ish the performance and velocity of the motor because of the retardation that it effects in the successive magnetizations and demagnetizations. It was Marcel Deprez, we believe, who was the first to enunciate this fact, and to thus explain the relatively feeble performance of the first motors constructed by Froment, Jacobi, Leroux, Larmenjeat, and others. It is this also that explains the relative power and effective performance of the Siemens bobbin motors, in which the magnetic mass in motion submitted to reversals of current is much smaller than in the first motors that we have just mentioned. And it explains, too, the good performance of the Gramme machines employed as motors, in which the changes of polarity are effected through successive sections.

A few inventors have gone a step further in this direction and *completely* done away with magnetic masses in that part of the motor submitted to reversals of current. The *Ecliptic* of Paul Jablochkoff, the inventor of the electric candle, belongs to this latter category, and the proem that the reader has just perused will permit us to give a description of the apparatus in a few lines.

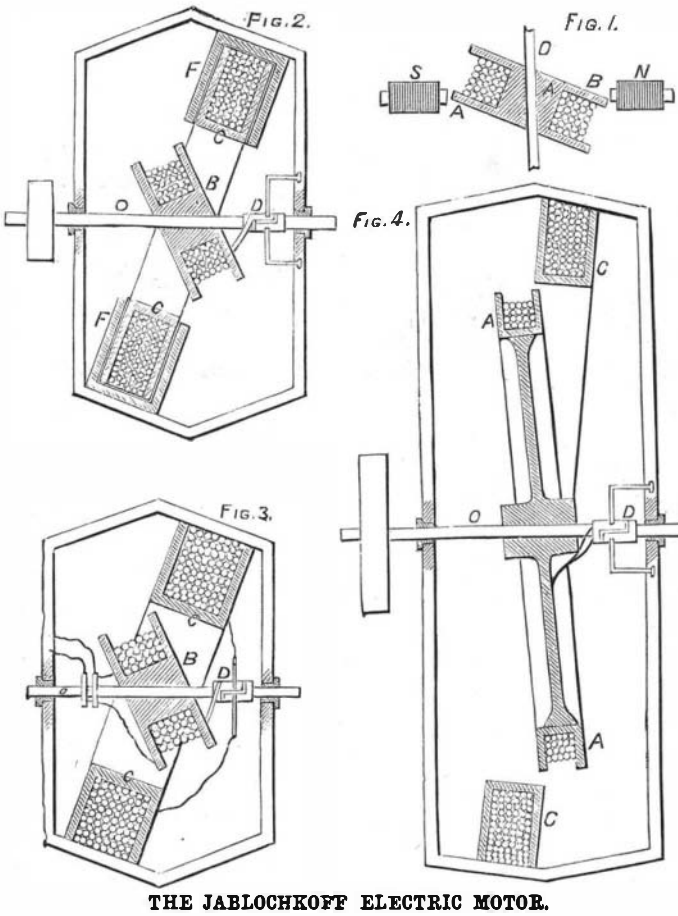
This motor consists essentially of two bobbins, one of them stationary and arranged in a vertical plane, and the other movable and fixed on a horizontal axis in an inclined position. It is to this latter position, which recalls that of the ecliptic to the equator, that Mr. Jablochkoff's apparatus owes its name. The stationary vertical bobbin is not in a vertical plane, perpendicular to the axis of rotation of the motor, but makes with such plane a certain angle that has been determined by experiment, and depends on the conditions of the apparatus's work.

The stationary bobbin is wound on a copper frame, and the movable one is fixed on an iron shell which, under the influence of the current traversing it, is converted into a short electro-magnet whose poles are formed of two circular disks. On the axis of rotation there is a commutator against which rub four brushes. This commutator is so formed that, during the rotation of the axle, the movable bobbin is traversed by a current *which never changes direction*, and preserves a permanent polarity in the flat electro-magnet; but at every half revolution the current is reversed in the fixed bobbin. The motor works, then, through the reciprocal attractions and repulsions of a movable permanent magnet, and of a fixed solenoid traversed by currents that are alternately of opposite direction. These reciprocal actions tend to produce a pivoting of the movable electro-magnet located in the interior of the fixed solenoid. The effect of the commutator's play is to cause a concurrence of these actions in the same direction, and thus to produce a continuous motion. Mr. Jablochkoff's motor is reversible, that is to say, it develops mechanical power at the expense of electricity and is capable of producing electricity at the expense of power.

We must remark here that, although the arrangement of this motor may appear to be new and original, the idea of preserving a fixed polarity in the movable part provided with an iron armature, and of reversing the current in the fixed part without iron, had already been applied by Mr. Bürgin, of Bale, to a motor which was exhibited at the Exhibition of Electricity in 1881, and which the inventor styled, because of its form, the *spherical motor*. As the experiments being made by the house Breguet with this motor are not finished, it is impossible to estimate its value from the standpoint of effective performance. But it appears to be simple in its construction; and its plainness, along with the low price at which it will be possible to offer it, constitute qualities sufficient to secure for it a goodly number of applications, provided its performance be, as is to be hoped, superior or at least equal to that of its predecessors.

Referring to the diagrams, Fig. 1 shows a simple form of machine, such as is described above. The bobbin, A, having cheeks, *a b*, of soft iron and wound with a coil of insulated wire, is fixed obliquely on the axis, O, and revolves between the poles of the electro-magnets, N and S. The obliquity of the coil is such that, in each revolution it presents the edges of *a* and *b* alternately to the poles of N and S, and alternating electric currents are set up in the coil of A. Fig. 2 shows a construction in which the coil, B, fixed obliquely on the axis, O, revolves within an oblique bobbin, C, which has an iron sheath, F, presenting interior polar edges toward the edges of B. The electric currents set up in the coil of B are collected and converted into currents of uniform direction by means of a commutator, D, of ordinary construction. In the construction shown in Fig. 3, the exterior bobbin, C, is of soft iron, constituting a solenoid.

The commutator, D, may be applied as shown, to alternate the currents in the coil of C, those in the coil of B being constant in direction, collected in the usual way, by rubbers bearing on rings, E. In this case, the internal bobbin, B, need not be of soft iron. When the machine is of large diameter, the interior coil, A, may be merely a ring of iron fixed on a wheel of non-magnetic material.—*E. Hospitalier, in Nature.*



THE JABLOCHKOFF ELECTRIC MOTOR.

THE SEA CUCUMBER'S TENANT.

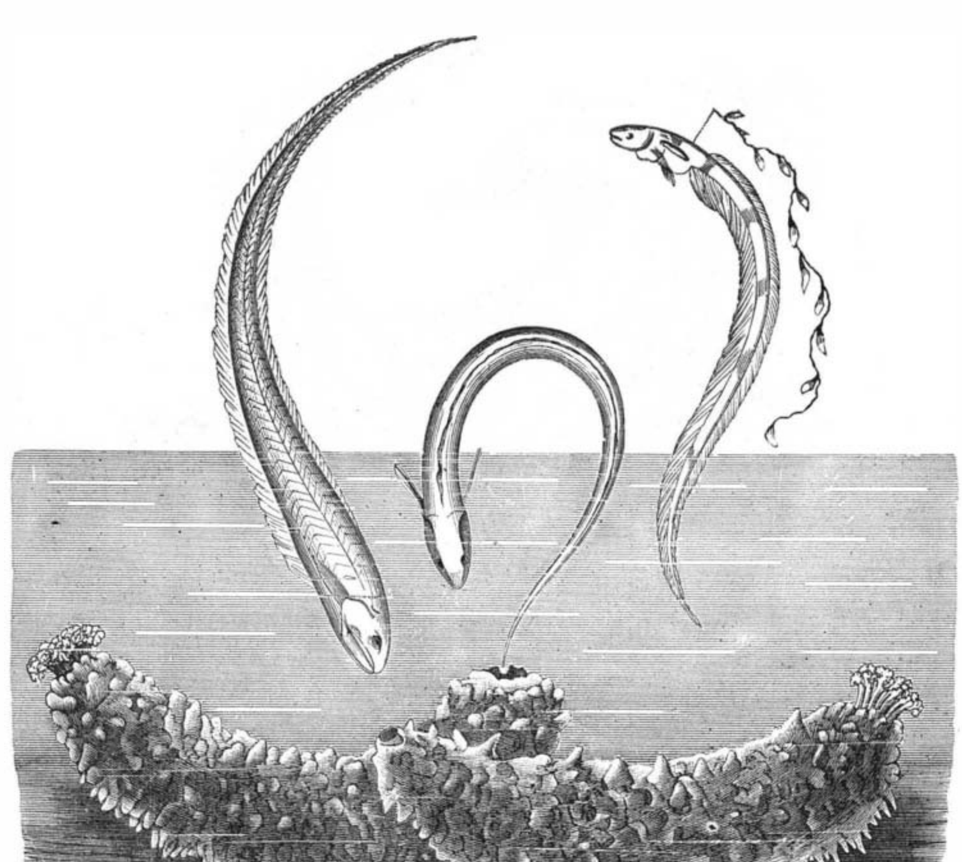
Among the curious phases of parasitic life which prying naturalists have discovered, the fish that lives in the stomach of the sea cucumber presents one of the most remarkable. Ordinarily the parasite is of a markedly lower type of organism than its unwilling host—the worm infests the vertebrate. In the case illustrated in the accompanying engraving, the host is greatly the inferior; the vertebrate finds its home within, if it does not also feed upon, the worm; and so far as trustworthy observation goes, the mature fish does not appear to long survive a separation from the holothurian.

The position in which the fish are shown in the engraving may, accordingly, be properly understood to be one suiting the artist's convenience only. The life history of this remarkable parasite is yet a mystery; it is probable that it enters the holothurian in early life and grows up with its host.

The holothurian, thus strangely tenanted, is found on the coral reefs of Florida, in shallow water, and has received the specific name *Floridana*. It is a large species, dark brown in color, and with smaller tentacles than those of the species inhabiting our more northern coasts. It feeds upon pieces of corals and small shell fish.

An examination of the stomach of the parasitic fish, to which the name *fierasfer* has been given, would determine whether the fish shares the dinner of the host or dines upon him. The latter ingratitude is suspected, and the holothurian could probably endure it without material injury, as it is capable of ejecting its viscera entirely and speedily reproducing a new set of digestive apparatus; but the observed position of the fish, with its head to the holothurian's mouth, would rather indicate that it sought its food in materials selected and swallowed by the host. The *fierasfer* attains a length of eight inches; it is quite slender and of a silvery white color.

The *Leipziger Illustrirte Zeitung*, to which we owe our illustration, states that the young *fierasfer* carries on its back a sharp spine, to which is attached a long thread bearing a series of black and white flaps, thus mimicking a colony of jelly fish. In view of the stinging capacity of many jelly fish, it is suspected that the young *fierasfer* may secure a degree of exemption from the attacks of other fish by means of this delusive yet threatening flag.



THE SEA CUCUMBER AND ITS TENANT.

Wire Cloth.

Wire cloth, such as is used by paper mills and for sieves, corn poppers, and hundreds of other purposes, is woven in the same manner as cotton or woolen goods, save that a large portion of the work is done on hand looms, samples of which can be seen in operation any day in factories on Cornhill, in this city, or near the Cottage Farm station on the Boston and Albany railroad. Wire cloth for window screens, requiring less care in its manufacture, is woven on power looms, and a single concern at Clinton, Mass., makes 15,000,000 square feet of this cloth per annum. The total amount of wire cloth woven by machinery for window screens alone in the United States is put down at 30,000,000 square feet per annum. For this purpose light and cheap iron wire is used.

For paper mills, cloth made of fine and strong brass wire is employed. There is no other process for making paper except by running the pulp over brass wire cloth, and this cloth has to be renewed every few months. A single firm of paper manufacturers in this city is put to an annual expenditure of $2,000 to replenish the wire cloth in its mills. As there are about 950 paper mills in the United States, it will be seen that the quantity of wire cloth required by them all is considerable.

Wire cloth, says the *Commercial Bulletin*, is sold by the square foot, and is graded according to the number of wires in an inch. Cloth which contains two meshes per linear inch or four per square inch, is designated as No. 2. That which contains 100 meshes per linear inch or 10,000 per square inch, is designated as No. 100. Cloth as fine as No. 120 is sometimes made, but it is always of brass or copper. No iron wire is used in any numbers above 40. The wire cloth used in window screens is No. 13, and that employed in flour sieves is principally No. 20. The brass cloth used by paper mills is mostly No. 60. The price of No. 2 iron wire cloth is 10 cents per square foot; that of No. 2 brass is 40 cents; and No. 2 copper is 45 cents. No. 100 brass cloth sells at $1.25 in small lots at retail, and at about $1.00 in large lots at wholesale. These prices will serve as fair examples of the value of wire cloth in general.

The Corn Starch Industry.

A conference of Western starch manufacturers was held in Cincinnati, in the latter part of October, to devise means for stopping a war of prices. Ten firms, claiming two-thirds of the manufacturing capacity of the country, agreed to consolidate their business to form a single joint stock company, and others were expected to join the combination. This action brings out the notable fact that two New York starch establishments, at Oswego and at Glen Cove, control the Eastern and foreign trade. They cannot compete for the Western trade with manufacturers in the West, owing to the double freight charges, the corn having to be brought from the West. The circumstance that the freight on corn is less than that on the starch made from it, however, together with the higher quality of the Eastern product, prevents the Western makers from controlling the entire trade.

RUSSIA estimates the value of the Siberian gold mines at $6,000,000 a year.