

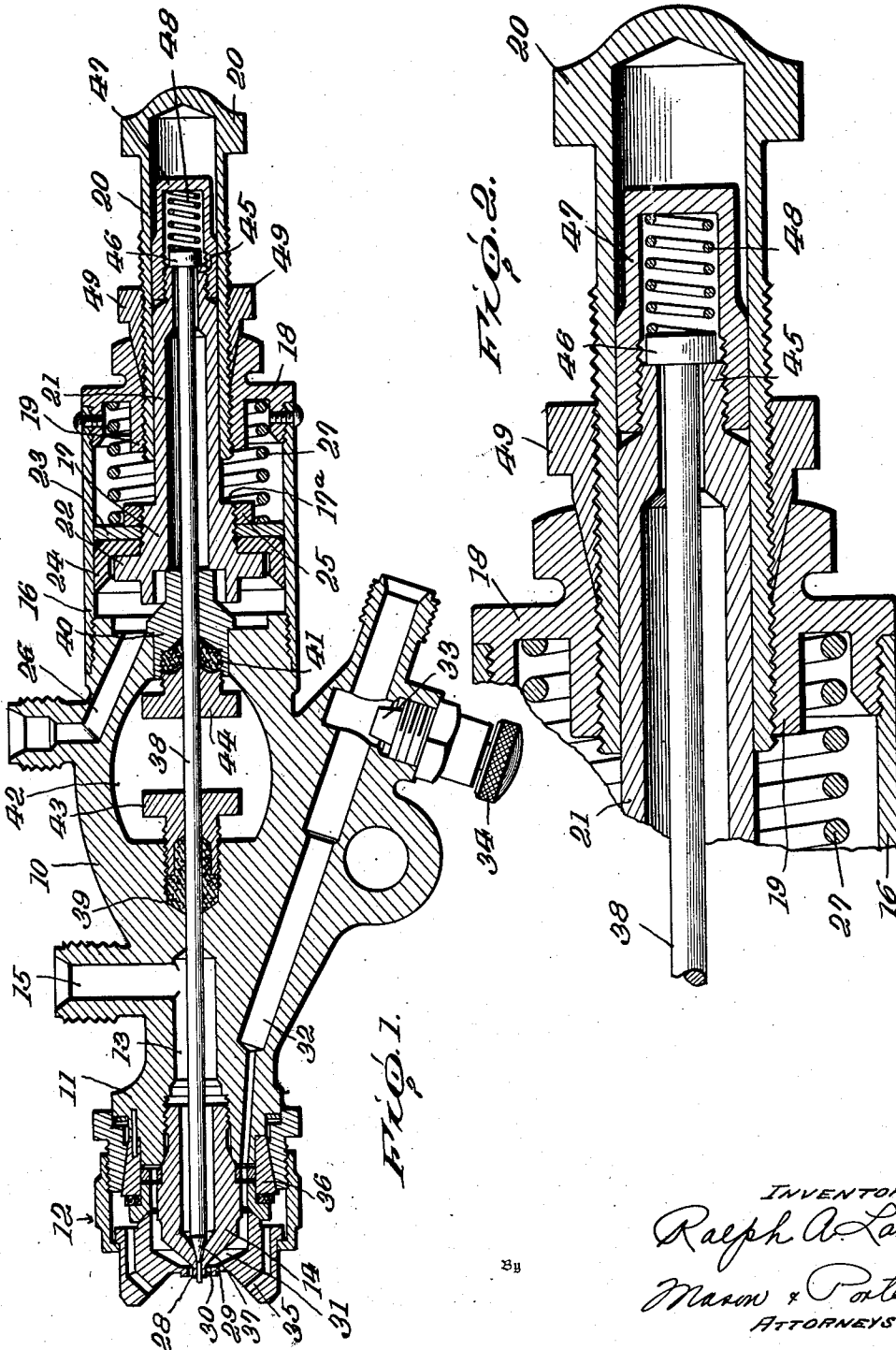
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SPRAY GUN

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SPRAY GUN

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1 Claim. (Cl. 299—140)

The present invention relates to new and useful improvements in devices for spraying surface coating materials, and more particularly to improvements in a device of the type employed for applying lacquers, varnishes, or the like to the surface of sheet metal containers.

According to the present invention, the coating material is applied by an air brush or spray gun of the type which includes a nozzle having a fluid tip with an opening through which the coating material is sprayed. Suitable air openings may also be associated with the nozzle in order to assist in properly distributing the coating material. In this type of spray gun, a valve in the form of a needle is employed for controlling the opening through the fluid tip. The body of the spray gun carries a piston which is movable in one direction under the influence of air pressure for opening the needle valve. This piston is movable in the opposite direction by a relatively heavy spring operable when the air pressure is shut off for closing the needle valve. Where relatively strong fluid tips can be employed for spraying the coating material, the force of impact resulting from the closing of a needle valve is not objectionable. However, in the manufacture of sheet metal cans, it is necessary to employ relatively small fluid tips with a small opening therethrough and with small air openings associated therewith. For instance, in machines for coating beer cans or the like, particularly in the coating of cone tops for such beer cans, extremely small fluid tips must be employed in order to distribute the varnish or lacquer. In such machines where the needle valve is closed by direct contact and movement with the piston under the action of a relatively heavy spring, it has been found that the force of impact results in considerable breakage of the fluid tips. When efforts were made to reduce the strength of the piston spring, it was found that the use of a piston spring weak enough to prevent breakage of the fluid tips, was such as to cause a substantial lag or delay in shutting off the delivery of the coating material with resultant disadvantages and waste of the material. In some forms of spray guns, a separate spring is employed for closing the needle valve but these types also present disadvantages with respect to delay in shutting off the flow of coating material where a relatively weak spring must be employed by reason of the fragile fluid tips.

An object of the present invention is to provide a spray gun of the above type wherein delay in shutting off the flow of coating material is prevented by rapid closing of the needle valve which is cushioned during its closing movement so as to prevent breakage of the fluid tips.

A further object of the invention is to provide a spray gun of the above type wherein spring

cushioning means are disposed between the piston and the needle valve in such a manner as to permit rapid closing of the needle valve so as to prevent breakage of the fluid tips.

A still further object of the invention is to provide a spray gun of the above type wherein the needle valve is opened by direct contact with the piston and wherein cushioning means carried by and movable with the piston is positioned between the piston and the needle valve for preventing breakage of the fluid tips during rapid closing therein.

The above and other objects of the invention will in part be obvious and will be hereinafter more fully pointed out.

In the accompanying drawing:

Figure 1 is a longitudinal sectional view of a conventional form of spray gun embodying the present invention, with the needle valve in a closed position.

Figure 2 is an enlarged fragmentary view, in longitudinal section, showing the details of the cushioning means of the present invention.

In the accompanying drawing, the invention is shown for purposes of illustration with a spray gun substantially of the type described in the R. W. Tracy Patent No. 2,052,953, dated September 1, 1936. Thus, the spray gun includes a body portion 10 having a reduced end portion 11 at one end thereof and a suitable form of nozzle 12 is carried by the end portion 11. The end portion 11 is provided with a longitudinal bore 13 having the outer end thereof in communication with a nipple 14. The inner end of the bore 13 is in communication with a transverse passage 15 to which a conduit for the coating material may be connected and the flow of coating material may be controlled in any suitable manner.

The opposite end of the body portion 10 has threadedly secured thereto a piston casing 16 within which a piston 17 is reciprocally mounted. The free end of the cylinder 16 is closed by a member 18 which is provided with a central internally threaded cylindrical portion 19 with which a sleeve nut 20 is adapted to threadedly engage. The piston includes a cylindrical sleeve portion 21 which extends into and is guided by the inner surface of the nut 20. The piston is also provided with an annular shoulder 22 and carries an annular washer 23 between which a packing leather 24 is secured and held in position by a nut 25 engaging the piston. A passage 26 in the body portion 10 is adapted to be connected to a source of air under pressure and this passage communicates with the space within the cylinder 16 and upon admission of compressed air thereto, the piston 17 will be urged outwardly against the action of a relatively stiff coil spring 27 which bears against the annular washer 23 and the inner surface of the closure member 18. Upon

closing the compressed air supply, the spring 27 will force the piston inwardly.

In employing the spray gun in a machine for coating cans and particularly cone tops for beer cans, it is essential that the nozzle be relatively small. The nipple 14 terminates in a small fluid tip 28 which is centrally apertured and which is in communication with the bore 13. Around the fluid tip 28, there is a relatively fragile ring member 29 which provides air apertures 30. Air is directed to these apertures through the chamber 31 which is in communication with a passage 32 in the body portion 10. This passage 32 is adapted to be connected to a source of air supply and the flow of air is controlled by a valve member 33 shiftable by a thumb screw 34. The nozzle is also provided with side air openings 35 which may be employed for flattening out the spray and to which air is supplied from the passage 32 through openings (not shown) in a ring member 36.

The flow of coating material through the fluid tip 28 is controlled by a valve 37 in the form of a needle having a shank 38 which extends longitudinally through the body portion and also through the sleeve 21 of the piston 17. The needle shank 38 extends through a packing 39 and also through a bearing member 40 and a packing washer 41. The body portion 10 is provided with a transverse opening 42 which permits access to packing nuts 43, 44. The packing nut 43 is adapted to compress the packing 39 and the packing nut 44 threadedly engages the bearing member 40 and is adapted to compress the packing washer 41 therebetween.

In Figure 2 of the accompanying drawing, the essential features of the present invention are more clearly shown. Thus, the outer end of the sleeve portion 21 on the piston 17 is provided with a reduced externally threaded end portion 45 through which the needle shank 38 extends. The needle shank 38 is provided with a head 46 which engages the end of the cylindrical reduced portion 45. A thimble cap 47 threadedly engages the reduced portion 45 within the sleeve nut 20 and provides an internal chamber within which a relatively weak coil spring 48 is disposed. One end of the coil spring 48 bears against the inner surface of the end of the cap 47 and the opposite end of the spring 48 bears against the head 46 on the needle shank 38.

In operation of the spray gun, the coating material is admitted to the passage 15 from which it passes through the bore 13 and into the nipple 14. Air is admitted past the valve 33, through the passage 32 and into the chamber 31 from which it passes outwardly through the orifice 30. As indicated above, air may, if desired, be directed into the outside ports 35 in the nozzle. With the air jets properly adjusted, the valve 37 must be open to permit passage of the coating material through the fluid tip 28. In order to open the valve 37, compressed air is admitted through the passage 26 so as to force the piston 17 outwardly against the action of the relatively heavy spring 27. During this outward movement of the piston 17, the reduced portion 45 thereon will engage the head 46 on the needle shank 38 and outward movement of the piston is limited by engagement between a shoulder 17a and the inner end of the sleeve nut 20. Permissive movement of the piston 17 may be altered by shifting the nut 20 which

is maintained in any predetermined set position by a locking nut 49. It will be seen that during this outward movement of the piston and the needle shank, the cap 47 moves in unison with the needle shank so that the light spring 48 is not altered in tension.

To shut off the spray of coating material, the compressed air supply through the passage 26 is closed so that the spring 27 immediately shifts the piston 17 inwardly toward the position shown in Figure 1. This inward movement of the piston is a rapid movement under the action of the heavy spring 27 and will effect inward movement of the needle shank and the valve 35 toward a closed position by reason of movement of the cap 47 with the piston. However, the light spring 48 serves as a cushioning or dampening means which, upon sudden inward movement of the piston, will permit relative movement between the piston and the needle shank. Thus, the full force of the spring 27 is not transmitted through the needle shank to the valve and the fluid tip 28 although the valve is moved inwardly with the piston so as to effect rapid closing of the fluid tip without substantial delay or lag in shutting off the spray. In other words, the spring 48 exerts its relatively light pressure on the needle shank so as to close the valve 35 and acts as a cushioning device for preventing breakage or damage to the fluid tip, while permitting rapid closing movement of the valve.

While one form of the invention has been shown for purposes of illustration, it is to be clearly understood that minor changes in the details of construction and arrangement of parts may be made without departing from the scope of the invention as set forth in the appended claim.

I claim:

A spray gun comprising a body having a coating material discharge passage at one end thereof, a valve seat surrounding said passage, a piston cylinder carried by the opposite end of said body and in axial alignment with said valve seat, a needle valve directly engageable with said valve seat for controlling the flow of coating material and having a shank portion extending into said cylinder, a piston in said cylinder and movable in one direction under the influence of fluid pressure for opening said valve and movable in the opposite direction for closing said valve, a relatively heavy spring disposed in said cylinder and directly engaging the piston for moving said piston in a valve closing direction, said piston having a centrally located sleeve extending away from said valve seat and through which said shank portion extends, a head at the end of said shank portion adapted normally to be engaged by said piston sleeve for opening said valve, a cap member carried by said sleeve for closing the end thereof and providing an internal chamber, a relatively light cushioning spring interposed between said head and said cap member and effective for normally and yieldably holding the shank head against the piston sleeve to move therewith toward and from the valve seat and for cushioning the force of impact between the valve and the valve seat in order to prevent damage thereto when the piston is moved in a valve closing direction by action of said relatively heavy spring.

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