Nov. 10, 1953 C. H. ZIESE 2,658,786

TOOL FOR CHANGING FLUORESCENT LAMP TUBES

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Fig. 1.

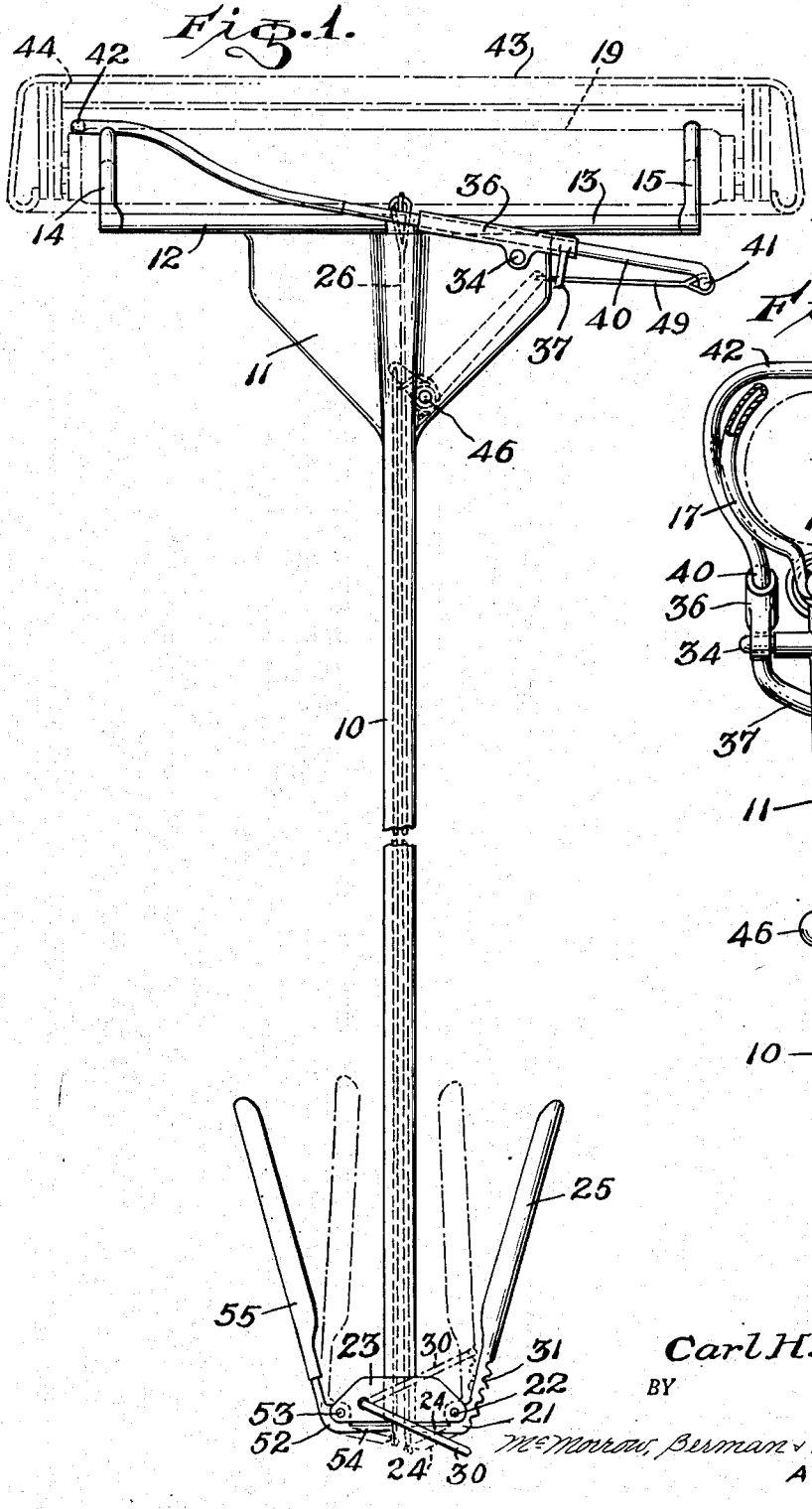
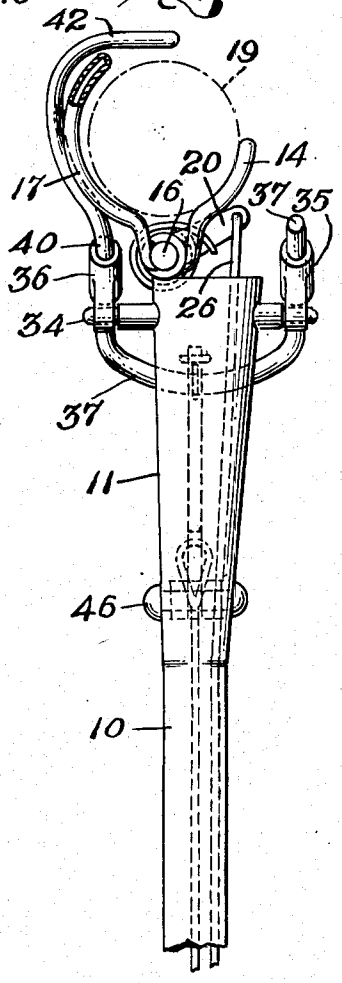


Fig. 2.



INVENTOR.
Carl H. Ziese
BY
McMorrow, Berman & Davidson
ATTORNEYS

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Fig. 3.

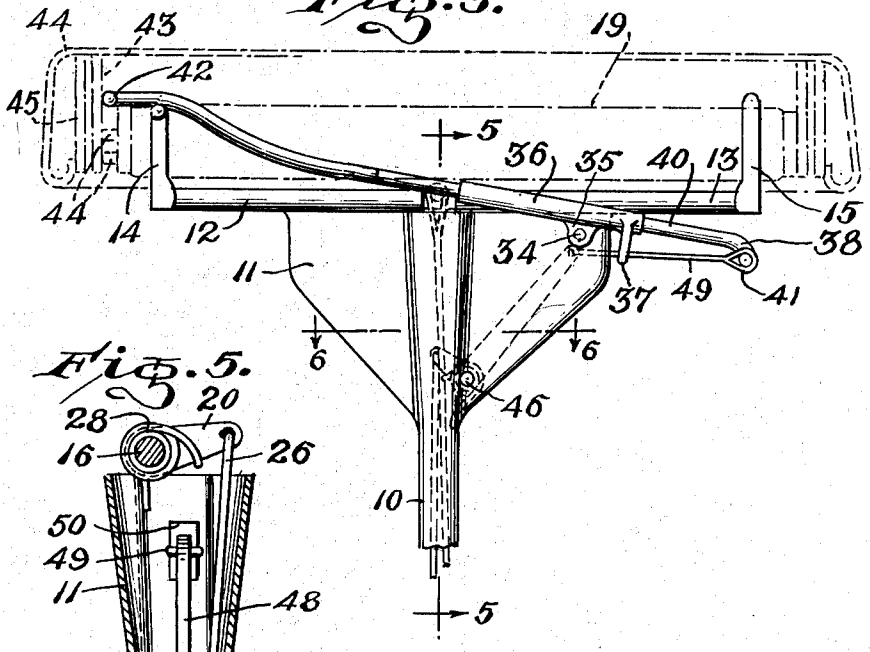


Fig. 5.

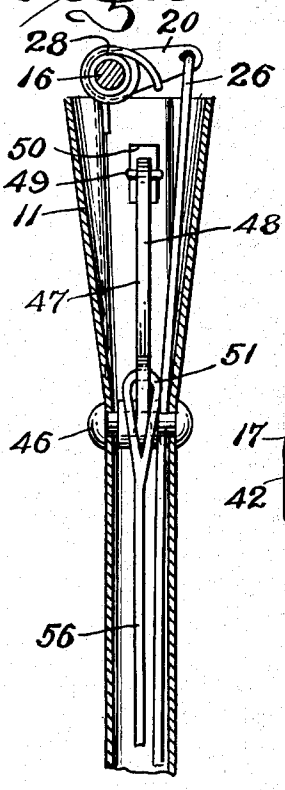
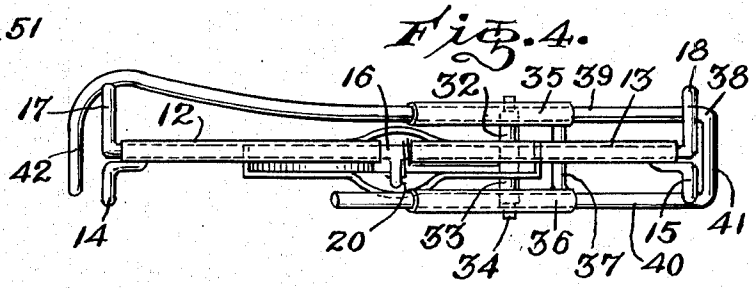


Fig. 4.



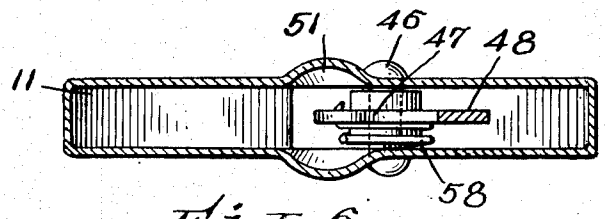


Fig. 6.

INVENTOR.
Carl H. Ziese
BY

McMorrow, Berman & Davidson
ATTORNEYS

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TOOL FOR CHANGING FLUORESCENT LAMP TUBES

Carl H. Ziese, Oklahoma City, Okla.

Application September 9, 1952, Serial No. 308,611

4 Claims. (Cl. 294—20)

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This invention relates to tools for changing lamp tubes and more particularly to a tool for inserting fluorescent lamp tubes in or removing them from a ceiling supported fixture while the operator stands on the floor below the fixture.

It is among the objects of the invention to provide an improved lamp tube changing tool which has a length such that an operator standing on a floor can easily reach a lamp tube supported on a ceiling above the floor and which is of rigid and light weight construction, so that it is easy to handle and effective in removing the lamp tubes from or inserting them in associated ceiling mounted fixtures; which is controlled entirely from the end thereof held by the operator and is effective to firmly grasp a lamp tube and impart longitudinal movement to the tube for removing the tube from or inserting it into an associated socket; which is effective to change fluorescent lamp tubes of different lengths; and which is simple and durable in construction, economical to manufacture, easy to use, and effective and efficient in use.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings wherein:

Figure 1 is a side elevational view of a lamp tube changing tool illustrative of the invention;

Figure 2 is a fragmentary side elevational view of the tube illustrated in Figure 1 with the tube rotated through an angle of approximately ninety degrees from the position illustrated in Figure 1;

Figure 3 is a fragmentary elevational view similar to Figure 1, but showing the components of the tool in a different operative position from that illustrated in Figure 1;

Figure 4 is a top plan view of the tool;

Figure 5 is a fragmentary cross sectional view on an enlarged scale on the line 5—5 of Figure 3; and

Figure 6 is a cross sectional view on an enlarged scale on the line 6—6 of Figure 3.

With continued reference to the drawings, the light tube removing tool therein illustrated is especially adapted for removing fluorescent tubes from sockets one of which is provided with a spring pressed abutment which engages the adjacent ends of the associated tube and is movable relative to the socket in a direction longitudinally of the tube to free the other end of the tube from the other of the pair of sockets holding the tube and has an elongated, tubular handle 10 with a housing formation 11 of elongated, rectangular cross sectional shape at one end of the handle and

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extending to opposite sides of the handle. Elongated sleeves 12 and 13 are mounted in end to end relationship on one longitudinal edge of the housing 11 at the outer open end of the housing and are disposed in end to end relationship with their adjacent ends spaced apart and their outer or distal ends projecting substantially equal distances beyond the corresponding ends of the housing 11. A curved finger 14 projects radially from the sleeve 12 at the outer end of the sleeve and in a direction away from the housing 11 and a corresponding curved finger 15 projects from the sleeve 13 at the outer end of this sleeve and also in a direction away from the housing. A shaft 16 extends through and is rotatable in the sleeves 12 and 13 and curved fingers 17 and 18 project perpendicularly from this shaft one at each end thereof and are respectively opposed to the curved fingers 14 and 15. The fingers 17 and 18 are somewhat longer than the fingers 14 and 15 and all of the fingers are arcuately curved longitudinally thereof to fit closely around and grasp a fluorescent light tube 19 of well known construction. These fingers are formed of stiff metal wire or small rods and are covered with an elastic material, such as rubber, in order that the fingers may obtain as firm a grip as possible on a lamp tube without breaking or damaging the tube.

An arm 20 projects radially from the shaft 16 between the adjacent ends of the sleeves 12 and 13 and extends from the shaft transversely of the housing 11 toward the side of the housing remote from the sleeves 12 and 13. A hand lever 21 of generally L-shape, is pivotally mounted intermediate its length by a pivot pin 22 on one end of a bracket 23 secured to the handle 10 at the end of the handle remote from the housing 11 and extending outwardly of respectively opposite sides of the handle. The lever 21 has one leg 24 extending from the pivot pin 22 partly across the adjacent open end of the tubular handle 10 and a leg 25 longer than the leg 24 extending from the pivot pin 22 along the handle 10 in spaced relationship to the handle. A tension element, such as the flexible cable 26, connects the arm 20 at its outer end to the hand lever 21 at the distal end of the arm 24 of this lever, so that hand pressure on the leg 25 of the lever 21 moving this leg toward the handle 10 will force the fingers 17 and 18 toward the correspondingly opposed fingers 14 and 15 to firmly grasp a lamp tube between the opposed fingers.

A coiled torsion spring 28 surrounds the shaft 16 between the adjacent ends of the sleeves 12

and 13 and is connected at one end to the arm 20 and at its other end to the adjacent side wall of the housing 11 to resiliently urge the shaft 16 to turn in a direction to move the fingers 17 and 18 away from the opposed fixed fingers 14 and 15. A wire band or loop 30 of elongated rectangular shape is pivotally connected at one end to the bracket 23 at a location spaced from the pivot pin 22 and is movable over the end of the bracket 23 adjacent the pivot pin 22 and along the adjacent portion of the leg 25 of the hand lever 21, the portion of the leg 25 being externally serrated in the portion thereof adjacent the pivot pin 22, as indicated at 31. When the hand lever 25 has been moved toward the handle 10 to firmly grasp a lamp tube between the opposed fingers 17 and 14 and 18 and 15, the hand lever may be locked in this position by swinging the loop 30 about its pivotal connection with the bracket 23 until the free end of the loop is engaged in a serration 31 on the hand lever 25 at a location to hold the hand lever in its tube grasping position relative to the handle 10.

Bearing structures in the form of hollow bosses 32 and 33 project outwardly from the respectively opposite sides of the housing 11 at a location spaced from the handle 10 to provide bearing apertures or bores and a pivot pin 34 extends through these bosses and has its axis disposed substantially perpendicular to a plane which is disposed medially of the interior of the housing 11 and includes the longitudinal center line of the handle 10.

Tubular guides 35 and 36 are pivotally mounted intermediate their length on the pivot pin 34 and are disposed one at each side of the housing 11 in substantially parallel relationship to each other. A longitudinally curved strut 37 extends between and interconnects the guides 35 and 36 at the ends of the guides at the side of the pivot pin 34 remote from the handle 10 and a U-shaped rod 38 having substantially parallel legs 39 and 40 and a bight portion 41 interconnecting the legs at corresponding ends thereof has its legs 39 and 40 slidably received in the tubular guides 35 and 36 respectively, and its bight portion 41 spaced from the ends of the tubular guides remote from the handle 10 of the tool.

Both of the legs 39 and 40 have a length greater than the length of the tubular guides 35 and 36 and extend entirely through these guides and the leg 39 is longer than the leg 40 and has at its end remote from the bight portion 41 a substantially perpendicularly disposed end portion 42 which constitutes a pusher formation which engages an end 43 of a lamp tube fixture 44 when the bight portion 41 of the U-shaped rod is moved toward the adjacent ends of the guides 35 and 36 and, with a lamp tube 19 grasped between the fingers 14, 15, 17 and 18, forces the lamp tube longitudinally away from the end 43 of the fixture, so that the terminals 44 on the corresponding end of the lamp tube are forced out of the corresponding sockets 45 in the adjacent end of the fixture and the lamp tube can be moved downwardly out of the associated fixture.

A pivot pin 46 extends through the housing 11 at a location adjacent the handle 10 and spaced from the outer end of the housing, and a bell crank lever 47 is disposed within the housing and pivotally mounted intermediate its length on the pivot pin 46. This bell crank lever has a leg 48 extending from the pivot pin 46 to a location adjacent the outer end of the housing 11 and a link 49 connects the bell crank leg 48 at its distal end to the bight portion 41 of the rod 38, this link passing through an aperture 50 in the adjacent end wall of the housing 11.

The bell crank lever 47 has a second leg 51 shorter than the leg 48 extending from the pivot pin 46 inwardly of the tubular handle 10 and a second hand lever 52 of L-shape is pivotally mounted intermediate its length on the bracket 23 at the end of the bracket remote from the lever 21 by a pivot pin 53 extending through the corresponding end of the bracket. This hand lever 52 has a leg 54 extending from the pivot pin 53 inwardly of the adjacent end of the handle 10 and has a second leg 55 longer than the leg 54 which extends from the pivot pin 53 along the handle 10 at the side of the handle opposite the hand lever 21. A tension element in the form of a flexible cable 56 connects the bell crank lever leg 51 at its distal end to the hand lever leg 54 at the distal end of this leg, so that movement of the leg 55 of the hand lever 52 toward the handle 10 will move the bight portion 41 of the U-shaped rod 38 toward the adjacent ends of the tubular guides 35 and 36 and force the pusher formation 52 of the rod against the adjacent end of a lamp tube fixture in which the rod is disposed. If the associated lamp tube 19 be now grasped by the fingers 14, 15, 17 and 18, and the hand lever 21 locked in tube grasping position relative to the handle 10, as explained above, and the hand lever leg 55 is moved toward the handle 10, the pressure exerted by the pusher formation 42 on the rod 38 against the adjacent end of the associated lamp tube fixture will force the terminals 44 at the corresponding end of the lamp tube out of the associated socket in the adjacent end of the fixture, so that the tube can be easily removed from or inserted into the fixture.

A coiled torsion spring 58 surrounds the pivot pin 46 and has one end connected to the housing 11 and its other end connected to the bell crank lever arm 51. This spring acts to resiliently urge the bight portion 41 of the rod 38 away from the adjacent ends of the tubular guides 35 and 36 to retract the pusher element 42 of the rod 38.

The guide tubes 35 and 36 and the legs 39 and 40 of the rod 38 are inclined outwardly of the housing 11 from the bight portion 41 of the rod to the pusher formation 42 thereon and, when pressure is first applied to the leg 55 of the hand lever 52, this inclination of the rod 38 causes the pusher formation 42 to tend to move in a direction away from the housing and toward the top of the lamp tube fixture 44. As pressure is continued on the hand lever 52 the pusher formation 42 is brought into engagement with the adjacent end of the fixture near the top of the fixture and between the top of the fixture and the upper surface of the tube 19, so that separating pressure between the tube and the corresponding end of the fixture is properly applied.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. A lamp tube changing tool comprising an elongated tubular handle, a hollow housing on one end of said handle extending to respectively

opposite sides of the handle, elongated sleeves fixedly secured on said housing in end to end relationship with each other and extending longitudinally of the outer end of said housing with their adjacent ends spaced apart, a shaft extending through said sleeve and rotatable therein, curved fingers projecting radially from said shaft one at each end thereof in a direction away from said housing, curved fingers projecting one from each of said sleeves at the outer ends of the sleeves and opposed one to each of the shaft carried fingers, a spring connected between said shaft and said sleeves resiliently urging said shaft carried fingers away from the sleeve carried fingers, an arm projecting from said shaft between the adjacent ends of said sleeves and transversely of the outer end of said housing, a first hand lever pivotally mounted on said handle at the end of the latter remote from said housing, a tension element connecting said arm to said first hand lever for movement of said shaft carried fingers toward the opposed sleeve carried fingers by said hand lever to grasp a lamp tube between the opposed fingers, a locking element carried by said handle and engageable with said first hand lever to hold the latter in lamp tube grasping position relative to said handle, bearing means on said housing, a pin extending through said bearing means transversely of said housing at a location spaced from said handle, tubular guides pivotally mounted intermediate their length on said pin one at each side of said housing and disposed substantially parallel to each other, a U-shaped rod having parallel legs slidably received one in each of said tubular guides and a bight portion spaced from the ends of said guides remote from said handle, one of said legs being longer than the other and having on its end remote from said bight portion a pusher formation engageable with an end of a fixture and effective when said rod is moved in a direction to bring the bight portion thereof nearer said tubular guides to exert a separating force between a lamp tube grasped in said fingers and the corresponding end of an associated lamp tube fixture, a bell crank lever disposed within said housing and pivotally mounted intermediate its length on said housing at a location spaced from said pivot pin, a link connecting one end of said bell crank lever to the bight portion of said U-shaped rod, a spring connected between said housing and said bell crank lever resiliently urging the bight portion of said rod away from the adjacent ends of said tubular guides, a second hand lever pivotally mounted on said handle at the end of the latter remote from said housing, and a tension element connecting the other end of said bell crank lever to said second hand lever for movement of said U-shaped rod by said second hand lever in a direction to force said pusher formation against the adjacent end of a lamp tube fixture.

2. A tool for changing lamp tubes comprising an elongated handle, a sleeve formation extending transversely of said handle at one end thereof, longitudinally curved fingers projecting perpendicularly from said sleeve formation one at each end thereof, a shaft extending through and rotatable in said sleeve formation, longitudinally curved fingers projecting perpendicularly from said shaft one at each end thereof and respectively opposed to the fingers on said sleeve formation to grasp a lamp tube therebetween, a first hand lever pivotally mounted on said handle at a location spaced from said sleeve formation,

means connecting said first hand lever to said shaft for rotation of the shaft by said first hand lever in a direction to move the shaft carried fingers toward the sleeve carried fingers, a guide pivotally mounted on said handle adjacent said sleeve formation and extending along the latter, a rod slidably mounted in said guide and having on one end a pusher formation adapted to engage an end of a lamp tube fixture, a second hand lever pivotally mounted on said handle at a location spaced from said sleeve formation, and means connecting said second hand lever to said rod for movement of the rod by said second hand lever in a direction to exert a separating force between one end of a lamp tube and the adjacent end of an associated fixture.

3. A tool for changing fluorescent light tubes comprising an elongated handle, a sleeve structure extending transversely of and secured to said handle at one end of the latter, tube grasping fingers projecting substantially perpendicularly from said sleeve structure one at each end thereof, a shaft extending through and rotatable in said sleeve structure, tube grasping fingers projecting substantially perpendicularly from said shaft one at each end of the shaft and operatively opposed to the corresponding fingers on said sleeve structure to grasp a light tube, a first manually operated means mounted on said handle at a location spaced from said tube structure, means connecting said shaft to said first manually actuated means for movement of the shaft carried fingers toward the sleeve carried fingers upon operation of said first manually operated means, a guide structure supported on said handle and extending longitudinally of said sleeve structure in spaced relationship thereto, a pusher element slidably mounted in said guide structure and having on one end a pusher formation disposed outwardly of the tube grasping fingers at the adjacent ends of said sleeve structure and said shaft, a second manually operated means mounted on said handle at a location spaced from said sleeve structure, and means connecting said pusher element to said second manually operated means for imparting longitudinal movement to said pusher element in a direction to exert a separating force between one end of a light tube grasped by said fingers and the adjacent end of an associated tube receiving fixture upon operation of said second manually operated means.

4. A tool for changing fluorescent light tubes comprising an elongated handle, a sleeve structure extending transversely of and secured to said handle at one end of the latter, tube grasping fingers projecting substantially perpendicularly from said sleeve structure one at each end thereof, a shaft extending through and rotatable in said sleeve structure, tube grasping fingers projecting substantially perpendicularly from said shaft one at each end of the shaft and operatively opposed to the corresponding fingers on said sleeve structure to grasp a light tube, a first manually operated means mounted on said handle at a location spaced from said tube structure, means connecting said shaft to said first manually actuated means for movement of the shaft carried fingers toward the sleeve carried fingers upon operation of said first manually operated means, a guide structure supported on said handle and extending longitudinally of said sleeve structure in spaced relationship thereto, a pusher element slidably mounted in said guide structure and having on one end a pusher formation disposed outwardly of the tube grasping fingers

at the adjacent ends of said sleeve structure and said shaft, a second manually operated means mounted on said handle at a location spaced from said sleeve structure, and means connecting said pusher element to said second manually operated means for imparting longitudinal movement to said pusher element in a direction to exert a separating force between one end of a light tube grasped by said fingers and the adjacent end of an associated tube receiving fixture upon operation of said second manually

operated means, said guide structure being pivotally supported on said handle for rocking movements about an axis at right angles to the axis of said shaft.

CARL H. ZIESE.

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