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[56]

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[54] METERING DEVICES

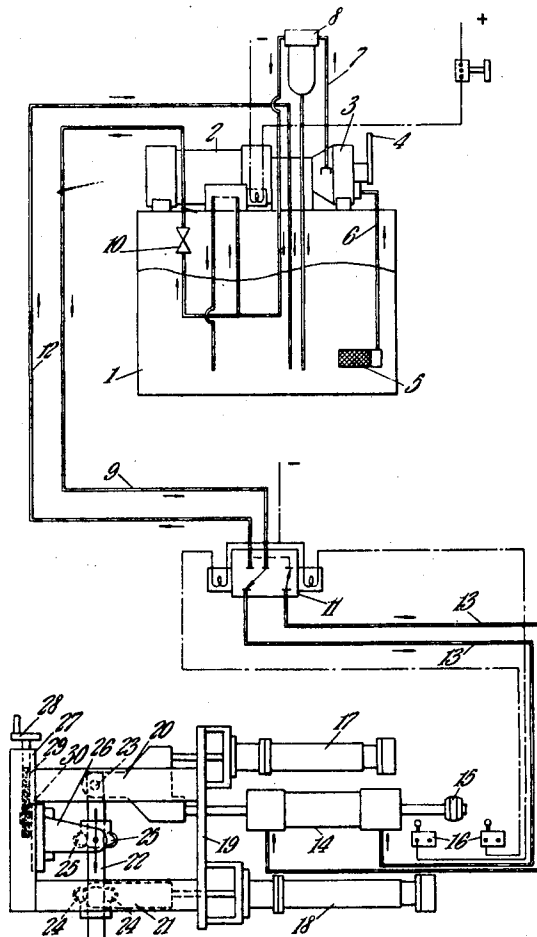
5 Claims, 1 Drawing Fig.

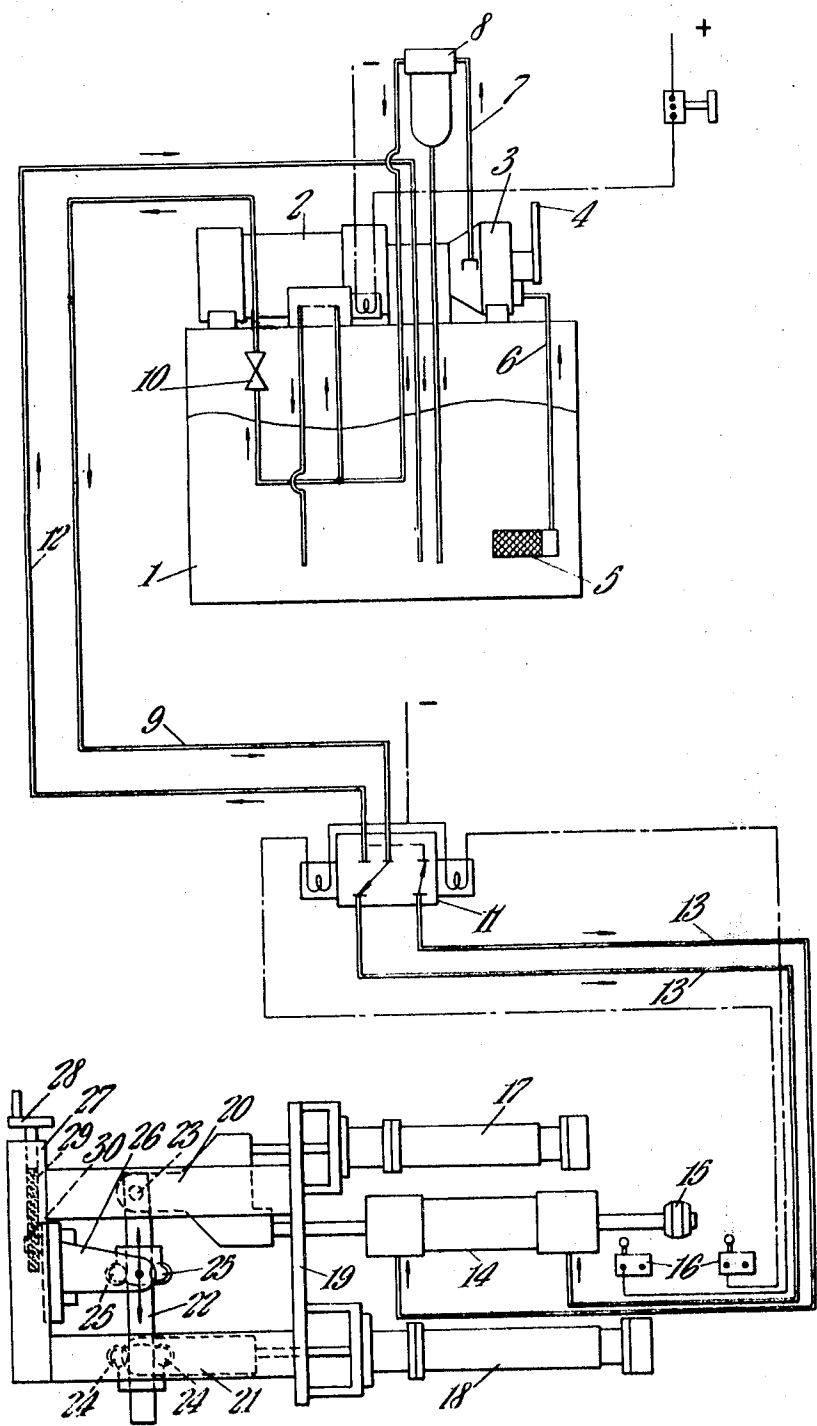
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ABSTRACT: A metering device for delivering two or more materials in predetermined ratios and at predetermined rates, which is unaffected by changes in viscosity and operating pressure. The device comprising a positive displacement delivery pump for each material, an hydraulic ram for driving the said delivery pumps at predetermined relative speeds, and a variable delivery hydraulic pump for driving the ram at a predetermined speed. In the case when two delivery pumps are provided they may be connected by a rocking member having a variable fulcrum to vary the relative speeds of the delivery pumps.





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METERING DEVICES

The invention relates to metering devices for delivering amounts of two or more materials in predetermined ratios and at predetermined rates.

The metering device according to the invention is widely applicable in the metering of liquid and flowable materials and has particular use where the materials are viscous liquids.

A difficulty in previous and existing metering devices of this type is the lack of inaccurate control of the actual rates of delivery of the materials, particularly if the operating pressure and/or viscosity is likely to vary.

The present invention consists in a metering device for delivering two or more materials characterized in that it comprises a positive displacement delivery pump for each material, an hydraulic ram for driving the said delivery pumps at predetermined relative speeds, and a variable delivery hydraulic pump for driving the ram at a predetermined speed.

Preferably, the output of the variable delivery hydraulic pump is adjustable by manual control.

Conveniently, in the case of two delivery pumps, the delivery pumps are connected by a rocking member having a variable fulcrum to vary the relative speeds of the delivery pumps.

The invention will be further described with reference to the accompanying diagrammatic drawing which illustrates a preferred embodiment of the invention.

The drawing shows an hydraulic power pack comprising a reservoir 1 on which is mounted a synchronous electric motor 2 which drives a variable delivery pump 3, of which the output is adjustable by means of a manual lever 4. The pump 3 draws liquid from the reservoir 1 through a filter 5 and line 6 and delivers it by line 7 to a relief valve 8. From the valve 8 the liquid is normally delivered to an output line 9 including a shut-off valve 10. The line 9 delivers to a solenoid-operated changeover valve 11. A return from the valve 11 to the reservoir is provided in the form of a return line 12.

From the valve 11, two lines 13 run to opposite ends of a double-acting hydraulic ram 14. An extension 15 from one end of the ram 14 cooperates with limit microswitches 16 to reverse the operation of the ram at the ends of the stroke by changing over the valve 11.

A pair of delivery pumps 17 and 18, which are also double acting and of positive displacement type, are mounted on a common frame member 19 and driven by means of slides 20 and 21 mounted in further frame members and interconnected by a rocking member 22 which is pivoted at 23 to the slide 20 and cooperates with rollers 24 mounted on the slide 21. A variable fulcrum is provided for the rocking member 22 by means of rollers 25 mounted between a pair of trunnions 26

slidably mounted on frame member 27 and adjustable thereon by means of a handwheel 28 carrying a lead screw 29 cooperating with a captive nut 30 mounted on the trunnion 26.

The slide 20 is directly driven by the ram 14 so that there is a direct correlation between the output of the pump 17 and the output of the pump 3. The output of the pump 18 is related to the output of the pump 17 in variable manner depending on the position of the rollers 25.

The relative outputs between the pumps 17 and 18 is thus set by means of the handwheel 28, and the actual output of the pump 17 is then set by means of the lever 4 controlling the output of the variable delivery pump 3.

The particular advantage of the system described is that the use of a variable delivery pump, with an accurately controlled delivery, renders the outputs of the delivery pumps 17 and 18 independent of the operating pressure, which depends on the viscosity of the components to be pumped, and which may vary under varying ambient conditions.

Various modifications may be made within the scope of the invention.

I claim:

1. In a metering device for delivering at least two materials in a predetermined ratio and at predetermined rates: the improvement which comprises, a separate positive displacement delivery pump for each respective one of at least two materials to be delivered in predetermined volume ratios and at predetermined rates, a rockable member operably connecting the delivery pumps, means defining a fulcrum for the rockable member means connected to the said means defining the fulcrum for varying the position of the fulcrum to vary the relative speeds of the delivery pumps, a hydraulic ram driving the delivery pumps at relative speeds determined by the position of the fulcrum, a variable delivery hydraulic pump for driving the ram at a predetermined speed, and conduit means connecting the variable delivery pump to said hydraulic ram.

2. In a metering device according to claim 1, in which the first-mentioned pumps comprise two pumps, and including means connecting said first-mentioned pumps to said means defining the fulcrum at fixed positions spaced from each other and disposed on opposite sides of said fulcrum.

3. In a metering device according to claim 1, manual control means for varying the output of the variable delivery hydraulic pump.

4. In a metering device according to claim 1, a synchronous electric motor driving said variable delivery hydraulic pump at a constant speed.

5. In a metering device according to claim 1, means connecting one of the first-mentioned pumps to said ram for joint movement therewith.

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