do not claim the subject of the United States patent No. 7205—but I claim the combination of the two, or any other suitable number of wheels, lever nippers (applied respectively to them), and their opening and closing bars, or mechanical equivalents for such bars. Also, the specified mode of constructing each of the nippers for receiving the sheet of paper from the table, viz: so that each jaw may move away from the other while the upper is being raised, the same producing the advantages not only of insuring the passage of the lower jaw underneath the sheet of paper simultaneously with that of the other jaw over it, but of both jaws closing upon the paper at one and the same time, so as not to lift it out of place. Also, the mode of constructing the lower jaw of each pair of nippers, viz: with a lip or bend arranged thereon. Also, the mode of applying and operating each of the points, viz: hinging or jointing it to the table, and combining with it a stop and lever, or the equivalents therefor. Also, the improved method of operating the frisket-carrier, the same consisting in causing it to descend and pass in an inclined position under the delivering tapes and rollers, while the nippers may be approaching the sheet table, the same enabling the press to be made lower and shorter than when the frisket-carriage is moved horizontally under the said delivering tapes or rollers.

88. MACHINERY FOR CUTTING COMB TEETH; Wm. Noyes, Jr., West Newbury, Assignor to S. C. Noyes & Co., West Roxbury, Massachusetts.

Claim—In combination with the saw, or the same and its peripheral guide or guides, a mechanism or means of pressing or bending the saw laterally. Also, the mode of producing the lateral and longitudinal movements of the carriage of the comb-carrier, viz: by means of the cam and its screw-thread periphery, arranged and operating in conjunction with a rack applied to the said carriage, as described.

89. MACHINE FOR CONVERTING OSCILLATING MOTION INTO DIRECT CIRCULAR MOTION; Louis Planer, Assignor to self and Joseph Auger, City of New York.

Claim—The grooved dog having its tail resting in a recess, or equivalent resting place, in the lever, without being pivoted, or otherwise attached thereto, and having a spring applied in combination with it and the said lever, and the whole being applied and combined with the wheel and its axle, as described.

90. HOOKS FOR VEST CHAINS; Anthony Wallach, Assignor to self and Adolph Wallach, City of New York.

Claim—The clasping hook, in combination with the bolt in the body of the vest chain hook.

91. MOULDS FOR PRESSING GLASS; Thomas Shaw, Assignor to self and John C. Bailey, Philadelphia, Penna.

Claim—Forming on the plunger a shoulder of a size corresponding to that of the upper edge of the recess in the base of the mould, and limiting the downward movement of the plunger, so that the said shoulder shall coincide or be slightly below the said upper edge of the recess.

92. PLUG BEDSTEAD FASTENING; Jacob J. Smith, Assignor to self and J. H. Pugh, Philadelphia, Penna.

Claim—1st, A double plug fastening for bedsteads, consisting of the two distinct parts, so constructed as to be adapted for being driven or secured into the post and rail respectively, and also fitted with a wedge-shaped dovetail tenon, and a corresponding groove, operating together so as to cause the end of the rail to be drawn tightly against the post, in the downward pressure of the said rail, after they are connected together. 2d, Making the post-plug with the inclined dovetail groove across in one side of the same, so as to operate in combination with the wedge-shaped tenon on the rail-plug.

MECHANICS, PHYSICS, AND CHEMISTRY.

*Note as to the Relation of Common and Voltaic Electricity.**

By J. J. WATERSTON, Esq.

In the seventh series of his "Experimental Researches," Faraday treats of the absolute quantity of electricity associated with the atoms of matter, and sums up with a statement as to the quantity of electricity associated with the chemical elements of a grain of water, which has often been quoted since in a way that tends to mislead as to the potential magnitude of the forces involved. There is an example of this in the last (January) number of the *Edinburgh Review*, p. 235, where the following passage occurs:—"Yet they find authority in the mar-

* From the Lond., Edin., and Dub. Philosophical Mag., May, 1859.

vellous fact, well authenticated by Faraday, that one drop of water contains, and may be made to evolve, as much electricity as under other manner of evolution *would suffice to produce a thunder-storm.*" The mechanical value of the chemical force that unites the oxygen to the hydrogen of a grain of water is well known to be about equal to the weight of 7 cwt. exerted through one foot. That such amount of force would *suffice* to produce a thunder-storm is plainly an idea that cannot be entertained; nor is it strictly implied by the words of Faraday, which are—"The chemical action of a grain of water upon four grains of zinc can evolve electricity equal in quantity to that of a powerful thunder-storm." This was written in 1833, when the application of a mechanical standard or work equivalent to molecular forces was but little thought of. To avoid conveying an incorrect impression now, it would be necessary to underline the word "quantity," and add, "but of *incomparably less intensity* than that of a powerful thunder-storm." The idea of the mechanical equivalent of a grain of water being equal to the mechanical equivalent of a thunder-storm would thus be excluded.

The progress of science, and the labors of Harris especially, has since enabled us to obtain some clearer ideas of quantity and intensity as applied to electricity. When the mechanical value of a constant quantity under different degrees of intensity has been ascertained—and this seems practicable with Harris' apparatus—we shall be in a position to estimate exactly the potential relation between voltaic and common electricity. In the mean time it may be useful to direct attention to certain data which already exist, by means of which we may roughly calculate an approximate result.

The great electric battery of the celebrated Dutch electrician, Van Merum, consisted of 100 jars, each exposing $5\frac{1}{2}$ square feet of coated glass, making altogether 550 square feet. It is stated that this battery, discharged through a length of 25 feet of iron wire $\frac{1}{140}$ th of an inch in diameter, fused it so that it was converted into red-hot balls thrown in all directions. Assuming that the heat evolved was sufficient to raise the temperature of the wire 3000 degrees, we have $\frac{1}{8}\frac{1}{2}$ of a cubic inch of iron thus heated; this is equivalent to about $\frac{1}{8}\frac{1}{8}$ cubic inch of water raised 3000 degrees, or 15,000 grains raised 1 degree.

To compare this battery strictly with that employed by Faraday, we should require to know the electric tension of each when charged, as indicated by the same electrometer; also the thickness of the glass in each. Such data are wanting; but, for a rough estimate, we may perhaps assume that they did not differ materially in these particulars.

Faraday states that the quantity of electricity required to decompose a single grain of water is equal to 800,000 charges of a 25 square feet battery, each charge made by thirty turns of a plate-glass machine, 50 inches diameter, in full action. The product of 25 by 800,000 is 20,000,000 square feet of coated glass. This, compared with 550, shows that the quantity of electricity associated with 1 grain of water is upwards of 36,000 times the amount in Van Merum's battery,

and consequently the heating power must be equivalent to 15,000 grains of water raised 36,000 degrees.

According to the experiments of MM. Dulong and Hess, 1 litre, or 61 cubic inches of hydrogen, burned in half a litre of oxygen, gives out heat sufficient to raise 3102 grms. of water 1° C., or 12.3 lbs. 1° F. The water formed by the combustion is 0.00168 lbs. The ratio this bears to 12.3 lbs. is 1 to 7345; so that the heat given out by the combustion of hydrogen sufficient to form 1 grain of water, would raise 7345 grains of water 1° F. in temperature. Comparing this with 15,000 grains raised 36,000 degrees, we arrive at the conclusion that the mechanical value of the electricity required to decompose 1 grain of water is less than $\frac{1}{76,000}$ th of the mechanical value of the electricity in the 800,000 charges of the 25-foot battery. Thus eleven charges of this battery represent the integral electric force contained in 1 grain of water.

Edinburgh, February 13, 1859.

*Durability of Electrotype Work.** By EDWARD RICHARDSON.

In reply to an inquiry made at the Institute of Architects, as to the probable durability of electrotype metal, and its thickness, and for the information of your general readers, I may state that in 1844, being called upon to furnish metal medallions, &c., for the granite testimonial to Major-General Sir Alexander Dickson, K.C.B., &c., near the Rotunda, on Woolwich-common, a very exposed situation, I suggested electrotype castings. A consultation of officers on the question followed, the results being, full permission to reproduce my models in electrotype copper, which was ably carried out in the depth of a severe winter for me, by Mr. Henry Cox, at Battersea, now local manager of the Lizard Serpentine Company. These castings were at that time of unusual size and thickness, viz: 2 feet 6 inches diameter, and fully an eighth of an inch thick of solid metal. This was effected also without shrinking, and every tool touch from the clay model was reproduced. These works have been now exposed for 15 years; and I believe that 500 will give no perceptible change in them. They weighed, as far as I can remember, thirty pounds each. No chasing was required. Mr. Cox, who, if he sees this, may speak for himself, afterwards executed much more extensive works for the Prince Consort, at Windsor, and other patrons.

On the other hand, I have had, for years, a small brass, about fifteen inches high, of my Templar, William, Earl of Pembroke, produced by the old fire process, which cost me pounds to chase, obliterating every line of my original model, and weighs nearly $\frac{1}{4}$ of a cwt. When are we to rival our foreign neighbors in this important branch? The zinc Berlin process seems forgotten.

* From the Lond. Builder, No. 845.