

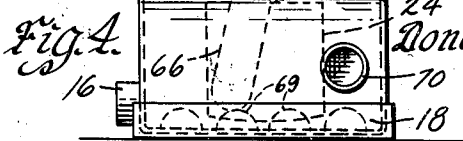
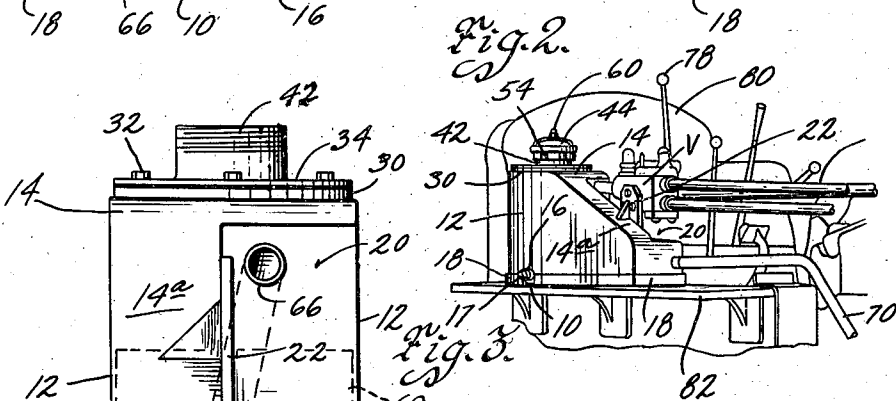
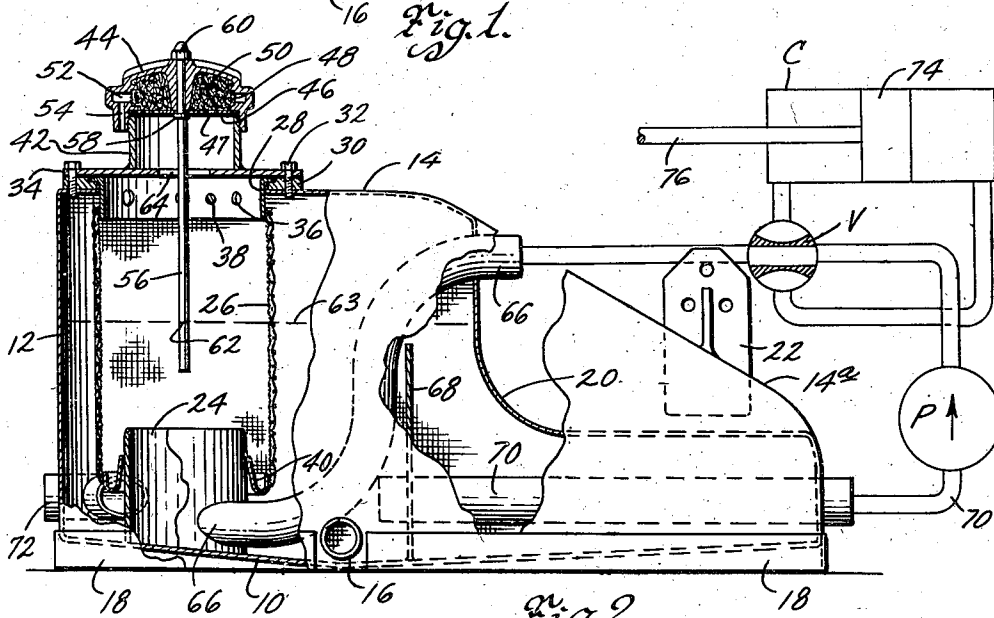
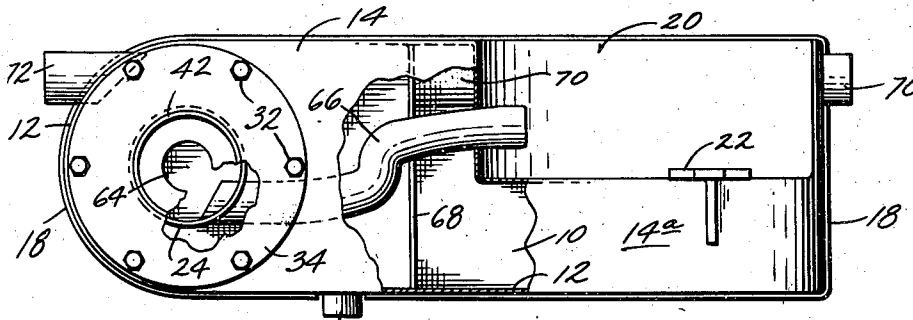
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D. M. NELSON ET AL

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OIL TANK

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Inventors
Donald M. Nelson & Harvey W. Rockwell
by Bair & Freeman
Attys

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OIL TANK

Donald M. Nelson and Harvey W. Rockwell, Cedar Rapids, Iowa, assignors to La Plant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, a corporation of Delaware

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12 Claims. (Cl. 210—43)

Our invention relates to an oil tank particularly adapted for hydraulic systems of bulldozers and the like.

One object of the invention is to provide an oil tank, which may be readily and inexpensively manufactured of heavy sheet metal or sheet steel, and welded together, and having a filtering and sediment collecting screen therein which produces an efficient separation of undesirable particles from the oil passing through the screen by imparting to the oil a swirling action in a swirl chamber of the tank.

Another object is to provide an oil tank having its elements so arranged that the oil is discharged for return to the tank below the level of the oil therein to minimize foaming, and the resultant inefficiency of operation of the hydraulic system.

Still another object is to provide a screen which can be readily removed, together with the sediment it has collected, for the purpose of cleaning the screen, the screen being provided with overflow openings adjacent its top so that oil can continue to flow, even though the screen is clogged.

Still another object is to provide a filler tube having a relatively large opening into the reservoir or tank so that the condition of the oil and its level in the tank may be inspected, a breather cap being provided for the filler tube to permit air to pass in or out, as the volume of oil changes, and provided with filtering material to eliminate dirt and dust passing into the tank when air is drawn into it.

Still another object is to provide the breather cap with a gauge rod depending therefrom by the use of which the level of the oil can be gauged.

Still a further object is to provide a tank particularly adapted for mounting beside the driver's seat of a tractor, and having a depressed part to receive a control valve in a position where it is handy for the operator to operate, the tank also having a bracket adjacent this depression to support the valve in alignment with the inlet of the tank.

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

Figure 1 is a plan view of our oil tank, with

parts broken away and other parts shown in section;

Figure 2 is a side elevation thereof, also with parts broken away and other parts shown in section, and diagrammatically showing a hydraulic system connected therewith;

Figure 3 is a perspective view of our oil tank showing how it is mounted beside the driver's seat of the tractor; and

Figure 4 is an end view of the oil tank taken from the right-hand end of Figure 2.

On the accompanying drawing we have used the reference numerals 10, 12 and 14 to indicate, in general, the bottom, vertical walls and top, respectively, of our oil tank. These parts may be cut to shape from heavy sheet metal or sheet steel, and suitably welded together to form a liquid-tight compartment. The bottom 10, it will be noted, slopes toward a point adjacent a drain tube 16. This tube may be internally screw-threaded to receive an ordinary pipe plug 17 (see Fig. 3), which may be removed when it is desirable to drain the tank. Because of the slanting bottom, it is necessary to have a level supporting means, and this is provided in the form of a band of strap steel 18, welded in position. The top 14 has a sloping portion 14^a, and a part of this is cut away to provide a depression, indicated at 20. The depression 20 is provided to receive a control valve V, which may be supported on a bracket 22 welded to the tank at one side of the depression.

Within the tank is provided a swirl chamber, in the form of a cylinder 24. This is open at the top, and is surrounded by a screen 26. The screen 26 may be formed of an outer layer of quarter-inch mesh galvanized hardware cloth and an inner layer of finer mesh woven brass wire. The upper end of the screen is welded or brazed to a supporting flange 28 which rests on a shoulder of a bolting flange 30. The bolting flange is welded to the top 14, and bolted to it by bolts 32 is a breather tube flange 34. A suitable gasket is interposed between the flange 34 and the flanges 28 and 30 to effect a seal. The flange 28, above the upper end of the screen 26, is provided with overflow openings 36. This flange is also provided with a lift rod 38 for lifting the screen assembly out of the tank for cleaning, after the bolts 32 and the flange 34 are removed.

At the bottom of the screen 26 an annular gutter 40 is provided for catching sediment, as will hereinafter appear. This gutter slips readily over the swirl chamber 24. The breather tube flange 34 has extended upwardly therefrom a filler tube 42.

It is threaded at its upper end so that a breather cap 44 may be screwed thereon.

The breather cap 44 has a bottom plate 46 provided with several perforations 47 and a breather screen 48. Confined within the screen 48, and between the cap and its bottom 46, is a quantity of oiled copper wool or the like 50, for filtering dust from the air which is breathed into the tank through the screen 48.

Communicating with the screen 48 is an annular passageway 52, and a plurality of air passageways 54 extend downwardly therefrom. The lower ends of these passageways communicate with atmosphere.

Depending from the breather cap 44 is an oil gauge rod 56, having a flange 58 to retain the bottom plate 46 in position, the flange, in turn, being drawn against the plate by an acorn nut 60 on the upper end of the gauge rod. The gauge rod may have a mark or groove 62 thereon, at the desired oil level 63. The filler tube flange 34 is provided with an enlarged opening 64 through which the gauge rod extends into the oil tank.

An oil inlet tube 66 extends from the depression 20 into the swirl chamber 24, entering the swirl chamber at a tangent, as shown in Figure 1. The inlet tube 66 is bent S-shaped within the reservoir, and passes over a baffle plate 68. The baffle plate minimizes oil splash in the tank when the tractor is in motion and has four half circle openings 69 adjacent its lower edge (see Fig. 4).

An outlet pipe 70 is provided for withdrawing oil from the front end of the tank. In certain installations the oil may be taken from the back end of the tank, and, for this purpose, an auxiliary outlet 72 is provided. When one outlet is used, the other one is suitably plugged.

The valve V, supported on the bracket 22, is a four-way valve, as shown in Figure 2, and is connected with a hydraulic cylinder C and a pump P, in addition to being connected to the inlet 66 and the outlet 70, in the manner shown diagrammatically. It is shifted to the right of the bracket in the diagram to avoid confusion. The cylinder C has an operating piston 74 therein, connected with a piston rod 76 which extends to the bulldozer blade, or other element to be moved by the hydraulic mechanism. The valve V in the position shown, locks the piston against movement, and permits the pump to merely circulate the oil through the reservoir or tank. This is the "idling" position.

To cause the piston 74 to move either to the right or left, the valve V is turned a quarter turn, counter-clockwise, or clockwise, respectively. The desired amount of movement can be had, and then the piston again locked in its new position.

Our tank structure permits a great volume of oil to flow through the reservoir, with the swirling action produced by tangential discharge of the oil into the swirl chamber 24 producing an efficient settling action of the foreign material, such as metal chips, welding spatter, core sand the like, which may be lodged in the pipe or other parts of the hydraulic system. This foreign material is prevented by the screen from passing through the pump and other working parts of the hydraulic system which may be thereby damaged. The swirling action causes the particles of foreign material to be thrown outward to the inner surface of the screen, where they are trapped, and most of them eventually lodge in the gutter-shaped sediment trap 40.

The basket-type screen is readily removable from the tank without the necessity of separating

the breather cap and oil gauge, these parts being removed in their entirety as a unit. The screen permits a large quantity of oil to circulate, and in a tank of a size approximately sixteen inches high, as much as fifty gallons a minute can be passed through the tank without overloading it. Any clogging of the screen, however, will not reduce the volume, as overflow can occur through the openings 38.

The oil, it will be noted, enters the tank below the normal oil level 63, and this minimizes aeration and foaming. Frothing or foaming reduces the efficiency of the system, and our arrangement is such as to increase the efficiency to a maximum.

During operation of the hydraulic system, the inlet pipe 66, when the valve is open for operating the piston 74, serves as a return from the cylinder, whereas, during the idling period, it is a direct return through the valve from the outlet side of the pump P. The arrangement of the parts of the tank is such that the handle of the valve, indicated at 78 in Figure 3, is handy to the operator as he drives the tractor from the seat 80. The tank itself is supported on a shelf 82 at the side of the operator's seat.

Some changes may be made in the construction and arrangement of the parts of our device without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims any modified forms of structure, or use of mechanical equivalents, which may be reasonably included within their scope.

We claim as our invention:

1. In an oil tank of the character described, a reservoir, a vertical tubular screen depending thereinto and closed at its top, a cylindrical baffle in the bottom of said screen having its bottom closed and its top open, said baffle constituting a swirl chamber, an annular U-shaped sediment collecting gutter surrounding said swirl chamber and, together with the swirl chamber, constituting a bottom for said screen, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

2. In an oil tank, a reservoir, a vertical tubular screen therein and having a closed top, a cylindrical baffle inside said screen having its bottom closed and its top open, said baffle constituting a swirl chamber, an inlet to said reservoir extending tangentially into said swirl chamber to cause rotation of the oil therein and discharge of the oil from the upper end of the swirl chamber and radially through said screen, and an outlet from said reservoir beyond said screen.

3. In an oil tank of the character described, a reservoir, a vertical tubular screen positioned therein with its top closed, a cylindrical baffle within said screen having its bottom closed and its top open, said baffle constituting a swirl chamber, an inlet to said reservoir extending tangentially into said swirl chamber, the oil discharging from the upper end of the swirl chamber and radially thru said screen, and an outlet from said reservoir beyond said screen.

4. In an oil tank of the class described, a reservoir, a vertical tubular screen therein, closed at its top and having overflow openings located at the top of the screen, a filler-tube over said screen, a cap on said filler tube and having a gauge rod extending downwardly therefrom into the screen, an open top cylindrical baffle in the bottom of said screen, providing a swirl chamber, a U-shaped annular sediment collecting gutter surrounding said swirl chamber and constituting

a bottom for said screen, in conjunction with said swirl chamber, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir.

5. In an oil tank, a reservoir, a vertical closed top tubular screen having a supporting flange, a removable filler tube flange overlying said supporting flange, a filler tube thereon, a breather cap on said filler tube, an open top and closed bottom chamber in the bottom of said screen constituting a swirl chamber, an annular dished sediment collecting gutter surrounding said swirl chamber and constituting therewith a bottom for said screen, said supporting flange, screen and gutter being removable as a unit for cleaning after said filler tube flange is removed, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

6. In an oil tank structure, a reservoir, a filler tube flange thereon, a filler tube on said flange, a cap on said filler tube and having a gauge rod extending downwardly therefrom into said reservoir, a vertical tubular screen depending from said flange into said reservoir and having a closed top, an open top and closed bottom chamber in the bottom of said screen constituting a swirl chamber, an annular sediment collecting gutter dished in cross section and surrounding said swirl chamber and constituting therewith a bottom for said screen, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

7. In an oil tank of the class described, a reservoir, a vertical tubular screen depending thereinto and having a closed top, a filler tube flange on said reservoir above said screen, a filler tube thereon, a breather cap on said filler tube, an open top and closed bottom chamber in said reservoir adjacent the bottom of said screen constituting a swirl chamber, a U-shaped sediment collecting gutter adjacent said swirl chamber and in conjunction therewith constituting a bottom for said screen, said screen and gutter being removable as a unit from said reservoir, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

8. In an oil tank structure, a reservoir having a sloping wall provided with a depression, a bracket for supporting a valve in said depression, a valve supported thereby, a vertical closed top tubular screen depending into said reservoir, a chamber in the bottom of said screen, said chamber being open at its top and closed at its bottom to constitute a swirl chamber, an annular

U-shaped sediment collecting gutter surrounding said swirl chamber and constituting therewith a bottom for said screen, an inlet from said valve in said depression to said reservoir and extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

9. In an oil tank structure, a reservoir having a wall provided with a depression, a bracket for supporting a valve in said depression, a valve supported thereby, a vertical closed top tubular screen in said reservoir, a chamber in said screen, said chamber being open at its top and closed at its bottom to constitute a swirl chamber, a sediment collecting gutter adjacent said swirl chamber and within said screen, an inlet from said valve in said depression to said reservoir and extending tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

10. In an oil tank structure, a reservoir having a sloping wall provided with a depression, a bracket on one wall of said depression for supporting a valve in the depression a valve supported thereby, a vertical tubular screen and a chamber in said reservoir, said chamber being open at its top and closed at its bottom to constitute a swirl chamber, an inlet extending from said valve in said depression and tangentially into said swirl chamber, and an outlet from said reservoir beyond said screen.

11. In an oil tank of the class described, a reservoir, a vertical tubular screen therein and having overflow openings located at the top of the screen, a filler tube flange overlying said supporting flange, a filler tube thereon, a breather cap on said filler tube and having a gauge rod extending downwardly therefrom into the screen, an inlet to said reservoir and one side of said screen, and an outlet from said reservoir and the other side of said screen.

12. In an oil tank of the character described, a reservoir, a baffle plate therein, a vertical tubular screen in said reservoir on one side of said baffle plate and having a closed top, a cylindrical baffle in the bottom of said screen closed at its bottom to provide a swirl chamber, an annular dished sediment collecting gutter surrounding said swirl chamber and constituting a bottom for said screen in conjunction therewith, an inlet to said reservoir extending tangentially into said swirl chamber, and an outlet from said reservoir extending from said side of said baffle and through that portion of said reservoir on the other side of said baffle plate.

DONALD M. NELSON.
HARVEY W. ROCKWELL.