

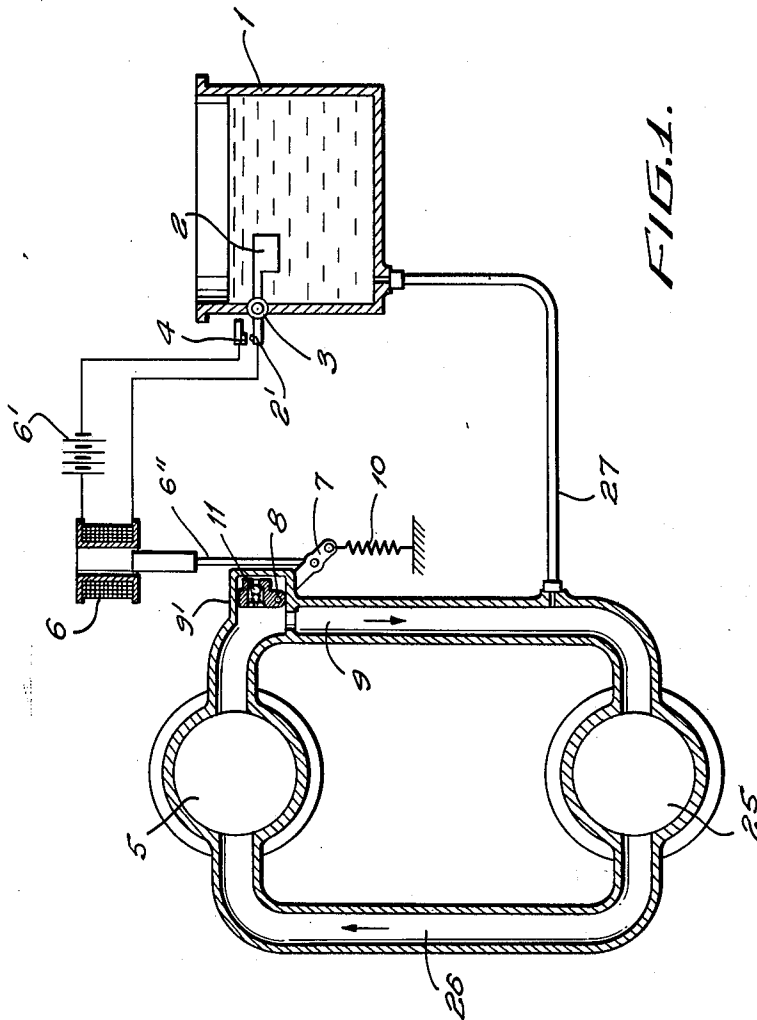
April 14, 1953

T. KLATTE ET AL
HYDRAULIC DRIVE

2,634,582

Filed June 19, 1951

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

FIG. 4.

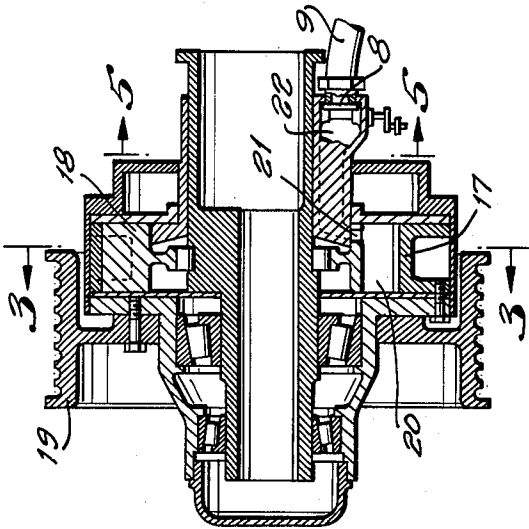


FIG. 5.

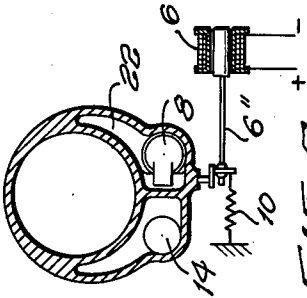


FIG. 2.

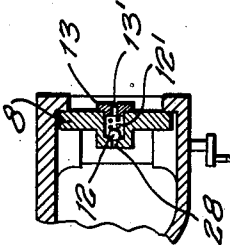
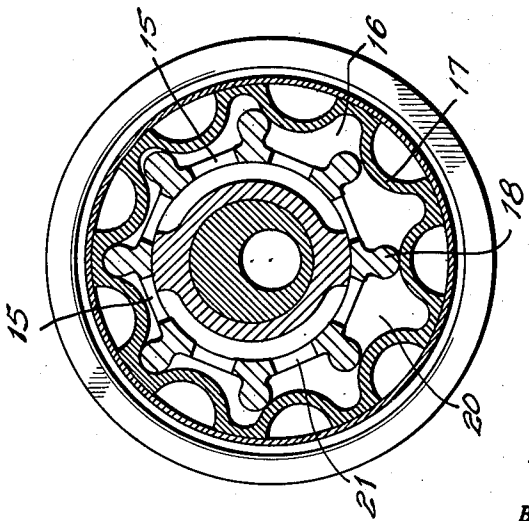


FIG. 3.



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UNITED STATES PATENT OFFICE

2,634,582

HYDRAULIC DRIVE

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11 Claims. (Cl. 60—53)

1

The present invention relates to a hydraulic drive, and more particularly to a safety device for a hydraulic drive of the type in which the fluid engine is coupled and braked by valves arranged in the fluid engine.

In hydraulic drives of this type it is often imperative that the fluid engine is reliably braked, for instance when the engine drives a hoisting apparatus. However, the braking device becomes ineffective if a conduit of the hydraulic drive breaks, or if too much fluid is lost on account of leaking.

It is the object of the present invention to obtain a reliable operation of a hydraulic drive by means of a safety device which stops or brakes the fluid engine when a break or leakage occurs in one of the conduits of the hydraulic drive.

It is another object of the present invention to provide in the return conduit of a hydraulic drive a shut-off valve controlled and actuated by the variations of the fluid conditions in a reservoir communicating with the conduits of the hydraulic drive.

It is a further object of the present invention to provide a safety valve in a shut-off valve in order to prevent excessive pressure when the shut-off valve is closed suddenly.

It is a still further object of the present invention to provide a safety valve which operates independently of the speed of rotation of the fluid engine which it is protecting.

With these objects in view a hydraulic drive, according to the present invention, mainly comprises a fluid pump and a fluid engine, each having an intake port and a discharge port, and being operated by a working fluid, supply conduit means connecting the discharge port of the fluid pump with the intake port of the fluid engine for transporting the working fluid from the fluid pump to the fluid engine, return conduit means connecting the discharge port of the fluid engine with the intake port of the fluid pump for transporting the working fluid from the fluid engine to the fluid pump, shut-off valve means located in the return conduit means adjacent to the discharge port of the fluid engine and being movable between two positions, namely, an open position permitting free passage of the working fluid through the return conduit means and a closing position closing the return conduit means, reservoir means for containing a predetermined amount of the working fluid, connecting conduit means connecting the reservoir means with a point of the return conduit means located between the shut-off valve means and the intake

2

port of the fluid pump permitting flow of the working fluid from the return conduit into the reservoir means and back, and control means operatively connected to the shut-off valve means for operating the same and actuated by the variations of the fluid conditions in the reservoir means so as to move the shut-off valve means into closing position when fluid flows out of the reservoir means through the conduit means into the return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

According to a preferred embodiment of the present invention the safety device is part of a hydraulic drive including a fluid pump and a fluid engine, each having an intake port and a discharge port, and being operated by a working fluid, supply conduit means connecting the discharge port of the fluid pump with the intake port of the fluid engine for transporting the working fluid from the fluid pump to the fluid engine, and return conduit means connecting the discharge port of the fluid engine with the intake port of the fluid pump for transporting the working fluid from the fluid engine to the fluid pump, and comprises in combination, shut-off valve means located in the return conduit means adjacent to the discharge port of the fluid engine and being movable between two positions, namely, an open position permitting free passage of the working fluid through the return conduit means and a closing position closing the return conduit means, reservoir means for containing a predetermined amount of the working fluid, connecting conduit means connecting the reservoir means with a point of the return conduit means located between the shut-off valve means and the intake port of the fluid pump permitting flow of the working fluid from the return conduit into the reservoir means and back, and control means operatively connected to the shut-off valve means for operating the same and actuated by the variations of the fluid conditions in the reservoir means so as to move the shut-off valve means into closing position when fluid flows out of the reservoir means through the conduit means into the return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be

best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a diagrammatic sectional view through a hydraulic drive provided with a safety device according to a preferred embodiment of the present invention;

Fig. 2 is a partial cross-sectional view showing a shut-off valve on a large scale;

Fig. 3 is a cross-sectional view through the fluid engine of the hydraulic drive taken on line 3—3 of Fig. 4;

Fig. 4 is a longitudinal sectional view through the fluid engine of the hydraulic drive; and

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 4.

Referring now to the drawings, Fig. 1 shows a fluid reservoir 1 in which a float 2 is arranged for rotation about a pivoting point 3 by means of a lever 2'. One end of the lever 2' is projecting out of the reservoir and operates a contact 4 according to the movements of the float 2. When the contact 4 is closed the circuit of the battery 6' is closed and the electro-magnet 6 is operated. A connecting conduit 27 connects the reservoir 2 with a point of the return conduit 9 adjacent to the fluid pump 25. A supply conduit 26 connects the fluid pump 25 with the fluid engine 5. The discharge port of the fluid engine 5 is connected to the return conduit 9, which is provided with a recessed portion 9' adjacent to the discharge port of the fluid engine. A shut-off valve 8 is pivotally mounted in the recess 9' movable between an open position located in recess 9' and permitting free flow in the return conduit 9, and a closed position transversal to the axis of the return conduit and closing the same. A pivotally mounted lever 7, secured to the valve 8, is actuated by a spring 10 to move the shut-off valve 8 in clockwise direction and to hold it in open position. The electro-magnet 6 is operatively connected to the lever 7 by means of a rod 6'' in such manner that when contact 4 is closed, lever 7 is turned counterclockwise against the action of spring 10 by rod 6'', whereby the shut-off valve 8 is turned counterclockwise and closed.

In the event that a leakage occurs in the hydraulic drive, fluid contained in the reservoir 1 flows through conduit 27 into the return conduit 9 and the level in the reservoir 1 drops. As soon as the level in the reservoir drops below the predetermined level of the float 2 the contact 4 is closed by means of lever 2', and electro-magnet 6 closes the shut-off valve 8.

In the event that the return conduit 9 breaks, which may occur when the fluid engine is braked, the level in reservoir 1 sinks rapidly and the shut-off valve 8 is actuated immediately whereby the fluid engine is stopped and an accident caused by sudden dropping of a load carried by a hoisting apparatus driven by the fluid engine may be avoided.

Reservoir 1 also performs a function as a balancing container and receives through conduit 27 any excess amount of fluid developing when the fluid circulating in the hydraulic drive expands owing to a raise of temperature.

If the quantity of fluid delivered by the fluid engine is very large, intolerably high pressure may develop when the shut-off valve is suddenly closed owing to a break in the conduit system.

A small passage could be provided in the shut-off valve permitting a small amount of fluid to pass through in closed position of the shut-off

valve in order to prevent excess pressure. This arrangement would have the disadvantage that the braking power of the fluid engine would then be dependent on the speed of rotation of the fluid engine at the moment in which the shut-off valve was closed.

According to a preferred embodiment of the present invention a spring loaded safety valve is provided in the shut-off valve in order to prevent excess pressure when the shut-off valve is suddenly closed whereby the above-described disadvantage of an uncontrolled passage through the shut-off valve is overcome.

The safety valve is preferably constructed as a ball valve 11 as shown in Figs. 1 and 2. After closure of the shut-off valve 8 the ball 12, which is pressed by spring 12' towards the valve seat 28, is moved by the fluid pressure in the fluid engine against the action of spring 12' away from valve seat 28 permitting flow of fluid through valve seat 28 and the bore 13' in the member 13 into the return conduit. The construction of the safety valve is such that the velocity of the fluid passing through the openings 28 and 13' is low, and that the pressure of the spring 12' increases only little when it is depressed by the movement of the ball 12. This results in a braking action which is almost independent of the speed of rotation of the fluid engine.

Figs. 3 and 4 show a fluid engine which may be used for driving a cable drum or a hoisting apparatus by means of a pulley 19. The fluid enters the fluid engine through intake port 14 and flows through slots 15 provided in the inner wheel 13 into the chambers 20 between inner wheel 13 and outer wheel 17. Chambers 20 diminish in size on rotation of the wheels 17 and 13, and press the fluid contained therein through slots 21 into the discharge port 22. Adjacent thereto the shut-off valve 8 is arranged. The fluid flows through conduit 9 to the fluid pump, or through connecting conduit 27 to the reservoir as long as shut-off valve 8 is open.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of safety devices for a hydraulic drive differing from the type described above.

While the invention has been illustrated and described as embodied in a shut-off valve provided with a safety valve and arranged in the return conduit of a hydraulic drive, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid

5

engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; and control means operatively connected to said shut-off valve means for operating the same and actuated by the variations of the fluid conditions in said reservoir means so as to move said shut-off valve means into closing position when fluid flows out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

2. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; and control means operatively connecting said float means and said shut-off valve means and actuated by the movement of said float means so as to move said shut-off valve means into closing position when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

3. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge

6

port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

4. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means; means urging said shut-off valve means into said open position; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; and control means operatively connecting said float means and said shut-off valve means and actuated by the movement of said float means so as to move said shut-off valve means into closing position when the level of the fluid contained in said reservoir means drop as a result of working fluid flowing out of said reservoir means through said connecting conduit means into said return conduit means

in the event that part of the working fluid circulating in the hydraulic drive is lost.

5. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means; spring means urging said shut-off valve means into said open position; reservoir means for containing a predetermined amount of said working fluid; connecting means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position against the action of said spring means when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

6. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means, said shut-off valve means being provided with a passage; a spring loaded safety valve located in said passage in said shut-off valve means and closing the same, but permitting said passage to open when the fluid pressure of said hydraulic engine exceeds a predetermined maximum pressure; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located be-

tween said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; and control means operatively connected to said shut-off valve means for operating the same and actuated by the variations of the fluid conditions in said reservoir means so as to move said shut-off valve means into closing position when fluid flows out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

7. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means, said shut-off valve means being provided with a passage; a safety valve located in said passage in said shut-off valve means and including a ball-shaped closure member movable between a closing position seated on a valve seat in said passage and an open position permitting working fluid to pass through said passage in said shut-off valve, and a spring urging said closure member into said closing position but being adjusted so as to permit said working fluid to move said ball-shaped closure member into said open position when the fluid pressure of said hydraulic engine exceeds a predetermined maximum pressure; spring means urging said shut-off valve means into said open position; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position against the action of said spring means when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said conduit connecting means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

8. A hydraulic drive, comprising in combination, a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid; supply

9

conduit means connecting said discharge port of said fluid pump with said intake port of said fluid engine for transporting said working fluid from said fluid pump to said fluid engine; return conduit means connecting said discharge port of said fluid engine with said intake port of said fluid pump for transporting said working fluid from said fluid engine to said fluid pump; shut-off valve means located in said return conduit means adjacent to the discharge port of said fluid engine and being movable between two positions, namely, an open position permitting free passage of said working fluid through said return conduit means and a closing position closing said return conduit means, said shut-off valve means being provided with a passage; a safety valve located in said passage in said shut-off valve means and including a ball-shaped closure member movable between a closing position seated on a valve seat in said passage and an open position permitting working fluid to pass through said passage in said shut-off valve, and a spring urging said closure member into said closing position but being adjusted so as to permit said working fluid to move said ball-shaped closure member into said open position when the fluid pressure of said hydraulic engine exceeds a predetermined maximum pressure; spring means urging said shut-off valve means into said open position; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of said return conduit means located between said shut-off valve means and said intake port of said fluid pump permitting flow of said working fluid from said return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein, and including a lever pivotally mounted in the wall of said reservoir means and projecting out of said reservoir means; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said lever of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position against the action of said spring means when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said connecting conduit means into said return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

9. In a hydraulic drive including a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid, supply conduit means connecting the discharge port of the fluid pump with the intake port of the fluid engine for transporting the working fluid from the fluid pump to the fluid engine, and return conduit means connecting the discharge port of the fluid engine with the intake port of the fluid pump for transporting the working fluid from the fluid engine to the fluid pump, in combination, a safety device comprising shut-off valve means located in the return conduit means adjacent to the discharge port of the fluid engine and being movable between two positions, namely, an open position permitting free passage of the working fluid through the return conduit means and a closing

10

ing position closing the return conduit means; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of the return conduit means located between said shut-off valve means and the intake port of the fluid pump permitting flow of the working fluid from the return conduit into said reservoir means and back; and control means operatively connected to said shut-off valve means for operating the same and actuated by the variations of the fluid conditions in said reservoir means so as to move said shut-off valve means into closing position when fluid flows out of said reservoir means through said connecting conduit means into the return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

10. In a hydraulic drive including a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid, supply conduit means connecting the discharge port of the fluid pump with the intake port of the fluid engine for transporting the working fluid from the fluid pump to the fluid engine, and return conduit means connecting the discharge port of the fluid engine with the intake port of the fluid pump for transporting the working fluid from the fluid engine to the fluid pump, in combination, a safety device comprising shut-off valve means located in the return conduit means adjacent to the discharge port of the fluid engine and being movable between two positions, namely, an open position permitting free passage of the working fluid through the return conduit means and a closing position closing the return conduit means; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of the return conduit means located between said shut-off valve means and the intake port of the fluid pump permitting flow of the working fluid from the return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of the level of the working fluid contained therein; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said conduit means into the return connecting conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

11. In a hydraulic drive including a fluid pump and a fluid engine, each having an intake port and a discharge port, said fluid engine being operated by a working fluid, supply conduit means connecting the discharge port of the fluid pump with the intake port of the fluid engine for transporting the working fluid from the fluid pump to the fluid engine, and return conduit means connecting the discharge port of the fluid engine with the intake port of the fluid pump for transporting the working fluid from the fluid engine to the fluid pump, in combination, a safety device comprising shut-off valve means located in the return conduit means adjacent to the discharge port of the fluid engine and being mov-

11

able between two positions, namely, an open position permitting free passage of the working fluid through the return conduit means and a closing position closing the return conduit means, said shut-off valve means being provided with a passage; a safety valve located in said passage in said shut-off valve means and including a ball-shaped closure member movable between a closing position seated on a valve seat in said passage and an open position permitting working fluid to pass through said passage in said shut-off valve, and a spring urging said closure member into said closing position but being adjusted so as to permit the working fluid to move said ball-shaped closure member into said open position when the fluid pressure of the hydraulic engine exceeds a predetermined maximum pressure; spring means urging said shut-off valve means into said open position; reservoir means for containing a predetermined amount of said working fluid; connecting conduit means connecting said reservoir means with a point of the return conduit means located between said shut-off valve means and the intake port of the fluid pump permitting flow of the working fluid from the return conduit into said reservoir means and back; float means arranged in said reservoir means for movement according to variations of

12

the level of the working fluid contained therein, and including a lever pivotally mounted in the wall of said reservoir means and projecting out of said reservoir means; electro-magnet means operatively connected to said shut-off valve means; and electric contact means arranged in the circuit of said electro-magnet means and actuated by the movement of said lever of said float means for energizing said electro-magnet means so as to move said shut-off valve means into closing position against the action of said spring means when the level of the fluid contained in said reservoir means drops as a result of working fluid flowing out of said reservoir means through said connecting conduit means into the return conduit means in the event that part of the working fluid circulating in the hydraulic drive is lost.

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