Nov. 27, 1956 R. R. PARDUCCI ET AL 2,771,980

BULB UNLOADING DEVICE FOR A CONTINUOUS CONVEYOR TYPE MACHINE

Filed March 31, 1955 3 Sheets-Sheet 1

Fig. 1.

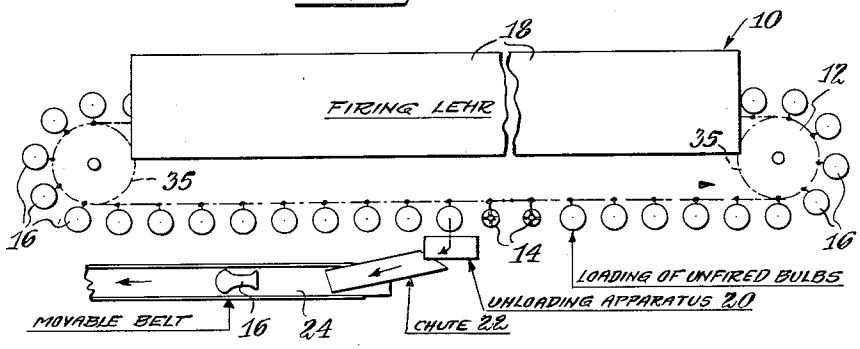


Fig. 4.

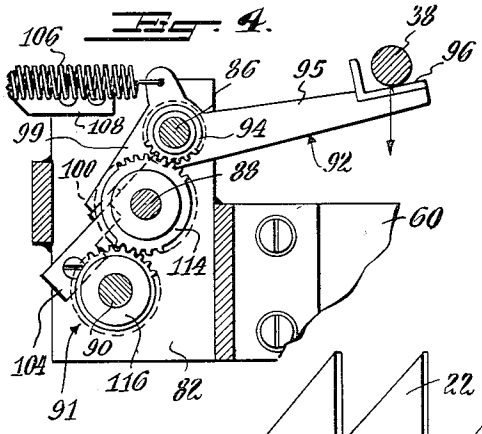


Fig. 6.

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Nov. 27, 1956 R. R. PARDUCCI ET AL 2,771,980

BULB UNLOADING DEVICE FOR A CONTINUOUS CONVEYOR TYPE MACHINE

Filed March 31, 1955 3 Sheets-Sheet 2

Fig. 2.

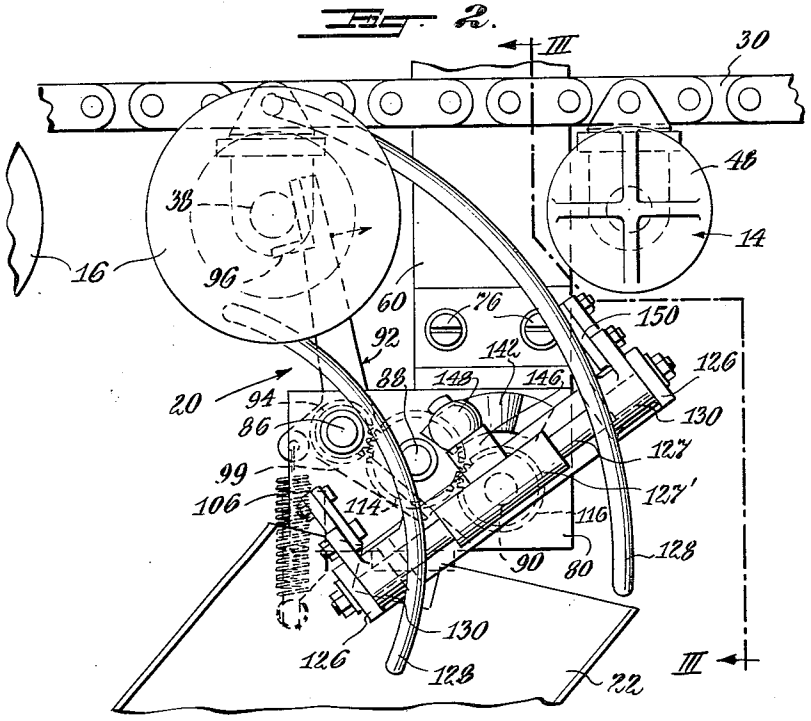
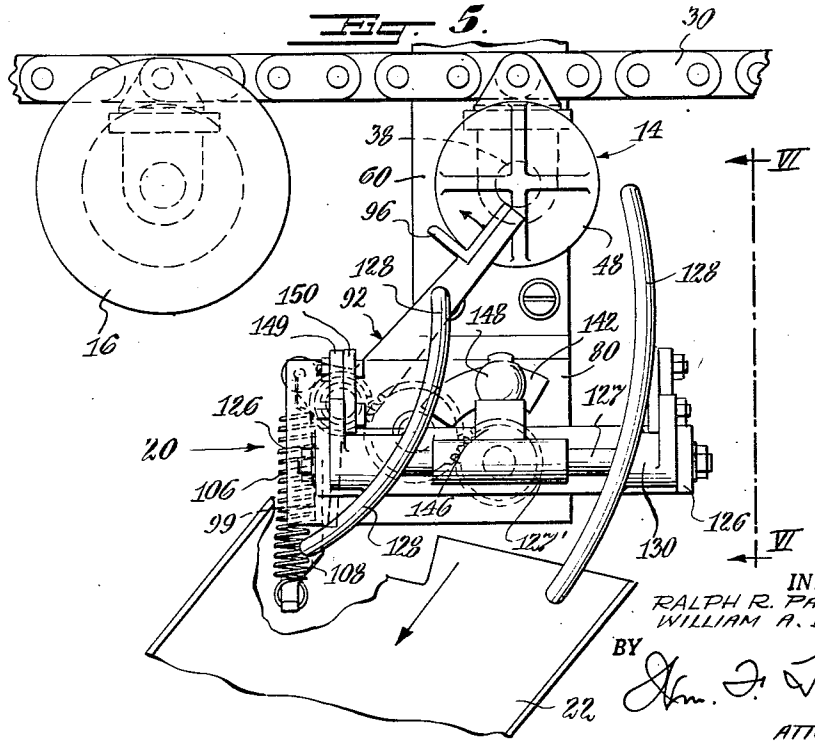


Fig. 5.



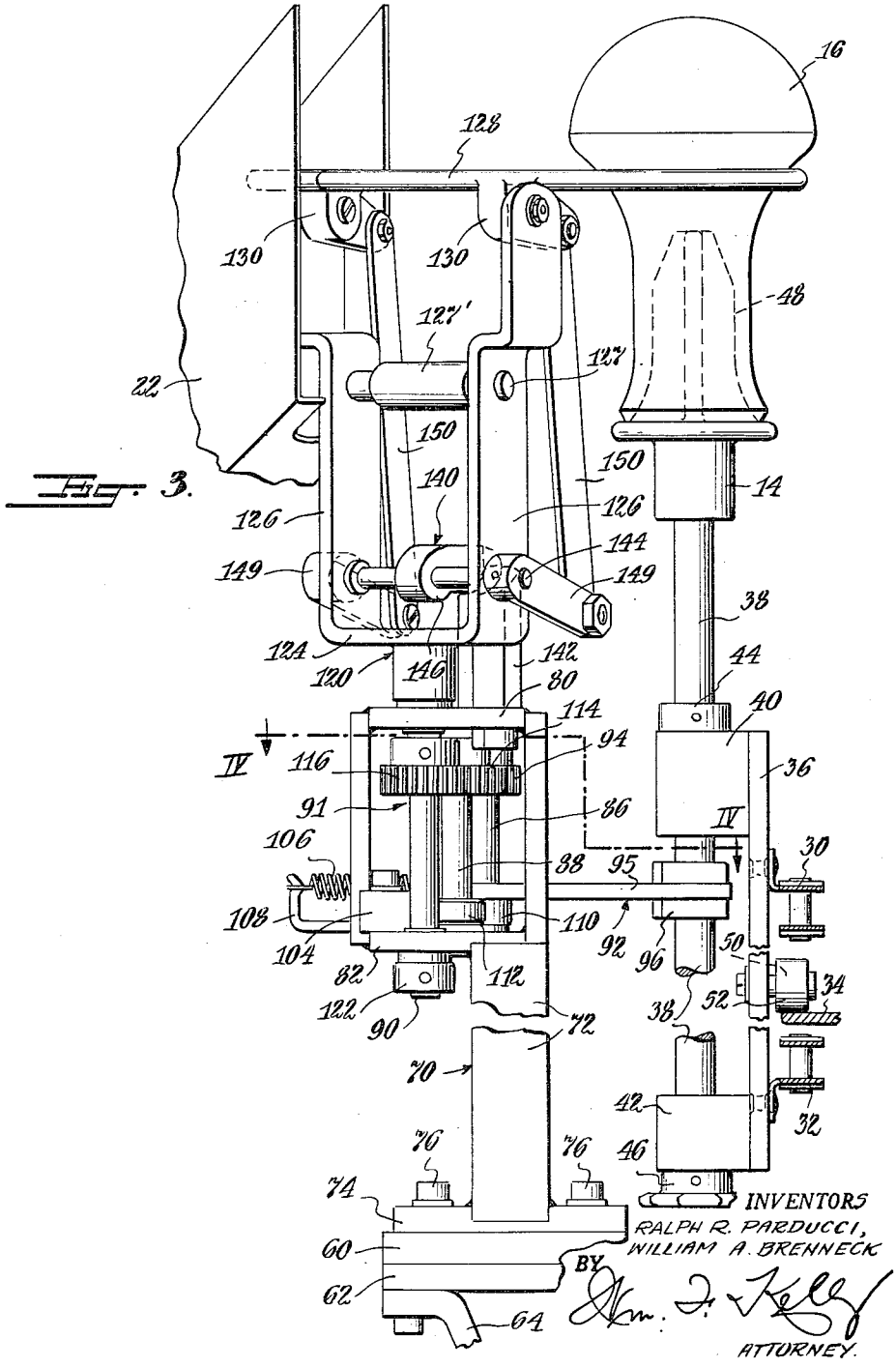
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Filed March 31, 1955 3 Sheets-Sheet 3

Fig. 3.



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BULB UNLOADING DEVICE FOR A CONTINUOUS CONVEYOR TYPE MACHINE

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Application March 31, 1955, Serial No. 498,304

4 Claims. (Cl. 198—27)

The present invention relates to a continuous conveyor type lamp making machine and, more particularly to a lamp or bulb unloading device for such a machine.

Although the bulb unloading device may be employed with any continuous conveyor type lamp making machine a continuous conveyor type bulb firing machine for incandescent lamps for semi-indirect lighting may be employed for purposes of illustrating the invention. These lamps have generally mushroom-shaped bulbs, the larger diameter bowl ends of which are coated with colored ceramic enamel. After drying in air an annular design may be scribed into the painted surface. The bulbs are then loaded into the heads of a continuous conveyor type machine and passed through a stationary firing lehr thereof at a firing temperature adjusted to prevent a shift in color but to fuse or fire the ceramic enamel to the bulb. In the past the lehred bulbs were unloaded from the firing machine by hand.

Hence, it has been found advantageous according to the present invention to provide an automatic bulb unloading or bulb transfer device for a continuous conveyor type lamp making machine.

The unloading device comprises a pair of rails which are vertically pivotable on a rail frame. The rail frame is horizontally rotated about its vertical axis by a rotating mechanism. An actuating finger or operating lever of this rotating mechanism is contacted by a head of the continuous machine and is rotated thereby. The operating lever is connected through a train of gears to the rail frame. The rails are pivoted vertically upon their pivot joints by a rail lifting mechanism. The lifting mechanism has a roller arm on a shaft journalled in the rail frame and is raised up and down by a stationary lifting cam on the rail frame. A connecting rod joins a lifting arm on each projecting end of the shaft to the pivot point of each rail.

As a lehred bulb on a bulb holder of the firing machine approaches the bulb unloading mechanism of the invention the rails thereof are in a position to straddle the neck of the lehred bulb just below the large diameter bowl of the bulb. The spindle of the bulb holder rotates the operating lever of the rotating mechanism for the rail frame. Simultaneously, the lifting cam of the rail lifting mechanism elevates the rails and hence moves the lehred bulb off the spindle upwardly to a point where the inclination of the rails causes the bulb to slide (through the force of the gravity) away from the line of heads on the continuous firing machine and into a delivery chute to a conveyor. Immediately thereafter the spindle loses contact with the operating lever of the unloading device and resilient means return the unloading device to its starting position.

In its general aspect the present invention has as its objective the automatic unloading of a bulb from a continuous conveyor type lamp making machine.

Referring now to the drawings in which like numerals of reference indicate the several views:

Fig. 1 is a diagrammatic plan view of a firing machine for fusing a dried ceramic enamel coating to the bulbs of semi-indirect general lighting lamps and an automatic bulb unloading device.

Fig. 2 is a plan elevational view of the bulb unloading device of Fig. 1 showing a firing machine spindle as it engages an operating lever of a rail frame rotating mechanism of the unloading device.

Fig. 3 is a side elevational view along the line III—III of Fig. 2 and in the direction of the arrows.

Fig. 4 is a fragmentary horizontal sectional view of the rail frame rotating mechanism of the bulb unloading device of the invention along the line IV—IV in the direction of the arrows.

Fig. 5 is a view, similar to Fig. 2, but showing the bulb unloading device of the invention in its bulb discharge position and the spindle about ready to disengage the operating lever of said device.

Fig. 6 is a vertical side elevational view of the bulb unloading device in its discharge position along the line VI—VI of Fig. 5 and showing the unloaded bulb delivered to a discharge chute.

Referring now to the drawings and particularly to Fig. 1 the reference numeral **10** designates a continuous conveyor type firing machine for ceramic coated incandescent lamp bulbs **16** and having a conveyor **12** which moves continuously about a frame (not shown). The conveyor **12** is provided with a plurality of heads **14** (Figs. 1, 2, 3, 5 and 6) for receiving ceramic enameled bulbs **16**, and carrying said bulbs **16** through a firing lehr **18** to fuse the ceramic enamel to the bulbs **16**. A bulb unloading device or bulb unloader **20** (Fig. 1) is located adjacent the discharge position of the firing machine **10** and a discharge chute **22** (Figs. 1, 2 and 5) for transferring a lehred bulb **16** from a head **14** through the chute **22** to a discharge conveyor **24**.

Conveyor 12

As shown in Figs. 2 and 3 the conveyor **12** comprises an upper chain **30** and a lower chain **32** disposed about the slide or guide rail **34**. Each of the chains **30** and **32** engages a sprocket **35** (Fig. 1) on either end of the machine **10**. One of the pairs of sockets **35** may be driven by means (not shown), such as a motor. Each of the heads **14** is carried by the upper chain **30** and the lower chain **32** and slides along the guide rail **34**, as hereinafter explained.

Heads

Each of the heads **14** has an upstanding U-shaped spindle mounting bracket **36** secured to the upper chain **30** and the lower chain **32**, as by rivets (Fig. 3). A spindle **38** extends through the bracket **36** and is journalled in the upper and lower generally horizontal hub portions **40** and **42** of the spindle mounting bracket **36**. The spindle **38** although free to rotate in the hubs **40** and **42**, is prevented from moving vertically with respect to the bracket **36** by means of a collar **44** carried by the spindle **38** contiguous to the upper hub **40** and a rotating gear **46** (Fig. 3) carried by the spindle **38** adjacent to the lower hub **42**. This gear **46** engages a stationary rack (not shown) which extends substantially the length of the firing lehr **18** so that the heads **14** are rotated during their passage therethrough thus assuring even firing of the enameled bulbs **16** carried on the heads **14**. A bulb holder **48** (Figs. 2, 3 and 5) contoured and suitably quadranted (Fig. 2) to fit the neck portion of the enameled bulb **16** is affixed to the upper end of each spindle **38**.

The upstanding portion of the spindle mounting bracket **36** carries a stud or roller shaft **50**. A roller **52** on the shaft **50** engages the guide rail **34** disposed between the upper chain **30** and the lower chain **32** of the conveyor **12**. The rail **34** is mounted on a portion of the frame (not shown) of the machine **10**.

Bulb unloader 20

An adjustable mounting plate **60** (Figs. 2, 3, 4 and 5) is secured by bolts (not shown) extending through an adjustable slot (not shown) in the plate **60** to a horizontal member **62** (Fig. 3) of the frame (not shown) of the machine **10**. The other side of the plate **60** may be affixed to a support member **64**, as by bolts. The lower end of the member **64** may be fastened to a lower horizontal member (not shown) on the frame (not shown).

A body or casting **70** (Fig. 3) of the bulb unloader **20** has an upstanding plate or angle **72** provided with a generally horizontal bottom mounting flange **74**, secured adjustably as through slots therein and bolts **76** (Fig. 2) to the mounting plate **60**. The angle **72** has an upper mounting plate or flange **80** (Figs. 2, 3, 5 and 6) and a lower mounting plate or flange **82** in suitable spaced relationship.

Rail frame rotating mechanism

An operating lever shaft **86** (Figs. 2, 3, 4 and 5), an idler gear shaft **88** and a rail frame mounting shaft **90** of the rail frame rotating mechanism **91** are journalled in suitable bearings in the upper plate **80** and the lower plate **82**.

The operating lever shaft **86** carries an operating bell crank lever **92** (Figs. 3 and 4) and a drive gear **94**. The operating lever **92** is provided with an inner arm **95** having a spindle engaging end portion **96**, and an outer arm **99** having an end portion **100** for engagement with an adjustable stop **104** mounted on the lower plate **82** of the casting **70**. This stop **104** determines the starting position of the operating lever **92**.

As shown particularly in (Figs. 2, 3, 4 and 5 resilient means, such as a spring **106**, extends from a lug on the operating lever **92**, to a spring mounting bracket **108** projecting from lower plate **82** of the casting **70**. The operating lever shaft **86** is retained between the brackets **80** and **82** by means of a gear hub of the drive gear **94** and a suitable collar **110** affixed thereto, as by set screws.

The idler gear shaft **88** is similarly journalled between the plate **80** and **82** by means of collar **112** and the hub of an idler gear **114** thereon. The gear **114** engages the drive gear **94** on the operating lever shaft **86** and a driven gear **116** on the shaft **90**. It will be understood that the shaft **90** carries a generally U-shaped rail frame or yoke **120** on the upper end thereof which projects beyond the upper plate **80** of the casting **70**. A suitable collar **122** retains the shaft **90** journalled between the plates **80** and **82**. The drive gear **94**, the intermediate or idler gear **114** and the driven gear **116** form a gear train for transmitting rotary motion of the operating lever **92** to the rail frame **120**.

The rail frame **120** comprises a bottom portion or plate **124**, and guide rail mount or side plates **126**, suitably integrated by a rod **127**. This rod **127** serves as a spacer and support for an asbestos sleeve **127'** for tipping a bulb **16** bowl down during transfer (Fig. 6). The side rails **126** have their upper portions suitably widened for mounting thereon, as hereinafter explained, a pair of arcuate guide rails **128**. Each of the guide rails **128** carry a pivot arm **130** for connection to a rail lifting mechanism **140**, as hereinafter explained.

Rail lifting mechanism

A stationary arcuate upwardly inclined cam **142** of the rail lifting mechanism **140** (Figs. 3 and 6) is mounted by suitable means, such as bolts, to the upper flange **80** of the casting **70**. A horizontal shaft **144** journalled in suitable bushings in the side rails **126** carries a roller arm **146** provided with a cam roller **148** for engagement with the cam **142**. Each of the outer portions of the shaft **146** which project beyond the plates **126** carries a lifting arm **149**. A connecting rod **150** joins the outer end of each of the arms **149** to a lug provided on a pivot arm **130** affixed to a guide rail **128**.

Operation

As the spindle **38** of a continuously moving head **14** (carrying an already lehred ceramic enameled bulb **16**) engages the end portion **96** on the inner arm **95** of the operating lever **92**, the lever **92** and hence the shaft **86** and the drive gear **94** carried thereby are moved in a clockwise direction, when viewed in Fig. 4, against the action of the spring **106**. The guide rails **128** are in a position to straddle the neck of the lehred bulb **16** just below the enlarged bowl portion of the bulb **16** (Figs. 2 and 3). The idler gear **114** on the shaft **88** moves in a counter-clockwise direction, as viewed in Fig. 4, so that the driven gear **116** on the rail frame mount shaft **90** moves in a clockwise direction when viewed in Fig. 4. Thus, as the spindle **38** moves the operating lever **92** through an arc in a clockwise direction (when viewed in Fig. 4) the rail frame or yoke **120** is likewise moved in a clockwise direction away from the heads **14** of the machine **10** by the above described rail frame rotating mechanism **91**.

Simultaneously, during the horizontal rotation of the rail frame **120** about a vertical axis, the roller **148** on the roller arm **146** rides up the inclined angular stationary cam **142**, thus rotating the shaft **144** and the operating arms **149** carried thereby upwardly in a counterclockwise direction, when viewed in Fig. 3. Upward movement of the arms **149** moves upwardly the connecting rods **150** to rotate the pivot arms **130**, the guide rails **128** and the lehred lamp **16** carried thereby about a horizontal axis. The upward movement of the rails **128** lifts the lehred bulb **16** off the spindle holder **48** and upwardly to the point where gravity causes the bulb **16** to slide downwardly on the rails **128**. When the neck of the bulb **16** strikes the asbestos sleeve **127'**, the bulb **16** is inverted and delivered bowl end first (Fig. 6) into a chute **22** from whence it slides into the conveyor **24** for transfer, for example, to a sealing machine (not shown).

At this point in the operation the spindle **38** (Fig. 5) is about to roll off the spindle engaging end **96** of the operating lever **92** of the bulb unloading mechanism **20** of the invention. As the spindle **38** of the head **14** moves further along with the conveyor **12** and disengages itself from the lever **92**, the spring **106** swings the lever **92** of the bulb unloading device **20** in a counterclockwise direction (Fig. 5) until the lever **92** engages the stop **104**. In this position the operating lever **92** and hence the bulb unloading mechanism **20** of the invention are ready, respectively, to receive the spindle **38** of the next approaching head **14** and the lehred bulb **16** carried thereby.

Although a preferred embodiment of the invention has been disclosed, it will be understood that modifications may be made within the spirit and scope of the invention.

We claim:

1. A bulb unloading device for a continuous conveyor type machine comprising a body, a rail frame rotatable in said body, a rail frame rotating mechanism on said body for engagement with a continuously moving head of said machine and for horizontally rotating said rail frame about a vertical axis, a pair of bulb receiving guide rails pivoted on said rail frame and a rail lifting mechanism on said body for simultaneously rotating said rails about a horizontal axis during the horizontal rotation of said rail frame.

2. A bulb unloading device for a continuous conveyor type machine comprising a body having an upstanding plate provided with a lower mounting flange and a pair of generally horizontally spaced shaft mounting flanges, a rail frame rotatable in said flanges, a rail frame rotating mechanism on said body for engagement with a

continuously moving head of said machine and for horizontally rotating said rail frame about a vertical axis, a pair of bulb receiving guide rails pivoted on said rail frame and a rail lifting mechanism on said body for simultaneously rotating said rails about a horizontal axis during the horizontal rotation of said rail frame.

3. A bulb unloading device for a continuous conveyor type machine comprising a body, a rail frame rotatable in said body, a rail frame rotating mechanism on said body for engagement with a continuously moving head of said machine and for horizontally rotating said rail frame about a vertical axis, said rail frame rotating mechanism comprising an operating lever shaft, an idler shaft and a rail frame mounting shaft journalled in said body, an operating lever on said operating shaft for engagement with a continuously moving head of said machine, a driven gear on said mounting shaft, a drive gear on said operating lever shaft, and an intermediate gear on said idler shaft in engagement with said drive gear and said driven gear, a pair of bulb receiving guide rails pivoted on said rail frame and a rail lifting mechanism on said body for simultaneously rotating said rails about a horizontal axis during the horizontal rotation of said rail frame.

4. A bulb unloading device for a continuous conveyor type machine comprising a body, a rail frame rotatable in said body, a rail frame rotating mechanism on said body for engagement with a continuously moving head of said machine and for horizontally rotating said rail frame about a vertical axis, a pair of bulb receiving guide rails pivoted on said rail frame and a rail lifting mechanism on said body for simultaneously rotating said rails about a horizontal axis during the horizontal rotation of said rail frame, said rail lifting mechanism comprising a stationary cam on said body, a shaft journalled in said rail frame, a roller arm on said shaft, a roller on said roller arm for engagement with said cam, lifting arms on the outer ends of said shaft and a connecting rod for joining each operating arm with a guide rail.

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