United States Patent [19]

Schwandt et al.

[11] **3,795,108**

[45] **Mar. 5, 1974**

[54] **PRESSURE FLUID DRIVE SYSTEMS FOR MINE INSTALLATIONS**

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[22] Filed: **Feb. 4, 1972**

[21] Appl. No.: **223,422**

[30] **Foreign Application Priority Data**

Feb. 11, 1971 Germany ..... P 21 06 444.8

[52] **U.S. Cl.** **60/484,** 60/486, 60/DIG. 5, 60/DIG. 10

[51] **Int. Cl.** **F15b 15/18,** F16h 39/02

[58] **Field of Search** 60/421, 464, 484, 486, DIG. 5, 60/97 P, DIG. 10

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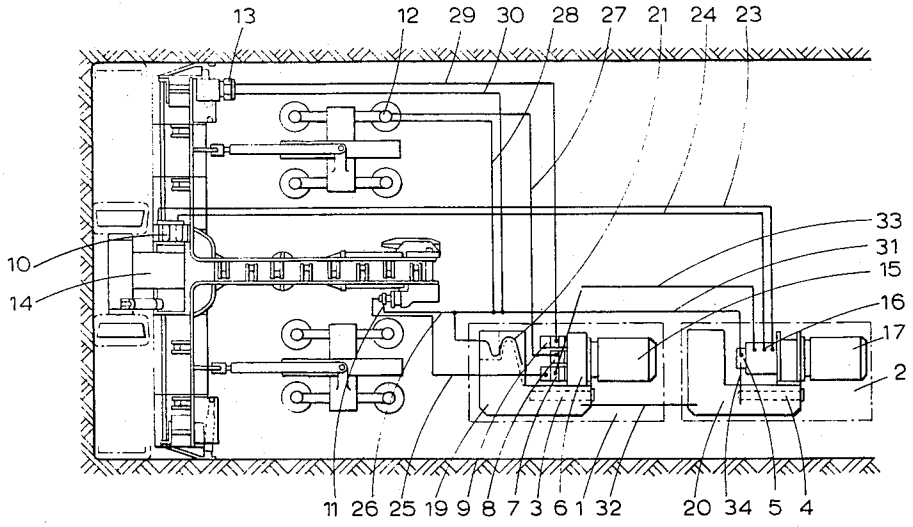
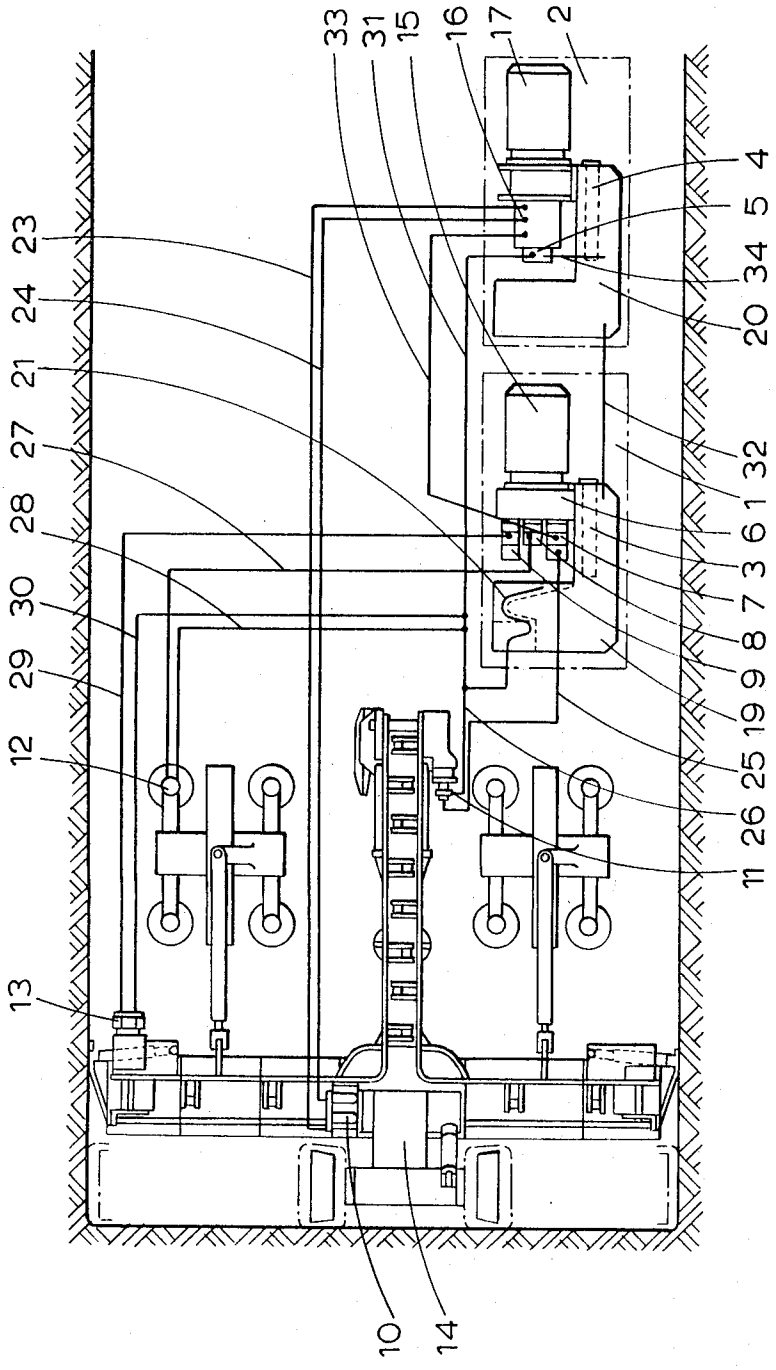
[57] **ABSTRACT**

A pressure fluid drive system for supplying pressure fluid to a number of different hydraulically-operated appliances in a mine working. The system employs two hydraulically interconnected pump units each having one or more pumps providing a plurality of pressure fluid outlets and a vessel containing a supply of pressure fluid for the pumps. Each of the outlets from the pumps is available for independently driving one of the appliances. One of the units has an additional pump used to circulate pressure fluid between the vessels of the pump units; the vessels of the units being directly interconnected via a conduit. Each pump unit has a device for cooling the fluid in the vessel and there is also provided a device for removing air from the fluid returned to the vessel of one of the units.

4 Claims, 1 Drawing Figure

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PRESSURE FLUID DRIVE SYSTEMS FOR MINE INSTALLATIONS

BACKGROUND TO THE INVENTION

The present invention relates to mineral mining installations and more particularly to pressure fluid drive systems for use in such installations.

In mineral mines it is known that installations sited, for example, in heading or drift galleries have various appliances including the actual mining, i.e., cutting machines which have to be powered. In most cases these appliances are powered hydraulically and hitherto it has been common practice to provide pumps for supplying fluid to the appliances with one pump supplying just one appliance or at most two appliances. Each pump thus employed is thus usually independently associated with a single appliance. Each pump has to have a vessel for containing a supply of pressure fluid for the pump and these supply vessels take up a large amount of space. This is especially disadvantageous in view of the restricted space available in mine workings.

A general object of the present invention is to provide an improved pressure fluid drive system.

SUMMARY OF THE INVENTION

According to the present invention there is provided a pressure fluid drive system comprising two separately operated pump units for supplying pressure fluid to different consuming appliances, each pump unit having at least one pump and a vessel for containing a supply of pressure fluid, the system additionally comprising a further pump for conveying pressure fluid between the vessels of said pump units.

Each pump unit preferably has a plurality of pressure fluid pump outlets.

Further, according to the invention, there is provided a mineral mining installation having a conveyor, a mineral cutting machine with a cutting device, roof support assemblies employing hydraulically-operated props, a hydraulically operated drive unit for driving the cutting device, a hydraulically operated drive unit for moving the machine, a hydraulically operated drive unit for operating the conveyor and a pressure fluid system for supplying pressure fluid to said drive units and the props, the pressure fluid system comprising two separately operated pump units, each having at least one pump with a plurality of pressure fluid outlets and a vessel for containing a supply of pressure fluid, one of the pump units being connected to supply pressure fluid to the drive unit for moving the machine, to the drive unit for operating the conveyor and to the props, while the other of the pump units is connected to supply pressure fluid to the cutting device; the other of the pump units having a further pump adapted to circulate pressure fluid between the vessels of the pump units.

The aforesaid vessels are preferably designed to have the minimum capacity, commensurate with the performance required and the system enables the maximum performance to be achieved in the minimum of space. A number of appliances, typically up to eight, can be operated by the two pump units. By adopting vessels of minimum capacity however the pressure fluid has little time to settle before it is returned to the appliance in question. Thus to avoid overheating preferably each pump unit is provided with a device for cooling the pressure fluid.

The vessels can each be typically of 1,030 litres in capacity and the further pump serving to circulate pressure fluid between the vessels can have a rating of 860 litres per minute.

Each pump unit may have a drive motor, preferably electrically powered, for driving the pump or pumps therein. In a preferred construction the drive motor of one of the pump units operates three pumps each having a plurality of pressure fluid outlets, the motor being coupled to said pumps via gearing. One of these three pumps may be a reciprocating-piston type pump. Also in this preferred construction the drive motor of the other of the pump units operates a reciprocating-piston type pump, constituting said at least one pump, and operates said further pump. Preferably an outlet of one of said three pumps of said one pump unit is connected to the reciprocating-piston pump of the other of the pump units via pressure fluid conduit. This enables a quantity of pre-pressurized fluid to be fed to the reciprocating-piston pump in order to compensate for leakage and ensure an adequate supply of fresh fluid. The flow of fluid to the pump in question may amount to about 56 litres per minute.

The further pump used to circulate fluid between the pump units may in fact convey pressure fluid from the vessel of the other of the pump units to the vessel of said one pump unit and the vessels of the pump units are preferably interconnected by means of a pressure fluid conduit.

According to another feature of the invention the system is additionally provided with a device for removing air from pressure fluid returned to the vessel of one of the pump units.

The invention may be understood more readily and various other features of the invention may become more apparent from consideration of the following description.

BRIEF DESCRIPTION OF DRAWING

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawing; which is a diagrammatic representation of a pressure fluid drive system made in accordance with the invention.

DESCRIPTION OF PREFERRED EMBODIMENT

As shown in the drawing the system has two self-contained pump units denoted **1** and **2.** The pump unit **1** is composed of an electric drive motor **15** coupled via intermediate gearing contained in a gear-box **6** to two hydraulically geared pumps **7, 9.** The pumps **7, 9** each have three operating stages or sections providing three outlets of pressure fluid. In addition, the motor **15** drives a further pump **8** employing a reciprocating piston. The unit **1** has in addition, a vessel **19** containing the supply of pressure fluid, a device **21** for removing air from the pressure fluid returned to the vessel **19** and a device **3** for cooling the pressure fluid.

The pump unit **2** is composed of an electric drive motor **17** coupled via gearing to a hydraulically geared pump **5** and to a further pump **16** employing a reciprocating piston. The unit **2** also employs a vessel **20** containing the supply of pressure fluid and a device **4** for cooling the pressure fluid.

Also ahown in the drawing is a mineral mining machine **14** employing a rotary cutting device operated by a hydraulically-driven unit **10.**

The machine **14** is moved along the mineral face by means of a hydraulically-driven drive unit **13.** A conveyor extends up to the machine **14** and the conveyor employs a circulated scraper chain assembly driven by means of a hydraulically-driven drive unit **11.**

The mining installation further employs roof support assemblies with hydraulically-operated props **12.**

The various hydraulic fluid consuming appliances **10, 13, 14, 11** and **12** are supplied with pressure fluid from the units **1, 2.** More particularly, the pump **16** is connected to the drive unit **10** via a pressure fluid supply conduit **23** and a pressure fluid return conduit **24.** One outlet from the pump **9** is connected to the drive unit **13** via a pressure fluid supply conduit **29** and a pressure fluid return conduit **30** extends from the unit **13** to the vessel **19.** Although not shown in the drawing another outlet from the pump **9** could conveniently supply fluid to a drilling machine.

The pump **8** is connected to the props **12** via a pressure fluid supply conduit **27** and for clarity the connection to only one of the props **12** is illustrated. The props **12** are connected through a pressure fluid return conduit **28** to the vessel **19** and again only one return conduit **28** has been shown. One of the outlets from the pump **7** is connected to the drive unit **11** via a pressure fluid supply conduit **25** and a pressure fluid return conduit **26** extends from the unit **11** to the vessel **19.**

Another of the outlets from the pump **7** feeds a quantity of pre-pressurized pressure fluid to the pump **16** via a conduit **33** in order to compensate for leakage.

The pump **5** acts to circulate pressure fluid from the vessel **20** to the vessel **19.** To this end there is provided a pressure fluid conduit **34** which extends from the pump **5** to the vessel **20,** and acts to draw fluid from the vessel **20** into the pump **5** by suction, and a pressure fluid conduit **31** which extends from the pump **5** to the vessel **19** and conveys pressure fluid thereto. The vessels **19, 20** are linked by a conduit **32.** The pump **5** acts to convey fluid through the conduits **34, 31** which act serially as a pressure fluid supply conduit, and fluid is returned from the vessel **19** to the vessel **20** through the conduit **32** which acts as a return conduit. The return conduits **28, 30** and **26** are connected to the conduit **31** and the conduit **31** is connected via the air removal device **21** to the vessel **19.** In this way most of the returning fluid is passed through the device **21.**

The preferred system as described can in fact drive some eight separate pressure fluid consuming units although in this particular example only five such units are utilized.

We claim:

1. In a mineral mining installation having fluid pressure operated appliances, a fluid pressure drive system comprising:

first and second separately operated pumping units each comprising a motor, at least one pump having a plurality of outlets, gearing drivably connecting said motor to said pump, a vessel for storing pressure fluid for said pump, and a device for cooling fluid pressure,

first conduit means connecting the outlets of said pump of the first pumping unit to a first set of said appliances, second conduit means connecting the outlets of said pump of the second pumping unit to a second set of said appliances, an auxiliary pump in said first pumping unit, third conduit means connecting said auxiliary pump between the storage vessels of said pumping units, and a fluid pressure return conduit interconnected between said storage vessels.

2. The mining installation of claim **1** wherein the motor in each pumping unit is electrically powered.

3. The mining installation of claim **1** wherein the motor in the second pumping unit drives three pumps.

4. The mining installation of claim **3** wherein one of said three pumps is of the reciprocating piston type.

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