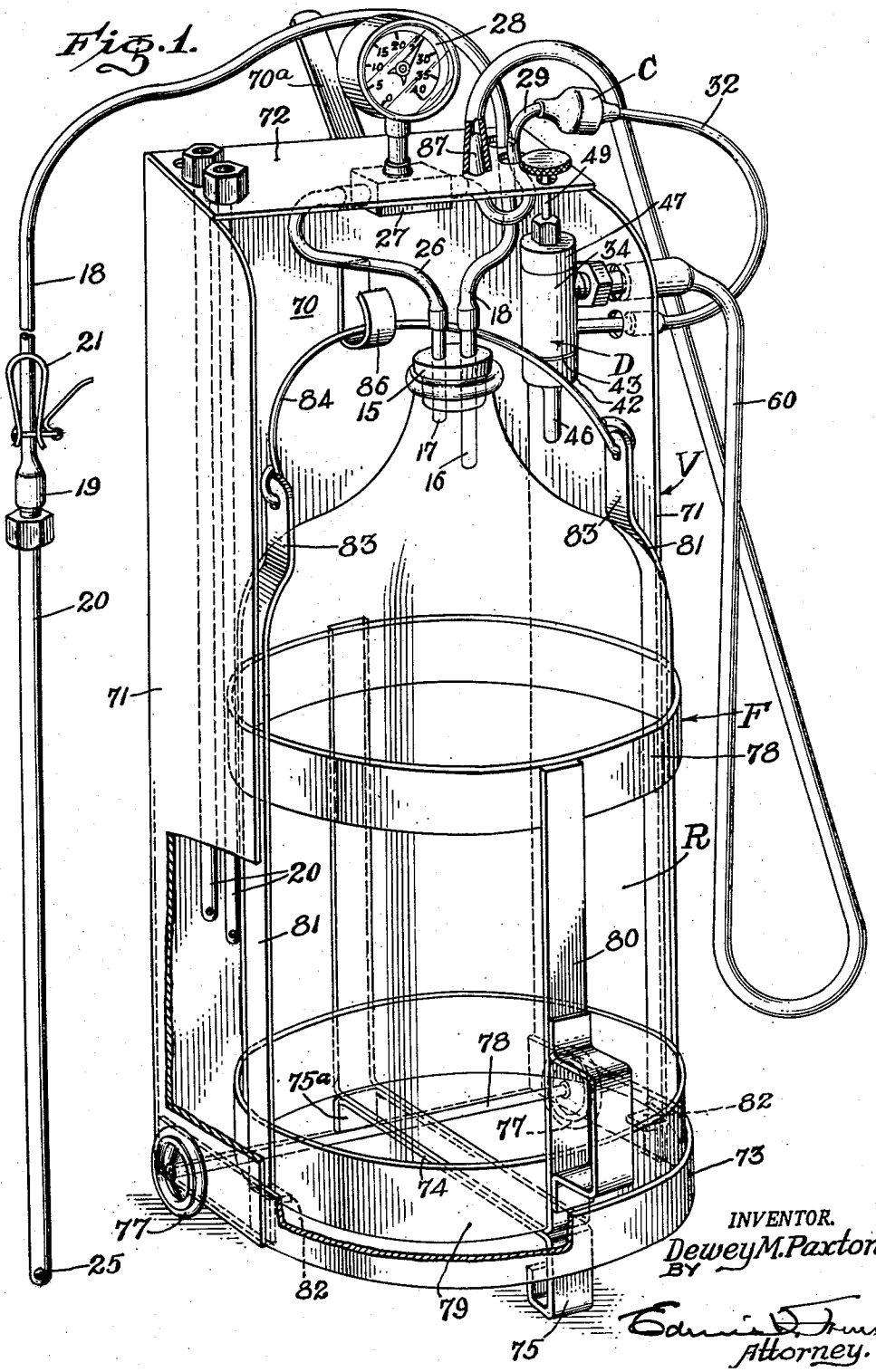
July 6, 1954 D. M. PAXTON 2,682,886

SUCTION APPARATUS

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Fig. 1.

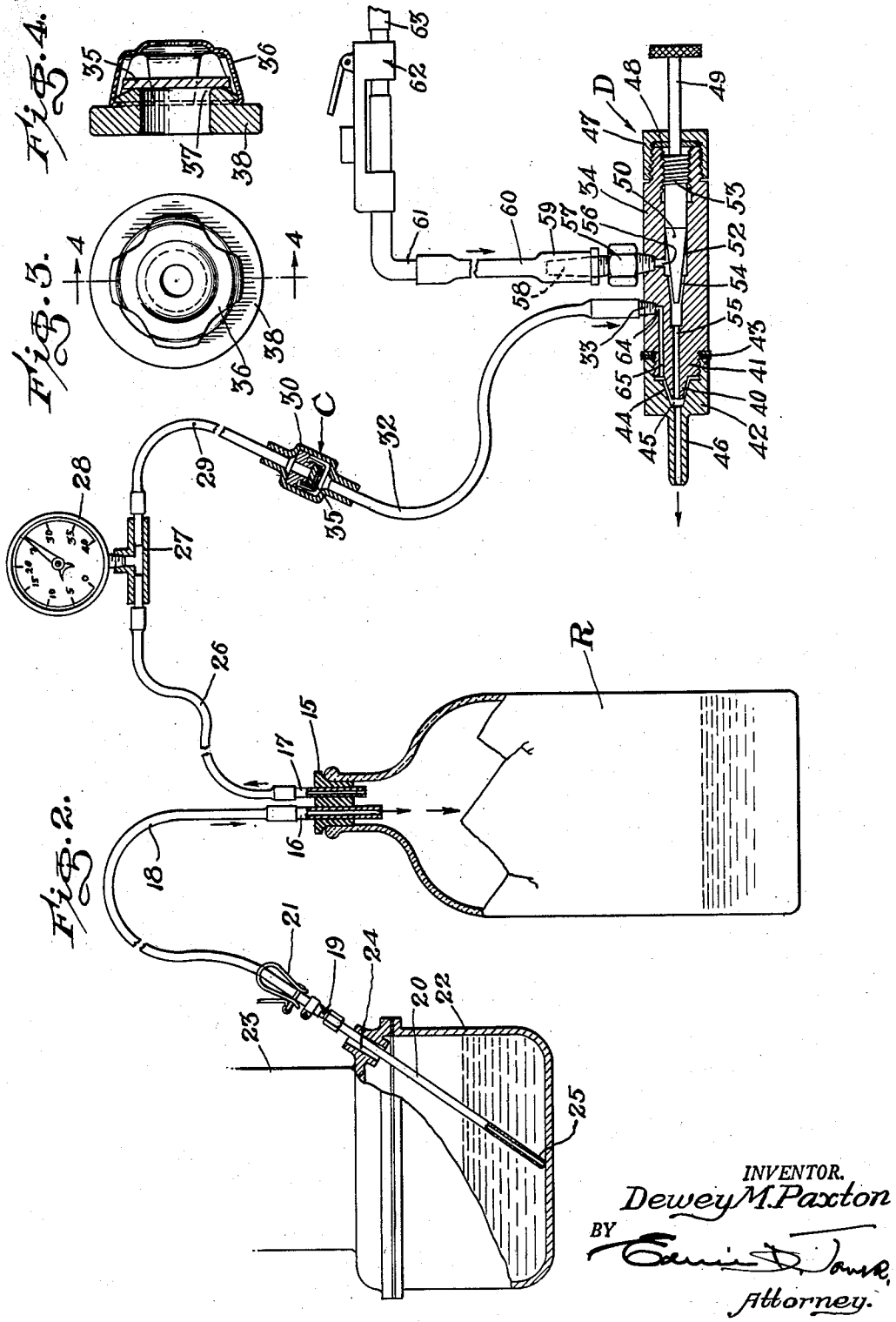


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SUCTION APPARATUS

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SUCTION APPARATUS

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4 Claims. (Cl. 137—205)

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My invention relates to and has for its purpose the provision of suction apparatus particularly adapted, although not necessarily, for quickly removing the dirty oil and sediment from the crankcase of motor vehicle engines incident to an oil change, and in such manner as to eliminate the necessity of jacking up the vehicle to drain the oil from the crankcase as is now the present practice.

This manner of removing the oil and the accompanying sediment is achieved in my apparatus by producing in a receptacle which is portable, a high vacuum through an extraneous means that can be detached from the receptacle and the vacuum maintained therein to be used in withdrawing the oil from a crankcase by a mere connection of the receptacle therewith through the oil gauge rod receiving opening in the crankcase.

Since the vacuum receptacle is portable, it can be brought to the motor vehicle to perform the oil removing operation, and, of course, without jacking up the vehicle. This is extremely advantageous in promoting the sale of oil at a service station because it permits the oil changing operation to be performed with dispatch and while the gasoline tank of the motor vehicle is being filled with gasoline from the pump.

It is also a purpose of my invention to provide in a suction apparatus of the character above described a novel form of vacuum producing device which, while capable of being manufactured at a relatively low cost since the parts thereof may be made with large tolerances, is operable to produce an extremely high vacuum through the use of air at relatively low pressures such as that used in the inflation of pneumatic tires.

In the adaptation of this device to my apparatus one is enabled to quickly attain a high vacuum in the apparatus receptacle, to be used as required not only to withdraw oil from the crankcase but for any other purpose where a vacuum can be employed, and particularly in association with a motor vehicle. It can be used for removing grease from the transmission and differential housings, the oil from fluid clutches and oil filter cases, and the gasoline and sediment from gasoline tanks.

Incident to such uses, whatever liquid is removed is delivered to the receptacle without loss so that, in the case of lubricating oil, it can be shipped to a refinery for re-refining thereof.

I will describe only one form of suction apparatus, including one form of vacuum producing device, each embodying my invention, and will then point out the novel features in claims.

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In the accompanying drawings:

Fig. 1 is a view showing in perspective one form of suction apparatus embodying my invention.

Fig. 2 is a view showing schematically and partly in section the apparatus of Fig. 1 without the vehicle thereof.

Fig. 3 is an enlarged elevational view of the check valve shown in Fig. 4.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3.

The apparatus of my invention in the main comprises a vehicle generally designated at V and on which are supported a receptacle R, a vacuum producing device D, and their appurtenances. Thus the complete apparatus is rendered portable so that it may be readily moved from place to place and without trailing hoses or electric cords, a very important advantage in its use at a service station.

As best shown in Fig. 2, the receptacle R comprises a glass bottle, preferably of a size to hold five gallons of liquid. Within the neck of the bottle is a stopper 15 and through which extends a rigid outlet tube 16 and a rigid outlet tube 17 which is longer than the tube 16 so as to project below the latter so that liquid entering the receptacle through the tube 16 will not be drawn out of the receptacle through the tube 17. A flexible pipe 18 is connected at one end to the tube 16, and at the other to a metal fitting 19 threadedly connected to one end of a metal suction nozzle 20. Ahead of the fitting 19 the pipe 18 carries a conventional manually operated valve 21 for pinching the pipe to close the same and prevent fluid from passing therethrough.

The nozzle 20 may be of any length suitable for the particular purpose for which it is to be used. As it is in the present case adapted to be used for withdrawing used oil from the crankcase 22 of an engine 23, it is of such length that it can be extended to the bottom of the crankcase through an oil gauge opening 24 thereof. Adjacent its lower end the nozzle 20 is provided in its side with one or more ports 25, the nozzle end itself being closed. To the outer end of the tube 17 is connected a flexible pipe 26 which leads to one end of a pipe T 27. Also connected to the middle of the T is a conventional vacuum gauge 28, while connected to the other end is a flexible pipe 29 which leads to a casing 30 for a check valve C. From the other end of the casing extends a flexible pipe 32 that is connected through a metal fitting 33 to a body 34 of the device D.

The check valve C is of conventional construc-

tion as shown in Figs. 3 and 4, and it comprises a disk **35** movable in a cage **36** to open and close a port **37** in a member **38** secured in the casing **30**. As will be seen in Fig. 2 the disk valve **35** is operable to permit air to be drawn from the receptacle R by the device D but to prevent air from entering the receptacle through the pipe **26**.

The vacuum producing device D of my invention is designed with two purposes in mind. One is to construct the device at a minimum cost by eliminating the necessity of making its parts with close tolerances, and the other is that the device by the use of air at relatively low pressure such as the pressure range employed to inflate pneumatic vehicle tires, can rapidly produce a very high vacuum in the receptacle R. In practice the device produces a 23 inch vacuum with an air pressure of approximately 40 lbs.

This device D in the present instance, comprises the elongated body **34** formed at one end with a conical head **40** adjacent which is a reduced portion **41** having screw-threaded thereon a second head **42** with shims **43** between the two. The head **42** is provided on its inner side with a conical socket or cavity **44** in which the head **40** is received so as to form between the two a chamber **45**. The outer side of the head **42** is formed with a discharge nozzle **46** communicating with the apex of the socket **44**.

The other end of the body **34** has screw-threaded thereon a cap **47** containing a gasket **48** for sealing the stem **49** of a valve **50** where it extends through the cap against the escape of air. The outer end of the stem is provided with a handle **51** for turning the valve **50** to effect an axial adjustment thereof in a passage **52** in the body. To this end the valve has a portion **53** screw-threaded in the body.

The valve **52** is of the needle type in that it is tapered to extend into a tapered and elongated seat **54** which at one end communicates with the passage **50** and at the other end with a duct **55** which leads axially to the apex of the head **40**. A lateral duct **56** leads to the passage **52** from a bored fitting **57** threaded in the body **34**, and at its outer end is provided with a tapered nozzle **58** for the reception of a tapered rubber cap **59** on the end of a flexible pipe **60**.

The pipe **60** is adapted for detachable connection with any source of fluid pressure, and since my apparatus is designed primarily for use in connection with the parts of a motor vehicle when in a service station or otherwise, the pipe is adapted for detachable connection to the outlet nozzle **61** of a conventional valve **62** for an air hose **63** employed to inflate the tires of motor vehicles.

The body **34** is also formed with a second lateral duct **64** which leads to one end of a longitudinal duct **65**. The latter duct **65** parallels the duct **55** and extends through the body at the base of the head **41** to communicate with the chamber **45**. The body **34** is tapped and threaded at the duct **64** to receive the fitting **33** and place the pipe **32** in communication with the duct.

In the operation of the device D, air, under pressure as supplied to the pipe **60** from the air hose **63** or any other source, is delivered to the passage **52** through the duct **56** and thence to the duct **55** to be discharged into the chamber **45** and finally to atmosphere through the nozzle **46**. As the air enters the duct **55** from the passage provided by the seat **54**, the duct **55** being of smaller diameter restricts air flow therethrough and thus provides a Venturi tube to greatly increase the velocity of the air as it is discharged into the chamber **45** and out of the nozzle **46**. As a consequence there is produced in the chamber **45** and the duct **65** which communicates therewith, a very high degree of suction. This suction in turn produces in the receptacle R, when the pinch valve **21** is closed, an extremely high vacuum.

The pressure of air delivered to the duct **55** is controlled by adjustment of the valve **50**, but the maximum degree of vacuum produced in the receptacle and the rapidity with which it is formed is determined by a very critical adjustment of the head **42**. Such adjustment varies the area of the chamber **45** which in turn controls the velocity of air leaving the nozzle **46**, and hence the degree of suction produced in the duct **65**.

The maximum inches of vacuum of which the device is capable with a given pressure of air can be easily effected and determined by adjusting the head **42** while watching the gauge **28**. Incident thereto and to fix such adjustment, shims **43** may be added or subtracted until the proper adjustment is attained. Manifestly, the use of shims eliminates machining the head **41** and **42** to extremely small tolerances as would be the case otherwise, and thus the cost of making these parts is reduced to a minimum.

From the aforedescribed operation of the device, it will be clear that in the operation of the apparatus the device functions to withdraw air from the bottle R through the tube **17**, and the pipes **26**, **29**, and **32** and to discharge it to atmosphere through the nozzle **46**. With the pinch valve **21** closed, a vacuum is produced in the bottle to be used for the drawing of liquid thereinto from any container such for example as the crankcase **22**. To so do it is only necessary to extend the nozzle **20** into the crankcase through the opening **24** and then open the pinch valve **21**, when the oil will be sucked into the nozzle, then into the pipe **18**, and finally into the bottle.

In the commercial embodiment of my apparatus, it is rendered portable to be readily moved from place to place by mounting it on the vehicle V. This vehicle may have the form of a two-wheeled truck of the construction shown in Fig. 1. As illustrated, the truck comprises a frame made up of a back plate **70** and a pair of side plates **71** secured to the vertical edges of the back plate and connected at their upper ends by a top plate **72**. A U-shaped rail **73** of angle formed cross section is secured to the lower ends of the side plate **71** so as to bridge the latter at the open side of the frame. A flat bar **74** is secured to and extends from the rail **73** to the back plate **70**. The forward end of this bar is bent downwardly to form a foot **75**, while the rear end is bent to form a lateral extension **75***a* which is welded to the back plate **70**.

A pair of wheels **77** are mounted on the ends of an axle **78** which extends through the side plates **71** at a point to one side of the vertical center of the frame so that by tilting the frame through a handle **70***a* secured to the top of the back plate **70**, the wheels will serve to support the frame from rolling movement.

The bottle R is adapted to be supported in a frame F which comprises an upper ring **78** and a lower ring **79**, the two rings being secured to each other by a U-shaped bar **80**. A pair of vertical strips **81** also connect the rings **78** and

79 to each other at points diametrically opposed with respect to the vertical portions of the bar 80. The lower ends of the strips 81 are bent laterally to provide supports 82 for the bottom of the bottle, and the upper ends of the strips are extended to provide ears 83 connected by a bail 84.

A handle 85 is secured to one of the vertical portions of the bar 80 and this handle and the bail 84 provide means for manually manipulating the frame F as a whole to insert it into and remove it from the truck frame, as well as to carry the bottle to any point for emptying. The bottle R as shown within the frame F in Fig. 1 and the frame is held against displacement from the frame by extending the bail 84 to a position in which it engages a hook 86, secured on the back plate 70.

Again referring to Fig. 1, the vacuum producing device D, the several pipes 18, 19, etc., the nozzle 20, and the gauge 28, are all supported on the truck frame, the gauge being fixed to the upper plate 72. Also supported on the truck frame and depending from the plate 72 are spare nozzles 20 of different lengths for use in crank cases of different depths.

From the preceding description it becomes apparent that all parts of my apparatus are supported on the truck frame, and hence it is made portable to be readily moved to a motor vehicle for removing the oil from the crankcase of a vehicle engine or any other purpose for which the apparatus may be used, as previously recited herein.

Since the device D can be operated to produce a vacuum in the receptacle R by the air pressure from a conventional tire inflating hose, once a vacuum is formed in the receptacle the hose may be disconnected from the pipe 60 and placed on a plug 87 fixed on the plate 72 and my complete apparatus moved to any point for use, devoid of any trailing pipes, hose, or cords.

What I claim is:

1. In a suction apparatus: a vacuum producing device, including: a body; a conical head on one end of the body; a first duct axially in the body; a second duct in the body communicating with the first duct and adapted for detachable connection to a source of fluid pressure; a solid valve adjustable in the body for controlling the passage of fluid from the second duct through the first duct, to the conical head; a third duct longitudinally in the body and extending to the head end thereof; a fourth duct in the body communicating with the inner end of the third duct; a second head having a port communicating with a conical socket therein receiving the first head, and adjustably mounted on the body axially to vary the distance between the two heads; and a source of air pressure connected to the second duct for delivering air under pressure to the first duct for discharge into said socket and from the port to atmosphere thereby producing a suction in the fourth and third ducts.

2. In a suction apparatus as embodied in claim 1, wherein the second head is screwthreaded on the body, and shims are interposed between the two for defining the adjustment of the second head on the body.

3. A portable suction apparatus, including: a wheeled vehicle having a vertical frame open at one side thereof; a receptacle; a frame for the receptacle extendable into the open side of the vehicle frame to be supported in the latter; detachably securing the receptacle in said vehicle frame; the receptacle having an opening in its top; a stopper for the opening; inlet and outlet tubes extending through the stopper; a pipe connected to the inlet tube; a manually operable valve in the pipe which when closed prevents air entering the receptacle through the inlet tube; vacuum means connectable to the outlet tube for withdrawing air from the receptacle to produce a vacuum therein for drawing fluids into the receptacle through said pipe upon opening of said valve; and a check valve in the outlet tube so that when the first mentioned valve is closed and said means disconnected from the outlet tube the vacuum in the receptacle will not be broken by reverse flow of air into the outlet tube

4. A portable suction apparatus for withdrawing liquids from containers, including: a vehicle; a receptacle mounted on the vehicle and having an outlet pipe and an inlet pipe; a manually operable valve for closing the inlet pipe; a device detachably connected to the outlet pipe and responsive to fluid pressure for withdrawing air from the receptacle to produce a vacuum therein when said valve is closed; and a one-way check valve in the outlet pipe automatically operable to permit air to be withdrawn from the receptacle by the device, but to prevent ingress of air into the receptacle, whereby once a vacuum is produced in the receptacle, the device can be detached from the outlet pipe and the vacuum in the receptacle used to draw liquid thereinto through an inlet pipe by opening the manually operable valve.

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