Constitution of the Sun.

In a paper presented to the French Academy (*Comptes Rendus*, xcvi., 136) Faye gives his reasons for believing that our sun and the other large self-luminous heavenly bodies have not yet arrived at either a solid or a liquid state, but are gaseous all the way to the centers. Otherwise, he says, the heat radiated from them would not be so quickly replaced by heat from within, and the surface, consequently, would soon become covered with a solid, non-luminous crust.

Cagniard-Latour has, however, proved by means of some very remarkable experiments that a gaseous mass can acquire the density of a liquid without changing its state of aggregation, provided both temperature and pressure are high enough at one time. If, then, the external strata of the solar atmosphere, where all matter is in an elementary or dissociated state, should cool sufficiently for the elements to enter into chemical combination, if the vapors of metallic calcium, magnesium, and silicium, mixed with oxygen there, on cooling should form clouds of lime, magnesia, and silica, for example, these clouds would sink to the interior, where they would again be dissociated, while at the same time they would drive the hotter particles upward, so that an approximately uniform temperature would be maintained until the whole mass had gradually cooled to such an extent as to assume the liquid and afterward the solid state.

Faye bases his hypothesis on the spectroscopic observations of many years, and on Carrington's study of sun spots, which show that the currents are all in zones parallel to the equator, while there are none from the equator toward the pole. Besides this, the flattening of the sun and the slow motion of sun spots near the poles are more easily explained on this hypothesis of Faye than on those hitherto in vogue.

Illuminating Gas in Russia.

The Chemical Society in St. Petersburg recently appointed a committee to determine what was to be understood by "illuminating gas of best quality." From their report we abstract the following points:

1. A good illuminating gas must give, when burning about 100 liters per hour in a bat wing burner, an illumination equivalent to 10 normal spermaceti candles, that burn 7·78 grammes per hour.

[One hundred liters equals 3·53 cubic feet, while 7·78 grammes = 120 grains. This requirement corresponds very nearly with our 14 candle gas.—ED.]

2. Since the material used in making gas, as well as the way in which it is made, has an effect on the value of the gas, it will be necessary, after a standard has been fixed on for the quality of the gas, for the city to establish an inspector to constantly watch the quality of the gas sent out.

3. Not only the illuminating power of the gas, but its composition, is of importance to consumers who use it indoors, hence the comptroller or inspector must also test it with regard to its chemical purification, and for this purpose also a standard must be fixed upon.

4. After estimating the quality of the gas, attention must also be given to the methods of illumination, since a good illumination depends, not on the quality of the gas alone, but on other causes, as, for example, on the pressure, the state of the pipes, the condition of the burners, etc.

5. The society advises sending a competent scientific person to Paris and other cities where such inspection is carried on, to study the methods and means employed.

Nottingham Worms.

In all angling localities, the merits of Nottingham worms for angling purposes are fully recognized; but only a comparatively few people are aware of the trouble that is expended upon them. This industry affords employment to a large number of persons throughout a considerable part of the year, who, every favorable night, collect the worms from their happy hunting grounds in the meadows. Naturally, the supply in wet weather is more abundant than when the atmosphere is dry, although some sort of a harvest can even then be obtained by watering the ground. The wormers are provided with lanterns, and have to exercise some considerable agility in catching their prey, as, if disturbed by any noise, they pop back into their holes. As soon as the worms are brought in from the country, they are taken to the 'farmer,' who places them in common field moss, and there they remain until they are as tough as a piece of India-rubber, which is a proof of their being in good order to use as bait, as a freshly caught worm is extremely tender, and breaks up readily when put on a hook. The worms are generally kept in moss from three or four days to a week, which is the longest period they can be preserved in good order. The worms are frequently picked over, in order to exclude all those that are broken and mashy; and when fit for use, they are usually sold for three and sixpence or four shillings per thousand, packed up in canvas bags filled with moss. For this purpose, only the plump and healthy worms are selected.

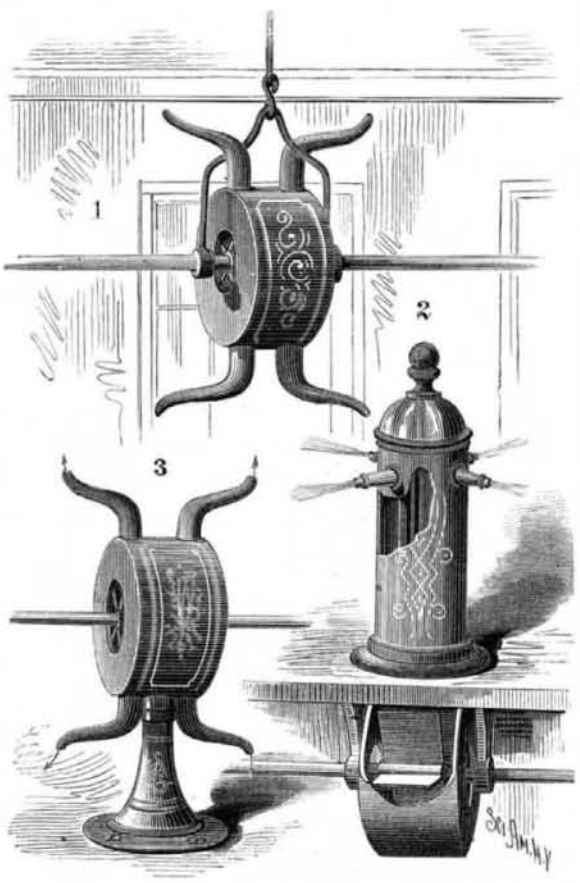
[The above from *Chambers's Journal* suggests a new industry not yet introduced into this country, and a useful hint to our fishermen respecting the toughening of their bait.—ED.]

IN Japan, one of the staple articles of food, fresh and pickled, is the daikon, a great radish that grows 2½ feet long and 4 inches in diameter.

NEW FANNING APPARATUS.

We give an engraving of an improved fanning apparatus designed for cooling purposes, and to be used in hotels, restaurants, private residences, offices, and in all other places where it is desirable to keep the air in circulation. It may be made in various sizes, and driven by any available motive power; the smaller sizes being propelled by a spring or weight, and the larger ones by steam or water power, gas or caloric engines, according to locality, extent of use, etc.

The apparatus consists of a fan formed of a series of wings or blades mounted on a shaft and inclosed in a casing, the casing having discharge pipes opening in various directions, according to the requirements. The apparatus may be suspended, as in Fig. 1, placed beneath a table or floor, as in Fig. 2, or supported by a standard, as in Fig. 3.



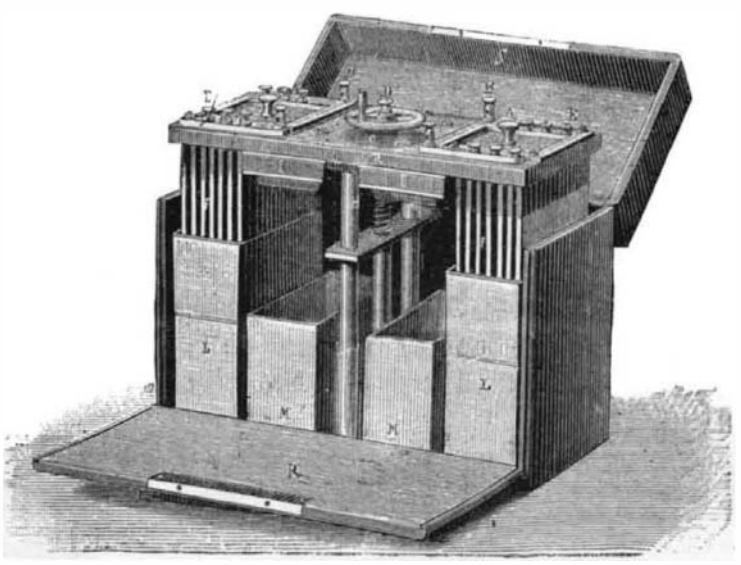
REIMERS' FANNING APPARATUS.

A patent has lately been granted for this invention to Mr. Jacob Reimers, of No. 1,325 Sturtevant St., Davenport, Iowa.

NEW PILE FOR GALVANO CAUTERY.

Mr. Chardon, a French manufacturer of electrical apparatus for medical and surgical purposes, has recently devised a pile which is specially designed for the practice of galvano cautery, and which does away with some of the serious inconveniences inherent to other piles of the kind that have hitherto been employed.

In this new apparatus, which is shown in the annexed cut, the elements are inclosed in an easily transportable box or case, and are so constructed that there shall be no danger of the fluid's spilling. It takes but a few minutes to mount and use the cautery, and but a few minutes also to close up the apparatus again to make it transportable.



NEW BATTERY FOR GALVANO CAUTERY.

The apparatus consists of a box, whose cover, S, and one side, R, are hinged, and within which is fixed a metallic support formed of three vertical columns united at their upper extremity by a horizontal crosspiece. Into the middle column, which carries a thread, enters a screw, while into the other two, which are smooth, enter two cylinders, H, that act as slides. This screw and these slides support, by means of a properly arranged device, a wooden tablet on which are fixed all the pieces that are necessary for the working of the apparatus. The head of the screw traverses this tablet and terminates in a wheel, C. It follows, from the well known properties of the screw, that the tablet, which cannot revolve because of the two slides, H, may be made to rise or descend by turning the wheel, C, in one direction or the other. Beneath the tablet and toward the extremities, at F, are situated the zincs and carbons. There are three of the former on each side, with four alternating carbons. These seven plates together do not take up much space in the box, but leave room for two quite thick sheets of rubber, I I, and four ebonite troughs. These latter are of different heights, those (L) containing the exciting liquid (solution of bichromate of potash and sulphuric acid) being nearly as high as the external case, and the others, M, being about half the height.

When it is desired to use the pile, the tablet is raised by revolving the screw, and the troughs, L, half full of liquid, are placed against the extremities of the box and secured in position by means of the troughs, M. Then, by revolving the screw in the opposite direction, the tablet is made to descend, and the zincs and carbons are caused to enter the liquid gently without splashing. If the circuit is closed, the current then begins to pass. The intensity of the latter is regulated by plunging the zincs to various depths into the liquid.

When the operation is terminated, and it is desired to carry the pile to another place, the tablet is raised high enough to free the extremities of the carbons and zincs, and the respective positions of the troughs, L and M, are changed. Then, by reversing the motion of the screw so as to cause the tablet to descend, the sheets of rubber, I, are pressed against the edges of the troughs containing the liquid with sufficient firmness to form hermetical covers to them. The case may then be closed preparatory to removal. It may be easily seen that no liquid can flow out, owing to the fact that the troughs that contain it are tightly closed, and that the small portion that drips from the zincs and carbons cannot injure the rest of the apparatus, inasmuch as it is caught in the troughs, M.

The zincs and carbons employed are about fourteen centimeters in width in each direction. The three zincs on each side, as well as the four carbons, are united for quantity, in such a way that two elements of wide surface are obtained. The terminals that are observed on the upper side of the tablet permit of employing at will one or the other of the elements only. On the contrary, the two elements mounted for tension may be used by attaching the conducting wires to one of the terminals of each of the elements, communication being established on another hand by a wide band of metal.

The carbons are platinized, and, toward their upper part, are invested with a layer of copper to which is soldered the strip of metal that unites the four carbons of each element to form a single one. This arrangement, which secures a continuity of the contacts, is of a nature to keep the resistance of the pile constant, and consequently to contribute to the constancy of the currents.

Although this apparatus has been introduced but a short time, it is being used in some of the hospitals at Lyons, Montpellier, and Brussels, and, if we mistake not, at the Bichat Hospital in Paris.—*L'Electricien.*

An Old Church in Arizona.

The most interesting of all sights is the grand old mission church of San Xavier, nine miles from Tucson, on the Papago reservation. This mission was founded in 1654, when the Papago (or Pima) Indians were supposed to have accepted the Christian religion. The Church of San Xavier was begun about the year 1700 and finished in 1798, excepting one of the towers, which is yet unfinished. The style of architecture is Moorish. The lines are wonderfully perfect. It is in the form of a cross, 70 x 115 feet, and has a well formed dome. A balustrade surmounts all the walls. The front is covered with scroll work, intricate, interesting, and partly decayed. Over the front is a life-size bust of St. Xavier. The interior is literally covered with frescoes. The altar is adorned with gilded scroll work.

The statues are as numerous as the paintings. The tiling on the floor is much defaced and but little is left. That of the roof is nearly all as perfect as when laid. Its manufacture is one of the lost arts. There is a chime of four good sized bells in the tower that have a soft, sweet sound. Ascending to the roof, you walk up long, narrow stairs in solid walls. But one can go at a time. The same is true in going to the gallery of the church.

It is marvelous that so long ago, and in such a place, such architecture, ornaments, painting, and sculpture were so well executed. You are admitted by two of the Papago signiors, who have it in charge. The admittance fee is 50 cents for each person.—*Denver Tribune.*

ACCORDING to the new act passed by the Maine Legislature, salmon, land-locked salmon, and trout, except in tide water, cannot be taken with nets, seines, weirs, or traps. The taking of land-locked salmon less than nine inches in length and of trout less than five inches is unlawful; also the transportation of more than fifty pounds of land-locked salmon or trout by any one person at a time.