April 21, 1953 M. B. DEUTSCH 2,635,921

SELF-FEEDING SPRAY GUN

Filed July 24, 1950

3 Sheets-Sheet 1

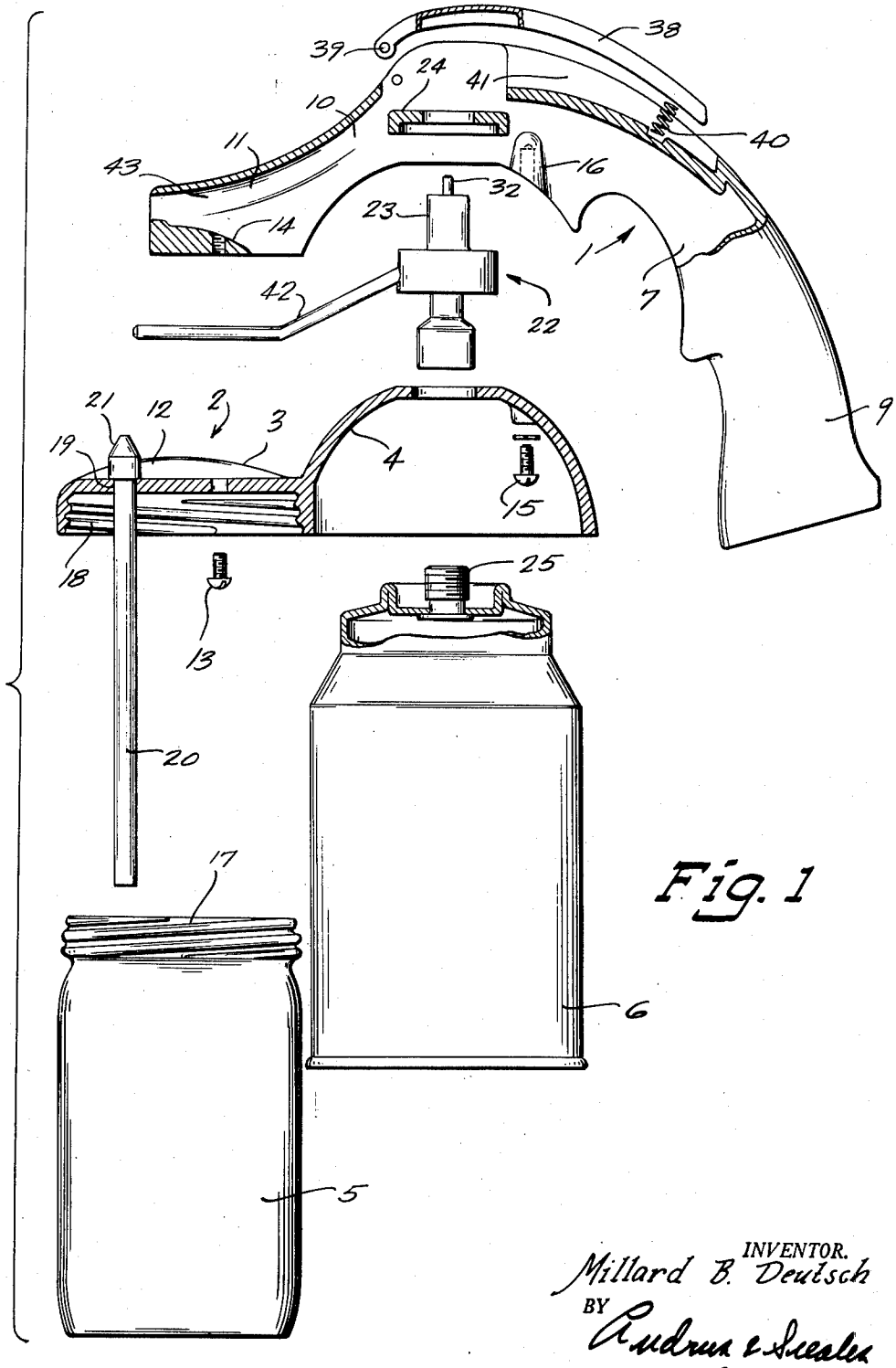


Fig. 1

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Fig. 2

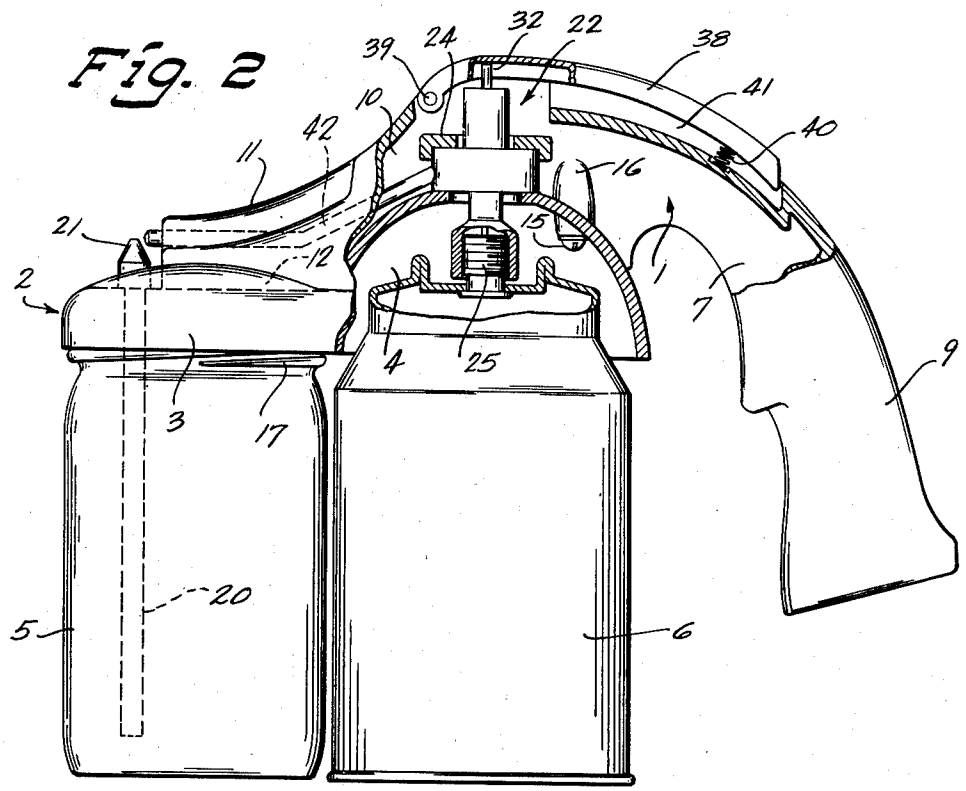
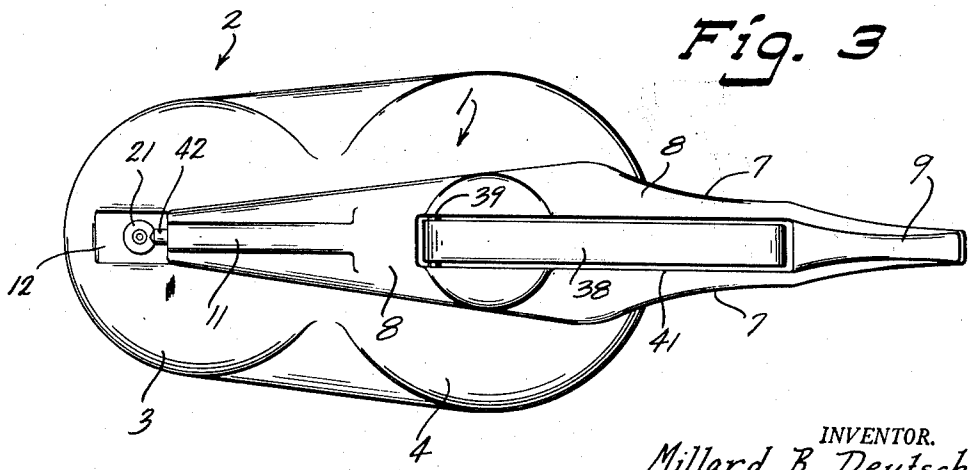


Fig. 3



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Fig. 4

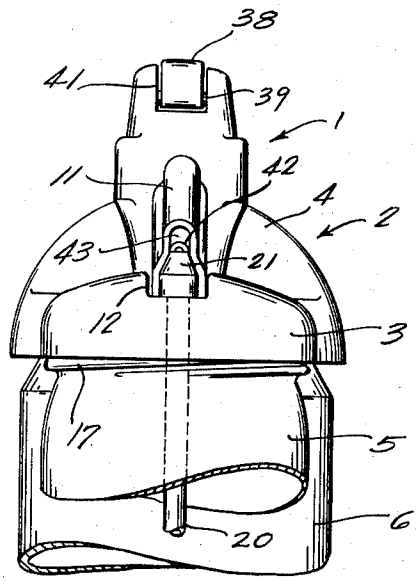


Fig. 5

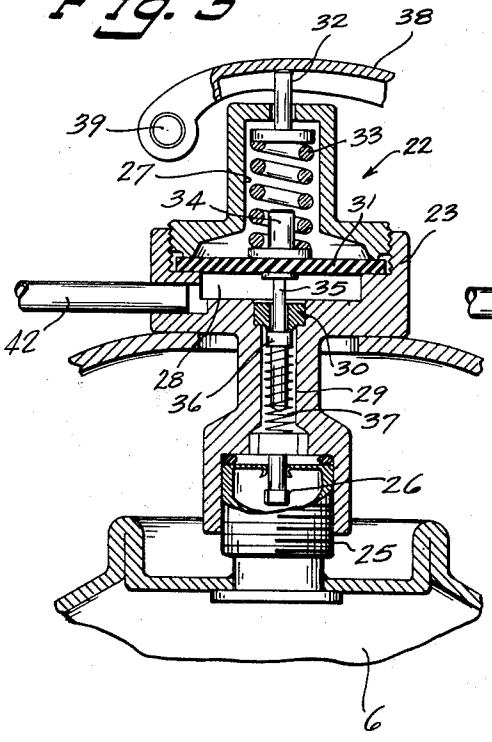
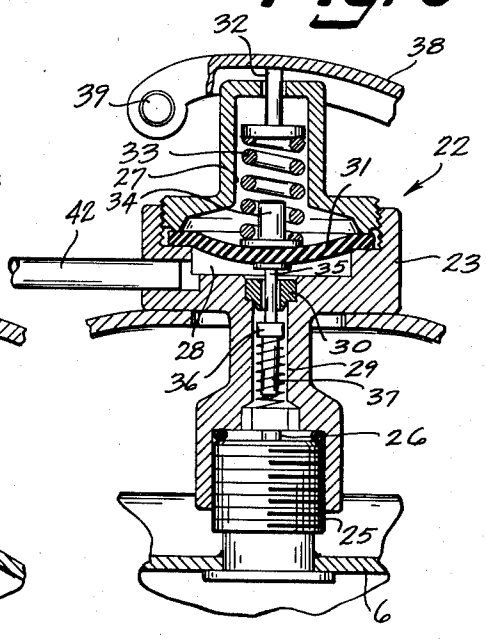


Fig. 6



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SELF-FEEDING SPRAY GUN

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7 Claims. (Cl. 299—86)

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This invention relates to self-feeding spray guns and more particularly to spray guns in which the spraying material is propelled by the discharge of a self-pressurizing fluid carried by the gun itself.

An object of the invention is to provide a spray gun employing separate spray material and propelling fluid containers or cartridges each of said containers being independently separable from the gun.

Another object of the invention is to provide a spray gun in which the nozzles, actuating, regulating and eduction members are all formed as a part of the gun, the spray material and propellant containers alone being individually separate therefrom. It is thus possible to employ less expensive containers of a disposable nature.

Another object of the invention is to provide a self-feeding spray gun adapted for use with spraying materials of widely varying type and with propelling fluids of widely differing pressure characteristics.

Another object of the invention is to provide a self-feeding spray gun having pressure regulation adapted to maintain a constant predetermined feeding pressure through propelling fluids of varying pressure characteristics are employed.

Another object of the invention is to provide a self-feeding spray gun having pressure regulation adapted to restrict the discharge pressure of a propelling fluid and thereby prolong the useful life of a charge of propellant and prevent freezing of the same.

Considerable difficulty has heretofore been encountered where relatively high pressure, self-pressurizing compounds have been employed as the propelling medium for fluid dispensers, and where it is desired that the fluid be continually dispensed for several minutes at a time. Compounds generally employed in such a dispenser have normal discharge pressure well in excess of that necessary to propel the fluid being dispensed in order to provide a greater useful life for a cartridge of a given volume. However, unless this pressure is effectively and positively restricted, the propelling compound is uneconomically and prematurely consumed, and furthermore, the rapid discharge of the compound at high pressure causes it to freeze and temporarily render the dispensing device inoperative.

The spray gun of the present invention provides highly effective pressure regulation which conserves the charge of propelling compound and prevents its freezing, thereby adapting the gun to such purposes as paint spraying where it may

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be desired to continually operate the gun for extended periods of time. Such pressure regulation is obtained while retaining simplicity in the gun itself. The simplification of design is carried through to the other self-contained actuating and eduction mechanism to provide an inexpensive, many-purpose gun highly adapted for use with a wide variety of spray materials and cartridge-contained propelling compounds.

A further object of the invention is to provide a self-feeding spray gun of such simplicity of construction as to comprise relatively inexpensive body members, while additionally providing for the joinder of the body members with spray material and propeller containers whereby the latter are highly accessible for ready replacement.

These and other objects and advantages will be more fully set forth in the following description of a preferred embodiment of the invention as illustrated in the accompanying drawings.

In the drawings:

Figure 1 is an exploded view of the spray gun, a spray material container and propellant cartridge;

Fig. 2 is a side elevation of the gun with portions broken away and sectioned;

Fig. 3 is a top view of the gun;

Fig. 4 is a front view;

Fig. 5 is an enlarged detail view of the pressure regulating valve showing the same in closed position when the gun trigger is in released position; and

Fig. 6 is a view similar to that of Fig. 3 showing the pressure regulating valve in an open position as a proper balance of discharge pressure is being established.

Referring to the drawings, the spray gun comprises a gun body formed in two parts to provide a hollow housing 1 and a cover member 2, the latter defining dome shaped recesses 3 and 4 to receive a spray material container 5 and an impeller cartridge 6, respectively.

Housing 1 of the gun body is formed to a substantially pistol shape. It comprises side members 7 that converge outwardly where they are joined by a web 8. Members 7 and 8 of housing 1 provide a rearwardly disposed handle grip 9, and they extend upwardly and forwardly to define a valve chamber 10 and a hollow barrel 11.

At the undersides of valve chamber 10 and barrel 11, the open inner edges of sides 7 of housing 1 are secured to and support the cover member 2.

Adjacent valve chamber 10, the sides 7 are formed to complement and embrace the rear

dome of cover member 2. Thus, upon assembly the recess 4 of cover 2 and the impeller cartridge 6 are disposed below the valve chamber 10 of housing 1. The forward dome of cover 2 is provided with a centrally disposed longitudinal slot 12 within which the forward portion of housing sides 7 are disposed upon assembly.

Cover member 2 and housing 1 are secured together by screws extending upwardly from each of the cover recesses 3 and 4 to be threaded within lugs carried by the inner surface of sides 7 of housing 1. Screw 13 secures the forward dome of cover 2 to lug 14 disposed within barrel 11. Screws 15 similarly fasten the rear dome to lugs 16 within valve chamber 10.

As illustrated, the spray material container 5 and forward dome of cover member 2 are joined by complementary threads 17 and 18 formed externally of the neck of container 5 and at the periphery of dome recess 3, respectively.

The recess 3 and slot 12 which is disposed above the same extend forwardly beyond barrel 11 of the housing 1 where they are joined by a vertical passageway 19 having its upper opening adjacent the forward end of barrel 11 and its bottom opening exposed to container 5.

Spray material is drawn from container 5 by a dip tube 20 held within passageway 19 and extending both to within container 5 and upwardly to without cover member 2 where it is secured to spray material tip 21 disposed at the forward end of barrel 11. The tip 21 is formed to a greater diameter than that of passageway 19 to seat upon slot 12 and support tube 20. Material container 5 may be readily unscrewed from cover 2 without disturbing either the tube 20 or the tip 21.

Material is drawn from container 5 by the propelling action of gas discharged under pressure from barrel 11 across spray material tip 21 where the material and gas are mixed. The gun employs a self-contained charge of propelling fluid, such as dichlorodifluoromethane (Freon), which is characterized by having vapor pressure at ordinary room temperatures. Such compounds generally attain pressure well in excess of that required to propel spraying materials. Freon, for example, reaches a pressure of approximately 70 pounds per square inch at 70° F. while approximately 25 pounds per square inch would be adequate for many spraying purposes. Likewise, gaseous emission of such compounds at their normal discharge pressures for even short periods of time generally causes freezing of the discharge orifice which necessitates interruption of the spraying operation.

To effectively prevent freezing and conserve the charge of propelling fluid in cartridge 6, the present gun employs a pressure regulator assembly 22 disposed within chamber 10 of gun housing 1.

Assembly 22 comprises a casing 23 which extends downwardly through a central aperture in the rear dome of cover member 2 to within recess 4. An enlarged central section of casing 23 seats upon the upper surface of the dome and is held against the same by a transversely extending flanged plate 24 which bridges the housing side member 7 and may be formed integral therewith. A central aperture in plate 24 permits the top portion of assembly 22 to extend upwardly further within chamber 10.

The spray gun is adapted to employ a disposable pressurized gas cartridge. As illustrated, the cartridge 6 is provided with an externally

threaded neck fitting 25 having a central aperture sealed by a frangible plug.

Referring to Figs. 5 and 6, the lower portion of regulator assembly casing 23 is internally threaded to receive fitting 25, and a piercing tool 26 disposed within the path of fitting 25 pierces its plug upon initial entry into the casing 23. After piercing has occurred, gas from cartridge 6 is free to flow around the tool 26 to within the regulator assembly 22.

Casing 23 of regulator assembly 22 defines an upper plunger cylinder 27, a central pressure chamber 28, and a lower valve cylinder 29. The cylinder 29 and pressure chamber 28 are separated by a valve seat insert 30. Pressure chamber 28 and plunger cylinder 27 are divided by a diaphragm 31 which is hermetically seated between threaded halves of the assembly casing 23.

Plunger cylinder 27 encloses the head of a plunger 32 having a stem extending upwardly through a central aperture in the casing 23 to without the assembly 22. An axially disposed plunger spring 33 in cylinder 27 abuts at its upper end against the head of plunger 32 and its lower end biases a spring follower 34 against the top of diaphragm 31.

The biasing action of plunger spring 33 and its follower 34 against the upper surface of diaphragm 31 is normally overcome by the opposed action of a valve stem 35 abutting the underside of diaphragm 31 and extending downwardly through a central aperture in valve seat insert 30, a valve 36 axially disposed in valve cylinder 29, and a valve spring 37 which normally biases the valve 36 to closed position against seat 30 thereby forcing stem 35 upwardly against the diaphragm 31. Gas entering valve cylinder 29 from cartridge 6 further tends to seat the valve 36 and elevate diaphragm 31.

As shown in Fig. 6, to unseat the valve 36 and thereby admit gas from cartridge 6 and valve cylinder 29 to pressure chamber 28, the stem of plunger 32 is depressed to act through plunger spring 33, follower 34, diaphragm 31 and valve stem 35 to unseat valve 36. Depression of plunger 32 is controlled by a trigger 38 pivotally secured to gun housing 1 by a pin 39. The trigger is normally biased outwardly from the gun by a spring 40 secured within a groove 41 formed in outer web 8 of housing 1. Groove 41 extends from the rear extremity of trigger 38 to its pivot pin 39 to accommodate the trigger when in squeezed position.

When trigger 38 is squeezed thereby unseating valve 36, gas is admitted to pressure chamber 28 and from the chamber 28 it is free to flow through a gas tube 42 which extends through the forward side of regulator assembly casing 23 and the hollow gun barrel 11 to be supported near its forward end in an aperture 43 formed at the front of barrel 11 in gun housing 1. Tube 42 protrudes through aperture 43 to point immediately adjacent the spray material tip 21 where the propelling gas and material are mixed.

A proper balance between pressure in chamber 28 and the compression of plunger spring 33 will maintain an even, steady flow of propellant at a pressure which will best conserve the charge of fluid and avoid freezing upon its discharge from tube 42. The entrance of propellant to within valve cylinder 29 tends to press valve 36 to closed position by action against the valve itself and its pressure within chamber 28 further presses diaphragm 31 upwardly to oppose the valve opening action of trigger 38 and plunger

spring 33. The amount of propellant admitted past valve 36 may be readily controlled by limiting the extent to which trigger 38 depresses plunger 32 and by preloading plunger spring 33.

Assembly of the gun and container is extremely simple as illustrated by Fig. 1. The regulator assembly 22 is set within the aperture in the rear dome of cover member 2 and the gas tube 42 is readily inserted through the barrel aperture 43 as cover 2 is brought adjacent the open underside of gun housing 1. Cover 2, assembly 22 and tube 42 are rigidly fixed upon their respective seats by the simple insertion of screws 13 and 15 through the domes of cover member 2. The containers are then readily threaded upwardly to within dome recesses 3 and 4. Trigger 38, dip tube 20 and material tip 21 are readily assembled without disturbing other members, and the material and propellant containers are removable for replacement in a highly accessible manner.

Various embodiments of the invention may be employed within the scope of the following claims.

I claim:

1. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member secured below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge, a substantially tubular member disposed within said housing to seat upon said cover member and extending downwardly to within said cartridge recess to join and communicate with a propellant cartridge and conduct propellant to within the housing, means to conduct propellant from said tubular member through said housing barrel and discharge the same from the forward end of the barrel, and means to conduct spray material to discharge the same adjacent the point of propellant discharge.

2. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member secured below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge and with a portion of the container recess extending forwardly of said housing barrel, a pressure regulating device disposed within said housing and adapted to seat upon said cover member and having a tubular portion extending downwardly through the cover to within its cartridge recess to join and communicate with a propellant cartridge, means to conduct propellant from said regulating device to without the forward end of said housing barrel, and an eduction tube carried by said cover member forwardly of said housing barrel and extending downwardly to within said container recess to conduct spray material from a container and provide a spray material outlet adjacent the point of propellant discharge.

3. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having

a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member secured below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge, a pressure regulating device disposed within said housing and adapted to seat upon said cover member and having a tubular portion extending downwardly through the cover to within its cartridge recess to join and communicate with a propellant cartridge, and a tube extending from said regulating device through said hollow housing barrel and its forward end to discharge propellant therefrom, said regulating device and tube being formed independently from said housing and cover member whereby they may be readily removed when the housing and cover are disassembled.

4. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member secured below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge, a pressure regulating device disposed within said housing and adapted to seat upon said cover member and having a tubular portion extending downwardly through the cover to within its cartridge recess to join and communicate with a propellant cartridge, a tube extending from said regulating device through said hollow housing barrel and its forward end to discharge propellant therefrom, and eduction means carried by said cover member to conduct spray material from said container and provide an outlet for the material abreast the forward end of said housing barrel.

5. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion, a cover member disposed below said housing and having separate recesses to receive said container and cartridge, a pressure regulating device disposed within said housing and having a tubular portion exposed to said cartridge recess to join and communicate with a propellant cartridge, a tube extending from said regulating device through said hollow housing barrel to discharge propellant from the forward end of the barrel, and eduction means carried by said cover to conduct spray material from said container and provide an outlet for the material abreast the forward end of said housing barrel.

6. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member disposed below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge and with a portion of the container recess extending forwardly of said housing barrel, means to mount said container and cartridge within their respective cover recesses, means to conduct propellant from said cartridge to without the

forward end of said housing barrel, and an eduction tube carried by said cover member forwardly of said housing barrel and extending downwardly to within said container recess to conduct spray material from a container and provide a spray material outlet adjacent the point of propellant discharge.

7. A self-feeding spray gun adapted to be removably attached to a spray material container and a cartridge of self-pressurizing fluid propellant, comprising a hollow gun housing having a substantially pistol shape with a forwardly extending barrel portion and being formed with its underside substantially open, a cover member disposed below said housing to provide a closure on the underside thereof and having separate bottom recesses to receive said container and cartridge, means to removably secure said cover

member to said hollow housing to provide ready access to the interior of the latter, means to mount said container and cartridge within their respective cover recesses, and means to conduct material and propellant from said container and cartridge for discharge forwardly of the barrel portion of said gun housing.

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