

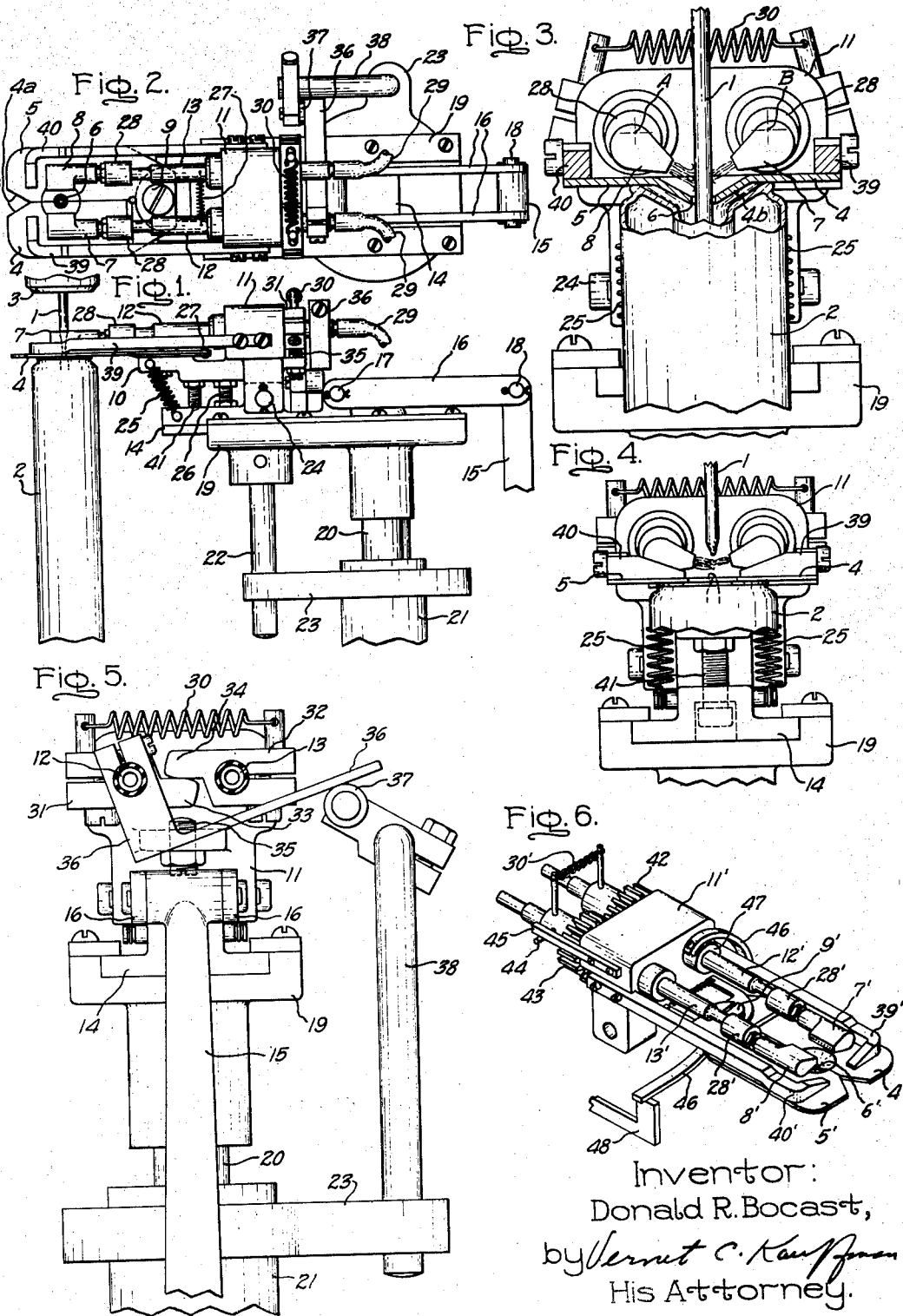
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APPARATUS FOR TIPPING-OFF SEALED ENVELOPES

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APPARATUS FOR TIPPING-OFF SEALED ENVELOPES

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My invention relates to apparatus for fusing off and sealing the vitreous tubing by which electric lamps, radio tubes and other completely enclosed electrical devices are exhausted and gas filled.

Such apparatus is located adjacent a port of the exhausting and gas filling apparatus which securely grips the free end of the vitreous tube extending from the electrical device. The apparatus effects the tipping-off of an intermediate portion of said vitreous tube adjacent the electrical device. In the usual combinations of apparatus, the tipping-off apparatus is located at a work station adjacent the periphery of a turret, and a series of exhaust ports, each connected to an electrical device, are successively advanced to said work station by indexing movements of the turret. Operation of tipping-off apparatus in such a combination of apparatus is automatic and is usually synchronized with the movements of the exhaust ports to and from the work station by being actuated by the main driving means for the turret and associated exhausting apparatus.

One object of my invention is to allow the maintenance of high operating speeds in exhaust apparatus by providing tipping-off apparatus capable of operating satisfactorily at such high rates of speed. The tipping-off apparatus must effect operation when the exhaust tubing of the electrical device is made from the usual commercial forms of vitreous tubing, which vary somewhat in wall thickness, and must form a strong satisfactory tip on the exhaust tubing at a desired relation to the electrical device.

A feature of my invention is the provision of tipping-off apparatus with burners rotatable in a plane through the exhaust tubing and means for effecting partial rotation of said burners midway in the tipping-off operation to reaim them along the length of said exhaust tubing. The manner of mounting the burners permits ready control of the aim thereof throughout the tipping-off operation and permits the construction of apparatus suited to extended periods of operation without mechanical difficulty.

Another feature of my invention is the provision of tipping-off apparatus wherein the burners are mounted eccentrically upon a rotatable mounting in such a manner that they are brought closer to the exhaust tubing when rotation of said mounting and reaiming of said burners along the exhaust tubing occurs. The mounting for the burners enables the flames therefrom to be directed over a specific area of

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the exhaust tube during the initial moments of the tipping-off operation, and then to be reaimed and concentrated on a more limited area thereof during the final moments of said operation.

5 All of the above-mentioned objects and features of my invention are attained by the manner of operation provided for by the mounting for the burners and by the means of fixing the position of said burners with respect to the electrical device and the exhaust tube thereof. The burners are initially brought to proper arrangement with the electrical device by movement of support means, also common to a baffle of the tipping-off apparatus, and become properly located when 10 said baffle is seated upon the end of the electrical device. Continuous pressure against the baffle by the support means causes a tension in the exhaust tube inasmuch as the end thereof is held securely by the port of the exhausting apparatus and, very shortly, results in the baffle and the electrical device being displaced and the heated portion of said exhaust tube being stretched. Although the motion of the baffle is produced directly by movement in the support means, and 20 results in a corresponding movement in the burners, the full effect thereof does not appear in said burners as they have an eccentric position on a rotatable mounting on the support means and are redirected at that time by a rotation of said mounting. The purpose of this latter 30 motion of the burners is to cause them to be reaimed toward the approximate center of the heated portion of the exhaust tube, which is now of much thinner section and closed off, and to be brought closer to said exhaust tube so that more concentrated portions of the flames from the burners rapidly burn through said portion to sever the tube.

35 Still other features and advantages of my invention will appear from the following detailed disclosure of species thereof and from the drawing.

40 In the drawing Fig. 1 is a side elevation of one form of tipping-off apparatus of my invention, said apparatus being part way through a cycle of sealing-off the exhaust tube of a lamp connected to a port of an exhaust machine; Fig. 2 45 is a plan view of said tipping-off apparatus; Figs. 3 and 4 are corresponding head-end views, on slightly different scales and with portions broken therefrom, of the tipping-off apparatus at the start and completion, respectively, of the sealing-off operation; Fig. 5 is a view of the back 50 end of the tipping-off apparatus; and Fig. 6 is

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a perspective view of a modified form of the tipping-off apparatus of my invention.

The tipping-off apparatus shown in Figs. 1 through 5 of the drawing starts its cycle of operation from a position to one side of the work station of an exhaust machine and is advanced end-foremost and horizontally into operative relation to the exhaust tube 1 of a lamp 2 connected to the exhaust port 3 of said exhaust machine at said work station to initiate said cycle. This advancing movement of the tipping-off apparatus forces the edges of the V-notch 4a formed by biased end portions of the movable baffles 4 and 5 against the exhaust tube 1 so that said baffles 4 and 5 are wedged apart, and continues until the baffles 4 and 5 come together with the notch or opening 6 around the exhaust tube. The burners 7 and 8, also a part of the tipping-off apparatus, are then properly arranged with respect to the exhaust tube, as shown in the drawing.

The baffles 4 and 5 are pivoted in a scissor-like arrangement on the screw 9 on the forward lip 10 of the saddle 11. The burners 7 and 8 are mounted on hollow shafts 12 and 13, respectively, extending through said saddle 11. Said baffles and burners are brought into position by motion of a supporting slide 14 for the saddle 11. This movement of the tipping-off apparatus corresponds to a like movement in prior apparatus as, for instance, in that disclosed in Patent 2,247,513 to Marshaus dated July 1, 1941. Since the movement must be synchronized with the arrival of the lamp 2 and exhaust port 3 at the work station occupied by the tipping-off apparatus, it may most conveniently be effected by means associated with the main actuating apparatus of the exhaust machine as in the prior disclosure.

In the present apparatus, the saddle 11, which is mounted upon the slide 14, is moved by an operating arm 15 connected thereto by the links 16—16 and the pins 17—18 and is under the influence of the main actuating means (not shown). The slide 14, in turn, is located within ways of a bracket 19 mounted upon the upper end of a vertical shaft 20 projecting from the hollow stationary column 21 and maintains its alignment with the work station since the bracket 19 and shaft 20 are prevented from turning by the guide rod 22, which extends downward from the bracket 19 and into a close fitting opening in the fixed collar 23 on the column 21. During the initial horizontal movement of the tipping-off apparatus into operative relation to the lamp 2, the slide 14 and the bracket 19 are held at a higher elevation than shown in Fig. 1, so that there is no interference between the downwardly cupped portions 4b (Fig. 3) of the baffles 4 and 5 about the opening 6 and the upper end of the lamp 2.

The next step in the operation of the tipping-off apparatus is a lowering movement of the entire apparatus which is complete when the lower surfaces of the baffles 4 and 5 bear against the upper end of the lamp 2 as shown in Fig. 3. This movement, which is effected by a corresponding movement of the vertical shaft 20 under influence of the main operating means (not shown), arranges the baffles 4 and 5 in position to push against the lamp 2 so that the exhaust tube 1 is placed under tension, and arranges the burners 7 and 8 at the proper position with respect to said lamp 2 to heat a specific portion of said exhaust tube 1. During the lowering movement, the baffles 4 and 5 and the saddle 11

normally take the full movement of the shaft 20 and slide 14. However, the lamp 2 may be so positioned in the exhaust port 3 that said baffles 4 and 5 will seat against said lamp 2 before said movement has been completed. Under these conditions, the saddle 11 pivots about the pin 24 by which it is attached to the slide 14 and the springs 25 and 25, extending between posts in the lip 10 on said saddle 11 and the slide 14, are stretched. Normally, the head of the stud 26 on the slide 14 forms a rest for positioning the lip 10 and the saddle 11.

The burners 7 and 8, at the start of the sealing-off operation, are directed against a portion of the exhaust tube 1 located as far within the hollow, or reentrant, end of the lamp 2 as is practical. As shown in Fig. 3, the fires are directed against a portion of said exhaust tube 1 contained within the cupped portions 4b of the baffles 4 and 5. The heat from the burners 7 and 8 is shielded from the lamp 2 to a considerable extent by the baffles 4 and 5 which are held tightly against each other by the contraction force of a helical spring 27 joining their opposite ends on the opposite side of the pivot screw 9.

The heat from the flames soon brings a relatively short length of the glass exhaust tube 1 to the softening temperature, at which time the softened portion is stretched longitudinally by the pressure of the baffles 4 and 5 which displaces the lamp 2 downward and away from the exhaust port 3 which tightly grips the upper end of the exhaust tube. The movement of the baffles 4 and 5 is initiated by the downward movement of the tipping-off apparatus under the constant downward pull of the vertical shaft 20. The stretch in the exhaust tube 1 and the pressure of the flames cause the walls of said exhaust tube 1 to draw in until the passage therethrough is closed and materially reduces the cross section of the heated portion. During this downward movement of the apparatus, the burners 7 and 8 take on still another motion which causes them to be reaimed in an upward direction so that the flames are directed against the approximate center portion of the now elongated plastic portion of the exhaust tube 1 and sever the tube 1 where it has been contracted. The burners 7 and 8 are also brought closer to the exhaust tube 1 at the same time they are reaimed so as to cause more concentrated portions of the flames to engage said tube 1 and, accordingly, increase the burn-off effect thereof.

The burners 7 and 8 are eccentrically mounted upon connectors 28, 28 attached to hollow shafts 12 and 13 respectively, and take the reaiming and repositioning movements occurring at this time from rotative movements of said hollow shafts 12 and 13 within the saddle 11. The burners are normally below the axes of rotation A and B (Fig. 3) of shafts 12 and 13 respectively. Both burners 7 and 8 also receive the combustible gas mixture through this supporting means which conducts the combustible gas through communicating passages in said connectors 28, 28, said hollow shafts 12 and 13 and flexible hoses 29, 29 from a source (not shown).

Throughout the cycle of operation the aim and position of the burners 7 and 8 are determined by the rotative effect produced in the supporting means, both by the contraction force of a helical spring 30 extending between posts on the fingers 31 and 32 on respective ends of the hollow shafts 12 and 13, and by the meshing of teeth 33 and 34 on said fingers 31 and 32, respectively, with each

other. The effect of the contraction force of the spring 30 is such that the fingers 31 and 32 are initially turned so that the tooth 33 of finger 31 bears against the stop screw 35 in the ear of the saddle 11 at which time the burners 7 and 8 are directed down into the depression 4b in the baffles 4 and 5. The reaiming and repositioning of the burners 7 and 8 occur when the downward motion of the apparatus brings the end of a lever 36, clamped to an end portion of the hollow shaft 12, into engagement with a stop in the form of the roller 37 on the post 38 upstanding from the collar 23, and causes said lever 36 to turn said hollow shaft 12. This rotation of hollow shaft 12 also effects a corresponding and opposite rotation of hollow shaft 13 since the teeth 33 and 34 on the fingers 31 and 32, respectively, remain in contact with each other and transfer motion therebetween.

The manner of reaiming the burners 7 and 8 at the time the apparatus is lowered causes the flames to be directed against the center of the heated portion of the exhaust tube 1 which has contracted under the combined effects of atmospheric pressure, pressure of the fires, and the stretching operation effected by the movement of the tipping-off apparatus. The manner of bringing the flames from the burners 7 and 8 nearer the exhaust tube 1, on the other hand, assists in effecting the rapid fusing-off of the sealed portion of the exhaust tube 1, which is now of thinner section, and also assists in fusing down the sealed end of the exhaust tube 1 connected to the lamp 2 into a strong and satisfactory tip. The particular burners 7 and 8 in the disclosed apparatus are also characterized by the different size flames they direct against respective sides of the exhaust tube 1 in order to develop a so-called "sucker-in" type of tip on said exhaust tube 1 which is disclosed in application Serial No. 124,187, filed October 28, 1949, by C. E. Bechard and which issued as Patent No. 2,561,838, July 24, 1951, and is assigned to the assignee of the present application. The burners 7 and 8 may also be aimed slightly offset from each other as also disclosed in said application.

The apparatus shown in Figs. 1 to 5 inclusive also includes a pair of fixed arms 39 and 40 attached to the saddle 11 and extending over into engagement with the top surface of the forwardly extending ends of the baffles 4 and 5. The function of these arms 39 and 40 is to prevent the displacement of the baffles 4 and 5 when the tipping-off apparatus moves down to stretch the exhaust tube 1.

The resistance offered to the downward movement of the tipping-off apparatus by the exhaust tube 1 is in almost all instances not so great as to tilt the saddle 11 on the slide 14. However, the saddle 11 is free to tilt about the pin 24 against the resistance of the springs 25, 25 and, should the lamp 2 offer such resistance, said saddle 11 can tilt to the limit allowed by the seating of the head of the bolt 41 (Fig. 4) in lip 10 of said saddle 11 against the bottom of the opening in the slide 14.

The modified tipping-off apparatus shown in Fig. 6 corresponds to that previously described in that duplicate baffles 4' and 5' are provided on a forward extending lip of a saddle 11' for engaging and effecting motion in the lamp, and opposed burners 7' and 8' are provided on said saddle 11' at proper operative relation to the opening 6' in said baffles 4' and 5' to fuse and work the exhaust tube of said lamp. The saddle 11' may be mount-

ed in place of saddle 11 on the slide 14 of the apparatus appearing in Figs. 1-5. The cycle of operation of this apparatus is initiated while the burners 7' and 8' are directed into the depression in the baffles 4' and 5' around the opening 6' since at the time the contraction force of a spring 30' on posts extending from the hubs of the gears 42 and 43 on the supporting shafts 12' and 13' for said burners 7' and 8' keeps said shafts 12' and 13' turned to their limit of movement. This position of the burners 7' and 8' is determined by the engagement of a stop pin 44 on gear 43 with the bar 45 on the saddle 11'.

Operation of the modified apparatus in Fig. 6 occurs in the same manner as the previously described apparatus; however, the reaiming and repositioning of the burners 7' and 8' is effected when said apparatus is lowered to such an extent that the curved arm 46 on the collar 47 of shaft 12' bears against the fixed bar 48. The turning movement produced in the burner 7' by motion of the arm 46 is also transmitted to the burner 8' through the intermeshing teeth of the gears 42 and 43 to cause opposite and corresponding motion in the burner support shafts 12' and 13'. The parts of the modified apparatus of Fig. 6 are numbered the same as corresponding parts of the modification of Figs. 1-5, with the addition of a prime.

Although preferred embodiments of my invention have been disclosed, it will be understood that the invention is not limited to the specific construction and arrangement of parts shown, but that they may be widely modified within the spirit and scope of my invention as defined by the appended claims.

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

1. In combination with apparatus comprising an exhaust port for holding the exhaust tube of an electrical device, mechanism for tipping-off said exhaust tube and comprising burners for directing heating fires against a portion of the exhaust tube, means movable away from the exhaust port and against the electrical device to effect displacement of said electrical device and stretching of the heated portion of the exhaust tube, means mounting the burners on the first-mentioned means for movement therewith along the exhaust tube and for rotation about axes normal to the direction of said movement, and means for rotating the burners during the movement of the said first-mentioned means to cause said burners to be reaimed along the length of said exhaust tube in a direction back toward said exhaust port.

2. In combination with apparatus comprising an exhaust port for holding the exhaust tube of an electrical device, mechanism for tipping-off said exhaust tube and comprising burners for directing heating fires against a portion of the exhaust tube, means movable away from the exhaust port and against the electrical device to effect displacement of said electrical device and stretching of the heated portion of the exhaust tube, means mounting the burners on the first-mentioned means for movement therewith along the exhaust tube and for rotation about axes normal to the direction of said movement, said burners being mounted eccentrically with respect to their axes of rotation, and means for rotating the burners during the movement of the said first-mentioned means to cause said burners to be reaimed along the length of said exhaust tube in a direction back toward said exhaust port.

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3. An apparatus for tipping-off the exhaust tube of an electrical device, the combination of an exhaust port for holding the exhaust tube, burners for directing heating fires against a portion of the exhaust tube, means movable away from the exhaust port and against the electrical device to effect displacement of said electrical device and stretching of the heated portion of the exhaust tube, parallel shafts mounting each of the burners on the first-mentioned means for rotation about axes normal to the direction of motion of said first-mentioned means, and means actuated by movement of the first-mentioned means for rotating the shafts counter to each other to cause the burners to be reaimed along the length of the exhaust tube.

4. Apparatus for tipping-off an exhaust tube extending upwardly from an electrical device and held in an exhaust port, comprising support means, a slide mounted on said support means for horizontal movement toward an exhaust tube, a pair of burners projecting forwardly from said slide and mounted therein for rotation about parallel, horizontal axes and aimed to direct flame jets generally toward each other, baffle means mounted on said slide and extending horizontally therefrom below said burners, means for moving said slide to carry said burners and baffle means forward into operative relation to said exhaust tube, means for moving said support means downward to cause the baffles to take a protective relation to the electrical device and to effect displacement of said electrical device and stretching of the heated portion of the exhaust tube, and means for rotating the burners during the downward movement of the said support means to reaim the burners.

5. Tipping-off mechanism for exhaust tubes extending upwardly from lamps and comprising support means, a pair of burners projecting forwardly from said support means and mounted thereon for rotation about parallel, horizontal axes with said burners in opposed relationship and normally aimed to direct flame jets toward each other at acute angles below the horizontal, baffle means projecting forwardly from said support means below said burners for engagement with the upper end of a lamp, means mounting said support means for downward movement, and means operable during said downward movement to rotate said burners to redirect the flames therefrom upwardly toward the horizontal.

6. Tipping-off mechanism for exhaust tubes extending upwardly from lamps and comprising support means, a pair of burners projecting forwardly from said support means and mounted thereon for rotation about parallel, horizontal axes with said burners in opposed relationship and normally aimed to direct flame jets toward each other at acute angles below the horizontal, said burners being mounted eccentrically with respect to their respective axes of rotation and below said axes, baffle means projecting forwardly from said support means below said burners for engagement with the upper end of a lamp, means mounting said support means for downward movement, and means operable during said downward movement to rotate said burners to redirect the flames therefrom upwardly toward the horizontal and closer together due to the eccentric mounting thereof as aforesaid.

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No references cited.