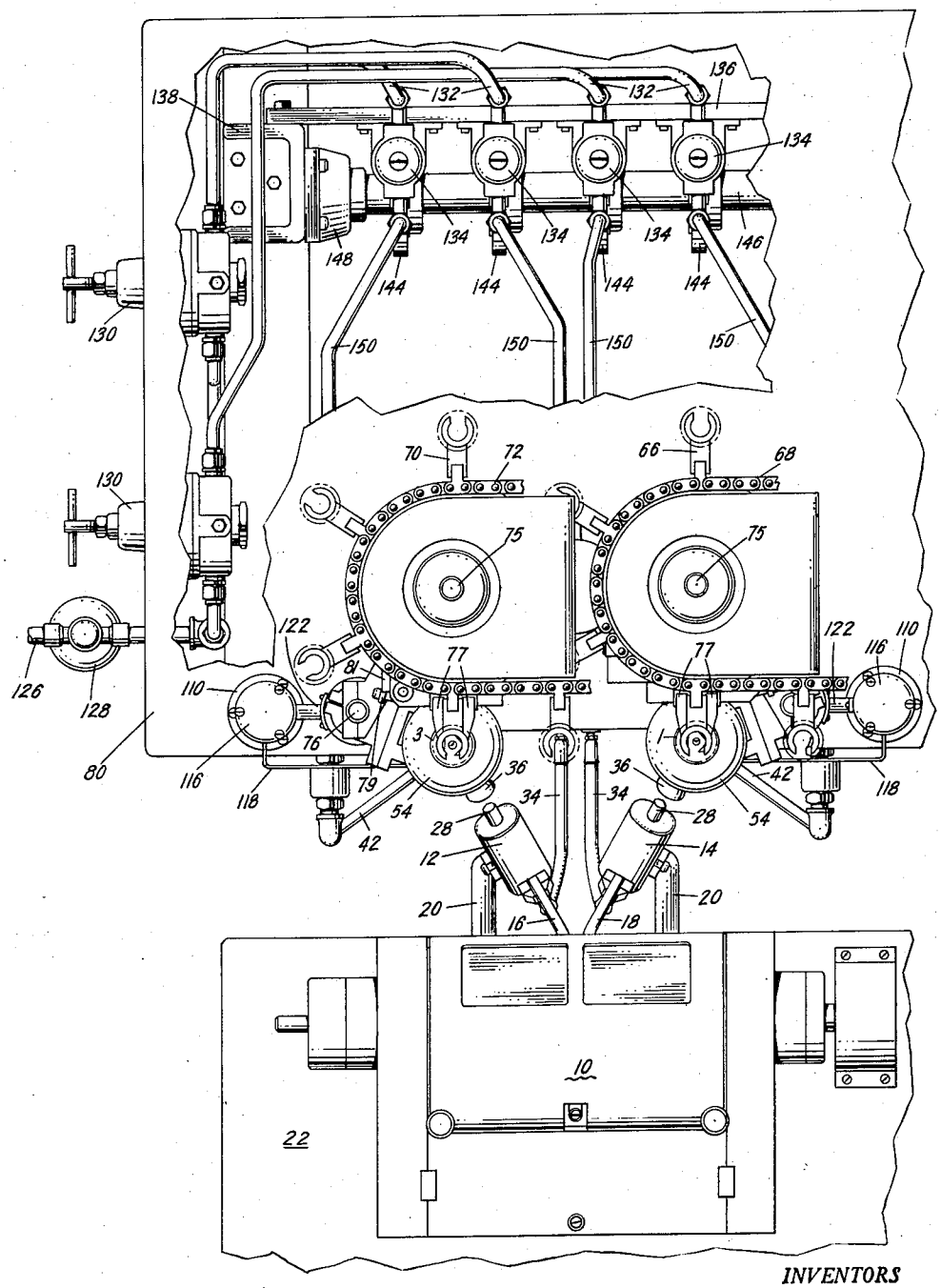
Dec. 2, 1958 A. ROSENBLATT ET AL 2,862,529

APPARATUS FOR FEEDING FILAMENTARY PARTICLES

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Fig. 1

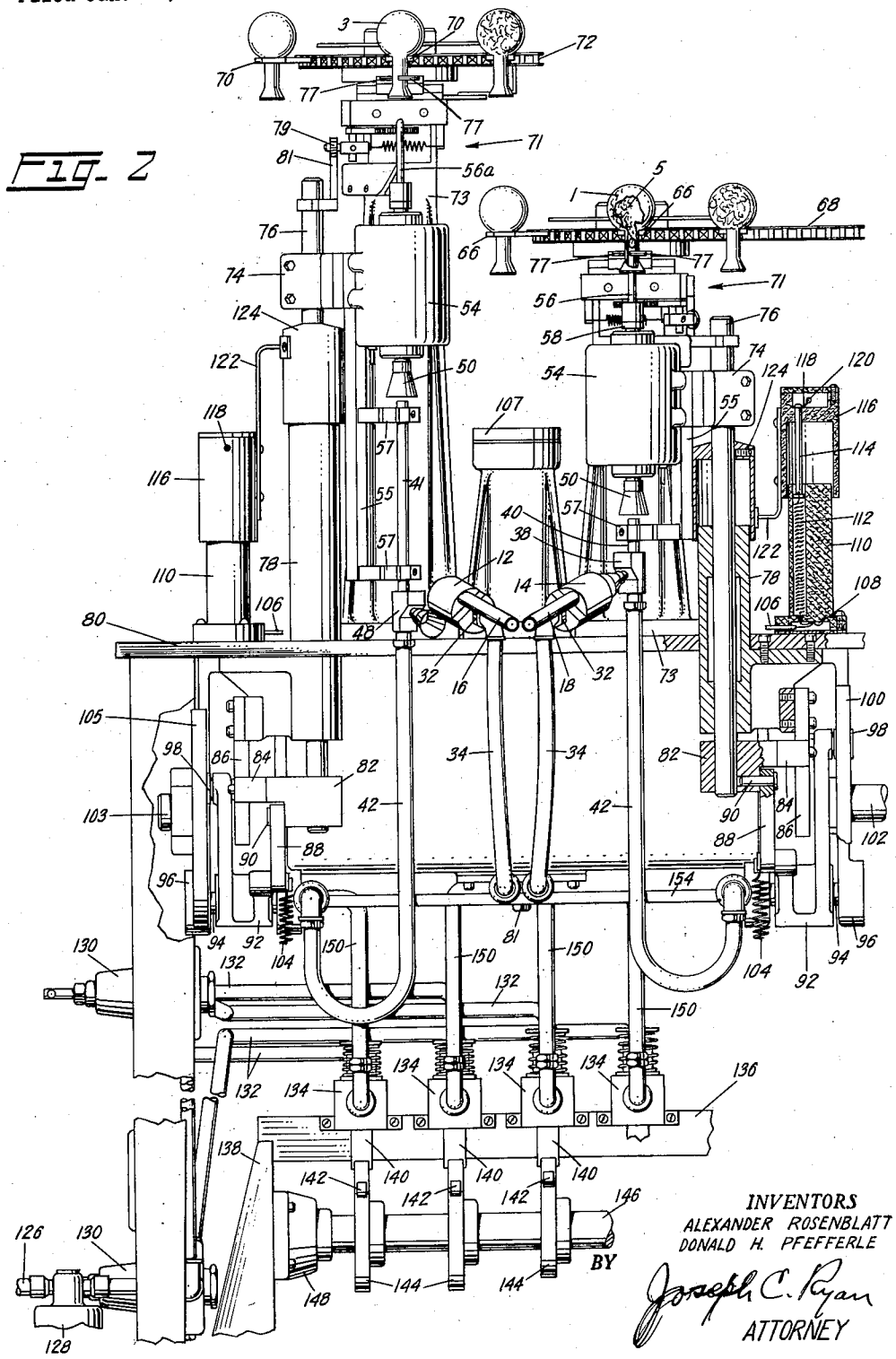
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Fig. 2



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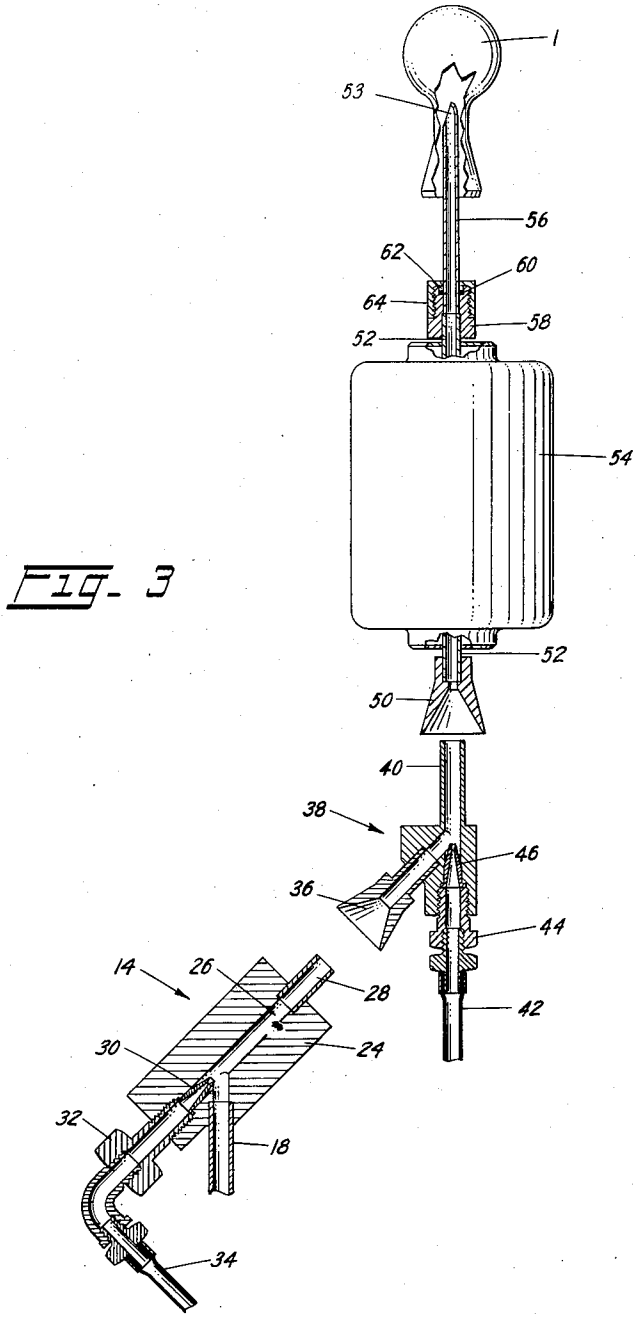


Fig. 3

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APPARATUS FOR FEEDING FILAMENTARY PARTICLES

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10 Claims. (Cl. 141—67)

This invention relates to the manufacture of flash lamps and more particularly to the introduction of a combustible metal into a flash lamp bulb.

In the manufacture of flash lamps, filamentary particles of a combustible metal material, such as shredded foil for example, are introduced into the lamp bulb. The shredded foil may be formed by feeding a sheet of the combustible metal material into a suitable cutting machine, such as the machine shown in U. S. Patent 2,699,831 for example. The shredded foil produced by the cutting machine is then fed to the lamp bulb. A method for introducing shredded foil into lamp bulbs is disclosed in the co-pending application of Bennett et al., Serial No. 192,224, filed Ocotber 26, 1950 now U. S. Patent 2,772,703.

An object of this invention is to introduce filamentary particles into flash lamp bulbs.

Another object of this invention is to provide apparatus for feeding filamentary particles into flash lamp bulbs.

A further object is to provide apparatus for automatically feeding filamentary particles to lamp bulbs carried to loading position by a conveyor.

These and other objects, advantages and features are attained, in accordance with the principles of our invention, by reciprocating a nozzle, preferably rotatable, into and out of a lamp bulb carried by an indexing conveyor. The reciprocating stroke of the nozzle is synchronized with the indexing of the bulb-carrying conveyor so that the forward stroke of the nozzle occurs after a bulb has been carried by the conveyor into register with the nozzle, and the return stroke occurs after a charge of filamentary particles, such as shredded foil, for example, has been delivered to the bulb through the nozzle. A pneumatic system employed to carry a charge of shredded foil from a supply thereof to the nozzle is actuated intermittently and is synchronized with the reciprocation of the nozzle to provide for the delivery of a charge of shredded foil to the nozzle when the nozzle is in delivery position with respect to a bulb.

This invention is further characterized by the provision of a pair of reciprocating nozzles, preferably rotatable, to which shredded foil is fed from a common supply, for alternately delivering a charge of shredded foil to a bulb on one conveyor and then to another bulb on another conveyor. Thus the output of a single foil shredding machine is employed to provide a charge of shredded foil to bulbs carried on two separate conveyors.

In the specific embodiment of the invention shown in the accompanying drawings,

Figure 1 is a plan view of apparatus for introducing a quantity of shredded foil into lamp bulbs, and includes also a portion of apparatus which may be employed to shred foil and a portion of the conveyors which carry bulbs into foil-filling position.

Figure 2 is a side elevational view, partly in section, of the apparatus of Figure 1.

Figure 3 is a fragmentary detail, partly in section, and on an enlarged scale, illustrating the means employed to

convey a quantity of shredded foil to the nozzle which delivers it to a flash lamp bulb.

Referring now to the drawings, particularly Figure 1 thereof, that portion of a foil shredding apparatus shown therein is designated by the general reference numeral 10. The foil shredding apparatus 10 may be of the type shown and described in U. S. Patent 2,699,831 for example. Shredded foil, as it drops away from the cutters of the foil shredding apparatus, is drawn into venturi assemblies 12 and 14 through venturi feeding tubes 16 and 18 respectively. The venturi assemblies are mounted on brackets 20 attached to the table 22 on which the foil shredding apparatus 10 is disposed.

Referring now to Figure 3, the venturi assembly 14 comprises a body member 24 having a bore 26 extending therethrough, one end of the bore being fitted with an outlet pipe 28, and the other end of the bore being provided with a nozzle 30 to which a plug 32 is attached, the plug 32 in turn being connected to a source of gas, such as air for example, under pressure through flexible tubing 34. Thus as foil is shredded by the foil shredding apparatus 10, the flow of gas under pressure through flexible tubing 34, plug 32 and nozzle 30 draws the shredded foil through the venturi feeding tube 18 of venturi 14, into the bore 26 and discharge it through the outlet pipe 28. The venturi assembly 12 is of similar construction and operates in the same manner as venturi assembly 14.

The shredded foil discharged from outlet pipe 28 (Fig. 3) is received by funnel 36 of venturi assembly 38 and is discharged through outlet pipe 40 thereof by the admission of gas, such as air for example, under pressure into the venturi assembly 38 through flexible tubing 42, plug 44 and nozzle 46. Venturi assembly 48 (Fig. 2) is of similar construction and operates in the same manner as venturi assembly 38, except that its outlet pipe 41 is much longer than outlet pipe 40 of venturi assembly 38 for reasons which will be apparent from the description below of the remainder of the apparatus of this invention.

The shredded foil discharged from outlet pipe 40 (Fig. 3) is received by funnel 50 mounted on one end of hollow shaft 52 of motor 54. The other end of shaft 52 is provided with a nozzle 56 which is attached thereto by means of a chuck 58. The chuck 58 is provided with an O-ring seal 60 held in place by a retaining ring 62 and nut 64. The force exerted by the gas entering the venturi 38 through flexible tubing 42 is sufficient to drive the shredded foil through the hollow shaft 52 and the nozzle 56 into the bulb 1. Similarly, shredded foil is fed to bulb 3 (Fig. 2) from venturi 48 and the venturi outlet pipe 41. Venturis 38 and 48 are supported from their respective associated motors 54 by means of arms 55 depending from the motors, and clamps 57 extending laterally from the lower ends of the arms 55 and attached to the outlet pipes 40 and 41 respectively of the venturis 38 and 48.

Referring now to Figures 1 and 2, bulb 1 is supported by a bulb holder 66 attached to an endless chain conveyor 68; and bulb 3 is supported by a bulb holder 70 attached to an endless chain conveyor 72. Conveyors 68 and 72 are provided with a plurality of bulb holders 66 and 70 respectively for carrying bulbs into position above and in register with the apparatus just described to receive a charge of shredded foil therefrom. Each of the bulb-conveyors is provided with a bulb orienting device, designated generally by the reference numeral 71, which is mounted on a pedestal 73 which supports idler shaft 75 of conveyors 68 and 72. The bulb orienting device 71 comprises a pair of jaws 77 which are opened and closed about the neck of a bulb by the motion transmitted thereto by suitable means from a roller 79 which rides on a bar cam 81 attached to lift shaft 76.

The apparatus for reciprocating the nozzle 56 into and

out of the bulb **1** to deliver a charge of shredded foil thereto will now be described. Delivery is effected when the nozzle **56**, venturi **38** and venturi **14** are in the relative position in which they are shown in Figure 3. The mechanism for advancing the nozzle **56** and its associated parts into delivery position is shown in Figure 2. The motor **54**, which is connected to the nozzle **56** by the chuck **58**, and which is connected to the venturi **38** by arm **55** and clamp **57**, is mounted on clamp **74** attached to the upper end of lift shaft **76**. Lift shaft **76**, which extends through and is supported by lift shaft housing **78** mounted on table **80**, has a clamp **82** attached to the lower end thereof. In order to prevent the lift shaft from rotating, the clamp **82** attached to the lower end of the lift shaft is provided with a slotted slide **84** which rides up and down on a guide bar **86** attached to and depending from the lift shaft housing **78**. A link **88**, depending from link pin **90** which is mounted in and projects laterally from clamp **82**, connects the lift shaft clamp **82** to one end of a cam arm **92**. Cam arm **92** is pivotally mounted intermediate its ends on shaft **94** which is supported in a bracket **96** depending from table **80**. The other end of cam arm **92** is provided with a cam follower **98** which rides on cam **100** mounted on cam shaft **102**. Cam follower **98** is maintained in positive engagement with cam **100** by the load placed thereon by spring **104**, one end of which is attached to cam arm **92** and the other end thereof being attached to a fixed member not shown. Similar apparatus, operating in a similar manner, is provided for delivering a charge of shredded foil to the bulb **3**. Cam shaft **102** on which cam **100** is mounted, and stub shaft **103** on which a cam **105** similar to cam **100** is mounted, are driven by a common drive (not shown) mounted on the table **80**, the casting **107** for housing a portion of this drive being mounted on top of table **80** as shown in Fig. 2.

The means for energizing the motors **54**, to effect rotation of the nozzles **56** will now be described, reference being made particularly to the right hand side of Figure 2. Wire **106**, from a source of electrical energy not shown, is connected to a screw **108** disposed in housing **110** of insulating material mounted on table **80**. The housing **110** is provided with a bore within which a spring **112** is disposed. One end of spring **112** is connected to screw **108** and the other end thereof is attached to one end of an electrically conducting rod **114** mounted in housing cover **116** which is slidably disposed on housing **110**. A wire **118**, attached to the other end of rod **114**, extends through aperture **120** in housing cover **116** and is connected to motor **54**. A bracket **122**, attached to both the housing cover **116** and a cap **124** slidably disposed on lift shaft housing **78** and attached to lift shaft **76**, provides a means whereby the housing cover **116** will reciprocate with the motor **54**. This means, in cooperation with the means just described for establishing the electrical connection through housing **110**, makes it unnecessary to provide a substantial slack in the wire **118** running between housing cover **116** and motor **54**.

The system for supplying gas, such as air for example, under pressure to the venturis **12**, **14**, **38** and **48** will now be described, reference being made particularly to Figures 1 and 2. Air from a source not shown is admitted into the system through feed line **126** into filter **128**. Four separate feed lines run from filter **128** to four separate pressure regulators **130**. A feed line **132** connects each of the pressure regulators **130** to an air valve **134**, the several air valves being attached to a mounting plate **136** supported by a pair of standards **138**, one of which is shown in Figures 1 and 2. Each of the air valves **134** is provided with a mercury switch **140** depending therefrom, the roller **142** of which rides on cam **144**. The cams **144** are mounted on shaft **146** which is supported in bearing housings **148** mounted on standards **138**. Feed lines **150** extending from air valves **134** are clamped to support bar **154** which is attached to table **80** by bolt **81**. Flexible tubes **34**, depending from venturis **12** and **14**, are connected to the termini of two of the feed lines **150** at support bar **154**. Similarly, flexible tubes **42**, depending from venturis **38** and **48**, are connected to the termini of the other two feed lines **150** at support bar **154**.

The operation of the shredded foil feeding apparatus will now be described, reference being made initially to Figure 2. The reciprocating nozzle **56** of the shredded foil feeding assembly illustrated at the right hand side of Figure 2 is shown in the advanced or delivery position, i. e., the tip thereof has been moved inside the bulb **1** to deliver a charge of shredded foil **5**; whereas the nozzle **56*a*** of the shredded foil feeding assembly illustrated at the left hand side of Figure 2 is shown in the retracted position, awaiting its turn to advance and deliver a quantity of shredded foil to bulb **3**.

Advancement of the nozzle **56** from its retracted position to its advanced position is effected by the cam **100** on cam shaft **102**, through cam follower **98**, cam arm **92**, link **88**, link pin **90**, clamp **82** and lift shaft **76**. As the lift shaft **76** moves upwardly, it carries with it the motor **54**, the nozzle **56** which is attached to the hollow motor shaft **52**, and the venturi **38** which is supported from the motor **54** by arm **55** and clamp **57**. When the upward stroke of the lift shaft **76** has been completed, the nozzle **56** is disposed inside bulb **1** (Fig. 3) and the funnel **36** of venturi **38** is in alignment with the outlet pipe **28** of venturi **14**. With the apparatus so disposed, the nozzle **56** is ready to receive a charge of shredded foil from the foil shredding apparatus **10** (Fig. 1) and deliver it into the bulb **1**.

Actuation of the pneumatic system for supplying air under pressure to the venturis **12**, **14**, **38** and **48** is synchronized with the reciprocation of the lift shafts **76** so that a blast of air is admitted to the shredded foil feeding system intermittently, i. e., when a nozzle **56** is in position inside a bulb. Referring now to Figure 2, the two right hand air valves **134** are shown in the open position, having been actuated by the rotation of the shaft **146**, through their respective cams **144**, rollers **142** and mercury switches **140**. Air from these two valves flows to the venturis **14** and **38** through the two feed lines **150** and flexible utbes **34** and **42** respectively. Air flowing through the venturi **14** draws shredded foil from the foil shredding apparatus **10** (Fig. 1) through feeding tube **18** and discharges it through outlet pipe **28** into funnel **36** of venturi **38** (Fig. 3). Similarly, air flowing through the venturi **38** draws the shredded foil through funnel **36** and discharges it through outlet pipe **40** and into funnel **50** on one end of the hollow motor shaft **52** with sufficient force to drive it through the shaft **52** and nozzle **56** into the bulb **1**. Rotation of the nozzle **56**, which is preferably provided with a delivery opening **53** in the side wall thereof like the nozzle shown in the copending application of Bennett et al. referred to above, effects a satisfactory distribution of the shredded foil within the bulb **1**.

The air valves **134** (Fig. 2) which were opened to admit air to the venturis **14** and **38**, are now closed by the further rotation of shaft **146** on which the cams **144** associated therewith are mounted, thereby terminating the flow of shredded foil to the nozzle **56**. The return stroke of the lift shaft **76** (Fig. 2), to withdraw the nozzle **56** from the bulb **1** to which a charge of shredded foil **5** has been delivered, is effected by the further rotation of shaft **102** on which cam **100** is mounted. The conveyor **68** indexes one station, carrying away the bulb which has been provided with a charge of shredded foil and bringing another bulb into loading position.

While the nozzle **56** and its associated mechanism is returning to its rest position, the nozzle **56*a*** (Fig. 2) and its associated mechanism is advancing from the rest position to effect delivery of a charge of shredded foil to bulb **3**. Since the mechanisms employed and their mode of operation are the same as those associated with nozzle **56**, a detailed description thereof is believed to be unnecessary.

From the foregoing, it is apparent that, in accordance

with the principles of this invention, not only is automatic apparatus provided for delivering a charge of shredded foil to flash lamp bulbs as they are advanced by a conveyor to a loading station, but maximum utilization of the output of a foil shredding machine is obtained by synchronizing two foil feeding mechanisms therewith and with two bulb conveyors whereby shredded foil is being fed to a bulb on one conveyor by one foil feeding mechanism while the other foil feeding mechanism is returning to its rest position after having just delivered a charge of shredded foil to a bulb on another conveyor.

What we claim is:

1. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a nozzle through which filamentary particles may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; means for reciprocating said nozzle into and out of a lamp bulb in register therewith on said conveyor; means for causing a flow of filamentary particles through said nozzle when said nozzle is in the advanced position of its reciprocating stroke; and means for rotating said nozzle when said nozzle is in the advanced position of its reciprocating stroke to effect a distribution within the lamp bulb of the filamentary particles flowing from said nozzle.

2. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a nozzle through which filamentary particles may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; means for reciprocating said nozzle into and out of a lamp bulb in register therewith on said conveyor; pneumatic means for causing a flow of filamentary particles through said nozzle when said nozzle is in the advanced position of its reciprocating stroke; and means for rotating said nozzle when said nozzle is in the advanced position of its reciprocating stroke to effect a distribution within the lamp bulb of the filamentary particles flowing from said nozzle.

3. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a reciprocable nozzle through which filamentary particles may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; a reciprocable venturi assembly, the outlet of which is in axial alignment with said nozzle; means for synchronously reciprocating said venturi assembly and said nozzle whereby said nozzle is moved into and out of a lamp bulb in register therewith on said conveyor; means, in communication with a source of filamentary particles, for introducing filamentary particles into said venturi assembly; means for actuating said venturi assembly to effect a flow of filamentary particles therethrough and through said nozzle into a lamp bulb when said nozzle is in the advanced position of its reciprocating stroke; and means for rotating said nozzle when said nozzle is in the advanced position of its reciprocating stroke to effect a distribution within the lamp bulb of the filamentary particles flowing from said nozzle.

4. Apparatus for providing lamp bulbs with a filling of shredded foil comprising: a reciprocable nozzle through which shredded foil may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; a stationary venturi assembly in communication with a supply of shredded foil; a reciprocable venturi assembly movable into foil-receiving relationship with respect to said stationary venturi, and said reciprocable venturi assembly having an outlet in axial alignment with said nozzle; means for synchronously reciprocating said nozzle and said reciprocable venturi whereby said nozzle is moved into and out of a lamp bulb in register therewith on said conveyor, and said reciprocable venturi is moved into and out of foil-receiving relationship with respect to said stationary venturi; and means for effecting a flow of shredded foil from a supply thereof through said stationary venturi assembly, said reciprocable venturi assembly and said nozzle into a lamp bulb when said nozzle and said reciprocable venturi assembly are in the advanced position of their reciprocating stroke.

5. Apparatus for providing lamp bulbs with a filling of shredded foil comprising: a reciprocable nozzle through which shredded foil may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; a stationary venturi assembly in communication with a supply of shredded foil; a reciprocable venturi assembly movable into foil-receiving relationship with respect to said stationary venturi, and said reciprocable venturi assembly having an outlet in axial alignment with said nozzle; means for synchronously reciprocating said nozzle and said reciprocable venturi whereby said nozzle is moved into and out of a lamp bulb in register therewith on said conveyor, and said reciprocable venturi is moved into and out of foil-receiving relationship with respect to said stationary venturi; means for effecting a flow of shredded foil from a supply thereof through said stationary venturi assembly, said reciprocable venturi assembly and said nozzle into a lamp bulb when said nozzle and said reciprocable venturi assembly are in the advanced position of their reciprocating stroke; and means for rotating said nozzle when said nozzle is in the advanced position of its reciprocating stroke to effect a distribution within the lamp bulb of the shredded foil flowing from said nozzle.

6. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a pair of nozzles through which filamentary particles may be discharged; a pair of conveyors, each of which is disposed in operative relationship with respect to one of said pair of nozzles, for carrying lamp bulbs sequentially into register therewith; means for alternately reciprocating said pair of nozzles into and out of lamp bulbs in register therewith on said conveyors; and means for causing a flow of filamentary particles alternately through one and then the other of said pair of nozzles when said nozzles are in the advanced position of their reciprocating strokes.

7. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a pair of nozzles through which filamentary particles may be discharged; a pair of conveyors, each of which is disposed in operative relationship with respect to one of said pair of nozzles, for carrying lamp bulbs sequentially into register therewith; means for alternately reciprocating said pair of nozzles into and out of lamp bulbs in register therewith on said conveyors; means for causing a flow of filamentary particles alternately through one and then the other of said pair of nozzles when said nozzles are in the advanced position of their reciprocating strokes; and means for rotating said nozzles when said nozzles are in the advanced position of their reciprocating strokes to effect a distribution within the lamp bulbs of the filamentary particles flowing from said nozzles.

8. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a pair of reciprocable nozzles through which filamentary particles may be discharged; a pair of conveyors, each of which is disposed in operative relationship with respect to one of said pair of nozzles, for carrying lamp bulbs sequentially into register therewith; a pair of reciprocable venturi assemblies the outlet of each being in axial alignment with one of said pair of nozzles; means for alternately reciprocating each venturi assembly and the nozzle in cooperative relationship with respect thereto whereby the said nozzles are moved into and out of lamp bulbs in register therewith on said conveyors; means, in communication with a source of filamentary particles, for alternately introducing filamentary particles first into one

and then into the other of said pair of venturi assemblies; and means for actuating said pair of venturi assemblies alternately to effect a flow of filamentary particles therethrough and through the nozzles in cooperative relationship with respect thereto into the lamp bulbs when said nozzles are in the advanced position of their reciprocating strokes.

9. Apparatus for providing lamp bulbs with a filling of filamentary particles comprising: a pair of reciprocable nozzles through which filamentary particles may be discharged; a pair of conveyors, each of which is disposed in operative relationship with respect to one of said pair of nozzles, for carrying lamp bulbs sequentially into register therewith; a pair of reciprocable venturi assemblies the outlet of each being in axial alignment with one of said pair of nozzles; means for alternately reciprocating each venturi assembly and the nozzle in cooperative relationship with respect thereto whereby the said nozzles are moved into and out of lamp bulbs in register therewith on said conveyors; means, in communication with a source of filamentary particles, for alternately introducing filamentary particles first into one and then into the other of said pair of venturi assemblies; means for actuating said pair of venturi assemblies alternately to effect a flow of filamentary particles therethrough and through the nozzles in cooperative relationship with respect thereto into the lamp bulbs when said nozzles are in the advanced position of their reciprocating

strokes; and means for rotating said nozzles when said nozzles are in the advanced position of their reciprocating strokes to effect a distribution within the lamp bulbs of the filamentary particles flowing from said nozzles.

10. Apparatus for providing a lamp bulb with a filling of filamentary particles comprising: a nozzle through which filamentary particles may be discharged; a conveyor disposed in operative relationship with respect to said nozzle for carrying lamp bulbs sequentially into register with said nozzle; means for effecting relative displacement of said conveyor and said nozzle whereby said nozzle is disposed in a lamp bulb in register therewith on said conveyor; means for causing a flow of filamentary particles through said nozzle; and means for rotating said nozzle, when it is disposed in a lamp bulb, to effect a distribution within the lamp bulb of the filamentary particles flowing from said nozzle.

References Cited in the file of this patent

UNITED STATES PATENTS

833,637	Sheffield	Oct. 16, 1906
1,859,562	Huston	May 24, 1932
2,273,735	Raymer	Feb. 17, 1942
2,347,046	Geiger	Apr. 18, 1944
2,547,606	Staller	Apr. 3, 1951

FOREIGN PATENTS

239,948	Great Britain	Sept. 24, 1925