July 1, 1930. F. R. TANIMOTO 1,769,608

TELEVISION DEVICE

Filed Sept. 1, 1928 5 Sheets-Sheet 1

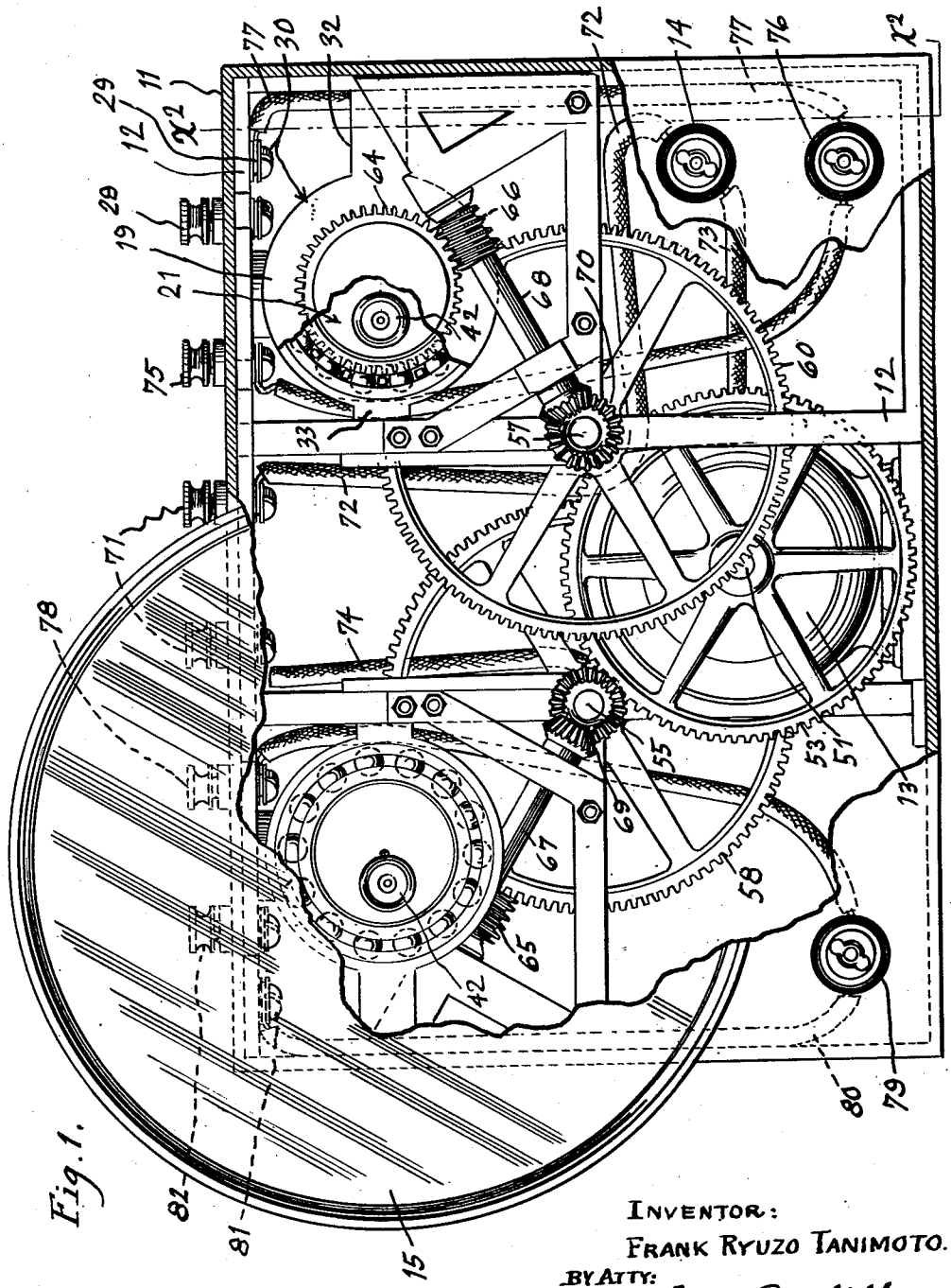


Fig. 1.

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TELEVISION DEVICE

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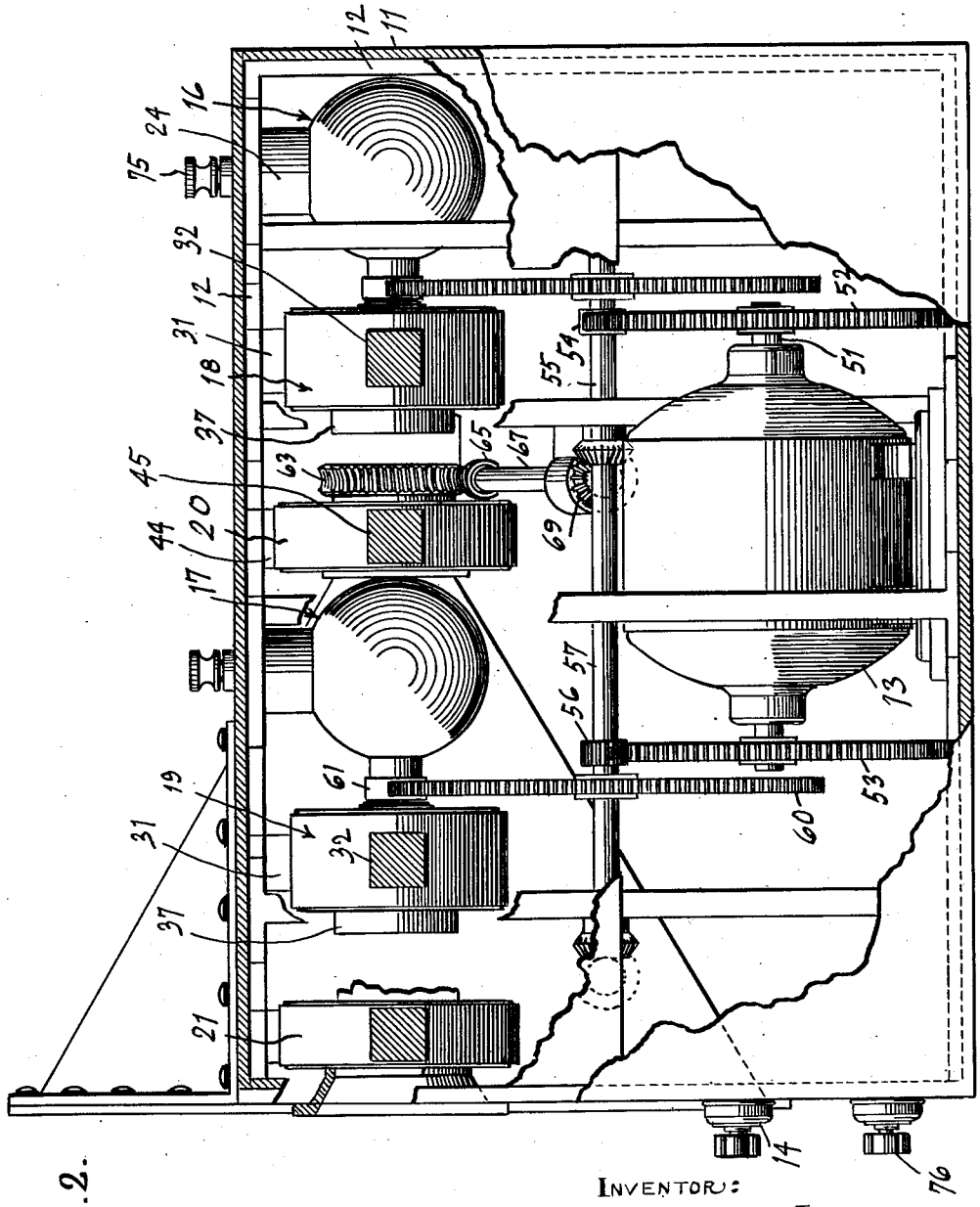


Fig. 2.

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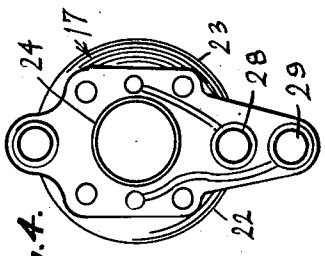


Fig. 4.

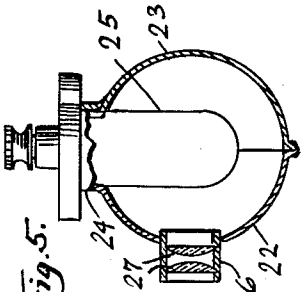


Fig. 5.

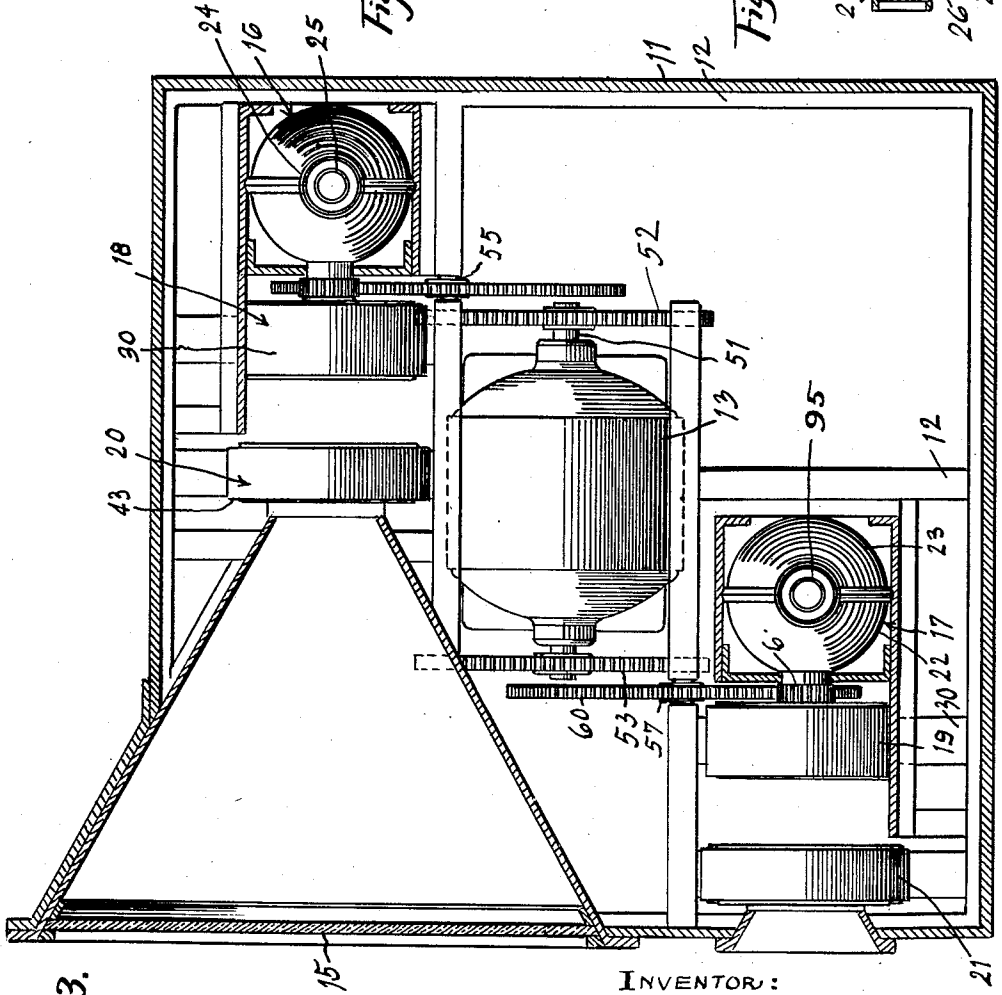


Fig. 3.

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TELEVISION DEVICE

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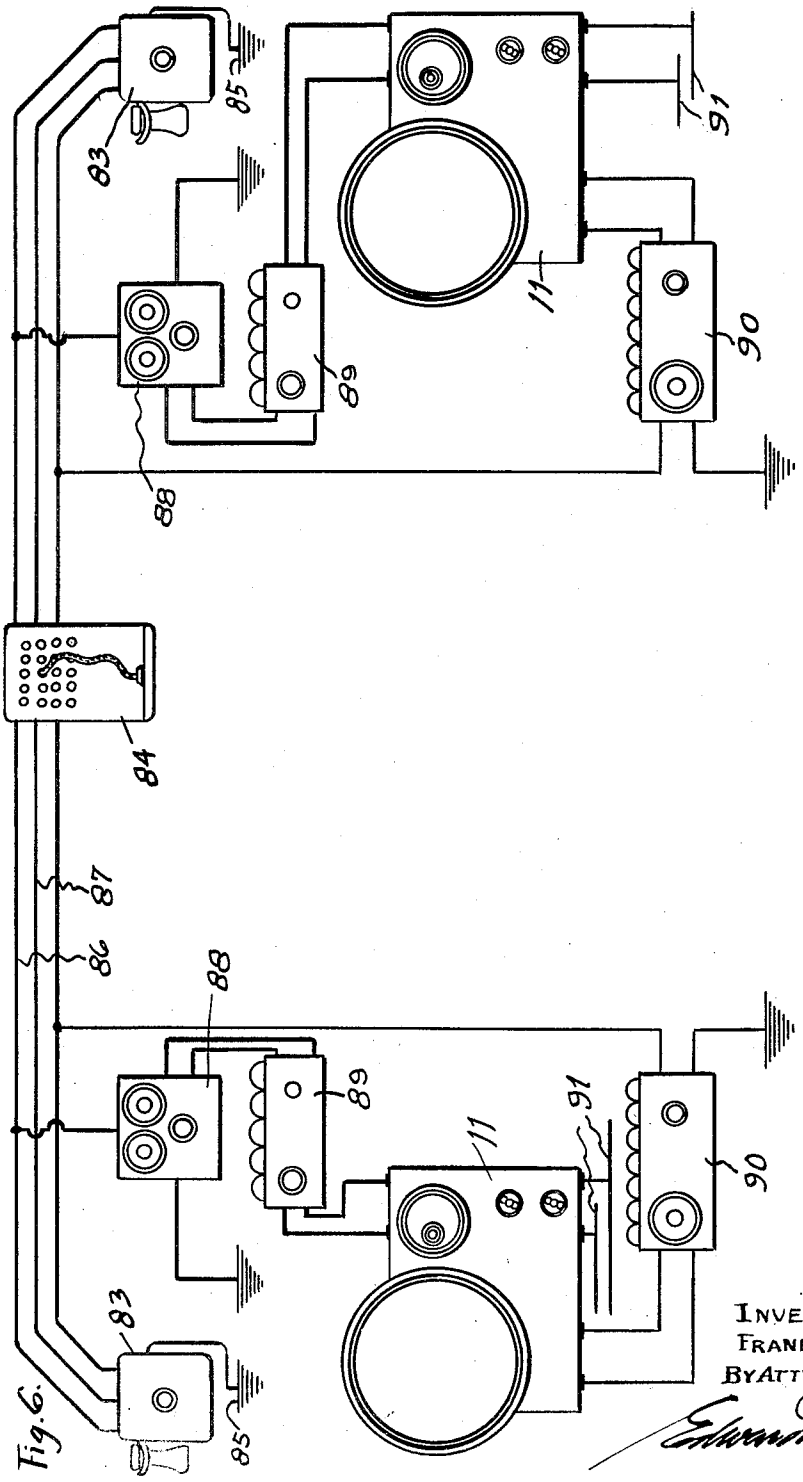


Fig. 6.

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TELEVISION DEVICE

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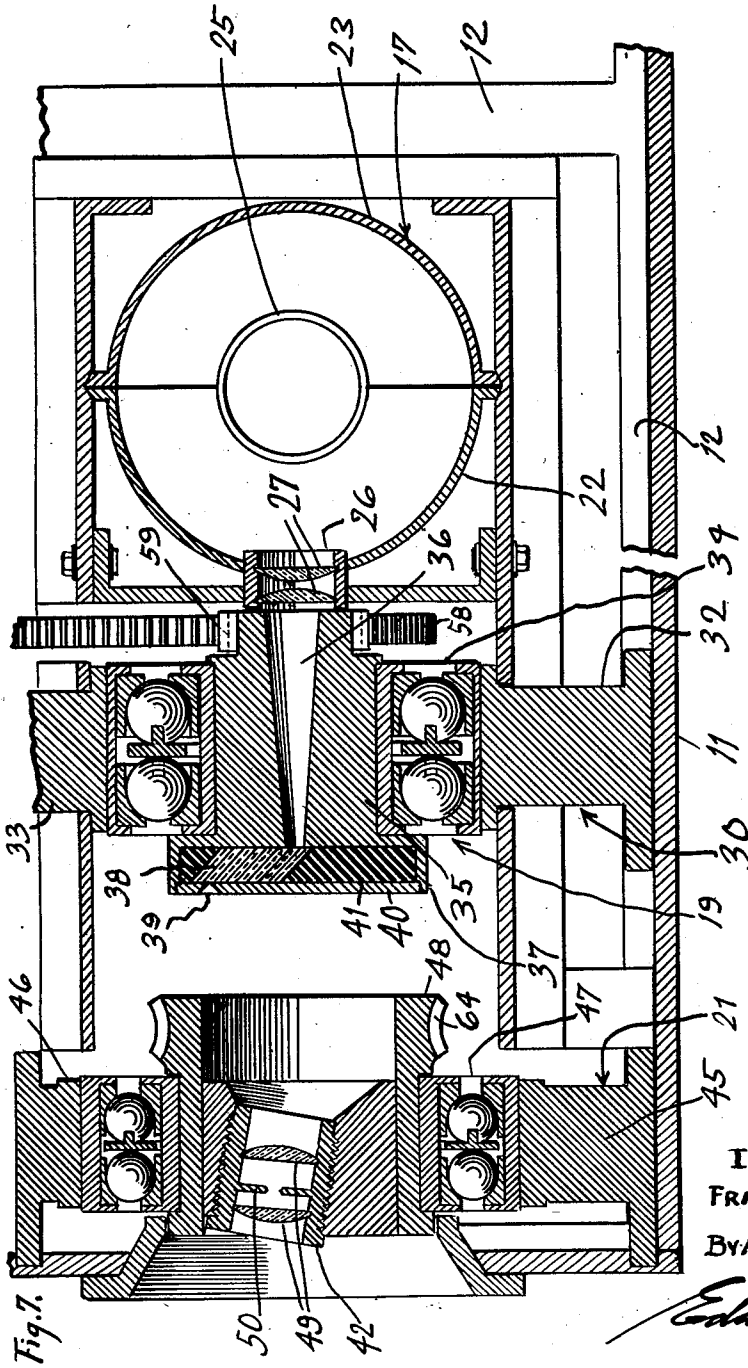


Fig. 7.

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Patented July 1, 1930 1,769,608

UNITED STATES PATENT OFFICE

FRANK RYUZO TANIMOTO, OF LOS ANGELES, CALIFORNIA

TELEVISION DEVICE

Application filed September 1, 1928. Serial No. 303,587.

This invention relates to television devices adapted for use with a telephone system, or any suitable radio or other transmitting system.

The object of this invention is to provide elements capable of transforming electrical impulses, either, radio, wireless, wire, or wire-wireless, into light, whereby actual images or pictures are produced so that they may be seen by the operator at the distant station on a line, to reproduce objects in motion, and to reproduce pictures and images with a natural appearance at the receiving station.

Other objects are to provide television apparatus that will take in a larger field of view, that will make the projected image appear more solid like and clear, to provide transmitting and receiving sets in one housing, and means for cutting out either set independently of the other.

The drawings illustrate a form of the invention which I have so far found to be the most practical for accomplishing the objects of the invention, but the device is susceptible of modifications, and I reserve the right to make minor changes and alterations that may fall within the scope of the appended claims.

In the drawings, Figure 1 is a front elevation of the device, a part of the casing being broken away to show the operative mechanism. Fig. 2 is a longitudinal sectional elevation of the device, taken on line X^2—X^2, of Fig. 1, certain of the parts being omitted. Fig. 3 is a plan and sectional view of the device, certain of the parts being omitted. Fig. 4 is a top plan view of a tube socket. Fig. 5 is a sectional elevation of a neon tube socket. Fig. 6 is a wiring diagram showing the method of connecting up the device with a three wire telephone system. Fig. 7 is an enlarged detail and sectional view of the operative parts.

Referring to the drawings, the television device consists of a housing 11, a frame 12 within the housing, an electric motor 13, a switch 14 for the motor, a ground glass screen 15 on which the picture or image received is projected, television devices 16 and 17, serving to transform electric impulses to light, and light to electric impulses, and mechanism whereby the motor imparts operative movement to the remaining television devices, which include impressing cylinders 18 and 19, and projecting cylinders 20 and 21.

Devices 16 and 17 are substantially alike in structure, each having a reflector consisting of two hemispherical members 22 and 23, having silvered inner walls, and arranged to admit the sockets 24. The socket in device 16, has a neon lamp 25, and the socket in device 17 has a photo-electric cell 95. The reflector member 22, has mounted therein a lens holder 26, containing the lens 27. The socket 24 has a binding post 28 and a binding screw 29, for attachment of wire conductors.

The impressing cylinders 18 and 19, each include a frame 30, having supporting brackets 31, 32 and 33, which are connected to frame 12, thereby protecting the frame from vibration while the rotary parts are moving at high speed. I provide ball-bearing member 34 in frame 30, and in which is mounted the revoluble and tubular impressing cylinder 35, having a hollow conical bore 36 in axial alignment with lens 27. Cylinder 35 has an integral prism housing 37, in which is mounted a rhombic prism 38, to refract the light so that it will pass through aperture 39, in cover 40, of the prism housing. Prism 38 is retained in position by suitable packing 41, of wood, fiber, or other compound, preventing breaking of the prism during the very high revolution of the impressing cylinder.

For projecting the image or picture, I provide a projecting cylinder 20, including a frame 43, supported by integral brackets 44, 45 and 46, connected to frame 12, thereby protecting the parts from vibration. Ball-bearing member 47 is mounted in frame 43, and has revolubly mounted therein the rotatable lens holder 48, adapted to carry a suitable projecting lens socket. The projection lens case 42, is eccentrically inserted in member 48, and contains the projecting lens 49 and diaphragm 50. The image or picture formed by the projecting lens 49, is thrown upon the

ground glass screen 15, in the front wall of the housing. The revoluble projecting cylinder 21 is similarly constructed, but the lens therein is adapted to scan the object which is to be reproduced in the distant television device.

For actuating the impressing cylinders and projecting cylinders, I provide an electric motor 13, provided with a shaft 51, on which are mounted the spur gear wheels 52 and 53. Spur gear wheel 52 drives pinion 54, on a countershaft 55, and gear wheel 53 drives pinion 56, on a countershaft 57. Countershaft 55 has mounted thereon a gear wheel 58, adapted to drive gear pinion 59, integral with impressing cylinder rotatable member 35, and countershaft 57, has mounted thereon a gear wheel 60, adapted to drive gear pinion 61, integral with impressing cylinder rotatable member 62. The projecting cylinder members have integral worm gears 63 and 64, driven respectively, by worm pinions 65 and 66, respectively on shafts 67 and 68, driven respectively, by miter gears 69 and 70. The projecting cylinders are rotated by the gear mechanism at a high speed of revolution, and the impressing cylinders are rotated at a much higher speed of revolution. Binding posts 71, are provided for the motor, there being an electric conductor wire 72, leading from a binding post 71, to switch 14, a wire 73, leading from switch 14 to the motor, and a wire 74, from the motor to the remaining binding post 71.

For energizing the photo-cell, I provide a binding post 75, and a wire leading therefrom to switch 76, a wire 77, from switch 76 to binding screw 29. The energizing current then passes to the photo-cell and thence to the binding post 28. This circuit controls the cell 17. The neon lamp 16 is controlled in a similar manner, for which I provide binding post 78, and a wire leading therefrom to switch 79, a wire 80, from switch 79 to a binding screw 81, the circuit continuing through the neon lamp and thence to binding post 82. Each energizing circuit for an electric cell, is independently controlled by a switch, allowing the operator to cut out either the receiving or transmitting elements, or both.

Referring to the diagram as shown in Fig. 6, the television device is shown in connection with a telephone system, and includes telephones 83, switch board 84, ground connections 85, for the telephones, and line wires 86 and 87. The television apparatus includes the radio transmitters 88, the amplifiers 89 for the transmitters, the amplifiers 90, for the receivers, and the television devices which form the subject of this invention. The motor is energized by terminals 91, from a source of electric energy.

In use, the motors of the transmitting and receiving devices are started in motion. Assuming an object to be in front of the television device, the transmitting lens will scan the object or picture to be transmitted, and will project the light therefrom to the adjacent impressing cylinder. The projected light is then passed through the very small aperture and thence through the adjacent cylinder prism, where it is transposed and projected through the conical chamber and into the lens of the adjacent photo-electric cell. Through the action of the light on this photo-electric cell, there is generated electrical impulses, which pass to power amplifier 89, and then projected, as shown in the present instance, by wire 92, to a distant receiving television device. The receiving elements are the same as the transmitting elements, with the exception that the incoming electric impulses are passed to the neon lamp, which transforms them into light, which is projected to the adjacent impressing cylinder, thence to the adjacent projecting cylinder, and thence onto the ground glass screen. The distant object, either still or moving, is therefore reproduced on screen 15.

By substituting a suitable projecting lens for the glass screen as shown, the device may be used for projecting motion pictures on a much larger screen. All supporting elements are of relatively thick metal, to attain precision of operation and effective results.

This device may be used in combination with a telephone exchange system, or with radio, wireless, wire-wireless, three wire phone system, two wire telephone system, or other suitable electrical transmitting means. In any wire system, the television devices operate, and do not interfere with the working of the telephone system.

What is claimed is:

1. In a television device, the combination with a frame, of an impressing cylinder operatively mounted therein, means for actuating the impressing cylinder with a high speed of rotary movement, a reflector at one end of the impressing cylinder and arranged to project light fluctuations into the cylinder, means within the reflector for translating electric energy into light and light into electric energy, a projecting and rotatable lens analyzer at the opposite end of the impressing cylinder, means for actuating the rotatable lens analyzer with a relatively slower speed of rotary movement, projecting lens mounted in the rotatable lens analyzer, said projecting lens having inclined and eccentric axis, and a projecting screen mounted in the wall of the housing and in axial alignment with the projecting and rotatable lens analyzer and impressing cylinders.

2. In a television device, the combination with a frame and a housing enclosing the frame, of an impressing cylinder operatively mounted within the frame, a reflector adjacent to and an axial alignment with the im-

pressing cylinder, a neon lamp within the reflector, lens mounted in the reflector and projecting light into the impressing cylinder, prisms mounted in the impressing cylinder and in the path of the projected light, and serving to transpose the light to a path eccentric with the axis of the impressing cylinder, a cover for the impressing cylinder having a minute aperture therein, said light being deflected through said aperture, a rotatable lens analyzer operatively mounted and in axial alignment with the impressing cylinder, a lens socket disposed in the rotatable lens analyzer and having its axis inclined relative to the axis of the rotatable lens analyzer, said socket being disposed eccentrically relative to the axis of the rotatable lens analyzer, two projecting lens mounted in the lens socket, a ground glass screen mounted in the housing and in axial alignment with the rotatable lens analyzer and impressing cylinder, and means for actuating the impressing cylinder and rotatable lens analizer with different speeds of revolution, the cylinder having the greater speed of revolution.

3. In a television device, the combination with a rotatable projecting lens analyzer, of a lens socket mounted in the rotatable lens analyzer, and having its axis inclined relative to the axis of the lens analyzer, a rotatable impressing cylinder disposed adjacent to and in alignment with the rotatable lens analyzer and having therein a conical chamber concentric with its axis, a prism housing integral with the rotatable impressing cylinder, a rhombic prism mounted in the prism housing, a cover for the housing having an eccentrically disposed and small aperture, said prism transposing the light from said small aperture to the said conical chamber, a photo-electric cell container adjacent to the impressing cylinder, a photo electric cell in the photo-electric cell container, lens in the photo-electric cell container in alignment with the conical chamber, and means for connecting the photo-electric cell with transmitting means, and means for actuating the impressing cylinder and rotatable lens analyzer with rotary movement.

4. In a television device, the combination with transmitting and receiving apparatus, each of which consists of a rotatable lens analyzer, a lens socket mounted in the rotatable lens analyzer, and having its axis inclined relative to the axis of the lens analyzer, and having its axis eccentrically disposed relative to the axis of the lens analyzer, a rotatable impressing cylinder adjacent to the rotatable lens analyzer, an eccentric aperture in the impressing cylinder, a conical and concentric chamber in the impressing cylinder, a rhombic prism transposing light from the said aperture to said conical chamber, of an electric motor adjacent to the said receiving and transmitting apparatus, gear transmissions whereby the impressing cylinders are actuated by the motor, and the rotatable lens analyzers are actuated by the motor, a photo electric cell adjacent to and in alignment with the impressing cylinder of the transmitting apparatus, and a neon lamp adjacent to and in alignment with the receiving apparatus and its impressing cylinder.

In testimony whereof, I hereunto affix my signature.

FRANK RYUZO TANIMOTO.