A window which transmits ray consists of a thin metal foil fixed to a frame consisting of metal, the outer edge of the foil being welded to the outer edge of the frame.
Fig. 1

Fig. 2
RAY TRANSMITTING WINDOW

This invention relates to a ray transmitting window consisting of thin metal foil and allowing the passage of X-rays and similar transmitting rays.

Such windows are used in tubes wherein rays which are to be transmitted are produced, for example, in an X-ray tube. These windows are also used in tubes into which rays must penetrate to produce signals therein. A tube of this type is, for example, an image transforming tube wherein intensity distributions present in the cross-section of a bundle of rays are transformed into corresponding electron distributions. In tubes wherein an electron ray is produced which is conducted through the window, it is also advantageous if the rays pass well through the window being keyed in order to make them effective outside the tube, for example, to produce a representation.

In image magnifying tubes having a large diameter of the image area it is particularly difficult to continuously apply thin windows vacuum tightly since thin foils tear easily when attempts are made to attach them at the edge.

An object of the present invention is to improve existing devices of this type.

Other objects of the present invention will become apparent in the course of the following specification.

In the accomplishment of the objectives of the present invention it was found possible to provide a permanent window out of thin metal foil by arranging the metal foil in a frame consisting of metal, the outer edge of the foil being welded to the inner edge of the frame.

The frame of the present invention can be made in a simple manner by using two metal rings constituting the frame, the foil being placed between the rings. The foil has a diameter which corresponds to the outer edge of the frame. Thereupon the two frame parts are welded together along with the foil, the welding being applied around the outer edge of the frame.

If as the result of heating by welding the framed foil should be tensioned, then the frame is subjected to a stretching, for example, by placing the frame upon a flat base and pressing upon the frame from the top a device with projections, for example, a pressure stamp provided with teeth.

According to an actually constructed embodiment of the present invention rings were used having an inner diameter of 75 mm. and an outer diameter of 100 mm. The rings consisted of tantalum sheets having a thickness of 0.4 mm. Between these rings was inserted a titanium foil which was 0.1 mm. thick and had the same diameter of 100 mm.

It is also possible to make the rings instead of tantalum out of steel or some other substance of sufficient strength which can be welded with the foil without suffering a loss in holding capacity. The foil can be also made of another substance.

In an actually carried out experiment a window was used having a diameter of 130 mm. and consisting of a titanium sheet having a thickness of 0.1 mm. in a frame consisting of sheet metal rings having a thickness of 1 mm. and a width of 20 mm. This window received tears only after being subjected to a load of 8 atmospheres above atmospheric pressure.

Usually tubes are not subjected to such a high load, since at most atmospheric air pressure has to be held against vacuum.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawing showing by way of example only, preferred embodiments of the inventive idea.

In the drawing:

FIG. 1 shows in side view, partly in section a feeler tube embodying the subject of the present invention.

FIG. 2 is a section through a portion of a device stretching the frame.

FIG. 1 shows a piston 1 of a feeler tube having a window consisting of a tantalum sheet 2 with a thickness of 0.1 mm. which is welded at its edge to a frame 3 consisting of a ring 4 and a flange 5. The welding layer 6 is located at the outer edges of the ring 4 and the flange 5. The flange 5 consists of a profiled part 7 having a U-shaped cross-section the legs of which are bent outwardly, whereby the end of one leg 8 is welded with the foil 2 and the end of the other leg 9 is welded with a flange 10 which is vacuum tightly smelted to the piston 1. Within the tube at the end of the piston 1 opposite the window there is provided at electronic gun 11 (shown by broken lines) which is provided with the necessary voltages through lines 12. Thus when the known deflecting devices (not shown) are switched on, an electronic ray can be transmitted for feeling through the foil 2 of the window.

FIG. 2 shows diagrammatically a device wherein a frame consisting of two rings 14 and 15 is mounted upon a flat base 13. Within the frame the foil 16 is welded by the weld coating 17. Above the frame lies a ring 19 serving as a pressure stamp 18 and provided with teeth 20 shaped as narrow steps and extending over the outer surface of the ring 19. When the stamp 18 is pressed downwardly in the direction of arrows 21 upon the upper surface of the ring 15 it will produce depressions in the frame 14, 15 which will have different depths depending upon the extent of warping of the frame. These pressed in depressions balance at the same time tensions which have caused a wave-shaped deformation of the frame 14, 15 and the foil 16, so that by these simple means a flat frame and a flat window are produced.

In case of a frame used for the tube shown in FIG. 1, the base 13 can be simply made of two parts which join to form a ring fitting in the U-shaped recess between the legs 8 and 10.

I claim:

1. A ray transmitting window comprising a metal frame and a thin metal foil having an outer edge welded to the outer edge of the frame, said frame comprising a flange consisting of a profiled part of U-shaped cross-section and having two legs, one of said legs being attached to said foil.

2. A ray transmitting window comprising a frame consisting of two metal rings and a thin round metal foil, said rings having outer diameters which are equal to the outer diameter of said foil, said foil extending between said rings, the outer edges of said rings being welded to the foil, the frame being pressed by a toothed stamp after the welding.

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