May 27, 1941. K. CONNELL 2,243,695

THERAPEUTIC APPARATUS

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Fig. 1.

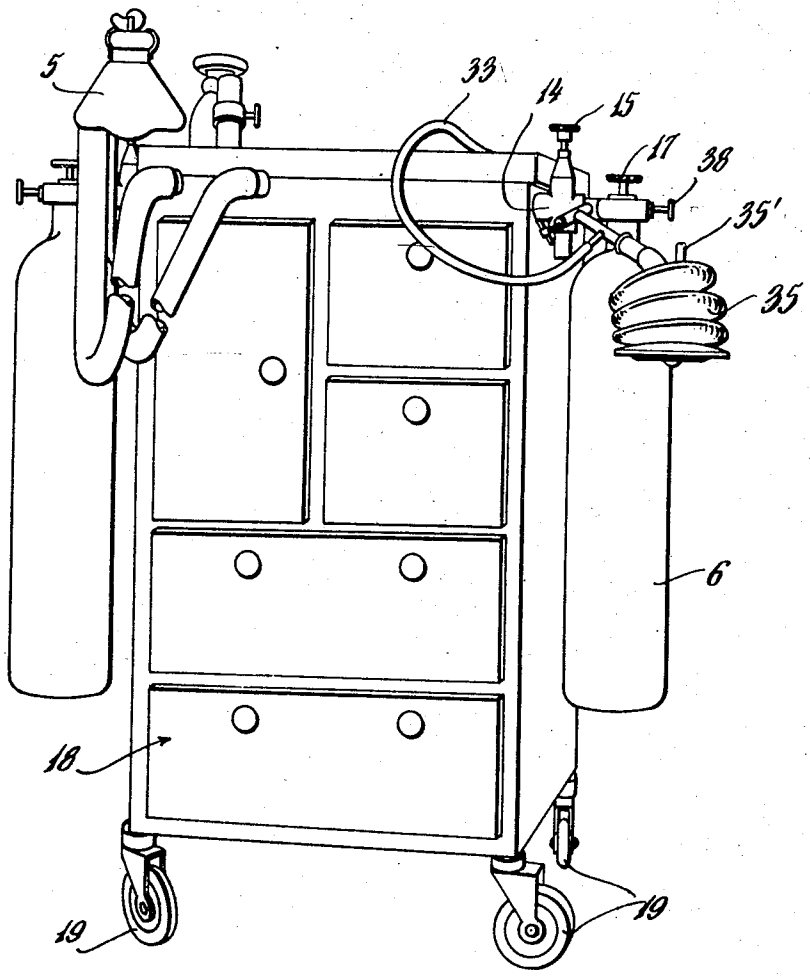
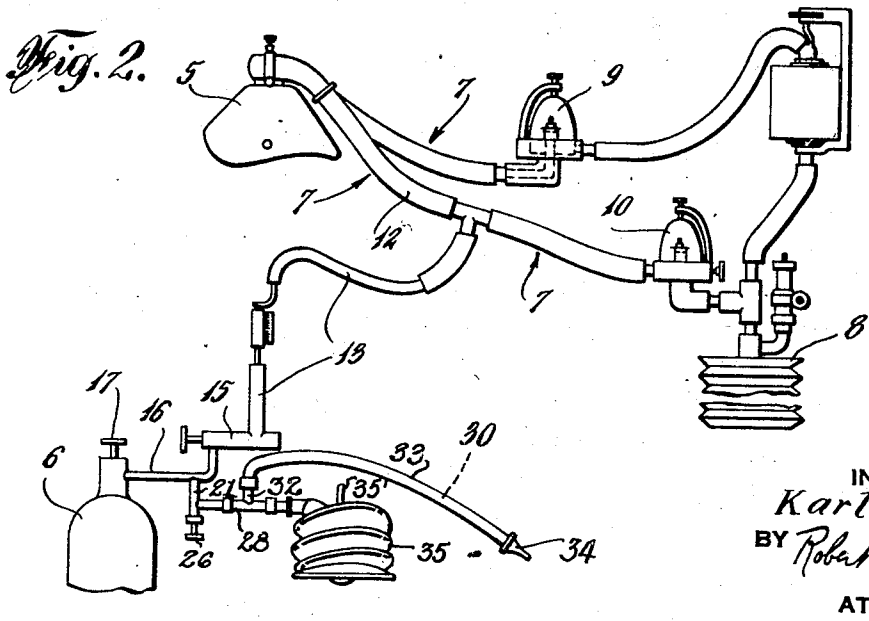


Fig. 2.



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Fig. 3.

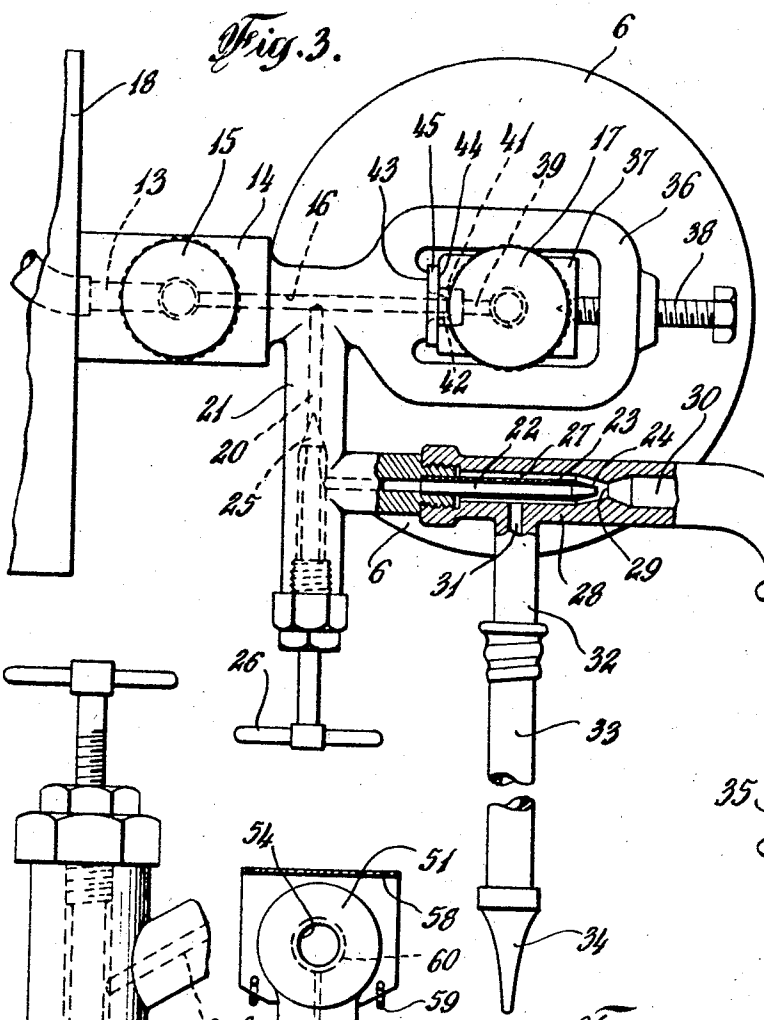


Fig. 4.

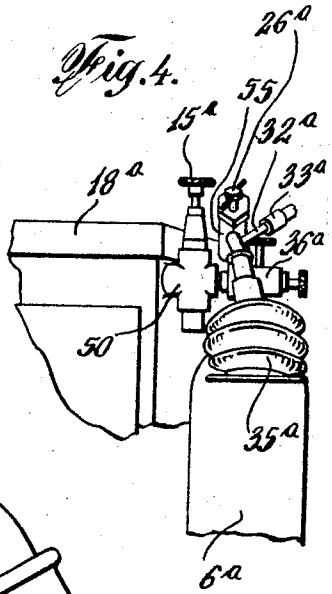


Fig. 7.

Fig. 5.

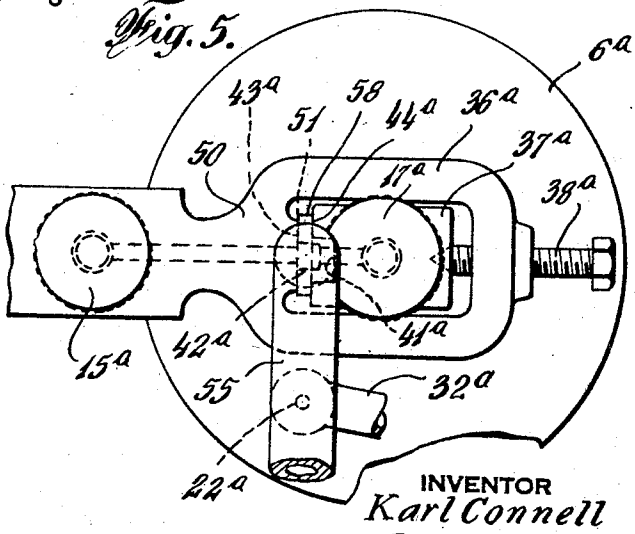
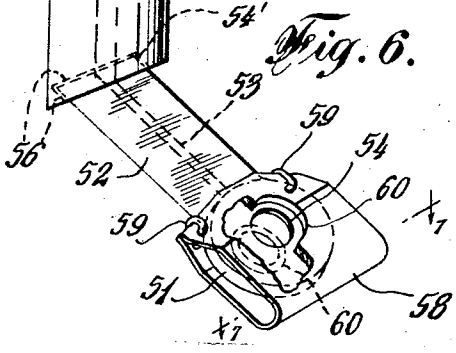


Fig. 6.



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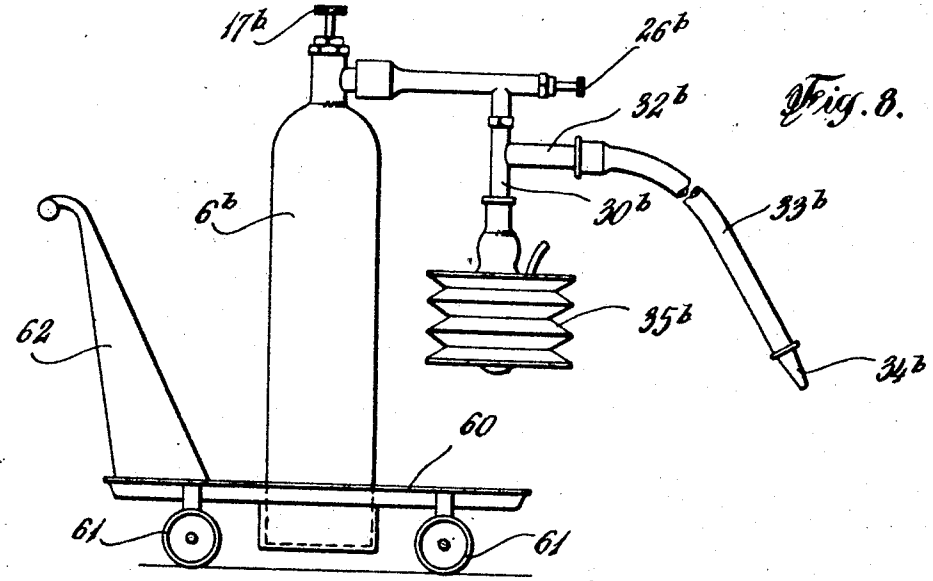


Fig. 8.

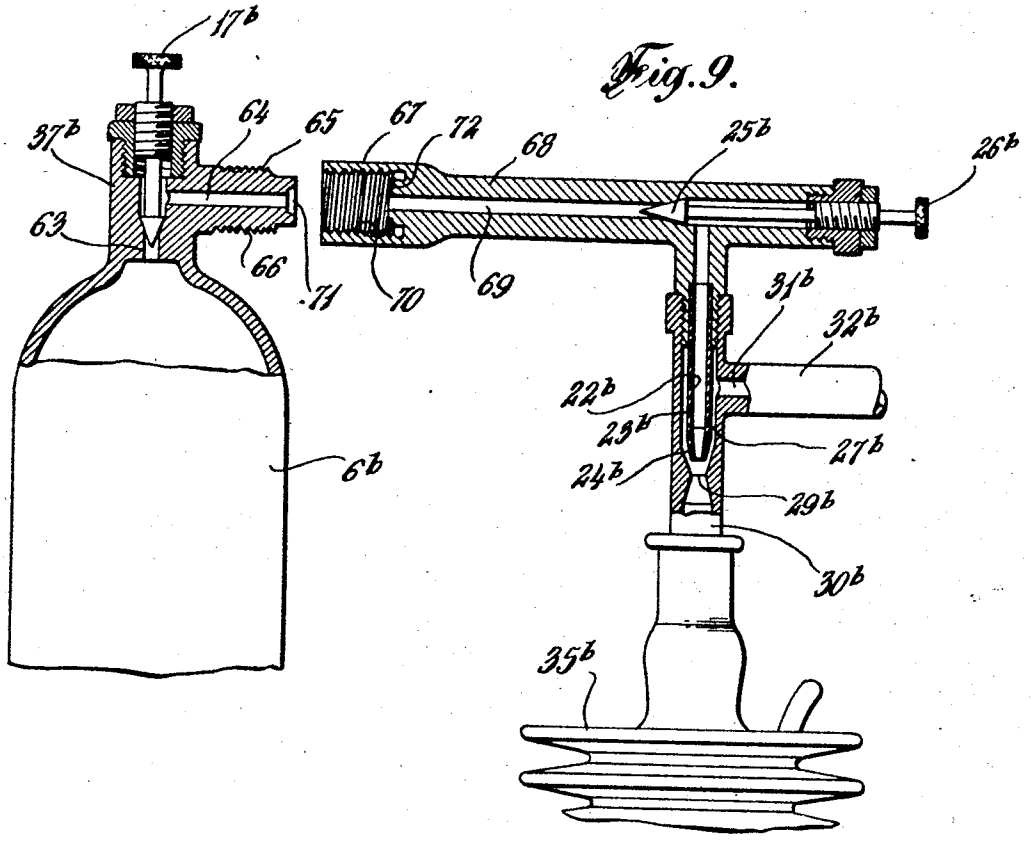


Fig. 9.

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Patented May 27, 1941

2,243,695

UNITED STATES PATENT OFFICE

2,243,695

THERAPEUTIC APPARATUS

Karl Connell, Branch, N. Y., assignor to Air Reduction Company, Incorporated, a corporation of New York

Application November 15, 1938, Serial No. 240,507

2 Claims. (Cl. 128—276)

This invention relates to apparatus utilizable in connection with surgical and other therapeutic procedures, and, in certain of its aspects, to therapeutic apparatus utilizable in procedures involving the administration of gases, such for instance, as anesthetic gases.

In surgical operations and in various other procedures of a therapeutic nature, it is ordinarily important that the operative field be cleared of body fluids, such, for example, as blood and pus and/or to clear the air passages of the patient of body fluids, such, for example, as mucous, vomitus, and operative debris. Most such procedures, moreover, involve anesthesia or the administration of gas for other therapeutic purpose. Previous to the present invention various means, such as electric and other power-driven pumps, hand syringes, and the like, have been employed for such purposes. Various of these devices possess one or more of a number of objectionable features including noisiness, lack of continuity of operation, ineffectiveness for a given purpose, difficulty of operation, and dangers of sparking in an atmosphere carrying inflammable anesthetic gas. In addition, unexpected emergencies often arise in which the use of a suction device is essential, but where a suitable suction device requires time-consuming preparatory steps before it is brought to the operative scene, installed, assembled, or made ready for use, or often, is entirely unavailable.

With the foregoing and other considerations in view the present invention contemplates the provision of suction means detachably connected as a part of a mobile unit including a container of precompressed gas, and, in certain of its more specific aspects, the provision of suction means in combination with gas administering means and forming a part of the gas-administering unit, or adapted for use in such combination. Units of this character, including a source of precompressed gas, as, for example, anesthetic gas or oxygen enclosed in steel cylinders, is commonly available as a routine matter in surgical operative and various other therapeutic procedures, or can readily, safely, and economically be made available. With a suction device included and operated by the compressed gas, suction of body-fluids may be effectuated instantly whenever required and in a manner which avoids the various dangers, inconveniences, annoyances, and ineffectivenesses involved in various of the prior procedures.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

In accordance with the present invention, in various of its aspects, a suction device may be provided as a part of a mobile unit including a container of precompressed gas to which the suction device is detachably connected, and a suction device may be provided as a part of a gas-administering unit, being connected in a conduit arranged to deliver for administration to a patient gas from a source of gas under pressure, such for instance, as highly compressed gas in a steel tank. In accordance with the invention in certain of its aspects, moreover, there may be provided a suction device adapted to be easily and effectively inserted into the gas line of a gas-administering unit.

Pursuant to the invention, gas from the source of compressed gas may be utilized with convenience, efficiency, and safety as the motive agent in an ejector device to create suction.

The invention accordingly comprises the features of construction, combinations of elements, and arrangement of parts, which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the claims.

It is to be noted that the term "gas" as employed herein is utilized generically to include mixtures of gases, as well as gases the molecules of which are of similar type.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a perspective view of one form of apparatus embodying the invention;

Fig. 2 is a schematic view thereof;

Fig. 3 is an enlarged detail partly-sectional top view of the portion of the apparatus shown at the upper right-hand side of Fig. 1;

Fig. 4 is a view similar to the upper right-hand part of Fig. 1, illustrating another form of apparatus embodying the invention;

Fig. 5 is a view similar to the upper right-hand part of Fig. 3, further illustrating the form of apparatus of Fig. 4;

Fig. 6 is a view of the fitting arrangement illustrated in Fig. 4, the relation of certain of the parts being adjusted for the sake of clearer showing;

Fig. 7 is a sectional view along the lines 7—7 of Fig. 6;

Fig. 8 is a side view of a particularly simple form of apparatus embodying the invention; and

Fig. 9 is an enlarged, partly sectional, view

of a portion thereof showing the suction device and the tank disconnected.

The form of apparatus illustrated in Figs. 1, 2, and 3 comprises means for administering an anesthetic gas including a mask 5 adapted to fit over the mouth and nose of a patient, and a source of gas, such for example as an anesthetic gas, contained in a highly compressed state (e. g. 100 to 2000 lbs. per sq. inch) in a tank 6, together with associated elements which are illustrated schematically in Fig. 2 and which as exemplified are of the form disclosed in my Patent No. 2,099,841, issued November 23, 1937. These elements include tubing illustrated generally at 7, and expansible reservoir bag 8, flutter-valve units 9 and 10, and other elements as disclosed in said patent. A connection between the tank and the mask is provided by a portion 12 of the tubing 7, and a branch 13 leads to a bracket 14 carrying a decompression valve 15, to which a channel 16 leads from the tank 6, which is equipped with a valve 17. The various elements are carried on or housed in a cabinet 18 mounted in a mobile manner on rollers 19; the bracket 14 being secured at one side of the cabinet.

From the channel 16 there extends a channel 20 in an arm 21 of the bracket, and from the channel 20 there leads a channel 22 extending thru a tube 23 which terminates in a nozzle 24. The channel 20 is adapted to be closed by a valve 25 operated by a handle 26. The valve 24 normally prevents escape of gas from the channel 16; but, when the valve 25 is open, gas is permitted, under control of the valve 25 and pursuant to the pressure of the gas in the tank, to flow thru the channel 22 and out of the nozzle 24 for operating the suction means. The nozzle 24 and the portion of the tube 23 adjacent thereto are disposed within a passageway 27 in a tubular member 28. The tubular member 28 is formed to provide a restriction 29 in the passageway 27 at a point just beyond the nozzle 24 in the present instance, so that gas issuing from the nozzle 24 will tend to draw air or other fluid from that part of the passageway 27 surrounding the tube 23 and force it thru the restriction and thru an ejection channel 30.

Communicating with the passageway 27 is a channel 31 in an arm 32 with a flexible rubber tube 33 at the end of which there is removably secured a member adapted for sucking a body-fluid, one form of such member being shown at 34. In order to receive the discharge from the suction device, there is provided in accordance with the invention in certain of its more specific aspects, a discharge receptacle carried by the discharge means. In the present instance there is detachably secured over the end of the tube 30 an expansible rubber bag 35 which is adapted to serve as a discharge receptacle or septic tank. This, as exemplified, is generally similar in form to the reservoir bag 8, being of accordion shape and formed with thin rubber walls so as to be of flexible capacity. In the present instance, it is provided with a tubular air vent 35' which may be molded integrally therewith.

The bracket 14, in the present instance, includes a yoke 36 adapted to embrace the squared neck 37 on the top of the tank 6. The neck 37 is thrust toward the end of the bracket containing the channel 16 by means of a screw 38. The neck is formed to provide a channel 39 leading from the shut-off valve 17 to a recess 41 in the left-hand side (Fig. 3) of the neck. Into this recess there projects a nub 42 of the bracket 14, the channel 16 opening at the end of the nub. Between the juxtaposed faces 43 and 44 of the bracket 14 and the neck 37, respectively, there is interposed an annular washer 45 which fits over the nub 42, and, when the screw 38 is tight, prevents leakage of gas from within the recess 41. Thus, when valve 40 is released, gas for anesthesia or other therapeutic purpose will be permitted to flow thru the channel 16, and, if the decompression valve 15 is open, will flow thru the branch 13 and to the patient. When the ejector control valve 25 is open, gas under pressure between the valves 15 and 17 will pass thru the channels 20 and 22 to effect a suction of mucous, blood, or other body-fluid thru the tube 33 and into the tube 30; this action being under the high pressure of the gas cylinder since in normal use the valve 17 is widely open and the release of pressure thru the decompression valve 15 is negligible. It is to be noted that this operation can occur whether or not the decompression valve 15 is in operative position or is closed.

In instances wherein it is undesirable or inconvenient to provide a bracket which includes an arm such as 21, or in instances where it is desired to utilize a bracket which is unequipped with such an arm, there may be utilized apparatus such as exemplified in Figs. 4–7. This form of apparatus, as exemplified, is similar, with the exceptions noted below, to the form of apparatus illustrated in Figs. 1–3, similar parts being indicated by similar reference numerals with the addition of the subscript *a*. In this instance, the tank 6*a* is connected with the cabinet by means of a bracket 50 which is similar to the bracket 14, except that less space is provided between the decompression valve 15*a* and the yoke 36*a*; and instead of a washer similar to the washer 45 there is inserted between the face 43*a* of the bracket 50 and the face 44*a* of the neck 37*a* of the tank 6*a*, a thin annular fitting 51 which is desirably about nine-hundredths of an inch thick, and which forms an end of a metal strip 52. This metal strip is formed with a small longitudinal bore 53 which terminates within the fitting 51 at its lateral opening 54. The opening 54 is made sufficiently larger than the nub 42*a* to permit gas-flow from the recess 41*a* past the nub and into the bore 53. The other end of the strip 52 is fitted within a recess 54' of a block 55, suitable packing 56 being provided. The block 55 has a channel 57 communicating with the bore 53 at one end and with the channel 22*a* at the other end, a valve 25*a* being provided to control the passage of gas into the channel 22*a*, and to shut off gas-flow when the use of gas for suction is not desired.

The fitting 51 is adapted to be inserted and removed at will. Since the space for adjustment of the neck of the cylinder, such as the necks 37 and 37*a*, within a holding means such as the yokes 36 and 36*a* is ordinarily not large (the nubs in common use on most anesthetic apparatus being one-fourth of an inch in diameter and one-fourth of an inch long) it is desirable to provide, on each side of the fitting 51, washer means which will not take up undue space. It is also desirable that the fitting be equipped with washer means which will not slip off when the fitting is put in place or removed. There is accordingly provided, in accordance with the invention in its more specific aspects, thin fibre washer means disposed on opposite sides of the fitting, and consisting, in the present instance, of a fibre sheet 58 which provides an envelope

covering the fitting; the corners of the envelope being secured together, as by staples 59. Each side of the fibre envelope 58 has a hole 60 cut therein so as to permit the loose insertion of the nub 42 therein and to permit gas flow from the recess 41a to the bore 54.

In certain instances a suction device of the general character indicated is desirable for use in situations where gas-administration means are not employed, or, if employed, are not of a character adapted for the provision of a suction device, or are, for some other reason, not to be associated therewith.

With the foregoing in view, there may be provided in accordance with the present invention, in certain of its aspects, a particularly simple form of device, one type of which is exemplified in Figs. 8 and 9. In these figures, elements similar to those of the preceding figures are in general indicated by similar reference numerals distinguished by the subscript b. The exemplified construction consists of a mobile unit comprising a tank 6b of precompressed gas. This tank is mounted upon a truck 60 provided in the present instance with wheels 61 and a handle 62. The tank 6b is provided with a valve 17b, which is adapted to close an opening 63 in the neck 37b of the tank and when open to permit gas from the tank to flow thru a bore 64 which extends to the end of a projection 65. The outer surface of this end is threaded as indicated at 66 to receive the interiorly threaded end 67 of a connecting portion 68 of the suction device. A bore 69 leads thru the portion 68 from the end of a nub 70 adapted to be pressed within a recess 71 in the end of the member 65, a washer 72 being provided to prevent leakage of gas outwardly thru the threading. The flow of gas thru the bore 69 is controlled by a valve 25b. After passing this valve, when it is open, gas flows thru a channel 22b and out of a nozzle 24b toward a restricted orifice 29b, and serves to create suction in a passageway 27b from which a channel 31b extends to a tube 33b carrying a suction member 34b. From the orifice 29b a discharge tube 30b leads to an expansible rubber receptacle 35b.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which as a matter of language might be said to fall therebetween.

I claim:

1. Therapeutic apparatus comprising a body-cleansant suction device, a channeled fitting adapted to permit gas-flow therethru and insertable in the gas line between a source of gas under pressure and a gas-administration means, a fibre envelope on said fitting and formed to serve as a washer and to permit desired gas-flow, and means connecting said fitting with said suction device.

2. In combination a high-pressure source of gas, means to conduct gas from said source, means for utilizing the force of gas-flow, a channeled fitting adapted to permit gas-flow therethru and insertable in said conducting means, thin fibre washer means disposed on opposite sides of said fitting and carried thereby and adapted to permit desired gas-flow, and means connecting said fitting and said utilizing means.

KARL CONNELL.