

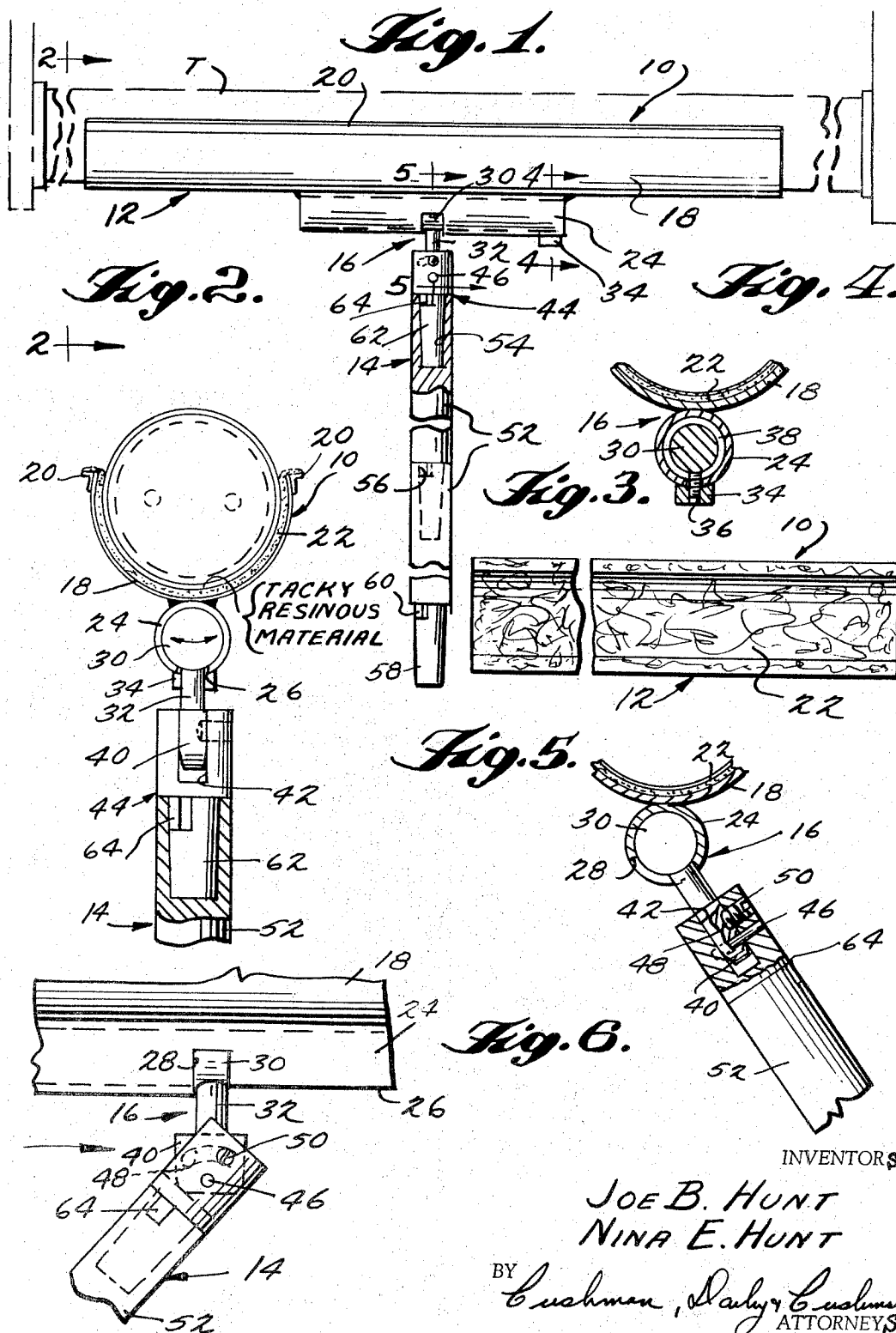
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FLUORESCENT TUBE CHANGING DEVICE

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FLUORESCENT TUBE CHANGING DEVICE

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ABSTRACT OF THE DISCLOSURE

A device for changing fluorescent tubes and the like having a generally semicylindrical head with the interior surface thereof provided with a tacky resinous material capable of sticking to the exterior periphery of the tube when contacted therewith so as to prevent sliding movement of the head with respect to the tube but to permit ready disengagement of the head from the tube in response to transverse movement of the head away from the tube and an elongated handle means connected with the head for effecting the movements of the head while in contact with the tube necessary to accomplish the changing of the tube.

This invention relates to maintenance of fluorescent lighting fixtures and the like and more particularly to a device for changing fluorescent tubes.

In our copending applications Serial No. 479,085, filed August 12, 1965 and Serial No. 502,933, filed October 23, 1965, there is disclosed a device for cleaning fluorescent tubes and a device for cleaning fluorescent fixtures, such devices being provided with an elongated handle assembly which may be used mutually with the cleaning head disclosed in either application. While cleaning both the tubes and the fixtures is an important aspect of fluorescent fixture maintenance, any program of total maintenance would of necessity include means for effecting replacement of burned out tubes. The replacement of tubes, like cleaning maintenance, often presents difficulties both from the standpoint of time required and the hazards involved. The present invention is adapted to be used in conjunction with a fluorescent tube cleaning device and a fluorescent fixture cleaning device of the type described in our aforesaid applications. Thus, the present tube changing device includes a head which may be used interchangeably with the handle assembly disclosed as part of the cleaning devices of both of the aforesaid applications.

Accordingly, an object of the present invention is the provision of a device for changing fluorescent tubes and the like which permits the operator to effect replacement of the tubes from a position remote from the fixture itself.

Still another object of the present invention is the provision of a device for changing fluorescent tubes which is engaged with and secured to a fluorescent tube by means of a tacky resinous material which serves to prevent relative sliding movement between the head and the tube so that the necessary movements to effect release and securement of the tube with the fixture by effecting appropriate movements of the head while in engagement with the tube through an elongated handle assembly.

Another object of the present invention is the provision of a tube changing device of the type described having an improved compound pivotal connection between the handle means and head of the device which greatly facilitates the transmission of the necessary movements from the handle assembly to the head to effect release and securement of the tube with the fixture.

Still another object of the present invention is the provision of a device for changing fluorescent tubes and the like which is simple in construction, easy to operate and economical to manufacture.

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These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawings wherein an illustrative embodiment is shown.

In the drawings:

FIGURE 1 is a side elevational view of a tube changing device embodying the principles of the present invention showing the same in operative engagement with a fluorescent tube;

FIGURE 2 is an enlarged fragmentary sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a top plan view of the device;

FIGURE 4 is an enlarged fragmentary sectional view taken along the line 4—4 of FIGURE 1;

FIGURE 5 is an enlarged fragmentary sectional view taken along the line 5—5 of FIGURE 1; and

FIGURE 6 is an enlarged fragmentary elevational view of the device showing the pivotal connection between the head and the handle means.

Referring now more particularly to the drawings, there is shown in FIGURES 1—3 a fluorescent tube changing device, generally indicated at 10, embodying the principles of the present invention. The device includes a tube engaging head, generally indicated at 12, an elongated handle assembly 14, and a compound pivotal connecting means, generally indicated at 16, for connecting the handle assembly 14 with the head 12.

The head 12 comprises an elongated semicylindrical member 18, which is generally of a size to receive a fluorescent tube or the like T therein. Preferably, the free longitudinal edges of the head member 18 are provided with outwardly extending flange portions 20. In the embodiment shown, the flanges are provided by fixedly securing, as by welding or the like, angle iron members to the outer marginal edge portions of the semicylindrical member. With this construction, the body is preferably made of a metal such as aluminum or aluminum alloy, although it will be understood that a plastic material may be utilized if desired.

Secured to the interior surface of the semicylindrical member 18, including the outwardly extending flanges 20, is a sheet of padding material 22 which provides a suitable glass engaging surface for the head. Preferably, the padding 22 is of leather with the grain side thereof suitably secured to the interior surface of the member 18, as by an adhesive or the like. The flesh side of the leather is thus exposed for engagement with the fluorescent tube T. While leather is preferred, other materials having similar padding characteristics may be utilized, if desired.

An important aspect of the present invention is the provision of a tacky resinous material on the tube engaging surface of the padding 22. A preferred material is polyvinyl chloride plastisol, heated to about 325° F. to semifuse it and render it tacky. An exemplary polyvinyl chloride plastisol is 60 parts polyvinyl chloride and 40 parts diacetylphthalate. Other plastisols may be used, as, for example, any of those recited in U.S. Patent No. 3,202,307, normally without the foaming agent. Organosols may also be used. The tacky resinous material is preferably coated onto the padding 22 at least throughout the central portion thereof, although it may extend upwardly toward the edges adjacent the flanges 20, if desired.

The compound pivotal connecting means 16 provides for limited pivotal movement between the head 12 and the handle assembly 14 about a first axis parallel with the axis of the head which is spaced closely from the central exterior periphery of the head and about a second axis spaced below and perpendicular to the first axis. While any suitable means may be utilized to provide these lim-

ited pivotal movements, the preferred structure, as shown, includes a cylindrical member 24 rigidly secured, as by welding or the like, to the central exterior periphery of the body 18. The cylindrical member 24 has a slot 26 formed therein extending from one end thereof longitudinally to the central portion thereof at a position diametrically opposed to the position of attachment to the semicylindrical head member 18. The inner end of the slot 26 communicates with the central portion of a radially extending slot 28.

Rotatably mounted with the cylindrical member 24 is a shaft 30 having a mounting arm 32 extending radially outwardly from the central portion thereof. As best shown in FIGURES 2 and 5, the mounting arm 32 is adapted to extend within the longitudinal slot 26 and is disposed within the radial slot 28 when the shaft 30 is fully mounted within the cylindrical member 24. Preferably, the radial slot 28 is of a size with respect to the mounted arm sufficient to permit a pivotal movement of the shaft 30 within the cylindrical member 24 of approximately 90°.

As best shown in FIGURE 4, the end of the cylindrical member 24, opposite from the longitudinal slot 26, has an interiorly threaded nut-like member 34 secured to the exterior surface thereof for receiving a set screw 36. The set screw 36 extends through a suitable opening in the wall of the cylindrical member 24 and is adapted to enter an annular groove or arcuate slot 38 formed in the adjacent exterior periphery of the shaft 30. The set screw 36 thus serves to detachably retain the shaft 30 within the cylindrical member 24 while at the same time permitting the aforesaid 90° pivotal movement of the shaft within the cylindrical member.

The outer end of the mounting arm 32 is formed with an enlarged portion 40 which is received within a slot 42 formed in one end of a handle engaging member, generally indicated at 44. The slotted end of the member 44 and the enlarged end portion of the mounting arm 32 are suitably apertured to receive a pivot pin 46 thus providing for a pivotal movement between the member 44 and the mounting arm 32 about an axis perpendicular to the shaft 30.

As best shown in FIGURES 5 and 6, one surface of the end portion 40 is formed with a slot 48 which is arcuate about the axis of the pivot pin 46. A set screw 50 is threadedly engaged within the adjacent portion of the slotted end of the member 44 and is adapted to enter the arcuate slot 48 so as to limit the pivotal movement to an extent of approximately 90°.

Any suitable means may be provided for connecting the handle engaging member 44 with the handle assembly 14. In the preferred embodiment shown, the handle assembly is made up of a plurality of handle sections 52 of substantially identical construction. As shown, each handle section at one end is provided with a socket 54 which tapers slightly inwardly, the peripheral wall forming the socket 54 having a pair of diametrically opposed, rectangularly shaped recesses 56 formed in the end thereof. The opposite end of each handle section 52 is shaped to engage within the socket and recesses 56 of the opposite end and, as shown, includes a reduced stem portion 58 tapered slightly in an inwardly diverging relation. At the inner end of the stem portion there is provided a pair of diametrically opposed, rectangularly shaped lugs 60 extending radially outwardly therefrom of a size to engage within the recesses 56.

In a like manner, the handle engaging member 44 is formed with a tapered surface 62 at the opposite end thereof shaped to engage within a socket 54. Again, at the inner end of the tapered surface 62 a pair of diametrically opposed lugs 64 are provided of a size to engage within the recesses 56.

In the operation of the device 10, the configuration of the head 12 and the provision of the tacky resinous material on the tube engaging surface of the padding 22 provide for an effective securement of the head to the tube T

so that appropriate movements may be imparted to the head through the handle assembly 14 to effect either the securement or release of the tube from its fixture. This operative engagement of the head 12 with the tube is effected simply by moving the head transversely toward the tube until the tacky resinous material contacts the exterior periphery of the tube. The nature of the material is such that this engagement may be readily disconnected by simply moving the head transversely away from the tube.

When the head is in operative engagement with the tube, the tacky resinous material will effectively prevent any relative sliding movement between the exterior periphery of the tube and the padding 22. In this way, the head 22 is simply engaged and disengaged with the tube and moved through the handle assembly to effect the desired movements of the tube to release or secure the same within the fixture.

For example, in replacing a conventional bi-pin tube T, the head is first turned to the right or left 1/8th of a turn from the center position shown in FIGURE 2. The head is then raised through the handle assembly 14 to the tube to be removed and pressed against the tube to effect operative engagement. Next, by applying a force to the handle which tends to effect a pivotal movement of the shaft 30 within the cylindrical member 24 and hence a turning movement of the head about the axis of the tube, the tube will be turned relative to its fixture to a release position. As stated above, the action of the tacky resinous material is such as to prevent any relative sliding movement between the head and the tube so that the turning or pivotal action imparted to the head 12 will likewise be imparted to the tube T engaged therewith. Once the tube has been thus released from its fixture, the operator can carry the tube downwardly through manipulation of the handle assembly and disengage it from the head by simply moving it transversely away from the head. A replacement tube is secured within the fixture by reversing the above procedure.

In removing a single pin or slim-line tube with the device 10 of the present invention, the head is moved upwardly into operative engagement with the tube, as before, with the handle assembly pivoted about the pin 46 to an approximately 45° angle, as shown in FIGURE 6. Then, by pressing the handle assembly in a direction toward the spring socket portion of the fixture, the opposite end of the tube is freed from its socket through the movement of the head by the handle. Then by releasing this pressure, both ends become free and the tube can be lowered for changing. This procedure is reversed for replacing the tube.

Preferably, the set screws 36 and 50 may be adjusted to provide a desired amount of frictional resistance to the pivotal movement during the operation. Ordinarily, there should be a moderate amount of friction to alleviate too much freedom of head movement. Where the device is to be used solely with one type of tube, the appropriate set screw may be fully tightened to eliminate the pivotal action which is not needed with the respective tubes, although under most conditions it is desirable to adjust the set screws so that either or both pivotal actions may be utilized when desired.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

It is claimed:

1. A device for changing fluorescent tubes and the like comprising a generally semicylindrical head having interior surface means of the same size as the exterior

periphery of a fluorescent tube arranged to be engaged therewith in response to transverse movement of said head toward the tube, said interior surface means having a tacky resinous material thereon capable of sticking to the exterior periphery of the tube when contacted therewith so as to prevent sliding movement of said interior surface means with respect to the exterior periphery of the tube but to permit ready disengagement of said interior surface means from the exterior periphery of the tube in response to transverse movement of said head away from the tube, and elongated handle means connected with said head for effecting transverse movement of said head into engagement with the exterior periphery of a tube to be changed and a subsequent movement of said head with the tube engaged therewith to release the latter from its fixture and for effecting movement of a replacement tube engaged with said head into securement with the fixture and subsequent transverse movement out of engagement with the secured tube in the fixture.

2. A device as defined in claim 1 wherein said tacky resinous material comprises a semifused polyvinyl chloride plastisol.

3. A device as defined in claim 1 wherein said head includes a sheet of padding material providing the interior surface means upon which said tacky resinous material is carried.

4. A device as defined in claim 3 wherein said padding material is leather, said interior surface means being provided by the flesh side thereof.

5. A device as defined in claim 1 wherein said elongated handle means is connected with said head by means providing for a limited pivotal movement between said elongated handle means and said head about an axis parallel with the axis of said head and spaced closely to the central periphery thereof to facilitate a partial rotational movement of said head about its axis when in engagement with a fluorescent tube of the type which is engaged and released from its fixture by a partial rotational movement of the tube with respect to its fixture.

6. A device as defined in claim 5 wherein said limited pivotal means comprises a cylindrical member fixedly secured to the central peripheral portion of said head, said cylindrical member having an elongated slot extending longitudinally from one end thereof and a radial slot communicating with the inner end of said longitudinal slot, a shaft rotatably mounted within said cylindrical member having a mounting arm extending radially outwardly therefrom through said radial slot.

7. A device as defined in claim 1 wherein said elongated handle means is connected with said head by means providing for a first limited pivotal movement between said elongated handle means and said head about a first

axis parallel with the axis of said head and spaced closely to the central periphery thereof to facilitate a partial rotational movement of said head about its axis when in engagement with a fluorescent tube of the type which is engaged and released from its fixture by a partial rotational movement of the tube with respect to its fixture and for a second limited pivotal movement between said elongated handle means and said head about a second axis spaced from said first axis in a direction away from said head and perpendicular thereto to facilitate a longitudinal movement of said head when in engagement with a fluorescent tube of the type which is engaged and released from its fixture by a longitudinal movement of the tube with respect to its fixture.

8. A device as defined in claim 7 wherein said limited pivotal means comprises a cylindrical member fixedly secured to the central peripheral portion of said head, said cylindrical member having an elongated slot extending longitudinally from one end thereof and a radial slot communicating with the inner end of said longitudinal slot, a shaft rotatably mounted within said cylindrical member, a mounting arm extending radially outwardly from said shaft through said radial slot, said mounting arm having an enlarged outer end portion, a handle engaging member having one end thereof slotted to receive the enlarged end portion of said mounting arm, a pin pivotally interconnecting the slotted end of said handle engaging member with the enlarged end portion of said mounting arm, the opposite end portion of said handle engaging member being shaped to detachably fixedly engaged said elongated handle means.

9. A device as defined in claim 8 wherein said shaft includes an arcuate groove formed in the exterior periphery thereof, a first set screw carried by said cylindrical member for engaging within said arcuate groove, the enlarged end portion of said mounting arm having a slot formed therein arcuate about the axis of said pivot pin and a second set screw carried by the slotted end of said handle engaging member for engagement within the slot formed in said enlarged end portion of said mounting arm.

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