distance round the earth in perfect safety, provided always that a moderately cold fresh air is given free access to the quarters in which they are stored. Heat, it is stated, produces an immediate effect upon the development of the larvæ, thus rendering it impossible to deliver them in good condition for growing.

The partial failure of the European silk crop the past year has made an unusual demand for Japanese eggs, and other large consignments are anticipated.

EDISON'S LATEST ELECTRIC LIGHT.

It is somewhat strange that carbon, the only substance of any value for the contact surfaces of telephone transmitters, should also prove to be the only substance suited to the light-giving portion of electric lamps. The production of an electric light by the incandescence of platinum is, for the present at least, laid aside by Mr. Edison for the more promising and more satisfactory carbon. Not the carbon so familiarly known in connection with electric lighting, but a new article having different qualities, and remarkable both for the simplicity of the process by which it is made, and its efficiency as a light-giving body when raised to incandescence by the passage of an electrical current.

The discovery of this new form of carbon was partly accidental, but more the result of Mr. Edison's faculty of seizing upon the slightest suggestion and following it as long as it invites investigation.

The first carbon prepared by Mr. Edison for this purpose was formed of a thread enveloped in a paste made of lampblack and tar, and carbonized at a high temperature. This carbon thread, although not remarkably successful, gave sufficient encouragement to warrant further investigation in the same direction. After the trial of a number of other substances it was determined that the best of all was paper, simple plain paper, without lampblack or other applications. In making these carbons the quality of cardboard or paper known as Bristol-board is used.

The completed carbon is shown full size in Fig 1; the blank from which it is made is shown full size in Fig. 2. It will be observed, by comparing Fig. 1 with Fig. 2, that the paper shrinks enormously during the process of carbonization.

The manufacture of these little carbon "horseshoes," as they are called at Mr. Edison's laboratory, is very simple. The paper blanks, after being cut by dies in the form shown in Fig. 2, are subjected to heat sufficiently strong to drive off by destructive distillation all volatile matters. The paper horseshoes thus prepared are placed with alternate layers of tissue paper in shallow iron boxes, and weighted down with thin plates of ordinary carbon. These boxes are closed by tight-fitting covers, and placed in a muffle, when they are raised to a high temperature, which is maintained for a considerable time. The only index of the completion of the process is the crackling of the oxide formed on the exterior of the iron boxes. After cooling the carbons are removed from the iron boxes and placed between the jaws of small platinum vises, *a a*, which are supported on thin platinum wires blown in the glass base and forming the electrodes. A portion of the glass base and the carbon and its supports are inclosed by a glass bulb, from which the air is so completely exhausted by means of a Sprengel pump that only a millionth part of the original volume remains.

Mr. Edison has improved the Sprengel pump so that high vacua may be produced in 25 minutes instead of the 45 hours consumed in the operation by some of our physicists. The vacuum is so nearly perfect that none of the tests to which the lamps have been subjected so far, indicate the presence of the slightest trace of air.

For making his Sprengel pumps and other vacuum apparatus, Mr. Edison fortunately secured the services of an expert glass worker, who was formerly engaged in the laboratory of the famous Geissler, of Bohn.

The electrical resistance of the slender carbon horseshoe is 100 ohms, and, while the lamp shown in Fig. 3 is intended to afford a light equivalent to a single four foot gas jet, it may be forced to give a light equal to that of 8 or 10 such jets. We saw a single lamp of this kind giving a light that enabled us to read the SCIENTIFIC AMERICAN 100 feet away. This was certainly an extraordinary performance for a piece of carbon having a surface no larger than that shown in Fig. 1.

One of the most remarkable experiments connected with the exhibition of these lamps was that of connecting one of them with the main electrodes by means of a yard of No. 36 copper wire, no larger than a horse hair. The light was maintained without heating this very small conductor. Of course a wire of this size is too small to use in regular practice, but it strikingly exhibits the advantage of having a light-giving body of high resistance.

The carbon is very tough and flexible, and not liable to be broken or injured by jars. We saw one of the carbon horseshoes nearly straightened before it broke. The carbon not only withstands rough mechanical usage; it is also proof against injury by the sudden turning on and off of the electric current. One of these carbons has been subjected to the severe test of applying and removing the electric current a number of times equivalent to 36 years of actual daily use, and yet the carbon is not in the least impaired.

The horseshoe form of the carbon has a great advantage over the straight pencil or the voltaic arc, the light being more diffused, and therefore softer and mellower, casting no sharp black shadows, nor giving such an intense light as to be painful to the eyes. The light resembles that of a gas jet excepting in the matter of steadiness, the electric light being perfectly uniform and steady.

The lamps are connected in multiple arc, *i. e.*, the two wires leading from the electrical generator run parallel to each other, and the lamps are placed between and connected with each wire. As Mr. Edison has his circuit arranged it does not make the slightest difference, so far as the lamps are concerned, whether one or fifty of them are in use; it does make a difference, however, in the power consumed at the generator. The regulation of the current is reduced to the simple matter of varying the intensity of the magnetic field in which the armature of the generator revolves.

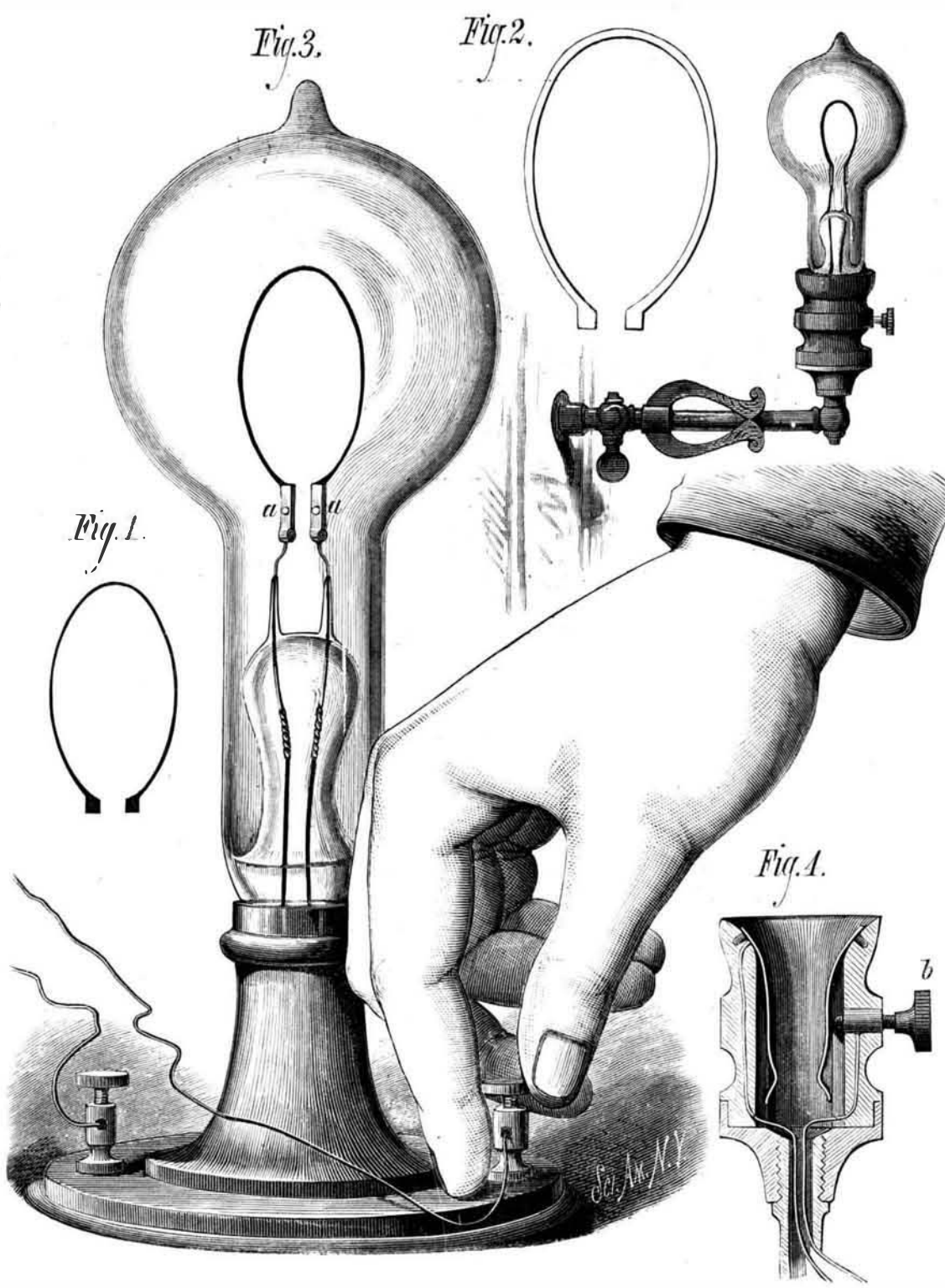
The entire lighting apparatus of a house, store, office, or factory, consists in the lamps and a few wires. There are no regulators, no complicated switches, no resistance coils to replace the lamps when the latter are not in use. The lamp, in its present form, is as simple as a candle, and, candle-like, it may be taken from its socket and replaced. This may be done while the current is on.

The construction of the socket which supports the lamp will be understood by reference to Fig. 4.

The lamp has attached to its electrodes slips of copper, which are bent upward against the sides of the glass, and touch two springs at opposite sides of the socket. One of these springs is connected with one of the electrical conductors; the other spring merely touches the copper strip, and does not form a part of the electrical conductor until it is touched by the thumb screw, *b*, this screw being connected with the second electrical conducting wire. To start the light it is only necessary to turn the screw, *b*, until it touches the spring. To stop the light the screw is turned in the reverse direction. From this it will be seen that the electric lamp is managed easier than a gas burner, as it requires neither lighting nor regulating.

On the evening of our visit to Mr. Edison's laboratory, he had more than thirty of these simple little lamps in operation, the current being supplied from one of his machines. Each lamp gives a clear, soft light equal to that of a four foot gas burner. These lamps had already been in continued operation for more than 48 hours, and they had seen altogether as much use as they would in 30 days of ordinary domestic or business service. The light certainly leaves nothing to be desired so far as its efficiency is concerned, and we are assured by Mr. Edison that, on the score of cheapness or economy, his system of illumination is far in advance of any other, not excepting gas at the cheapest rates. It seems that the subject of general electric lighting is now reduced to a mere question of time. If Mr. Edison's lamps withstand the test of time, he has unquestionably solved the vexed question and has produced what the world has long waited for; that is, an economical and practical system of electric lighting adapted to the wants of the masses.

The details given above were obtained by us direct from Mr. Edison and his assistants during a recent visit to the Menlo Park laboratory.



EDISON'S LATEST ELECTRIC LAMP.

Nitrolin.

A new explosive compound, known as nitrolin, is compounded as follows: From 5 to 20 parts of sugar or sirup are mixed with from 25 to 30 parts of nitric acid in a wooden or gutta percha vessel. Of this compound 25 to 30 parts are mixed with 13 to 35 parts of nitrate of potassa and from 13 to 15 parts of cellulose.—*Chem. Centralblatt.*

MISCELLANEOUS INVENTIONS.

Mr. David Booker, of Edom, Texas, has patented an improved implement for trimming and cutting and laying down hedges. It consists in a peculiar combination of knives and levers.

Mr George C. Phillips, of Silver City, Nev., has invented a steam piston packing, which consists in making the suitable packing rings with their adjoining faces inclined in opposite directions, so that the pressure of the gland will compress and expand the packing rings alternately to pack the piston and stuffing box, such rings being used in connection with a conical sleeve of novel construction, which sits within the stuffing box and around the piston rod.