United States Patent

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[72] Inventor **John P. Uetz**
Philadelphia, Pa.

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[73] Assignee **Philco-Ford Corporation**
Philadelphia, Pa.
a corporation of Delaware

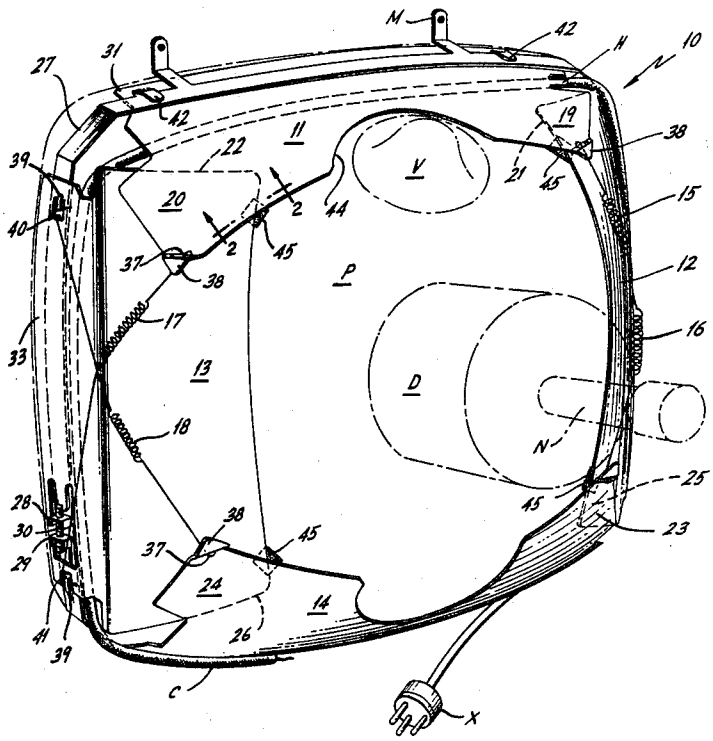
[54] **SHIELDING APPARATUS OF METAL PLATES STRAP-MOUNTED ON CATHODE RAY TUBE FOR SHIELDING AGAINST EXTERNAL MAGNETIC FIELDS**
2 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **315/8;** 313/312
[51] **Int. Cl.** **H01j 29/06**
[50] **Field of Search** 313/313, 312, 329; 315/8

[56] **References Cited**
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Primary Examiner—John Kominski
Assistant Examiner—V. L. Lafranchi
Attorney—Carl H. Synnestvedt

ABSTRACT: Apparatus for shielding cathode ray tubes, particularly color picture tubes, from the effect of the earth's and other external magnetic fields. The shielding apparatus comprises a series of overlapping steel sheets, pressed together and against the tube structure by resilient fasteners. These sheets and fasteners are secured to a strap which is tightened around the circumference of the cathode ray tube, near the front thereof, and shaped and disposed for securement to the inside of a cabinet enclosing the tube.



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SHEET 1 OF 2

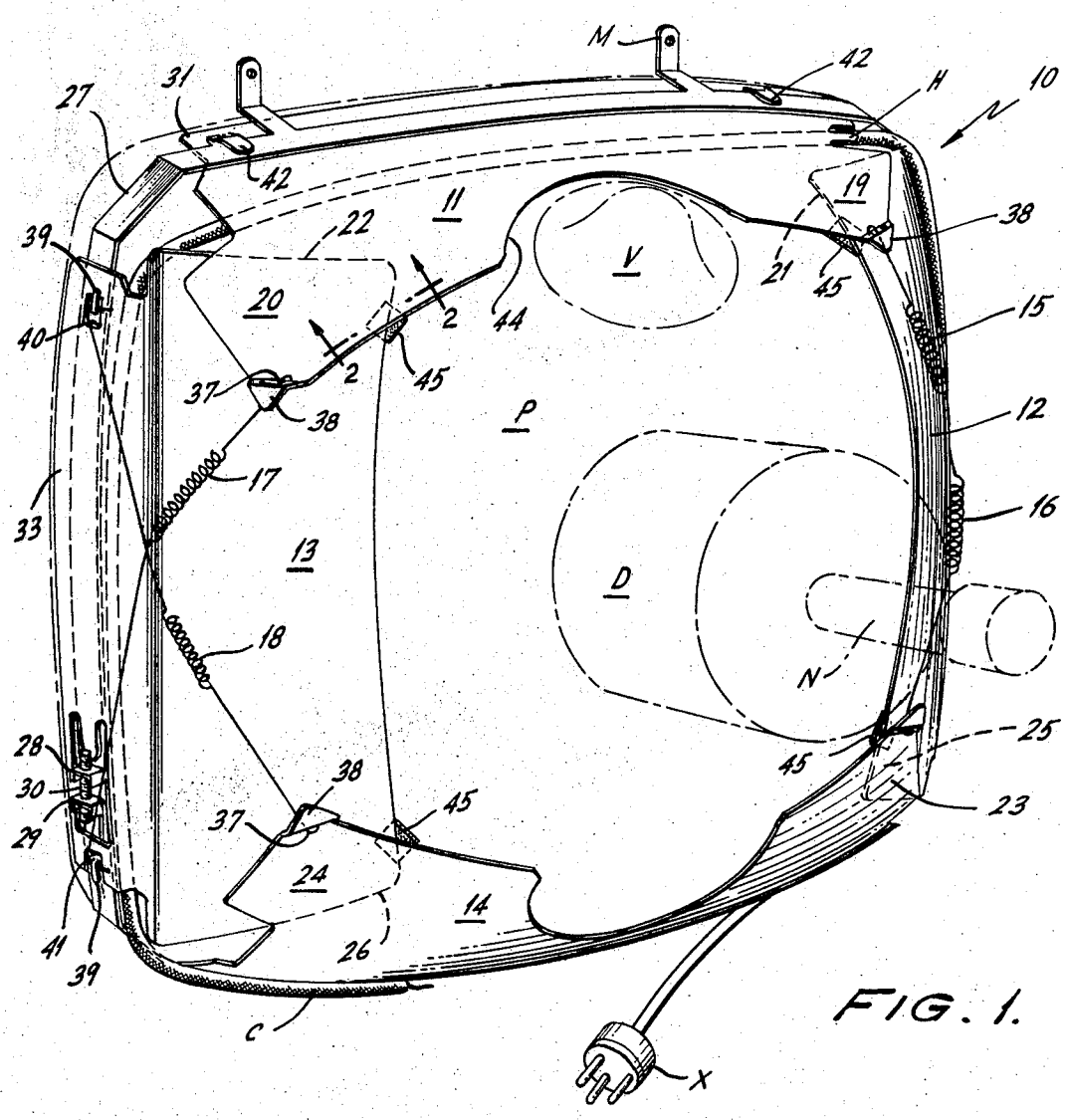


FIG. 1.

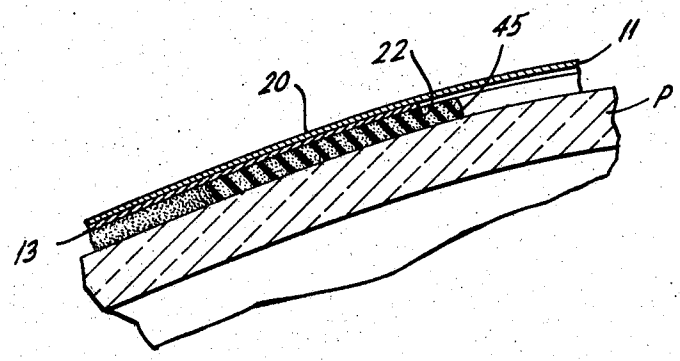


FIG. 2

INVENTOR.
JOHN P. UETZ
BY
Francis D. Rogers
ATTORNEY

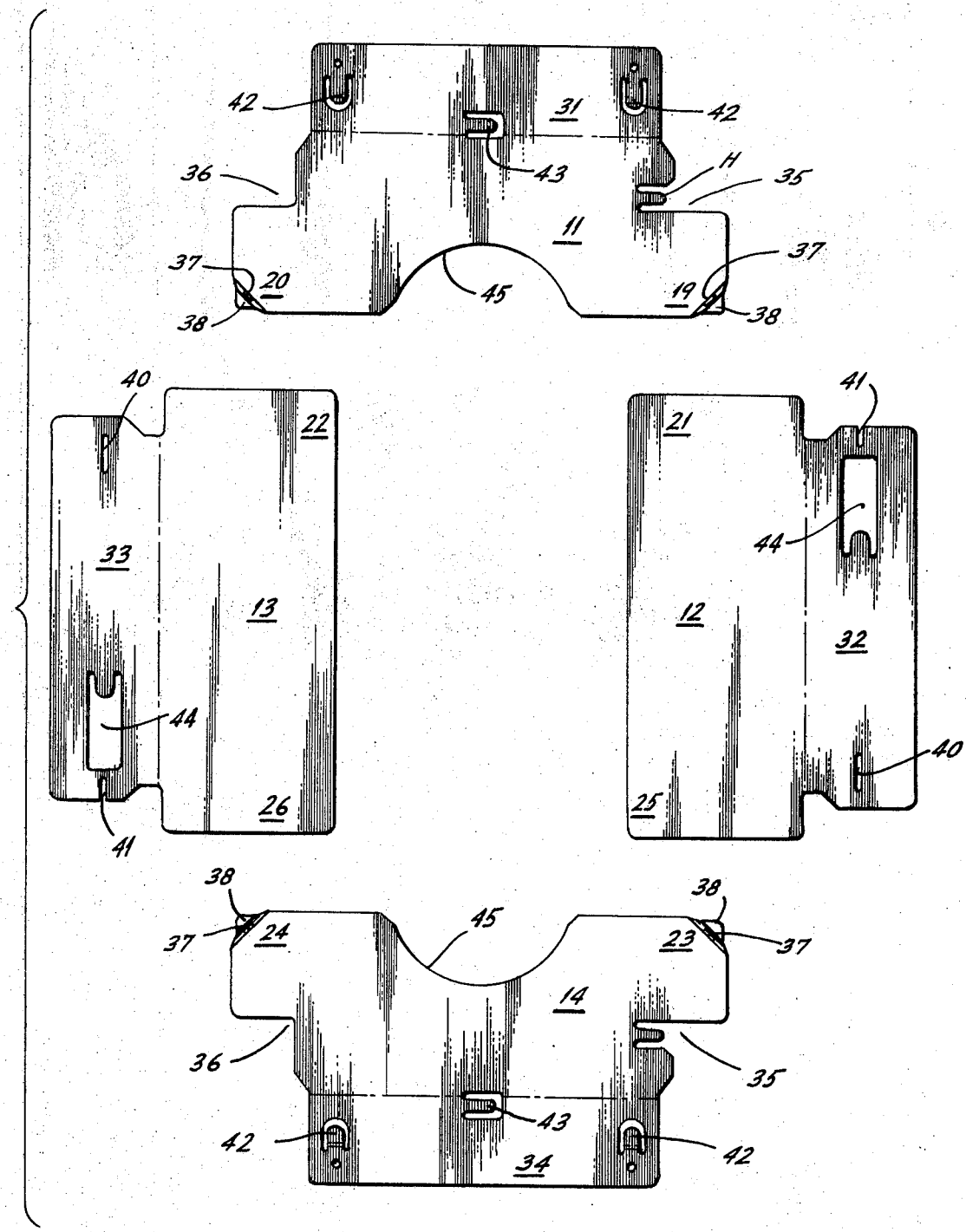


FIG. 3.

INVENTOR.
JOHN P. UETZ

BY

Frank D. Prager

ATTORNEY

SHIELDING APPARATUS OF METAL PLATES STRAP-MOUNTED ON CATHODE RAY TUBE FOR SHIELDING AGAINST EXTERNAL MAGNETIC FIELDS

BACKGROUND OF THE INVENTION

Color picture tubes must be shielded from effects of the terrestrial field and other external magnetic fields. Heretofore this was done by a unitary, annular member of magnetic material, which generally was constructed as a welded or riveted structure in the approximate form of a truncated cone or pyramid, or sometimes use was made of a flexible ring of steel foil held to the tube by adhesive. Such a riveted or welded pyramid or conelike member proved cumbersome and expensive. If the construction was made in a more simple form, for example as a flat and rigid plate, it was very inefficient as a shield, and required a large and heavy coil for degaussing. The flexible adhesive-fastened shield was most closely joined to the tube, and therefore magnetically most efficient, but such a shield caused difficulties when the tube required servicing or repair.

It is the object of this invention to overcome the difficulties and shortcomings of prior art structures by providing shield apparatus of light weight, low cost, high efficiency, and which is easy to attach and detach.

NATURE OF THE INVENTION

According to the invention, individual sheets of steel or the like are held in partly overlapping position, one in surface contact with the other where they overlap, and all in suitable contact, either direct or indirect, with the picture tube. The resulting apparatus shares characteristics of the built-up or riveted cone structure, and also shares advantages of the adhesive-fastened foil ring, but avoids the shortcomings of the prior devices. The plates or sheets used according to the invention need not be permanently welded, riveted or bolted. Instead, and more economically, I use a system of simple, resilient fastening means to press the several steel sheets against the tube, preferably with resilient padding underlying the sheet structure, and also to press mutually overlapping parts of the sheets against one another. These sheets and fasteners are secured to a strap. The strap in turn is tightened around the periphery of the cathode ray tube, and would be secured to the inside of a cabinet (not illustrated). By means of this construction the invention provides high shielding efficiency while facilitating service work.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of the new shield, fastened to a picture tube structure.

FIG. 2 is a fragmentary, sectional and slightly enlarged view, taken along line 2–2 in FIG. 1.

FIG. 3 is a plan view of sheet elements suitable for use in the new shield, showing them in the form that they have before they are applied to the tube structure.

DETAILED DESCRIPTION

As shown in FIG. 1, picture tube P has annular shield **10** mounted on the rear surface of its bulb, the central configuration of the shield being of such form and size that central portions of the tube extend rearwardly through it and that the mounting of high voltage lead-in V on the bulb, and of deflector coils D on tube neck N, is not impeded by the presence of the shield elements. The new shield, as illustrated, comprises top sheet or segment **11**, right and left side segments **12, 13**, and bottom segment **14**, all made of magnetic material such as magnetically highly permeable but substantially nonretentive steel, and all held together and to corresponding parts of the tube by extension springs **15, 16, 17, 18**. As shown in the drawing, the invention provides corner portions **19, 20** of top sheet **11**, resiliently held by springs **15, 17**, in overlying relationship to corner areas **21, 22** of side sheets **12, 13**, respectively. Similar relationship is provided by springs **16, 18** for corner areas **23, 24** of bottom segment **14**, which overlap corresponding areas **25, 26** of the side segments. In order to make sure that the overlapping areas of the several segments are pressed against one another and against the tube, as is required for efficient magnetic shielding, the four extension springs connect the four corner areas of the shield segments to suitably chosen parts of support structure which is located at the front end of the tube and comprises a tube mounting strap **27**.

This strap, as shown, has end brackets **28, 29** interconnected by bolt **30** to fasten the strap securely to the circumference of picture tube P, and the strap also holds the four shield segments, **11** to **14**, against rearward displacement of these segments. For this purpose the segments have forwardly extending angle portions or tabs, which are best shown in FIG. **3** and are numbered **31, 32, 33, 34**. It is preferred to make these tabs shorter than the segments, so that recesses **35, 36** are formed adjacent corner portions **19, 20, 23** and **24**, thereby facilitating the required bending of the segments when they are applied to the tube. The extension springs **15** to **18** interconnect shield apertures **37**, disposed in offset parts **38** of corner portions of the top and bottom segments, with lanced hooks **39** formed on strap **27**, said hooks projecting through apertures **40, 41** in side segment tabs **32, 33**. Some of these hooks also serve to hold these tabs to strap **27**, as is shown in FIG. **1** at **40**, while fasteners **42** are provided to hold top and bottom segment tabs **31, 34** to this strap. Additional fasteners **43** can be used for holding the latter segments in position while the different springs are being applied to them. Side segments **12, 13**, which are interchangeable have recesses **44** (FIG. **3**) for brackets **28, 29** of strap **27** (FIG. **1**), while interchangeable top and bottom segments **11, 14** each have a recess **45** for high voltage button V.

The segments can be fabricated as generally flat sheeting with such outline at **35, 36** (FIG. **3**) as to facilitate bending of the sheet structure while adapting it to the tube surface. When the retaining springs are applied, they cause such bending, for example bending of corner area **20** onto **21**, corresponding to the shape of the tube, thereby providing adequate magnetic unity of the seal ring.

As best shown in FIG. **2**, a resilient cushion **45**—made for example of foam rubber or of a composition of rubber and cork or the like—is provided below the sheeting, and especially below every pair of mutually overlapping corner areas, such as **20** and **22**. These cushions, interposed between the sheeting and the underlying tube structure P, facilitate the mutual contacting of wide surface areas on the sheet segments, thereby enhancing the magnetic shielding effect.

A conventional degaussing coil C, with connector X, is provided. Holders, some of them shown at H, hold this coil in proper position with respect to the assembled shield and the tube. Of course the entire tube and its attachments are held by suitable mounting means, secured to strap **27** some of which are shown at M in FIG. **1**. These and similar parts of the unit are not believed to require detailed description at this point.

It will be obvious from the foregoing description that the new shield segments can be formed, applied and removed, as well as reinstalled, by techniques of the utmost simplicity. When installed or reinstalled in a tube, the new shield fits the tube configuration as closely as is required for efficient shielding, while it avoids the need for heavy and cumbersome, permanently welded pyramid structures and the like and also avoiding the use of delicate and nonreplaceable shielding, formerly provided by cemented foil materials.

I claim:

1. Apparatus for shielding a cathode ray tube from external magnetic fields, such as that of the earth, comprising: a strap extending around the circumference of the tube near the front thereof; means to interconnect ends of the strap and thereby securely to fasten the strap to said tube around its circumference; a series of overlapping sheets of flexible magnetic material, each marginally held to said strap and extending

therefrom to cover back portions of the tube; spring means engaging said sheets and said strap to press the sheets against one another and against the tube; and means providing for rigid securement of said strap, and thereby said tube and shield means, to a supporting structure.

2. Apparatus as described in claim 1 wherein said overlapping sheets have corner structures disposed in quadrilateral arrangement on the back of the tube, and wherein said spring means are extension springs, each extending from one of said corner structures diagonally to a portion of said strap adjacent another corner, said extension springs crossing one another on opposed sides of the back of the tube.