of the chalk, all surplus chalk is removed by a loop-bar scraper. The roller in the chalk chamber may be readily removed when it is desired to use the device without chalking the line.

PICOLET'S WIMSHURST INDUCTION MACHINE WITHOUT SECTORS.

To the Editor of the Scientific American:

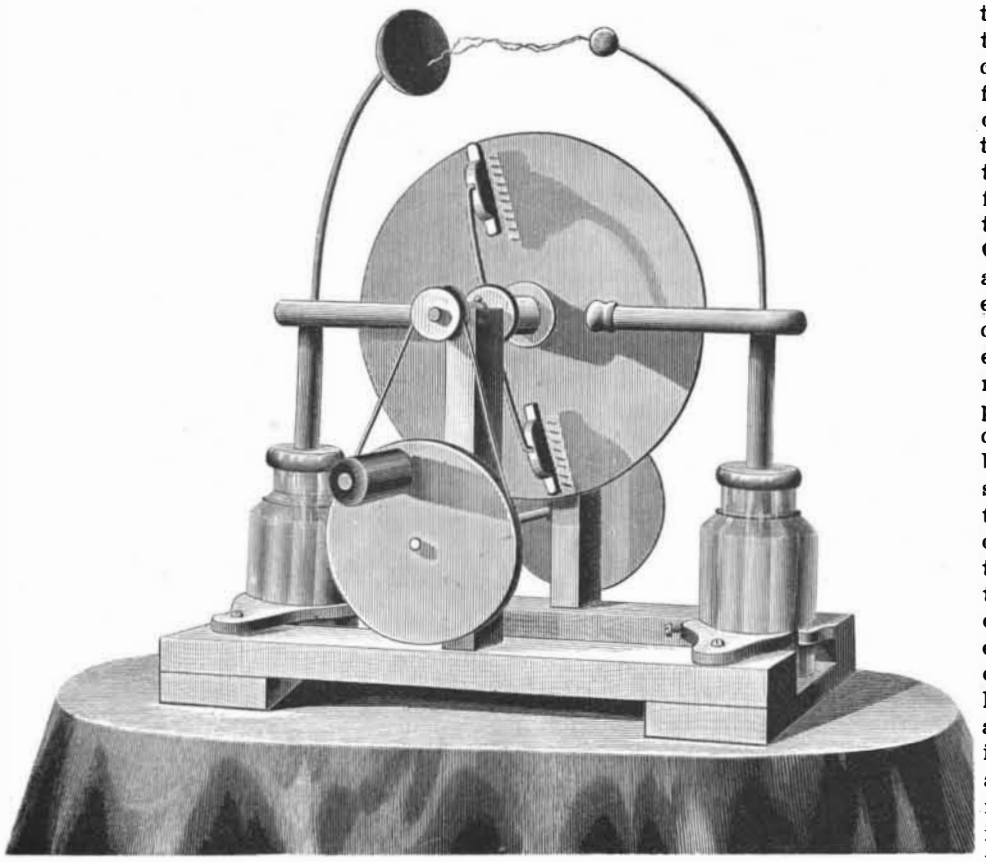
Having read an article in the French weekly *La Nature*, of April 14, stating that the Wimshurst machine made without sectors is something new in the way of influence machines, I take the liberty of asking your attention to a description of a machine of my invention which I constructed in 1892. It is like a Wimshurst machine of the disk type, only the plates have no sectors on them, and where the brushes of an ordinary sector machine would be combs are placed parallel to the plane of the brush-holders, and extending from near the edge to about the length of half the radius of the plates. The collectors cover the same part of the radius as the combs, and in other respects are like those on a Wimshurst machine. The positive pole terminates in a small ball, and the negative pole in a small disk.

As nothing touches the disks, I think that my machine, as respects wear and friction, is superior to Mr. Bonetti's, and although mine is imperfectly made, it gives very good results. The plates are 5 inches in radius, and the greatest distance that a spark can jump across is, under favorable conditions, 5¾ inches.

I inclose a diagram to illustrate how the machine works. In the diagram, the smaller circle represents the front plate of the machine, and the larger circle represents the back plate.

A and B are the collectors, C and D the combs facing the front plate, and E and F the combs facing the back plate.

The machine can be started by holding a positively electrified body, an electrophorus for instance, near the front plate, opposite the comb, E, while the disks are revolving. This positively electrified body acts inductively on E, attracting negative electricity on to the plate opposite E, and repelling positive electricity through F on to the plate opposite F. By the rotation of the back plate, the negative electricity from E is carried to the collector A, and the positive electricity from F is carried to the collector B. Now, while the negative electricity is being carried to A it comes opposite C, and attracts positive electricity to the plate opposite C; and in the same way, while the positive electricity is being carried from F to B, it comes opposite D, and attracts negative electricity to the plate facing D. The positive electricity from C is carried to B, and the negative electricity from D is carried to A. The electricity that is now on the front plate acts on the combs facing the back plate in the same way as that on the back plate acted on the combs facing the front plate; and thus the electricity on one plate induces electricity on the other, so that they keep up a reciprocal action. This action is maintained as long as the plates are made to rotate, and is accompanied by a powerful discharge of sparks between the electrodes.



PICOLET'S WIMSHURST'S INDUCTION MACHINE WITHOUT SECTORS.

The distribution of electricity on the two plates is shown in the diagram by plus and minus signs. The signs farthest from the center of the plates correspond to the electricity on the back plate, and the signs nearest the center to the electricity on the front plate.

May 4, 1894. ANDRE J. PICOLET.

ELECTROSTATIC INDUCTION MACHINES WITHOUT SECTORS.

The improvement made by Mr. Wimshurst in electrostatic induction machines through the construction, in 1883, of the one that bears his name, is well known.

This machine is formed, in principle, of two parallel disks of insulating material, glass or ebonite, provided with numerous sectors. The disks have rapid rotary motion in different directions. The difference of potential developed manifests itself between two conductors connected with insulated combs arranged on diametrically opposite sides of the disks and embracing the two disks on each side. Mr. Bonetti has simplified the construction of the Wimshurst machine and increased its discharge by omitting the metallic sectors of the disks and increasing the number of the brushes. It is the practical realization of an idea brought out for the first time, we believe, by Mr. George Pellissier in 1891 in the *Journal de Physique.*

The machine thus modified is represented in Fig. 2. We find therein all the elements of the Wimshurst machine, less the metallic sectors glued to the disks, plus supports that permit of making the brushes slide over the diametral conductors. The disks may be of glass or ebonite, but the latter material, which is less hard and fragile, is generally preferred. The machine is not excited automatically, but by rubbing one of the disks with the finger covered with a little mosaic gold. The direction of the current, once determined, cannot change. The machine is non-reversible. No inversion is produced while running unless the other disk is rubbed at a symmetrical point. This fixedness of the current and the facility of rapidly and surely effecting its inversion constitute valuable qualities in therapeutics.

The discharge also can be varied within wide limits

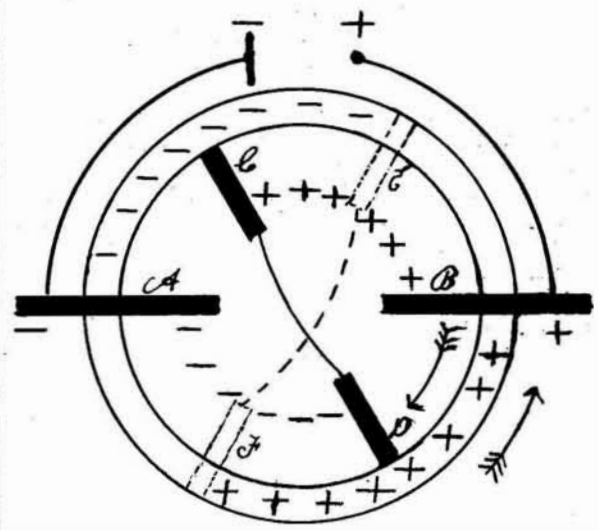


DIAGRAM ILLUSTRATING THE ACTION OF PICOLET'S MACHINE.

either by suppressing some of the brushes or by shifting their points of contact upon the disks. When the entire surface of the disk is brushed by the metallic pencils, the discharge is maximum. Measured by the Lane electrometer, it is, according to Mr. D'Arsonval, three times greater than that of a Wimshurst machine of the same dimensions provided with sectors. Upon shifting the brushes in order to make them touch the same zones, the discharge is reduced in proportion with the reduction of the surface brushed.

The suppression of the sectors has led to another advantage relative to the maintenance. The plates destitute of sectors are more easily cleaned, and the brushes last longer, since they do not rub against metallic sectors, which wear them away in themselves being worn away, and which become deteriorated and torn.

The principle of the Wimshurst machine without sectors has been likewise applied to a more powerful machine, represented in Fig. 1, and in which the disks are replaced by two concentric ebonite cylinders, whose mean diameter is 50 centimeters and whose common height is 50 centimeters. These two cylinders, separated by a distance of a few millimeters only, are mounted upon two thick ebonite disks fixed upon concentric shafts with ball bearings and actuated by friction wheels. Series of external and internal combs and brushes, arranged according to generatrices, replace the radiating combs and brushes of the disk machine. Fig. 1 represents the machine as it operated

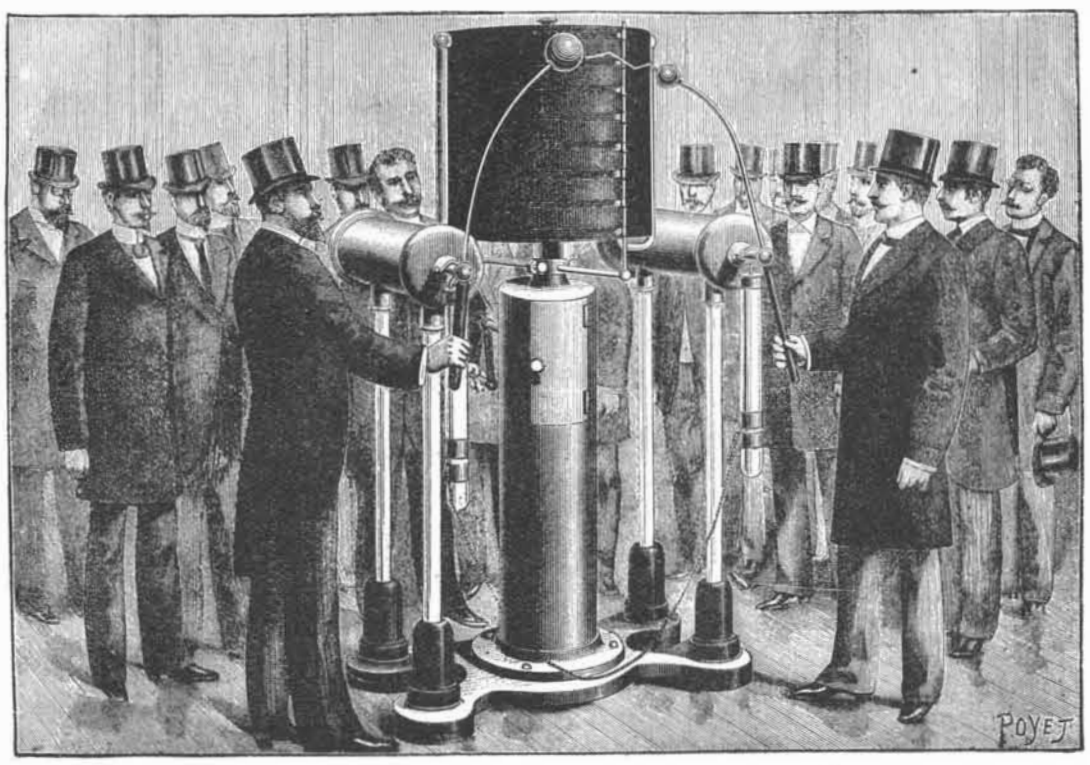


Fig. 1.—BONETTI'S CYLINDRICAL WIMSHURST MACHINE.

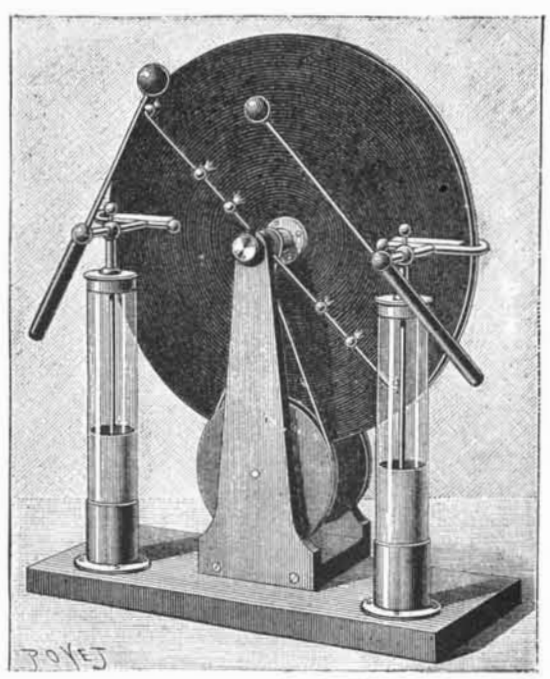


Fig. 2. ELECTROSTATIC INDUCTION MACHINE WITHOUT SECTORS.

during the Easter sessions of the French Society of Physics.

The machine thus established produces powerful and noisy sparks and discharges whose effects appear to be much superior to those of the most improved older types, but of which it is difficult to indicate the order of magnitude in default of comparative measurements and of experiments expressing the results obtained in C. G. S. units. Such want, which we should like to see supplied, contributes in a certain measure to perpetuate the belief that there exist profound essential differences between the machines called electrostatic and the dynamo-electric ones outside of their mode of action, while in reality they both produce electro-motive forces, intensities and powers that differ only in the order of magnitude. —*La Nature.*

The Craig Colony for Epileptics.

The Legislature of New York State has passed and the Governor signed the bill establishing a colony for epileptics in that State. The colony is named after the late Oscar Craig, president for some years of the State Board of Charities. The bill provides for the purchase of a tract of 1,875 acres of beautiful land in the Genesee Valley, near Mount Morris, in Livingston County. This tract is all in one piece, well watered by brooks, and consisting of fine fields, woodland and orchards, and already provided with picturesquely grouped buildings to the number of thirty-five. It has been a colony of the Shakers for twenty or thirty years, and is, therefore, perfectly adapted to its new use.

The law requires that all of the buildings put up shall be on the village plan. A board of five managers is provided for, and these have already been appointed. Governor Flower, in order to make the new charity as ideal as possible, decided to select a specialist on nervous and mental diseases as one of the managers, so as to insure the best scientific treatment of patients and to keep the resident medical men in touch with all the latest developments in the pathology and treatment of epilepsy. He also appointed a lady residing within a few miles of the colony as one of the managers, in order that the women and children and general housekeeping can be kept under constant surveillance. In addition a lawyer, a homeopathic physician and an editor were added to the board. The managers serve without salary and meet at the colony once or oftener monthly. Having these ends in view, the Governor appointed as the board of managers, Dr. Frederick Peterson, of New York; Mrs. C. F. Wadsworth, of Geneseo; Geo. M. Shull, of Mount Morris; Dr. Chas. E. Jones, of Albany; and W. H. Cuddeback, of Buffalo.

An important provision in the bill is that the managers may accept any bequests of persons interested in the welfare of epileptics, and it is believed that many charitable wealthy people will build cottages upon the splendid sites on the tract to bear their names and exist as lasting memorials to their desire to serve humanity in this wise.

A medical superintendent, steward, matron, pathologist, nurses, school teachers, teachers of various industries and arts, and so on, are to be appointed as needed; but the colony will not be ready probably to receive patients before the autumn of 1895.

It is thought that the colony will ultimately number fifteen hundred to two thousand members. As soon as possible the six hundred epileptics in the county almshouses will be taken in charge. Later private patients will be received at prices corresponding to the accommodations asked for. It is sure to become self-supporting in the course of time, and to grow into an industrial and agricultural village that will more than rival the similar and famous colony at Bielefeld, Germany, upon which this is, to a certain extent, modeled.

At their organization in Albany, on the 3d of May, the board of managers made Dr. Frederick Peterson, of New York, president, and George M. Shull, of Mount Morris, N. Y., secretary of the board.

Magnetism of the Earth Illustrated.

Mr. Henry Wilde, F.R.S., of Manchester, has a theory that the exterior of our earth is permanently magnetic; also that an interior one is movable and magnetic, rotating in the plane of the ecliptic, 23½ degrees, and loses one revolution in 960 years, or 2·25 of a degree annually; he assumes, also, that the internal sphere is electro-dynamic. At a recent conversazione of the Royal Society he exhibited two globes, one within the other, and each containing a coil of insulated wire, through which currents of electricity could be sent, and mounted so that their motions should be such as to agree with his hypothesis. By placing a compass over different parts of the outer globe, he obtains the same variations and dip as are found in nature; so considers that he has proved his case, or at all events has done so until some better hypothesis is brought forward.

Prof. Silvanus Thompson exhibited some illustrations of polyphase electric currents, among which one of the most striking was the revolution of a copper egg in a rotary magnetic field; it could not get out of the field.

Mr. Henry A. Fleuss exhibited a mechanical pump for the rapid production of high vacua, and vacuum tubes exhausted by it. It was a double-barreled air pump worked by a driving wheel turned by hand, but the essential part of it he keeps secret; all he says is, that in the valvular part is a special heavy oil, totally free from water.

Mr. J. W. Kearton exhibited several of his magic mirrors on which no image was visible to the eye; but when light was thrown upon them from an electric lantern they cast reflected images upon a screen. His mirrors owe their peculiar properties to curved elevations and depressions in the polished metallic face, the elevations producing figures in shade by scattering of light, and the depressions figures in light by condensing rays reflected from the mirror on to a screen. The figures in relief and intaglio are first produced by the action of any suitable acid on the metal plate, and are then polished down until they disappear to direct vision, after which the surface of the mirror is electro-gilt.

Mr. Killingworth Hedges exhibited a model of his method of transmitting force by spheres or balls. Instead of water as a medium, balls, each having a crushing strain of fifteen tons, are used; and any pressure on one end of the row of balls is at once transmitted positively to the other, the tube in which they are contained running round corners, and up and down in the same way as the hydraulic pipe. At the bends the tube containing the row of balls has to be made with care, and to be very smooth inside.

Fruit Growing in Florida.

Florida has an exceedingly vigorous horticultural society, which held its seventh annual meeting in Jacksonville on the 10th of April. *Garden and Forest* says: The two hundred active members who assembled were welcomed by the mayor, who encouraged them by some eloquent remarks on the importance of fruit growing and other branches of horticulture. President W. W. Adams illustrated this fact by stating that the orange crop alone amounted to five million boxes, while peaches, pears, and tomatoes were leaving the State by the car load, and there are preparations already made in the State to furnish train loads of all these in the near future, while there are orange groves enough planted to produce in a few years twenty million boxes. Mr. Adams claimed that the depressed condition of the fruit trade was not due to overproduction, because the crop of oranges now produced would only furnish one orange a month to each inhabitant of the United States. The business, however, had outgrown the facilities for transportation, and something must be done to enlarge these facilities and economize in transportation, or the future of fruit growing in Florida would be without hope.

Mr. George H. Wright reported that in Orange County grape growing began some seven years ago, and last year there were five hundred acres in cultivation. The low price received in 1893 had reduced the acreage somewhat. Refrigerator car service was necessary to make growing grapes for market profitable, otherwise the grapes must be converted in to wine. He advised against planting any more Niagaras, and on sandy soil such varieties as Herbemont, Norton's Virginia, Cynthiana, were recommended. He thought that vineyards should be set on higher land than had been previously recommended. The vines should have clean culture until June 1, and a complete fertilizer, one which contained ammonia, phosphoric acid, and potash, should be freely used. Growers from western Florida stated that grapes in that region set on high and well drained soil had done well. Some growers declared that their products had reached Northern markets in such good order as to realize reasonable returns. The experience of others was less satisfactory, and many of the members claimed that, on the whole, grape growing, beyond raising enough for family use, was not an industry to encourage.

A large pineapple grower of southern Florida had found scrub pine land to be the best adapted for this fruit, and the varieties which were the most profitable were the Egyptian Queen, strawberry, and the scarlet pine. From 12,000 to 15,000 plants could be set out on an acre, and sixty per cent of these would fruit the second year, while the next year some of the plants would have from three to five fruits each. Mr. Richards, who is known as the pineapple king, states, in reply to an inquiry as to how long the plants would bear, that he had been in the business fourteen years, and his plants now looked better than they did five years ago.

The fruit committee called attention to a formidable rival of Florida which was much nearer than California; this was the coast region of Texas, where an area equal to the entire peninsula could be utilized for growing subtropical fruits. During the last twenty-five years the progress of fruit growing in both these States had been so rapid, and they had so many interests in common, that it was proposed to hold a joint meeting of Texas and Florida horticulturists to devise the best means of uniting for mutual benefit.

Professor Swingle, of the State Experiment Station, reported that he had discovered a speedy and easy way of making a sulphur solution which had proved an effective remedy for the rust mite and red spider which attacked citrus fruits. The formula is 32 pounds of flowers of sulphur made into a paste, with 12 quarts of water, 20 pounds of caustic soda 98 per cent strong, and 4 quarts of water, which are thoroughly mixed and then diluted to 20 gallons. Two quarts of this to a barrel of water should be used for the rust mite and 4 quarts for the red spider. Against the white fly, which causes what is known as smut on the orange and is now the occasion of some alarm, the following remedy was recommended by Professor Webber: Four and a quarter pounds of caustic soda, 20 pounds of resin, 3 pints of fish oil, and 20 gallons of water are put in an iron kettle, and when dissolved are boiled ten minutes. When the mixture is cooled it should be used in the proportion of one part diluted with five parts of water. This is effective against scale of all kinds and the red spider, and is just as valuable for deciduous trees as for the orange and lemon. The cost of this mixture was estimated at half a cent a gallon of spraying material when ready for application.

It was generally agreed that in applying fertilizers high grade mixtures were to be preferred. Some of the members advised planters to buy the different materials and mix them at home. Others believed that it is equally as cheap to purchase the prepared fertilizer from reliable firms. It is evident that more experience is needed with commercial fertilizers as well as with homemade manures before definite conclusions can be stated in regard to their use in this region.

Afterall, the topic of paramount importance was that of transportation and transportation rates, and the statement that a barrel of flour could be brought East for one-third of the price which it costs to transport a box of oranges West was cited as an instance of unjust discrimination. The resolution to favor the bill now before Congress to open the coasting trade to vessels carrying foreign flags caused such a heated discussion that the society adjourned with some bitter feeling on both sides.

How to See Cataract in your Own Eye.

The following simple method enables a patient to see a cataract in his own eye and note its growth and development, probably better than any oculist can observe it for him.

Cataract is said to be due to the gradual deposition of oxalate of lime in the substance of the crystalline lens, at first in small spots or streaks, sometimes in one part and sometimes in another. The deposit gradually increases until it penetrates the whole of the lens, causing blindness. The remedy, then, is to remove the lens, and after its removal the patient needs a substitute in the form of highly magnifying spectacles.

All that is necessary to enable a patient to see his own cataract for himself is a piece of card and a needle --a visiting card will do very well. Pierce a clean round hole near the middle of the card and hold the card up to the light close to the eye, looking preferably in the direction of a piece of blue sky. With the card near to the eye, the patient will not see the small hole pierced by the needle, but he will see a comparatively large faintly illuminated field with his cataract projected upon it. He is, in fact, observing the shadow cast by his cataract on the retina at the back of his eye. With a small puncture in the card the shadow so thrown is comparatively sharp. But with a normal eye an evenly illuminated field or clean disk will be seen. The patient may thus map down his own cataract, and settle for himself whether it is extending and whether he will have an operation or not. None of the oculists I have seen have known of the method, and there may, consequently, be some advantage in making it public.—*J. S., in Knowledge.*

Modern Chemical Science as an Aid to the Police.

A Buda-Pesth manufacturer has informed the police that he possesses a powder with which thieves can be caught. Having for the last few days made the unpleasant discovery that his cash box was plundered day after day, and failing in all his attempts to catch the thief, he applied in his dilemma to Mr. Telek, professor of chemistry at the Franzstadt Commercial Schools, and the latter gave him a powder which he sprinkled over his cash every night before leaving the office.

This powder has the peculiar effect of dyeing the skin blue, the color being intensified by washing, while it resists the application of soap. On the very first day the manufacturer noticed a deficiency of eight crowns in the silver cash box. He at once called his employes together and ordered them one by one to steep their hands into a basin full of water, got ready for the purpose. One of the men was very loth to follow the example of his comrades. At last he consented, when, no sooner had he dipped his hands in the bowl, than they turned dark blue! His employer stepped up to him and said: "You are the thief!" and the man at once confessed.—*Anhaltischer Staats-Anzeiger.*