June 19, 1956 E. H. DODGE 2,751,133

EXHAUST HEAD CONSTRUCTION

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Fig. 1

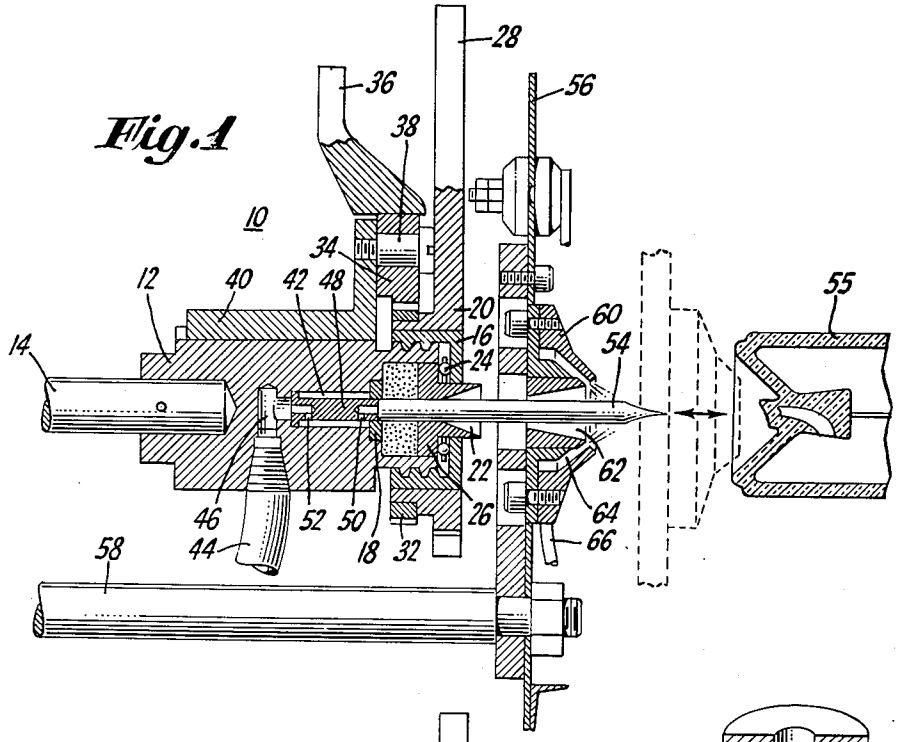
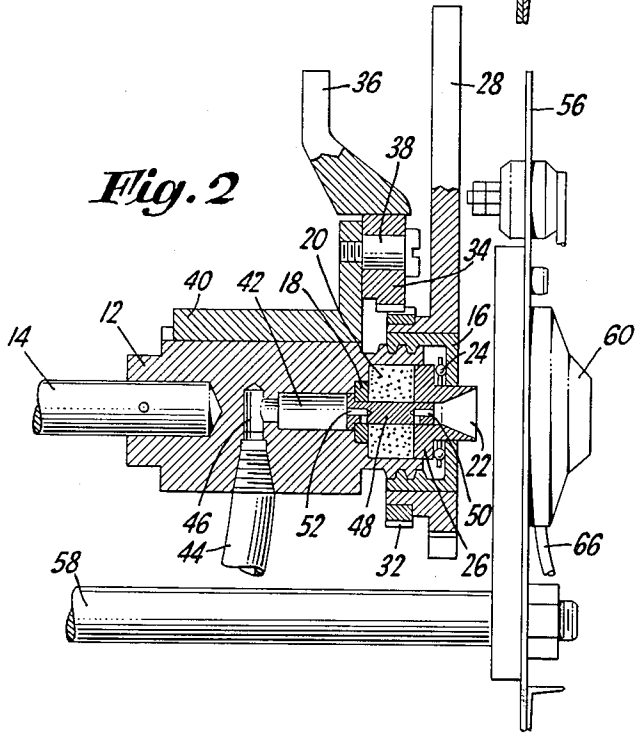


Fig. 2



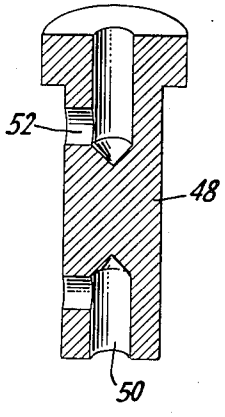


Fig. 3

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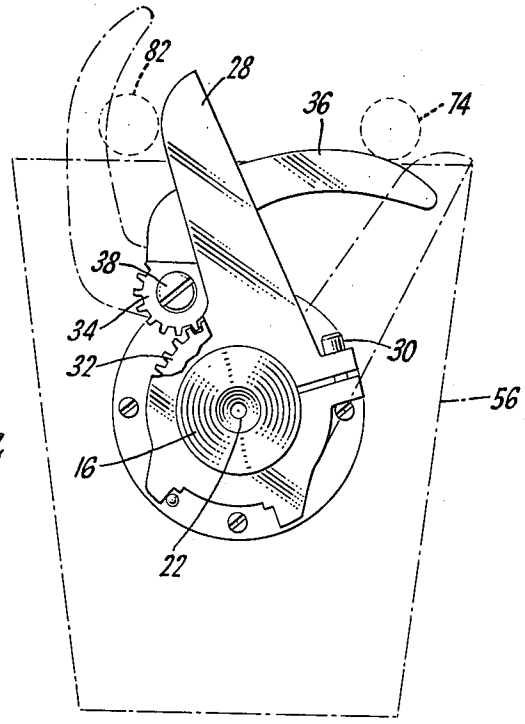
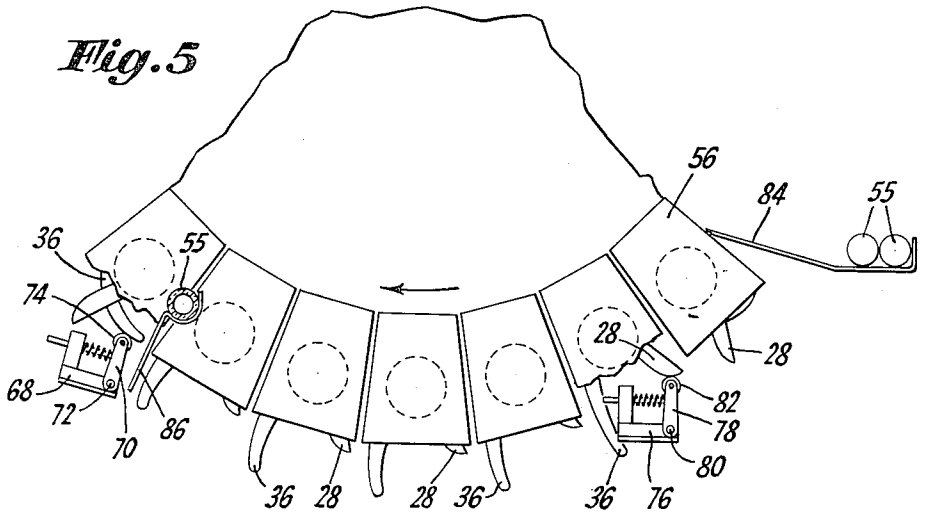


Fig. 4

Fig. 5



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EXHAUST HEAD CONSTRUCTION

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Application December 15, 1953, Serial No. 398,324

3 Claims. (Cl. 226—20.4)

This invention relates to the manufacture of electric discharge devices and more particularly to apparatus employed for evacuating or exhausting devices of this type.

In the manufacture of electric discharge devices, such as fluorescent lamps for example, it is generally the practice to perform the exhausting and filling operations through a slender tubulation, commonly called an exhaust tube, projecting from the mount at an end of the device and in communication with the interior thereof. The exhaust tube is usually threaded into a resilient collar seated in a head connected to an evacuation system and the resilient collar, with the exhaust tube extending therethrough, is deformed sufficiently to effect a hermetic seal between the resilient collar and the exhaust tube. Apparatus employed to exhaust and fill electric discharge devices usually comprises a multitude of heads connected to one or more vacuum pumps and a source of filling gas through a valve system. Since, on most of these machines, two or more heads are connected to one another through the valve system for at least a short interval during an operating cycle, gaseous impurities such as air which enter the vacuum pump system through one head can spread to other heads and contaminate the lamps which are connected to these other heads. This situation arises for example when no lamp is connected to one of the heads. Various devices have been designed to isolate the head through which these gaseous impurities enter the vacuum pump system in order to protect the lamps connected to the other heads. Since these devices are usually actuated by an abnormal or excessive flow of gas through the head, the vacuum pump system and lamps connected to some of the other heads are bound to be contaminated to a certain extent.

An object of this invention is to provide an exhaust machine head which can be automatically isolated from the remainder of the exhaust machine without the necessity for a substantial leakage of gaseous impurities through the head to the vacuum pump system.

Another object is to provide an exhaust machine head which can be automatically isolated from the remainder of the exhaust machine and prevent the flow of gaseous impurities through the head to other heads of the machine.

These and other objects, advantages and features are attained in accordance with the principles of our invention by providing an exhaust machine head with a pin slidably disposed in a chamber therefor behind the resilient collar which grips the exhaust tube and effects a hermetic seal therebetween. The pin has ports therein, through which communication is established between the exhaust tube and the vacuum pump system. When no lamp is present in the head, the pin is gripped by the resilient collar and a hermetic seal therebetween is effected. This operation is performed before the head is advanced to its initial communication with the vacuum pump system and thus isolates the head and prevents gaseous impurities from flowing back into the vacuum

pump system and into lamps connected to other heads on the machine.

In the specific embodiment of the invention illustrated in the accompanying drawings, Figure 1 is a vertical sectional view through an exhaust machine head showing the pin, which isolates the head from the rest of the machine, in the retracted position.

Figure 2 is a vertical sectional view through the exhaust machine head of Figure 1, showing the pin in the advanced position.

Figure 3 is a half section of the pin in perspective on an enlarged scale.

Figure 4 is a front view of the head showing the levers which operate on the resilient collar in the head.

Figure 5 is a fragmentary detail view of a portion of an exhaust machine with which the head of the preceding figures may be employed, showing the devices for actuating the levers which open and close the ports in the heads within which the lamp tubulations are received.

Referring now to the drawings, particularly Figure 1 thereof, exhaust machine head **10** comprises a block **12** mounted at one end thereof on a rod **14**, and provided at its other end with a threaded cap **16**. Disposed within the block **12** and secured therein by the threaded cap **16** are collar **18**, resilient collar **20**, funnel guide **22** and ball-bearing race **24**, the ball-bearing race **24** being concentric with the funnel guide **22** and disposed between the flange **26** thereof and the inner face of the cap **16**. Lever **28** is clamped to the cap **16** by screw **30** (Fig. 4). Lever **28** has a gear **32** mounted thereon which meshes with gear **34** of lever **36**. Lever **36** is pivotally mounted at **38** on bracket **40** mounted on block **12**. The block **12** is provided with a chamber **42** immediately behind collar **18** and in register with the aperture therein. Communication between chamber **42** and tubing **44** is established through bore **46**.

Pin **48** is located within chamber **42** and is normally disposed as in Figure 1, i. e., the free end of the shank portion thereof lies within the aperture in collar **18**. The pin **48** is provided with a port **50** at one end thereof and a port **52** at the other end thereof, each port being defined by a pair of connecting holes drilled in the pin at right angles to one another. Port **50** establishes communication between lamp tubulation **54** and chamber **42**. Port **52** establishes communication between chamber **42** and bore **46**.

Burner plate **56** mounted on rod **58** supports burner **60**. The burner **60** is provided with a centrally located aperture **62** through which tubulation **54** extends and a gas chamber **64** to which gas is supplied through tubing **66**.

The mechanisms for actuating the levers **28** and **36** to cause the resilient collar **20** to grip and to subsequently release the exhaust tubulation **54** of a lamp **55** are shown in Figure 5 which is a fragmentary detail of the "Apparatus for Exhausting Electric Discharge Devices" shown in the pending application of Dodge and Kimball, Serial No. 343,842, filed March 23, 1953, now Patent No. 2,726,799. As is shown and described in that application, lamps to be processed on the machine are picked up by the exhaust machine heads from a feeding cradle and are discharged therefrom upon completion of the operating cycle to a delivery chute.

The mechanism for actuating levers **28** and **36** to cause the resilient collar **20** to grip an exhaust tubulation **54** comprises a bracket **68** mounted on a fixed support (not shown), a spring-loaded lever **70** pivotally mounted thereon at **72**, and a cam follower **74** supported on the lever **70** and lying in the path of lever **36**. The mechanism for actuating levers **28** and **36** to cause the resilient collar **20** to release its grip on an exhaust tubulation **54** comprises a bracket **76** mounted on a fixed support (not shown), a spring-loaded lever **78** pivotally mounted there-

on at 80, and a cam follower 82 supported on the lever 78 and lying in the path traversed by lever 28.

The operation of the apparatus will now be described, starting with the several components thereof in the position shown in Figure 1. As shown in Figure 1, processing of lamp 55 on the exhaust machine has been completed and burner 60 has completed its reciprocating stroke effecting a tipping of exhaust tubulation 54 from the lamp. At this point, lamp 55 rolls down onto delivery chute 84 (Fig. 5). The gripping force exerted on the tubulation 54 by the resilient collar 20 must now be released and the tubulation ejected from the head 10 in order to permit the head to receive the next lamp to be processed.

Relaxation of the gripping force which the resilient collar 20 exerts on the tubulation 54 is effected when head 10 moves past bracket 76 and lever 28 is rotated by cam follower 82 which lies in its path. Rotation of lever 28 effects rotation of threaded cap 16 on which it is mounted. Rotation of cap 16 loosens it and relieves the force which had been applied through ball-bearing race 24 and flange 26 of funnel guide 22 to resilient collar 20. Since lever 28 is connected to lever 36 through gears 32 and 34, lever 36 is also rotated by rotation of lever 28.

The tubulation 54 is now free to be ejected from the head 10. This is accomplished by introducing a blast of compressed air into the head 10 through tubing 44 (Figs. 1 and 2) at a point in the operating cycle of the exhaust machine about midway between the two mechanisms for actuating the levers 28 and 36 (Fig. 5). This blast of air drives the pin 48 in chamber 42 forward until the head thereof strikes collar 18 (Fig. 2) and the tip of the shank thereof has pushed tubulation 54 out of funnel guide 22. The shank of pin 48 now extends through resilient collar 20, port 50 of pin 48 lying outside the collar 20 at one face thereof and port 52 of pin 48 lying outside collar 20 at the other face thereof. With the pin 48 so disposed, head 10 is advanced to pick up the next lamp 55 from feeding cradle 86, a portion of which is shown in Figure 5.

When the head 10 reaches a point in axial alignment with a lamp 55 in feeding cradle 86, the head 10 is advanced toward the lamp end on in order to encompass the exhaust tubulation 54. This is accomplished by movement of rod 14 on which head 10 is mounted. As the head 10 moves towards lamp 55, the free end of exhaust tubulation 54 enters funnel guide 22, strikes the tip of pin 48 and pushes it rearwardly in its chamber 42 until it assumes the position shown in Figure 1. With the exhaust tubulation 54 so disposed, the next operation performed thereon is the effectuation of a hermetic seal between tubulation 54 and resilient collar 20. This is accomplished when head 10 moves past bracket 68 and lever 36 is rotated by cam follower 74 which lies in its path. Rotation of lever 36 (Figs. 1, 2 and 3) effects rotation of threaded cap 16 through gear 34, gear 32 and lever 28. Rotation of threaded cap 16 tightens it against resilient collar 20, deforming the collar and effecting a hermetic seal between the colar and tubulation 54. The head 10 is then further advanced and the exhausting and filling operations are performed on the lamp 55 connected thereto.

If a head 10 fails for any reason to pick up a lamp from the lamp-feeding cradle 86, the pin 48 in cooperation with the resilient collar 20 automatically seals off the head and prevents impurities from entering the exhaust system therethrough. This is made possible by reason of the fact that normally the shank of pin 48 extends through collar 20 and the head of pin 48 abuts collar 18 (Fig. 2) when head 10 approaches lamp-feeding cradle 86, and the pin will remain in this position unless it is pushed back into its chamber 42 by a tubulation 54 of a lamp. Thus, under "no lamp" conditions, actuation of lever 36 by cam follower 74 effects a tightening of resilient collar 20 about pin 48 and effects a hermetic seal therebetween, and this occurs, as mentioned above, before head 10 is connected through tubing 44 to the exhaust system. With the head 10 so sealed, contamination of the exhaust system and lamps connected to other heads is prevented, as head 10 is advanced through a complete operating cycle of the exhaust machine.

What I claim is:

1. In a head through which an electrical device having a tubulation extending therefrom and in communication therewith may be placed in communication with exhausting and filling systems and the like, the combination of a resilient collar for receiving the tubulation of the electrical device; a pin slidably disposed in a chamber in the head and in axial alignment with said collar, said pin having ports therein establishing communication therethrough into said chamber, and said pin being movable into said collar; and means for pinching said resilient collar about said pin when said pin extends therethrough to effect a hermetic seal therebetween and close off the path of communication through said pin to said chamber.

2. In a head through which an electrical device having a tubulation extending therefrom and in communication therewith may be placed in communication with exhausting and filling systems and the like, the combination of a resilient collar for receiving the tubulation of the electrical device; a pin slidably disposed in a chamber in the head and in axial alignment with said collar, said pin having ports therein establishing communication therethrough into said chamber; means through which said chamber may be connected to a source of gas under pressure for driving said pin forward in its chamber and into said collar and ejecting the tubulation therefrom; and means for pinching said resilient collar about said pin when said pin extends therethrough to effect a hermetic seal therebetween and close off the path of communication through said pin to said chamber.

3. In a head through which an electrical device having a tubulation extending therefrom and in communication therewith may be placed in communication with exhausting and filling systems and the like, the combination of a resilient collar for receiving the tubulation of the electrical device; a pin slidably disposed in a chamber in the head and in axial alignment with said collar, said pin having a port therein at each end thereof establishing communication therethrough into said chamber; means through which said chamber may be connected to a source of gas under pressure for driving said pin forward in its chamber and into said collar and ejecting the tubulation therefrom; and means for pinching said resilient collar about said pin when said pin extends therethrough to effect a hermetic seal therebetween and close off the path of communication through said pin to said chamber.

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