July 16, 1940. J. M. BORN 2,208,244

SERVICE UNIT FOR AIR CLEANERS

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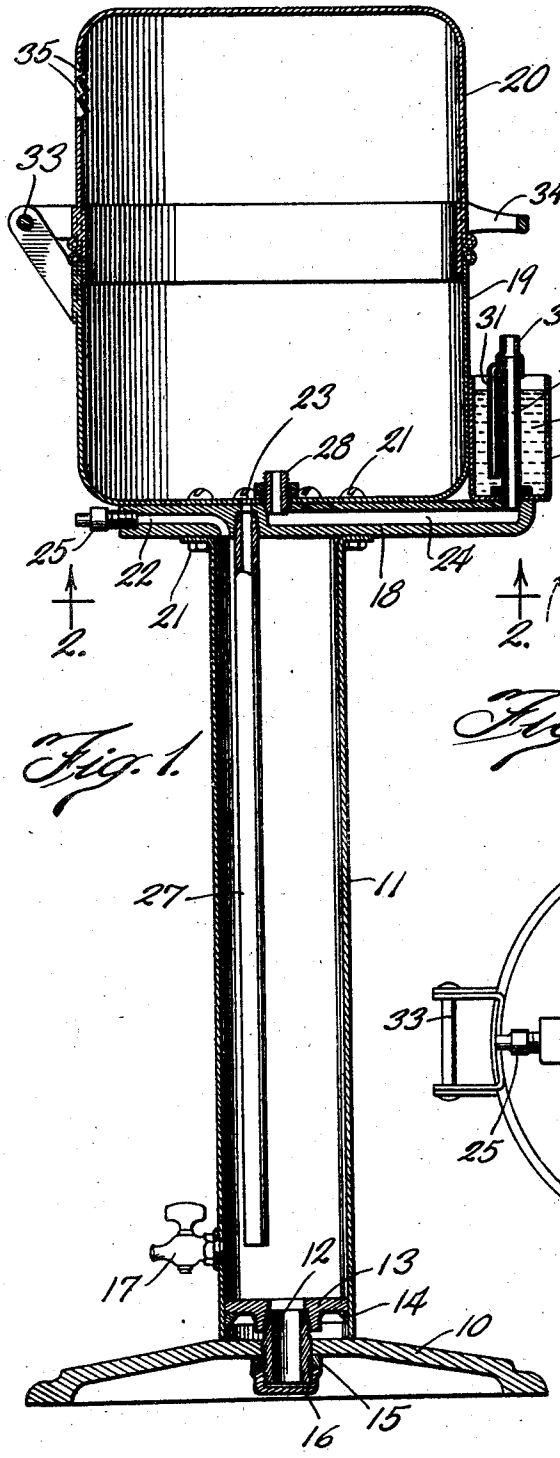

Fig. 1.

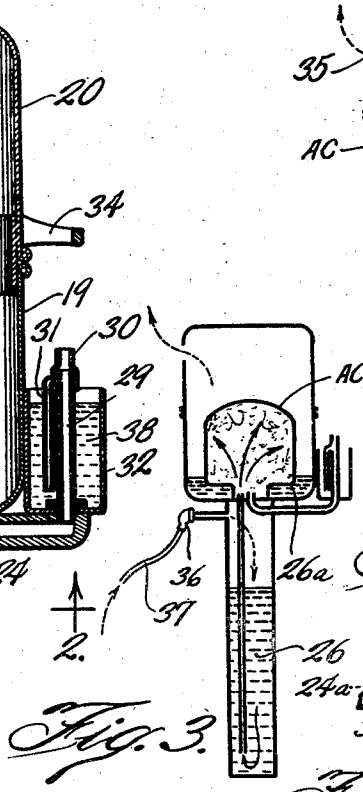

Fig. 3.

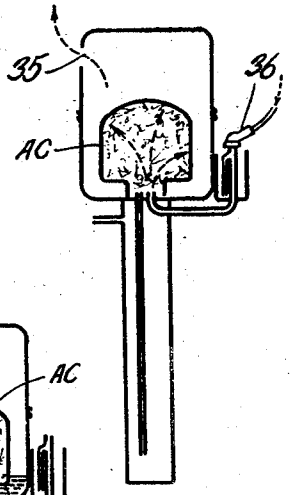

Fig. 4.

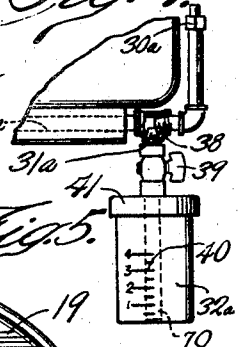

Fig. 5.

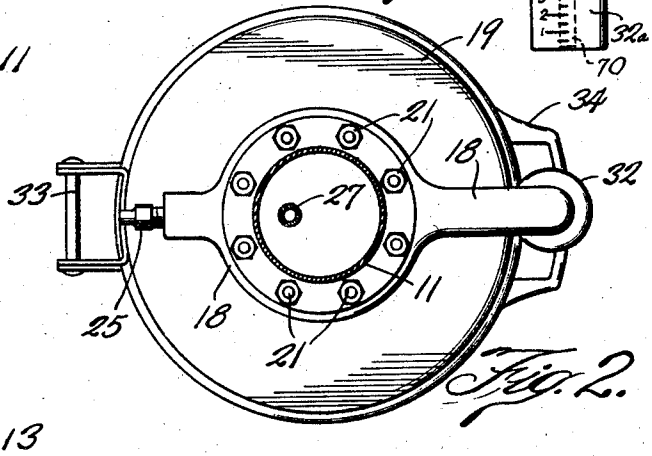

Fig. 2.

INVENTOR
Julius M. Born
BY Bair & Freeman
ATTORNEYS

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Fig. 6.

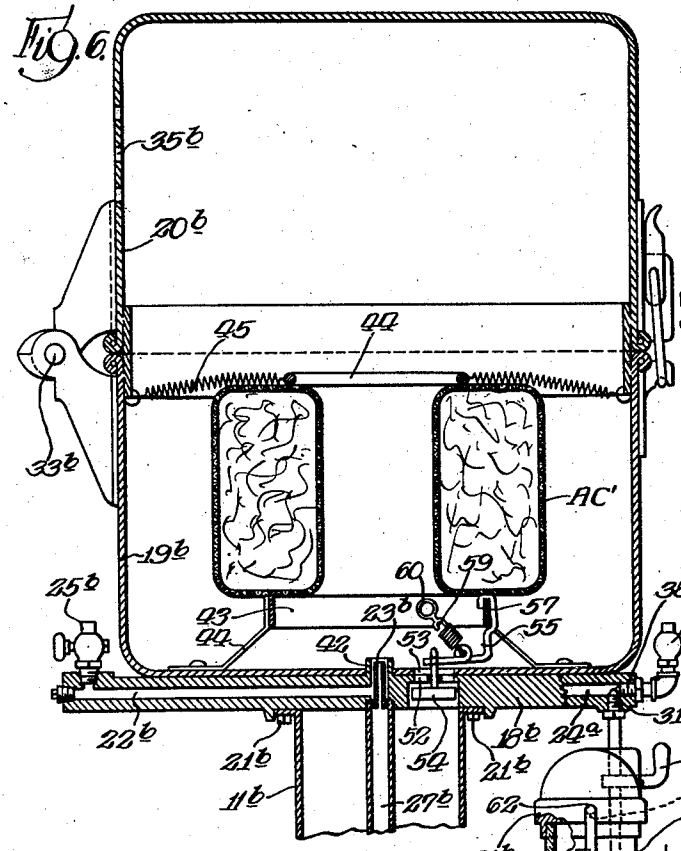


Fig. 10.

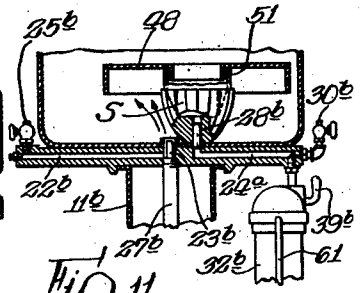


Fig. 11.

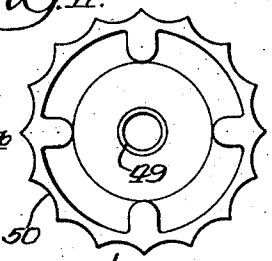


Fig. 12.

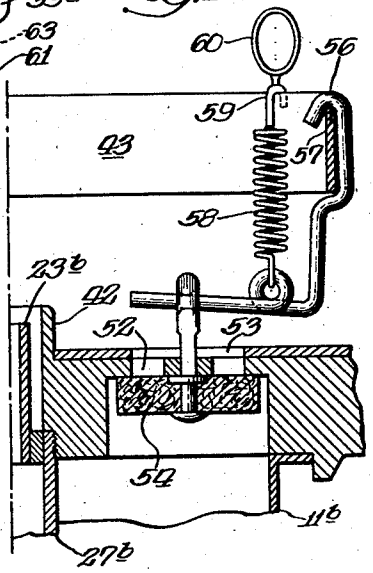


Fig. 7.

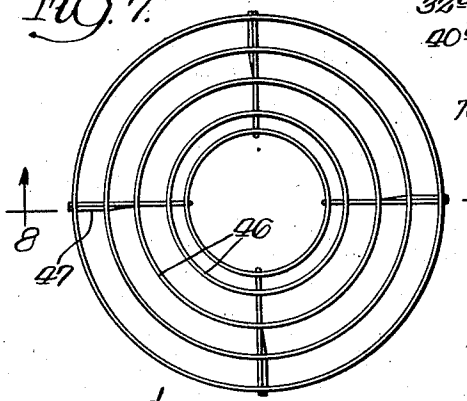


Fig. 8.

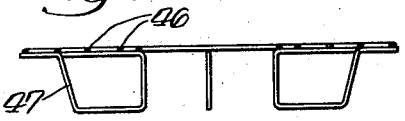
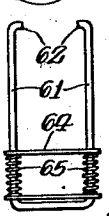


Fig. 9.



INVENTOR.
Julius M. Born,
BY Bair & Freeman
ATTORNEYS.

Patented July 16, 1940 2,208,244

UNITED STATES PATENT OFFICE

2,208,244

SERVICE UNIT FOR AIR CLEANERS

Julius M. Born, St. Paul, Minn., assignor, by mesne assignments, to Vulcan Manufacturing Co., Inc., St. Paul, Minn., a corporation of Minnesota

Application February 13, 1939, Serial No. 256,163

6 Claims. (Cl. 91—45)

An object of my invention is to provide a service unit for air cleaners, the present application being a continuation in part of my copending application, Serial No. 156,375, filed July 29, 1937 and issued Sept. 26, 1939, as Patent No. 2,174,311.

Another object is to provide a service unit which is inexpensive to manufacture and simple to operate and maintain.

Still a further object is to provide a cleaning and reoiling unit for air cleaners having a reservoir for cleaning fluid and convenient means for withdrawing the cleaning fluid therefrom and projecting it through an air cleaner merely by applying a compressed air chuck to the unit, such as is found available at garages and service stations.

A further object is to provide the unit with means for drying the air cleaner by evaporating the cleaning fluid therefrom, this also being accomplished by applying a compressed air chuck to the unit.

Another object is to provide a container connected with the unit for containing a supply of oil to reoil the air cleaner after it is cleaned and dried, the oil being withdrawn therefrom and discharged into the air cleaner by applying an air chuck to an air nozzle provided therefor.

Still a further object is to provide a unit which, during the cleaning, drying and reoiling of an air cleaner, involves the process of first discharging cleaning fluid therethrough; second, discharging air therethrough to dry the cleaner, and third, discharging oil into the air cleaner for reoiling it for its intended service.

Still another object is to provide means within the container of the unit for supporting air cleaners and other articles to be cleaned, one of such supports being in the form of a fluted and flared casting which is effective to deflect cleaning fluid in the desired direction toward a particular type of article being cleaned.

Further objects are to provide a hold-down element in the container for the articles being cleaned, a novel means to hold an oil cup in such position that it can be readily removed for refilling, and a selectively closable valve which is readily operated for the purpose of retaining cleaning fluid in the container instead of permitting it to return to the reservoir.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of the device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, in which

Figure 1 is a vertical sectional view through a service unit for air cleaners embodying my invention;

Figure 2 is a sectional view on the line 2—2 of Figure 1;

Figures 3 and 4 are diagrammatic views showing respectively the steps of cleaning and drying the air cleaner by means of my service unit;

Figure 5 is a sectional view similar to a portion of Figure 1 illustrating a modified type of reoiling container for my service unit;

Figure 6 is a sectional view similar to the upper portion of Figure 1 showing modifications of my structure;

Figures 7 and 8 are a plan and a sectional view, respectively (the section being taken on the line 8—8 of Figure 7), showing a rack structure which can be used in my device for the purpose of supporting certain types of air cleaners or other articles to be cleaned in the unit;

Figure 9 is a front view of a bail for supporting an oil container, the side view of the bail being shown in Figure 6;

Figure 10 is a sectional view similar to the lower portion of Figure 6 showing another supporting device for an article being cleaned in the cleaning unit;

Figure 11 is an enlarged plan view of the support shown in Figure 10, and

Figure 12 is an enlarged view of a portion of Figure 6 showing a return valve in closed position, wherein as in Figure 6 it is shown in open position.

On the accompanying drawings I have used the reference numeral 10 to indicate a base. A tubular post-like reservoir 11 extends upwardly therefrom. The post 11 is secured to the base 10 by means of a cleanout nipple 12. The upper end of the nipple 12 is threaded into a closure plate 13 formed on the bottom of the reservoir 11, and which is welded in position as indicated at 14.

Within the base 10 a lock nut 15 is positioned on the lower end of the nipple 12 and a cleanout cap 16 closes the lower end of the nipple. A drain cock 17 projects into the side of the reservoir 11 and is located slightly above the bottom plate 13.

At the top of the post or reservoir 11, I provide a head plate 18, above which is mounted a container comprising a bottom part 19 and a cover 20. The bottom part 19, the plate 18 and the upper end of the reservoir 11 are secured together by means of a series of bolts 21. The head plate 18 has an air inlet passageway 22, a clean-

ing fluid passageway or nozzle 23 and an oil and air passageway 24. An air nipple or nozzle 25 communicates with the passageway 22 and is adapted for connection of the usual air or tire chuck therewith for discharging air into the reservoir 11 to displace its contents.

The contents of the reservoir 11 may comprise any suitable cleaning fluid, such as gasoline, indicated at 26 in Figure 3, and this fluid is displaced through an intake pipe 27 leading to the nozzle 23.

An air and oil nozzle communicates with one end of the passageway 24 while the other end thereof communicates with an upright pipe 29. The pipe 29 has an air nozzle 30 at its upper end and a Venturi tube 31 extending into its side. The pipe 29 and the nozzle 31 are located in an oil container 32 carried by the base plate 18.

The cover 20 is hinged to the container bottom 19 as indicated at 33. A handle 34 is provided for the convenience of the operator in opening the container. Louvered perforations 35 are provided in the cover 20 to permit the escape of air without permitting the escape of any droplets of cleaning fluid or oil which might be projected into the cover 20.

As shown in Figure 5, the oil container may comprise a transparent receptacle 32*a* having a Venturi nozzle 31*a*. The nozzle 31*a* cooperates with an air nozzle 38 which in turn is connected with the air nipple 30*a* to spray oil by Venturi action into the air stream flowing to the passageway 24*a*. Air, in passing from the nozzle 31*a*, will draw oil through a valve 39 when open and a tube 70. As the oil recedes in the receptacle 32 the quantity thereof being used up can be observed by a scale 40 thereon.

The receptacle 32*a* is readily removable, for instance, by being screw-threaded into a cap 41 connected with the valve 39. The receptacle 32*a* may be filled with oil and during the process of reconditioning the air cleaner the drying process may be completed while the valve 39 is closed and after its completion it is merely necessary to open the valve for reoiling the air cleaner, while the air chuck is still maintained in engagement with the air nipple 30*a*.

In Figure 6, I show a modified form in which parts corresponding to the previous figures bear the same reference numerals with the addition of "*b*." A plate 18*b* is supported on the tubular reservoir 11*b* and has the container parts 19*b* and 20*b* mounted thereon. The cleaning fluid intake pipe 27*b* terminates in nozzle 23*b* which is surrounded by an air nozzle 42. The air nozzle 42 communicates with the air passageway 22*b* and the air intake nipple 25*b*. The nipple 25*b* is adapted for coaction with an air chuck so that when air from the chuck is discharged from the nozzle 42 it will draw cleaning fluid from the nozzle 23*b* by Venturi action and discharge it through the air cleaner AC'. The air cleaner is thereby efficiently cleaned by the combined action of the air and cleaning fluid.

A support is shown for the air cleaner AC' in the form of a ring 43. A plurality of legs 44 support the ring 43 in an elevated position above the bottom of the container 19*b*. As an aid to holding the cleaner in position on the ring, I provide a hold-down element 44 preferably in the form of a ring. It is connected by a plurality of springs 45 to the periphery of the container so that the springs are under tension, as illustrated, for holding the air cleaner in position. When inserting or withdrawing the air cleaner, the ring 44 can be tipped up edgewise and pushed to a position close to one side of the container to permit the air cleaner to pass it.

My cleaning unit is adaptable for cleaning other articles as well as air cleaners. In Figure 7, I show a supporting rack consisting of a plurality of wire rings 46 and radially extending supports 47 formed of wire. The various wires are welded together and the supports 47 are adapted to rest on the ring 43. Various articles, such as automobile engine parts or air cleaner sumps and breather caps and screens can be placed on the rack wires 46 and thereby supported for cleaning purposes.

In Figure 10, I show another type of support indicated generally at S and particularly adapted for supporting a sump member 48 of an air cleaner. The sump member 48 is in an inverted position so that the bottom thereof where sediment collects can be cleaned by cleaning fluid projected from the nozzle 23*b*.

The support S is in the form of a flared and fluted casting having its base end uppermost. It is provided with a bore 49 adapted to surround the oil nozzle 28*b* so that the oil nozzle thereby acts as a support and positioning means for the member S. Fluting of the member S is indicated at 50. The nozzle 28*b* supports the member S in such position relative to the nozzle 23*b* that the cleaning fluid is deflected by the support and into the bottom of the sump 48. A cylindrical flange 51 is provided in the upper end of the support S to engage the sump and support it.

In connection with the reservoir 11*b* and the container 19*b* and 20*b*, I provide return openings 52 and 53. A valve member 54 is normally open relative thereto. The valve member 54 is supported by a wire clip 55 which has a hook end 56 in a notch 57 of the ring 43. The weight of the valve causes it to remain open.

A spring 58 is connected with the clip 55 and has a hook member 59. The hook member 59 terminates in a ring 60 adapted to be manually engaged for stretching the spring and engaging the hook with the edge of the ring 43 as shown in Figure 12. This closes the valve for the purpose of retaining the cleaning fluid in the container 19*b*—20*b* when desired. For instance, it is sometimes desirable to project the entire charge of cleaning fluid from the reservoir 11*b* into the container 19*b*—20*b* and in that event the valve 54 can be closed. When it is desired to return the cleaning fluid to the reservoir, then the valve can be opened and a quick return will be effected through the openings 52 and 53.

Air Cleaner Servicing Process

1. Cleaning the air cleaner

Initially a quantity of gasoline or other cleaning fluid is poured into the container bottom 19 and flows down the pipe 27 to fill the reservoir 11. When it starts running out of the air chuck 25, the operator knows that the reservoir is full.

The first step of the process involves projecting the cleaning fluid 26 through the air cleaner as illustrated in Figure 3. After the air cleaner, indicated at AC, is placed in the container 19—20 (these cleaners being usually a perforated sheet metal container filled with copper wool or other air filtering material which is oiled to catch dust from the air passing through the air cleaner) an air or tire chuck 36 of a compressed air hose 37 is applied to the air nozzle 25 for discharging air into the reservoir 11, as indicated by the dash

line arrows. The cleaning fluid 26 is thereby displaced through the pipe 27 and nozzle 23, the nozzle spraying the air cleaner AC as indicated by the solid line arrows.

The cleaning fluid will collect in the container bottom 19, as indicated at 26a, during this step of the process, the excess air escaping through the louvered openings 35.

2. Drying the air cleaner

After the cleaning fluid 26 hase been displaced to the level of the lower end of the pipe 27, the air chuck 36 is applied to the air nozzle 30, which at first continues the cleaning process as any of the cleaning fluid 26a remaining in the container bottom 19 will be projected through the air cleaner AC.

As soon as all of this fluid has drained back into the reservoir 11, through the nozzle 23, however, then air only will pass through the air cleaner and be discharged through the louvered openings 35, this step of the process being continued until the cleaner has been thoroughly dried.

3. Reoiling the air cleaner

The oil container 32 is then filled with a reoiling fluid 38, such as No. 40 S. A. E. crank case oil, to about the level illustrated in Figure 1. The air chuck is then reapplied to the air nozzle 30 and will draw the oil 38 from the container 32 in through the tube 31 by Venturi action and spray it from the nozzle 38 into the air cleaner.

When the supply of oil has been exhausted, the cleaner will be thoroughly oiled and ready for another period of service.

The cleaning fluid 26 may be re-used a number of times for successive air cleaner service operations. By permitting it to stand in the reservoir 11, the dirt will settle to the bottom and may be cleaned out by removing the cap 16, after draining out the fluid from which the sediment has settled through the drain cock 17. Occasionally, of course, the supply of cleaning fluid 26 must be replenished to take care of evaporation, although the fluid from the drain cock 17 can be used.

The unit is self-contained and may be operated efficiently and effectively by the mere introduction of compressed air to the nozzles 25 and 30 in the manner described.

In Figures 6 and 9, I show a modified structure for holding the oil container 32b in position against the head member 41b. This mechanism consists of a bail 61 having fingers 62 located in sockets 63 of the head 41b. A cross piece 64 is slidably mounted on the bail 61 and urged to engage the container 32b by springs 65, the springs thereby biasing the container to engage the head in such manner that the container can be readily detached for refilling.

The bail 61 permits ready removal of the container 32b for replenishing the oil supply therein. It is merely necessary to move the container downwardly against the tension of the springs 65 and then swing it out from between the arms of the bail 61 and remove it from the cross piece 64. These operations are reversed when replacing the container in position.

From the air cleaner servicing process just described in three steps, in connection with Figures 1 to 5 of the drawings together with the description of the Figures 6 to 12, it is believed that the operations of Figures 6 to 12 are obvious.

Changes of the character shown in Figures 5 to 12 inclusive may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention. It is therefore my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

What I claim as my invention and desire to secure by Letters Patent of the United States is:

1. In a device of the class described, a container for an air cleaner, a nozzle directed toward the interior of said container, means within said container for supporting an air cleaner in position to receive oil projected from said nozzle, an oil container suspended below said first container and connected thereto by passageway, and means for withdrawing oil from said oil container by Venturi action and projecting it, together with the compressed air used to effect such Venturi action through said passageway and nozzle into the air cleaner for reoiling the air cleaner.

2. In a device of the class described, a container for an air cleaner, a cover for cooperation with said container to completely enclose the air cleaner, a nozzle opening into the bottom of said container, a reoiling device comprising a fitting having an air passage therein communicating with said nozzle, an air chuck nipple connected with said fitting to receive air from an air chuck and discharge it through said passage into said container, an oil container head supported by said fitting, a tube depending therefrom and connected at its upper end with said passage at a point spaced from said nozzle and an oil container mounted on said oil container head and depending therefrom, the lower end of said tube being located in said oil container adjacent the bottom thereof.

3. In a device of the class described, a container for an air cleaner, a cover therefor, a reoiling device comprising an oil container, a supporting head therefor, a bail connected therewith, to support said oil container on said supporting head, a passageway from said oil container to the bottom of said first container and means for propelling oil from said oil container through said passageway to said first container.

4. In a device of the class described, a container for an air cleaner, a cover therefor, a reoiling device comprising an oil container, a supporting head therefor, a bail connected therewith, a cross piece slidable on said bail and engageable with said oil container, resilient means urging said cross piece and thereby said oil container toward said supporting head, a passageway from said oil container to the bottom of said first container and means for propelling oil from said oil container through said passageway to said first container.

5. In a device of the class described, an openable container adapted to receive and entirely enclose an air cleaner, a nozzle opening into said container, means including a passageway for discharging air through said nozzle, an oil container, a tube having an intake located below a supply of oil therein, said tube communicating with said means for discharging air through said passageway and nozzle whereby to draw oil from said tube by Venturi action, mix it with air in said passageway for effecting such Venturi action and discharge the mixed oil and air through said nozzle, and a shut-off valve between said oil container and said air discharging means.

6. In a device of the class described, a container for an air cleaner, a cover therefor, a nozzle opening into the bottom of said container, a reoiling device comprising a fitting having an air passage therein communicating with said nozzle, a nipple connected with said fitting to receive air and discharge it through said nozzle into said container, an oil container head supported by said fitting, a tube extending downwardly therefrom and connected with said passage at its upper end, an open top oil container mounted against the bottom of said oil container head and receiving the lower end of said tube, and a bail to retain said oil container against said head.

JULIUS M. BORN.