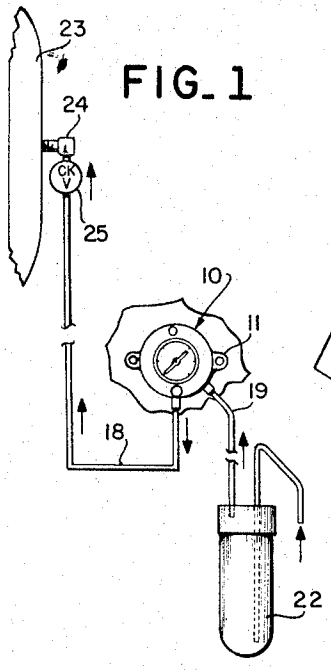
Nov. 7, 1967 A. D. BROWN ETAL 3,351,090

ASPIRATOR APPARATUS

Filed June 25, 1965

FIG_1



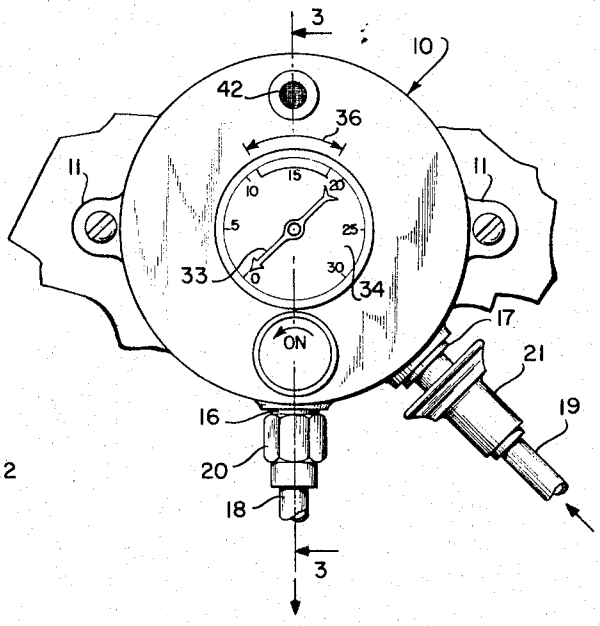


FIG_2

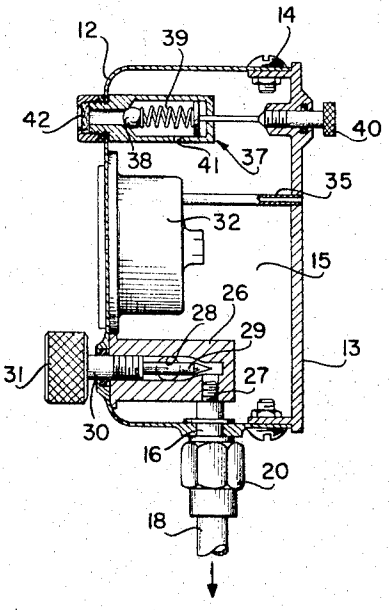


FIG_3

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ASPIRATOR APPARATUS

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ABSTRACT OF THE DISCLOSURE

A regulator for aspiration devices is provided to permit the use with safety of the conventional manifold of an automobile engine as a controlled suction source of infinite duration. Included with this regulator are the connectors and accessories necessary to produce an operative apparatus and facilitate its installation.

This invention relates to aspirator apparatuses and more particularly to improvements therein, contemplating a compact aspirator apparatus readily connectable to a convenient source of negative pressure or suction for its operation and including adjustments for the precise regulation of such pressure.

The present invention has in view a handy, portable apparatus to permit the use of a readily available source of negative pressure such as the intake manifold of an internal combustion engine as a suction source of infinite duration.

While this invention has general application, it finds particular utility in emergency situations. For example, rescue vehicles such as ambulances are presently equipped with tanks, bottles, and like containers of gas under high pressure which including a valving system whereby the release of pressure therefrom creates a venturi action which produces the required suction for the associated aspirator. Since these containers become quickly exhausted in such usage, the length of aspirator time available on such vehicles is short inasmuch as the space and weight limitations of the vehicle make it impractical to carry containers of unlimited volume.

It is therefore within the purview of the instant invention to provide an aspirator apparatus including means for its connection to a source of negative pressure, e.g. the manifold system of an engine together with means to regulate the effective suction produced thereby. In essence, this apparatus comprises in a unitary assembly a vacuum chamber, a connector to establish communication between this chamber and a source of negative or vacuum pressure, an adjustment to regulate the atmospheric condition internally of the chamber, and a vent connection extending from the chamber.

The novel features that are considered characteristic of the invention are set forth with particularity in the appended claims. However, the construction, organization, and method of operation of the invention, together with additional objects and advantages thereof, will best be understood from the following description of a specific embodiment when read in connection with the accompanying drawings wherein:

FIGURE 1 is a schematic diagram of an aspirator apparatus made in accordance with the teachings of this invention;

FIGURE 2 is an enlargement of the control device shown in FIGURE 1, connected between the source of negative pressure and the drain conduit to regulate the effective suction forces therebetween; and

FIGURE 3 is a section taken along line 3—3 of FIGURE 2 to show primarily the means to adjust and regulate the pressure condition within the vacuum chamber of the control device.

Referring more specifically to the drawings, **10** designates the control device of the aspirator apparatus provided with attachment means in the form of integral ears **11** by which it may be removably mounted to suitable fixed structure (not shown) to maintain it in the desired position. The device **10** is a hollow cup-like case **12** closed and sealed by a cover plate **13** removably secured as at **14** at its open end to define an internal vacuum chamber **15**.

The wall of the case **12** is pierced by a pair of individual centrally-bored couplings **16** and **17** each appropriately secured thereto and adapted to connect respective fluid hoses or tubes **18** and **19**. To this end, each coupling **16** and **17** extends outwardly of the case **12** to receive and releasably connect a suitable fitting **20** and **21**, respectively. The tube **19** is the drain line of the apparatus adapted to contact the fluid or other matter to be evacuated, and in the preferred form of the invention a standard aspiration bottle **22** is employed in this line to collect and retain the evacuated matter. In this case the fitting **21** is preferably one of the standard quick disconnect variety to facilitate removal and replacement of the tube **19** and bottle **22** assembly.

The tube **18** is the suction line of the apparatus adapted to connect to the negative pressure source, for example a manifold **23**, of an internal combustion engine through an appropriate fitting **24**. A standard one-way check valve **25** fitted with a screen on the manifold side is employed in the suction line or tube **18** as a safety precaution to prevent an inadvertent reversal of pressure direction in the chamber **15** which might otherwise occur due to sudden erratic or irregular operation of the engine.

Within the case **12**, the coupling **16** connects to control means such as an adjustable needle valve **26**; thus, the internal passage of the valve **26** terminates at one end in a port **27** connected to the coupling **16** and at the other end in a port **28** communicating with the chamber **15** which in turn communicates with the line **19**. The valve stem **29** is linearly adjustable in the passage to vary the effective cross-sectional area thereof through a threaded extension **30** connected to the stem **29** and piercing the base wall of the case **12** where it terminates in a knurled knob **31** to facilitate its rotation.

Also within the case **12** is a standard vacuum gage **32** to constantly monitor and indicate the internal pressure of the chamber **15**. To this end, the gage **32** is secured in any conventional manner to the base wall of the case **12** with its pointer **33** disposed adjacent the outer surface of the base wall of the case where it sweeps an associated dial **34** secured to the case **12** and enclosed within a transparent cover. The dial **34** is calibrated in appropriate units corresponding to the vacuum condition within the chamber **15**, a vent tube **35** being provided for the gage **32** for communication with ambient air externally of the case **12**. Preferably, a predetermined operating range **36** is clearly marked on the face of the dial.

In order to prevent an abnormal vacuum within the chamber **15** as for example might be caused by sudden or erratic operation of the engine, an automatic relief valve **37** is also provided. Any standard valve of this type may be employed so long as it is actuated to open in response to a preselected vacuum condition within the chamber to admit ambient external air thereto. Preferably, this valve **37** is mounted internally of the case **12**, being secured to the base wall thereof with its interior open to the exterior of the case **12** through a vent therein. Internally, the valve carries a ball **38** normally disposed or seated in the vent under the action of a compression spring **39** the tension of which is adjustable by a control **40** operable from outside of the case **12**. This spring **39** is exposed to the vacuum condition within the chamber **15** through one

or more passages **41** in the body thereof and when the vacuum increases to a predetermined pressure as determined by the setting of the control **40**, the spring is compressed allowing the ball **38** to unseat and open the interior of the valve **37** to external atmosphere. A screen **42** may be employed in the vent to exclude foreign matter from the interior of the valve **37**.

In operation, with the manifold system functioning, the tube **19** is placed in contact with the matter to be evacuated and the relief valve **37** is set to the desired value depending upon the ambient air of the environment. Needle valve **26** is adjusted to establish communication between the chamber **15** and the manifold system through line **18** whereby the suction operation commences. Matter is thereby drawn through the line **19** and deposited in the bottle **22**. Concurrent with this operation, the attendant constantly watches the dial **34** and by adjustment of the valve **26** regulates the environment within the chamber **15** to maintain the suction at the desired rate within the pre-established range **36**.

The foregoing disclosure is directed to a preferred embodiment of this invention from which various changes and modifications will be obvious to those skilled in the art without departing from the invention. The appended claims are intended to cover all such modifications and equivalents that fall within the true spirit and scope of the invention.

What is claimed is:

1. An aspirator apparatus comprising a vacuum chamber, a connector carried by said chamber and connectable to a source of negative pressure to establish communication therebetween, an adjustment on said chamber operative on said connector to regulate the fluid pressure therein, a pressure indicator mounted within said chamber and viewable externally of said chamber to designate the fluid pressure within the chamber, and a suction tube extending from said chamber.

2. The apparatus of claim **1** including a one-way check valve between said connector and said source.

3. The apparatus of claim **1** including a vacuum bottle interconnected medially in the length of said tube.

4. The apparatus of claim **1** including an adjustable relief valve in said chamber connecting the interior thereof with ambient external air.

5. The apparatus of claim **1** wherein said adjustment includes a needle valve to vary the effective cross-sectional area of said connector and means operable externally of said chamber for the movement of said needle valve.

6. The apparatus of claim **5** including a gage indicating the pressure condition internally of said chamber.

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