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G. P. McDONNELL.

VACUUM CUT-OFF.

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UNITED STATES PATENT OFFICE.

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GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

VACUUM CUT-OFF.

No. 859,323.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed April 29, 1904. Serial No. 205,622.

To all whom it may concern:

Be it known that I, GEORGE P. McDONNELL, a citizen of the United States, residing at St. Louis, Missouri have invented a certain new and useful Improvement in Vacuum Cut-Offs, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a sectional view through a work bench to which one form of my invention is applied; Fig. 2 is a front elevational view of the work bench showing the application of the invention; Fig. 3 is a top plan view of the bench to which the invention is applied, parts being broken away to show the tube connections; Fig. 4 is a side elevational view of the preferred form of tube closer; Fig. 5 is a plan view of a portion of the flexible tube showing the position of the bend when the tube is closed; Fig. 6 is a side elevational view of a modified form of tube closer; and Fig. 7 is a further modified form of tube closer.

This invention relates to an improved means for efficiently, conveniently and expeditiously cutting off communication between a vacuum pump or exhaustor and a co-operating part associated therewith.

The invention is applicable to use in connection with the manufacture of incandescent electric lamps and the accompanying drawings illustrate its application for this purpose.

The reference numeral 1 designates the top of a base or work bench and 2 refers to the front thereof. In practicing the manufacture of incandescent electric lamps I prefer to employ two exhaust pumps so as to provide an initial exhaust for the air or gases in the bulb and a secondary exhaustor exerting a greater suction through the tube in communication with the lamp bulb. In practice a single operator conducts the manufacture of two lamps at the same time. While the air and gases are being exhausted from the bulb of one lamp the sealing of the other lamp can be effected. I have therefore illustrated appurtenances for conducting the manufacture of two lamps.

Suitably supported upon the base or work bench 1 are standards 3 and 4 connected at their upper extremities by the cross bar 5. The forwardly projecting hinged arms 6 and 7 are designed for the purpose of supporting the lamp and are held in proper position for easy manipulation by means of the torsional springs 8 and 9 respectively. The lamps are so supported upon the arms that the lead-in wires may contact between the plates 10 on the ends of the arms, said plates 10 co-operating with a suitable source of energy so that the lead-in wires of the lamp complete the circuit and cause the lamp filament to be heated to incandescence.

The members designated by the reference numerals 11 and 11^a are in the form of sockets to receive the ends of the tubulatures 12. The sockets are on the ends of the tubes 13 each of which is preferably connected to a coupling member 14 having a depending portion 15, the lower end of each coupling merging into a sediment-receiving receptacle 16 in axial alinement with the socket 11. Diametrically opposite projections or limbs of the coupling 14 communicate with flexible rubber tubes 17 and 18 respectively communicating with the primary and secondary exhausters (not shown). Inasmuch as each tubulature-receiving socket is provided with a primary and secondary exhaustor I find it convenient to arrange the intermediate and adjacent flexible tubes so that they communicate with a single exhaust tube 19 in communication with the secondary pump. The primary tube portions 20 and 20^a for the respective lamps can be merged into a single tube and connected to a primary exhaustor common to both tubes.

By reference to Figs. 2 and 3 it will be observed that the primary exhaustor or pump can be closed with respect to either lamp bulb without affecting the other, and that the secondary exhaustor may also be closed to either lamp bulb without affecting the other. By arranging the tubular connections between the exhaustor and the co-operating part (in the present instance, the tubulature socket), the closing of any portions of the tubes can be effected independently of the remaining ones.

I have provided a novel means for cutting off communication between the exhaustor and the tubulature socket which consists of a flexible tube which is non-collapsible under action of the exhaustor or pump but which tube is of a length in excess of the distance between the exhaustor and the co-operating part. The reason for providing the primary and secondary exhaust tubes 17 and 18 of each lamp of greater length than the distance between the exhaustor and the co-operating part is to permit a bend to be formed in the tube so as to cut off communication with the exhaustor. In actual practice any number of bends may be made in the tube and under certain conditions a single bend in each tube will be sufficient due to the fact that the suction caused by the vacuum pump or exhaustor will have a tendency to assist in closing communication in the particular tube by bringing the inner walls 21 and 22 of the bent portion of the tube into intimate contact with each other in which position they will be maintained partly through the action of the suction caused by the pump or pumps and partly by a mechanical device which assists in maintaining the bend temporarily. In actual practice, however, I prefer to form a loop intermediate the ends of each flexible tube, which loop will preferably be provided with two bends 23 and 24

which can be contracted as indicated in Fig. 5 for closing communication in the tube. One form of the mechanical device for holding the loop in a collapsed condition is illustrated in Fig. 4 and is designated by the reference numeral 25. This device is what might be designated as a tube closer and it consists of an arm carried by an integral bracket portion 26, the arm being of various depths to form shoulders 27 and 28 for engagement by the tube when the tube is contracted or expanded. The loop in the tube is preserved by a strap 29 which fits over the adjacent portions of the tube as illustrated in Fig. 4. If the tube possesses a sufficient amount of resiliency to automatically expand as soon as it is released from engagement with the shoulder 27 it will not be necessary to engage the intermediate portion 30 of the loop with the shoulder 28. As the tube becomes weakened at the bend or bends, however, the suction in the pipe caused by the exhaustor or pump will have a tendency to maintain intimate contact between the inner walls of the tube at the bend or bends after the intermediate portion 30 is thrown out of contact with the shoulder 27. In order to guard against this objection it has been found that under certain conditions it is advisable to slip the portion 30 over the shoulder 28 so that the bend or bends in the loop will be rounded out as indicated in dotted lines in Fig. 5. It will be apparent that by contracting the loop, or if a loop is not employed, by providing the bend, the suction of the pump will automatically close the tube as mentioned heretofore.

In Fig. 6 I have illustrated a slightly modified form of tube closer which comprises an arched portion 31 adapted to be secured to the front portion 2 of the bench, said arched portion carrying a jaw provided with a shoulder 32 against which the intermediate portion 30 of the tube will bear when the bend in the tube is collapsed. A pivoted lever 33 is provided for the purpose of releasing the intermediate portion 30 of the tube when it is desired, to open communication between the pump and its co-operating part or parts.

In Fig. 7 a still further modified form of vacuum cut-off is illustrated comprising an arched portion 34 for securing the tube to the bench and a spring-retained or yielding jaw 35 having a shoulder 36 for engagement with the portion 30 of the tube when it is desired to cut off communication with the exhaustor. The up-standing posts or pins 37 are for the purpose of maintaining the portion 30 of the tube in proper position with relation to the jaw 35.

It will be apparent that by providing a suction tube having a bendable portion an inexpensive, durable and

efficient means will be provided for cutting off the exhaustor from one end of the tube.

In order that the connection between the tubulature and the socket 11 will be perfect, an oil is applied to the socket. The suction of the exhaustor has a tendency to draw the oil or other sealing liquid into the pipe 13 where it might ultimately find its way into one of the flexible tubes. In order to avoid this, however, I have provided the catch receptacle 16 in axial alignment with the socket 11 so that oil or chemicals drawn from the lamp will drop by gravity into the receptacle 16 to be subsequently removed therefrom as occasion may demand.

I am aware that minor changes in the construction, arrangement and combination of the several parts of my device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an apparatus for exhausting gases from an electric lamp bulb, the combination with an exhaustor, and a flexible tube in connection therewith, the tube having a substantially circular loop, means for keeping the tube looped, an upright bracket having an arm extending outwardly therefrom upon which the loop rests, and a shoulder on the arm for engagement with a portion of the loop to hold the same in a collapsed state, whereby communication may be cut off from the exhaustor and the lamp.

2. In an apparatus for exhausting gases from an electric lamp bulb, which consists of a suction tube having means for connection with the bulb, an exhaustor also connected to said tube, a substantially circular loop in the tube intermediate said bulb and exhaustor, an upright bracket arranged adjacent said loop, having an arm extending outwardly therefrom, shoulders on the arm for alternately engaging the loop whereby the same will be respectively held in a state of collapse at opposite ends thereof, and prevented from collapsing.

3. In an apparatus for exhausting electric lamp bulbs, the combination with an exhaustor and a flexible tube communicating therewith, of a collapsible loop in the tube, means for keeping the tube looped, an upright bracket, an arm extending outwardly therefrom adjacent said loop, and a shoulder on the arm for engagement with the loop for maintaining the same in a collapsible state at the end of the loop.

4. In an apparatus for the described purpose, a pipe secured to a support at two fixed points in its length, a loop between said fixed points, and means carried by the support for retaining the pipe in looped condition and having a shoulder for holding the loop in a collapsed condition to effect a closure in the pipe.

In testimony whereof, I hereunto affix my signature, in the presence of two witnesses, this 28th day of April, 1904.

GEORGE P. McDONNELL.

Witnesses:

B. F. FUNK,
CORA BADGER.