

NEW POSTAL COIN SCALE.

This ingenious scale, recently patented, is so fully shown in the accompanying cut that a description is hardly necessary. A letter scale is a necessity to every business man, and the coin attachment adds but a trifle to the cost, and is of equal advantage to all who handle coin, especially as it gives the three tests that the counterfeiter finds it impossible to overcome—weight, diameter, and thickness.

Full information may be obtained of the special agents, Messrs. Geo. F. June & Co., 267 Broadway, New York, who have an advertisement in this issue, to which attention is directed.

American Steamboats Sweep the World.

There is apparently a large and extended market for American flat river steamers on the shallow navigable rivers of Europe and Asia. In China they have already effected almost a revolution in the water carrying trade of that empire, and we hear that there is a brisk demand for them already on the Volga. The plan adopted in that case by the American builders is to take out the machinery with them, and to build the steamers of timber on the spot. This plan produces a steamer much cheaper than the iron river steamers exported from England, which have been in use there for some time. Not only is their success due to that cause, but more especially owing to the fact that the American built boats only require a draught of four feet, while most of the English steamers require nine. Even a draught of five feet bars the navigation through a great portion of the river, and the speed of the wooden American boats is said to be better than that of any of their iron competitors. The light draught of the American boats has opened up a navigable length of some 2,000 to 2,300 miles on the Volga, which will probably induce considerable further orders for the other large rivers of Russia. There should be an equally good market for such steamers on the rivers of the Argentine Republic, which are very wide, but for the most part shallow. We understand, however, that there is a strong prejudice against them, owing to their liability to catch fire—the first two which were run on the Plate having been destroyed by fire. We do not see why America should have a monopoly of such flat bottomed river steamers, and we recommend this to the attention of English ship builders, though as a nation we are said to be the last to suit our goods to customers' requirements.—*Marine Engineer.*

A NEW AND INTERESTING ELECTRICAL MACHINE.

We find in a recent number of *Engineering* the following description and illustration of a new electrical machine designed by Mr. James Wimshurst, of the Board of Trade, and which possesses several points of superiority over the Holz machine, while at the same time it can be constructed for but a fraction of the cost.

This new machine consists of two circular disks of ordinary window glass, 14½ inches in diameter, mounted upon a fixed horizontal spindle in such a way as to be rotated in opposite directions at a distance apart of not more than one-eighth of an inch. Each disk is attached to the end of a hollow boss of wood, or of ebonite, upon which is turned a small pulley. This is driven by a cord or belt from a larger pulley, of which there are two attached to a spindle below the machine, and which is rotated by a winch handle, the difference in the direction of rotation being obtained by the crossing of one of the belts.

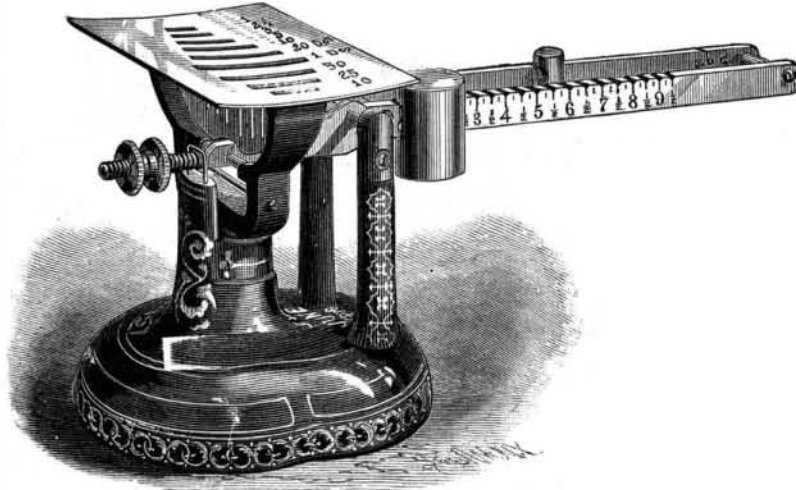
Both disks are well varnished, and attached by cement to the outer surface of each are twelve radial sector shaped plates of thin brass disposed around the disks at equal angular distances apart.

The two sectors, situated on the same diameter of each disk, are twice in each revolution momentarily placed in metallic connection with one another by a pair of fine wire brushes attached to the ends of a curved rod, supported at the middle of its length by one of the projecting ends of the fixed spindle upon which the disks rotate, the brass sector-shaped plates just grazing the tips of the brushes as they pass them.

The position of the two pairs of brushes with respect to the fixed collecting combs, and to one another, is variable, as each pair is capable of being rotated on the spindle through a certain angular distance; and there is, as in the case of the collecting commutator brushes of dynamo electric apparatus, one position of maximum efficiency. This position in the machine we are now describing appears to be when the brushes touch the disks on diameters situated about 45 deg. from the collecting combs, and 90 deg. from one another. To make this clear, let us suppose the twelve

sector shaped plates to be numbered round like the hours of a clock, from I. to XII., then opposite plates, such as XII. and VI., X. and IV., VIII. and II., if on the front disk, would be momentarily connected together when passing the diameter, joining a point midway between X. and XI., and IV. and V., on a clock face; and, if on the back disk, they would be connected when passing between I. and II., and VII. and VIII.

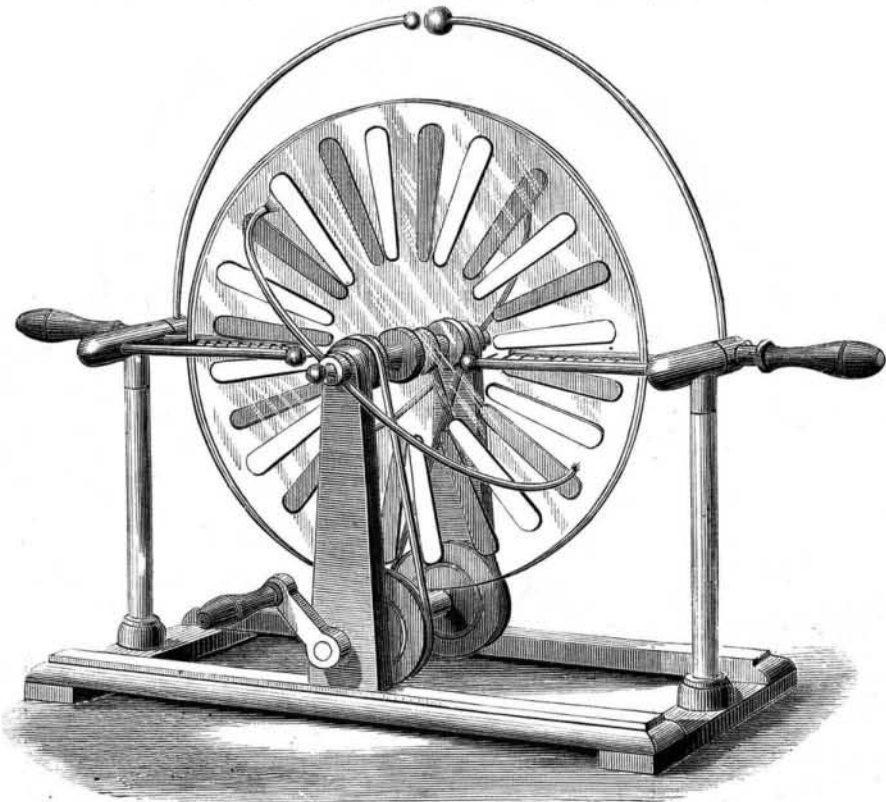
The fixed conductors consist of two forks furnished with collecting combs directed toward one another and toward the two disks which rotate between them, the position of the two forks, which are supported on ebonite pillars, being along the horizontal diameter of the disks. To these collecting combs are attached the terminal electrodes, whose distance apart can be varied by the two projecting ebonite handles shown in the illustration.



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The presence of these collecting combs appears to play no part in the action of the apparatus except to convey the electric charge to what may be termed the external circuit; for the inductive action of the machine is quite as rapid and as powerful when both collectors are removed, and nothing is left but the two rotating disks and their respective contact or neutralizing brushes, the whole apparatus bristling with electricity, and if viewed in the dark presents a most beautiful appearance, being literally bathed with luminous brush discharges.

It is one peculiarity of this interesting machine that it is only with the greatest difficulty that the polarity of its electrodes can be reversed, and in this respect it has a very decided advantage over most of the induction machines. It is difficult to account satisfactorily for the exceptionally high efficiency of the apparatus.



WIMSHURST'S NEW ELECTRICAL MACHINE.

With a machine of the size we have described, and which is shown in the illustration, there is produced under ordinary atmospheric conditions a powerful spark discharge between the electrodes when they are separated by a distance of 4¼ inches, a pint size Leyden jar being in connection with each electrode; and these 4¼ inch discharges take place in regular succession at every two and a half turns of the handle. This remarkable efficiency may be partly due to the duplex action of the apparatus, both plates being active and contributing electricity to the collecting combs, the sector-shaped plates of brass acting as inductors when in their position of lowest efficiency as carriers, and as carriers when in

the positions at which their inductive effect is at a minimum, and *vice versa*; and as it follows from the construction of the instrument that the inductors of the one disk are at the position of highest efficiency, when those of the other are at their lowest, and *vice versa*, and as this applies with equal force to the sectors when considered as carriers, it also follows that the charging of the electrodes, and, therefore, the discharge between them, is by mutual compensation maintained constant. The machine is, moreover, perfectly self-exciting, requiring neither friction nor the spark from any outside electric exciter to start it, and this is one of the most remarkable features of the apparatus, for under ordinary conditions the machine is working at its full power after the second or the third revolution of the handle.

We are inclined to think that this initial charge is obtained not so much, as in Sir William Thomson's replenisher, from a minute difference of electrical potential between two parts of the apparatus—for the insulation is hardly perfect enough to allow so minute a difference to be so enormously increased in so short a time—but rather from the frictional influence of the air, and that chiefly between the plates—that is to say, on the surfaces opposite to those to which the sectors are attached. Within this narrow space the air friction must be far greater than on the outside surface, on account of the two disks rotating in opposite directions. Whether, however, the initial charge be derived from air friction or not, its generation is a point of very great interest, and this is especially conspicuous in the remarkable experiment to which we have referred, in which both conductors are removed, and the most brilliant electrical effects are produced when the apparatus consists simply of two disks rotating in opposite directions, with no fixed conductors except the light conducting brushes.

From the above description and illustration it will be apparent that the apparatus can be constructed for a few shillings, and thus a very useful and highly instructive generator of static electricity is, by Mr. Wimshurst's latest invention, placed within the reach of all. Having constructed several machines himself, Mr. Wimshurst is of the opinion that manufacturers could construct and sell them with a reasonable profit for something not much more than seventeen shillings apiece. If such a result can be obtained, Mr. Wimshurst will, besides having won the gratitude of the scientific world for having made a valuable contribution to the science of electricity, deserve the thanks of teachers and students for placing in their hands a much-needed instrument for the induction and production of electricity.

Why Men Cannot Fly.

The New York *Sun* wisely concludes that this century is likely to be forever memorable for its mechanical and engineering triumphs. It is distinguished from all the centuries which have preceded it as the age of steam and electricity, of rapid transportation for human beings and their products, and for bringing all the world in instant communication, one part with another.

Other eras may have surpassed us in literature and art. Some of our metaphysical science may not be so wonderful to the future as it seems to us; but our mechanical and engineering development has been so far beyond anything of the same sort in the past, even taking many centuries together, that this century is separated from the eighteenth by the broadest gulf in the history of human progress from era to era.

Yet, with all our mechanical triumphs and our engineering achievements, the *Sun* thinks that we are no further advanced in one respect than men were one hundred years ago, or a thousand years ago, except to some slight extent for military purposes. Ballooning has made no progress, and is still nothing more than an amusement of no practical value. We do not seem to be any nearer flying than men were at the beginning of the Christian era.

Our modern engineers have not yet constructed a practicable flying machine; nay, they have not yet so much as taken the first step in that direction.

The London *Engineer*, which has lately discussed flying machines in a scientific way, comes to the conclusion that there is no combination of wings or arrangements of any kind which will enable a man to fly with his own strength. He lacks muscular power to practice the accomplishment in which the birds are so proficient. And even if machines are devised to compensate for that lack of power and endurance, they will not be successful unless they shall be so constructed that each pound of the machine will develop as much energy as each pound of a bird. "Not till then," says this engineering critic, can flight for man be achieved. Because birds fly, that is no reason why man should do