FLUORESCENT FIXTURE CLEANING DEVICE

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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The present invention relates to cleaning lighting fixtures and more particularly a device for cleaning fluorescent lighting fixtures or the like.

In our copending application, Ser. No. 479,085, filed Aug. 12, 1965, there is disclosed a device for cleaning fluorescent tubes including a disposable cleaning head arranged to be detachably connected with an elongated handle assembly whereby the fluorescent tubes may be cleaned without the necessity of gaining close access to the fixture. As stated in the aforesaid application, the cleaning maintenance of fluorescent fixtures is, in many instances, a time-consuming and arduous task, presenting some hazards. In order to maintain the fixtures in a most efficient working order, not only must the tube itself be kept clean to insure that maximum lumen output is provided, but the fixture itself and particularly the reflective surfaces thereof should likewise receive periodic cleaning maintenance. Just as the lumen output of a fixture can be decreased by deposits of dust and dirt on the tube itself, so is the lumen output decreased by the deposit of dust and dirt on the reflective surfaces of the fixture. In order to provide for the greatest efficiency in cleaning maintenance, not only from a standpoint of lumen output but appearance as well, it is necessary to provide a device for cleaning the fixture as well as the fluorescent tubes themselves.

An object of the present invention is to provide a device for cleaning fluorescent fixtures or the like which can be easily operated from a position remote from the fixture itself.

Still another object of the present invention is the provision of a device for cleaning fluorescent fixtures or the like which is simple in construction, effective in operation, and sufficiently economical to manufacture as to provide disposable cleaning parts.

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 an end elevational view of a common fluorescent lighting fixture, with parts broken away for purposes of clear illustration; showing a fixture cleaning device embodying the principles of the present invention in cleaning relation therewith;

FIGURE 2 is a top plan view of the fixture cleaning device;

FIGURE 3 is a side elevational view of the device with certain parts in section for purposes of clear illustration;

FIGURE 4 is an enlarged fragmentary sectional view taken along the line 4—4 of FIGURE 3; and

FIGURE 5 is a fragmentary sectional view taken along the line 5—5 of FIGURE 3.

Referring now more particularly to FIGURES 2–5 of the drawings, there is shown therein a device, generally indicated at 10, embodying the principles of the present invention. In general, the device 10 includes a cleaning head, generally indicated at 12, which preferably is disposable, and a handle assembly, generally indicated at 14, which is detachably, fixedly connected with the cleaning head.

As best shown in FIGURES 3 and 5, the cleaning head 12 comprises a central base portion 16 and a pair of outwardly extending flexible arms 18 and 20. As shown, the base portion is in the form of an annular part 22 having a tubular handle engaging part 24 extending downwardly therefrom. The flexible arms 18 and 20 are preferably of a thin, elongated rectangular configuration in the cross section, as shown in FIGURE 4, and each extends outwardly from the base portion 16 at diametrically opposed positions with respect to the other. Preferably, a pair of triangular strengthening ribs 26 are provided between the annular base part 22 and the adjacent portions of the arms 18 and 20, respectively. The entire cleaning head thus far described, including the base portion 16 and the flexible arms 18 and 20, is preferably made of a non-electrically conductive material, such as plastic or the like. A preferred material is high impact styrene, although other plastic materials may be utilized, if desired.

The cleaning head is preferably made in a one-piece construction by an injection molding process. With this construction of the cleaning head, the arms 18 and 20 are provided with a desired stiffness and flexibility so that they will deflect from their normal position, wherein they extend outwardly from the base portion in widely diverging relation, into a position of substantial alignment.

Referring now more particularly to FIGURES 3 and 4, it will be noted that the cleaning head 12 provides a very widely divergent generally V-shaped surface 28 which, during the cleaning operation, faces upwardly. Provided on the upwardly facing wide V-shaped surface 28 is a cleaning pad, generally indicated at 30. As shown, the arms 18 and 20 are straight and define an angle therebetween of approximately 164°. It is within the contemplation of the present invention, however, that the arms may have a slight curvature, the essential characteristic being that the outer end portions of the arms are capable of deflection when moved upwardly during the cleaning action so as to conform the cleaning pad thereon with a flat horizontal surface to be cleaned.
As will also be noted from FIGURE 3, each arm is disposed at an equal angular distance with respect to a longitudinal axis, indicated at 32, which is coincident with the axis of the annual base part 22 and the axis of the handle assembly 14. In the embodiment shown, each arm extends outwardly from the axis 32 at an angle of the order of 90°.

As best shown in FIGURE 4, the cleaning pad 36 is preferably in the form of a piled fabric having a backing 34 and piles 36 extending upwardly therefrom of the order of ½ inch. As shown, the cleaning pad 36 is secured to the end 30 of the handle assembly by a suitable adhesive of the type which is not attacked by commercial detergents or the like.

Any suitable means may be provided for connecting the tubular handle engaging part 24 of the base portion with the handle assembly 14. In the preferred embodiment shown, the handle assembly is made up of a plurality of handle sections 40 of substantially identical construction. As shown, each handle section at one end is provided with a socket 42 which tapers slightly inwardly, the peripheral wall forming the socket 42 having a pair of diametrically opposed rectangularly shaped recesses 44 formed therein and thereof. The opposite end of each handle section 40 is shaped to engage within the socket 42 and recesses 44 of the opposite end and, as shown, includes a reduced stem portion 46 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 48 extending radially outwardly therefrom of a size to engage within the recesses 44.

In a like manner, the tubular handle engaging part 24 of the cleaning head 12 is formed with a tapered surface similar to the stem 48 for engaging within the socket 42. At the inner end of the tubular handle engaging part a pair of diametrically opposed lugs 50 are provided of a size to engage within the recesses 44.

While it is recognized that the fluorescent fixture cleaning device 10 of the present invention cannot be conveniently used with every fluorescent fixture configuration, it is particularly suited for use with the most common fixture such as illustrated in FIGURE 1 and designated generally by the numeral 52. The fixture 52 embodies a simple rectangular box like frame structure 54 providing a flat planar horizontally extending reflector surface 56. Mounted below the surface 56, as by conventional support sockets 58, is a plurality of fluorescent tubes 60. As is quite common, the fluorescent tubes are simply exposed when the fixture is in use and consequently the reflector surface 56 may be readily cleaned with the device 10 of the present invention without the necessity of gaining immediate access to the fixture. Common flat fixtures with exposed tubes of the type somewhat schematically illustrated at 52 in FIGURE 1 are in widespread use, particularly in industry where relatively high ceilings are more commonly encountered and the problem of access presented is most difficult.

Referring now to FIGURE 1, the device 10 of the present invention is operated to effect a cleaning action of the reflector surface 66 in the following manner. It will be noted from FIGURE 2 that the arms 13 and 20 are in alignment with each other when viewed in plan and have a width of a size permitting the same to engage between two adjacent parallel fluorescent tubes 68 in the fixture 52. With this construction, the present device is first moved, with the operator gripping the handle means 14, until the cleaning head is adjacent the fixture and the arms 13 and 20 are positioned with their longitudinal extent in parallel relation with an adjacent pair of tubes 68 between the latter. The operator then simply moves the cleaning head inwardly by the handle means until the arms 18 and 20 are disposed adjacent the reflector surface 56. It will be noted that the combined thickness of the arms and associated cleaning pad is of a size sufficient to permit the arms to pass between the reflector surface 56 and the adjacent upper periphery of the tubes.

60. After the cleaning head has been inserted into a first position adjacent the reflector surface with the arms parallel to the tubes, the operator then turns the handle means to rotate the cleaning head approximately 90° into a second position, as shown in dotted lines in FIGURE 1. With the cleaning head in this position, the operator then effects the cleaning action by combined upward pushing force or movement, which deflects the arms into a generally straight position so as to conform the cleaning pad with the reflector surface 56, as shown in full lines, and horizontal movement in a direction parallel to the axis of the tubes.

The outward extent of each of the arms and the associated cleaning pad is of a size to engage substantially the entire area of the reflector surface disposed above the two adjacent tubes 68. While the spacing of the tubes will vary depending upon the particular construction of the fixture, in the exemplary embodiment shown in FIGURE 1 which is adapted to receive four fluorescent tubes, the outward extent of the arms is such that the entire reflector surface 56 can be engaged by the cleaning pad by insertion between two separate adjacent pairs of tubes.

Of particular significance in connection with the cleaning head of the present invention is that it is light in weight, made of non-electrically conductive material and is sufficiently economical to manufacture that it may be disposable. In conjunction with these desirable features, the stiffness of the arms insures that an adequate cleaning pressure will be applied at the outer free end portions of the arms due to the wide V-configuration thereof.

The particular construction of the cleaning pad is also of importance in the device of the present invention. The piled fabric pad 36 described above is generally preferred as it achieves an effective cleaning action without excessive frictional contact with the surface of the fixture. Any suitable material may be used in the fibers which make up the pile fabric, a preferred material being a copolymer of vinyl chloride and acrylonitrile (60–40 Dynel), although other vinyl chloride copolymers may be used with advantage. Where the fibers are made of this material the pile is soft in texture, will take a moisture treatment, and will not leave a lint deposit on the fixture. It does not need to be so wet as to cause dripping of moisture while in use and is effective to remove dust from the fixtures without moisture where necessary. Other synthetic and natural fibers may be utilized where desired, such as lamb's wool, nylon and polyethylene terephthalate.

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.

What we claim is:

1. A device for cleaning fluorescent fixtures of the type including a downwardly facing generally horizontally extending reflector surface and at least a pair of exposed fluorescent tubes disposed in parallel spaced relation therebelow comprising an elongated handle having a longitudinal axis, a cleaning head connected with one end of said handle, said cleaning head including a base portion and a pair of straight stiffly flexible arms extending outwardly from said base portion at diametrically opposed positions in widely divergent relation in a direction away from said one handle end, said cleaning head providing surface means facing generally in a direction away from said one handle end and extending to said free end portion of one of said arms to the outer free end portion of the other of said arms, cleaning pad means provided on said surface means, said cleaning pad means comprising a piled fabric having a backing secured to
said surface means of said cleaning head, the width of the arms and base portion of said cleaning head being of a size to pass upwardly in parallel relation between a pair of fluorescent tubes of a fixture into a first position with respect to said fixture, the combined thickness of said arms and the cleaning pad means thereon being of a size to pass between the horizontal reflector surface and tubes of the fixture in response to a 90° pivotal movement of said head about the axis of said handle from said first position into a second position, the outwardly diverging extent and stiffness of said arms being such as to enable said cleaning pad means to engage and clean the area of the horizontal reflector surface above and between the pair of tubes in response to a combined upward force and horizontal movement of said handle in a direction parallel to said tubes when said cleaning head is in said second position.

2. A device as defined in claim 1 wherein said piled fabric has a pile height of approximately ½ inch.

3. A device for cleaning fluorescent fixtures of the type including a downwardly facing generally horizontally extending reflector surface and at least a pair of exposed fluorescent tubes disposed in parallel spaced relation therebelow comprising a disposable cleaning head of plastic material adapted to be detachably fixedly connected with an elongated handle means, said cleaning head including a base portion having means thereon for fixedly engaging one end of an elongated handle means and a pair of straight stiffly flexible arms extending outwardly from said base portion at diametrically opposed positions in widely divergent relation in a direction away from said handle engaging means, said cleaning head providing surface means facing generally in a direction away from said handle engaging means extending from the outer free end portion of one of said arms to the outer free end portion of the other of said arms, cleaning pad means provided on said surface means, said cleaning pad means comprising a piled fabric having a backing secured to said surface means of said cleaning head, the width of the arms and base portion of said cleaning head being of a size to pass upwardly in parallel relation between the pair of fluorescent tubes of a fixture into a first position with respect to said fixture, the combined thickness of said arms and the cleaning pad means thereon being of a size to pass between the horizontal reflector surface and tubes of the fixture in response to a 90° pivotal movement of said head about a vertical axis extending through said base portion from said first position into a second position, the outwardly diverging extent and stiffness of said arms being such as to enable said cleaning pad means to engage and clean the area of the horizontal reflector surface above and between the pair of tubes in response to a combined upward force and horizontal movement of said cleaning head in a direction parallel to said tubes when said cleaning head is in said second position.

4. A device as defined in claim 3 wherein said piled fabric has a pile height of approximately ½ inch.

5. A device as defined in claim 3 wherein said arms are of elongated flat rectangular configuration in section.

6. A device as defined in claim 5 wherein said base portion includes an annular part and reinforcing rib parts between said annular part and said arms.

References Cited

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