

[54] **FLUORESCENT LAMP HANDLING DEVICE**

[76] Inventor: **Bill C. Jordan**, 5014 8th St.,
Alexandria, Va. 22312

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[58] Field of Search..... 294/19 R, 20, 21

[56] **References Cited**

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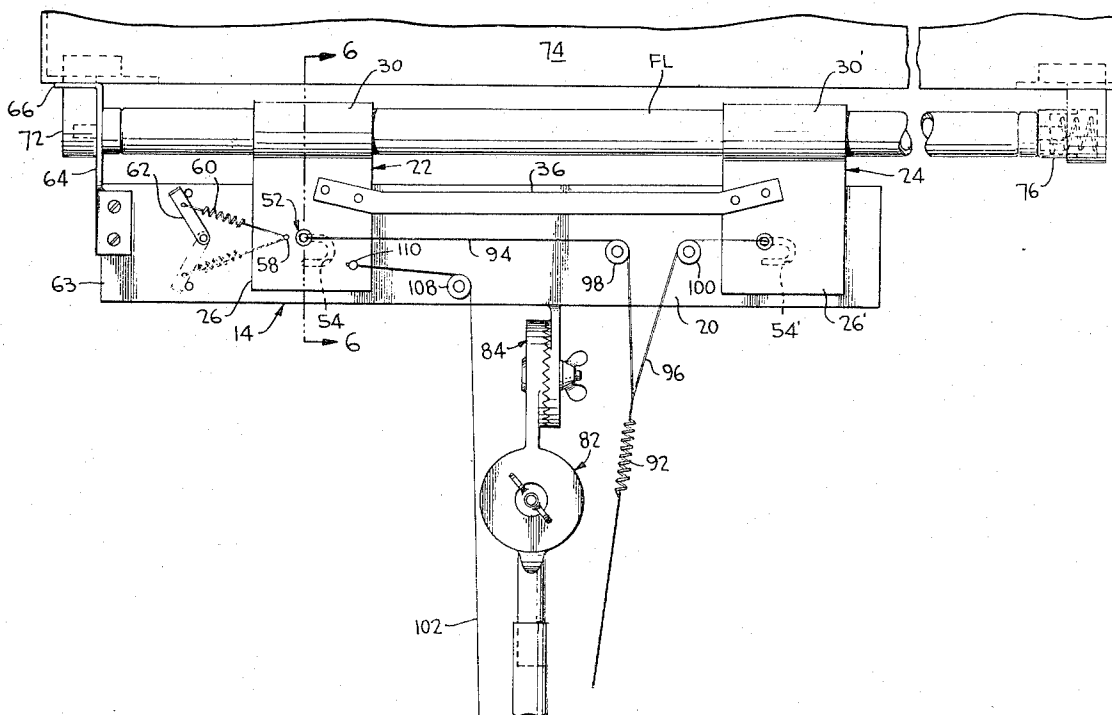
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Primary Examiner—Richard E. Aegerter
Assistant Examiner—Johnny D. Cherry
Attorney, Agent, or Firm—Sherman & Shalloway

[57] **ABSTRACT**

A fluorescent lamp handling device for installing and removing fluorescent lamps on a fixture including a clamping assembly for gripping a fluorescent lamp and a cam mechanism for controlling the position of the clamping assembly relative to a support such that by aligning the support, the cam mechanism can be actuated to move a fluorescent lamp gripped by the clamping assembly in transverse directions to depress a movable, spring biased socket of a fixture receiving one end of the fluorescent lamp and move the other end of the fluorescent lamp relative to a stationary socket of the fixture to permit installation or removal of the fluorescent lamp.

14 Claims, 7 Drawing Figures



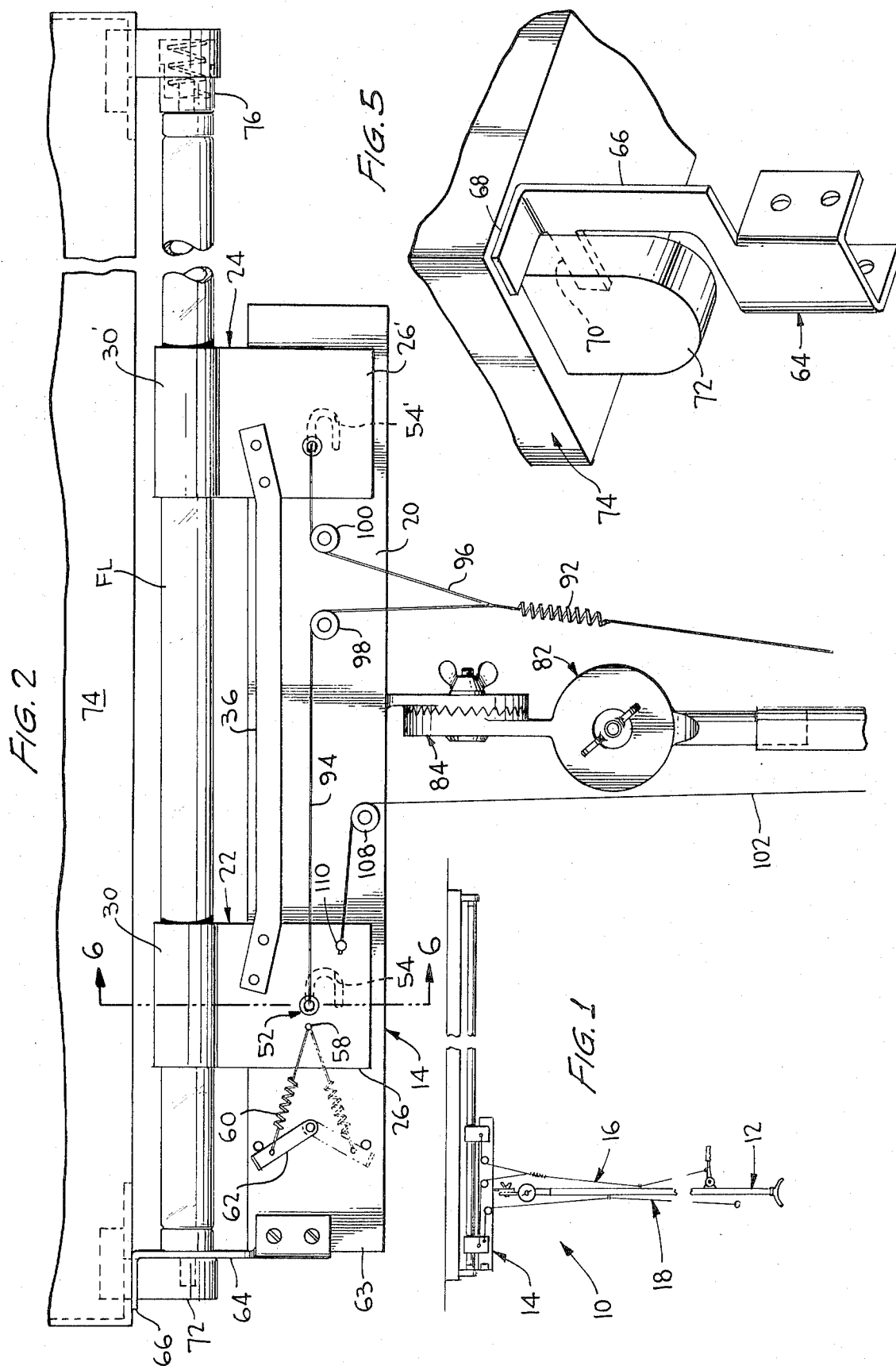


FIG. 3

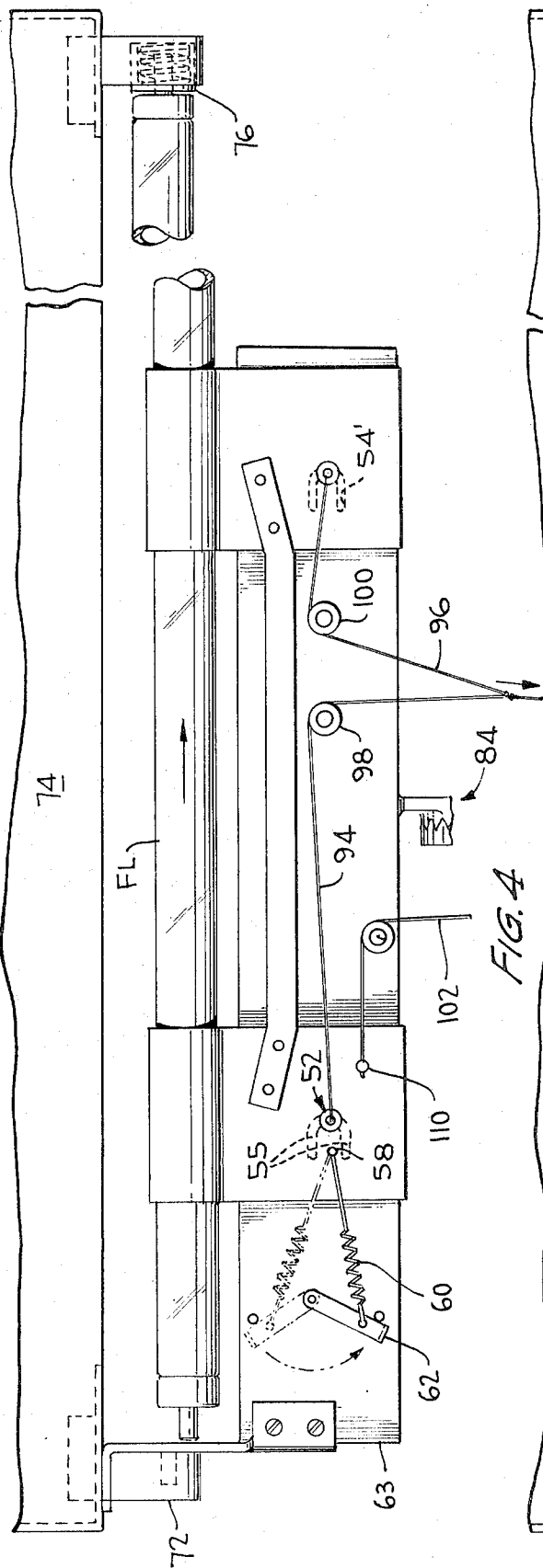


FIG. 4

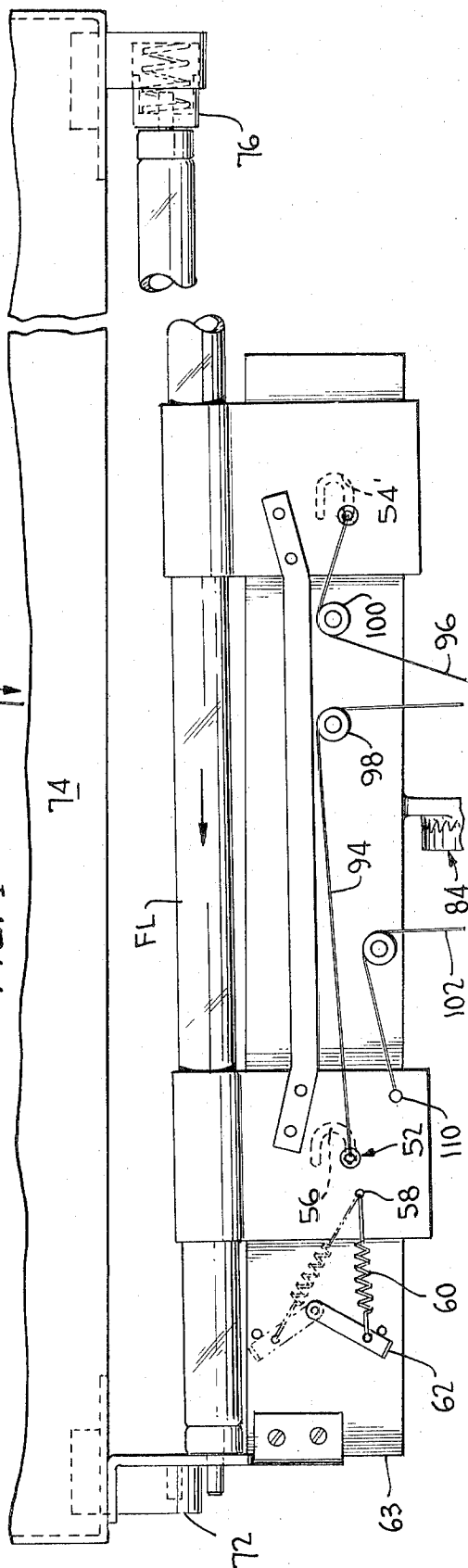


FIG. 6

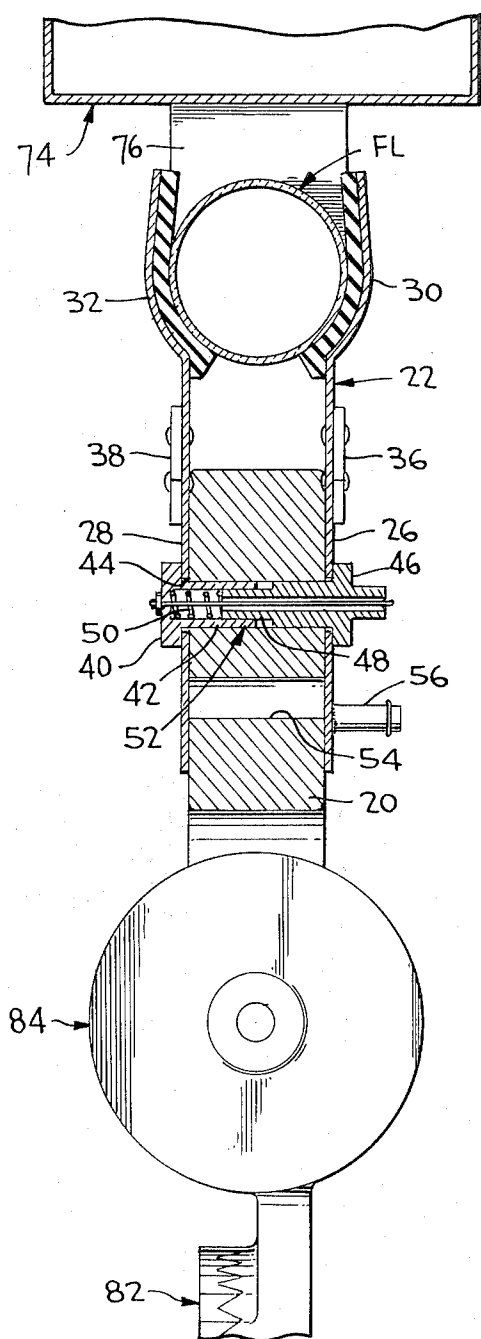
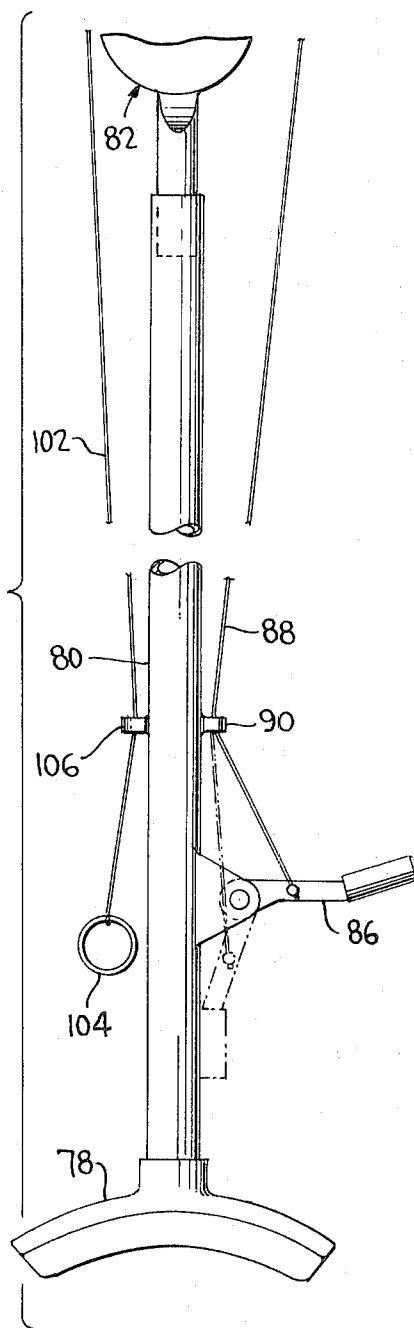


FIG. 7



FLUORESCENT LAMP HANDLING DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention pertains to fluorescent lamps and, more particularly, to a fluorescent lamp handling device for installing and removing fluorescent lamps on inaccessible fixtures.

2. Discussion of the Prior Art

In many commercial establishments and in various buildings with high ceilings, fluorescent lighting is utilized without covers in order to light large areas. Fluorescent lamps utilized in such applications are normally eight feet in length and have a pin extending from either end thereof to receive electricity supplied to the lamp. Fixtures for such fluorescent lamps normally have a movable, spring biased socket for receiving one of the pins such that after insertion of the pin, the socket can be depressed to permit insertion of the pin at the opposite end of the fluorescent lamp in a stationary socket.

In the past, such fluorescent lamps were replaced only during nonbusiness or nonbusy hours due to the interruption to normal activities required to place a ladder or other apparatus beneath the fixture to permit a person to manually replace the fluorescent lamp. Furthermore, many times the fixtures for such fluorescent lamps are disposed over obstacles, such as counters, shelves, or other furniture, thereby requiring a person seeking to replace such fluorescent lamps to either move the obstacle or take dangerous risks to replace the fluorescent lamp.

Devices have been proposed for handling fluorescent lights to facilitate installation in and removal from fixtures; however, such devices have had the disadvantages of being overly complex while still requiring substantial manipulation of the fluorescent lamp and the device. An eight-foot fluorescent lamp represents an unwieldy object which is easily broken and presents dangerous situations when broken; and, accordingly, it is required that devices for handling fluorescent lamps be as safe as possible and not require substantial manipulation.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a fluorescent lamp handling device for installing and removing fluorescent lamps on a fixture avoiding the abovementioned disadvantages of the prior art.

Another object of the present invention is to provide a fluorescent lamp handling device requiring only a single positional movement for installing a fluorescent light on a fixture or removing a fluorescent light from a fixture.

A further object of the present invention is to construct a device for handling fluorescent lamps in such a manner as to permit a fluorescent lamp to be moved in horizontal and vertical directions remotely without moving the device itself.

The present invention has an additional object in that a fluorescent lamp handling device is designed to grip only one end of a fluorescent lamp and includes a cam mechanism for moving the gripped end of the fluorescent lamp transversely in horizontal and vertical directions after a pin at the opposite end of the lamp is in-

serted in a movable, spring biased socket of a fixture to automatically insert the pin at the gripped end of the fluorescent lamp in a stationary socket of the fixture.

Additionally, it is an object of the present invention to construct a fluorescent lamp handling device of a simple nature which can firmly hold an eight-foot fluorescent lamp and permit installation or removal of the fluorescent lamp relative to an inaccessible fixture by positioning the handling device relative to the fixture and actuating a cam mechanism carried thereby to automatically install or remove the fluorescent lamp.

Some of the advantages of the fluorescent lamp handling device of the present invention over the prior art are that the fluorescent lamp handling device is relatively simple in structure, requires only a single positioning of the device for installation or removal of a fluorescent lamp and can be quickly and easily utilized to install or remove fluorescent lamps, even during business hours in a commercial establishment without requiring ladders or other obstructive apparatus to reach inaccessible fixtures.

The present invention is generally characterized in a fluorescent lamp handling device for installing or removing fluorescent lamps on a fixture including a support, a clamping assembly slidably mounted on the support for clamping an end of a fluorescent lamp, a cam mechanism controlling movement of the clamping assembly relative to the support in transverse directions and an actuating assembly connected with the cam mechanism to operate the cam mechanism to move the clamping assembly in the transverse directions whereby a fluorescent lamp clamped in the clamping assembly can be installed on or removed from a fluorescent lighting fixture.

Other objects and advantages of the present invention will become apparent from the following description of the preferred embodiment taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic, broken front elevation of a fluorescent lamp handling device in accordance with the present invention.

FIG. 2 is a broken front elevation of the fluorescent lamp handling device of FIG. 1.

FIGS. 3 and 4 are broken elevations of the fluorescent lamp handling device of FIG. 1 in various stages of removal of a fluorescent lamp from a fixture.

FIG. 5 is a broken perspective of the alignment member of the fluorescent lamp handling device of FIG. 1.

FIG. 6 is a section taken along line 6—6 of FIG. 2.

FIG. 7 is a broken elevation of the operating end of the fluorescent lamp handling device of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The fluorescent lamp handling device 10 of the present invention is illustrated in FIG. 1 and includes as basic components a support assembly 12 adapted to be held by an operator and extending over a substantial length to support a clamping assembly 14 operable by a clamp line assembly 16 to grip a fluorescent lamp to be installed or removed and movable relative to the support assembly 12 by actuation of a movement line assembly 18.

As illustrated in FIG. 6, the support assembly 12 includes a base member 20 rectangular in cross-section and having a length of approximately three feet, and the clamping assembly includes a pair of clamp assemblies 22 and 24 mounted in sliding relation on base member 20, which clamp assemblies are substantially identical in structure. Accordingly, only clamp assembly 22 is described in detail hereinafter with reference to FIG. 6 with it being understood that clamp assembly 24 includes substantially the same structure given the same reference numbers with primes. Clamp assembly 22 includes a pair of plates 26 and 28 slidably engaging opposite sides of base member 20, the plates 26 and 28 having curved ends 30 and 32, respectively, lined with a resilient material such as rubber, to grip a fluorescent lamp FL therebetween. Plates 26, 28 and 26', 28' of each clamp assembly are connected together by straps 36 and 38 such that the clamp assemblies are movable simultaneously. Plates 26 and 28 are controllably interconnected by a fitting 40 having a hollow tubular end 42 extending through an aperture 44 in plate 28 with the head of the fitting 40 engaging the surface of plate 28 and a mating fitting 46 having a central passage therethrough with a cylindrical extension 48 slidably extending within the tubular end 42 of fitting 20. A coiled spring 50 is mounted in compression within fitting 40 to bias fitting 46 away from fitting 40, and the fitting 46 is secured to plate 26 such that the plates 26 and 28 are normally spaced to maintain curved ends 30 and 32 thereof in a non-clamping position.

The fittings 40 and 46 form a cylindrical cam follower generally indicated as 52, the cam follower 52 riding in a U-shaped cam channel 54 formed in base member 20. Cam channel 54 has a pair of legs 55 extending in substantially parallel relation with the longitudinal axis of the fluorescent lamp FL held by the clamp assemblies 22 and 24 and a base 56 connecting the legs 55 and extending substantially transverse thereto such that cam channel 54 has portions to control movement of cam follower 52 in orthogonal directions. Cam channel 54' differs from cam channel 54 only in that the ends of the legs 55' are spaced by a smaller distance in order to compensate for the different positions at which clamp assemblies 22 and 24 engage the fluorescent lamp FL.

Plate 26 has an aperture 58 therein in which is hooked one end of a coiled spring 60 mounted in tension between plate 26 and a control mode lever 62 which is pivotally mounted on a pin at an end 63 of the base member 20 and movable between an installation mode, as illustrated in FIG. 2, and a removal mode, as illustrated in dashed lines in FIG. 2 and in full in FIGS. 3 and 4. Aperture 58 and the pin about which lever 62 pivots are aligned with cam follower 52 such that with the lever positioned for installation, the cam follower will be biased toward the end of the upper leg 55 of the cam channel and with the lever positioned for removal, the cam follower will be biased toward the end of the lower leg 55 of the cam channel. In this manner, the tension from spring 60 biases the clamp assemblies toward the end 63 of the base member 20 to control the position of cam follower 52 in cam channel 54.

At the end 63 of base member 20 is mounted an alignment member 64 having an upstanding leg 66 defining an index for alignment of a fluorescent lamp to be gripped, the leg 66 being bifurcated to provide laterally and longitudinally extending legs 68 and 70, re-

spectively, which are adapted to engage the front and side of a stationary socket 72 of a fluorescent lighting fixture 74, as illustrated in FIG. 5. The fluorescent lighting fixture 74 has a movable, spring biased socket 76 mounted at an opposite end thereof as is conventional.

The support assembly 12 includes a gripping member 78 carried by an extension pole 80 which extends from an operating end to a pair of angular adjustment mechanisms 82 and 84, respectively. The angular adjustment mechanisms 82 and 84 each include a pair of toothed discs with a bolt extending through the center thereof to engage a wing nut on the opposite side thereof. The angular adjustment mechanisms 82 and 84 have central axes transverse to each other such that mechanisms 82 and 84 can be loosened and rotated to adjust the base member 20 mounted on mechanism 84 such that the support assembly can be bent to any angular position to permit the fluorescent lamp handling device 10 to be utilized to replace fluorescent lamps on inaccessible fixtures.

The clamping line assembly 16 includes an operating handle 86 mounted on pole 80 at a position so as to be easily moved by an operator, the handle, as illustrated in FIG. 7, having an unclamped position and a clamped position shown in phantom. A line 88 is attached to handle 86 at a position such that the handle is stable in either the clamped or unclamped states, and line 88 extends through a guide 90 mounted on pole 80 to one end of a spring 92 which has its opposite end connected to a pair of clamping lines 94 and 96 extending through the passages in fittings 46 and 46' and attached to the fittings 40 and 40' and clamp assemblies 22 and 24, respectively, the lines 94 and 96 extending around guides 98 and 100, respectively, which are in horizontal alignment with fittings 46 and 46' of each of the clamp assemblies.

The movement line assembly 18 includes a line 102 having an actuating ring 104 attached to the end thereof and extending through a guide 106 mounted on pole 80 to maintain the actuator ring 104 within easy reach of the operator. The line 102 extends around a guide 108 on base member 20 and is secured to a post 110 extending from plate 26 of clamp assembly 22.

In operation, in order to remove a fluorescent lamp from a fixture, the lever 62 of the control mechanism is placed in the removal position, as illustrated in FIG. 3, and the cam follower 52 is manipulated such that it is in the upper leg 55 of the cam channel 54. The angular adjustment mechanisms 82 and 84 are adjusted to properly orient the base member 20 relative to the pole 80, and the fluorescent lamp handling device 10 is then raised and positioned at the fixture 74 containing the fluorescent light FL to be removed. As best illustrated in FIG. 5, legs 68 and 70 are positioned to abut the stationary socket 72 of the fixture 74, and the curved ends 30 and 32 of the clamp assemblies are positioned around the fluorescent lamp FL. Handle 86 is now pulled to the clamped position illustrated in phantom in FIG. 7, such movement of handle 86 pulling clamping lines 94 and 96 to pull the plates of each clamp assembly 22 and 24 together to tightly grip the fluorescent lamp FL. The movement line assembly 80 is now actuated by simply pulling ring 104 which, through line 102, moves the clamp assemblies to the right looking at FIG. 3 with the cam follower 52 moving from the upper leg 55 of the cam follower channel 54 to the base

56. At this point, the clamp assemblies have moved as far to the right away from end 63 of the base member 20 as is possible; and, when the operator feels the end of motion, he releases ring 104 and the bias of spring 60 of the control mechanism will pull the clamp assemblies toward end 63 with the cam follower 52 riding in the lower leg 55 of the cam follower channel 54 due to the position of lever 62. Thus, it will be appreciated that by means of the cam mechanism and the control mechanism, pulling on ring 104 moves the fluorescent lamp in transverse directions, normally horizontal and vertical. The horizontal movement depresses the movable, spring biased socket 76 such that the pin in the stationary socket 72 is pulled free thereof, as illustrated in FIG. 3; and, thereafter, the vertical movement drops the fluorescent lamp below the stationary socket 72, as shown in FIG. 4. The fluorescent lamp handling device 10 may now be lowered and the fluorescent lamp removed therefrom by moving the handle 86 back to its unclamped position, as shown in FIG. 7.

To install a fluorescent lamp in a fixture, the fluorescent lamp FL to be installed is positioned within the curved ends 30 and 32 of the clamp assemblies with the edge adjacent one pin thereof abutting arm 66 of the alignment member 64 for indexing. The handle 86 is then placed in the clamped position, as illustrated in phantom in FIG. 7, to clamp the fluorescent lamp FL in place on the fluorescent lamp handling device 10, and the device is raised and positioned at the fixture on which the fluorescent lamp FL is to be installed with the legs 68 and 70 of the alignment member 64 at the stationary socket, as shown in FIG. 5. During the initial positioning of the fluorescent lamp handling device 10, the pin in the end of the fluorescent lamp FL opposite the gripped end is inserted in the movable, spring biased socket 76. With the control lever 62 having been previously placed in the installing position, as illustrated in phantom in FIG. 4, the fluorescent lamp handling device is now in position to automatically install the fluorescent lamp FL by merely pulling ring 104 to move the clamp assemblies 22 and 24 to the right as controlled by the cam mechanism and then releasing the ring to permit spring 60 to guide the cam follower 52 to the end of the upper leg 55 of the cam follower channel 54 thereby moving the fluorescent lamp first in a horizontal direction to depress the spring biased socket 76, then in a transverse vertical direction, and then in an opposite horizontal direction such that the pin is inserted in the stationary socket 72, as illustrated in FIG. 2.

The dimensions of the cam channel 54 correspond to the length of the pins carried by the fluorescent lamps and the distance between the lower edge of the stationary socket and the hole therein for receiving the pin such that movement of the cam follower between the ends of the legs 55 and the base 56 is sufficient to free the pin from the stationary socket 72 and the movement to the opposite leg provides sufficient vertical displacement to move the fluorescent lamp below the stationary socket.

Inasmuch as the present invention is subject to many variations, modifications and changes in detail, it is intended that all matter described above or shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A fluorescent lamp handling device for installing and removing fluorescent lamps on a fixture comprising

support means;

clamp means adapted to grip an end of a fluorescent lamp, said clamp means being slidably mounted on said support means;

cam means carried by said support means and controlling movement of said clamp means relative to said support means in a first direction and a second direction transverse to said first direction; and

actuating means connected with said cam means to operate said cam means to move said clamp means in said first and second directions whereby a fluorescent lamp clamped in said clamp means can be installed on or removed from a fluorescent lighting fixture.

2. A fluorescent lamp handling device as recited in claim 1 wherein said support means includes an elongate pole having a first end supporting a base member slidably mounting said clamp means and a second end, said actuating means being operable from said second end of said pole.

3. A fluorescent lamp handling device as recited in claim 2 wherein said base member has a cam channel therein having portions extending in said first and second directions, and said cam means includes a follower secured to said clamp means and movable in said cam channel.

4. A fluorescent lamp handling device as recited in claim 3 wherein said clamp means includes a pair of plates slidably engaging opposite sides of said base member, each of said plates having a curved end for gripping a fluorescent lamp.

5. A fluorescent lamp handling device as recited in claim 4 wherein said cam channel has a U-shaped configuration, and said follower includes cylinder means riding in said cam channel and connected with said pair of plates.

6. A fluorescent lamp handling device as recited in claim 5 wherein said U-shaped cam channel has a pair of legs extending substantially in said first direction and a base connecting said legs and extending substantially in said second direction, said first direction being aligned with the longitudinal axis of a fluorescent lamp gripped by said clamp means, and further comprising control means for determining which of said legs said follower rides in from said base to control the operation of said fluorescent lamp handling device between installation and removal modes of operation.

7. A fluorescent lamp handling device as recited in claim 6 wherein said control means includes a spring biasing said clamp means toward one end of said base member to maintaining said follower in one or the other of said legs of said cam channel, and said actuating means includes a line secured to one of said plates and extending along said base member and said pole to said second end thereof such that a force applied to said line moves said clamp means away from said one end of said base member to move said follower in said cam channel from one leg to said base, said spring moving said follower from said base to the other of said legs.

8. A fluorescent lamp handling device as recited in claim 7 and further comprising a clamp line secured to one of said plates and passing through said cylinder means and along said base member and said pole to

said second end thereof and spring means biasing said pair of plates apart, said clamp line overcoming said spring means to move said plates toward each other to grip a fluorescent lamp.

9. A fluorescent light handling device as recited in claim 2 wherein said clamp means includes a first clamp assembly having a pair of plates slidably engaging said base member with curved ends adapted to grip a fluorescent lamp and a second clamp assembly having a pair of plates slidably engaging said base member with curved ends adapted to grip a fluorescent lamp, said base member has a first cam channel aligned with said first clamp assembly and a second cam channel aligned with said second clamp assembly, each of said cam channels having portions extending in said first and second directions, and said cam means includes a first follower mounted on said pair of plates of said first clamp assembly and movable in said first cam channel and a second follower mounted on said pair of plates of said second clamp assembly and movable in said second channel.

10. A fluorescent light handling device as recited in claim 9 wherein each of said first and second cam channels has a U-shaped configuration with a pair of legs extending substantially in said first direction and a base connecting said legs extending substantially in said second direction, said first direction being aligned with the longitudinal axis of a fluorescent lamp gripped by said first and second clamp assemblies, said first and second followers each includes cylinder means riding in said U-shaped channels, and further comprising control means for determining which of said legs in said first and second U-shaped channels said first and second followers ride in to control the operation of said fluorescent lamp handling device between installation and removal modes of operation.

11. A fluorescent light handling device as recited in claim 10 wherein said control means includes a spring biasing said first and second clamp assemblies toward

one end of said base member to maintain said first and second followers in one or the other of said legs of said first and second cam channels, respectively, and said actuating means includes a line secured to one of said plates of one of said first or second clamp assemblies and extending along said base member and said pole to said second end thereof and strap means interconnecting said first and second clamp assemblies such that a force applied to said line moves said first and second clamp assemblies away from said one end of said base member to move said first and second followers in said first and second cam channels, respectively, from one leg to said base, said spring moving said first and second followers from said base to the other of said legs.

12. A fluorescent light handling device as recited in claim 11 and further comprising operating means including a handle pivotally mounted at said second end of said pole and a clamp line connected to said handle and to each of said first and second clamp assemblies, said handle having a stable unclamped position and a stable clamped position moving said clamp line to pull the pair of plates together of each clamp assembly to clamp a fluorescent lamp therein.

13. A fluorescent light handling device as recited in claim 12 wherein said support means includes a pair of angular adjustment mechanisms to permit angular adjustment of said base member relative to said pole in transverse directions.

14. A fluorescent light handling device as recited in claim 11 wherein said support means includes an alignment member extending from said one end of said base member to define an index surface adjacent said one end of said base member and carrying legs at the end thereof adapted to be aligned with a stationary socket of a fluorescent lamp fixture, said indexing surface being adapted to receive the edge of a fluorescent lamp to be held by said first and second clamp assemblies.

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