

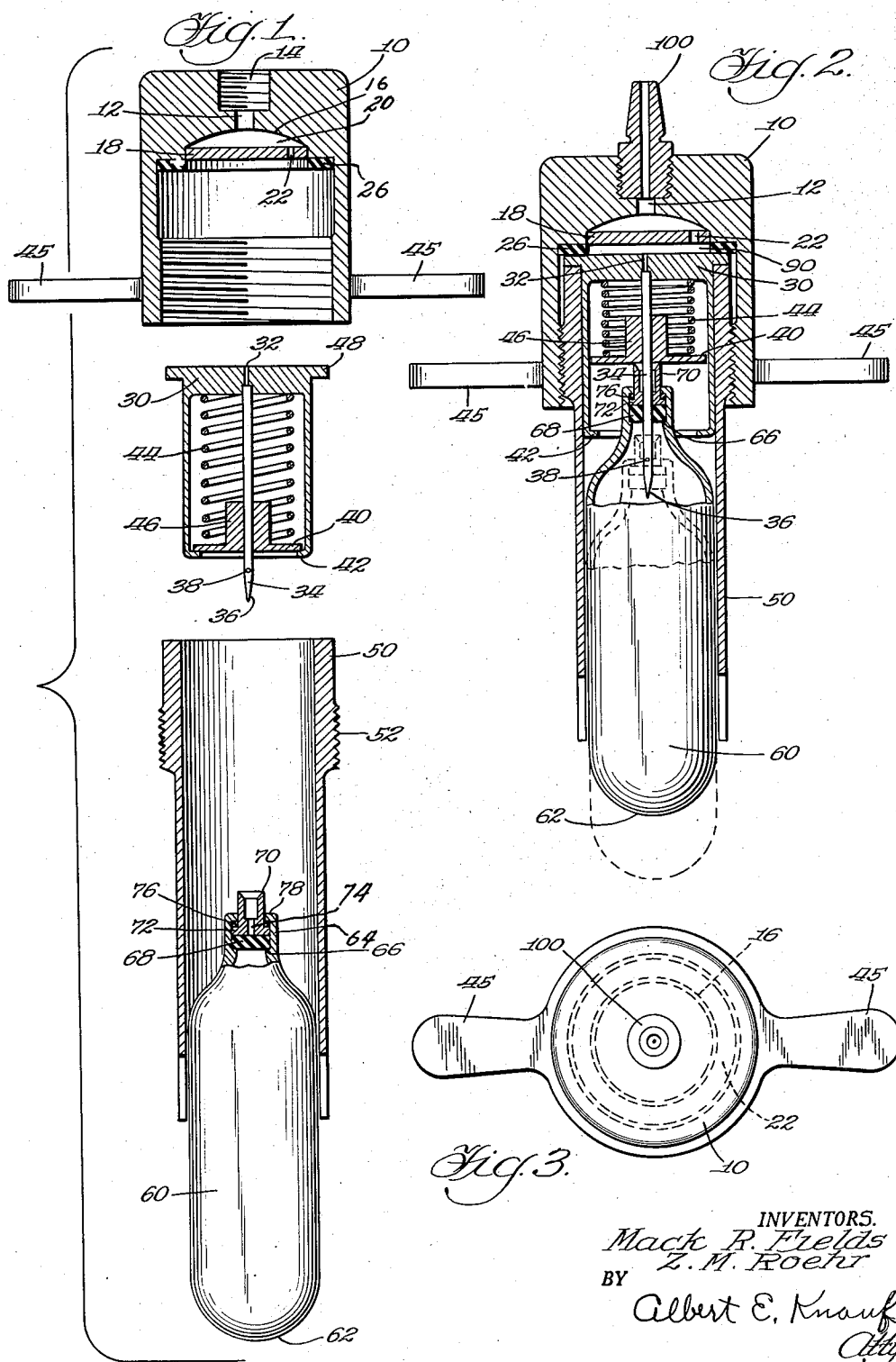
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GAS CONTAINER AND DISPENSING MEANS

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GAS CONTAINER AND DISPENSING MEANS

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5 Claims. (Cl. 222-5)

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This invention relates to a gas container and a dispensing valve for the container. More specifically, the invention relates to a relatively small container for gas under high pressure, and means for controlling the release of gas from the chamber.

The device of our invention has utility in supplying a small, easily transported supply of gas under pressure, with a positive control for the release of the gas. The device permits a definite control of the rate of release of the gas, and a control of the quantity of the gas released.

Referring to the drawings:

Fig. 1 is a cross sectional view of a device according to the invention with the parts separated;

Fig. 2 is a cross sectional view of an assembled gas container and control valve in operative position; and

Fig. 3 is a top plan view of the device of Fig. 2. The valve head 10 of Fig. 1 is a cup-shaped element having a gas release orifice 12 through the bottom of the cup. The orifice 12 leads to an enlarged outlet 14 which is threaded to accommodate a directing nozzle, such as 100 in Fig. 2. The interior bottom of the cup-shaped piece 10 is a dish-shaped, countersunk well 16. A tight-fitting disc 18 is seated in the well, leaving a head-space 20 which acts as a drying chamber. A small aperture 22 through the disc 18 forms a communicating passage with the interior of the head 10 and the outlet 12.

The valve housing is a cup-shaped member 30, having a stepped opening 32 providing a passage through its bottom. An elongated thin needle 34 is attached in the stepped aperture 32, extending axially away from the cup bottom, and projecting beyond the open end of the housing 30. The needle 34 is a hollow member having a solid sharpened point 36. A lateral hole 38 opens into the hollow portion of the needle, allowing communication through the housing 30. A disc 40, slidable inside the housing 30 is retained in the housing by an annular lip 42. The disc 40 is retained against the lip 42 by a compression spring 44. The disc 40 has a centrally located hub 46 slidable, axially, along the needle 34. The housing 30 has an exterior lateral flange 48 adjacent its bottom end.

The sleeve 50 is a hollow tube, having exterior threads 52 adjacent one end. The sleeve 50 is large enough to slidably accommodate the container 60.

The container 60 is a hollow cylindrical body having a rounded closed end 62 and a restricted

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neck-like portion 64, being the only outlet to the otherwise imperforate body. The neck portion 64 has an internal rabbet 66, against which is abutted a disc or diaphragm of soft self-sealing elastic rubber 68. A tube portion 70 having an enlarged portion 72 of approximately the same diameter as the internal diameter of the neck 64, to form a tight fit therewith, is abutted against the exterior side of the disc 68. The tube 70 has a restricted opening 74 adjacent the disc 68. A washer 76 of soft elastic rubber encircles the tube 70 and abuts the exterior side of the enlarged end portion 72. The end portion 78 of the neck 64 is rolled radially inward toward the tube 70 sealing the assembly against the rabbet 66.

The valve is assembled as shown in Fig. 2 by placing the housing 30 inside the head 10, so that the flange 48 abuts a rubber washer 26 leaving a small head-space 90 between the disc 18 and the housing 30. The housing 30 is retained in place by the sleeve 50, which is screwed into place by engaging the threads 52 with the threads 24.

In operation, the container 60 which is filled with a gas under pressure is slipped into the sleeve 50, as indicated by the dotted lines in Fig. 2. The gas container 60 is pushed onto the needle until the tube 70 of the container 60 abuts the disc 40 of the housing 30. In this position the needle 34 pierces the diaphragm 68 of the container 60, but the needle is not far enough through the diaphragm 68 to allow the hole 38 to communicate with the interior of the container 60. For releasing the gas the container 60 is pushed further into the sleeve, causing the disc 40 to slide inwardly in the housing 30, and compressing the spring 44. As the container 60 is pushed against the disc 40, the diaphragm 68 slides over the needle 34 until the hole 38 communicates with the interior of the chamber 60 allowing gas to enter the needle 34, through the aperture 32 into the drying chamber 90, through the hole 22, and subsequently out through the outlet 100.

On releasing the pressure against the container 60, the spring 44 pushes the disc 40 back to its original position against the lip 42, and the container is pushed down the needle so that the hole 38 emerges back through the disc 68 thereby shutting off the flow of gas.

When held in one hand, in the two fingers engaging the arms 45 on the head 10, and the butt 62 of the container 60 seated against the palm of the hand, a surprisingly convenient and sensitive control to the rate of discharge is obtained.

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With the tension of the spring 44 counterbalancing a gentle finger grip, slight variations in muscular effort are effective to give the operator a sensitive and easy control of the rate of discharge. The rate of flow of the gas is proportional to the area of emergence of the hole 30 into the chamber 60, so that by allowing only a very minor portion of the hole 38 to emerge to the disc 68, the rate of flow will be relatively small, and conversely allowing the full area of the hole 38 to emerge through the disc 68, a maximum flow is obtained.

In one embodiment of the invention, a container which is about $2\frac{1}{2}$ inches long and about $\frac{3}{4}$ of an inch in diameter, and a control valve assembly of the proper size, has been found satisfactory for supplying the gas necessary to operate medicinal sprayers, atomizers, and like devices. For instance, such a container of the size indicated, holding about two liters of Freon gas, measured at atmospheric pressure, is sufficient to supply enough pressure for two or three applications of a nose sprayer. Also such a size is very convenient for a physician to carry around, and enables him to use the efficient office spray equipment, heretofore limited only to office use.

Practically any gas may be used in the container, so that such a container and valve assembly may be utilized in other than the medical work.

The control valve is especially advantageous for medical work in that the pressure drop from the container through the valve assembly is so great, that it is impossible to deliver the harmful pressure to the patient, thereby avoiding any inadvertent injury to delicate tissues and membranes.

The directing nozzle 100 is changeable to fit any type of equipment used. Generally, medical devices are fitted with Luer type fittings, so that one outlet is ordinarily sufficient.

The container 60 has an added advantage in that it may be refilled several times before being discarded. To fill the container, gas under pressure is introduced through the outlet of a valve assembly, similar to that shown, and the container is filled through the needle. The filling process is substantially the reverse of the dispensing process.

Others may readily adapt the invention for use under various conditions of service, by employing one or more of the novel features disclosed or equivalents thereof. As at present advised with respect to the scope of our invention, we desire to claim the following subject matter.

We claim:

1. A dispensing container for fluid under pressure comprising, in combination: a substantially cylindrical container having an arcuate end wall; an elongated neck portion at the other end of said body; said neck portion being the only outlet in said container; an internal rabbet in said neck portion facing axially outward; an elastic, self-sealing, pierceable diaphragm in said neck portion having annular peripheral abutment with said rabbet; a hollow tube having an enlarged end portion abutting the other side of said diaphragm; said hollow tube having guide means in the nature of a restricted passage adapted to position a diaphragm piercing member and an elastic washer telescoped on said tube and abutting said enlarged portion; the end of said neck portion being rolled inwardly to retain the parts in fixed relation adjacent said lip and seal said container.

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2. A control valve for a gas container having a pierceable diaphragm comprising, in combination: a head-piece having a passage there-through; said head-piece having an enlarged portion in said passage adapted as a gas drying chamber; a cup shaped housing in said head-piece; a slidable disc closing said housing; a hollow needle attached to the transverse wall of said housing and passing through said slidable disc; a spring in said housing between said transverse wall and said slidable disc, holding said disc remote from said wall; a lateral opening in said needle adjacent its pointed end; said needle constituting a communicating passage between said head-piece and a gas container when said container is pushed onto said needle; and a sleeve in said head-piece extending axially away therefrom, and axially guiding said container.

3. A control valve for a gas container having a pierceable diaphragm comprising, in combination: a cup-shaped head-piece having a restricted opening through its end wall; said head-piece having an enlarged portion in said passage adapted as a gas drying chamber; a housing telescoped in said head-piece; said housing being cup-shaped and having an opening in its end wall; a hollow needle telescoped in said last mentioned opening and extending axially away from said wall in the interior of said housing; an internal disc closing said housing, slidable on said needle and in said housing; a spring in said housing, normally holding said disc remote from said end wall; an internally bulging lip adjacent the open end of said housing, adapted to prevent said disc from leaving said housing; said needle having a lateral opening positioned outside the said disc when said disc is in normal resting position; and a sleeve telescoped in said head-piece adapted to slidably receive a gas container.

4. Gas dispensing means comprising, in combination: a cup-shaped head-piece having a delivery passage in its bottom; said head-piece having an enlarged portion in said passage adapted as a gas drying chamber; a cup-shaped housing telescoped in said head-piece and opening in the same direction; a rigid needle extending axially up from the bottom of said housing and beyond said housing; said needle having a communicating passage opening through the bottom of said housing and opening laterally through the side wall of said needle above said housing; said housing having an annular flange projecting radially near its bottom; a sleeve, having threaded connection with said head-piece, for engaging said flange to clamp said housing in place; said head-piece having a cavity facing the bottom of said housing; a sealing gasket engaging said flange and head-piece to seal said cavity; a pressure container axially slidable in said tube toward and away from said needle; said container having a pierceable self-sealing diaphragm adapted to be pierced by said needle to establish communication with the contents of said container; and resilient means of limited movement tending to push said container axially to a position beyond effective communication; said resilient means including a disc in said housing axially slidable in said housing and on said needle; said housing having a flange adjacent its open end to limit outward movement of said disc; and a compression spring housed in said housing under said membrane.

5. Gas dispensing means comprising, in combination: a cup-shaped head-piece having a delivery passage through the bottom thereof; a

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connector fastened in said delivery passage; the bottom of said head-piece having an internal recess communicating with said passage; said recess being closed by a member having a small hole therethrough; whereby the space defined by said recess and said member constitutes a gas drying chamber; a cup-shaped housing telescoped in said head-piece and opening in the same direction; a stepped passage through the bottom of said housing; a rigid needle fastened in said stepped passage and extending from the bottom of said housing and axially beyond the side wall thereof; said needle having a penetrating point and a communicating passage opening through the said stepped passage and opening laterally through the side wall of said needle beyond said housing; said housing having an annular flange projecting radially near the bottom thereof; a sleeve having threaded connection with said head-piece, for engaging said flange to clamp said housing in place; said housing having an interior disc slidable therein and slidable on said needle; a spring in said housing normally hold-

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ing said disc remote from the bottom of said housing; and a container axially slidable in said sleeve having a pierceable self sealing diaphragm adapted to be pierced by said needle, when said container is pushed onto said needle; said disc under spring tension resisting inward movement of said container and pushing said container away from said needle when the inward pressure on said container is released.

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Certificate of Correction

Patent No. 2,574,028

November 6, 1951

MACK R. FIELDS ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows:

Column 4, line 72, for "membrane" read *disc*;

and that the said Letters Patent should be read as corrected above, so that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of March, A. D. 1952.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.