

Dec. 28, 1965

C. VIVIER

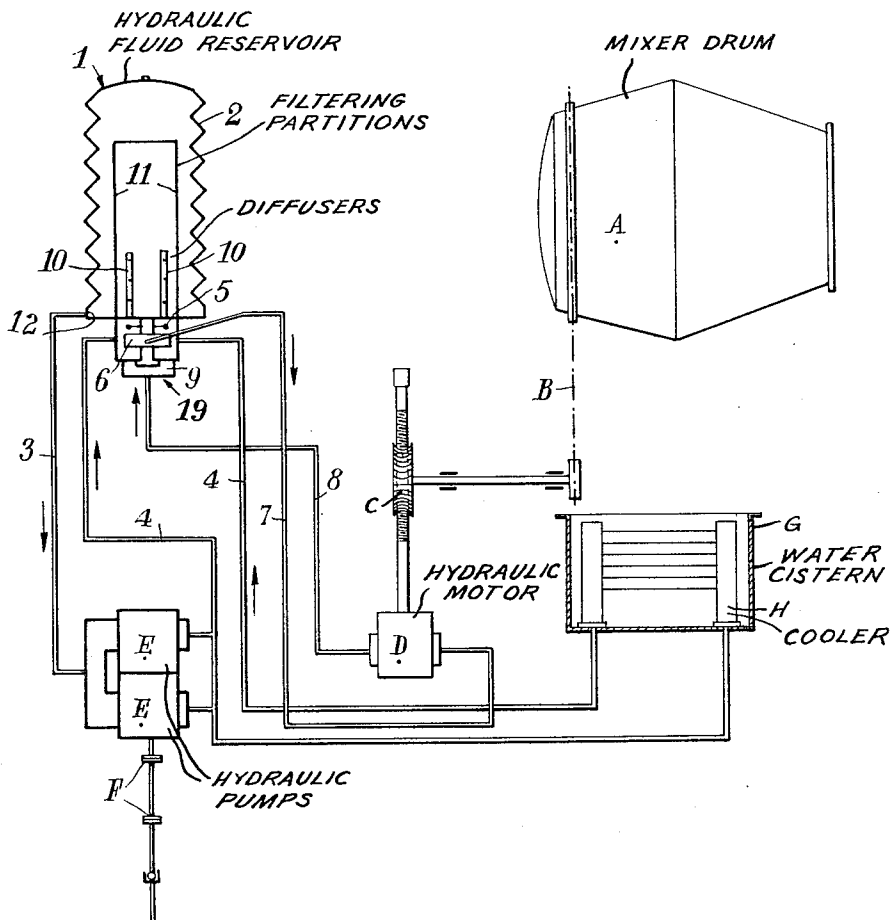
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HYDRAULIC SYSTEM NOTABLY FOR MIXER TRUCK

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Fig.1



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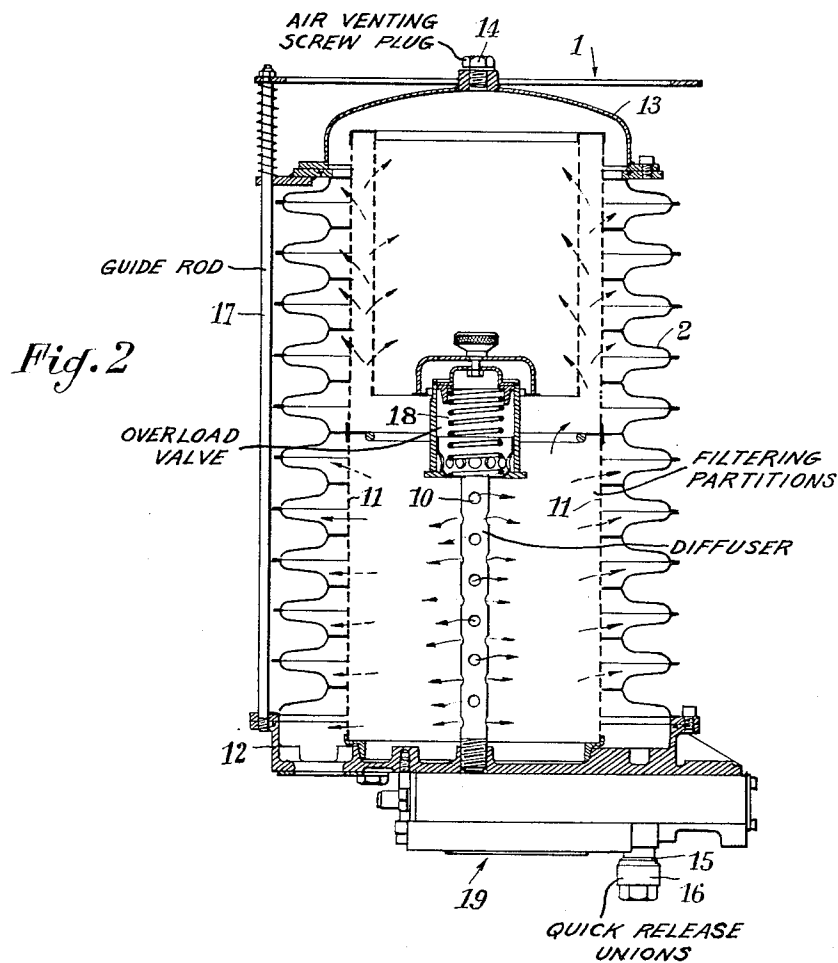
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HYDRAULIC SYSTEM NOTABLY FOR MIXER TRUCK

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Claims priority, application France, July 19, 1963, 942,012, Patent 1,370,837; Oct. 18, 1963, 951,078, Patent 84,532

8 Claims. (Cl. 60—53)

This invention relates to concrete mixing machinery and has specific reference to mixer trucks of the type comprising hydraulic means for operating the mixer.

As a rule, the hydraulic system of a mixer truck comprises the following component elements:

- One or more pumps driven from the truck engine.
- One or more distributors for changing the speed, and reversing the direction of rotation, of the drum.
- One or more hydraulic motors driving said drum through a reduction gearing.
- A pressure limiting device.
- An oil reservoir.
- An oil cooler.
- A filtration system.
- A water cistern containing the water necessary for preparing a concrete mix and washing the drum after the concrete mix has been discharged therefrom.

Moreover, in hydraulic systems using constant-output pumps and motors the circuit is generally of the "open" type, that is, wherein the oil from the reservoir contacts the atmosphere (frequently with the intermediary of an air filter).

It is the object of this invention to provide a hydraulic system of this general type wherein the hydraulic fluid is sheltered from any contact with the surrounding air and the functions of the cooling and filtration means are devolved to the reservoir proper which is designed accordingly.

In this hydraulic system the oil reservoir comprises a closed and expansible outer wall adapted to be filled completely with the hydraulic fluid and to act as a cooling device, whereas inner filtering partitions 11 are adapted to filter continuously the hydraulic fluid flowing through the circuit.

The features and advantages of this invention will appear more completely from the following description in which reference is made to the accompanying drawings illustrating diagrammatically by way of example a typical form of embodiment of the invention. In the drawings:

FIGURE 1 is a diagram illustrating the principle of operation of the hydraulic system according to this invention, the arrows showing the path followed by the hydraulic fluid during the operation of the system; and

FIGURE 2 is an axial section illustrating on a larger scale a typical form of embodiment of the oil reservoir according to this invention.

As shown in FIGURE 1, the complete system comprises a mixer drum A rotatably driven from a hydraulic motor D to which it is connected through a reduction mechanism comprising for example, as shown, a worm and wheel gearing C and another reducing transmission B. The hydraulic motor D is supplied with hydraulic fluid under pressure by means of one or a plurality of pumps E rotatably driven through a transmission F from a power take-off of the truck or directly from the truck engine, or from a separate motor, the fluid being drawn from a reservoir 1.

In the arrangement illustrated in the drawings the outer wall 2 of reservoir 1 consists of a series of stacked and welded dished annular elements constituting together

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a kind of bellows. A feed line 3 connects one inlet 12 of this reservoir to two pumps E mounted in parallel. The delivery lines 4 of these pumps are connected, within a base plate 19 of reservoir 1 and by means of a pair of distributors 5, to a load manifold 6 from which a load line 7 leads to the hydraulic motor D having its return line 8 connected, in the same base plate 19 of said reservoir, to a return manifold 9 from which the hydraulic fluid is returned to a central portion of the reservoir by means of one or two diffusers 10.

This central portion of the reservoir is bounded by filtering walls or partitions 11. Thus, the hydraulic fluid cannot flow back to the annular portion of reservoir 1 from which the feed line 3 leads to the hydraulic circuit unless said fluid has been properly filtered by flowing through said partitions 11. Thus, the continuous filtration of the hydraulic fluid is carried out in a particularly simple and efficient manner.

The filtering partitions 11 as well as the distributors 5 and manifolds 6, 9 are carried by the base plate 19 as shown in FIGURE 2. An upper cover 13 for the outer wall 2 of reservoir 1 is provided with an air venting screw-plug 14 permitting the proper filling of the reservoir 1 with hydraulic fluid. This filling operation is effected by using a pair of orifices, one for filling and the other for draining the reservoir, which extend through the base plate 12 of the reservoir and are provided with quick-release unions 15, 16 of the valve and self-obturator type. In addition to the filling and draining operations which are thus greatly facilitated and accelerated, these unions 15, 16 are used for effecting a forced filtration of the hydraulic circuit before actually putting same into operation. The oil is drawn through one of the unions, flows through the workshop pump and filter unit and is delivered back to the circuit through the other union. The hydraulic circuit may be kept operating during this filtration step so that all the oil in the system will have been completely filtered after a relatively short time period.

The upper cover 13 of the outer wall of the reservoir 1 is guided and retained during its axial movements by guide rods 17. One of these rods 17 may be graduated to permit the reading of the volume of contained in reservoir 1.

The expansibility of the outer wall 2 of reservoir 1 is such that the inner volume of this reservoir can be altered to absorb the expansion of the circuit oil due to its temperature increase. The outer surface of this reservoir constituted by the stacked arrangement of dished or pressed elements or washers is considerably greater than that of a conventional cylindrical reservoir of same dimensions. As a result, the transfer of heat from the oil in the hydraulic circuit to the surrounding atmosphere is improved and the use of an oil cooling system may be dispensed with. These dished washers may be made from copper sheet material or blanks in order further to improve the cooling action. Finally, means for circulating air around the reservoir may be provided in order to further reduce the oil temperature.

The oil filters mounted in the reservoir according to this invention are provided with an overload valve 18 adjusted to open at a pressure of the order of 20 p.s.i., and adapted to permit the oil flow therethrough if for any reason these filters became abnormally clogged.

In FIGURE 2, a pneumatic control system is associated with the distributors. This control system may also be completely different without departing from the spirit and scope of the invention.

The base plate 19 of reservoir 1 is formed with the proper number of orifices for mounting a pressure gage and/or a thermometer thereon.

The compact arrangement of parts according to the present invention affords considerable savings in the return pipings normally provided in conventional constructions between the distributors and filters and between the filters and the reservoir.

The pump suction communicates directly with the reservoir without any interposition of members likely to retard or interfere with the fluid flow. On the other hand it should be noted that the fact of filling the expansible reservoir produces on the suction side a vacuum of a few mm. Hg facilitating the priming of the pumps and eliminating notably any risk of cavitation.

This invention further comprises a specific arrangement of the hydraulic system which is applicable more particularly to a concrete mixer and comprising compulsorily a water cistern G in which water is very frequently renewed to feed said concrete mixer.

This arrangement consists in causing one or a plurality of the pipe lines of the hydraulic circuit of the system to pass through a cooler H dipped into the water cistern.

In fact, as the water contained in this cistern is frequently renewed during the operation of the mixer it acts as an active coolant and this cooling effect adds itself to that of the special wall of the reservoir according to this invention. Since the water in this cistern is at a substantially constant temperature, lower than that of the hydraulic fluid circulating through the pumps and motor, the temperature of the hydraulic transmission is kept at a predetermined, substantially constant value and the efficiency of this transmission is thus definitely improved.

What I claim is:

1. A hydraulic system comprising at least one pump, at least one hydraulic motor and a reservoir connected to the suction side of said pump, said reservoir comprising a base plate, at least one diffuser mounted on said base plate, filtering partitions mounted on said base plate to form a closed space around said diffuser, a lateral wall rising from said base plate around said filtering partitions, said lateral wall consisting of stacked dished annular elements of heat-conducting material, a cover closing the top of said lateral wall, said lateral wall and said cover forming around said filtering partitions another closed space, a pump supply line connected through said base plate to said other closed space, at least one pump output line leading into a load manifold also housed in said base plate, a motor feed line leading from said load manifold, a return motor line opening into a return manifold housed in said base plate and a distributor housed in said base plate and communicating with said first closed space.

2. A hydraulic system comprising at least one pump,

at least one hydraulic motor and a reservoir connected to the suction side of said pump, said reservoir comprising a base plate, at least one diffuser mounted on said base plate, filtering partitions mounted on said base plate to form a closed space around said diffuser, a lateral wall consisting of stacked dished annular elements of heat-conducting material, a cover closing the top of said lateral wall, said lateral wall and said cover forming around said filtering partitions another closed space, a safety valve mounted in one of said filtering partitions and providing a direct communication between said first closed space and said other closed space when the pressure of the hydraulic fluid in said first space exceeds a predetermined value, a pump supply line connected through said base plate to said other closed space, at least one pump output line leading into a load manifold housed in said base plate, a supply line leading from said load manifold to said motor, a motor return line opening into a return manifold housed in said base plate and a distributor housed in said base plate and communicating through said diffuser with said first closed space.

3. A hydraulic system as set forth in claim 1, wherein said cover of said reservoir is provided with an air venting screw-plug for properly filling said reservoir with hydraulic fluid.

4. A hydraulic system as set forth in claim 1, comprising two quick-release unions mounted in two orifices, one for filling and the other for draining said reservoir, formed through said base plate.

5. A hydraulic system as set forth in claim 1, wherein said outer wall of the reservoir is cooled by an air stream.

6. A hydraulic system as set forth in claim 1, comprising rods mounted on said base plate for guiding the movements performed by said cover during variations in the volume of hydraulic fluid contained in said reservoir.

7. A hydraulic system as set forth in claim 6, wherein one of said guide rods is graduated for constantly telling the volume of hydraulic fluid contained in said reservoir.

8. A hydraulic system as set forth in claim 1, notably for controlling a concrete mixer comprising a water cistern, wherein one or more pipe lines of said hydraulic circuit extend through the lower portion of said water cistern for cooling purposes.

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