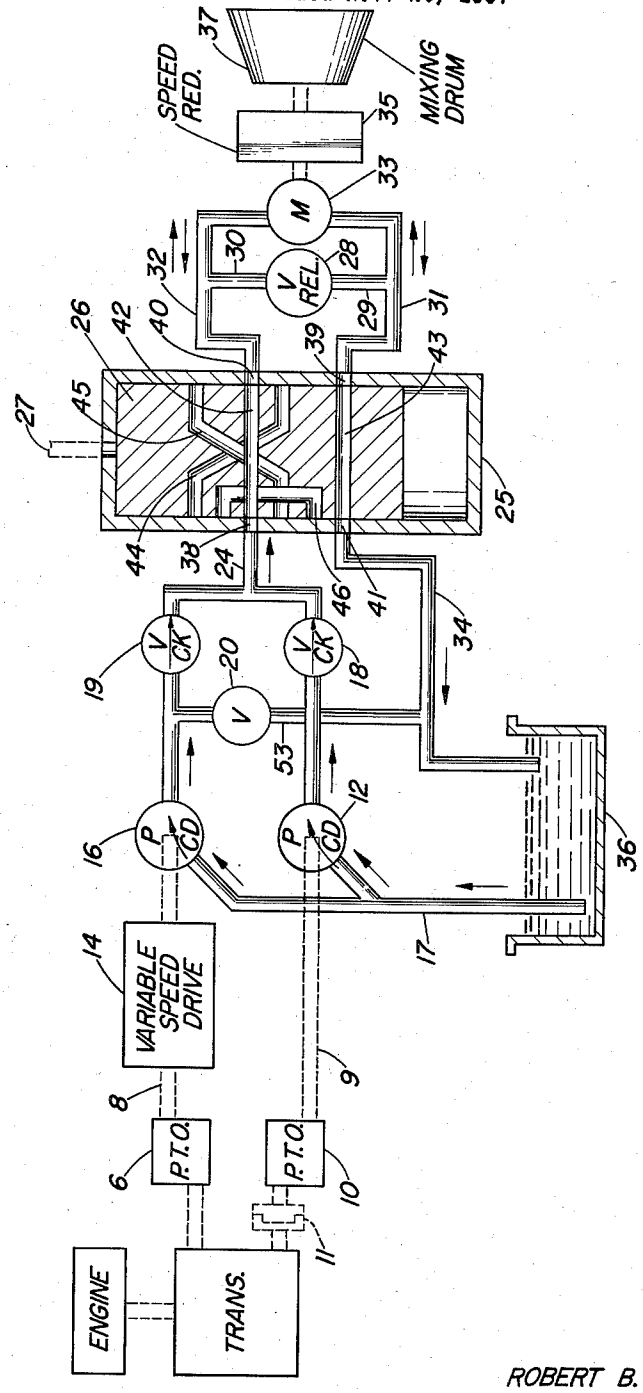
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HYDRAULIC MECHANISM FOR CONCRETE MIXER

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HYDRAULIC MECHANISM FOR CONCRETE MIXER

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1 Claim. (Cl. 60—19)

This invention relates to a hydraulic operating mechanism for a concrete mixer mounted on a truck and more particularly to a hydraulic system which permits the drum of a concrete mixer to be selectively operated at two different speeds by the engine of the truck.

It is well known that concrete mixers on trucks generally operate within two different speed ranges. The drum may be rotated at a higher speed such as 12 to 16 r.p.m. while charging the drum with raw materials whereas the mixing and agitating of the materials is done at a lower drum speed within the range of 4 to 6 r.p.m. Hydraulic systems proposed heretofore have been generally unsatisfactory due to the problems in connection with the dissipation of heat. It has been suggested that heat exchangers or variable volume piston type hydraulic pumps be utilized to overcome these problems but for practical economy reasons such solutions have not been feasible.

The present invention provides a hydraulic system in which heat problems are overcome through the use of a two pump system, both pumps being operated when the drum is to be rotated at a high speed and one pump only being operated when the drum is rotated at its lower mixing speed. The hydraulic system disclosed herein provides means for removing the load from the power takeoff when the truck clutch is disengaged to facilitate changing gears.

According to the present invention the transmission of the truck is provided with a pair of power takeoffs which drive hydraulic pumps through suitable reduction gearing. One or both of these pumps drive a fluid motor geared to the mixing drum of the concrete mixer. One pump delivers approximately 50 g.p.m. while the other pump operates at approximately 20 g.p.m. During the charging cycle both pumps are operated so as to deliver about 70 g.p.m. to the fluid motor. After the charging operation is completed the larger pump is shut off so that the smaller pump delivers sufficient fluid to rotate the drum at the desired mixing speed. Hydraulic valve means is provided so that the direction of rotation of the drum may be controlled or for stopping motion of the drum altogether when the drum is empty.

A primary object of the present invention is to provide a hydraulic system for a concrete mixer in which the mixer drum can be selectively operated at charging and mixing speeds.

Other objects and many of the attendant advantages of the present invention will become apparent upon consideration of the drawing wherein:

The single figure shows diagrammatically the hydraulic system utilized to operate the concrete mixer equipment.

Referring to the drawing, it will be seen that there is provided a power takeoff means 6 which may be of a well-known construction. It is designed to drive shaft 8 (shown in dotted lines) at the same speed as the engine speed of the vehicle. Shaft 8 serves to drive one hydraulic pump 16 in a manner to be more fully described hereinafter. There is also provided a conventional power takeoff as shown at 10 connected by shaft 9 (shown in dotted lines) to a hydraulic gear pump 12 which delivers a large

volume of oil such as, for example, 50 g.p.m. The power takeoff 10 has a clutch 11.

There is a variable speed drive 14 between the power takeoff 6 and the pump 16. Thus, the pump 16 may be controlled so as to produce a constant output of approximately 20 g.p.m.

The fluid is normally stored in a reservoir 36 and passes out from this reservoir along line 17 to supply pumps 12 and 16. The pumps 12 and 16 are connected in parallel, and the output passes through check valves 18 and 19 respectively and along line 24 to valve 25. The valve 25 is rather complex. It has three positions and may be used to cause a fluid motor 33 to rotate a mixing drum 37 in either direction or cause it to remain stationary.

The fluid valve 25 may be controlled from a remote position but the details of the remote control means are not shown or described herein since they may be conventional.

The valve 25 is illustrated as consisting of a cylinder with a piston 26 therein which may be moved to any one of three positions by a rod 27.

The cylinder has four ports 38, 39, 40 and 41.

The piston has a number of passageways therein. Those designated 42 and 43 pass straight through and thus directly connect port 38 to port 40 and port 39 to port 41. Those designated 44 and 45 are crossed and serve to reverse the flow, since they connect port 38 to port 39 and port 40 to port 41. The passageway 46 is a by-pass port in that it connects port 38 to port 41.

Thus with the piston 26 in the position shown in the drawing, the pump output line 24 is connected with line 32 and conduit 31 is connected with line 34 and the reservoir. In the other end position of piston 26 the pump output line 24 is connected with conduit 31 and conduit 32 is connected to the reservoir. Fuid passing through lines 31 and 32 drives a fluid motor 33 which through connecting means 35 drives the concrete mixer drum 37. It can be seen that by reversing the position of valve 25 the direction of drum rotation can be reversed.

There is provided a pressure relief valve 28 which by way of lines 29 and 30 is connected with conduits 31 and 32 respectively. This pressure relief valve is designed to operate in either direction so that in the event that valve 25 is closed to block conduits 31 and 32 and should the inertia of the system cause further fluid flow within lines 31 and 32 the pressure relief valve 28 will prevent the building up of excess pressure within either line.

There is also provided a valve 20 connected in line 53 between the output line of pump 16 and the fluid reservoir 36. The valve 20 may be opened to permit fluid flow directly from the pump 16 to the reservoir 36. It can be seen that this action serves to remove the load from the power takeoff means 6 when desired. During the period of time in which the output of the pump 16 is connected with the fluid reservoir, check valves 18 and 19 prevent reverse flow of the fluid from the fluid motor 33.

The hydraulic system according to the present invention operates in the following manner. When the drum is to be charged, power takeoffs 6 and 10 are both engaged so that there is approximately 70 g.p.m. supplied through line 24. The valve 25 is moved to the end position shown to cause the drum to be rotated by fluid motor 33 in a forward direction. After the charging cycle is completed the power takeoff 10 is disengaged by clutch 11 so that the drum is rotated at a lower speed by pump 16. As pointed out hereinbefore, although the input to pump 16 will vary over a wide range depending upon the speed of the vehicle, the output of the pump may remain fairly constant by means of variable speed drive 14.

When the truck reaches the jobsite, the position of

valve 25 is reversed to reverse the direction of rotation of the drum and permit discharge of the contents.

By providing two hydraulic pumps to operate the drum at the two selected speed ranges an economical practical system is provided which will avoid the production of large quantities of heat normally due to the necessity for pressure relief valves to relieve pressure at the lower drum speeds.

It is obviously possible to vary the specific construction of the elements of the system without altering the operating principles. For example, the specific transmission and reduction gearing system between the power takeoff and pump may be altered to suit varying operational requirements without departing from the principles of the invention. What is claimed as new and desired to be secured by Letters Patent is:

In a truck equipped with a variable speed propulsion engine and with a concrete mixing drum mounted for rotation thereon, the improvement which comprises: a first hydraulic pump; a first variable speed drive mechanism connecting said first pump to said engine to maintain the delivery rate of said first pump reasonably constant in spite of fluctuations in the speed of said engine; a second hydraulic pump; a second drive mechanism connecting said second pump to said engine, said second drive mechanism including a clutch for disengaging the drive of said second pump; a reversible hydraulic motor; conduit means connecting the outputs of both of said pumps to said motor; a reversing valve in said conduit means for directing fluid from said pumps to drive said motor in either direction; a bypass valve for bypassing fluid from said first pump around said motor; and drive means adapted to connect said motor to said mixing drum to rotate the same in a direction dependent on the direction in which said motor is driven, whereby said drive means may: (1) remain stationary while said engine is running with said clutch disengaged and said bypass valve open; (2) be driven in either direction at relatively high speed while said engine is running with said clutch engaged and said bypass valve closed; and (3) be driven in either direction at relatively low and reasonably constant speed while said engine is running at varying speeds with said clutch disengaged and said bypass valve closed.

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