

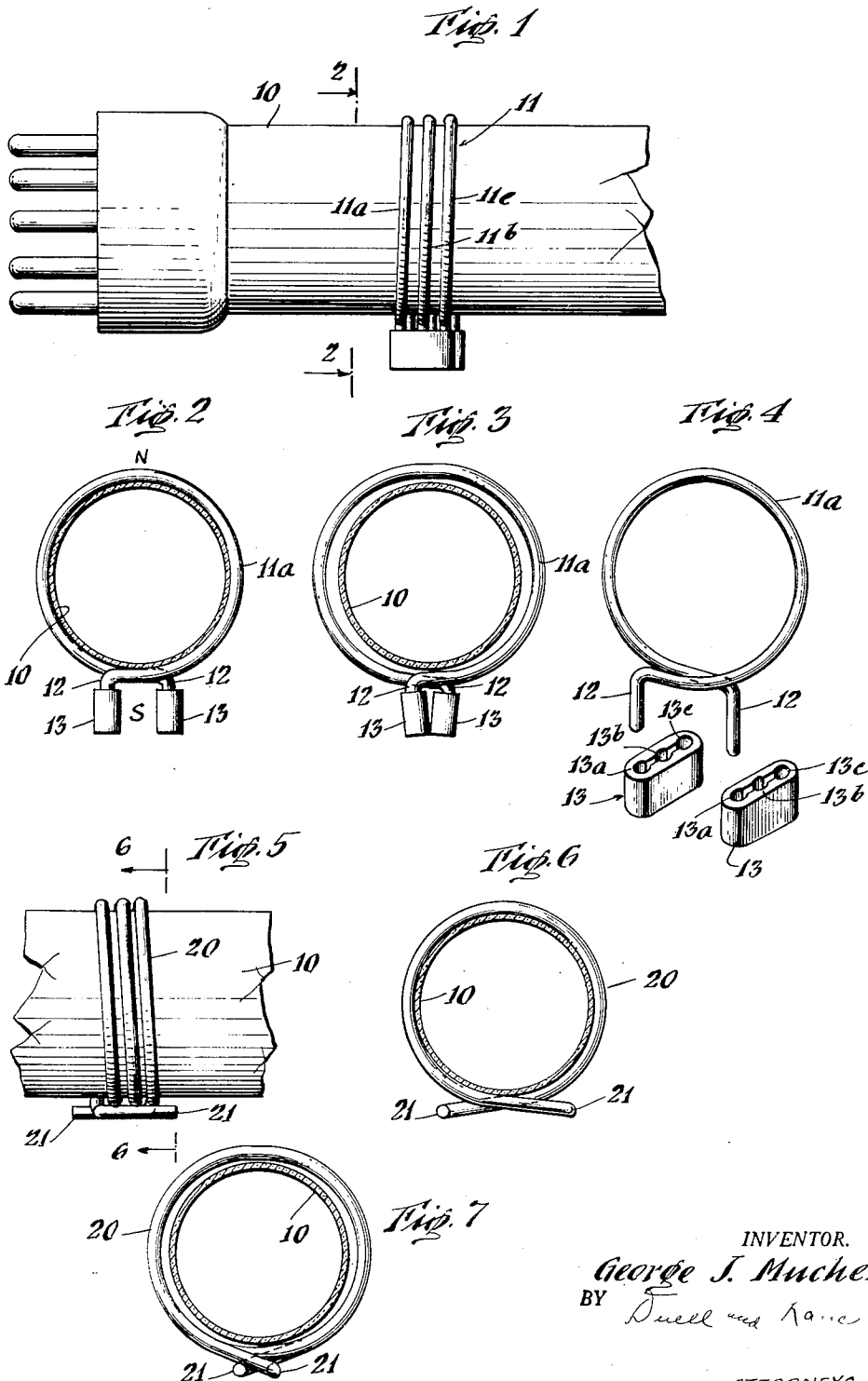
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MAGNETIC STRUCTURE FOR USE IN ION-TRAPS

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MAGNETIC STRUCTURE FOR USE IN
ION-TRAPSGeorge J. Mucher, Brooklyn, N. Y., assignor to
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This invention relates to electronic apparatus, and particularly to what is known in the cathode ray tube art as an "ion trap."

The kinescope, which is a form of cathode ray tube which comprises the viewing tube in a television receiver, is costly; and it is of importance to prevent the bombardment of the viewing screen by ions, which are materially heavier than electrons and are capable of damaging the screen coating. In the past, relatively complicated magnetic traps have been utilized to deflect the ions so that they will be dissipated against the neck or barrel portion of the tube before striking the fluorescent screen.

The present invention concerns an ion trap which is inexpensive to manufacture, easy to install, and capable of entirely satisfactory performance. A preferred form of the invention comprises a desired number of loops of springable magnetic material which may be expanded to fit over the neck of the cathode ray tube and which will contract to snugly embrace the walls of the tube. Ordinarily, the assembly will include at least two loops. However, in the event of employing a material having adequate magnetic properties—without incorporating too great a mass or resistance to flexing—only a single turn would have to be employed which might extend throughout substantially 360°. It is a simple matter for the installer to place the ion trap on the neck of the tube and to adjust it axially and radially thereon to properly position the magnetic poles of the trap for optimum effectiveness.

It is an object of the invention, therefore, to provide an improved ion trap for cathode ray tubes.

It is another object of the invention to provide an ion trap which may be inexpensively manufactured from wire or bar stock on automatic machinery.

An additional object of the invention is that of providing a simplified form of ion trap which will be readily adjustable to various neck diameters of cathode ray tubes.

It is still another object to provide an improved ion trap which is simple for the installer to position, adjust, and remove, under field conditions.

With these and other objects in mind, reference is had to the attached sheet of drawings

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illustrating practical embodiments of the invention and in which:

Fig. 1 is a side elevation of the neck portion of a cathode ray tube, showing one embodiment of the invention in typical operation position;

Fig. 2 is an end elevation, in section, on lines 2—2 of Fig. 1;

Fig. 3 is a view similar to Fig. 2 but illustrating the manner in which the diameter of the ion trap may be increased to permit its insertion or removal on a tube;

Fig. 4 is an exploded perspective of the embodiment of Fig. 1, showing but one of the magnetic elements;

Fig. 5 is a side elevation similar to Fig. 1, showing a second form of the invention;

Fig. 6 is an end elevation in section on lines 6—6 of Fig. 5; and

Fig. 7 is a view similar to Fig. 3 with respect to the second embodiment of the invention.

Referring to the drawings, Fig. 1 shows the neck portion 10 of a cathode ray tube such as a television kinescope, on which is mounted an ion trap 11 embodying one form of the present invention. The complete tube and its component focusing and deflecting mechanisms have not been shown, because they form no part of the present invention. It is to be understood, however, that within the neck of the tube there is provided the usual electron gun (not shown) in which the electron beam is developed and directed toward the target area or screen of the tube. As is known, the electron beam is focused and then deflected to trace a pattern on the target screen. The focusing coil and deflector means are normally located to the right of the ion trap as viewed in Fig. 1.

In the embodiment of Fig. 1, the ion trap comprises a plurality—for example, three—single loop coils 11a, 11b, 11c, of magnetic material. The coils are magnetized so that each has north and south magnetic poles in identical diametrical relationship as viewed in Fig. 2. It will be understood that the respective poles can be at the extremities of any diameter about the full periphery of the coils; it is preferable, however, to have one of the poles related to a definite reference point, such as the leg portions of each of the coils, to avoid the necessity of otherwise marking the pole positions.

Fig. 4 is representative of all of the coils. Each coil, therefore, has its end portions in overlapping relationship, terminating in the spaced, downwardly directed, leg portions 12. The respective legs are parallel to the plane of the loop. When the leg portions are manually squeezed together, the coil diameter will enlarge or distort so as to provide a substantially larger central opening.

To mount the coils in mutual parallelism, there are provided the non-magnetic clamps or separators 13, which have channels or passages 13a, 13b, 13c to singly receive the leg portions of the individual coils. The channels are mutually parallel and suitably spaced to mount the individual coils in spaced relationship such as shown in Fig. 1. After the leg portions of the plurality of coils are inserted into the base clamp channels, the clamps may be crimped or compressed for frictional securement to the leg portions. Accordingly, the clamps are preferably tubular in form. It has been found unnecessary to braze or otherwise permanently secure the ends of the coils within the blocks.

A further advantage derived by the clamps is that when the coils are properly assembled therein, each will be distorted substantially equally when the clamps are drawn into contact with one another, as shown in Fig. 3. The space between the respective inner walls of the clamps is such that when they are squeezed together to the Fig. 3 position, the resulting enlargement of the coils will permit the unit to be passed over the connection base of the tube, and when the clamps are released the coils will resiliently grip the side walls of the tube. The installer may, therefore, enlarge the effective coil diameter at will, to shift the trap axially or radially on the tube neck when adjustments are necessary.

In the embodiment of Fig. 5, the ion trap 20 comprises a single length of wire or bar stock wound as a uniform diameter helix having a suitable number of convolutions. The wire or bar stock, like that of the previous embodiment, is of springable magnetic material, and is appropriately magnetized after winding so that each convolution has mutually aligned north and south poles. The ends of the coil are bent oppositely outwardly and then in parallel relationship as suggested in Fig. 5 to provide the finger pieces 21 by means of which the said coil ends may be gripped and moved to the Fig. 7 position to enlarge the effective coil diameter and permit its installation or removal over the end of the tube, or adjustment along the neck thereof. In manner similar to that described with respect to Fig. 1, the ion trap, when the finger pieces are released, fits the tube neck snugly and in resilient engagement therewith.

Thus among others, the several objects of the invention as afore noted are achieved. Obviously numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

I claim:

1. A magnetic structure for use in an ion-trap for resilient engagement about the neck of a cathode ray tube, comprising a plurality of coils of springable magnetic material, said coils being of uniform diameter and each magnetized with the respective magnetic poles in mutual alignment, and finger piece means at the extremities of said coils by which the effective coil diameter may be increased upon squeezing said finger piece

means together, to relax the resilient grip of the device on the neck of said tube.

2. A magnetic structure for use in an ion-trap, said structure comprising a plurality of mutually independent, permanently magnetized coils of springable magnetic material, each coil being characterized by angularly offset terminal portions, and a base block for receiving the said terminal portions of all of the coils to secure the respective coils with respect to each other.

3. A magnetic structure for use in an ion-trap, said structure comprising a plurality of individually magnetized coils of springable magnetic material, each said coil being characterized by angularly offset terminal portions, and non-magnetic base block means for receiving the said coil ends and said base block means being arranged to maintain the coils in parallel relationship.

4. A magnetic structure for use in an ion-trap, said structure comprising a plurality of individually magnetized coils of springable magnetic material, said coils being of substantially equal diameter when relaxed, and the ends of each coil extending oppositely outwardly and then downwardly, each end portion of a coil being similar to the corresponding end portion of each other coil, and a base block to receive the said corresponding ends, said base block being of tubular form and having groove-forming channels in its inner wall to receive the said downwardly extending coil end portions.

5. A magnetic structure for use in an ion-trap, said structure comprising a uniform diameter helix of springable magnetic material, the convolutions of said helix being individually magnetized with the respective magnetic poles in mutual alignment, the ends of said helix extending oppositely outwardly and then parallel to the helical axis to provide finger grip portions for manually distorting the helix to increase the effective inside diameter thereof.

6. A magnetic structure for use in an ion-trap, said structure comprising a uniform diameter helix of springable magnetic material, the convolutions of said helix being individually magnetized with the respective magnetic poles in mutual alignment, the ends of said helix extending oppositely outwardly and then in mutually parallel relationship to provide finger piece means for manually distorting the helix to increase the effective inside diameter thereof.

7. In a magnetic structure for use in an ion-trap—as an article of manufacture—a resilient magnetic element extending substantially in the form of a loop with overlapped relatively movable end portions, said end portions upon being shifted serving to contract and expand the loop.

8. In a magnetic structure for use in an ion-trap—as an article of manufacture—a clamp for application to the end of a magnetic coil which is to encircle a part of a cathode ray tube, said clamp including a body of material formed with a socket to receive and retain the coil end.

9. In a magnetic structure for use in an ion-trap—as an article of manufacture—a clamp for application to the ends of magnetic coils which are to encircle a part of a cathode ray tube, said clamp including a body of non-magnetic material formed with a plurality of sockets extending parallel to and spaced from each other and each of which are to receive and retain one of the coil ends.

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