June 11, 1957 R. A. KUEBLER 2,795,246

EXHAUST MACHINE HEAD

Filed Dec. 28, 1954

Fig. 1.

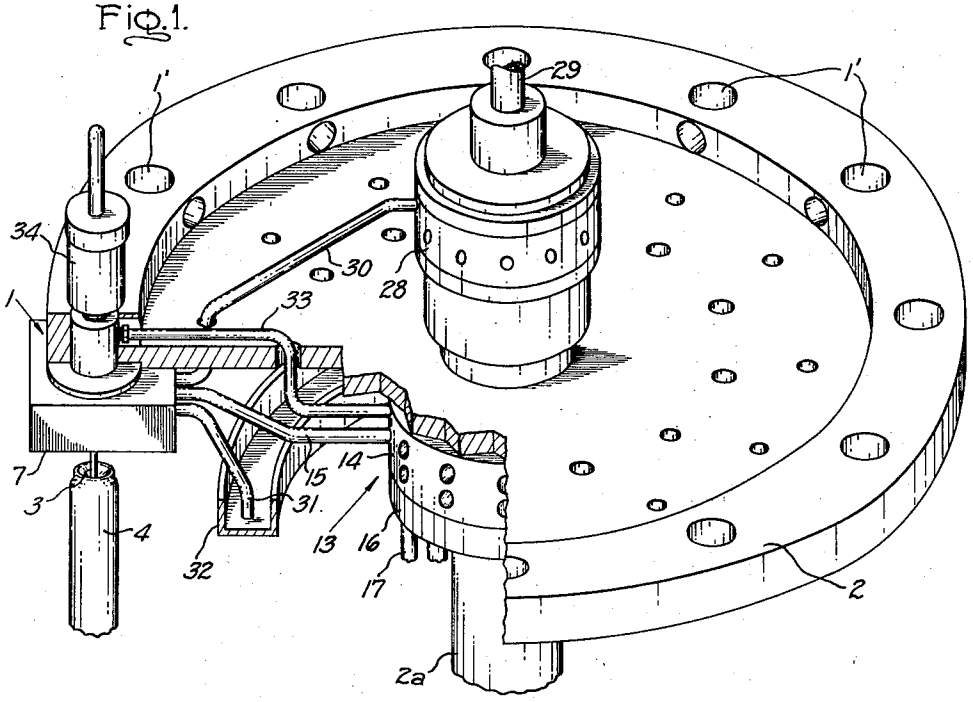


Fig. 2.

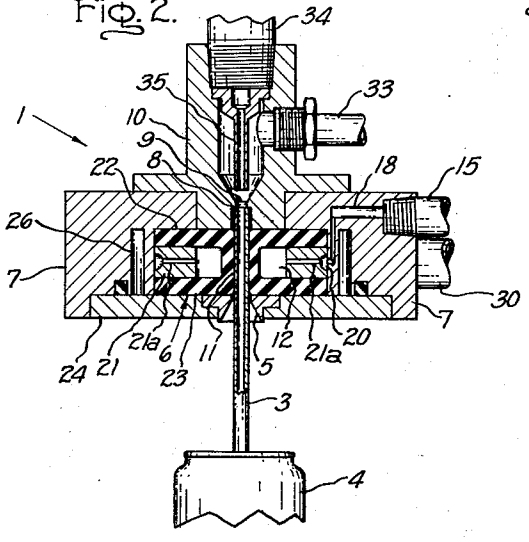
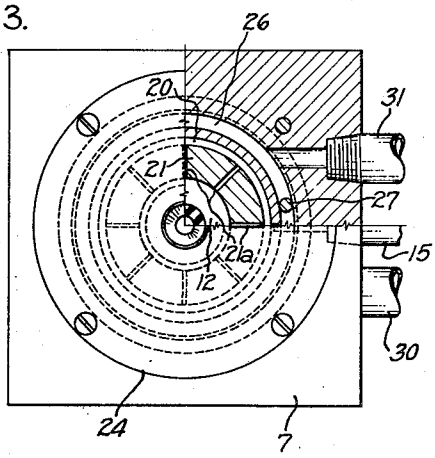


Fig. 3.



Inventor:
Robert A. Kuebler,
by Vernet C. Kauffman
His Attorney.

United States Patent Office 2,795,246 Patented June 11, 1957

2,795,246

EXHAUST MACHINE HEAD

Robert A. Kuebler, Cleveland Heights, Ohio, assignor to General Electric Company, a corporation of New York

Application December 28, 1954, Serial No. 478,120

5 Claims. (Cl. 141—66)

This invention relates to exhaust machines for electric lamps and discharge devices and more particularly to an exhaust head for such machines for holding and making an airtight connection to the exhaust tube of a lamp or electric device to be evacuated.

An object of the invention is to provide an exhaust machine with new and improved exhaust heads particularly adapted to automatic feeding and unloading of lamps.

A more specific object is to provide an improved fluid actuated exhaust head facilitating insertion and withdrawal of exhaust tubes.

Another object is to provide a fluid actuated exhaust head incorporating an effective cooling arrangement.

A feature of the exhaust head, according to the invention, is a resilient fluid-actuated compression clamping member of relatively shallow depth and having a short obstruction-free exhaust passage particularly suitable for conducting a dose or charge of mercury into the exhaust tube of the lamp or discharge device.

Another feature of the exhaust head is a resilient clamping member of spool-like form with a relatively narrow transversely apertured hub and wide laterally extending flanges. These flanges are peripherally clamped to restrain the hub and restore it to shape and prevent binding during withdrawal of an exhaust tube from the exhaust passage formed by the transverse aperture.

Other features and advantages of the invention will appear from the following description of a preferred embodiment taken in conjunction with the accompanying drawing.

In the drawing:

Fig. 1 is a simplified perspective view of the main turret of an exhaust machine with a single exhaust head illustrated and with associated rotary valves and conduits according to a preferred embodiment of the invention;

Fig. 2 is a vertical section through the center of the exhaust head with a lamp operatively engaged therein;

Fig. 3 is a bottom plan view of the exhaust head with a quarter portion sectioned along a medial plane.

Referring to Fig. 1, there is shown a single exhaust head 1 of a number accommodated in wells 1' about the periphery of a rotary turret type carrier 2 of an exhaust machine for evacuating and gas filling electric lamps. As illustrated in Fig. 2, the head makes a gastight connection with the exhaust tube 3 of a fluorescent lamp 4 depending below it. The lamps are loaded into the exhaust heads at a loading station. The turret on its supporting shaft 2*a* rotates step by step in the usual fashion and indexes the lamps to successive work stations where the evacuation and gas filling operations are performed, and finally to a tipping-off station where the exhaust tubes are sealed off and severed from the lamps and to an unloading station where the processed lamps are removed from the machine.

Referring particularly to Figs. 2 and 3, a lamp is loaded into the head by threading exhaust tube 3 upward through a funnel-like guide member 5 and into a transverse central aperture through the hub 6*a* of a resilient clamping member 6 confined in a cylindrical well in a block 7 fastened

to the underside of the turret at its periphery. The lamp is raised to the point where the exhaust tube seats against limiting shoulder 8 about central exhaust passage 9 in upper body portion 10 of the head. The clamping member is of spool-like form and is made of a resilient deformable material such as natural or synthetic rubber. In the relaxed state of the clamping member, central aperture 11 therethrough is somewhat larger than exhaust tube 3 to allow ready insertion of the tube therein. The lamp may be additionally supported by holding jaws (not shown) in combination with the exhaust head, as shown for instance in Patent 2,247,513, Marshaus. The lamp is supported, either manually or by holding jaws, at least until the clamping member is actuated and grips the exhaust tube.

The exhaust head is actuated by the introduction of pressurized fluid, compressed air in this instance, into annular chamber 12 about hub 6*a* of the resilient clamping member. This compresses or forces the hub radially inward, so that the walls of aperture 11 close about the exhaust tube and embrace it tightly to form a gastight joint. The introduction of fluid is controlled by rotary valve 13 having an upper section 14 fast to shaft 2*a* of the turret. A suitable port in the lower face of upper section 14 is connected to the head by conduit 15 and admits fluid to the head when it registers with a cooperating port in the upper face of stationary lower valve section 16. This cooperating port may take the form of a circular slot extending over an angle subtending the work stations whereat it is desired to maintain the lamps clamped and sealed in the exhaust heads. A supply pipe 17 connects the cooperating port to a suitable source of compressed air.

Within block 7 of the exhaust head, the pressurized fluid from pipe 15 enters a passage 18 terminating midway in the side walls of the cylindrical well in which clamping member 6 is accommodated. Thence, the fluid passes into the peripheral groove or channel 20 about ring member 21 and through radial holes 21*a* into annular chamber 12.

An important feature of the invention is the peripheral fastening or clamping of laterally extending flanges 22, 23 of resilient member 6. These flanges are wide, that is, of considerable radial extent, relative to hub portion 6*a*, in order to allow the walls of the hub portion to move in relatively freely and uniformly under the influence of the pressurized fluid. The flanges are clamped at their edges between block 7 and the upper side of ring 21 in the case of flange 22, and between the lower side of ring 21 and bottom cover plate 24 in the case of flange 23. The ring is proportioned in thickness to achieve sufficient squeezing or deformation of the edges of the flanges so as to lock them securely in place and effect an airtight joint. However, beside providing the desired airtight joint, this arrangement causes the flanges to enter into radial tension when pressurized fluid compresses the hub portion and assures that central aperture 11 reopens properly and quickly when fluid pressure is removed. Also, it assists in maintaining the shape of resilient member 6 to the end that the exhaust tubes may be readily inserted into and withdrawn from the exhaust head when it is unactuated. Thus binding of exhaust tubes with resultant breakage and concomitant excessive wear of the resilient clamping members is substantially eliminated.

As an illustrative example of an exhaust head in accordance with the invention, a resilient clamping member 6 was made of soft natural rubber with a flange diameter of 2 inches, a thickness or height of ¾ inch, a hub diameter of 7/16 inch and a central aperture of approximately 13/64 inch to accommodate an exhaust tube of 5/32 inch nominal diameter. Other parts of the head were in the proportions illustrated in the drawing. Such a head was effectively actuated with compressed air at 15 to 30 pounds per square inch to provide a gastight seal

and successfully withstood a life test in excess of 100,000 cycles of actuation.

The exhaust head may be cooled by circulating water through the annular passage 26 which surrounds the well accommodating clamping member 6. Water enters passage 26 on one side of a partitioning pin 27 (Fig. 3) and discharges at a point on the opposite side of the pin. A rotary valve or coupling 28 on the upper end of shaft 2a supplies cooling water from a common supply pipe 29 to individual pipes 30 connected to the exhaust heads. The waste cooling water flows out from the heads through drain pipes 31 and into a circular trough 32 which accommodates the ends of the drain pipes as the turret revolves.

The exhaust machine illustrated may be used to evacuate and gas fill electric lamps and to introduce a dose of a vaporizable material, such as mercury, therein. For the evacuation and gas filling, passage 9 in the head is utilized. This passage is connected to the rotating upper section 14 of the rotary valve by conduit 33 which leads to a suitable port therein which registers at various stations of the turret with cooperating ports in stationary lower section 16 connected to suitable sources of vacuum and filling gas, such as argon. Mercury may be introduced into the lamp from a doser 34 mounted upon upper body portion 10. The doser releases in known fashion a small quantity of mercury into the head. A funnel-like body 35 below the doser guides the mercury directly to the exhaust tube 3. The relatively shallow depth of clamping member 6 in the exhaust head provides a comparatively short path for the droplets of mercury to fall through before entering the lamp and, accordingly, assures unimpeded passage of the mercury. The shallow depth feature also permits reducing the length of the exhaust tubes to less than has been practicable up to now and thereby occasions a saving in material.

While a preferred embodiment of the invention has been illustrated and described in detail, it is not intended to limit the invention to the exact structure shown as various modifications thereof will readily occur. The appended claims are intended to cover such modifications falling within the true spirit and intent of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. An exhaust head for clamping and making a gastight connection to the exhaust tube of an electrical device comprising a body having a generally cylindrical well therein, a clamping member of flexible resilient material accommodated within said well, said member having a transversely apertured, relatively narrow hub portion and wide laterally extending flange portions, means clamping said flange portions peripherally in said well to restrain their edges against radial displacement, means defining with said clamping member an annular cavity surrounding the hub portion thereof, and a passageway through said body communicating with said annular cavity for supplying pressurized fluid to compress the walls of said hub portion in order to cause an exhaust tube inserted in said transverse aperture to be embraced tightly therein, said flange portions being stretched under radial tension due to peripheral restraint of said flange edges when pressurized fluid is admitted to said cavity, whereby to facilitate disengagement of said exhaust tube from said transverse aperture when fluid pressure is released.

2. An exhaust head for clamping and making a gastight connection to the exhaust tube of an electrical device comprising a body having a generally cylindrical well therein and an opening thereinto along the axis of said well, a clamping member of flexible resilient material accommodated within said well, said member being of generally flattened spool-like form with a relatively narrow hub portion transversely apertured along said axis and wide laterally extending flange portions, a clamping ring accommodated between said flange portions and proportioned relatively to said well to clamp said flanges peripherally in said well to restrain the edge portions of the flanges against radial displacement, said ring defining with said clamping member an annular cavity surrounding the hub portion thereof, and a passageway through said body communicating with said annular cavity for supplying pressurized fluid thereto to compress the walls of said hub portion in order to cause an exhaust tube inserted in said transverse aperture through said axial opening to be embraced tightly therein, said flange portions being stretched under radial tension due to peripheral restraint of said flange edges when pressurized fluid is admitted to said cavity, whereby to facilitate disengagement of said exhaust tube from said transverse aperture when fluid pressure is released.

3. An exhaust head for clamping and making a gastight connection to the exhaust tube of an electrical device comprising a body having a generally cylindrical well therein and an opening thereinto along the axis of said well, a clamping member of flexible resilient material accommodated within said well, said member being of generally flattened spool-like form with a relatively narrow hub portion transversely apertured along said axis and wide laterally extending flange portions, a clamping ring accommodated between said flange portions and proportioned relatively to said well to clamp said flanges peripherally in said well whereby to restrain the edge portions of the flanges against radial displacement, said ring defining with said clamping member an annular cavity surrounding the hub portion thereof, said ring having a peripheral groove in its external side wall and radial holes therethrough leading from said groove to said annular cavity, and a passageway through said body leading to said groove for supplying pressurized fluid to said annular cavity to compress the walls of said hub portion in order to cause an exhaust tube inserted in said transverse aperture through said axial opening to be embraced tightly therein, said flange portions being stretched under radial tension due to peripheral restraint of said flange edges when pressurized fluid is admitted to said cavity, whereby to facilitate disengagement of said exhaust tube from said transverse aperture when fluid pressure is released.

4. An exhaust head for clamping and making a gastight connection to the exhaust tube of an electrical device comprising a body for fastening to the carrier of an exhaust machine and having a generally cylindrical well therein, a clamping member of flexible resilient material accommodated within said well, said member being of generally flattened spool-like form with a relatively narrow hub portion transversely apertured along the axis of said well and wide laterally extending flange portions, a clamping ring accommodated between said flange portions and proportioned relatively to said well to clamp said flanges peripherally in said well whereby to restrain the edge portions of the flanges against radial displacement, said ring defining with said clamping member an annular cavity surrounding the hub portion thereof, a passageway through said body communicating with said annular cavity for supplying pressurized fluid to compress the walls of said hub portion in order to cause an exhaust tube inserted in said transverse aperture to be embraced tightly therein, said flange portions being stretched under radial tension due to peripheral restraint of said flange edges when pressurized fluid is admitted to said cavity, whereby to facilitate disengagement of said exhaust tube from said transverse aperture when fluid pressure is released, and an annular passage in said body distinct from and surrounding said well for the circulation of a cooling medium therein.

5. In combination with an exhaust machine having a rotary turret indexable to a series of work stations, an exhaust head for clamping and making a gastight connection to the exhaust tube of an electrical device comprising a body fastened to said turret and having a gen-

erally cylindrical well therein, a clamping member of flexible resilient material accommodated within said well, said member being of generally flattened spool-like form with a transversely apertured, relatively narrow hub portion and wide laterally extending flange portions, means clamping said flange portions peripherally in said well to restrain the edge portions of the flanges against radial displacement, means defining with said clamping member an annular cavity surrounding the hub portion thereof, a passageway through said body communicating with said annular cavity, a rotary valve controlled by said carrier and a conduit connection therefrom to said passageway for supplying pressurized fluid to said annular cavity at predetermined stations of said turret to compress the walls of said hub portion in order to cause

an exhaust tube inserted in said transverse aperture to be embraced tightly therein at said predetermined stations, said flange portions being stretched under radial tension due to peripheral restraint of said flange edges when pressurized fluid is admitted to said cavity, whereby to facilitate disengagement of said exhaust tube from said transverse aperture when fluid pressure is released.

References Cited in the file of this patent

UNITED STATES PATENTS

1,045,567	Fannmark	Nov. 26, 1912
1,188,044	Clay	June 20, 1916
1,195,516	Shields	Aug. 22, 1916