Sept. 10, 1929. C. BOL 1,728,034

EXHAUST HEAD

Filed Feb. 2, 1924

Fig. 1.

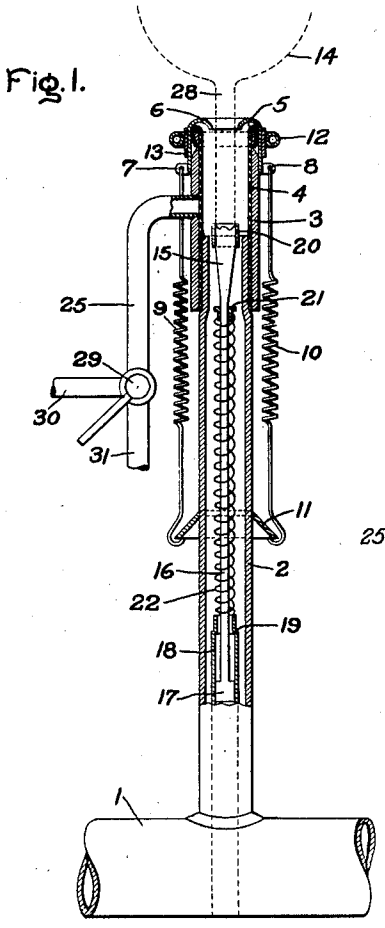


Fig. 3.

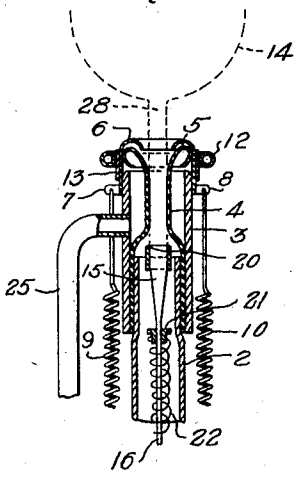
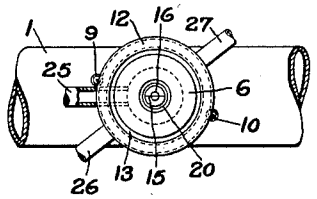


Fig. 2.



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UNITED STATES PATENT OFFICE.

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EXHAUST HEAD.

Application filed February 2, 1924, Serial No. 690,330, and in the Netherlands March 9, 1923.

This invention relates to an improved device for holding an exhaust tube or for providing an air tight seal around it and more particularly it is adapted for making an air tight connection of the exhaust-tube of a vessel that is to be exhausted to the vacuum-conduit as frequently is the case when exhausting electric incandescent lamps or electric discharge tubes.

The device according to the invention comprises an elastic or resilient tube clamped means at both ends and a device for pressing the free middle part of the elastic tube against the exhaust tube by a fluid or a gaseous medium under pressure.

As materials for the elastic tube, rubber, caoutchouc, india-rubber, gutta-percha and the like are particularly adapted.

The elastic tube may be placed within a rigid tubular casing, the elastic tube being at both ends clamped air tight to the rigid casing whilst a device is provided for feeding and discharging a fluid or gaseous medium under pressure between the rigid casing and the middle part of the elastic tube.

One or both ends of the elastic tube may be bent around one of the ends of the rigid casing and clamped to it by means of a metal cap, which is resiliently held in position.

An important feature of the invention is the use of a fluid or gaseous medium for pressing the free middle part of the elastic tube against the exhaust tube so as to obtain by very simple means a uniform pressure on all sides, which is the chief condition for a good air tight seal. In many cases the pressure in a common water-pipe is sufficient for the purpose of the invention, but the use of compressed air is generally more advisable. Since a particularly simple means for expanding the elastic tube to release the exhaust tube, after compressing the elastic tube by compressed air is to make use of a vacuum. To this end it is only necessary to connect the space which was first connected to the compressed air-pipe to cause the elastic tube to grip the exhaust tube to a vacuum-pipe such as the vacuum-pipe which is always used in incandescent lamp factories.

In the case of the device according to the invention being used for connecting a hollow cylindrical body, for example an exhaust tube air tight, to a vacuum-pipe, the elastic tube is preferably slid over the end of the vacuum-pipe and a metal casing is slid over the elastic tube in such a manner that one end of the latter is clamped air tight between the vacuum-pipe and the metal casing. In the said case the vacuum-pipe may also be provided with a device for supporting the exhaust-tube. This device is preferably vertically movable and resiliently supported.

The accompanying drawing represents a device according to one embodiment of the invention.

Figure 1 is a vertical section of the device with the elastic tube compressed to grip the exhaust tube.

Figure 2 is a plan and Fig. 3 is a vertical section of the device with the elastic tube expanded to release the exhaust tube.

According to the drawing a vertical metal vacuum tube 2 is fixed to a vacuum-pipe 1. A tube 4 of rubber or similar material is slid over the upper end of the metal tube 2 and a tubular metal casing 3 is provided around the said elastic tube. The lower part of the casing 3 telescopes over the upper part of the tube 2 for gripping the lower end of the rubber tube air tight. At this point the tube 2 and the sleeve 3 are preferably somewhat tapered which ensures a better seal.

The upper part of the rubber tube 4 is bent at 5 around the upper end of the casing 3 and a small collar 6 is slid over this upper part in order to ensure, also at that point, an air tight seal between the rubber tube 4 and the casing 3 This air tight seal is improved by the fac- hat the collar 6, which is bent at the upper end is resiliently pulled downwards. To this end lugs 7 and 8 are fixed to the collar 6, and springs 9 and 10 are fastened on one side to these lugs and on the other side to a ring 11, which is rigidly attached to the metal tube 2.

It will be clear that by this device the rubber tube 4 is clamped air tight at both ends to the wall of the casing 3, whereas the middle part of the rubber tube can move freely inside and radially of the sleeve.

For supporting the exhaust tube of the lamp 14 a yielding support is provided within the metal tube 2. Said support comprising a rod 16 which carries at its upper end a flattened part 15 and a small ring 20 forming a cup shaped head whilst at its lower end it is provided with a small guide block 17. It can move vertically in a small bushing 18 which is somewhat contracted at 19 so as to limit upward movement of the rod 16. The latter is supported by a spiral spring 22, which on one side is fastened to the bushing 18 and on the other side to a small ring 21.

When the lamp with the exhaust tube is placed on the support 15, the spring 22 will be somewhat compressed by the weight of the lamp, which offers the advantage hereinafter described.

The pipe 25 joined to the casing 3 serves for feeding and discharging a liquid under pressure, or compressed air, and if necessary for a connection to a vacuum pipe.

The operation of the exhaust head will now briefly be described:—

When the lamp 14 with the exhaust tube 28 is placed on the upper end of the rod 16, the rubber tube 4 is expanded and is in the position shown in Fig. 1 so that the exhaust tube may be introduced without any difficulty. It will be clear that at this time there is no vacuum in the pipe 1.

A liquid or gas under pressure, preferably compressed air, is then fed through the pipe 25. The valve 29 is turned into the proper position to feed the compressed air from the pipe 30. The pressure of the compressed air may amount to several atmospheres. The middle part of the rubber tube 4 is thus pressed radially inward against the exhaust tube, whereby an air tight seal between the rubber conduit and the exhaust tube is obtained. Then the tube 1 is put into connection with a vacuum pump or a vacuum conduit and the lamp 14 is thoroughly exhausted. Meanwhile the bulb of the lamp may be heated in the known manner in order to deprive it of the occluded gases and vapours. The conduit 1 may also be connected first to a so-called preliminary vacuum and then to a high vacuum pump. After a sufficiently high vacuum pump. After a sufficiently high vacuum has been obtained in the lamp the conduit 1 is shut off from the vacuum pump or conduit and the lamp 14 is sealed in any suitable manner, at a short distance above the collar 6, whereupon the pipe 25 is shut off from the compressed air supply by means of the valve 29. Preferably also the pipe 25 is then put into connection with a vacuum pipe, by means of the valve 29 and the pipe 31, for example with the so-called preliminary vacuum-pipe in which a pressure of for example some centimeters of mercury prevails and which is commonly used in incandescent lamp manufacture.

Because of the shutting off of the compressed air the rubber tube 4 returns into its primary or expanded position, which movement is facilitated by producing a vacuum in the pipe 25. The exhaust tube 28 is thus disengaged from the rubber tube and as the whole weight of the lamp no longer rests on the upper end of the rod 16 but only the weight of the stub or sealed off end of the exhaust tube, the latter is somewhat raised by reason of the spring 22, and thus acts to some extent as an ejector of the exhaust tube so that its removal is facilitated.

As the rubber tube would reach an objectionably high temperature owing to the sealing-off of the lamp, it is preferable that some cooling medium should be provided. To this end an annular cooling jacket 12 is provided on the ring 13 which is mounted on the collar 6. The jacket 12 is provided with inlet and outlet pipes 26 and 27 (Figure 2) for some suitable cooling-liquid.

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

1. An exhaust head for engaging an exhaust tube and comprising a rigid tubular casing, a resilient tube mounted inside and concentric with said casing and joined air-tight at its ends to said casing, means for introducing a fluid under pressure into the space between said casing and said tube, and a yielding support mounted in the bore of said casing and normally in position to be encountered by the inner end of an exhaust tube placed in said head, said support being resiliently held in normal position and mounted to be moved longitudinally of said casing and out of normal position by an exhaust tube inserted in said tube.

2. An exhaust head for engaging an exhaust tube and comprising a rigid tubular casing, a resilient tube mounted inside and concentric with said casing and joined air tight at its ends to said casing, means for introducing a fluid under pressure into the space between said casing and said tube, and a yielding support mounted in the bore of said casing in position to be encountered by the inner end of an exhaust tube placed in said head, said support comprising a rod mounted to move longitudinally of said casing, a head on said rod extending transversely of said casing to engage the inner end of an exhaust tube inserted in said tube, and a coil spring surrounding said rod to hold it in normal position and compressed by movement of said rod due to insertion of an exhaust tube into said exhaust head.

3. An exhaust head for engaging an exhaust tube and comprising a rigid tubular casing, a resilient tube mounted inside and concentric with said casing and joined air tight at its ends to said casing, a resilient ejector comprising a support and a spring connected thereto mounted in said casing in posi-

tion to be encountered by an exhaust tube inserted in said tube and thereby moved to set said spring under strain as the exhaust tube is inserted, and means for admitting fluid under pressure to the space between said casing and said tube while the exhaust tube is in place and said spring is under strain and for releasing said fluid and thereby releasing the exhaust tube and permitting said spring to eject the exhaust tube.

In witness whereof, I have hereunto set my hand this 10th day of January, 1924.

CORNELIS BOL.

CERTIFICATE OF CORRECTION.

Patent No. 1,728,034. Granted September 10, 1929, to

CORNELIS BOL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, strike out line 12, and insert instead "at both ends and means for pressing"; page 2, lines 50 and 51, strike out the words "After a sufficiently high vacuum pump."; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 15th day of October, A. D. 1929.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)