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C. H. WYSS, JR

2,367,816

RADIANT ENERGY RECEIVING DEVICE

Filed Oct. 1, 1941

FIG. 1

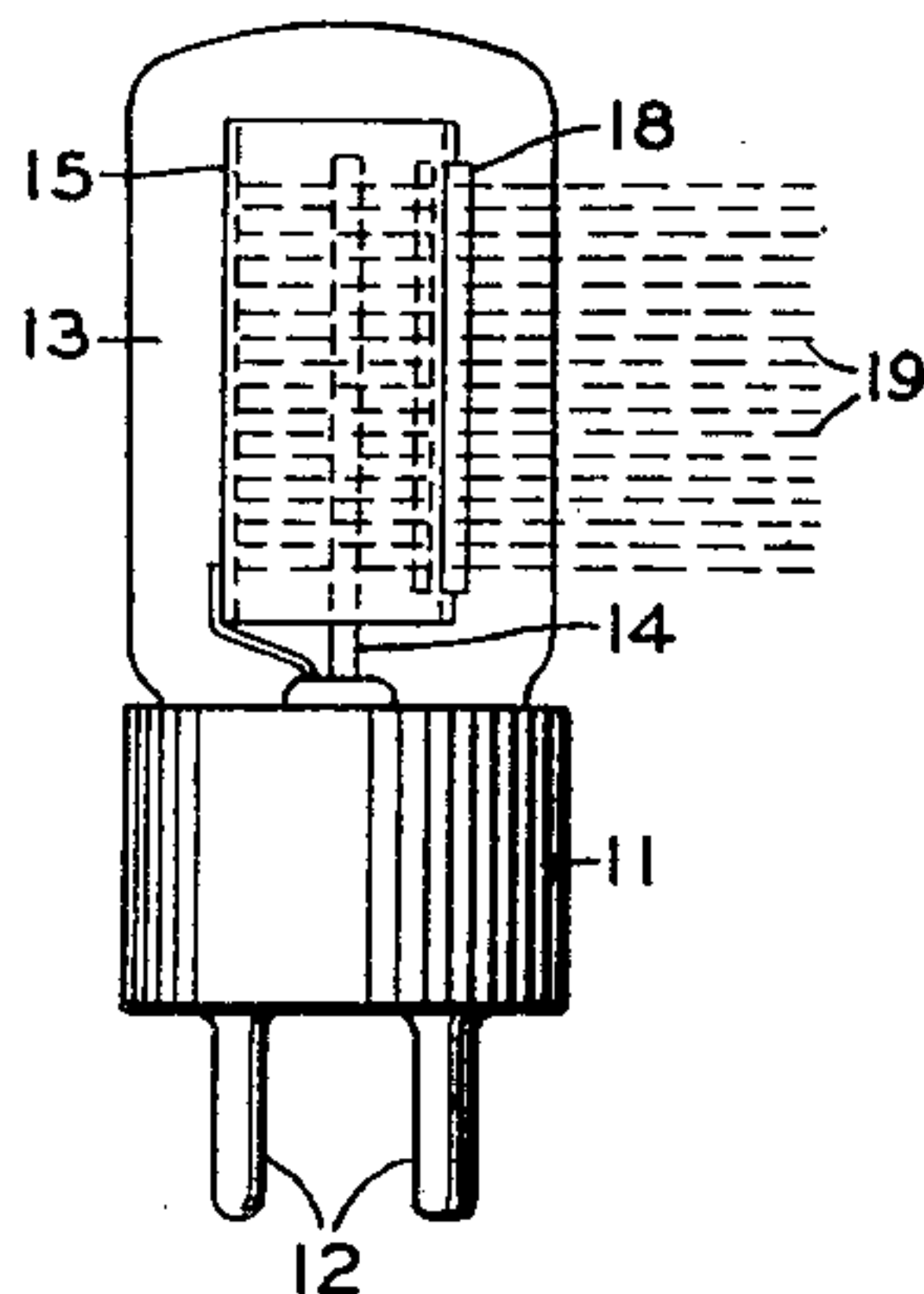


FIG. 3

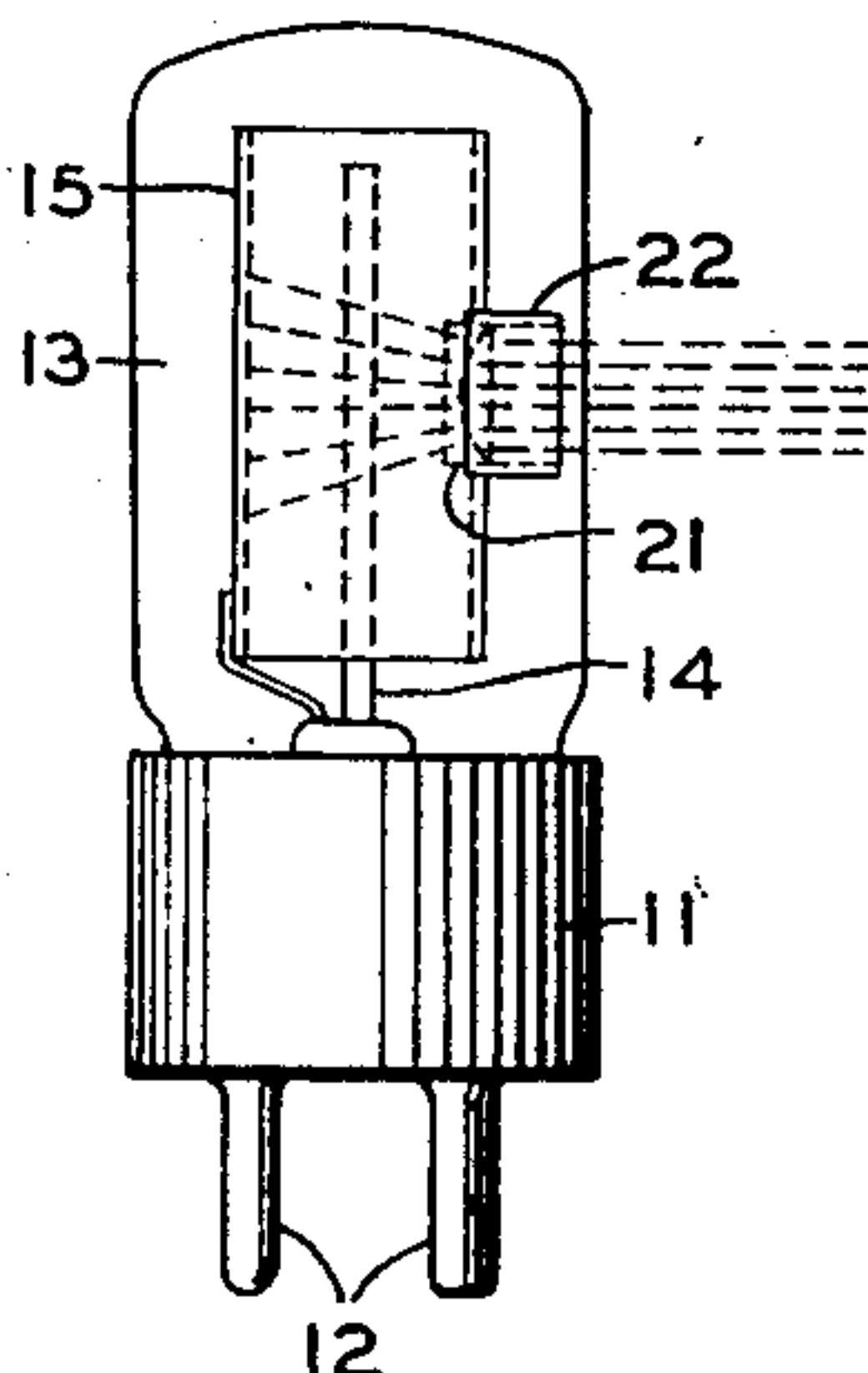


FIG. 5

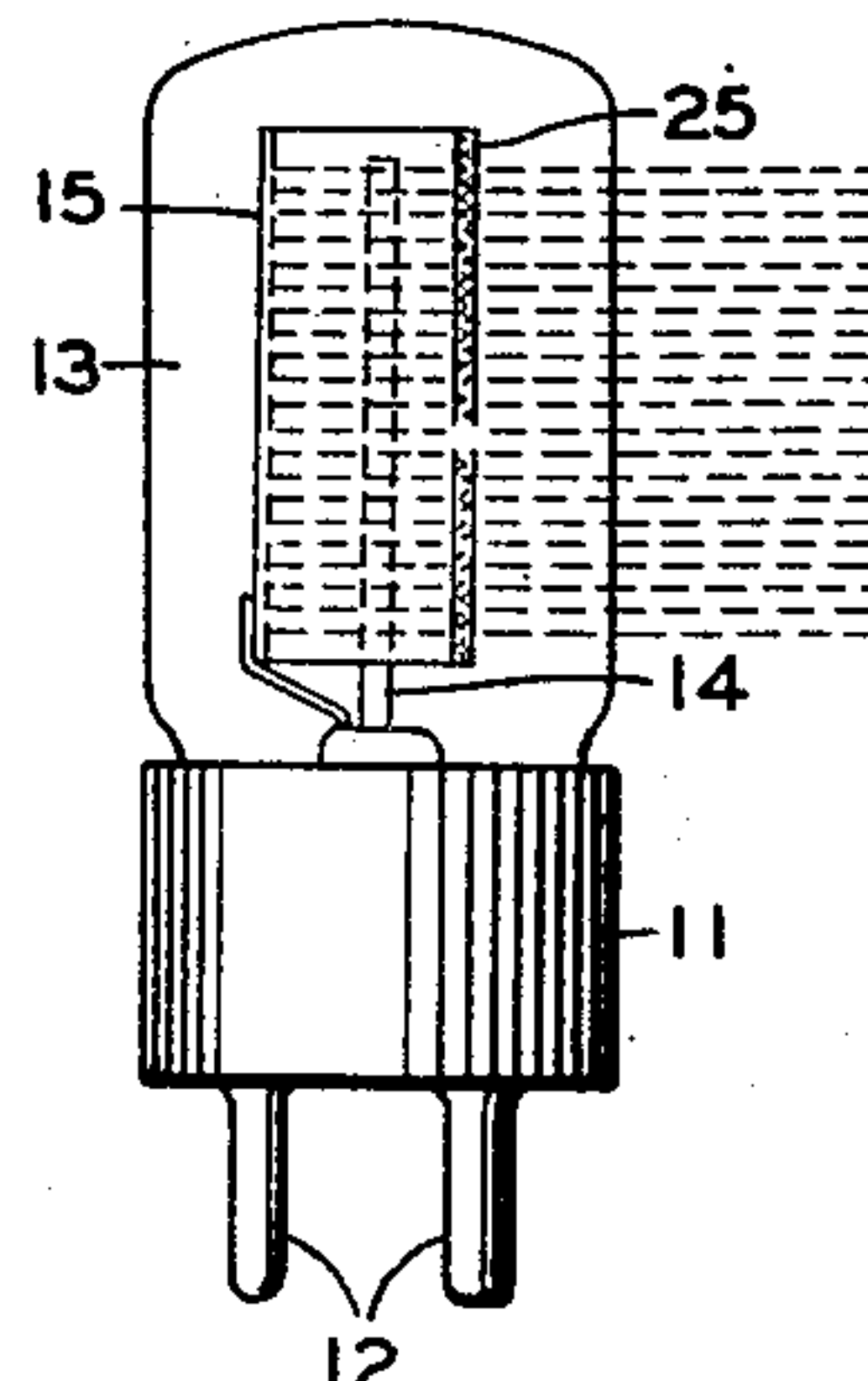


FIG. 2

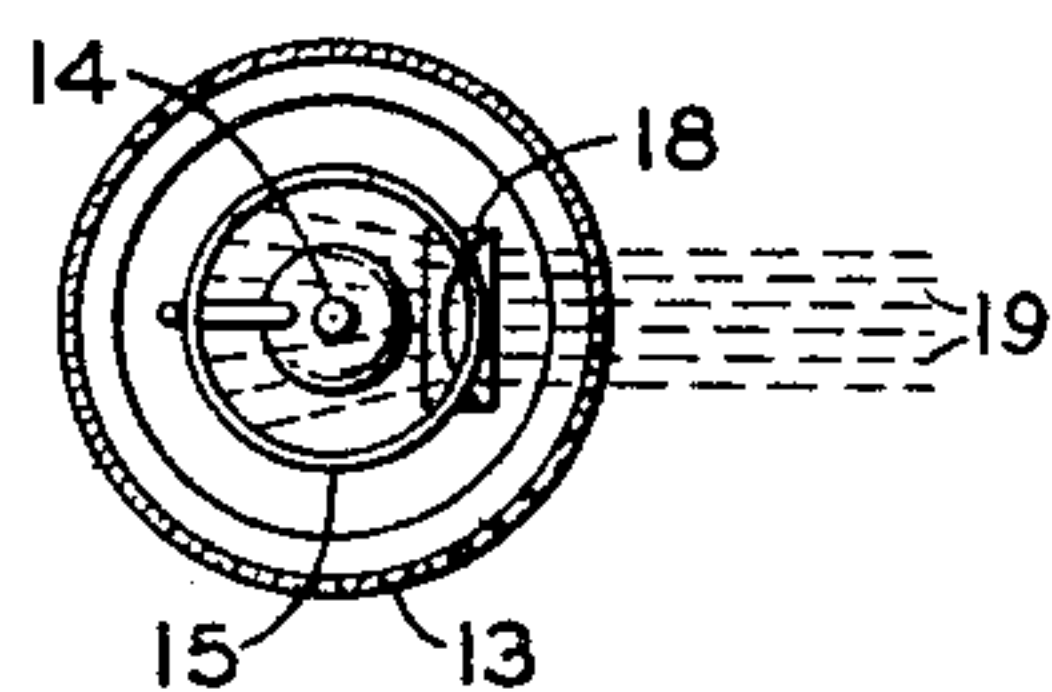


FIG. 4

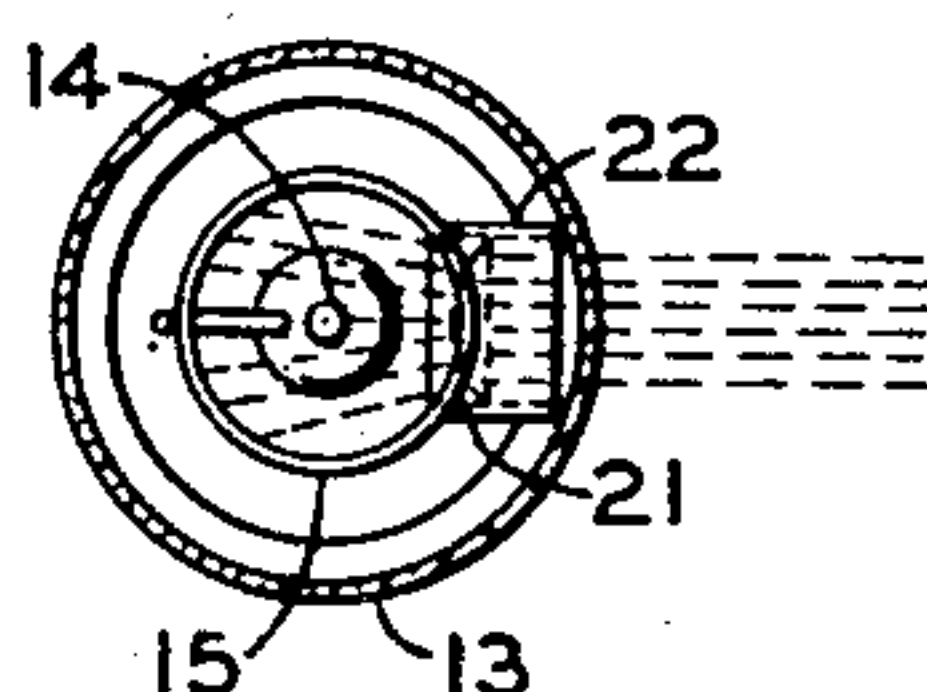


FIG. 6

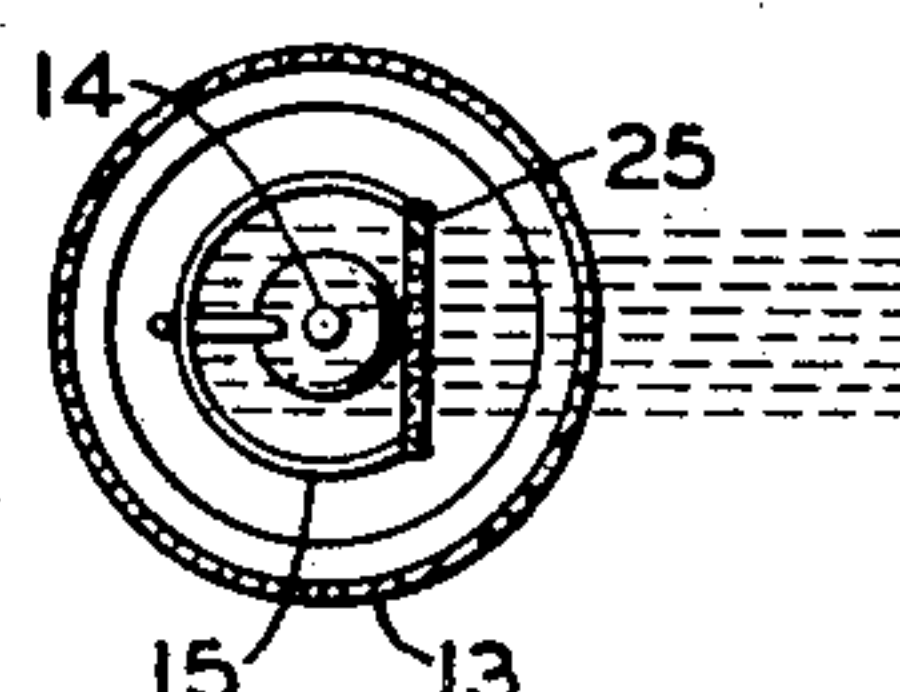


FIG. 7

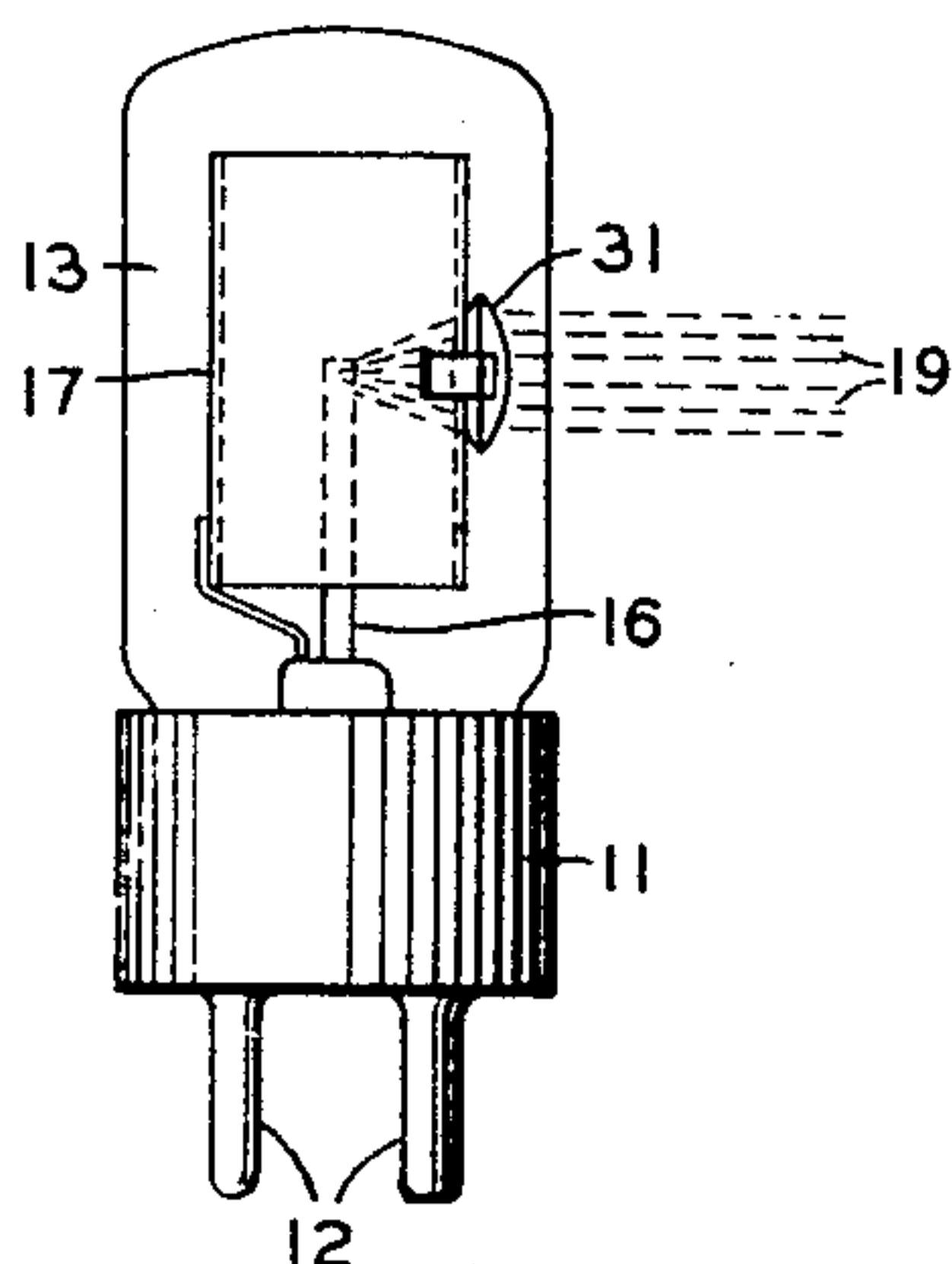


FIG. 9

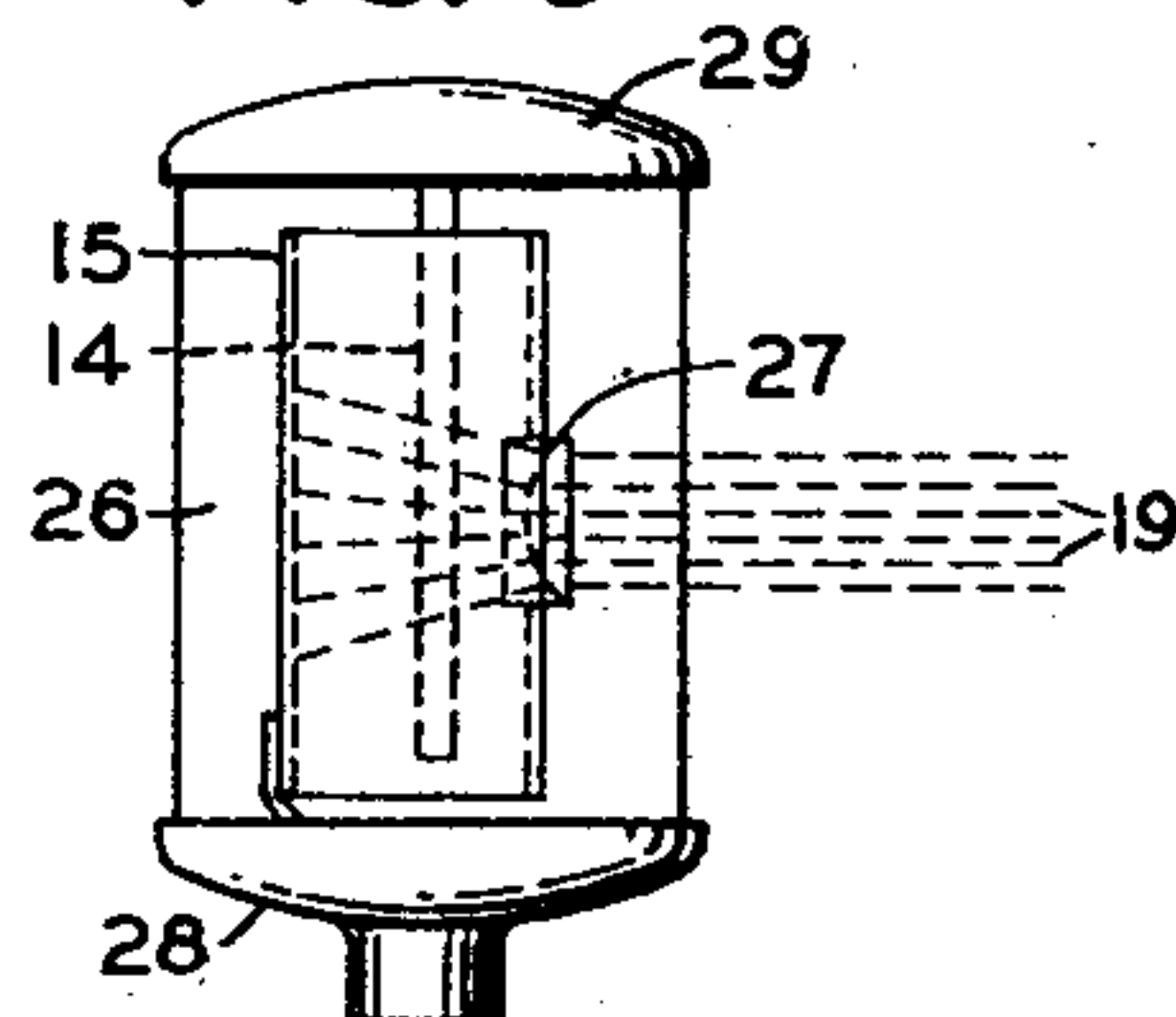


FIG. 10

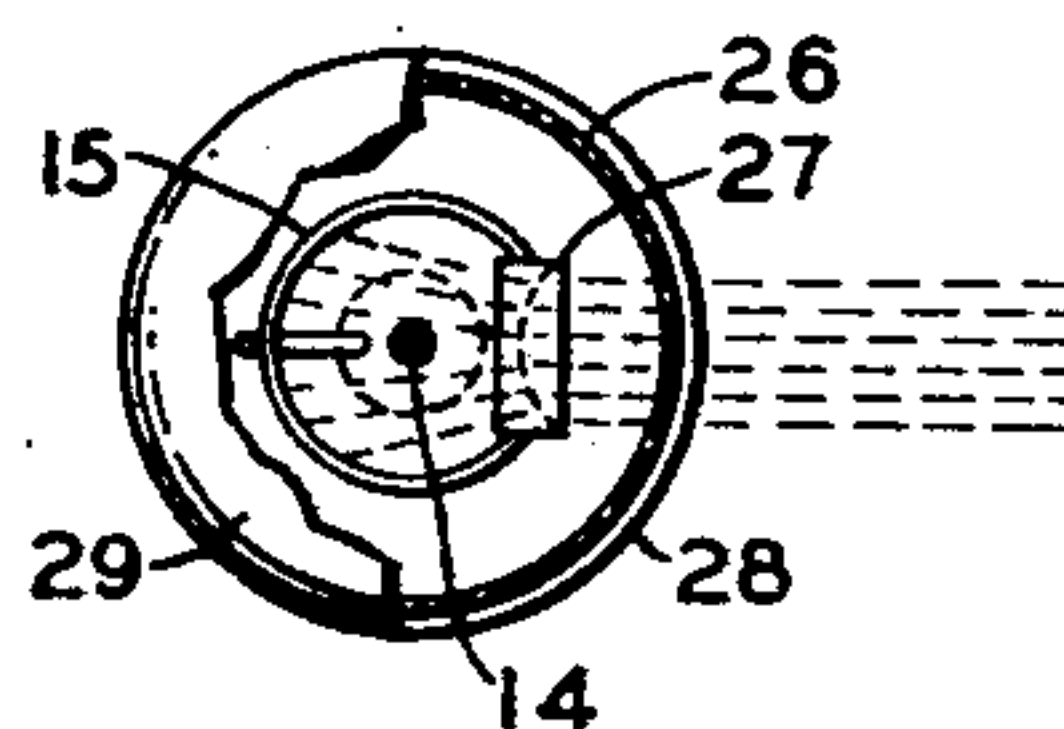
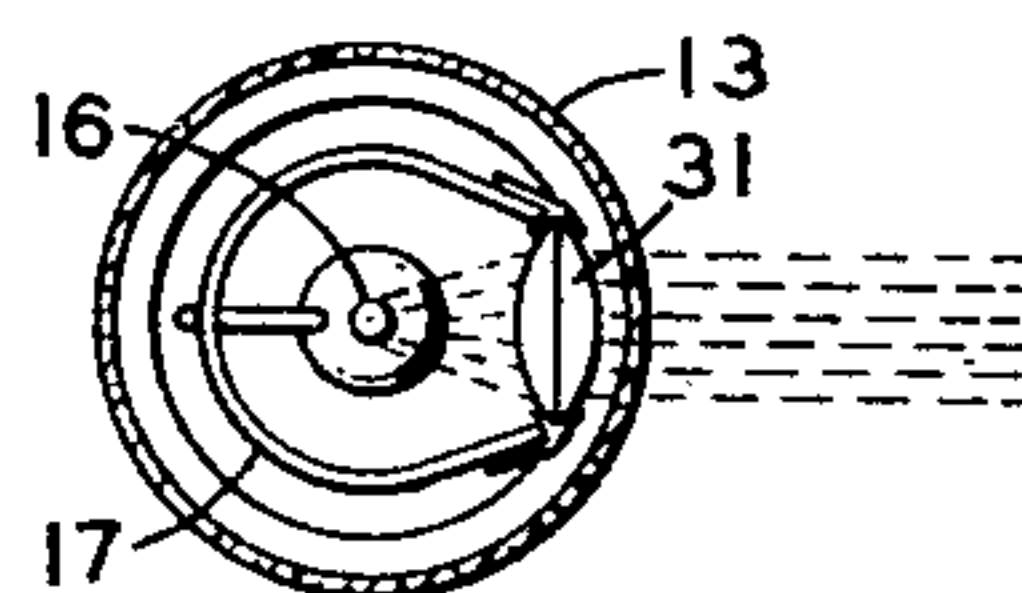


FIG. 8



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2,367,816

RADIANT ENERGY RECEIVING DEVICE

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Application October 1, 1941, Serial No. 413,154

3 Claims. (Cl. 250—165)

This invention relates to receivers for radiant energy such, for example, as photoelectric tubes, and an object is to provide a light sensitive element of this type having increased efficiency and usefulness.

A further object is to provide a photoelectric tube constructed and arranged to embody in a single integral structure all elements necessary to its operation including such elements as, for example, lenses, filters, shields and the like, which have hitherto been provided in a separate assembly; so that the tube constitutes a complete unit ready for operation without requiring the setting up or adjustment of any extraneous optical system.

In the present invention, the entire assembly is so mounted as an integral unit within the phototube structure that the relative disposition of the different elements is fixed with great precision in the manufacture of the tube, and a large number of tubes can be produced having the same operating characteristics.

These and other objects and advantages are attained by the present invention, certain illustrative embodiments of which are shown in the accompanying drawing, in which:

Fig. 1 is an elevational view of a photoelectric tube constructed in accordance with one embodiment of this invention;

Fig. 2 is a horizontal section through the tube shown in Fig. 1;

Figs. 3 and 4 are views similar to Figs. 1 and 2, showing another embodiment of the invention;

Figs. 5 and 6 are similar views showing a further embodiment;

Figs. 7 and 8 are similar views showing a still further embodiment; and

Figs. 9 and 10 also are similar views showing another embodiment of the invention.

The illustrative embodiments of the invention comprise a photoelectric tube having a base 11 provided with the usual contact prongs 12 for engagement with a receptacle, not shown. A cylindrical envelope 13 is mounted on the base, and the anode and cathode elements are mounted thereon. The envelope is made of material capable of transmitting radiant energy within the operating range of the device. In the case of a photoelectric tube the envelope is transparent. Figs. 1 to 6, 9 and 10 show tubes of the central anode type in which a centrally positioned anode 14 is partially surrounded by the sensitive cathode 15, while Figs. 7 and 8 show a central cathode type in which a centrally positioned sensitive cathode 16 is located within a surrounding anode

17. As will be seen by reference to Figs. 1 to 8, inclusive, the electrodes are supported relative to the base by a conventional central press or stem; one of the electrodes in each modification being supported directly by the press or stem while the other is supported by a bent wire-like member attached to the press or stem.

As illustrated in Figs. 1 and 2, a rectangular light controlling or modifying member 18 such, for example, as a lens, color filter or the like, is mounted within the envelope 13 and positioned so as to extend along and substantially close the open slot of the anode 15. Considering the member 18 as a lens, for example, it will be apparent that being mounted within the envelope of the tube at the time of manufacture its position with relation to the sensitive element can be permanently fixed with great precision to permit a complete distribution and accurate focusing of the light rays 19 over the area of the sensitive element within the envelope.

In Figs. 3 and 4 there is shown a tube having a small lens 21 permanently mounted within the envelope and a lens surrounding hood 22 is also mounted in the envelope and extends outwardly through the envelope from the edge of the lens to prevent any light except the desired beam from entering the tube. This arrangement permits the lens and hood being permanently sealed together and accurately fixed with relation to the sensitive cathode 15 so that not only is the light beam dispersed over the entire cathode area, but only the desired light beam has ingress to the tube, all foreign light being positively excluded. The practical advantages of such a construction are apparent in view of the fact that a photoelectric tube is such a sensitive element that a difference of 1% or 2% in the energy admitted to the tube will affect the accuracy of its operation.

Instead of being light-focusing lenses, the elements 18 and 21 in Figs. 1 and 3, respectively, may be color filters, with or without associated lenses, to prevent operation of the tube by any rays except those of a particular wave length such, for example, as infra-red. In the case of a tube intended to be responsive only to certain predetermined rays, a color filter for shutting out all other rays will eliminate the dragging effect of such other rays and the consequent reduction in sensitivity when response to a given ray only, such as infra-red, is desired. If, on the other hand, it is desired to admit ultra-violet rays to the sensitive element, the envelope 13 and lens 21 should be formed of quartz.

Figs. 5 and 6 show one modification, and Figs.

9 and 10 another, of a tube adapted to be operated by polarized light to increase the sensitivity and power of the tube. In Figs. 5 and 6 a polarizing filter 25 is permanently fixed within the envelope along the open side of the sensitive cathode so that only polarized light is effective thereon. In Figs. 9 and 10 a tube is shown having the entire envelope 26 formed of polarizing material, and a control lens 27 may or may not be incorporated within the envelope, as desired. In this form, the envelope is mounted on a base 28. A cap 29 closes the outer end of the envelope and, as shown, provides a support for the anode 14 which extends downwardly therefrom. The electrode 15 is supported in the same manner as electrodes of the Figs. 1 to 8, inclusive, embodiments, i. e., by a bent wire-like member (part of which is shown in Figs. 9 and 10) attached to the central press or stem (not shown).

In the form shown in Figs. 7 and 8 a central cathode tube is provided with a focusing lens 31 permanently mounted within the envelope 13 in the exact position to focus the light beam on a small point of the central cathode 16, a result hitherto impossible with the lens outside the envelope and the light dispersed. Obviously, other light controlling or modifying elements can be substituted for the lens 31.

In all embodiments of the invention the lens or other light modifying device is supported relative to the base by being secured to one of the electrodes which in turn is held in desired position by a bent wire-like member attached to a central press or stem.

It will be apparent that many modifications and changes can be made in the structure and arrangements shown without departing from the essential attributes of the invention, and all such changes are contemplated as coming within the scope of the appended claims.

What is claimed is:

1. A photoelectric tube comprising a base, a pair of electrodes supported in spaced relation relative to said base, one of said electrodes being a sensitive element, and means for polarizing the rays incident on said sensitive element comprising an envelope of polarizing material supported by said base and surrounding said electrodes.
2. A photoelectric tube comprising a base, a pair of electrodes supported in spaced relation relative to said base, one of said electrodes being a sensitive element, means for polarizing the rays incident on said sensitive element comprising an envelope of polarizing material supported by said base and surrounding said electrodes and a cap closing the end of said envelope opposite said base.
3. A photoelectric tube comprising a base, a pair of electrodes supported in spaced relation relative to said base, one of said electrodes being a sensitive element, means for polarizing the rays incident on said sensitive element comprising an envelope of polarizing material supported by said base and surrounding said electrodes and a lens within said envelope and carried by one of said electrodes in predetermined fixed relation to said responsive element.

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