Jan. 12, 1954 J. H. BROOKS 2,665,814

ARTICLE TRANSFER APPARATUS

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Fig. 1

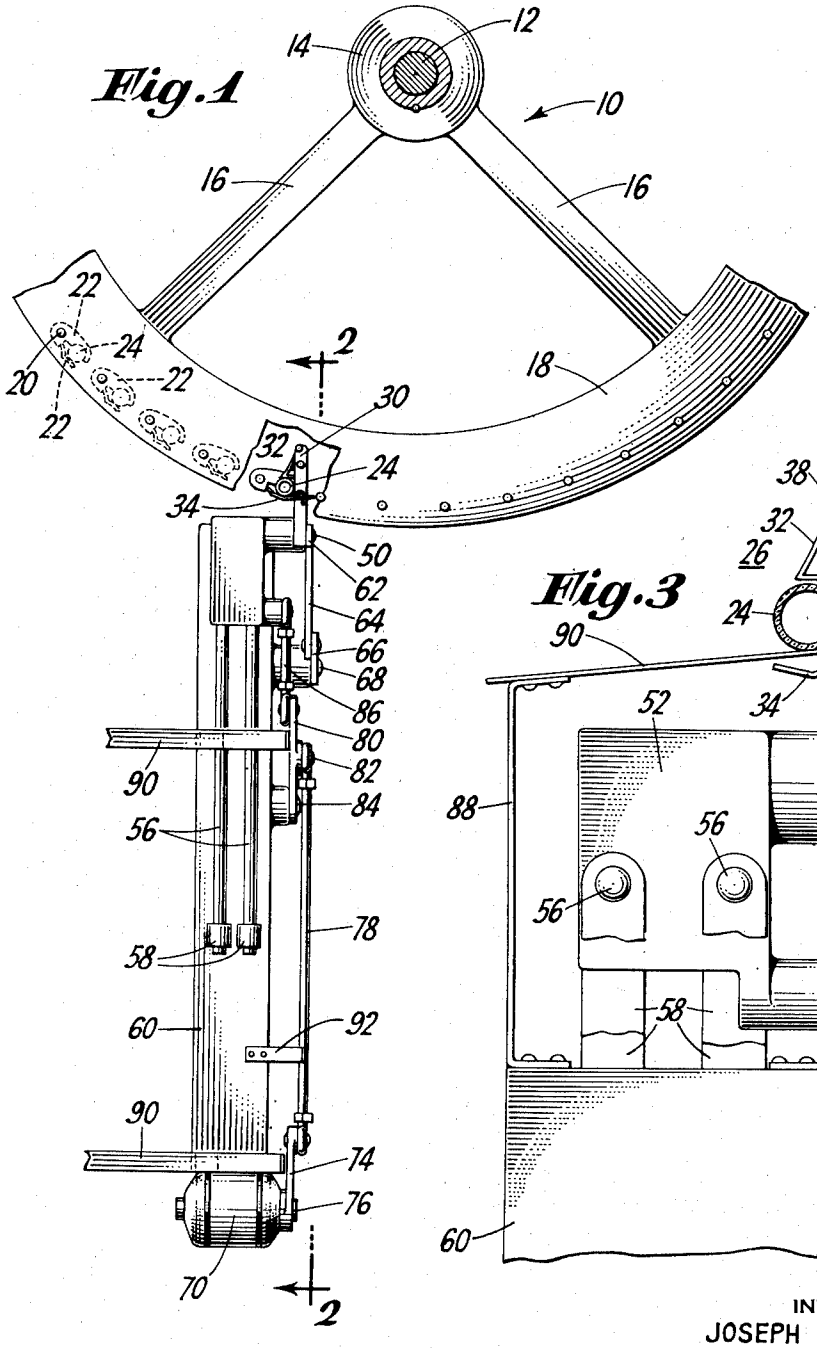


Fig. 3

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Fig. 2

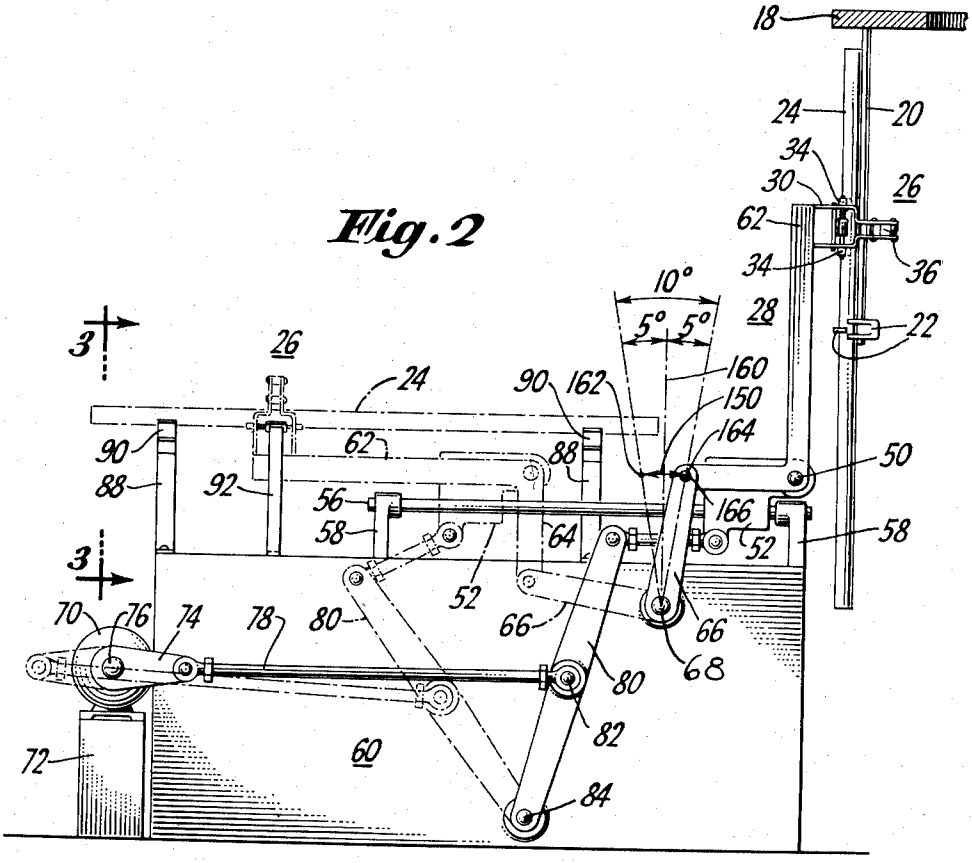
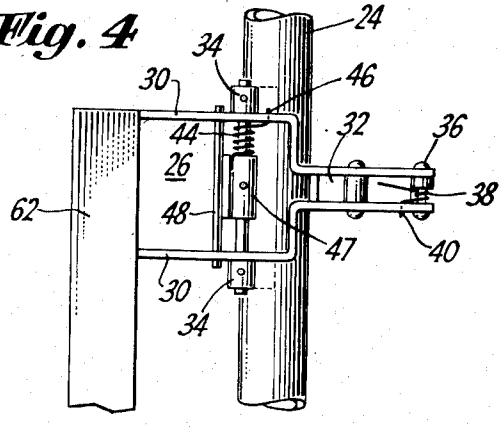


Fig. 4



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ARTICLE TRANSFER APPARATUS

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5 Claims. (Cl. 214—3.1)

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This invention relates to article transfer apparatus and more particularly to a transfer apparatus employed in connection with the manufacture of fluorescent lamps.

In the art of manufacturing electrical devices, it is necessary to transfer the devices from one location to another as successive operations are performed thereon. More particularly, in the art of manufacturing fluorescent lamps, the lamps are transferred from one machine or apparatus to another as various manufacturing operations are performed thereon. In some cases, the transfer operation is executed manually. Heretofore, the removal of a fluorescent lamp from an exhaust machine has been performed manually.

An object of this invention is to transfer a workpiece from one position to another between successive manufacturing operations performed on said piece.

Another object is to transfer an elongated workpiece from one position to another and simultaneously orient its axis to a different position.

A further object is to provide apparatus for automatically removing fluorescent lamps from an exhaust machine.

The foregoing objects and others are attained, in accordance with the principles of this invention, by providing a bell-crank lever transfer arm mounted on a crosshead which, when actuated, removes an electrical device from a machine on which a manufacturing operation has been performed and places it on a suitable receptacle therefor.

A specific embodiment of this invention is described in the following specification and illustrated in the accompanying drawings in which:

Figure 1 is a plan view of a lamp transfer apparatus embodying the principles of this invention and a fragmentary plan view of an exhaust machine with which the apparatus may be associated.

Figure 2 is a side elevational view looking in the direction 2—2 of Figure 1.

Figure 3 is an end elevational view looking in the direction 3—3 of Figure 2.

Figure 4 is a detail of the hand which grasps and retains a lamp during the transfer operation.

Figure 1 shows a portion of a fluorescent lamp

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exhaust machine which includes a rotatable turret 10 supported on a vertical column 12. The turret 10 comprises a hub 14, supporting arms 16 extending radially therefrom, and a ring plate 18 mounted on the outer ends of the arms 16. The ring plate 18 has a plurality of rods 20 depending therefrom which have fingers 22 mounted thereon. Lamps 24 are held by these fingers 22 during the exhaust operation performed on the machine. After the operation on the exhaust machine has been completed, the lamps 24 are removed therefrom and transferred to another location for further operations thereon.

The lamps 24 are removed individually from the exhaust machine by a hand 26 mounted on a transfer arm 28.

Referring now to Figures 3 and 4, the hand 26 comprises a frame 30 which supports a latch 32, a pair of jaws 34, a lamp release finger 47 and a stop pin 48. The latch 32 is pivotally mounted on the frame 30 at 36 and is provided with a torsion spring 38 anchored at one end in the frame 30 at 40 and its free end placing an outward pressure on the latch 32. Intermediate the ends of the latch 32 is located a hook 100 to control the outward travel of the latch. The jaws 34 are fixedly mounted on the ends of rod 42 supported in the frame 30, each jaw being bent at one end for maintaining the lamp tightly against both the foot of the latch 32 and the frame 30. A torsion spring 44, encircling rod 42, is anchored at one end in the frame 30 at 46 with its free end pressing against lamp release finger 47, to urge the jaws 34 toward a lamp gripping position. When the jaws 34 are not in engagement with a lamp, the rotational movement of the release finger 47 in a clockwise direction as seen in Fig. 3 is arrested by the stop pin 48.

Referring now to Figure 2, the transfer arm 28 is a bell-crank lever fulcrumed at 50 in a crosshead 52 mounted on a pair of parallel slide bars 56 supported on standards 58 upstanding on a platform 60. The bell-crank lever transfer arm 28 consists of arm 62 to which the hand 26 is fixedly attached and arm 64 to which a link 66 fulcrumed at 68 in the side of the platform 60 is connected. Drive shaft 76 of motor 70 mounted on pedestal 72 has a crank arm 74 mounted thereon to which one end of a con-

necting rod 78 is attached. The other end of the connecting rod 78 is pivotally mounted on a lever 80 intermediate its ends at 82. The lever 80 is fulcrumed at one end thereof at 84 on the side of the platform 60. The other end of lever 80 has a link 86 attached thereto which connects the lever 80 to the crosshead 52. The platform 60 has a pair of standards 88 upstanding thereon which support tracks 90 mounted on the tops thereof, down which lamps 24 roll when discharged from the hand 26. Actuation of the jaws 34 of the hand 26 to release a lamp 24 therefrom is effected by a fixed trigger 92 upstanding on the platform 60 (Fig. 3) which is engaged by the lamp-releasing finger 47 of the hand 26.

The operation of the lamp transfer apparatus will now be described. As shown in the drawings, the apparatus is independently operated from the exhaust machine 10 by a motor 70, the motor being set to function in timed relation with the mechanisms of the machine.

Assuming the normal position of the transfer arm 28 to be in the horizontal position as shown in Fig. 2 in phantom, the exhaust machine indexes the lamps 24 until they reach the transfer station A where the lamps 24 are to be successively withdrawn by the hand 26. On reaching this station the motor 70 is engaged, causing the drive shaft 76 to rotate 180°, the distance necessary to complete one-half of the full cycle of the operation (i. e. to move the transfer arm 28 through 90° from the horizontal to the vertical position). This rotational stroke of the drive shaft 76 of the motor 70 is translated into linear displacement of the crosshead 52 through crank arm 74, connecting rod 78, lever 80 and link 86.

As the crosshead 52 advances in a direction toward the right as shown in Fig. 2 to the position shown in solid lines, the link 66 rotates through 90° clockwise about its fulcrum 68 thus causing the transfer arm 28 to pivot clockwise about its fulcrum 50, also causing it to rotate through 90° from the horizontal to the vertical position.

The lever 80 moves the crosshead 52 through link 86 to the right as shown in Fig. 2 causing simultaneous clockwise rotation of arm 62 and link 66 through 80° causing said arm to attain substantially a vertical position at 162 before the crosshead 52 has reached the end of its stroke. The horizontal travel of arm 62 is attained in the last 10° of the arcuate stroke of the link 66 and the remainder of the linear stroke of the crosshead 52 because of the lever 66, terminating its arcuate swing 5° to the right of the perpendicular 160. Hence, the final 10° swing occurs at the peak of the swing 150 where the pivot 166 travels substantially horizontal between points 162 and 164. This horizontal movement of the arm 62 is necessary to protect the lamps 24 from being broken against the exhaust machine when they are withdrawn from same.

As the transfer arm 28 moves in to permit the hand 26 to grasp a lamp held by fingers 22 in the exhaust machine, the hand moves in to the right of the lamp (Fig. 1) with the latch 32 riding along against the lamp 24 and being deflected thereby about its pivot 36 until it gets by the lamp. The torsion spring 38 (Figs. 3 and 4) on which a load has been placed by the deflection of the latch 32 returns the latch 32 to its normal position with the foot protruding beyond the frame 30 to the limit of the hook 100. At this point the lamp 24 is in positive engagement

and securely held between the foot of the latch 32, the frame 30 and the jaws 34.

The lamp is now ready to be withdrawn from the machine. This is accomplished by reversing the above process i. e., the motor 70 continues to rotate through the final 180° to its original starting position, thereby causing the operations described above to take place in a reversed sequence.

What I claim is:

1. An apparatus for transferring a workpiece from a pick-up to a delivery station comprising: a crosshead; a bell-crank lever fulcrumed on said crosshead; a grapple mounted on one of the arms of said bell-crank lever for grasping the workpiece; a link having one end on a fixed support and having its other end connected to the free end of the other arm of said bell-crank lever; and means for reciprocating said crosshead to thereby rotate said bell-crank lever to move said grapple to and from the pick-up and delivery stations.

2. Lamp transfer apparatus comprising: a platform; a pair of slide bars mounted on said platform; a crosshead slidably mounted on said slide bars; a bell-crank lever fulcrumed on said crosshead; a grapple mounted on one of the arms of said bell-crank lever; a link having one end fulcrumed on a fixed support and having its other end connected to the free end of the other arm of said bell crank lever means for reciprocating said crosshead on said slide bars to thereby rotate said bell-crank lever about its fulcrum during the reciprocation of said crosshead to move said grapple from and to pick-up and delivery positions; and means on said platform for opening said grapple at the delivery position.

3. An apparatus for transferring a workpiece from a pickup to a delivery station comprising: a bell-crank lever; a crosshead on which said bell-crank lever is fulcrumed; a grapple, for grasping the workpiece, mounted on one arm of said bell-crank lever; a base; a link fulcrumed in said base and connected to the other arm of said bell-crank lever; a second lever fulcrumed in said base; a link connecting said second lever to said crosshead; and means for oscillating said second lever about its fulcrum to thereby effect reciprocation of said crosshead and oscillation of said bell-crank lever about its fulcrum to move said grapple to and from the pickup and delivery stations.

4. An apparatus for transferring a workpiece from a pickup to a delivery station comprising: a bell-crank lever; a crosshead on which said bell-crank lever is fulcrumed; a grapple, for grasping the workpiece, mounted on one arm of said bell-crank lever; a base; a link fulcrumed in said base and connected to the other arm of said bell-crank lever; a second lever fulcrumed in said base; a link connecting said second lever to said crosshead; a crank; a connecting rod connecting said crank with said second lever intermediate its ends; and means for driving said crank to cause said second lever to oscillate about its fulcrum and to thereby effect reciprocation of said crosshead and oscillation of said bell-crank lever about its fulcrum to move said grapple to and from the pickup and delivery stations.

5. An apparatus for transferring a workpiece from a pickup station to a delivery station comprising a base, a member reciprocatably movable on the base, a bell crank lever pivotally supported by said member, said lever having an arm which

is substantially vertical at the pickup station, a grapple supported at the upper end of said arm, the other arm of the bell crank lever extending horizontally, a link pivoted at its lower end on the base and at its upper end to the horizontally extending arm with the link slightly out of the vertical and leaning toward the bell crank lever pivot when the grapple is at the pickup station, whereby the grapple will move substantially linearly horizontally during the initial movement of the member in a direction opposite the direction of lean of the link, and means for reciprocating said movable member to effect simultaneous translation and rotation of the bell crank lever and consequent movement of the grapple between pickup and delivery stations.

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