Oct. 25, 1932. W. L. OSBORNE 1,884,819

APPARATUS FOR CLEANING LUBRICANT CASES OF ENGINES

Filed March 30, 1928 3 Sheets-Sheet 1

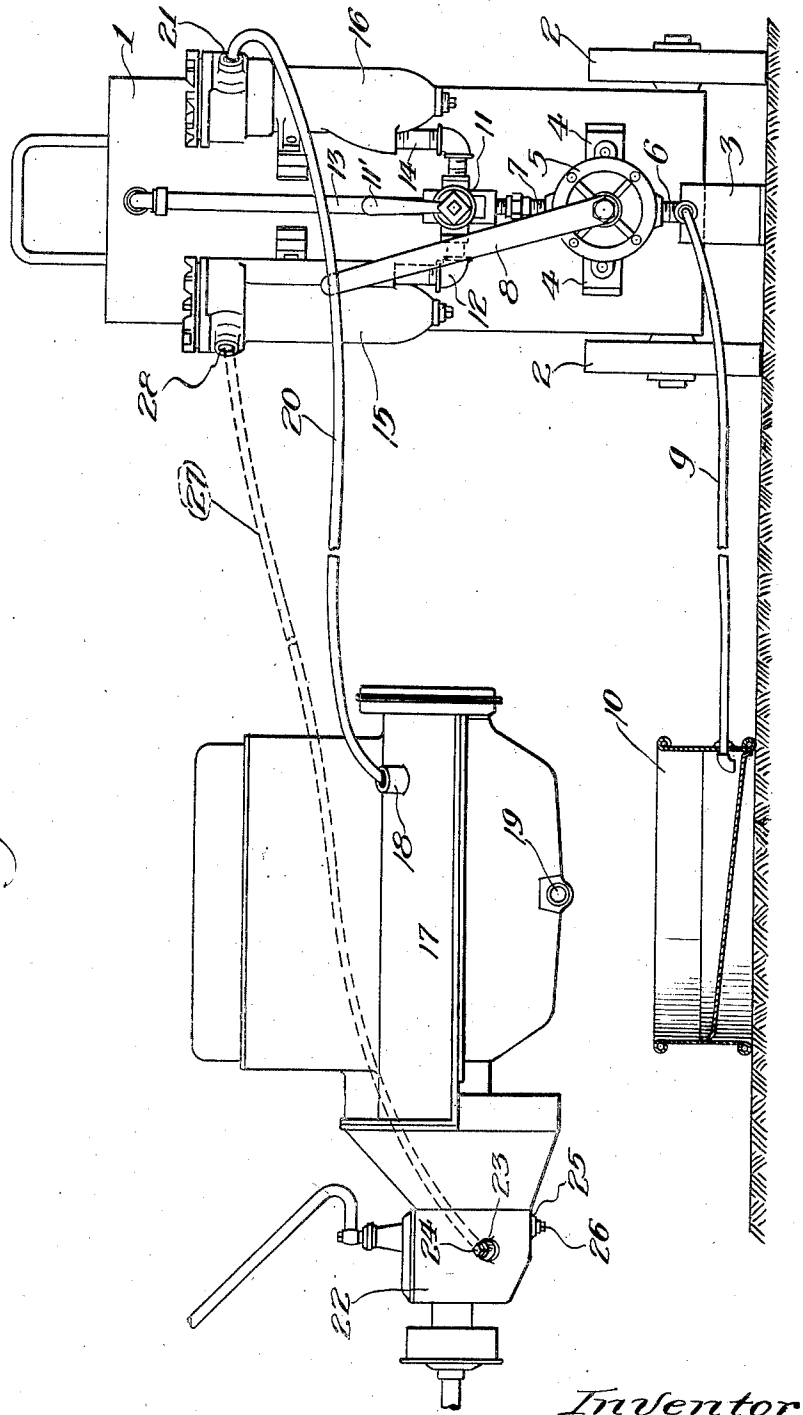


Fig. 1

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Fig. 2.

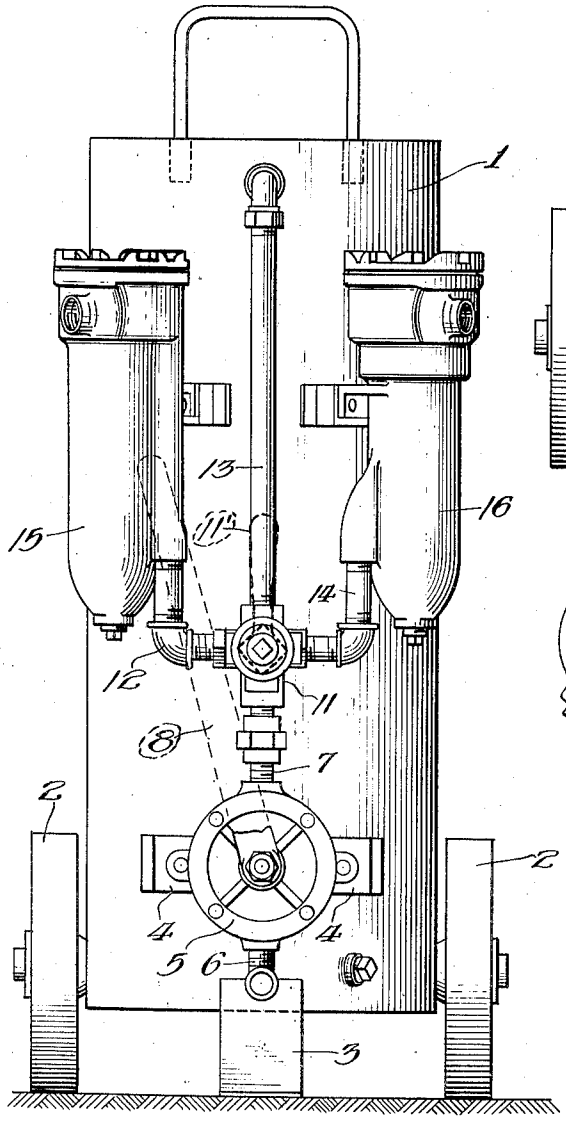
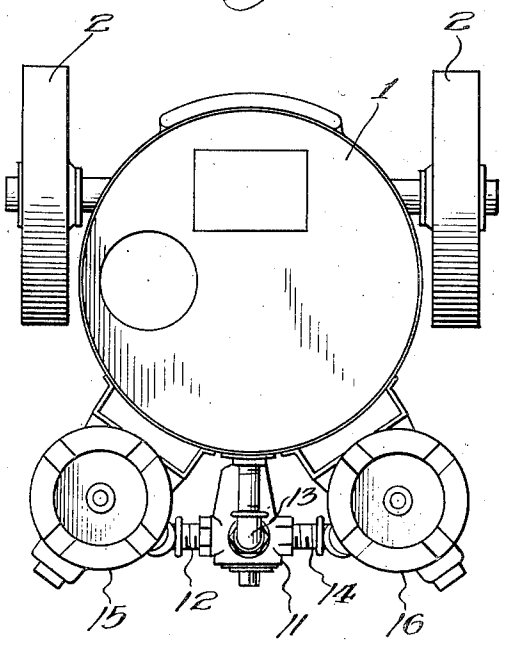


Fig. 3.



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Fig. 4

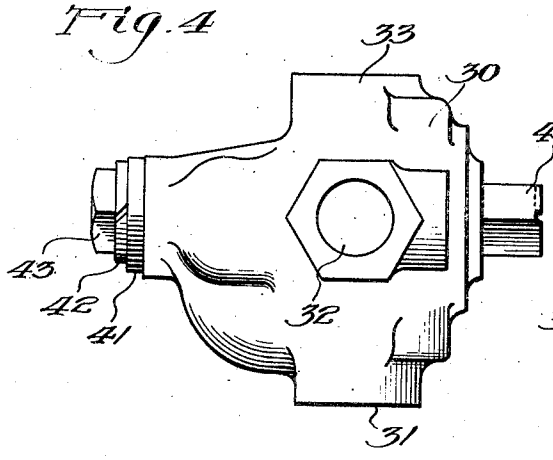


Fig. 5.

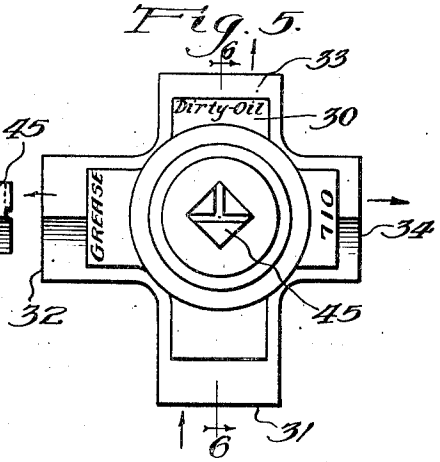


Fig. 6.

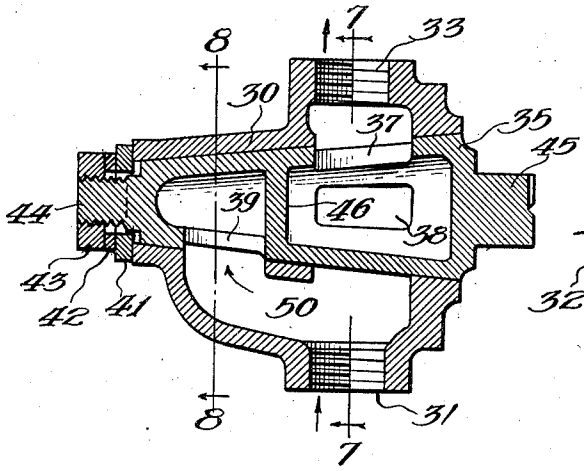


Fig. 7.

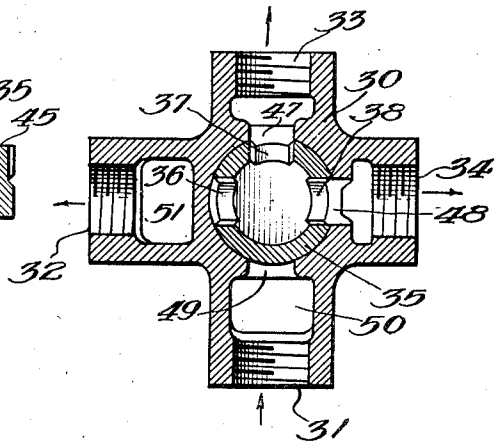


Fig. 8.

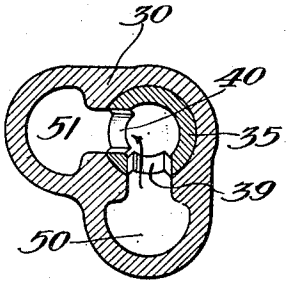


Fig. 9.

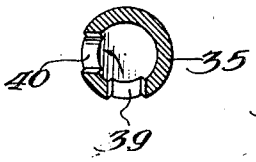
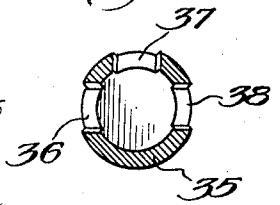


Fig. 10.



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Patented Oct. 25, 1932 1,884,819

UNITED STATES PATENT OFFICE

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APPARATUS FOR CLEANING LUBRICANT CASES OF ENGINES

Application filed March 30, 1928. Serial No. 265,931.

This invention relates to improvements in a portable device for cleaning lubricant cases of engines, and is more particularly adapted to the cleaning of transmission and differential housings of motor vehicles, such as automobiles, motor trucks, and the like. However, the invention is also adapted for use in cleaning lubricant cases of engines generally, as for example, motors of trolley cars, Diesel engines, boats, airplane engines and the like.

The objects and advantages of the invention will hereinafter more clearly appear from the following description, but broadly speaking, the purpose is to provide a portable device to effectively and easily clean the case containing the lubricant together with the mechanism enclosed in such case. To this end the invention is carried out, first, by preferably draining off the dirty oil or used lubricant and then forcibly circulating a flushing or cleaning oil through the case and around the mechanism contained therein.

The device is not only relatively compact and simple to manufacture, being devoid of any mechanism or parts liable to get out of order, but is especially characterized by the facility with which it can be brought into communication with, or detached from, the crank case or other part of an automobile or other element to be speedily cleaned.

As a feature of the present invention the device comprises generally a storage receptacle, a pump, connections to and from the pump and the storage receptacle, and filtering means interposed in one of the connections from the pump for filtering the flushing or cleaning oil before it is returned to the lubricant containing case.

As another feature of the present invention the filtering means preferably comprises separate filters, one designed to filter flushing oil from a crank case and the other particularly designed to filter the cleaning oil used in the cleaning of transmission and differential housings.

In the use of a device of the character described herein in the cleaning of crank cases, transmission and differential housings and the like it developed that the greases used in transmission and differential work, especially where greases are used whose bases are still bottoms, produces an asphalt-like residue very similar to tar, which has no lubricating properties, will not flow and is very sticky. In using a single filter to filter the flushing oil from the crank case and the cleaning oil from the differential or transmission housing it was found that this sticky tar-like substance would adhere to the filter bag and spread so as to clog that portion of the bag and stop the filtration of the oil therethrough. In addition, when particles of this sticky tar-like substance got into the crank case, it tended to stop up the oil grooves. Therefore, it was necessary to design a separate filter for filtering oil used in cleaning transmission and differential housings which led to the designing of the filter of the present invention.

To make the cleaning device universal in its use, I have mounted two separate independently operated filters thereon, one for filtering flushing oil used in cleaning crank cases and the other for filtering oil used in cleaning transmission and differential housings.

To elminate the necessity for using and manipulating a number of control valves in the use of the device, I have devised improvements, which form the basis of the present invention, comprising a single valve control to selectively direct liquid from the pump through either of the two filters or to storage, the proper manipulation to position the valve for any given condition depending upon whether it is desired to pass used lubricating or used cleaning oil to storage or pass flushing or cleaning oil to either filter.

Among the advantages of the single valve control are that it makes the device "fool proof", permitting unskilled workmen to operate the device without any chance of mislocating valve ports; single instead of multiple control, resulting in economy and saving in cost, assembly, time, repair, replacement and labor in operation; convenience and compactness.

The single valve preferably takes the form of a liquid distributing valve rather than a stop valve.

In the drawings, Fig. 1 is a diagrammatic

side elevational view, partly in vertical section illustrating the employment of the device of the present invention in the cleaning of a crank case or the differential and transmission housing of an engine.

Fig. 2 is an enlarged front elevational view, and

Fig. 3 is a top plan view of the device of the present invention.

Fig. 4 is an elevational view, and

Fig. 5 is an end view, of the single control distributing valve.

Fig. 6 is a cross-sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a cross-sectional view taken on line 7—7 of Fig. 6.

Fig. 8 is a cross-sectional view taken on line 8—8 of Fig. 6.

Fig. 9 is a cross-sectional view of the valve per se, taken on line 8—8 of Fig. 6.

Fig. 10 is a cross-sectional view of the valve per se, taken on line 7—7 of Fig. 6.

Referring more in detail to the drawings, 1 designates as a whole an enlarged drum storage tank which may be for instance 15 to 25 inches in diameter and 25 to 40 inches in height, more or less, and of a capacity of, say 30 to 35 gallons more or less, as may be desired. This drum may be provided with base wheels 2 and a support 3. Mounted exteriorly of the drum 1 is a bracket 4 on which may be mounted a pump 5, the latter having inlet 6 and discharge 7. A handle 8 may be provided to manually operate the pump, or the pump may have connection with any means for permitting mechanical operation. The pump inlet 6 may be arranged to have detachable engagement with a flexible conduit 9, the latter being connected to a suitable drip-pan 10 in the manner shown. The pump outlet 7 may be suitably connected to a four-way distributing valve 11, the latter communicating respectively with branch pipes 12, 13 and 14, whereby upon selective manipulation of the valve 11 any of the branches 12, 13 or 14 may be connected with the discharge of the pump.

The branch 12 may communicate with a filter 15 which is especially adapted to filter from flushing media the heavy tar-like substances removed from transmission and differential housings and the like. The pipe 13 may communicate with the drum 1 whereby liquids such as used lubricants or used flushing or cleaning oil pumped by the pump 5 may be directed to the storage drum 1. The pipe 14 may communicate with a filter 16 which may be especially adapted to filter from flushing media the foreign material removed from the crank case of the engine. Since the substances filtered out of the liquid by the filter 15 are derived from grease and heavy oils said filter will hereinafter, for the sake of convenience, be referred to as "grease filter 15", and since the substances removed by the filter 16 are derived from motor oils the said filter 16 will be hereinafter referred to as "oil filter 16".

A crankcase is designated diagrammatically at 17 and is normally provided with a filling opening 18 and an outlet or drain 19, the latter being normally closed by means of a plug (not shown). A flexible hose 20 is adapted to have detachable engagement at one end with the discharge 21 of the oil filter 16 while the other end is adapted to have removable engagement with the filling opening 18.

A transmission case is illustrated diagrammatically at 22 and is normally provided with a filling opening 23 normally closed by means of a plug 24 and an outlet or drain 25 normally closed by means of a plug 26. A flexible hose 27 may have one end detachably connected to the discharge 28 of the grease filter 15 while the other end is adapted to be detachably connected to the filler opening 23.

In the operation of the device in the cleaning of a crank case, the drip-pan 10 is placed under the drain opening 19 and the plug (not shown) removed from the said opening permitting the used oil to drain therefrom into the drip pan. The pump handle 8 is then oscillated to cause the pump 5 to draw the used oil from the pan 10 through the hose 9 and inlet 6, discharging it through the outlet 7, the distributing valve 11 at this stage being so manipulated as to cause the oil to be directed into the pipe 13 and thence into the drum 1 wherein it is stored.

After the used lubricating oil has been drained from the crank case 17 and stored in the drum 1, a suitable quantity of flushing liquid, say 1 to 2 gallons, more or less, may be put into the drip pan 10. The valve 11 is now manipulated to connect the pump discharge 7 with the pipe 14 leading to oil filter 16. The hose 20 is connected to the filler opening 18 and the pump handle 8 is oscillated, causing the flushing oil to be drawn from the drip pan 10, passed through the oil filter 16, and discharged into the crank case 17, the flushing oil discharging through the drain 19 into the drip pan 10 from which it is drawn by the pump 5 and again recycled through the oil filter 16 and crank case 17.

By continuing the operation of repeatedly filtering the flushing oil and repeatedly returning it to the crank case, the flushing oil will continue to be circulated, cleaning not only the crank case by reason of the agitation thereof, but removing all of the entrained dirt and foreign substances which later are then deposited in the oil filter 16. When the crank case has been sufficiently cleaned, the valve 11 may be so regulated as to connect the pump discharge 7 with the pipe 13 connected with the drum 1. The handle 8 of the pump 5 is then oscillated to

cause the used flushing oil to be directed to the drum 1 for storage.

When it is desired to clean or flush out transmissions, differentials and the like, the operation may be as follows: The drip pan 10 is placed under the drain 25 and the plugs 24 and 26 removed. The hose or conduit 27 is then engaged with the filling opening 23 in a manner similar to the engagement of the hose 20 with the crank case 17. In the event the oil or grease within the transmission 22 is too thick or viscous to readily flow out of the drain 25 a quantity of light distillate such as gasoline, kerosene or the like may be put in the drip pan 10 and the pump 5 manipulated to cause the distillate to be circulated through the grease filter 15 and conduit 27 into the transmission case 22 and back into the drip pan 10, thus the heavy oil or grease will be diluted or cut, whereby it will readily flow through the opening 25.

When the bulk of the grease in the transmission case 22 has been removed, the valve 11 is adjusted to connect the pump outlet 7 with the pipe 13 whereby the pump 5 will cause the mixture of grease and distillate to flow through the pipe 13 into the drum 1 wherein it is stored. When all the above mixture has been stored in the drum 1, the valve 11 is manipulated to cause the pump discharge 7 to be connected to the grease filter 15.

A fresh supply of flushing medium, such as gasoline or the like, is put into the drip pan 10 and the pump 5 caused to circulate the same through the grease filter 15 and hose 27, being discharged into the transmission case 22. The flushing media discharges from the transmission case 22 through the drain 25 into the drip pan 10 from which it is drawn by the pump 5 and again recycled through the filter 15 and transmission 22.

By continuing the operation of repeatedly filtering the flushing medium and repeatedly returning it to the transmission case 22 the flushing medium will continue to be circulated, cleaning not only the transmission case by reason of the agitation thereof, but removing all of the entrained dirt and foreign substances which are then deposited in the grease filter 15. When the transmission case 22 has been sufficiently cleaned the valve 11 may be manipulated to connect the pump outlet 7 with the pipe 13 which is connected with the drum 1. The pump 5 is then operated to cause the used flushing medium to be passed into the drum 1 for storage.

Other varied forms of operation may be readily performed, as will be apparent to those conversant with the art by manipulating the valve 11. Thus, for instance, a fresh supply of flushing medium may be used to clean the transmission case 22 after the above described operation, the valve 11 being adjusted, if desired, to cause the flushing medium to be circulated through the oil filter 16.

A suitable nozzle may be attached to either of the conduits 20 or 27 whereby the used oil or flushing media may be sprayed upon the various parts of the chassis, such as springs, et cetera.

Describing now in detail the four-way distributing valve 11 as illustrated in Figs. 4 to 10: A suitable metallic casing 30 may be provided having an inlet 31 and outlets 32, 33 and 34. A tapered hollow core 35 having openings 36, 37, 38, 39 and 40 adapted to have a "ground fit" with the casing 30 may be provided. A D washer 41, a spring washer 42, and a nut 43 adapted to have threaded engagement with a portion 44 of the core 35 may be employed to maintain the core 35 in the casing 30. The core 35 may be provided with a boss 45 adapted to engage the handle 11′ (Figs. 1 and 2) whereby the core 35 may be readily rotated within the casing 30. The openings 36, 37 and 38 in the core 35 may be separated from the openings 39 and 40 by means of a wall 46. The casing 30 may be provided with openings 47, 48 and 49 communicating respectively with outlets 33 and 34 and inlet 31. A port 50 may communicate with the inlet 31 and the portion of the core 35 having the openings 39 and 40 and a similar port 51 may communicate with the outlet 32 and the same portion of the core 35.

The openings 36, 37, 38, 39 and 40 may be so arranged that when the openings 39 and 40 register with the ports 50 and 51, none of the openings 36, 37 and 38 are in registration with the inlet 31, thus the liquid will flow from the inlet 31 through the port 50, the openings 39 and 40, the port 51, and the outlet 32. If it is desirable to connect the inlet 31 to the outlet 33 the core 35 may be rotated until the opening 36 registers with the opening 49, the opening 38 registering with the opening 47 and the opening 40 registering with the port 50, the opening 37 not registering with any of the openings 47, 48 or 49, and the opening 39 not registering with either of the ports 50 or 51. Thus, the liquid will flow from the inlet 31 to the outlet 33. If it is desirable to connect the inlet 31 to the outlet 34 the core 35 may be rotated until the opening 36 registers with the opening 48 and the opening 37 registers with opening 49, the opening 38 not registering with any of the openings and the openings 39 and 40 not registering with either of the ports 50 or 51. Thus, the liquid will flow only from the inlet 31 to the outlet 34.

It will be apparent that, when the outlets 32, 33 and 34 are connected to the pipes 12, 13 and 14, and the inlet 31 is connected to the pump discharge 7, the liquid discharged by the pump 5 may be passed through the desired branch.

For the convenience of the operator, and in order to insure correct manipulation and adjustment of the valve in the hands of unskilled workmen, it may be desirable to label the different outlets as illustrated in Fig. 5.

The end of the flexible hose 20 may, if desired, have a more or less permanent engagement with the outlet 21 of the filter 16, in which case a second flexible hose 27 can be provided having more or less permanent engagement with the outlet 28 of filter 15. Or, a single flexible hose may be utilized for both filters, in which event the hose will be provided with means for engaging the outlets 21 and 28 of the filters 16 and 15 in a detachable clamp-like engagement.

From the foregoing it will be apparent that I have devised a meritorious improvement to be applied to portable flushing or cleaning devices.

I claim as my invention:

A portable cleaning accessory for lubricant containers of engines comprising in combination, a storage receptacle, a pump having inlet and outlet mounted thereon, separate independently operable filters also mounted on said storage receptacle, branches communicating respectively between the pump outlet and each of said filters and with the storage receptacle, and a single valve disposed in said pump outlet for regulating the passage of liquid from the pump to a selected filter or to the storage receptacle.

In testimony whereof I affix my signature.

WILLIAM L. OSBORNE.