A New Method of Television

By W. G. WALTON

Below is given a description of the newest method of transmitting photographs by radio or wire at such a speed as to enable the distant envisioning of transpiring events.

MR. W. G. WALTON, in the interest of scientific progress, has kindly given an interview for RADIO NEWS in which he explains the great difficulties in accomplishing the "Radio Movie," the ultimate object of his research. Both he and Mr. W. S. Stephenson, of the General Radio Company, London, have done a great deal of research work in the matter of the transmission of pictures by radio, and have made some highly interesting discoveries.

WHAT HAS BEEN DONE

"For a matter of 30 to 40 years attempts to transmit pictures by electrical means have been made, and the advent of the motion picture led to dreams of transmitting pictures at such a speed that a motion picture effect could be produced," Mr. Walton said.

"The light sensitive device has been, and still is, the greatest source of our troubles. Selenium cells have the disadvantage of slow action and lag, while photo-electric cells, though faster, give only very minute currents which need amplifying by many stages of resistance coupled vacuum tube amplifiers. Neither of these devices is a desirable feature of commercial apparatus. The time required by the fastest apparatus is too long. To be an entire success, apparatus must be faster and such that it can be used at a moment's notice without many adjustments, and the reception of a reasonable picture must be a certainty.

"Television or the radio movie," he continued, "is the transmission and reception of pictures by electricity in such rapid succession that a motion picture effect is obtained. Apparatus for this purpose is generally the same as that used in the transmission of photographs, but operating at a much greater speed."

ONE METHOD

One of the methods is to traverse the picture in lines by optical arrangements and transmitting impulses, the strength of which depends on the intensity of the small sections of these lines as they are shown in succession on a light sensitive device.

At the receiving end a beam of light varied in intensity by a shutter actuated by the impulses received from the transmitting end is traversed over a screen by an optical arrangement similar to that used at the transmitting end. Everything depends upon the rate at which the light sensitive device can respond and also the light controlled shutter at the receiving end. This refers to schemes using one cell.

MILLIONS OF DOTS

Before difficulties in the way of television can be appreciated, the number of dots necessary to produce a reasonable picture must be known. Television to be a complete success must have almost as good a definition as the standard motion picture. With a picture of one square foot consisting of a million dots and held a foot away from the eye, an average person will be able to distinguish the dots. Such a picture will give good detail of a town or landscape view.

SPEED

Motion pictures are shown at the rate of 16 per second. Taking this as the rate at which complete pictures must be repeated by television apparatus, our light sensitive device in single cell methods has to respond to 18,000,000 different impulses per second, and so must the light control shutters. This is, of course, putting the problem at its worst. Some investigators have stated that 300,000 (an enormous difference) will suffice. Allowing that the number of complete pictures is 10 per second, our picture consists of 30,000 dots, 150 lines of 200 dots each. Take any magazine or newspaper picture and mark off 30,000, the picture within this area can hardly be said to have good detail, certainly not in a landscape or incident picture.

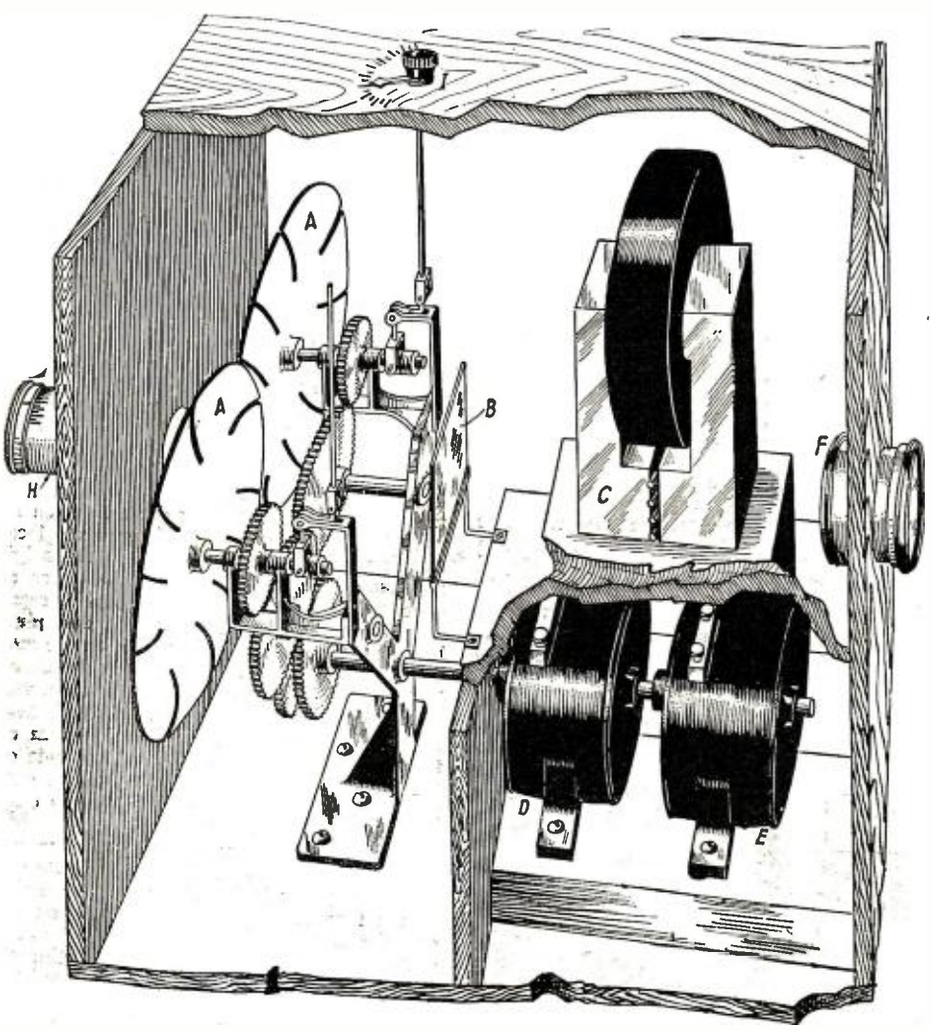
We are striving to produce something as good as the motion picture, and though 18,000,000 per second is high, it is a good ideal to aim at. Light sensitive devices as used up to the present time have not been able to respond to anything like such a speed.

"Mr. W. S. Stephenson and I," Mr. Walton continued, "have done a considerable amount of research work. In an endeavor to discover something much faster, we tried the possibilities of vacuum tubes to see if light would affect a stream of electrons by bending the stream or otherwise producing some action. Results were doubtful, masked by other things such as light from the filaments.

"Although we have not abandoned this idea, we are trying another line of investigation which shows great possibilities. We have hopes of producing a light sensitive arrangement with a reverse effect, so that an extremely rapid shutter will not be required at the receiving end."

HETERODYNING WAVE-LENGTHS

Light waves are electro-magnetic in nature, differing from radio waves only as regards wave-length, though the difference is great. Our endeavor is to convert light frequencies into radio frequencies by an action similar to heterodyning (super imposing one wave-length on another) in several steps. The radio frequency thus produced is, after amplification, transmitted direct without modulating a carrier wave. The possibility is now apparent. A picture consisting of light waves is converted into an invisible picture of radio waves which, after amplification and reconversion at the receiving end, produces a visible image on the screen. As just described, the trouble is in sorting out the waves and putting them in their respective positions at the receiving end. But if the picture at the sending end is split into sections, and each section has a frequency of its own, then the rearrangement at the receiving end is only a matter of reversing the operations which took place at the transmitter.



The reproducing apparatus which recreates the image transmitted to it by the sender.