

[54] **FILM INSERTION AND REMOVAL
DEVICE FOR USE WITH A CATHODE
RAY TUBE**

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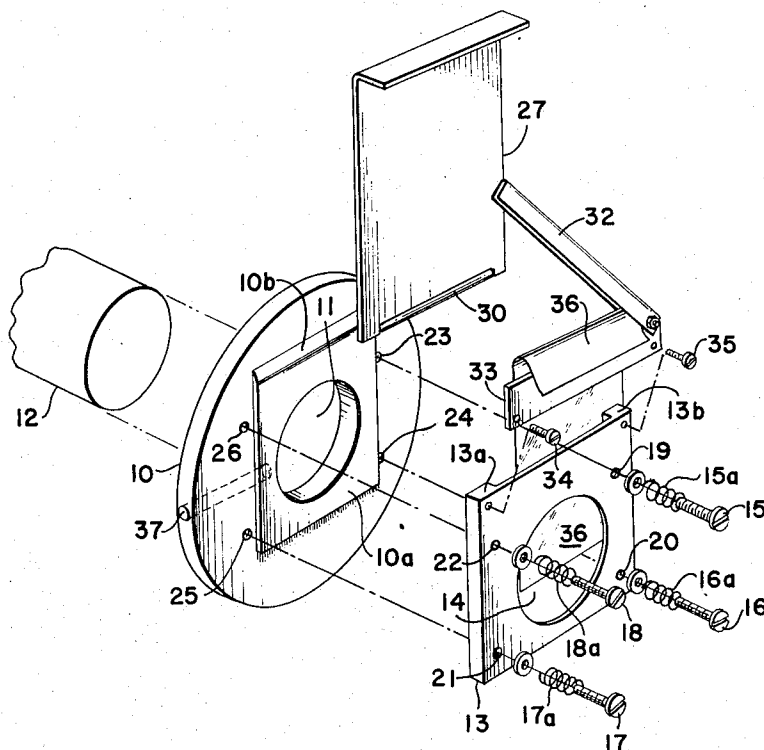
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[57] **ABSTRACT**

An assembly which facilitates the insertion and removal of a sheet of film which is positioned adjacent the face of the cathode ray tube. Film, such as that employed in photochromic techniques, positioned against the face of a cathode ray tube generating an ultra-violet beam, for example, can be drawn into intimate contact with the faceplate of the cathode ray tube by means of a partial vacuum applied between the film and the faceplate through a conduit in a member of the assembly which receives the faceplate portion of the cathode ray tube. Because of the chemical coatings on the film and the warmer temperature associated with the operation of photochromic equipments, the film frequently sticks to the faceplate. Since photochromic film has limited life, it requires relatively frequent replacement which is accomplished by inserting a sliding member between first and second members, the sliding member having a roller positioned along its bottom edge and parallel embossments along its sides for "peeling" the film from the faceplate of the cathode ray tube without marring or disfiguring the surface of the faceplate.

8 Claims, 2 Drawing Figures



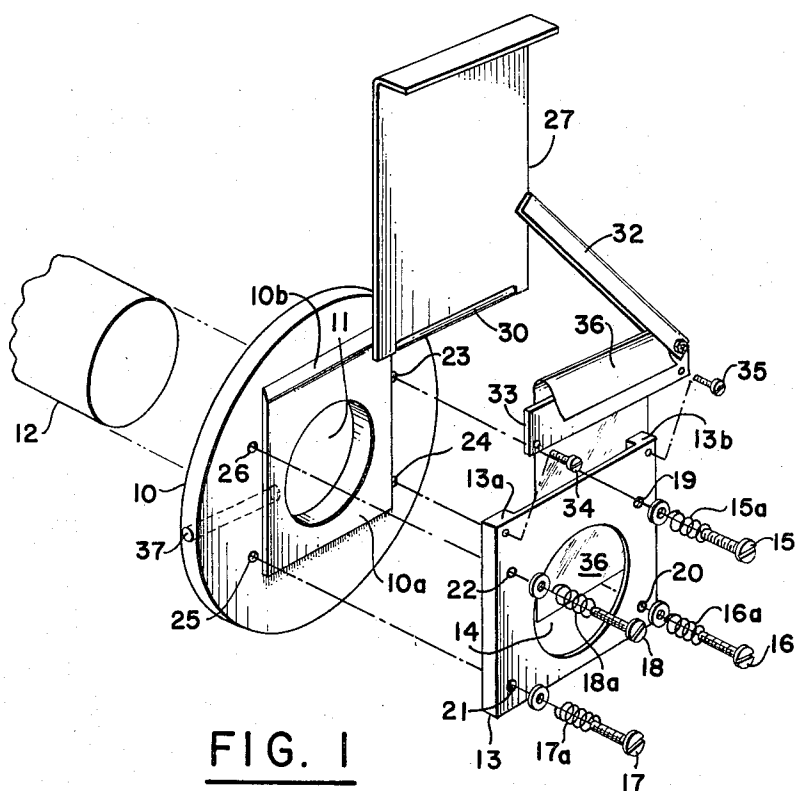


FIG. 1

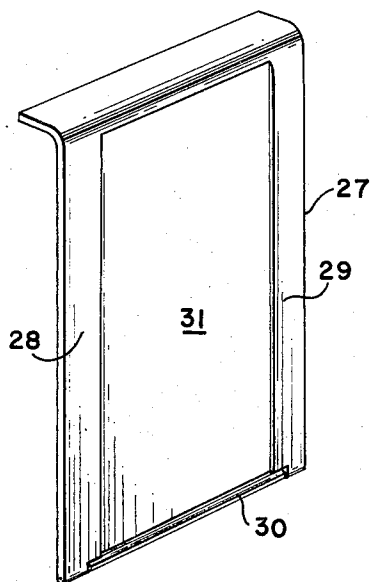


FIG. 2

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FILM INSERTION AND REMOVAL DEVICE FOR USE WITH A CATHODE RAY TUBE

STATEMENT OF GOVERNMENT INTEREST

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

BACKGROUND OF THE INVENTION

In systems such as the Navy Tactical Data System (NTDS) it is often desirable to display available tactical data on a large screen for convenient and accurate visual presentation. Such large screen displays may employ an optical projection system and since the tactical data is frequently changing with respect to the disposition of aircraft, vessels, etc. the information portrayed on a large screen display must be constantly changed if it is to be up-to-date and accurate. Accordingly, a photochromic technique may be availed of by means of which symbols representing data may be "written" on a sheet of photochromic film which is responsive to ultraviolet energy. The symbols are caused to appear on the photochromic film by directing a beam of ultraviolet light generated by a suitable cathode ray tube to its faceplate which is positioned in intimate contact with the photochromic film. The photochromic film becomes darkened upon exposure to the beam of ultraviolet light and, in response to the movement of the ultraviolet ray beam, the darkened lines generated by the trace of the cathode ray tube can be made to portray different symbols, for example, representative of each different kind of data presented.

One of the advantageous features of the use of photochromic film is that the information thus caused to appear on the film, gradually fades and bleaches out in a relatively short time so that, by the time a new data is developed and available, the old data has effectively bleached itself out of the visual presentation recorded on the photochromic film.

In order to control and enhance the bleaching out process it is desirable to maintain a uniformly warm temperature of the film. Accordingly, warm air is circulated against the film and this warm air, together with other heat generated in the optical system which enlarges and projects the visual data, may, and frequently does, cause the chemical coatings on the photochromic film to become tacky and adhesive.

Additionally, in order for the visual presentation to have the best resolution, the photochromic film must be in direct, intimate contact with the faceplate of the cathode ray tube whose beam is being employed to "write" the symbolic information on the photochromic film. One technique used to ensure intimate contact of the film with the faceplate is to apply a partial vacuum to the area surrounding the faceplate so that the film is drawn into direct, intimate contact with the faceplate of the cathode ray tube. The partial vacuum and the adhesive condition of the film surface causes it to adhere to the faceplate of the cathode ray tube.

Moreover, photochromic film currently in use with the Navy Tactical Data System Large Screen Display has a relatively limited life of the order of four to eight hours of actual use, so that the film must be frequently replaced. In an intricate and complex optical projection system of the type employed in conjunction with the use of photochromic techniques it is highly desirable that the cathode ray tube remain undisturbed, and not be removed merely for the purpose of withdrawing a sheet of photochromic film which is adhered to its face.

Accordingly, it is highly desirable that means be provided for use in connection with the film and the cathode ray tube for conveniently and quickly removing photochromic film without marring, damaging, or defacing the faceplate of the cathode ray tube or disturbing its position in the optical system. An ancillary requirement is, of course, that the same means which is used to remove the film from the face of the cathode ray tube, be afford insertion of a new replacement

sheet of film properly positioned against the faceplate of the cathode ray tube in a quick convenient, expeditious manner.

SUMMARY OF THE INVENTION

The present invention contemplates an assembly or device for meeting the requirements of insertion and removal of a sheet of film adjacent the face of the cathode ray tube, such as may be employed in NTDS, for example, to generate a large screen display of real-time tactical data. The assembly of the present invention includes a first member having an aperture configured and dimensioned to receive the faceplate portion of the cathode ray tube. A second member also having a similarly dimensioned aperture is supported on the first member for resilient movement relative to the plane of the face of the cathode ray tube. This movement may typically be achieved by a number of suitably spaced spring-loaded supports which permit movement of the second member toward or away from the face of the cathode ray tube.

The aperture in the second member is aligned with the aperture in the first member, so that the film inserted therebetween is exposed to view together with the face of the cathode ray tube. A suitable clamp means may be included as a part of the second member to retain the film in its proper position between the apertures of the first and second members.

For purposes of removing the film from the face of the cathode ray tube without damaging, defacing, or marring the face of the cathode ray tube, a third or sliding member is provided and is of a size and shape suitable for being slidably received between the first and second members. The third or sliding member has parallel embossed portions running along its sides for sliding engagement with the first member on opposite sides of the aperture. Additionally, a small diameter, elongate roller is supported along the lower edge of the sliding member and is so disposed that it does not extend beyond the plane defined by the recessed portion of the sliding member between the two parallel side embossments. Accordingly, when the sliding member is inserted between the first and second members, it operates by reason of its embossment configuration and recessed elongate roller to "peel" the film from the face of the cathode ray tube in a manner of operation which prevents the sliding member from touching any part of the face of the cathode ray tube.

After the sliding member is thus inserted, the photochromic film may readily be removed for replacement by a fresh, new sheet of film to maintain the efficiency of the photochromic phenomena employed in the system. By reason of the configuration of each of the coacting members of the assembly of the present invention and the coaction of the embossments which are brought into sliding engagement between members of the assembly, the cathode ray tube is maintained in a desired, usable state without scratching, marring or defacement of its faceplate.

A preferred embodiment of the present invention may include aligned and engaging embossments on the first and second members to facilitate the sliding insertion of the sliding member and may as well include a conduit for the application of a partial vacuum in the area where the faceplate of the cathode ray tube is positioned. The partial vacuum draws the photochromic film into direct, intimate contact with the face insuring finer and more accurate resolution of the visual data caused to be portrayed on the photochromic film by the controlled operation of the cathode ray tube which typically may produce an ultraviolet ray beam, for example.

Accordingly, it is a primary object of the present invention to provide an assembly for the insertion and removal of a sheet of film which it is desired to be positioned adjacent the face of a cathode ray tube.

An equally important object of the present invention is to provide such a device which prevents any scratching, marring, defacing or damage to the face of the cathode ray tube in the operation of inserting and removing the film.

Yet another most important object of the present invention is to provide such an assembly which is operative in a manner that does not require removal, repositioning or other spatial disturbance of the cathode ray tube relative to the optical system with which it is employed.

These and other features, objects and advantages of the present invention will be better appreciated from an understanding of a preferred embodiment of the new method as disclosed in the following description and as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is an exploded view of the preferred embodiment of the present invention;

FIG. 2 is an illustration showing the details of the construction of the sliding member of the assembly illustrated in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 illustrates, in an exploded fashion, a preferred embodiment of the present invention. A first member 10, has an aperture therein 11 which may be cylindrical in shape. The aperture 11 is configured to receive the faceplate portion of a cathode ray tube 12. A second member 13 is similarly provided with an aperture 14 and is arranged to be resiliently supported on the first member 10 so that the second member 13 is capable of resilient movement relative to the plane of the face of the cathode ray tube 12 positioned in the aperture 11 of the first member 10.

A suitable arrangement for such resilient support may comprise four screws 15, 16, 17, and 18, spring-loaded by respectively associated springs 15a, 16a, 17a, and 18a, inserted through appropriately positioned holes 19, 20, 21, and 22 in the second member 13, and screwed into the tapped folds 23, 24, 25, and 26 of the first member 10.

Accordingly, the second member 13 may be moved against the spring-loaded action of its supporting screws 15, 16, 17, and 18 to permit the insertion of a third or sliding member 27 between the first member 10 and the second member 13. The reverse side of sliding member 27 illustrated in FIG. 1 is shown in FIG. 2, and it will be noted that parallel embossed side portions 28, and 29 extending the length of the entire member 27. Additionally, a small diameter, elongate roller 30 is supported along its lower edge. The sliding member 27 as illustrated in FIG. 2 also has a recessed center portion 31 which is defined by the embossments 28, and 29; the small diameter, elongate roller 30 is so proportioned and supported that it does not extend to the plane of the embossments 28 and 29 and preferably does not extend beyond the recessed portion 31 of the sliding member 27 for reasons which will be more fully explained and better understood from a description of typical operation of the assembly of the present invention.

The second member 13 also includes a clamping means for the purpose of securing a sheet of film between the aperture 11 of the first member 10 and the aperture 14 of the second member 13. The clamping means may comprise an elongate member of U-shaped cross-section which is so dimensioned as to fit snugly over an extension member 33 secured to the top of the second member 13 by appropriate means such as screws 34 and 35 illustrated in FIG. 1.

It should be noted that second member 13 has two embossed portions 13a and 13b which are disposed along the sides of the first member 13 in parallel relationship and the purpose of this particular configuration of the second member 13 will appear more fully in an explanation of the operation of the assembly of the present invention.

It should also be noted that the first member 10 has an embossed portion 10a which spans the aperture 11 and has parallel edges which are so dimensioned as to engage and fit with the edges of the two embossed portions 13a and 13b of the second member 13. Additionally, the embossed portion 10a of

the first member 10 has a beveled top edge 10b for purposes of expediting the insertion of the sliding member 27 in a manner which will be readily understood by the description of a typical operation of the present invention which follows.

OPERATION

In the operation of the present invention it is to be understood that first member 10 and the second member 13 are assembled by means of the screws 15, 16, 17, and 18 together with the respective springs 15a, 16a, 17a, and 18a to provide for resilient movement of the second member 13 in a direction away from the plane of the face of the cathode ray tube 12 which is positioned, supported and rests within the aperture 11 of the first member 10.

The sheet of film, such as photochromic material, may be inserted by hand between the first member 10 and the second member 13 so that it is positioned to entirely cover the aperture 11 in which the face of the cathode ray tube 12 is positioned. In a preferred embodiment of the present invention a vacuum is applied to the area between the film 36 and the faceplate portion of the cathode ray tube 12 through a conduit 37 provided in the first member 10 for this purpose. The vacuum draws the film 36 into intimate, direct contact with the faceplate portion of the cathode ray tube 12 and enhances the accuracy and resolution of the data information, symbols, etc. visually portrayed on the photochromic film by the operation of ultra-violet beam of light developed by the cathode ray tube 12, for example.

It is also customary to maintain the photographic film 36 at a uniform elevated temperature so that the rate of decay or "bleaching" of the sequentially portrayed dynamic information caused to appear on the film, will be "bleached" uniformly with respect to time to permit additional new data to be portrayed on the photographic film 36 as it becomes available. In one equipment which employed a preferred embodiment of the present invention the elevated temperature was maintained on the photographic film 36 was approximately 60° C or the equivalent of 140° F. Those familiar with, and knowledgeable in the employment of photochromic techniques, and more particularly the use of photographic films, will readily realize that such temperatures, in addition to heat which may be generated by an associated large screen projection system, will very likely cause most photochromic film to have a adhesive, tacky quality so that the film will tend to adhere tenaciously to the surface of the cathode ray tube.

Furthermore, photochromic films have a limited life so that after four to eight hours of usage, for example, their efficiency significantly declines, requiring that they be regularly and periodically replaced. As was previously mentioned, it is highly desirable in most large screen display systems that the cathode ray tube its optical alignment with the associated projection system, etc. not be disturbed when it is necessary to replace photochromic film. Accordingly, in the operation of the present invention, the sliding member 27 is inserted between the first member 10 and the second member 13 and it is guided downwardly by the embossed portions 13a and 13b of the second member 13 with the roller 30 in immediate contact with the film between the film and the first member 10. As the sliding member 27 is inserted downwardly, the roller 30 peels the film from the face of the cathode ray tube 12 while the embossed portions 28 and 29 in contact with the embossed portion 10a of the first member 10, ensure that the sliding member 27, and more particularly its recessed portion cannot possibly come in contact with the faceplate of the cathode ray tube 12 to damage it, deface it, or mar it in any way. When the sliding member 27 has been inserted fully down into the assembly between first member 10 and the second member 13, film 36 is then unclamped from the clamp 32 and removed by hand without disturbing the cathode ray tube or any part of portion of associated optical systems and projection systems.

After the sliding member 27 has been removed by drawing it up out from between the first member 10 and the second

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member 13, the new piece of film may be inserted by hand down into the space between the first member 10 and the second member 13, clamped in place by means of clamp 32, so that the system is in a condition to again function normally.

It should be noted that the embossed portion 10a of the first member 10 has a beveled portion at its top edge 10b to facilitate the entry of the sliding member 27 between the first member 10 and the second member 13. Moreover, the embossed portion 10a of the first member 10 is so dimensioned that its parallel edges fit into positioning engagement between the embossed portions 13a and 13b of the second member 13, thus assuring the correct positioning of the second member 13 relative to the first member 10 and also providing a guide for the insertion of sliding member 27.

It will now be apparent to those skilled in the art that the present invention contemplates that the elongate roller at the bottom edge of the sliding member 27 be so positioned and dimensioned that it does not extend beyond the plane of embossed portions 28 and 29 of the sliding member 27. This ensures that the roller 30 cannot come in contact with the face of the cathode ray tube 12 when the sliding member 27 is inserted in the manner previously described.

In the preferred embodiment it is highly desirable that the elongate roller 30 be so positioned and be of such diameter that it does not extend beyond the recessed portion 31 of sliding member 27 to further ensure that it cannot come in contact with the faceplate portion of the cathode ray tube 12 when the sliding member is inserted between the first member 10 and the second member 13 for purposes of removing the film 36 from its position adhering to the faceplate.

Those knowledgeable in the related arts will readily appreciate that the concept of the present invention is such that it ensures quick, efficient, and safe removal of photographic film from a condition of adhering to the faceplate of a cathode ray tube, while at the same time assuring that such removal will be affected without in any way disturbing or damaging the faceplate on the tube.

Moreover, the removal of the photographic film is accomplished with the entire cathode ray tube assembly and associated optical systems remaining in place so that optical alignment, relative positioning of related elements, etc. are not in any way disturbed.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the ap-

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pended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An assembly for the insertion and removal of a sheet of film adjacent the face of a cathode ray tube comprising:
 - a first member having an aperture therein for receiving the faceplate portion of said cathode ray tube;
 - a second member having an aperture therein, and being supported on said first member for resilient movement relative to the plane of the face of said cathode ray tube and with its aperture in alignment with said aperture in said first member;
 - a sliding member configured to be received between said first and second member in resilient engagement therewith,
 - said sliding member having parallel embossments for slidably engaging said first member on opposite sides of its aperture and having an elongate roller supported along its lower edge; and
 - clamp means for retaining said film between the apertures of said first and second members.
2. An assembly as claimed in claim 1 wherein said elongate roller is proportioned and supported so that its cylindrical surface does not extend to the plane of said sliding member.
3. An assembly as claimed in claim 1 wherein said elongate roller is proportioned and supported so that its cylindrical surface does not extend beyond the plane of the recessed portion of said sliding member between said embossments.
4. An assembly as claimed in claim 1 wherein said first member includes a conduit communicating with its aperture for applying a partial vacuum between said film and said faceplate portion of said cathode ray tube.
5. An assembly as claimed in claim 1 wherein said clamp means comprises an elongate, U-shaped cross-section member pivotably supported for clamping engagement of said film.
6. An assembly as claimed in claim 1 wherein said first member includes an embossed area encompassing its aperture and having at least two parallel edges.
7. An assembly as claimed in claim 6 wherein a third edge of said embossed area is beveled for facilitating the sliding engagement of said sliding member therewith.
8. An assembly as claimed in claim 6 wherein said second member has side embossments with parallel inner edges disposed for edgewise engagement with said two parallel edges of the embossment of said first member.

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