done wear longer, as there is less scale on the work. Moreover, the heat is uniform, and can be maintained from morning till night without cessation, enabling the workmen to do more and better work; and there is no smoke, dust, or ashes.

Fig. 2 shows the interior of a burner cylinder with oil inlet at the end. The supply of oil is maintained at a constant level by means of the float, which controls the oil-valve. An end view of the cylinder

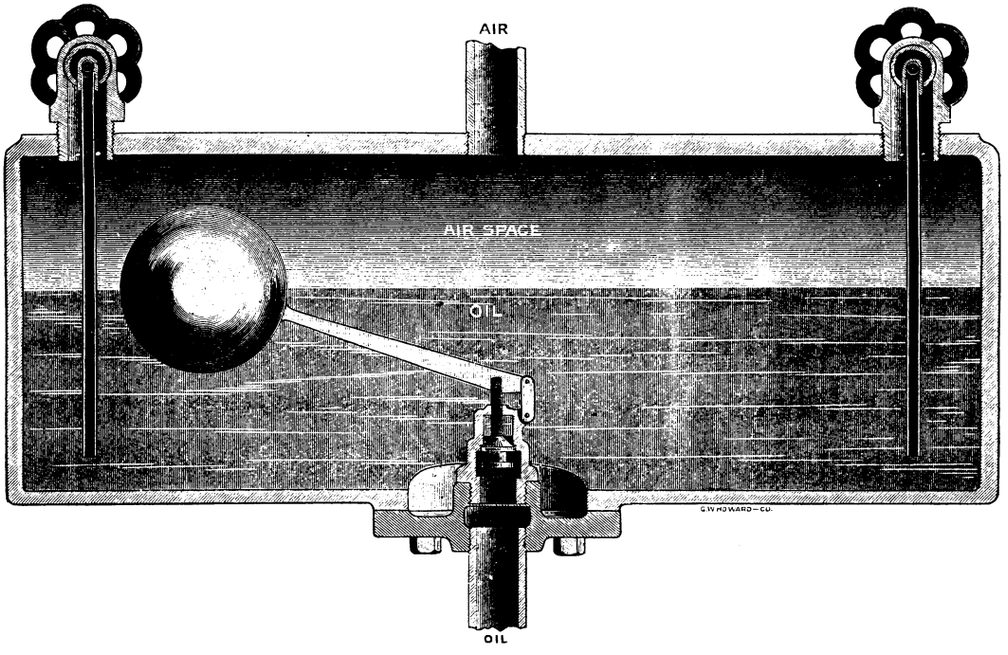


FIG. 3. — AERATING CYLINDER FOR DOUBLE PETROLEUM BURNER.

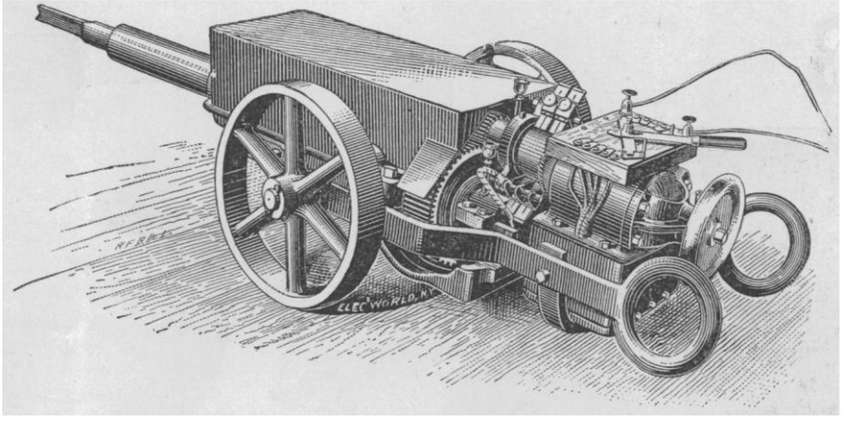
is also given, showing the burner, and the hand-wheel which regulates or cuts off the supply of air and oil. The operation of the mechanism is as follows: Oil is forced into the cylinder at any desired pressure until checked by the float and valve. At the same time a constant air-pressure is maintained in the cylinder by means of an air-compressor, the air being admitted through the pipe at the top of the cylinder. The hand-wheel being turned, the oil is forced up through the small pipe by the air, while a certain amount of air, proportioned to the oil, passes through the large pipe surrounding the oil-pipe. At the nozzle of the burner, where ignition takes place, the oil and air are commingled, the oil being thoroughly atomized and aerated, — circumstances most favorable to complete combustion. A two-burner cylinder is shown in Fig. 3, in which the oil inlet is at the bottom of the cylinder.

THE ELECTRIC COAL-DIGGER.

THIS is the name applied to a new mining-machine, designed and constructed by Elmer A. Sperry of Chicago, and shown in operation at the electrical exhibit of the National Electric Light Association, during its convention in Chicago recently. For five years Mr. A. L. Sweet has experimented on this project, until, with the assistance of Mr. Sperry, success has crowned their efforts.

An electrical motor is situated on the rear of the machine, and substantial gear-work transmits the power to the mechanism which operates the projectile carrying the pick.

The projectile, including the "bit," "pick," or other colter, weighs from sixty pounds up, depending upon the kind of work. The stroke is from six to eight inches, delivered with a force of many hundred pounds, and varying from one hundred and fifty to three hundred blows per minute, according to conditions, yet always under control of the operator.



THE SPERRY ELECTRIC COAL-DIGGER.

The unique feature of the machine consists in the fact, that, no matter where or at what point in the working stroke the projectile is arrested by the work or face, it is instantly picked up at that point, and returned backward to deliver another blow. For instance: if the normal stroke is six inches, and the pick strikes the

coal after travelling only four inches out of the six, the pick is not left there to push the machine and miner backward away from the work in such manner that the successive blows cannot do effective work; but the moment it has delivered its blow, and without delay, it is withdrawn for the next stroke.

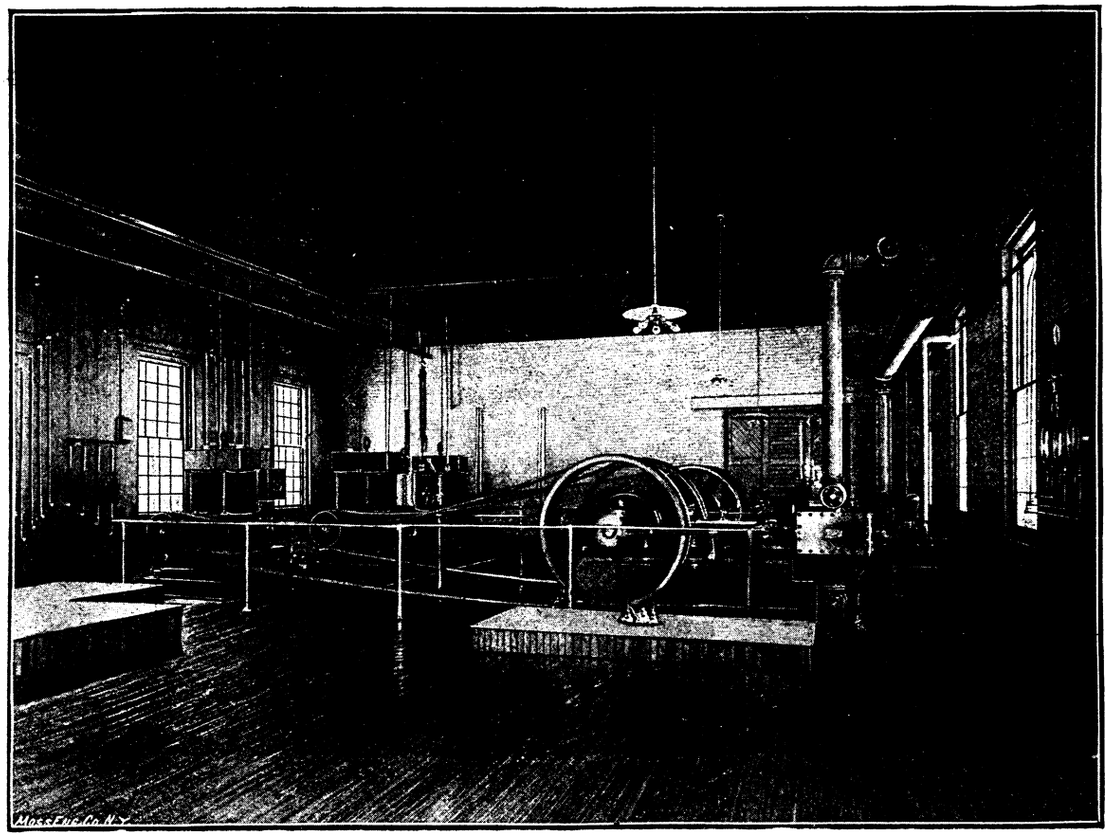
The flexible electrical conductors lead from the dynamo in the engine-room down the shaft and to the machine. It is claimed that the whole design is such that danger from the current is done away with, and that the machine, wires, generator, and every part, are free from danger either to life or property.

A UNIQUE ELECTRIC POWER STATION.

THE great advantages one method of conversion of energy possesses over another when favored by circumstances is illustrated in a striking manner at the power station of the People's Electric Railway of Scranton, Penn. At a short distance from this station is an almost inexhaustible supply of "culm,"—the screenings of anthracite coal, which until recently was considered practically valueless. This culm, which costs little more than the expense of carting it to the station, is the fuel used in generating steam for the engine which drives the dynamos, the boiler-furnaces being specially adapted to the economical consumption of such fuel. As a consequence of this cheapness of fuel, it is claimed by the officers of the road, it costs less to supply the electric motive power necessary to operate the railway than it would to furnish one horse with food and attendance. When it is known that there are twenty cars in operation on this line, and that the grades are not few in number, some of them being steep, the enormous advantages given to the electric system by such exceptional favoring circumstances are apparent at a glance. The results of two months' experience on the Scranton road makes prominent not only the fact that the electric railway is a good thing in its way, but also the further fact that many things now looked upon as useless will eventually prove to be of great economic value. The culm at Scranton is now a marketable product of the mines.

An interior view of the electric power station spoken of is given in the illustration on this page. The electric current is furnished by three Edison dynamos, of 80,000 watts capacity each, wound for an electric pressure of 500 volts at a maximum. The station is most complete in all its appointments, and is furnished with electric lights, current being taken from the dynamos used to supply the motive power for the road.

The twenty cars with which the road is equipped are of the Sprague system, and ran uninterruptedly during the severe snowstorms which have visited Scranton since the road was opened. The Sprague Company and the people of Scranton, as well as the officers of the road, have reason for the satisfaction they express over the working of the road. The extraordinary economy in working expenses, if nothing else, makes this a notable electric railway.



THE ELECTRIC POWER STATION, SCRANTON, PENN.

A COTTON FABRIC.

A COTTON fabric which has been patented in England is thus described by the *Canadian Journal of Fabrics*: "It has the appearance and soft feel of chamois leather, and, it is guaranteed, will not lose its special qualities when washed. In making the cloth, cotton yarns form the warps, these being dyed a fast color, a chrome yellow tint being preferable. They are sized and dressed in the usual manner. The weft is spun soft, and is used in the undyed state. The fabric is woven from these yarns, and is then passed several times through cylinder teasing or raising machines, whereby the surface is broken and a good ground nap is produced on one side or both sides thereof. The fabric is then 'soap' finished, to impart to it the desired appearance and soft, cold feel of chamois-leather. It is applicable for either wet or dry cleaning purposes and also as a polishing cloth, and especially suitable for underclothing and for linings of the same, and for general use as a