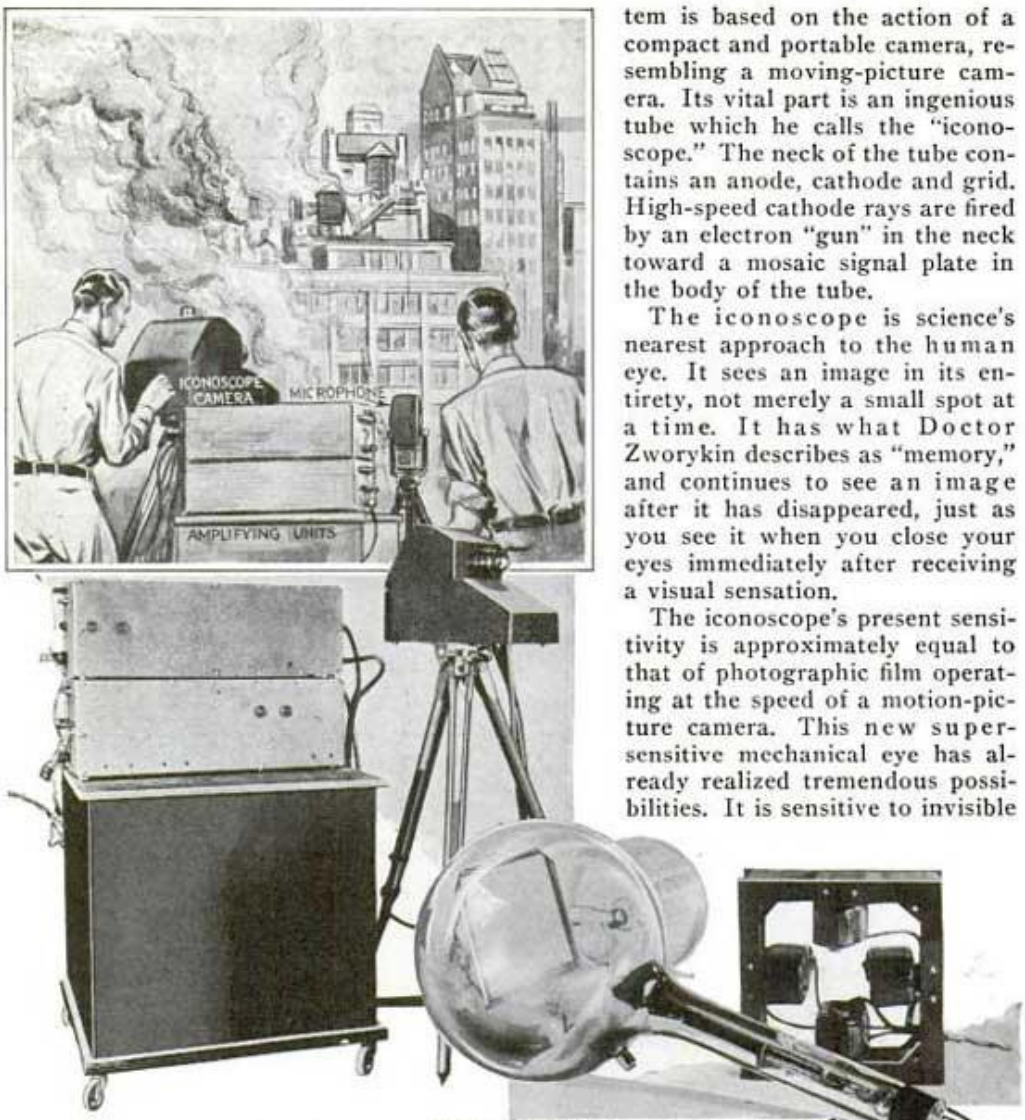


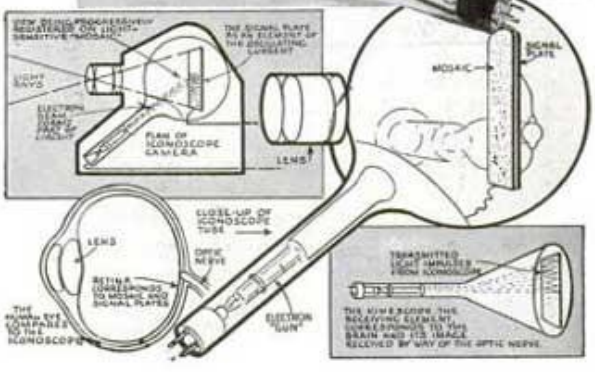
tem is based on the action of a compact and portable camera, resembling a moving-picture camera. Its vital part is an ingenious tube which he calls the "iconoscope." The neck of the tube contains an anode, cathode and grid. High-speed cathode rays are fired by an electron "gun" in the neck toward a mosaic signal plate in the body of the tube.

The iconoscope is science's nearest approach to the human eye. It sees an image in its entirety, not merely a small spot at a time. It has what Doctor Zworykin describes as "memory," and continues to see an image after it has disappeared, just as you see it when you close your eyes immediately after receiving a visual sensation.

The iconoscope's present sensitivity is approximately equal to that of photographic film operating at the speed of a motion-picture camera. This new supersensitive mechanical eye has already realized tremendous possibilities. It is sensitive to invisible ment. Television itself still may be imperfect, but it now stands on a sure footing.

The recent advance of the television art is best explained by a comparison between the old mechanical scanning system and the mosaic system. The latter realizes an actual ten-per-cent efficiency in the reproduction of images. But at the same time, this ten per cent represents an efficiency 7,000 times greater than the mechanical system formerly used.

Doctor Zworykin's mosaic sys-



Above, Iconoscope Camera and Amplifying Unit; Below, Iconoscope Vacuum Tube and Diagram Showing Operation

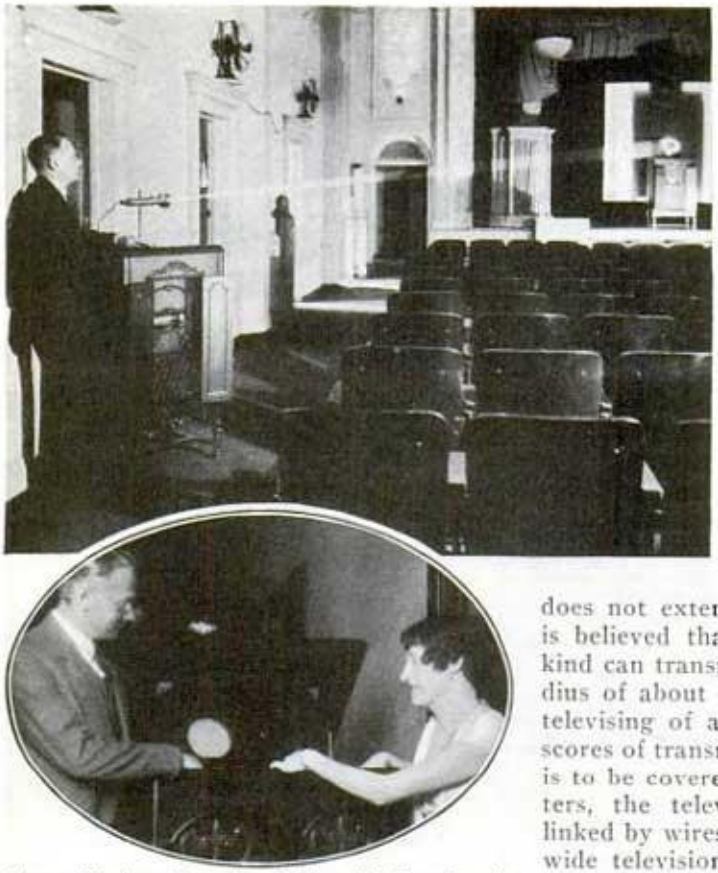
light waves, such as ultra-violet, and infra-red. One immediate possibility is its use as an ultra-vision device for seeing what is not visible to the human eye even through a microscope. Thus it is expected that we shall soon reveal many mysterious and microscopic reactions and processes which have heretofore escaped our notice. The range of man's eyesight is likely to be widened so that he can peer into and record nature's darkest secrets.

The iconoscope's military value is incalculable. It places in the hands of combatants an instrument for seeing enemy maneuvers carried out under cover of darkness. The portable television camera makes it possible for an aviator to fly over enemy lines at night and visualize the secret maneuvers for his superior officers stationed behind the lines. Television camera lenses secreted at strategic points would give commanding officers a constant graphic description of operations in no man's land at night.

Top, How "Mosaic" Television Can Be Used in War; Center, Booster Station Plan; Below, Using with Microscope to See Tiny Objects in Motion

The heart of the iconoscope is a device corresponding to the millions of rods and cones behind the human retina. This device, a signal plate, is a sheet of mica, four by five inches, which is the host to 3,000,000 photo-cells, or electric eyes. Each cell in this mosaic is microscopic, 10,000 of them occupy only one square centimeter. All 3,000,000 of these photo-cells are contained in a vacuum tube whose bulb is eight inches in diameter.

The iconoscope is the chief part in the



Above, Showing How Speech May Be Transformed into Beam of Light, Transmitted to Photo-Electric Cell and Converted Back to Original Form; Below, Demonstrating Cathode-Ray Television Set

scheme of transmission; the chief part of the receiving end is the kinescope. The iconoscope corresponds to the human eye; the kinescope is the brain. Both these devices have cathode-ray tubes which fire powerful beams of electrons. In the transmitting end the cathode rays are fired against 3,000,000 photo-cells which convert this energy into short radio waves which are broadcast; in the receiving end the cathode rays are fired against a fluorescent screen which shows us the moving image. Simply the system does this—it converts a moving picture at the transmitting end into radio waves which are turned back into a moving picture at the receiving end.

The whole apparatus is decidedly simple; merely a portable cathode-ray camera and a pair of boxes containing the amplifiers at the transmitting end; and a small simplified radio receiver and amplifier at the receiving end. According to Doctor Zworykin, the immediate future of television will be separate from sound broadcasting. The present broadcasting band from 200 to 550 meters is impractical for television. Television broadcasting and its associated sounds will probably occupy waves about six meters long. In the ultra-short wave spectrum many thousands of television transmitters could be operated simultaneously without interference.

But the range of ultra-short television waves does not extend beyond the horizon. It is believed that one transmitter of this kind can transmit clear images over a radius of about sixty miles; therefore, the televising of a single event may require scores of transmitters if the whole country is to be covered. Unlike sound transmitters, the television stations cannot be linked by wires. This complicates nation-wide television broadcasting. It may be necessary to have convenient repeating stations at numerous points.

Two separate systems of broadcasting are now contemplated. The sound and television systems will probably parallel each other on radio waves far apart. For complete sound and sight reception each home will have two receivers, one for sound and the other for television. Subsequently it will undoubtedly become possible to harmonize and join the sound and sight system into one. In the beginning, moving-picture films will probably play a large role in the television art. The present television apparatus is admirably suited for broadcasting from celluloid images.

Doctor Zworykin now is trying to perfect a television camera that will operate in darkness, making it possible to televise scenes in dark streets, auditoriums, studios and theaters. Although the present television receiving set projects an image on a relatively small space, it has much greater possibilities. The definition is so

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"MOSAIC" TELEVISION FOR THE HOME

(Continued from page 324)

sharp and clear that images can be enlarged to the size of a moving-picture screen. The room does not have to be dark to see the images, and bright, glaring lights are not necessary at the transmitting end. Doctor Zworykin's television camera operates in broad daylight.

Doctor Zworykin states that the mosaic system which he has devised can transmit television images in colors, if a wider transmitting band is used. He also sees the possibility of televising the front pages of important newspapers and transmitting them to other cities where matrices can be made and placed on rotary presses.

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