

May 13, 1969

H. CHARLOP

3,443,754

CONSTRUCTION FOR A POWDER-TYPE FLAME SPRAY GUN

Filed Nov. 14, 1966

Sheet 1 of 3

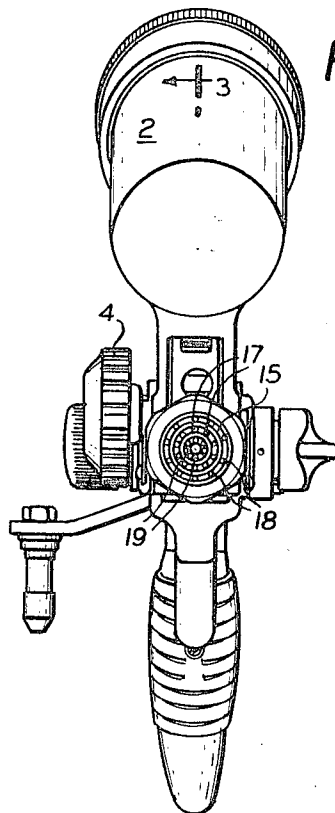
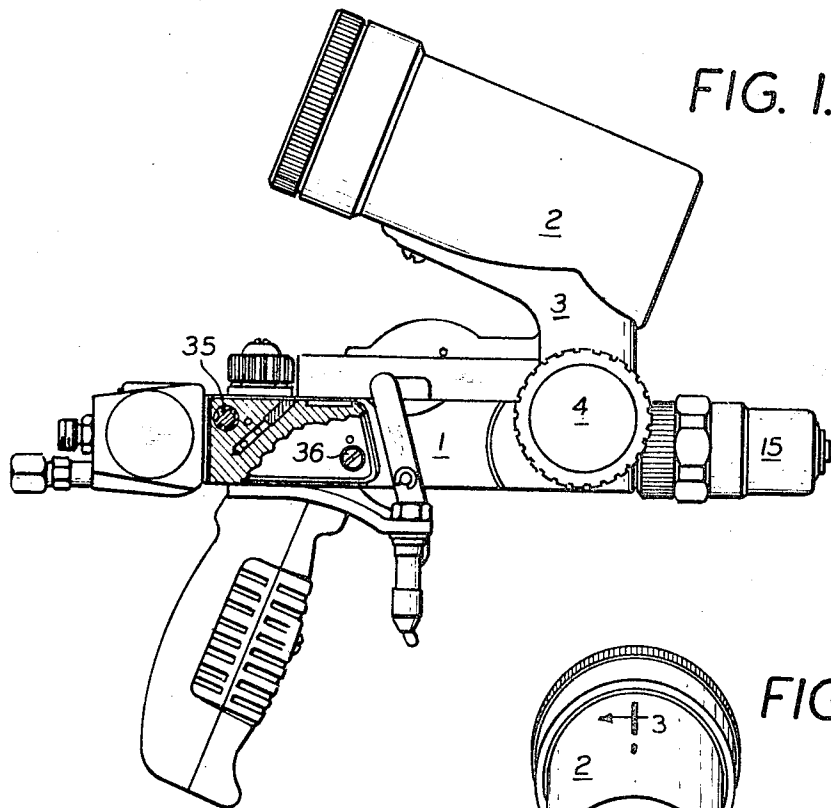
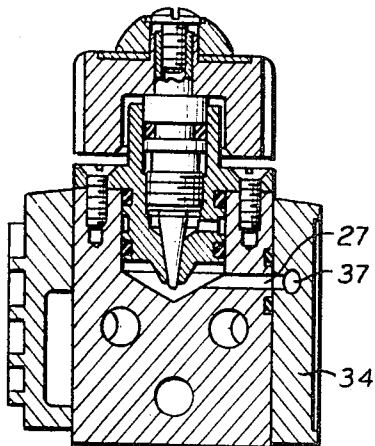


FIG. 4.



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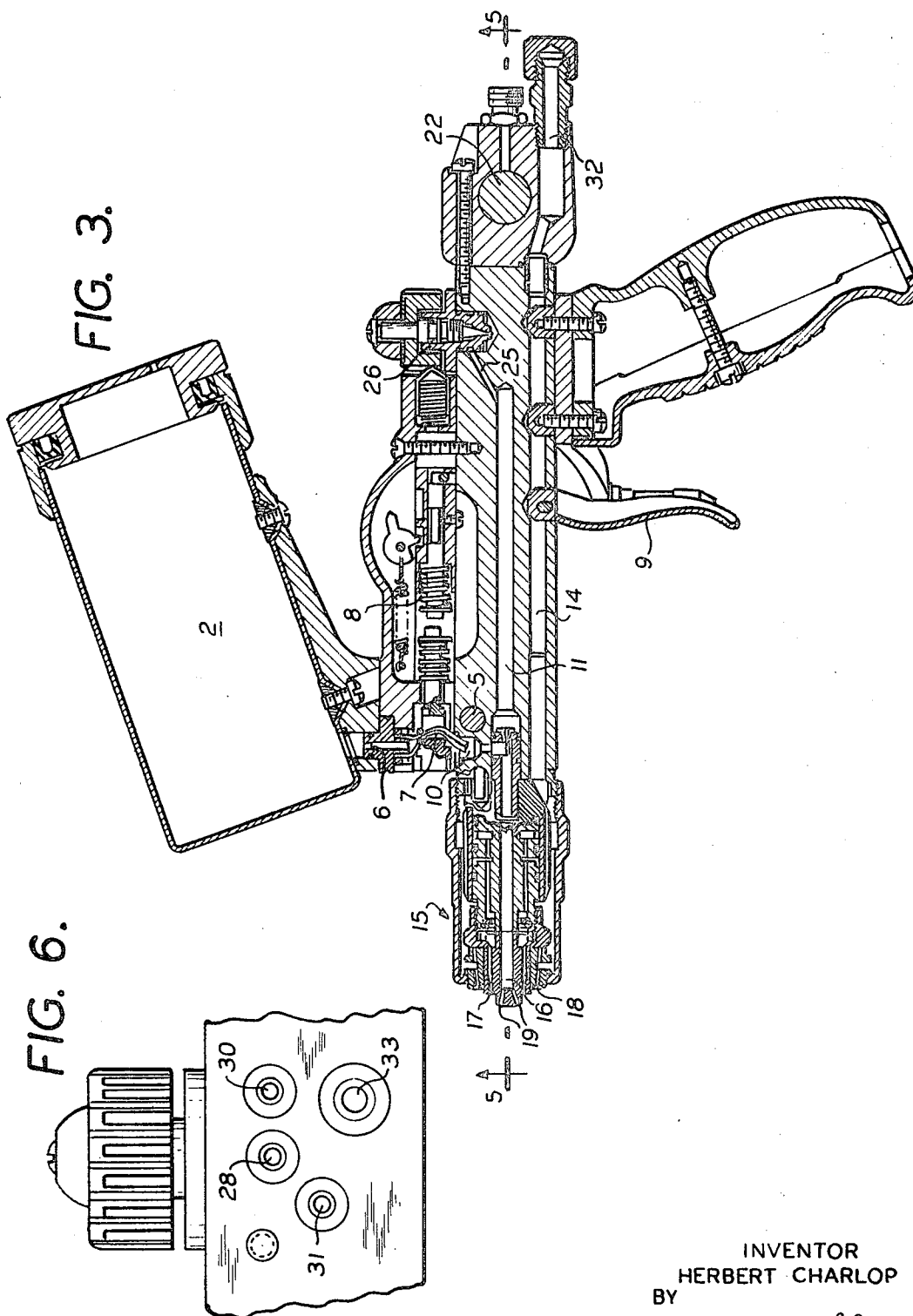
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Sheet 3 of 3

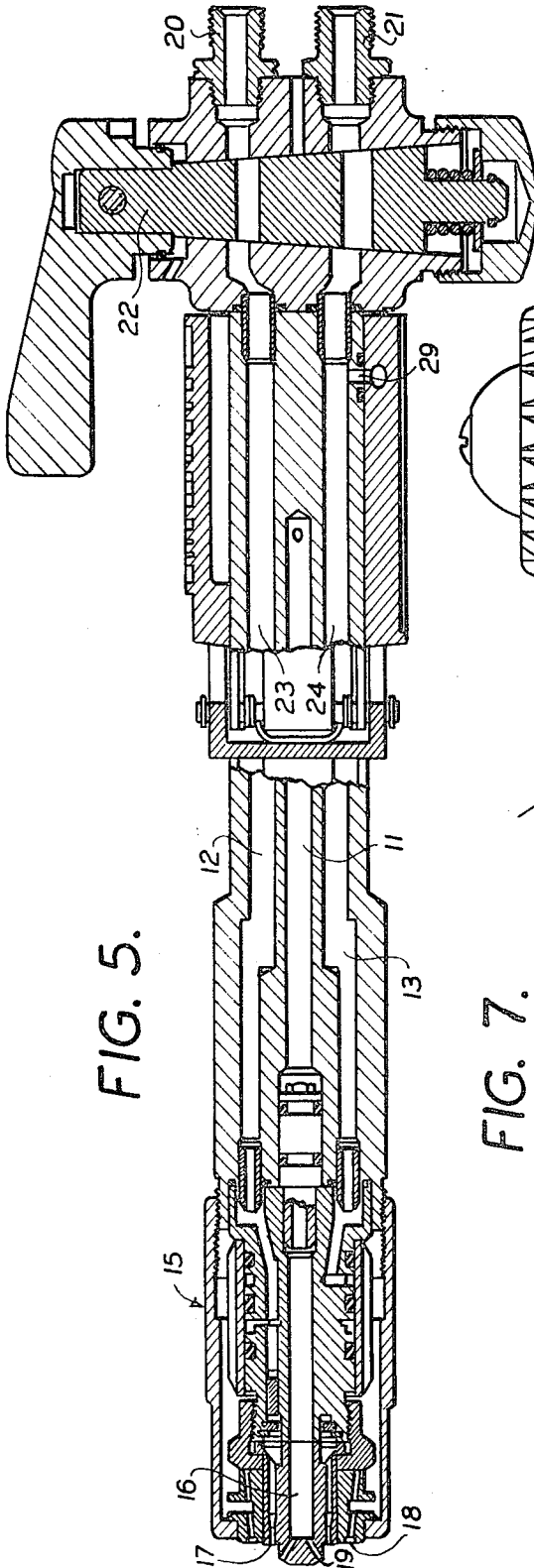


FIG. 5.

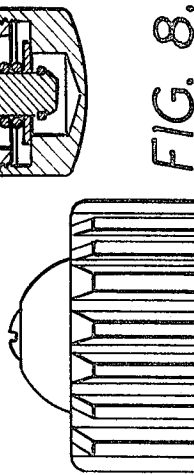


FIG. 7.

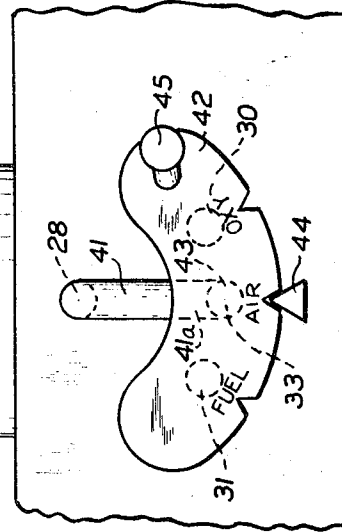


FIG. 8.

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1

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CONSTRUCTION FOR A POWDER-TYPE FLAME SPRAY GUN

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Int. Cl. B05b 7/20

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6 Claims

ABSTRACT OF THE DISCLOSURE

Powder-type flame spray gun having an arrangement on the gun body for optionally connecting one of the fuel and combustion-supporting gas conduits in flow communication with the carrier gas conduit to use the gas passed through the conduit as the carrier gas, these means being in the form of lateral extensions of the conduits through the side of the gun body, and exchangeable valve plates for optionally connecting the desired lateral extensions of the conduits.

This invention relates to an improved construction for a powder-type flame spray gun.

The invention more particularly relates to an improved construction of a powder-type flame spray gun of the type described in U.S. Patents 2,820,670 and 2,961,335, which will allow the optional use of fuel gas, oxygen-containing gas, or an auxiliary gas, as the carrier gas for the powder.

In powder-type flame spray guns of the type described in U.S. Patents 2,820,670 and 2,961,335, a portion of one of the gases used to form the combustible mixture, is bled off and fed through a central conduit, to act as a carrier gas for the powder. Under certain spray conditions it is desirable to use the fuel gas as the carrier gas, while under other spray conditions it is desirable to use the oxygen-containing gas as the carrier gas. The conventional guns were so constructed that only one of these gases could be utilized for this purpose, and if it were desirable to use the other in its stead, special inconvenient, cross-over valve equipment and flow control arrangements were required.

One object of this invention is a powder-type flame spray gun which allows quick, easy and convenient optional selection of either the fuel or oxidizing gas as the carrier gas.

A still further object of this invention is a flame spray gun which allows easy and convenient optional selection of the fuel gas, oxidizing gas, or an auxiliary gas such as air as the carrier gas.

These and still further objects will become apparent from the following description read in conjunction with the drawings in which:

FIG. 1 is a side elevation of an embodiment of a powder-type flame spray gun in accordance with the invention;

FIG. 2 is a front elevation of the gun as shown in FIG. 1;

FIG. 3 is a vertical, longitudinal section of the gun shown in FIGS. 1 and 2;

FIG. 4 is a partial cross-section of the gun shown in the preceding figures;

FIG. 5 is a horizontal, longitudinal section of the gun shown in the previous figures;

FIG. 6 is a partial side elevation of a portion of the

2

gun in the preceding figures, with the valve cover plate removed;

FIG. 7 is a phantom perspective view showing an embodiment of a valve plate of the gun in accordance with the invention; and

FIG. 8 is a diagrammatic side elevation showing another further embodiment of a valving switch-over arrangement in accordance with the invention.

Referring to the drawings 1 represents the body of the spray gun, on which is mounted the inclined, cylindrical powder container 2, which is detachably held in place by the saddle 3 and knurled hand screw 4, so that by unscrewing the hand screw 4 and sliding out the threaded pin 5 attached thereto, the entire powder container may be removed. A passage 6 leads from the container 2 into the pinch-type shut-off valve 7, which is controlled by the shut-off mechanism 8 and trigger arrangement 9, in the identical manner as described in U.S. Patent 2,820,670. With the shut-off valve 7 open, the passage 6 extends therethrough into the powder feed chamber 10 provided in the gun body 1. The gun body 1 is also provided with a carrier gas conduit 11, a fuel gas conduit 12, an oxygen conduit 13, and auxiliary gas or air conduit 14, all these leading partially axially through the gun body and terminating at the gun nozzle arrangement 15.

While the gun nozzle arrangement may be of conventional construction, as for example described in the above mentioned patents shown, the same has the construction as described in further detail in my copending application, Ser. No. 594,094 filed concurrently herewith, and is basically provided with the central powder passage 16, which communicates with the carrier gas conduit 11 for picking up powder fed into the powder feed chamber 10.

A mixing arrangement is provided for mixing the fuel and oxygen gas passed through the conduits 12 and 13 respectively and conducting the same through the ring of burner jets 17 for combustion. Additionally a ring of jets 18 is provided, which is fed by the air from the air conduit 14. The powder carried in the carrier gas exits through the divergent openings 19 at the forward end of the powder passage 16, so that the powder particles are distributed in the flame, thereby being at least heat-softened and propelled against the surface to be covered in the conventional manner. The gas passing through the jets 18, such as the air, may be utilized to cool the work or prevent overheating of the particles, as described in my said copending application.

The rear of the gun is provided with a fuel line connection 20 and an oxygen line connection 21, both of which pass through the tapered plug valve 22, into the passages 23 and 24 respectively; the passage 23 being connected to the conduit 12, and the passage 24 to the conduit 13. The carrier gas conduit 11 is connected at its rear end by the passage 25 to the adjustable needle valve 26, of the type described in the aforementioned patents. A lateral gas passage 27 leads into the needle valve 26, so that gas passed into this lateral passage will pass through the needle valve into the passage 25 and into the carrier gas conduit 11. The passage 27 terminates as an opening 28 on the side of the gun, as shown in FIG. 6, which opening is surrounded by a rubber O-ring. A further lateral passage 29 connects to the passage 24 for oxygen and terminates as the opening 31. A similar passage is in communication with the fuel gas passage 23 and

terminates as the opening 30. A connection 32 is provided for the auxiliary gas, such as the air, and communicates with the conduit 14. A further similar lateral passage is connected with this and terminates as the opening 33. A valve plate 34 is secured to the side of the gun covering the openings 28, 30, 31 and 33, and is removably screwed in place by the screws 35 and 36. As shown, the valve plate 34 has the two lateral bores 37 and 38, which extend from the inner side half way through. These are interconnected by the passage 39, so that the same are flow-communited.

The passage 39 is provided by drilling through the plate and then inserting the plug 40. As may be noted, with the valve plate 34 in place, the passage 37 is aligned with the opening 28 and thus sealed in communication with the passage 27 by means of the O-ring. In the same manner the passage 38 is in alignment with the opening 33 and thus sealed by the O-ring surrounding the passage 33 in communication with the lateral passage connected to the auxiliary or air conduit 14. The gun is provided with two additional similar valve plates 34. In one, however, the passage 38 is in alignment with the opening 30, and in the other the passage 38 is in alignment with the opening 31; the valve plate having the passage 38 in alignment with the opening 30 utilizes the fuel gas as the carrier gas, and the one with the alignment of the passage 38 and the opening 31 utilizes the oxygen as the carrier gas.

In operation powder to be sprayed is placed in the powder container 2, a fuel gas line such as acetylene, hydrogen or propane line is attached to the connection 20, and the oxygen or air line connected to the connection 21. An auxiliary gas line, such as compressed air or an inert gas line, is connected to the connection 32. The tapered plug valve 22 is opened so that the oxygen flows through 24 and 13, the fuel flows through 23 and 12, the same mixing in the nozzle and emerging from the jets 17, where the same are ignited, forming the torch-like flame. Compressed air is passed in through 32 and moves through the conduit 14 and out of the jets 18, performing a cooling function. A portion of the compressed air flows from the conduit 14 through the lateral connection and through the opening 33, passage 38, 39, 37, into the passage 27, and through the needle valve 26, the passage 25 and conduit 11, into and through the passage 16, and out through the jets 19. When the trigger 9 is squeezed and released, the pinch valve 7 is open, powder flows into the powder feed chamber 10, is picked up by the gas flowing from 11 through 16, and is thus carried out through the jets 19 into the flame for spraying. The amount of carrier gas may be controlled by a suitable adjustment of the needle valve 26.

If the operator, for different spraying operations or when spraying under different conditions, wishes for example to utilize in place of the air, a fuel gas as the carrier gas, he simply removes the valve plate 34 and exchanges it with a valve plate in which the passage 38 is in alignment with the opening 30. Alternatively, if the operator wishes to utilize the oxygen gas as the carrier gas, he exchanges the plate for a plate in which the passage 38 is aligned with the opening 31. The plates may be conveniently marked with the source of carrier gas which they represent. Thus, as shown in FIG. 7, the plate 34 is marked "air."

Alternatively, in place of providing exchangeable plates, a turret arrangement containing the individual plates may be provided, so that the plates are snapped in place by simply rotating the turret.

Furthermore, a suitable switch-over valving arrangement may be provided, for example as shown in FIG. 8. As shown, connected in the opening 28 is the rotating connection pipe 41, on which is provided the crescent valve plate 42. In the valve plate the pipe 41 communicates by the passage 41a to the lateral opening 43. The entire plate 42 may swing on the pipe 41 around the pivot point 28 and is held in one of three positions by the detent 44.

In this arrangement the openings 31, 33 and 30 are equidistantly spaced on a radius, so that with the pipe 41 in the central position as shown, the passages 27 and 33 are in communication corresponding to use of air as a carrier gas, whereas when the same is rotated from the position shown to the next notch in a clockwise direction, the opening 31 is in communication with the pipe 41 corresponding to oxygen as the carrier gas, and when rotated in a counter-clockwise direction from the position shown, the opening 30 is in communication corresponding to the use of the fuel gas as a carrier gas. The positions as shown may be appropriately marked with the designations "oxy," "air" and "fuel," and a handle 45 may be provided for convenience in rotation.

Thus, as may be seen, in accordance with the invention the powder-type flame spray gun is provided with means on the gun body for optionally connecting a selected one of the fuel and combustion supporting gas conduits in flow communication with the carrier gas conduit, whereby the gas passing through the selectively-connected conduit, acts as the carrier gas for the gun. Preferably, an additional auxiliary gas, such as air conduit, is provided and means are provided on the gun body for optionally connecting a selected one of the fuel, combustion-supporting, or auxiliary conduits in operational flow-communication with the carrier gas conduit.

While the invention has been described in detail with reference to certain specific embodiments, various changes and modifications which fall within the spirit of the invention and scope of the appended claims will become apparent to the skilled artisan. The invention is thus only intended to be limited by the appended claims or their equivalents wherein I have endeavored to claim all inherent novelty.

I claim:

1. In a powder-type flame spray gun having a gun body with a nozzle at its forward end, a combustion-supporting gas, a fluid gas, and a carrier gas conduit extending at least part way through the gun body in communication with the nozzle, the improvement which comprises each of said conduits having lateral extensions through the side of said gun body and including exchangeable valve plates for optionally connecting said lateral extension of said fluid gas conduit and lateral extension of said combustion-supporting gas conduit with said lateral extension of said carrier gas conduit whereby the gas passing through the connected fuel gas or combustion-supporting gas conduit acts as a carrier gas for the gun.

2. Improvement according to claim 1 including an auxiliary gas conduit extending at least partially through the main body, said auxiliary gas conduit having a lateral extension through the side of the gun body and including an additional exchangeable valve plate for connecting the lateral extension of said auxiliary gas conduit with the lateral extension of said carrier gas conduit.

3. Improvement according to claim 2 in which said lateral extensions terminate adjacently on a flat surface of the side of the gun body, each surrounded by an O-ring gasket, and in which said valve plates are plates for attachment in surface contact with said flat portion, each said plate having an opening in alignment with the lateral extension of said carrier gas conduit, a further opening in alignment with one of the lateral extensions of said fuel gas, combustion supporting gas, and auxiliary gas conduits, and an internal passage flow-connecting said openings.

4. Improvement according to claim 3 including an adjustable valve positioned in said carrier gas conduit, with said lateral extension of said carrier gas conduit leading into the inlet side of said valve.

5. In a powder-type flame spray gun having a gun body with a nozzle at its forward end, a combustion-supporting gas, a fluid gas, and a carrier gas conduit extending at least part way through the gun body in communication

5

with the nozzle, the improvement which comprises a hand-operated switch-over valve mounted on the gun body for optionally connecting a selected one of said fuel and combustion-supporting gas conduits in flow communication with said carrier gas conduit whereby the gas passing through said selectively connected conduit acts as a carrier gas for the gun.

6. Improvement according to claim 5 in which said gun body additionally has an auxiliary gas conduit extending at least partially therethrough and in which said hand-operated switchover valve has an additional position flow-connecting said carrier gas conduit with said auxiliary gas conduit.

5

10

6

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U.S. Cl. X.R.

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