EDISON'S KINETOGRAPH AND COSMICAL TELEPHONE.

Recently the daily papers have been filled with reports of interviews with Edison, from which the reading public would obtain the idea that Edison had lately invented something of paramount importance, whereas these inventions, as curious and wonderful as they appear, are, in reality, scarcely more than the pastime of the hour with Mr. Edison.

The "kinetograph" is a machine consisting of a clever combination of a photographic camera and the phonograph, by which the words and other sounds of a speech or play are recorded simultaneously with the photographic impressions of all of the movements of the speaker or actor. The photograph impressions are taken at the rate of forty-six per second, and the phonograph has its capacity increased so that it will make a continuous record for thirty minutes without any shifting of the cylinders. The celluloid film upon which the photographic impressions are taken is perforated along one edge with a series of holes arranged at regular intervals with as much precision as can be secured by means of the finest perforating mechanism. This feature is of vital importance, for the holes must move the film with such regularity as to make each separate impression when reproduced coincide exactly with the words or sounds recorded in the phonographic cylinder simultaneously with the position and expression of the speaker, actor, or singer at the time the sounds were uttered. Exact synchronism between the sound-recording mechanism and the shutter-operating and film-moving devices of the camera necessitates exceedingly accurate mechanism both in the recorder and in the reproducer. The phonograph and camera mechanism in both cases is driven by the same motor, and controlled by the same regulating mechanism.

The greatest difficulty experienced in taking the photographic impressions and reproducing them was in the stopping and starting of the film. It was found that the stopping and starting of even so light a thing as the film forty-six times in a second required about two-thirds of the time, the remainder being utilized for the exposure of the plate. To secure enough light for the production of a good image in so short a space of time, a special camera lens of large aperture had to be constructed, at a cost of $600. The apparatus has already been carried to such perfection that the motion of the speaker's lips coincides so exactly with the words reproduced by the phonographic cylinder that the words actually seem to proceed from the picture, and all the movements of the speaker or actor are reproduced by the succession of the different images with such rapidity as to make the picture appear absolutely continuous, instead of intermittent, as it really is.

The reproducing apparatus is practically a reversal of the camera and phonograph; that is to say, instead of the photographic camera, a superior form of projecting lantern is employed, which is provided with a strong light and mechanism for moving forward the strip with an intermittent motion corresponding exactly to the motion of the negative strip in the camera, and, like it, acting in perfect synchronism with the phonograph. The lantern is also furnished with a light interrupter, which eclipses the light during the brief period required for shifting the film forward to a new position to show the succeeding picture. The phonograph with its resonating horn is able to reproduce the sounds so that they may be easily heard in any part of an ordinary hall without the necessity of applying the ear to the instrument, as in the case of the commercial machines, and the successive pictures necessary to produce the effect of motion upon the screen follow each other with such rapidity, and with so little change in the successive positions, as to give the picture all the appearance of life.

Mr. Edison is at work preparing apparatus on a large scale, which will be finished in time for exhibition at the Chicago Exposition. This apparatus does not seem to be adapted for universal use, although a favored few may be able to enjoy it. It will give to public speakers, actors, and opera singers the gift sighed for by the poet, who said:

> "Oh! wad some pow'r the giftie gie us,
> To see oursels as others see us!"

We think if some of our public speakers would patronize a machine of this kind, they would soon change their style of oratory. May we not expect the early adoption of this instument in institutions where elocution forms a branch of education?

While talking with Mr. Edison in regard to this novel invention, the subject of his cosmical telephone was brought up. He states that he is really carrying the project into execution in the form of a practical experiment at his iron mine in Ogden, N. J. With this telephone he expects to hear the sounds of some of the terrific operations going on in the sun. Some years ago, when the long distance telephone with a metallic circuit was being experimented with, Mr. Edison had control of a long line, and he says that he frequently heard very strange sounds in the telephone, which could have proceeded from no earthly origin. As sun spots were frequent at that time, he at once attributed these effects to solar eruptions, and afterward, when experimenting at his iron mine with the magnetic needle, he found frequent, sudden, and very appreciable disturbances of the needle. These he attributed to the variable magnetic action of the sun.

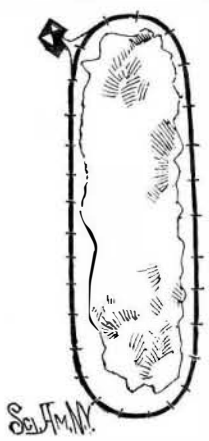

Fig. 2.—PLAN OF MINE.

Fig. 3.—POSITION OF COSMICAL TELEPHONE WITH REFERENCE TO THE EARTH.

He then conceived the idea of surrounding the mine with a number of convolutions of wire which terminate in a telephone receiver and in suitable recording apparatus. The mine consists of an almost solid body of magnetic iron a mile long, four hundred feet wide, extending into the earth to an unknown depth. This immense body of iron forms the magnet of the telephone, and fifteen convolutions of wire mounted on telegraph poles surrounding the outcrop of this iron form the conductor of the telephone, and the terminals of this great coil extend to an observatory erected at one end of the mine. Mr. Edison is looking for some important revelations when this work is finished. When questioned as to the feasibility of seeing by telegraph, and his experiments in that direction, he said he is doing absolutely nothing toward solving that problem. He considered it hardly worthy of attention, but he stated that photographic pictures could be sent telegraphically as readily as hand writing or diagrams, that he had accomplished this by means of an ordinary photographic negative used in the electro-chemical telegraph, and also by means of a common photograph used in the electric motorgraph.

Forging Metals by Electricity.

A committee from the Franklin Institute, Philadelphia, Pa., and a number of newspaper men lately witnessed a very interesting exhibition of forging by electricity at the factory of the Electrical Forging Co., 163 to 169 Oliver Street, Boston, Mass., which is thus described by the *Journal of Commerce* of that city. The plant of the company consists of a 60 horse power electric motor, fed from the Edison circuit, driving an alternating current generator, and a special converter in which the electro-motive force can be reduced to a very low voltage and increasing the current up to 12,000 amperes. To this converter is attached the heating apparatus, which at present consists simply of a number of bronze clamps with electrodes of peculiar design and construction, and which holds the piece to be heated. In addition there are a large number of presses, rolling machines, and like apparatus for the production of all the different articles that can be rolled or pressed from a bar of heated metal.

Interest is mostly felt, however, in the machinery that heats the metal. This is capable of giving to the piece to be heated current according to the desire of the operator, and all is within his control. A bar of wrought iron inserted in the jaws of the machine was in a few seconds at a white heat, and finally melted, dropping to the floor a liquid mass. Another piece of steel was heated, one end fastened in a vise and twisted in close spirals throughout its entire length at one heat. Other pieces wound about a mandrel formed a spiral spring at a single heat.

A three-eighths inch rod of steel was heated in a few seconds, beaten into a knife blade, ground, and inserted in a handle within a short time. A square bar of three-fourths inch iron was heated evenly throughout its length and worked into different shapes on the anvil and straightened again at a single heat. Many other interesting tests were made, all showing the rapidity with which the iron and steel can be heated by electricity and heated evenly within any limits desired.

The methods used being comparatively in the earliest stage of development, were necessarily crude, so that the exhibition, it seems to us, was of value more particularly because of the possibilities it opened up. Forging of every description may be done, from that ordinarily given to the blacksmith to work now done at the expenditure of considerable labor and time in specially prepared machines. Its capacity is limited only by the number of dies that can be made for the different articles it is intended to produce. The superiority of the method lies in the evenness with which the whole mass is heated. The blacksmith now heats the outside of his metal to a white heat, while the inside is comparatively cool. Under these conditions the outside rapidly gives off its heat and the work must again be placed in the forge to be reheated for further working. Then the metal is unevenly heated throughout, and when rolled or pressed into various shapes is entirely unreliable because of the unequal internal strains to which it is subjected by the unequal contraction of the article in cooling. In the electric method the passage of slow alternating currents heats the interior of the iron first. This even temperature is particularly valuable in the tempering of fine tools, and is absolutely necessary. It then becomes a matter of certainty instead of dependence upon the skill and judgment of a single man, probably, in a whole factory. The heating of the metal is so instantaneous that it is only in the path of the current, and the projecting ends are barely warm.

It looked little short of marvelous to see a workman hammering a bar of iron a foot long held in his bare hands, while six inches of the other end was red hot. This merely indicates how readily any desired portion can be heated without affecting the rest, simply because it has not time to conduct the heat, and also showing how free the process is from all those disagreeable things that are inseparable from the present blacksmith's forge or rolling mills. The freedom of the metal from all gases is another advantage, as it can be readily understood that when a piece is heated by a current of electricity no gases are developed, and the metal, whether it be iron, steel, brass, or composition, after having been heated by this process, is without scale, which is not possible under any other method.

The question may suggest itself as to the difference between this and the method of heating for electric welding. They are essentially different. In the well known welding process the two pieces are brought end to end like the opposite poles of an arc lamp, the imperfect contact of the two pieces concentrating the current at the point of greatest resistance, and heating that point at once to the greatest extent. As the ends are pressed together, new paths for the electricity are found until the whole or both ends are heated and forced together until welded. In the method for forging, however, the contact is as perfect as possible and heats the metal by the passage of the electricity through the metal to be heated. The process is the invention of George D. Burton, of Boston. The gentlemen from the Franklin Institute to investigate the matter were Prof. Carl Hering and Prof. Herman Hering, of the Manual Training School, Philadelphia; Prof. Pike, of the University of Pennsylvania; Mr. Billbury and Prof. Spangler.

Another Huge Blast.

According to our contemporary *Stone*, a journal in the interests of workers, users, and producers of stone, marble, and granite, published at Indianapolis, Ind., an explosion of gigantic proportions is to take place at the South Bethlehem, N. Y., stone quarry about the middle of June. The big blast of two years ago is to be not only repeated, but doubled in volume and extent. At least 50,000 tons of rock will be displaced. Mr. Callanan, the owner of the quarry, has been preparing this event since last winter, drilling going on all along the mountain face. The explosion will take place in the presence of a company of distinguished engineers, who, with a number of other invited guests, will be brought from New York and Albany by special train on the day of the blast. The explosion is expected to be unprecedented in the history of mining and blasting in this country, and will be looked forward to with interest in many quarters.

Fig. 1.—PHOTO-ENGRAVING OF A PORTION OF THE STRIP NEGATIVE OF THE KINETOGRAPH (ACTUAL SIZE).

SEA water is heavier than fresh water because of the salt dissolved in it.