OPTICS

Still Views with Depth Effect Projected for First Time

Method is Theoretically Applicable to Movies But Cost Would be Very Great, Dr. Ives Tells Optical Society

NO SUCCESSFUL means of projecting stereoscopic movies, without requiring some sort of mask or goggles before the observer's eyes, has yet been invented, but members of the Optical Society of America, meeting at the University of Virginia, last week, saw for the first time a method of doing it with still pictures. Dr. Herbert E. Ives, of the Bell Telephone Laboratories, under whose direction their work in television has been carried out, demonstrated the method, which is his invention.

Even with still picture projection, the apparatus used here was very crude and projected small pictures, visible to only a few at a time. However, Dr. Ives pointed out, the methods used are capable of refinement. But he held out no hope of true stereoscopic movies by such means in the near future.

"These methods are theoretically applicable to the projection of motion pictures in relief," he said. "The complexity and cost of apparatus for satisfactory motion picture projection would, however, be very great."

Started With Father's Invention

Dr. Ives' method traces its ancestry to an invention of his father, Frederic E. Ives, inventor of the half-tone process used to reproduce photographs in newspapers and magazines. This was called the parallax stereogram. As with ordinary stereo pictures, intended to be viewed in the double lens stereoscope, two pictures were made from two viewpoints, separated approximately the distance between the two eyes. These were both printed on a glass transparency consisting of fine vertical strips, so that every alternate strip presented the view seen from one point and the intermediate ones the other. A grating consisting of opaque and clear strips the same width was carefully adjusted and fixed just in front of the picture. Then, when looked at from the correct position, this grating covered one set of strips for the right eye and the other for the left, so the picture stood out in full relief.

Dr. Ives a few years ago elaborated this and made what he called the parallax panoramogram, a device which was invented independently by Dr. C. W. Kanolt, formerly of the Bureau of Standards. This was taken with a special form of moving camera. The result was a picture made up of strips, but each strip consisted of a minute panorama of that part of the subject, from a number of viewpoints. This was viewed through a grating, in which the clear strips were much narrower than the opaque ones, so that when viewing the picture from any direction the eye saw the parts photographed from a similar direction. When looked at with two eyes, each saw the proper part and stereoscopic relief was obtained. The advantage of this was that the picture did not need to be viewed from a certain angle.

Improvements

Dr. Ives has now developed this further. In one method he replaces the grating with a film on which are embossed narrow vertical ribs, like those used for amateur color motion picture film. The ribs act as cylindrical lenses, directing the light the same way as the clear strips in the grating, but are not as wasteful of light. Another improvement is obtained with this film to produce a stereoscopic picture that does not need to be viewed with the light behind, but can be handled like an ordinary photograph.

For projection, Dr. Ives has worked out two methods, both of which he demonstrated. In one, the screen is made up of a series of vertical glass rods, each designed so that the light is reflected back in the same way that it came. A battery of many lanterns all project on this screen, each projecting a view of the original subject made from a particular angle. Each picture can be seen from only one direction, so each eye sees its proper picture, but for satisfactory results an enormous number of separate projectors would be needed.

The other method is to use a screen of rods, so shaped that when viewed, one sees only light from a very narrow strip on the back. By means of a very accurate lens, a parallax panoramogram, as used for the smaller pictures, is projected on the back of this screen, and the strips of the pictures registered with those of the screen with great precision. Then, when viewed from the front, the audience sees a stereoscopic picture. Neither method is practicable for motion pictures under present conditions, because of the large number of separate films and projectors that would be required for the first and the extraordinarily great accuracy needed in the projection of the second.

Other Developments

Television from color movie film, with all the colors reproduced; a method of securing television reproduction of fine detail without the use of extraordinarily wide frequency bands, either by radio or wire; and improved reproduction of color values in two way television; these are other late advances described by Dr. Ives.

The transmission of color movie film is done with the Kodacolor process, used in amateur 16 millimeter movie cameras. In this process a series of minute ridges running the length of the film yields a positive film in which the image is made up of a series of fine horizontal lines. The position of these lines with respect to the ridges determines the color which they show on the screen. This is because the ridges act as cylindrical lenses and direct the light for the screen picture through one or more of three vertical color filters placed before the lens.

For the television arrangement, a scanning disc, with a series of fine holes, rotates in front of the film as it moves in front of a light. Then a lens projects the image on to three photoelectric cells side by side. No color filters are used, but the cells are arranged so that one picks up the red image, one the green and one the blue. In the television receiver, which is the same as that used in previous experiments in transmitting color images from real subjects, the current from each of these cells is fed into a glow lamp which reproduces the original color. The light from these three lamps is combined, and so the eye sees the reproduced image in full color.

Science News Letter, November 8, 1930