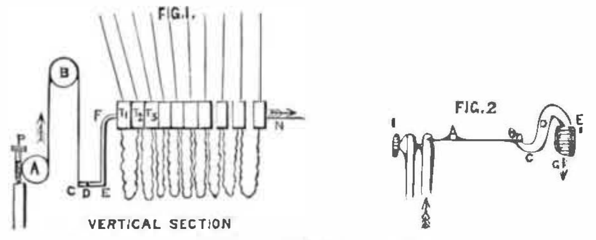
SIEMENS' ELECTRIC CURRENT GOVERNOR.

The idea of employing the stretching of a wire by the heating of the current passing through it was suggested by the early contrivers of electric lamps as a simple means of regulating the distance between the carbons, and it has the advantage that, as the heat produced per second is proportional to the square of the current flowing through it, a very slight change in the current will produce a considerable variation in the quantity of heat produced per second, and, therefore, in the temperature, if the mass of the substance to be heated is very small. On the other hand, when the current diminishes in strength it is necessary that the temperature of the heated substance should immediately fall; this requires considerable radiating surface. These conditions Dr. Siemens has fulfilled in the following instrument, the principle of which is shown in the accompanying engraving, which we extract from the *Electrician:*

A B C is a vertical band of metal not more than a twentieth of a millimeter, or two-thousandths of an inch, thick, passing over the roller, B, one end of the band being fixed to the roller, A, and the other, C, to the short end of a lever, C D E F, turning on a pivot, D. If now, by turning the pinion, P, the thin metallic band is tightened, the upper end, F, of the lever, C D E F, is pressed against the movable metallic terminals, T_1, T_2, T_3, etc., of the resistance coils; the result is, these are pushed out of the vertical and pressed together, and all the coils are short circuited. If now a current, entering at A, and leaving at N, passes through the vertical metallic strip, A B C, the lever, C D E F, and the terminals, T_1, T_2, T_3, etc., it heats the strip, which consequently expands and diminishes the pressure of F on T_1; some of the terminals, therefore, separate from one another, and some of the resistance coils are introduced into circuit (in the engraving six are shown short circuited and three in circuit). Resistance will be automatically introduced until an equilibrated state is arrived at, when the heat lost from the metallic strip, A B C, by radiation, convection, and conduction is exactly equal to that generated by the current, and any further decrease or subsequent increase of the current (provided the change is within certain limits) will be at once checked. To provide against accidental charges in the radiating power of the strip, produced by currents of air, etc., the portion, A B C, is under a glass cover.



SIEMENS' GOVERNOR.

In some trials made with this instrument before the Royal Society it was shown that the interposition of a certain resistance into the circuit only altered the deflection of a tangent galvanometer from 40° to 39·5°, when the regulator was employed, whereas, without it, the insertion of the same extraneous resistance diminished the deflection from 60° to 40°.

Fig. 2 shows another form of governor proposed by Dr. Siemens. The wire, A B, is stretched until the lever, C D E, turning on the pivot, D, produces sufficient pressure on a pile of Edison carbon disks in the glass tube, G. This pressure becomes less, and the resistance of the carbons becomes greater the more the wire stretches by heating with the current passing through it and through the carbon disks; the stronger, therefore, is the current the greater is the resistance opposed to it.

Either of these instruments may be used as a recorder of the electric current by attaching a pencil to the lever and allowing it to make a continuous mark on a strip of paper moved by clockwork at right angles to the direction of motion of the lever.

A Reptile which Lived Twelve Million Years Ago.

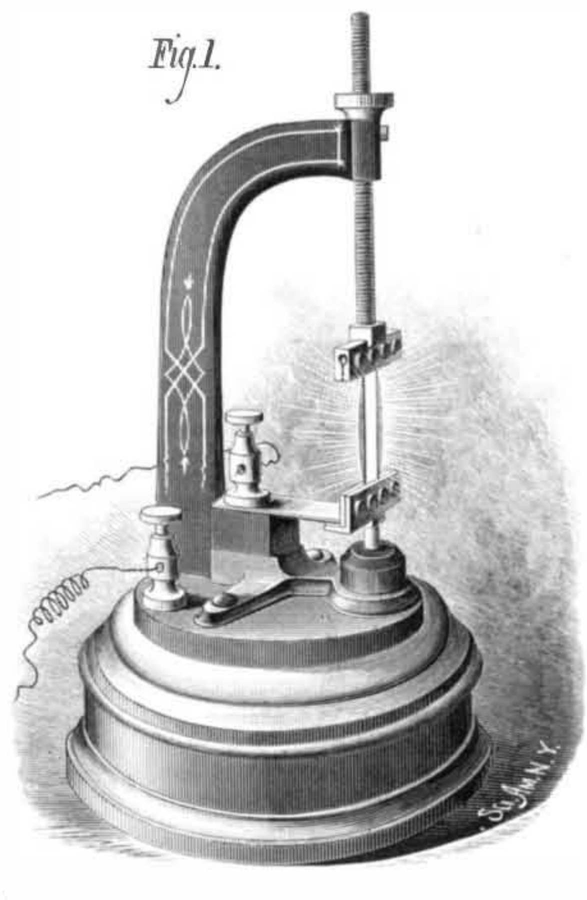
The American Museum of Natural History, of this city, has just been enriched by a contribution of three slabs of sandstone taken from the Connecticut Valley. The donor of the slabs desires that his name shall not be mentioned in print, but the specimens are said to have come from Turner's Falls, Mass. On two of the slabs are impressed large foot prints of some amphibious animal. Professor Hitchcock names the animal the *Brontozoum giganteum.* The beast is, or was in ancient times, a reptile of enormous size, as the prints of his feet on the slabs presented to the museum show. The theory of the geologists is that this monster was formed something like a frog; that he walked mostly on his hind legs, only using his fore legs when it was necessary for him to drop down to rest. It is estimated that he lived about 12,500,000 years before the appearance of man on this earth.

The third slab is covered with the marks of the feet of some insect which is unknown to the present generation. From the foot prints the geologists have determined that the insect was of the *ephemana* genus. Insects of this class can live in the water several days, but on the land they survive for but from one to twenty-four hours. The theory regarding these foot prints is that the insect found himself on dry land, with the tide receding, and in attempting to gain the water he left these marks upon the sand, which are presumed to teach the nineteenth century something of the history of the past.

NEW ELECTRIC LAMP.

To the Editor of the Scientific American :

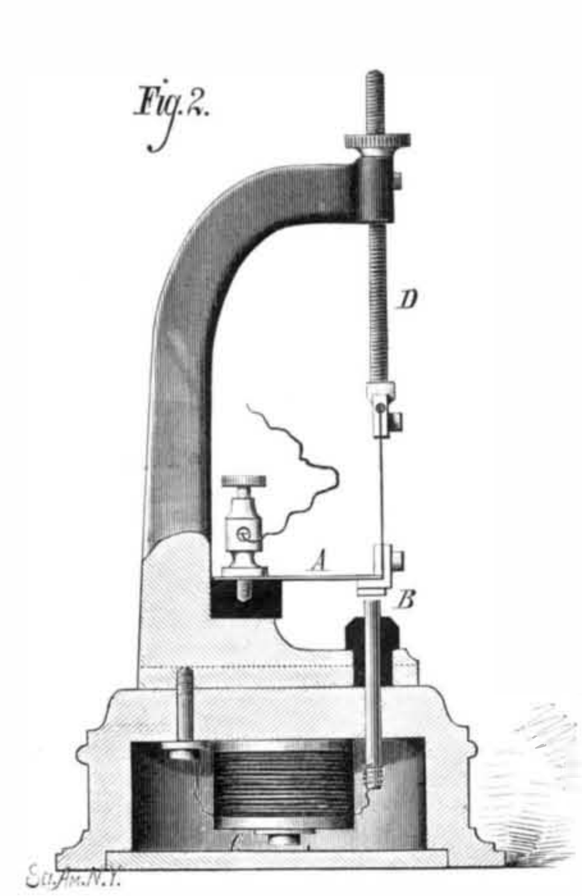
I notice in a recent paper a cut of Mr. Edison's platinum lamp. This lamp is so like one I made about two years ago, that I send you mine, and hope you will find a place for it



in your paper. Upon a careful examination of the two you will see that they both have the following features in common, namely: 1. The light is produced by a band of incandescent metal. 2. The metal is held taut by a spring. 3. The current is shunted by the expansion of the metal producing the light. 4. The shape of the metal is the same. 5. The contact points of the shunt are tipped with platinum. 6. The degree of expansion before the current is shunted is regulated by a screw.

The only thing not common to both is, I had a resistance coil in the shunt. Now, as I never saw Edison and he never saw me, how did it happen that we both made the same thing and almost exactly alike, except in the shape of minor details?

I never applied for a patent on my lamp, from the fact that I found from experiment that it required a very much greater expenditure of power to produce a given light with it than was required with the carbon points, so I put it on the shelf. Its operation is so simple that you need no explanation to understand it. I made the model represented in the engraving during the summer or fall of 1877; I have the original drawing. I first tried it on 35 cups Bunsen, as I



had no magneto machine then. About one year ago I took the resistance coil out of the base to use for another purpose. When I tried it again I run the wires outside of the case and used a rheostat. I afterward cut them off and connected them inside, so that for the last 10 or 12 months it has been in principle just exactly like Edison's lamp. I look upon the matter as a remarkable coincidence. HIRAM S. MAXIM.

Bridgeport, Conn., February 26, 1879.

[Fig. 1 shows Mr. Maxim's lamp in perspective; Fig. 2 is a vertical section. The spring, A, which clamps the lower end of the platinum strip, is secured by a binding post to a vulcanite block attached to the base of the iron standard. An insulated platinum tipped rod, B, extends through the base of the standard, and is connected with one terminal of a resistance coil, C, concealed in the base. The other terminal of the coil is in electrical communication with the iron standard. A threaded rod, D, extends downward through the upper end of the standard, and has at its lower end a clamp for holding the upper end of the platinum strip. The rod, D, is adjusted by the nut which bears on the top of the standard, so that when the platinum foil is cool the spring, A, does not touch the rod, B.

One electric wire being secured in the binding post that holds the spring, A, and another being connected with the vertical standard, the current passes through the spring, A, the platinum strip, the rod, D, and the vertical standard, heating the platinum to incandescence. Should the current increase so as to bring the temperature of the platinum nearly to the melting point, the strip expands until the spring, A, touches the end of the rod, B, when a portion of the current passes through the resistance coil, C.

When the temperature decreases the platinum contracts and breaks the contact between A B.]

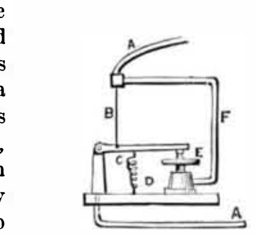
Cement for Glass.

Take 10½ lb. of pulverized stone and glass and mix with it 4¾ lb. of sulphur. Subject the mixture to such a moderate degree of heat that the sulphur melts. Stir until the whole becomes homogeneous, and then run it into moulds. When required for use it is to be heated to 248°, at which temperature it melts, and may be employed in the usual manner. It resists the action of acids, never changes in the air, and is not affected in boiling water. At 230° it is said to be as hard as stone.

EDISON'S ELECTRIC LIGHT.

A correspondent of the *Electrician* gives the following description of Edison's regulator:

His sheet of iridio-platinum is rigidly affixed, at the top, to a crossbar, to which is attached one wire. The crossbar at the bottom, to which the lower edge of the sheet and the other wire are attached, is a lever drawn down by a spring. Underneath this lever is an adjustable screw, tipped with platinum. From the standard of this screw runs a shunt wire to the top of the sheet. As the sheet is heated it expands, and the spring on the lever draws it down. The shunt screw is set to the desired degree of heat (light), and when this is reached the lever is in contact with the screw, and the current is shunted out of the sheet. In practice, this contact is being constantly made and broken. There you have the key to this "wonderful" performance.



A A, conducting wires; B, edge of illuminating sheet; C, lever; D, spring; E, shunt post; F, shunt wire.

Ocean Beach (Cal.) Placer Mines.

At a meeting of the San Francisco Academy of Science, Mr. Christy reports that in the black sand beach placer mines of California, the gold is found in the layers of magnetic iron sand which alternate with layers of common quartz sand; also in the gravelly layers swept by the surf. Hard pan is reached at a depth of two to four feet. It is composed of a sort of clay sandstone, and upon the "hard pan" is usually found a layer of coarser sand or granite, which is usually the best pay dirt found. Some of the higher layers of black sand are quite rich also. Under the microscope the black sand shows itself to be composed of more or less perfectly rounded grains of magnetic oxide of iron, with a few silica grains and occasional fragments of what appears to be garnet. Mixed with the sand is the gold, which, under the microscope, is usually bright, and in only a few cases presents a rusty appearance. The gold is invariably in the form of oblong or elliptical scales, which are doubly concave and usually surrounded by a thickened rim. Another curious fact is the great purity of the gold, which has been reported to have assayed from 950 to 953 fine, and is said to be the purest placer gold ever found in California.

Thrift of the French Working Classes.

The most striking fact with regard to the French working classes is that nearly all are possessed of money. However little they earn they save something. Thrift is their great characteristic; in fact, it is said of the French operatives that they spend less in proportion to their means than any in the world. Many keep their accumulations in an old stocking secreted in their houses; others—a daily increasing number—invest in various securities, the most popular investment being the purchase of land. Every Frenchman, when he can, becomes the owner of the house in which he lives. Of course he is greatly aided in this by the French land laws and laws of inheritance, which cut the whole country up into small holdings. Savings banks with government security, building clubs, sick clubs and friendly societies are also in favor; but no money is tied up in trade unions.