Aug. 7, 1934. C. BOYDEN 1,968,815

APPARATUS FOR FUSING AND SPRAYING SUBSTANCES

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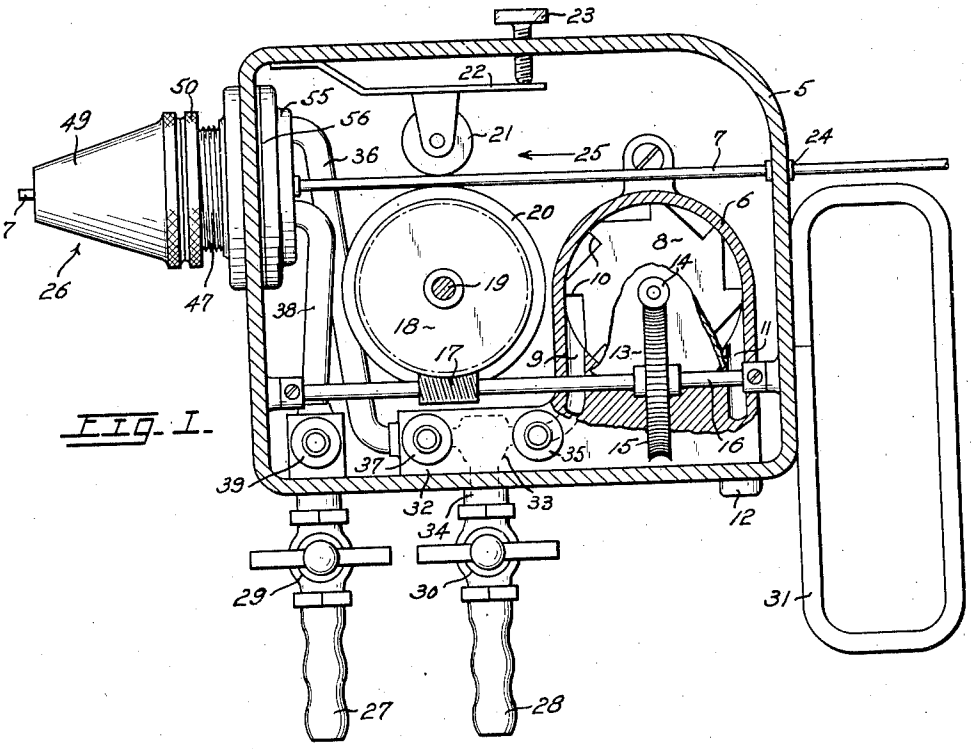


FIG. 1.

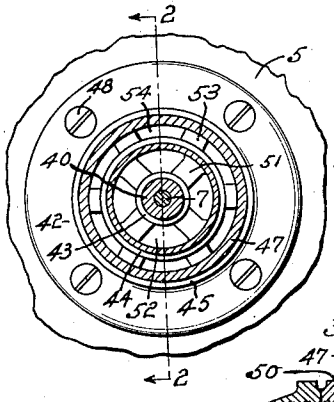


FIG. 3.

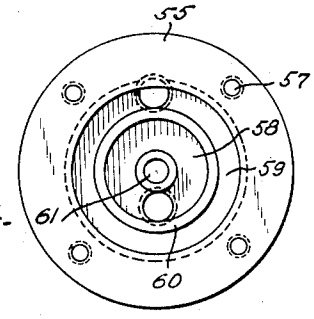


FIG. 4.

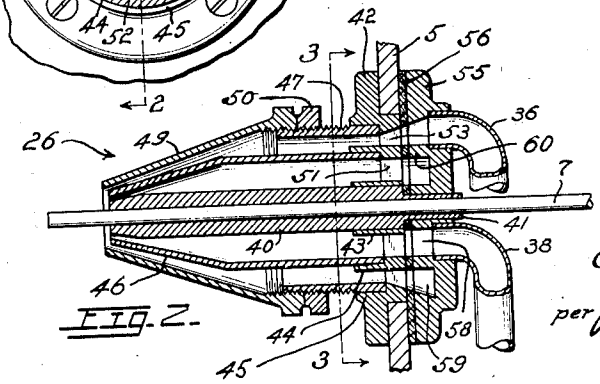


FIG. 2.

Inventor;
Charles Boyden,
per Arthur J. Farnsworth.
Attorney.

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APPARATUS FOR FUSING AND SPRAYING SUBSTANCES

Charles Boyden, Los Angeles, Calif., assignor to Metallizing Company of America, Inc., Los Angeles, Calif., a corporation of California

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3 Claims. (Cl. 91—12.2)

My invention relates to means for fusing, spraying, and projecting fusible substances, such as metallic wires, for the purpose of covering surfaces with such substances. Among its principal objects are; first, to provide improved apparatus of the character mentioned, whereby certain distinct operating advantages may be attained; second, to provide in such apparatus means whereby various operating adjustments may be made independently of each other; third, to provide a more satisfactory burner-nozzle construction in apparatus of this character; and, fourth, to secure the above results by means of simple and dependable apparatus.

My objects are attained in the manner illustrated in the accompanying drawing, in which:—

Figure 1 is a side elevation of a portable fusing, spraying, and projecting gun that embodies the principles of my invention, the view being shown partly in section and with certain parts broken away;

Figure 2 is an enlarged elevation of the nozzle portion of the above apparatus, in central section;

Figure 3 is a cross-sectional elevation of the nozzle taken on the line 3—3 of Fig. 2; and

Figure 4 is an elevation of the inner face of the rear cover plate of the nozzle.

Similar reference numerals refer to similar parts throughout the several views.

The embodiment of my invention that I have selected for illustration is a portable device of the nature mentioned, adapted for fusing, spraying, and projecting fusible material supplied in rod form, by means of combustible gas and an air blast; and wherein the automatic feeding elements of the device are driven by an air-motor. This apparatus comprises a casing 5; wherein is mounted a simple form of compressed air motor 6; and a rod 7 of the substance that is to be fused, sprayed, and projected.

The air motor may be of any suitable type, and is not a part of my present invention. The motor illustrated comprises a housing 6 comprising a cylindrical chamber in which a ratchet-wheel rotor 8 is adapted to rotate at high speeds. The rotor fits the inner wall of the circular chamber with small clearance. A jet of air for operating the motor may enter the motor housing through a small passage 9, in such a way as to impinge directly upon one of the operating surfaces 10 of the rotor. This will cause it to turn in a clockwise direction, and, by its rotation, the succeeding surfaces 10 are rapidly presented to the action of the jet. The air entrapped between the teeth of the rotor will be carried around by its rotation, and ultimately will be discharged through exhaust passage 11 and exhaust nozzle 12. A cover plate 13 (shown broken for convenience) closes the motor housing, and fits snugly against the side of the rotor.

It will be obvious that a motor of the type described is capable of operating at very high speeds, and of delivering a large amount of power in proportion to its size. Its purpose is wholly to advance the material that is to be fused and sprayed, at a low speed of progression. It is necessary, therefore, to employ reduction gearing of great ratio. I have illustrated a worm 14 upon the rotor shaft, and worm-gear 15 meshing with it, and mounted upon rotatable shaft 16. The latter shaft carries a worm 17, meshing with a worm-gear 18 that is mounted upon a rotatable shaft 19. Upon the latter shaft is also mounted a knurled-wheel 20, adapted to engage and drive the rod 7, at a low continuous rate of progression. In order that this drive may be positive, I supply a rotatable roller 21 carried upon a stiff spring 22, directly above the axis of rotatable shaft 19. A thumb screw 23 bears against the free end of spring 22, and affords a convenient means for resiliently pressing roller 21 against fusible rod 7.

Fusible rod 7 passes through a guide opening in the casing at 24, between roller 21 and knurled-wheel 20, and then through the burner and spraying apparatus, being guided by the latter. Its movement is to the left, as indicated by arrow 25.

At 26 I have indicated, generally, a nozzle that is adapted for fusing rod 7, by means of a high temperature gas flame, and for thereafter spraying it upon a surface to be coated. A combustible-gas inlet nozzle, adapted for hose connection, is indicated at 27, and a similar compressed-air inlet nozzle is indicated at 28; these nozzles being provided respectively with cocks 29 and 30, whereby the gas and air may be turned on to the device. A handle 31 of convenient form is provided, whereby the whole apparatus may be manipulated and handled in the manner common to spray gun apparatus.

As above described, the apparatus is known to the prior art. My invention consists in a novel and improved type of burner construction in such apparatus as that described above; and in the manner in which air for the burner-nozzle, and for the motor, is supplied and controlled.

In a device of the nature herein being considered, it will be obvious that fine operating adjust-

ments will be required, for the gas supply, air supply to the burner-nozzle, and air supply to the motor. It does not appear to have been appreciated in the art hitherto, that it is vitally important to have separate and independent means for regulating the air supply to the burner and motor. Thus devices of this nature that have hitherto been employed, have made use of a common air supply, and a single air-regulating means. It has been common, in fact, to direct the exhaust from the motor into the burner-nozzle, as a means of supplying air thereto. Thus, in prior constructions, there has been no way provided for regulating the air supply to the burner, without also affecting the air supply to the motor. Independence of regulation of air supply to the burner and motor, is a fundamental characteristic of my present invention.

For accomplishing the above described independent control of the air supply to the burner and motor, I provide separate branch conduits communicating with air inlet nozzle 28, and having independent regulating means therein. Thus in the embodiment of my invention illustrated, I have shown the motor base as having an extension of considerable length, integral therewith, at 32. This extension has a central cored chamber therein, indicated by dotted lines 33, which communicates through nipple 34 with air cock 30. The motor inlet passage 9 communicates with chamber 33, and the flow therethrough to the motor is regulated by a screw valve 35. Air pipe 36 leading to the burner, also communicates with chamber 33 and the flow therethrough is regulated by screw valve 37. Obviously therefore, air supplied to the burner may be regulated independently of the air supplied to the motor, and vice versa. Regulation of either will not effect the other, provided the capacity of the air inlet passage through nozzle 28 is sufficiently large.

Combustible gas is led to the burner through pipe 38, and the flow through this pipe is regulated by means of a screw valve 39.

Screw valves 35, 37, and 39 can, most conveniently, be mounted spaced in a row as shown, the operating means being the knurled thumb-wheels indicated.

Burners comprising concentric gas and air nozzles, have been provided in the prior art, and are not claimed broadly by me herein. My invention, so far as the burner is concerned, resides in its structural features. These will now be described in detail.

My burner construction comprises a central tubular member 40, through which rod 7 passes freely but snugly. This tubular member has a conical end at the left, and a nipple 41 of reduced diameter at the right.

A special circular fitting 42 is mounted upon tubular member 40 at the shoulder resulting from the junction of its main portion with its right hand nipple. This fitting comprises three coaxial annular flanges 43, 44, and 45 respectively, of which the innermost is seated upon tubular member 40, at its shoulder. A conical ended gas tube 46 engages the inner surface of annular flanges 44; and exteriorly screw-threaded nipple 47 engages the inner surface of annular flange 45. All of the parts mentioned may be conveniently assembled by brazing or welding. Fitting 42, with its attached parts, may be assembled upon casing 5 by means of screws, as shown at 48.

An internally threaded conical nozzle 49 engages the exterior screw threads of nipple 47. It cooperates with conical gas tube 46 to form a conical annular air supply for the burner, and the width of this annular passage may be controlled by turning the nozzle upon nipple 47. A check nut 50 maintains this adjustment, when satisfactorily made.

Annular flanges 43 and 44 are spaced by means of spokes 51, thus leaving passages 52 for the incoming gas flow, between the spokes. Similarly flanges 44 and 45 are spaced by means of spokes 53, leaving passages 54 between the spokes for the incoming air flow.

The nozzle construction is completed by means of the plate fitting 55, which also cooperates in mounting the nozzle upon casing 5 in the manner shown, with an interposed gasket 56. Tapped holes 57 are provided for engaging the screws 48.

Fitting 55 is provided with two annular coaxial channels 58 and 59, separated by an annular flange 60. A central hole 61 is provided for engaging nipple 41. Gas supply 38 passes through fitting 55 and communicates with annular channel 58; and air supply pipe 36 similarly communicates with annular channel 59.

From the foregoing description it will be apparent that I have produced apparatus for greatly improving the art of fusing, spraying, and projecting fusible substances. Thus I have provided a burner of very simple and compact construction, whereby the fusible material may be melted, sprayed, and projected, in a manner that will be readily understood by those familiar with the art; and I have provided independent means for regulating the air supply to the burner and to the motor, whereby either may be regulated without affecting the other.

Having thus fully described my invention, I claim:

1. Apparatus of the character described, comprising; a supporting member; a base-plate having a tubular hub, and a plurality of co-axial annular flanges spaced from the hub and from each other by spokes leaving apertures therebetween; a cover-plate co-operating with the base plate to secure the supporting member therebetween, and having separate co-axial annular channels communicating with said respective sets of apertures; a gas-burner nozzle including co-axial spaced tubes having their inner ends attached to said flanges, adapted for fusing and then spraying outwardly solid material that is fed thereinto; means for feeding solid material into said nozzle through said hub; and means for supplying combustible gas and compressed air to said channels respectively.

2. Apparatus of the character described, comprising; a housing having an orifice in a wall thereof; a base-plate, upon the outer wall of the housing over said orifices and positioned thereby, having a tubular hub and a plurality of co-axial annular flanges spaced from the hub and from each other by spokes leaving apertures therebetween; a cover-plate, upon the inner wall of the housing over said orifice, co-operating with the base-plate to secure the wall of the housing therebetween, and having separate annular channels communicating with said respective sets of apertures; a gas-burner nozzle including co-axial spaced tubes having their inner ends attached to said flanges, adapted for fusing and then spraying outwardly solid material that is fed thereinto; means within the housing for continuously feeding solid material into said nozzle through said hub; and means for supplying combustible gas and compressed air to said channels respectively.

3. Apparatus of the character described, comprising; a housing having an orifice in a wall thereof; a base-plate, upon the outer wall of the housing over said orifice and positioned thereby, having a tubular hub and a plurality of co-axial annular flanges spaced from the hub and from each other by spokes leaving apertures therebetween; a cover-plate, upon the inner wall of the housing over said orifice, co-operating with the base-plate to secure the wall of the housing therebetween, and having separate annular channels communicating with said respective sets of apertures; a gas-burner nozzle including co-axial spaced tubes having their inner ends attached to said flanges, adapted for fusing and then spraying outwardly solid material that is fed thereinto; means, including a compressed air motor within the housing, for continuously feeding solid material into said nozzle through said hub; means for supplying combustible gas to one of said channels; and means for supplying compressed air to another of said channels and to said motor, from a common source, at independently controllable rates.

CHARLES BOYDEN.