ports the pivots, or is otherwise geared so as to permit of its being rapidly rotated. The two springs of the commutator are connected to a delicate astatic galvonometer at a convenient distance, or to a movable coil placed in a magnetic field. At right angles to the plane of the rod projects a pointer. This pointer is attached to the frame carrying the rod. The frame is mounted on pivots so as turn in any direction; the stand carrying the frame having two axes, one horizontal, the other vertical as in the altazimuth mounting of the telescope. If there be an electric current passing in a straight line of indefinite length underneath the axle it will produce a magnetic field diminishing in power as the distance from it increases. This magnetic field, when cut by the helices, tends to generate currents in them. The commutator causes all the currents to flow through the galvanometer in one direction if the pointer is placed in a line perpendicular to the lode, but when the rod is suitably placed and the pointer is in the direction of the lode, the currents are directed half in one direction and half in the other through the galvonometer, which returns to zero. Thus if the galvonometer is defected with the rod in any position, it shows the pressure of a lode. By inclin ng a rod until no current is produced, the pointer is brought to a position in which it indicates the direction of the lode, and by taking two observations, one on each side of the lode, at which the pointer shows an angle of 45 degrees, half the horizontal distance of the lode beneath the surface of the earth supposing the surface to be level or uniform. As cases may arise where it is not possible to place the apparatus on each side of the lode, for example, suppose the lode to be near the side of a sloping mountain, the apparatus may be provided with means of shunting the lower coils until the currents generated in the two coils are equalized, then by a little calculation based upon the known laws of electricity the distances of the lode from the surface is indicated.

Lastly, if desired, by making the resistance coils of the shunt suitable functions of the resistance of the coils, and making them into the form of a slide resistance box and numbering them, the position of the shunts at which neutrality is obtained may be arranged to indicate without calculation the number of metres that the lode is below the surface. The hollow helices at each end of the rotating bar may be varied in form and may be replaced by two bar electro-magnets.—*English Mechanic.*

ILLUMINATION BY ELECTRICITY AND GAS COMBINED.

The report reaches us that by a recent English invention light is produced by electricity and gas combined, the electric current operating to decompose carbon from a flow of gas, bringing about complete combustion, the result being a clear white flame.

That the heat of the electric arc has a tendency to separate the carbon from any hydro-carbon gas or vapor, is proved by Maxims' method of building up the carbon strips for his incandescent lamps; he places a very fine platinum wire or its equivalent in an atmosphere of gasoline vapor, and heats it to incandescence by an electric current which is just strong enough to do so. Carbon is thereby gradually deposited on the wire and increases its thickness until it becomes so good a conductor that its incandescence by that current ceases, it will then require a stronger current afterward to use it, which is the current for which the lamp is intended.

These Maxims' carbon strips show under the microscope a crystalline deposit or carbon glistening like little diamonds, quite a contrast with the carbons made by the carbonization by fire, of fibrous lignite, such as wood, paper, jute, etc.

We may by the way suggest the highly interesting question if this may not put some enterprising chemist on the track to manufacture crystalline carbon, that is diamonds. It would be a new triumph for applied chemistry.

In regard to using the electric arc for illumination in connection with hydro-carbon gas, we remark that this was done in this city two years ago, by passing the arc from carbon points through a jet of gasoline vapor, which amounts to about the same thing. The result was satisfactory; but practically the electric light without the hydro-carbon vapor or gas, was considered good enough not to warrant extra complications. It would however be worth while to find if economy could not be effected in this way, and a weaker electric light be increased, so that a ten light dynamo-electric machine could be made to feed fifteen lights, each of which by the addition of a gas jet could be made equal to one of the ten lights without gas.

MODERN IMPROVEMENTS IN GLASS MAKING.

The following is a record of the principal improvements in glass making during the last fifty years, as given by a prominent manufacturer.

Robert Lucas Chance, of Birmingham, England, successfully introduced the manufacture of Bohemian sheet glass into his district in 1838. James Chance perfected the process of grinding and polishing sheet glass, now known as patent plate.

The substitution, about the year 1830, of carbonate of soda, as the alkaline ingredient in glass in place of kelp, and subsequently for crown and sheet glass, of sulphate of soda (saltcake) in the place of carbonate.

An increase in the size and improvement in the workmanship of the plates, sheets, and tables pro luced.

An improvement in the color of the glass by the use of purer materials and modifications in the process of melting.

Numerous improvements in the flattening of sheet glass, resulting in the removal or diminution of many imperfections.

The use of the diamond in the process of splitting cylinders in the place of a red hot iron.

An increase in the size of the melting pots and furnaces, with the view of economizing coal and labor.

The adoption, in the casting of plate glass, of various mechanical contrivances. The origin of some important improvements of this class is due to the manager of the Birmingham Plate Glass Works.

The use of the same pot for the two processes of melting and casting plate, superseding the old method of transferring the contents of the melting pot into the vessel used for casting.

The substitution of small coal, or slack, in the melting processes in the place of the large coal or lumps.

The application of Siemens' regenerative process to the melting of glass, by which the amount of smoke is greatly diminished, the colour of the glass is improved, a greater control is obtained over the furnace, and a saving of fuel is effected wherever, by this process, slack can be substituted for large coal or lumps. These advantages are to some extent counterbalanced by the increased cost of the furnace, and its increased liability to get out of order. The process, however, as applied to glass making, is so new that there has been scarcely time as yet to overcome the difficulties that have presented themselves.

The introduction of the Gill furnace, whereby coal is economized to a remarkable extent without sacrificing the effectiveness of the combustion of the evolution of heat.

There have been many improvements, besides, in machinery for pressing and ornamenting glassware, but they are too numerous and intricate to detail here. The most important of these, too, had their origin in the United States, which have rapidly come to the front with labor-saving devices in glass manufacture as in other industries.—*Pot. and Glass Reporter.*

RISING INDUSTRIES IN INDIA.

The marked success of the cotton spinning and weaving mills in Bombay, after preliminary failures, has led to a great extension of this industry in the Presidencies of Bombay and Bengal, and in other parts of India. Nor does there appear to be any limit, practically speaking, to their extension, seeing that the mills work successfully in the heart of the cotton producing districts, where there is an abundant population from whom to draw for labor, and who are also the consumers of the manufactured fabrics.

The jute mills in Bengal are well known as successful enterprises, having eclipsed the special industry of Dundee, thanks, in some measure, to the transfer of Dundee capital and Dundee skill from the banks of the Tay to the banks of the Hooghly. The demand for their products continues to increase, and keeps so ahead of production that some other jute mills are making extraordinary profits. The growing trade in seeds and cereals in India is sufficient to take off any extra quantity of bagging that may be produced, and the Australian requirements are increasing year by year.

Coal is worked in Bengal by the East Indian Railway, and by upwards of sixty other collieries, the total output being not far short of 1,000,000 tons per annum. Rope making is already a large industry. Dye works, tanneries, soap works, sugar refineries, silk works, and paper mills are all going concerns and presumably profitable.—*British Trade Journal.*

Southern sweet gum is coming into general use as a finishing wood, and for furniture and similar uses.