

Nature of Electricity.

Prof. Thompson has shown how a series of floating magnet poles of like name, repelling one another, tend to produce equal distribution of the poles. Prof. Thompson, arguing from the second law of electrostatics (inverse squares), sought to explain the first law in a rational manner, on the hypothesis of self-repelling molecules, which tend to uniform distribution. When there is a surplus in one part and a deficit in another, the molecules are urged toward each other, *i. e.*, attract. This was shown by putting a surplus of floating magnets at one part of the basin. By the movements of these magnets, when confined in barriers and with surplus and deficit purposely made, the author imitated the effects of a Leyden jar, induction, a battery current, etc., the motions and arrangement of the poles illustrating the hypothetical behavior of electricity. The author was led by the hypothesis to infer that either the ether is electricity, or that the ether is electrified, and the former seemed the simpler conclusion.

GRINDING MILLS.

High grinding, low grinding, and gradual reduction, or a system which will more or less completely embody the elements of any two systems, have engaged the attention of millers to a remarkable degree for some years past. With the efforts made for the advancement of this industry there have come remarkable improvements in all kinds of grinding mills. The dressing of burr millstones and the attention given to their running have also directed inventors to the making of improved forms of other grinding mills, where various designs of grinding and cutting disks of metal have been introduced for a greater variety of work, and for its performance in a much better way than was formerly possible.

We herewith illustrate some points of mills now being

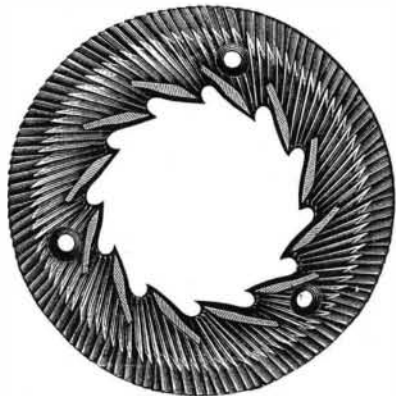


Fig. 1.

made, which are guaranteed to do a wide variety of work—to be fully equal to any pair of French burr millstones or any roller mill for the reduction of wheat to flour, either for the first breaks or regrinding the middlings and bran, also for fine corn to table meal, or corn and cobs to feed meal, as well as drugs, spices, and calcined bones to powder.

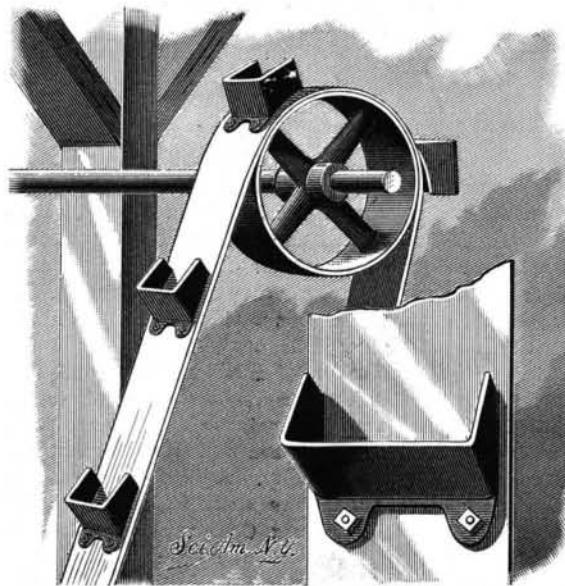
Fig. 1 represents the front side of the grinding disk, and Fig. 2 is an enlarged view of the same. The first reduction is produced in the bossed part of the disk, where the furrows run sharp cutting edge front, to cut the grain fine with the least power possible. The second reduction is upon the flat outer circle of furrows running their inclined sides front, to mash and mellow the meal already cut fine. The saw toothed inner edge of the disks forms a natural crusher, to reduce pieces sheared from the cob, so they will pass through the mill by the aid of the conveyer flights arranged around the eye of the disks. These conveyer flights are arranged to act like a fan to draw cool air and grain into the mill at a low speed. The grain, first cut fine, is then rolled, mashed, and mellowed so perfectly that it enlarges in bulk. The grinding disks are cheaply renewed and easily interchangeable. A spring extending from the bridge tree down to the base gives sufficient elasticity to allow of nails and spikes passing through the mill without injury, while not crowding during the grinding.

These mills are made in several varieties, adapted for either animal power or steam or water power, the "Scientific grain mill" and "Quaker City grinding mill" especially having acquired an enviable degree of popularity. Their special construction is covered by several patents,

and the makers, Messrs. A. W. Straub & Co., of 2,227 to 2,231 Wood Street, Philadelphia, endeavor to make them the best mills in the market.

ELEVATOR BUCKET.

The buckets shown in the accompanying engraving may be constructed of either wrought, malleable, or cast iron, or other suitable material. Each bucket is made with a back and sides but without any bottom, the belt on the outside of which the bucket is arranged serving that purpose. The outer edges of the sides are so shaped as to conform, or nearly so, to the circular travel of the belt around the drums.



HOLMES' ELEVATOR BUCKET.

The buckets are secured to the exterior of the belt by short bolts passing through flanges on the back, whereby they may be readily attached to or removed from the belt. By making them without an attached bottom and arranging them on the outside of the belt they will readily and quickly empty themselves as they pass over the upper drum of the belt, as the flexing of the belt will work the contents away from the open bottoms of the buckets, relieving the mass within and giving it a quick and free discharge. The construction effectually prevents the clogging or sticking of the mass to the interior. As the buckets have but three sides, the belt answering for the fourth, they can be more easily made than those having four sides. The elevator can also be arranged vertically or nearly so, and its buckets will empty freely, thus saving a large amount of space in mills having several stories. This form of bucket is cheap, simple, and durable.

This invention has been patented by Mr. Joseph A. Holmes, of Greenland, N. H.

Demagnetizing of Watches.

One of our contemporaries, in noticing the "queer freaks of watches" from having become magnetized by being brought too near dynamos or swift running belts, is led to refer to the Maxim machine for demagnetizing them as one whose "mechanism is a secret." Readers of the SCIENTIFIC AMERICAN will doubtless remember that we gave illustrations and description of this machine in August,

of influence of the magnet. The opposite poles, of course, destroy the magnetism of each other, and the recharging of each separate piece in the watch is prevented, or rather is successively weakened by the gradual withdrawal under the compound motion the machine gives the watch. An interesting paper explaining early experiments in this line, with full illustrations, will be found in SUPPLEMENT Nos. 206 and 207. It was written by Prof. Alfred M. Mayer, of the Stevens Technological Institute.

Another Possible Cause of Boiler Explosions.

M. Vignes, in the *Journal la France*, draws attention to experiments made as long ago as 1846, by Professor Donny, of Ghent, and intended to show the influence which air exercises on the boiling point of water and on the character of its ebullition. In this experiment, ordinary water is placed in a clean glass tube, open at one end, and boiled long enough to drive away not only the air above the surface of the water, but all the air dissolved in the water. Then when the upper part of the tube is full of pure steam, the mouth is hermetically sealed and the tube is left to cool. When cool, it is about half full of water, above which is vapor of water at a very low pressure. The tube being thus prepared, its lower end is plunged into a bath of glycerine or oil, which is gradually heated. No ebullition is visible in the tube when the temperature reaches 234 degrees Fah. At 240 degrees Fah., however, the column of water bursts, as it were, in two, with a sudden explosion, and part of it is flung against the sealed end with such force as often to break it open. Now in industrial works, it often happens that a boiler, having been filled with water, works for three or four hours without receiving a further supply. It may then be cooled down, and the next time it is wanted it may very probably be fired up again without starting the feed pump, the water level being judged sufficiently high; but the water in such a boiler will be in the same condition as

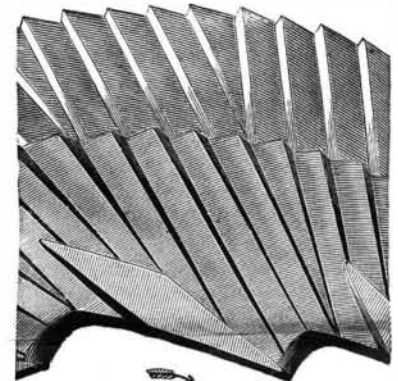
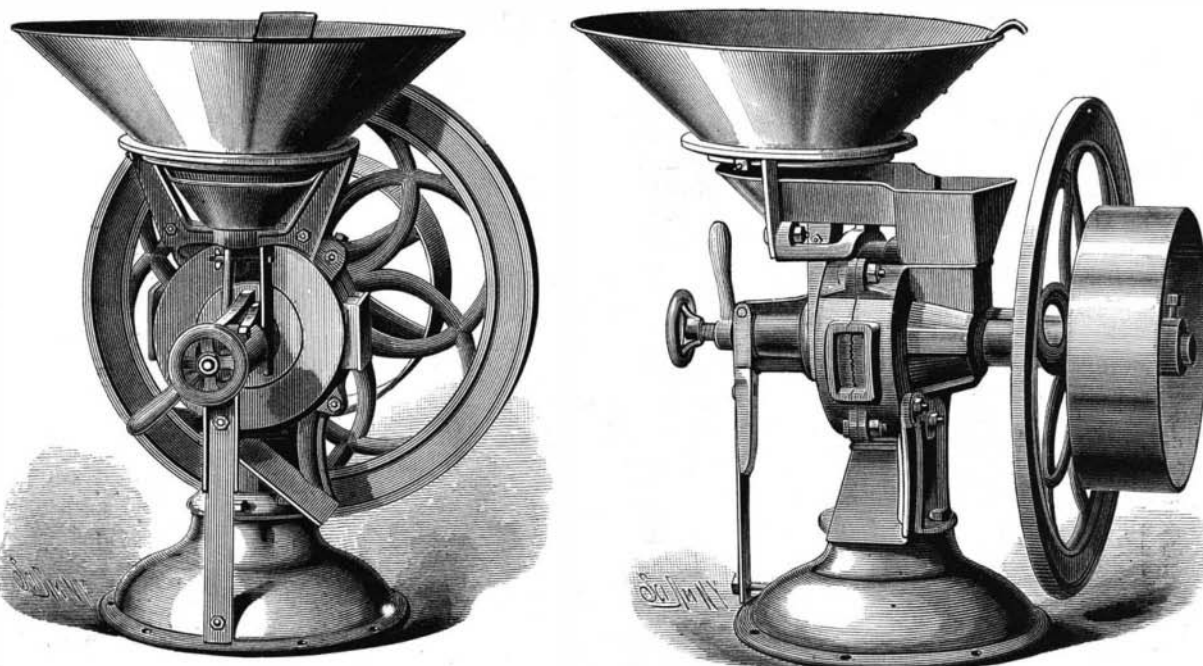


Fig. 2.

that in the test tube; that is, it will be deprived of all air, and consist of water below and vapor above, the latter, however, being probably at a much higher pressure than that of the water in the tube. This water has no free surfaces in its interior due to the presence of bubbles of air, from which evaporation can take place. Consequently, as in the test tube, there will be delay in vaporizing—at least, until the expansion becomes great enough to overcome the pressure of the superincumbent vapor, and a sudden flashing into steam, which will be of the nature of an explosion, and may easily overcome the resistance of the boiler. The pressure

thus attained may be very great. In the test tube, the pressure of the temperature of explosion—240 degrees Fah.—will be eighty-six times what may be taken as the pressure of the superincumbent vapor in the boiler, as already observed. That pressure will probably be much higher, and the pressure of the explosion will probably be much higher also. To avoid this source of danger, it will be sufficient, as M. Vignes points out, to make it a rule always to feed a boiler when it is fired up after standing. This will have the double effect of lowering the pressure and of facilitating evaporation, by distributing the mass of water in the boiler, and charging it to some extent with bubbles of air. Meanwhile, the facts he has adduced are certainly sufficient to warrant a belief that we have here a key to many cases of boiler explosions which have hitherto been wrapped in mystery, and it seems very desirable that careful and precise experiments should be undertaken to prove or disprove the production, on a large scale, of the phenomena thus shown to exist in laboratory experiments.



STRAUB & CO'S GRINDING MILL.

1881. The theory on which it works is that the different parts of the watch—the plates, arbors, mainspring, balance wheel, etc., all being magnetized, though with different degrees of strength, are brought within the influence of a powerful magnet, and then rapidly rotated, so that the watch is subjected to rapid reversals of polarity, while at the same time it is being steadily withdrawn from the field