A NOVEL SOLUTION OF THE PROBLEM OF TELEPHOTOGRAPHY.

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Many inventions have recently appeared for the telegraphic transmission of handwriting, drawings, and photographs. Ingenious though they be, nearly all of these devices have never passed the experimental stage, which circumstance is partly due to the extraordinary sensitiveness and complicated construction of the mechanism employed. The main difficulty met with in solving this interesting problem, however, lies in the means of obtaining and maintaining a perfect agreement between the working of the transmitting and receiving stations. In fact, an accurate reproduction cannot be obtained except by causing identical parts of the original and reproduced pictures to pass at equal times in front of a given point. On the other hand, the two picture rollers should perform their respective motions in equal intervals of time.

These difficulties, it is claimed, are successfully overcome by the "teleautocopist," an apparatus recently invented by Laurent Sémat and constructed by F. Ducretet and E. Roger of Paris. Moreover, the machine is well adapted for the transmission of musical notes, shorthand records, prints and—a matter of especial importance for the criminal police—sketches or anthropometrical data.

The roller used at the transmitting station has a larger diameter than the receiving roller. A motor which requires no superintendence is used to actuate both. Different in diameter and accordingly different in peripheral area, the rollers, nevertheless, reproduce a picture exactly the size of the original.

On the smaller roller of the transmitter (represented in Fig. 1) is wound a metal foil on which the picture to be transmitted is drawn or printed. The style which touches this foil serves to throw into the circuit the current impulses that will reproduce the picture. Whenever a conducting portion of the metal foil is struck, the circuit is closed, and on passing over an ink-coated portion the circuit is opened.

On the larger roller (at the receiving station, similar to Fig. 1) is wound a sheet of carbon paper and upon this, a sheet of ordinary paper. Assuming the difference in the peripheral areas of the two rollers to be 1/8, the reproduction of the original picture on the larger roller will take up only 7/8 of its peripheral area. The peripheral speeds of the two rollers are chosen at the opposite ratio of their peripheral areas; that is, the smaller roller performs a full revolution in 7/8 of the time of revolution of the larger one. Again, the first-named roller, after completing one revolution, is stopped and is not started again until the other roller has moved on through the disengaged eighth of its peripheral area. The process is repeated with each revolution. When starting from a given point, the two rollers are accordingly seen to pass in front of the style, at equal times through equal lengths of their peripheral area; the longitudinal displacement is identical on the two rollers in the reproduction of original dimensions. In order, however, to reproduce in a magnified or reduced size, the relative diameters and displacements of the rollers are proportionately altered.

Besides the advantages afforded by the simplicity and perfection of synchronism, the Sémat apparatus dispenses with any selenium cells and photographic views, all operations being performed in full daylight, merely by means of mechanical devices. No special knowledge is required for adjusting the apparatus, which is readily connected with any ordinary telegraph or telephone line.

The speed of transmission is easily raised to five minutes in the case of pictures measuring 7 x 12 centimeters.

The inventor, who is an official of the Egyptian railways, has recently made some successful experiments on this apparatus, at the Khedival Palace at Cairo, when the telephotographic record reproduced herewith was obtained. The apparatus was then installed at the annual exhibition of the French Physical Society and there demonstrated.

The mechanism for obtaining accurate synchronism comprises an armature which arrests a peg fixed to the transmission roller as long as its electromagnet is excited. At the receiving station is installed an interrupter, which opens the current each time it is struck by a cam rigidly connected with the roller.

As the speed of rotation of the (smaller) transmission roller is higher than that of the (larger) receiving roller, the former, after each revolution, is arrested by the armature striking the peg until the large roller (which turns at a correspondingly lower speed), by interrupting the circuit, allows the electromagnet to relieve its armature and accordingly the stop.

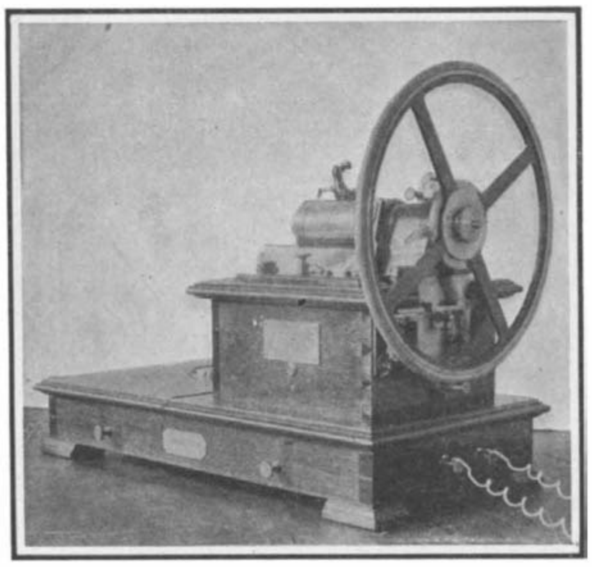

Fig. 1.—View of the transmitting apparatus, identical in appearance with the receiving apparatus.

Fig. 2.—The Egyptian Khedival insignia transmitted by the teleautocopist.

Fig. 3.—Portrait of Arago transmitted by the teleautocopist.

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Cement from Blast-Furnace Slag.

Cement is made from blast-furnace slag by various methods. Among the newer processes are the following:

Canaris Process.—The slag is granulated in a milk of lime made from freshly-slaked lime in a vessel provided with a stirrer. Two parts by weight of anhydrous lime (CaO) are employed for each 100 parts of slag.

Collosseus Process.—Slag in the fused state is treated with solutions of salts of calcium, magnesium, or aluminium. The action is twofold. The physical structure of the slag is altered and chemical changes are effected by which the injurious ingredients, especially sulphur, are made harmless and even conducive to proper setting and hardening.

Muller Process.—For certain purposes it is advantageous to substitute salts of barium or strontium for the salts of calcium, etc.

Grau Process.—A jet of dry superheated steam is projected upon fused slag in such a manner that the slag falls in the state of powder and forms a pile which is allowed to cool slowly in order to prolong the effect of the heat and steam.

The new process of Dr. Ekenberg for converting raw peat into fuel is based on the fact that after the peat has been heated in the presence of water to 150 deg. C. about 90 per cent of the water in the peat, which ordinarily cannot be separated by mechanical means, can be removed by moderate pressure. By then applying a small amount of artificial heat, a fuel free from water can be obtained.

Soaps for Removing Spots.

Many soaps sold as spot-removers are ordinary cocoanut oil soaps, and remove only the spots which are prepared for the purpose by the vender. For example, spots made by daubing cotton goods with a mixture of tar and acid can be removed with pure water, and completely disappear when washed with ordinary soap. True spot-removing soaps contain ox gall and turpentine, which can be detected by their characteristic and powerful odors, even if the soaps are scented.

A good spot-removing soap may be made by mixing 20 parts by weight of good hard white soap, in very small pieces, with 8 parts of water and 12 parts of ox gall. The mixture is allowed to stand over night and is then heated gently until solution is complete. The heating is continued a little longer, in order to evaporate some of the water, and 1/2 part of oil of turpentine and 1/4 part of benzine are stirred in, after the vessel has been removed from the fire. The still liquid soap is then colored with a little ultramarine green, dissolved in ammonia, and is poured into molds, which are at once covered.

The following process is also recommended, but it requires some care, as the soap is easily separated by agitation, especially if the ox gall is not fresh. In a vessel heated on a water bath, 28 parts by weight of cocoanut oil are thoroughly incorporated with 5 parts of talc or fuller's earth, 1/10 part of brilliant green and 1/50 part of ultramarine green. The mixture is allowed to cool to 90 deg. F.; 14 parts by weight of lye of a strength of 38 Baumé are then added and, after saponification is completed, 5 parts of ox gall are stirred in. If any separation takes place, the vessel is closely covered and heated on the water bath until the mixture becomes uniform. Finally 1/4 part of turpentine and about 8 parts of benzine are added and the soap is poured into molds.

Natural Synthesis.

In an address to the chemical congress recently held in London, Prof. Paterno, of Rome, called attention to the evolution which is taking place in the synthetical processes employed in the commercial production of organic chemical compounds. There is a tendency to substitute, for the crude, tedious, and complex methods hitherto used, processes of an entirely different character, in which the desired chemical changes are effected at ordinary temperatures, without the employment of violent reagents. As chemical science develops it allows an approximation to the ideally perfect methods of synthesis by which nature produces vast quantities of compounds in infinite variety. Duclaux has wittily rallied those chemists of to-day whose ambition and efforts are wholly directed to the comparatively easy production of new compounds, even if these compounds serve no other purpose than to enlarge dictionaries of chemistry. Manufacturing chemists will assuredly discover and utilize new and more natural methods of synthesis. The researches of the past half century in connection with ferments, microbes, toxines, diastases, catalyzers and the colloidal state of matter have indicated very interesting possible applications of these agencies to the processes of technology. Some of these agencies have long been known. Many kinds of fermentation, for example, have been utilized from time immemorial, but the mechanism of their action was unknown. Now that it is better understood it is safe to predict that the practical employment of that action in chemical synthesis will soon follow. Very important applications of this newly acquired knowledge of biological chemistry have already been made. Yeast, which only converts sugar into alcohol and carbon dioxide, has been, to some extent, displaced by mold fungi, which also convert starch into sugar. Agricultural experiments have demonstrated the great fertilizing power of infinitesimal quantities of catalyzers, and a new and valuable method of saponification has been devised by Dr. Nicloux.

Electrical illumination will be a great feature of the Hudson-Fulton Celebration from September 25th to October 9th. Over a million incandescent lamps, 10,000 arc lamps, and searchlights aggregating 1,800,000 candle-power will be used in addition to the regular lighting of the city in New York alone, not to mention the illumination of the Jersey shore and numerous special advertising signs.