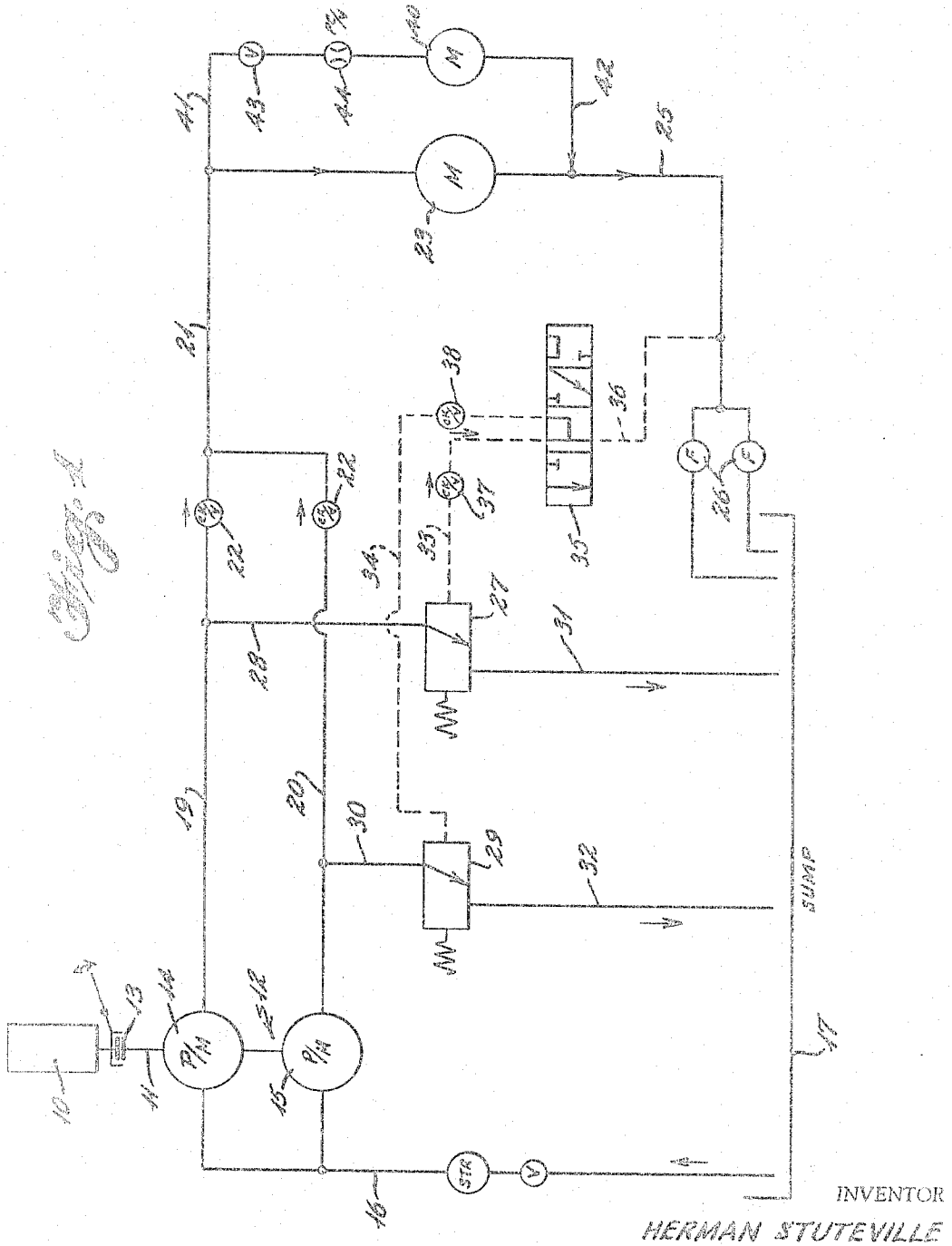
April 4, 1967 H. R. STUTEVILLE 3,312,059

HYDRAULIC SPEED CONTROL SYSTEM FOR DISCHARGING LIQUID CARGO

Filed Oct. 22, 1965 3 Sheets-Sheet 1



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Fig. 2

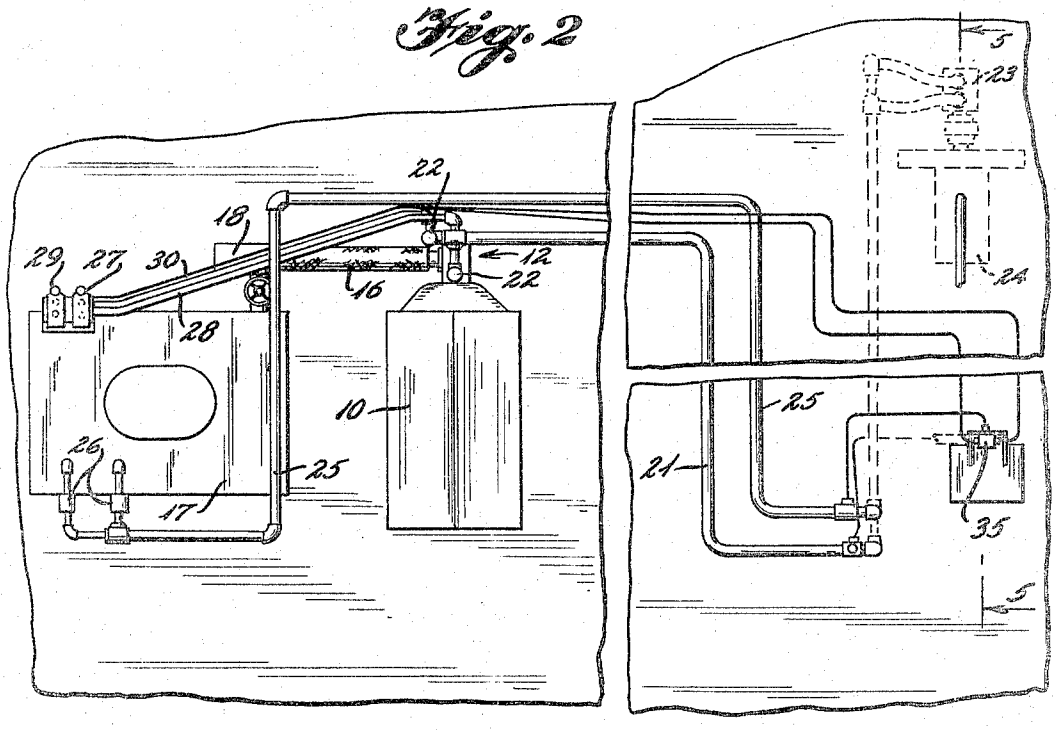
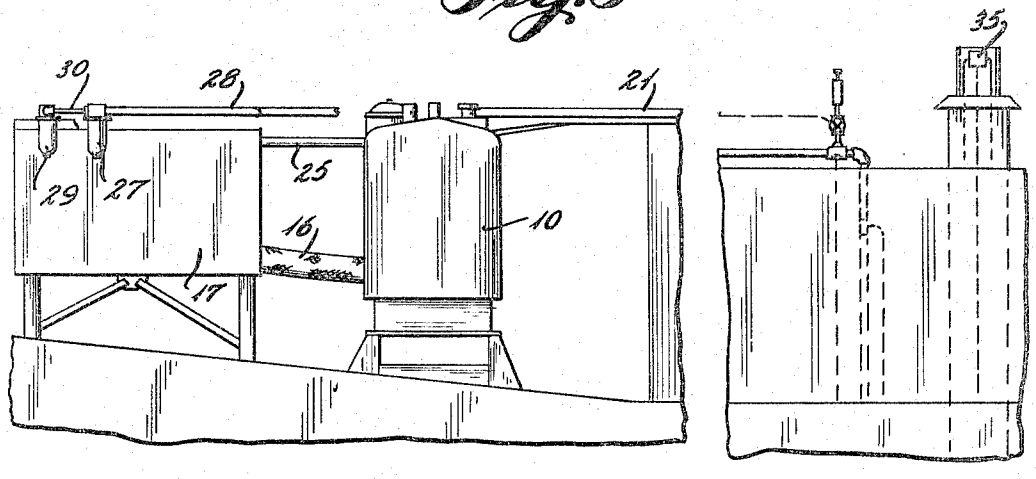


Fig. 3



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Fig. 4

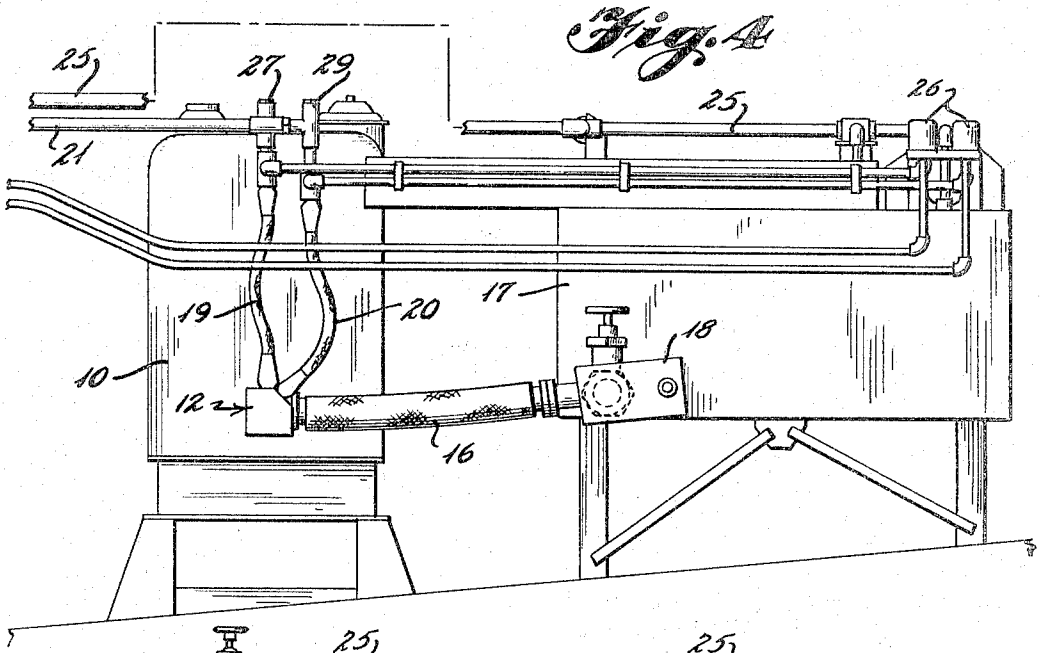
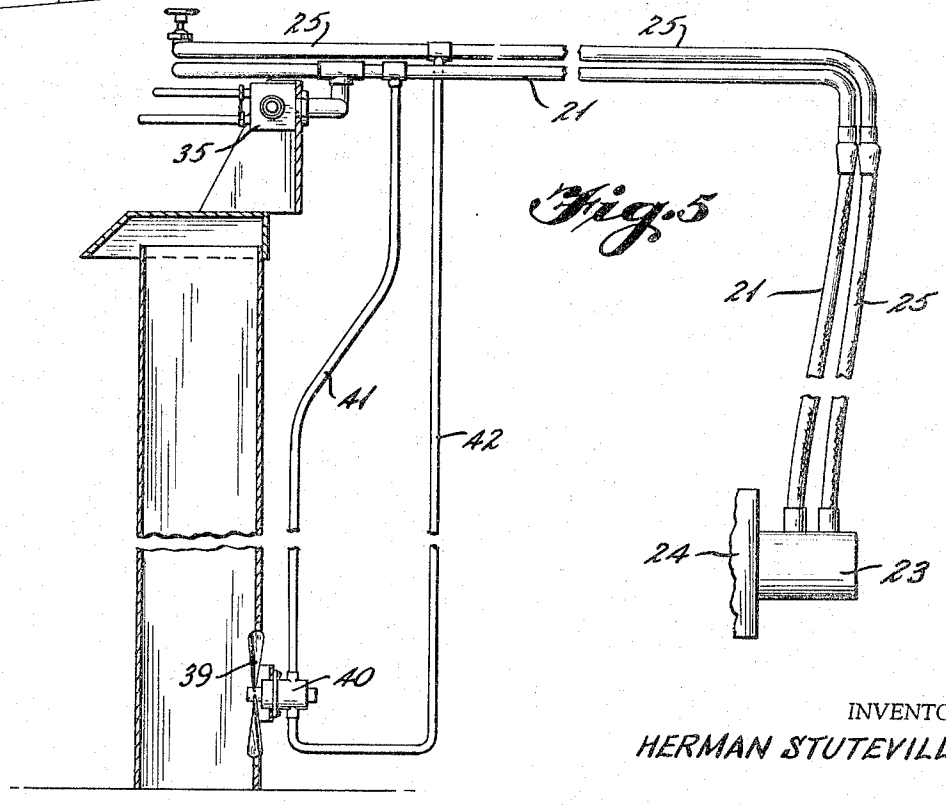


Fig. 5



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HYDRAULIC SPEED CONTROL SYSTEM FOR DISCHARGING LIQUID CARGO

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4 Claims. (Cl. 60—52)

This invention relates to apparatus and equipment for discharging bulk fluids from marine or other vehicles at varying rates of speed depending upon the character of the fluid.

Heretofore, liquid cargo has been discharged from ships, barges, tank cars and other bulk carriers by means of an internal combustion engine driving a fluid pump through a truck transmission which removed the cargo from the tanks. This has been hazardous, particularly where volatile fluids have been discharged due to the ever present danger of fire and explosion. Also these prior devices have not proved satisfactory due to the character of the cargo being handled which may vary through a wide range from relatively light products such as gasoline or light fuel oil to the relatively heavy viscous products such as asphalt, molasses and the like.

It is an object of the invention to provide a fluid operated cargo discharge pump system wherein the pump can be located in the vicinity of the liquid cargo and can be operated from a remote position.

Another object of the invention is to provide a hydraulic transmission system having a cargo discharge pump which can be operated at various speeds to accommodate fluids of varying weights and viscosity and which can be controlled by a control valve from a remote position.

Other objects and advantages of the invention will be apparent from the following description considered in conjunction with the accompanying drawings wherein:

FIG. 1 is a schematic diagram of the system of the present invention;

FIG. 2, a top plan view thereof;

FIG. 3, a side elevation of one side of the power plant;

FIG. 4, an enlarged side elevation of the other side; and,

FIG. 5, an enlarged fragmentary section on the line 5—5 of FIG. 2.

With reference to the drawings a power plant 10, such as an internal combustion engine or an electric motor, is provided having a drive shaft 11 connected to a double pump unit 12 through a clutch 13. The pump unit includes a pair of independent vane pumps 14 and 15 each of which is mounted on and driven simultaneously by the drive shaft 11. The pump 14 has a greater capacity than the pump 15, for example, pump 14 may have a capacity of 55 g.p.m. while pump 15 may have a capacity of 31 g.p.m., for a purpose which will be described later. The pumps 14 and 15 receive fluid from a common suction line 16 connected to a fluid reservoir or sump 17. If desired a strainer 18 may be disposed along the suction line 16 to remove any impurities from the fluid.

The pumps 14 and 15 are provided with fluid flow lines 19 and 20 respectively, which are connected to a common fluid flow line 21. Preferably, the fluid flow lines 19 and 20 each has a check valve 22 located adjacent to the connection to the common fluid flow line 21. The common flow line 21 carries fluid under pressure to the hydraulic motor 23 of a cargo pump 24 and such fluid is discharged from the motor through a fluid line 25 back to the reservoir 17. If desired the fluid line 25 can be connected to a pair of filters 26 which may be operated simultaneously or independently to remove any impurities from the system and prevent the ingress thereof into the reservoir 17.

Due to the nature of the various cargos it is desirable to operate the cargo pump 24 at various speeds and in order to do this fluid under pressure from either or both of the pumps 14 and 15 can be supplied to the hydraulic motor 23 and fluid from either or both of the pumps 14 and 15 can be diverted so that the fluid pumped thereby will not pass through such hydraulic motor. This is accomplished by connecting the fluid flow line 19 to a balanced piston type relief and unloading valve 27 by a fluid line 28 and connecting the fluid flow line 20 to a balanced piston type relief and unloading valve 29 by a fluid line 30. Such relief valves 27 and 29 are connected to the reservoir 17 by fluid discharge lines 31 and 32, respectively.

The relief and unloading valves 27 and 29 have vent lines 33 and 34, respectively, connected to a four-position control valve 35 which can be selectively operated in any desired manner. A fluid discharge line 36 connects the valve 35 with the fluid line 25. A pair of lightly spring loaded check valves 37 and 38 may be interposed in the vent lines 33 and 34 to make certain that the vent lines remain full of fluid since air in these lines would cause erratic, unresponsive control.

All marine vessels are required to comply to certain safety precautions and one of these requirements is the location of an exhaust fan 39 in the pump room which is operating before, during, and after the time that the cargo pump is in use, particularly when handling certain petroleum products. The fan 39 is driven by a fluid or hydraulic motor 40 having an inlet line 41 connected to the fluid line 21 and a discharge line 42 connected to the fluid line 25. The flow of fluid through the inlet line 41 is controlled by a cutoff valve 43 and a pressure compensated flow control valve 44. When fluid under pressure is caused to flow through the line 25, a small amount of such fluid is diverted into the inlet line 41 to operate the fan 39. When the control valve 35 causes fluid from the pumps 14 and 15 to bypass the hydraulic motor 23 a small amount of such fluid will pass through the check valves 22 with sufficient pressure to operate the hydraulic motor 40 to drive the fan 39. However, the pressure in the fluid line 21 is not sufficient to operate the hydraulic motor 23 due to the inertia of the cargo pump 24. In this manner the exhaust fan 39 will be operated at any time the power plant 10 is in operation regardless of the position of the control valve 35.

In the operation of the device, the power plant 10 rotates the pumps 14 and 15 to force fluid under pressure through fluid lines 19 and 20. Such fluid may pass through the check valves 22 into the common fluid line 21 or may be diverted through the relief and unloading valves 27 and 29 depending upon the condition of such valves. The control valve 35 regulates the valves 27 and 29 in such a manner that when the control valve is in the first position the vent of valve 27 will be open to relieve the pressure on one side of the piston of valve 27 and permit the valve to open thereby causing the fluid from pump 14 to bypass through the valve 27 and unload such fluid into the reservoir 17. The vent of valve 29 will be closed and fluid from the pump 15 will pass into the common fluid line 21 to drive the hydraulic motor 23 and cargo pump 24 at a relatively slow speed.

When the control valve 35 is in the second position (FIG. 2), the vents of both valves 27 and 29 will be open and permit most of the fluid under pressure to bypass the hydraulic motor 23 so that such hydraulic motor and cargo pump 24 will not operate. At the same time a small amount of pressure will pass through the check valves 22 into the common fluid line 21 to operate the hydraulic motor 40 and fan 39. In the third position, the vent of valve 27 will be open and the vent of

valve **29** will be closed so that fluid from the pump **14** will drive the hydraulic motor **23** at an intermediate speed. In the fourth position, the vents of both valves **27** and **29** will be closed so that fluid from both pumps **14** and **15** will drive the hydraulic motor **23** at a high speed.

It will be obvious to one skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is illustrated in the drawings and described in the specification, but only as indicated in the accompanying claims.

What is claimed is:

1. A hydraulic speed control system for discharging liquid cargo comprising a power plant, at least first and second fluid pumps driven simultaneously by said power plant, said first pump having a predetermined capacity, said second pump having a capacity less than said first pump, a fluid reservoir, at least one suction line connecting said first and second pumps with said reservoir, each of said first and second pumps having an independent fluid flow line, said fluid flow lines being connected to a common fluid flow line, a cargo pump driven by a fluid motor connected to said common fluid flow line, means for discharging fluid from said fluid motor to said reservoir, a first relief and unloading valve connected to the independent fluid flow line of said first pump, a second relief and unloading valve connected to the independent fluid flow line of said second pump, means for discharging fluid from said first and second relief and unloading valves to said reservoir, and a selectively operated control valve for controlling the position of said first and second relief and unloading valves, whereby either or both of said first and second pumps can supply fluid under pressure to said fluid motor to drive said fluid motor at varying rates of speed and either or both of said first and second pumps can bypass said fluid motor.

2. The structure of claim **1** including a fluid operated pump room exhaust fan having a second fluid motor, means for connecting said second fluid motor to said common fluid flow line, and means for connecting said second fluid motor to said means for discharging fluid from said first fluid motor, whereby said second fluid motor will be operated when said first fluid motor is operated.

3. The structure of claim **1** including means for discharging fluid from said control valve to said reservoir.

4. The structure of claim **1** in which said means for discharging fluid from said fluid motor is provided with a pair of filters which can be operated independently or simultaneously.

No references cited.

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