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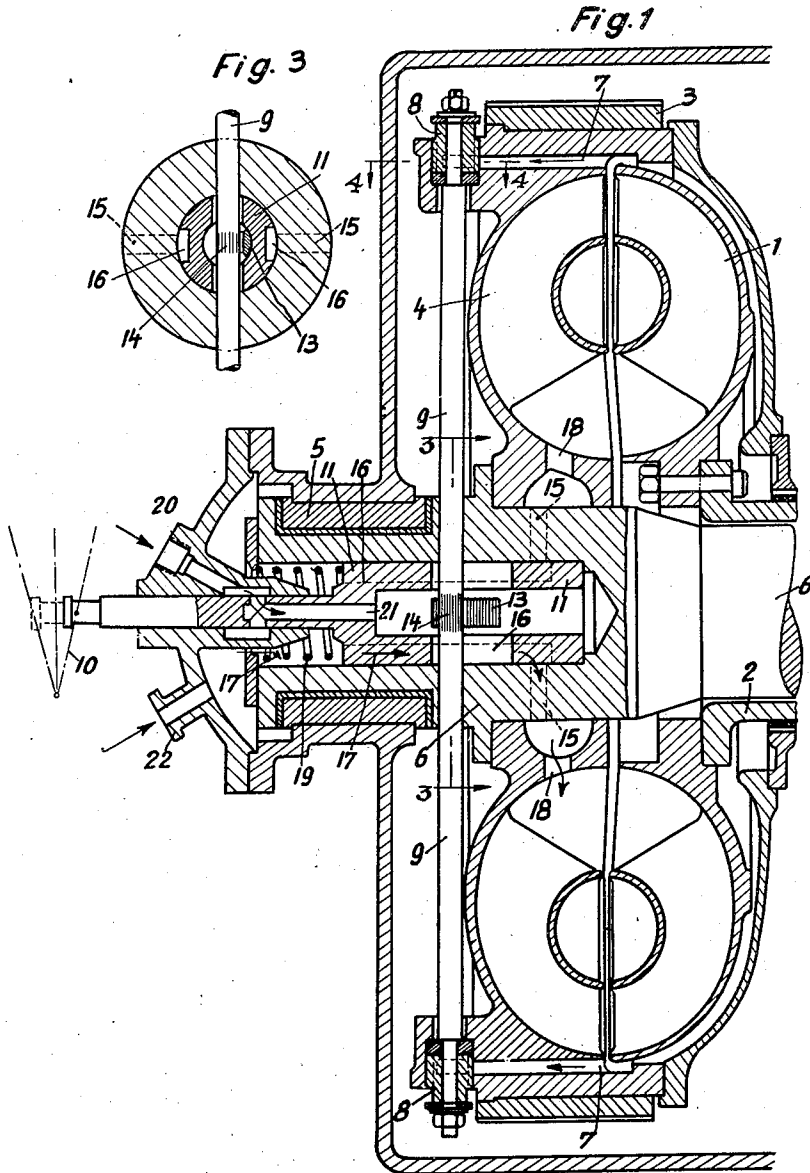
C. SCHMIESKE

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EMPTYING DEVICE FOR LIQUID COUPLINGS

Filed Jan. 10, 1930

2 Sheets-Sheet 1



Carl Schmieske,
Inventor

by *H. J. M. M.*
Attorney.

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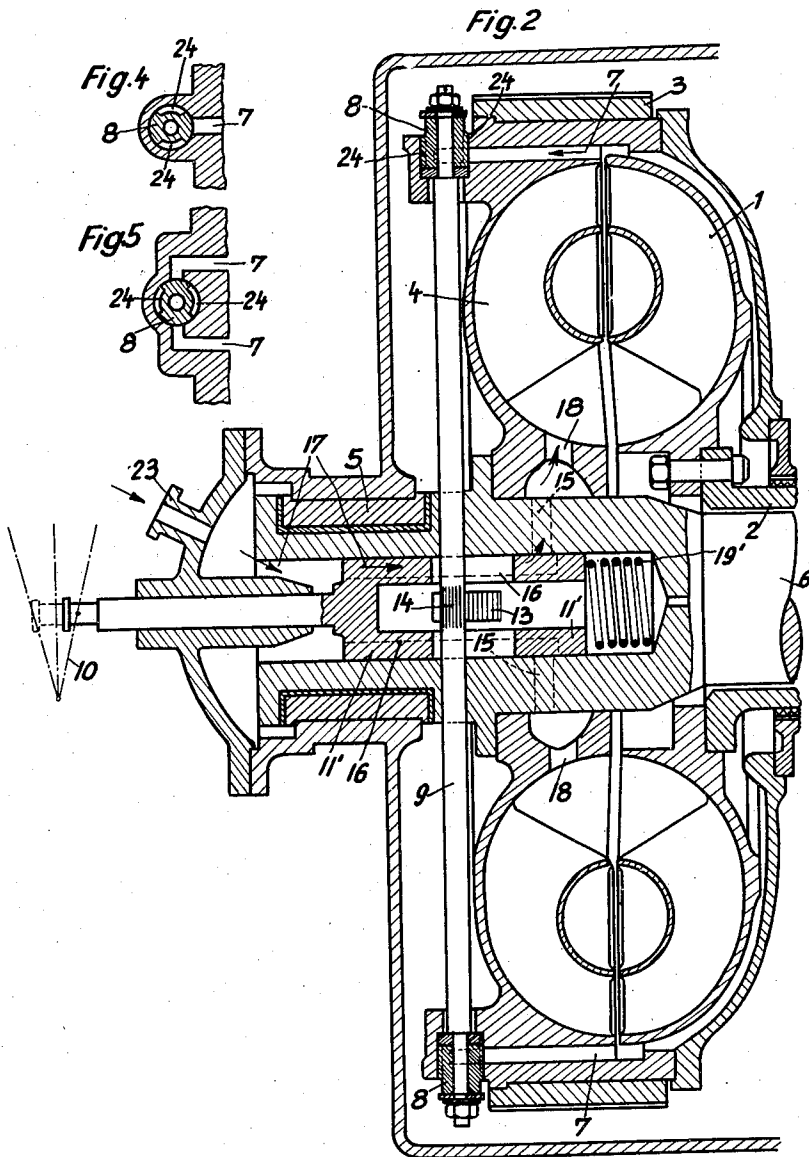
C. SCHMIESKE

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2 Sheets-Sheet 2



Carl Schmieske,
Inventor

by *W. H. McKinney*

Attorney.

UNITED STATES PATENT OFFICE

CARL SCHMIESKE, OF BREMEN, GERMANY, ASSIGNOR TO DEUTSCHE SCHIFF- UND MASCHINENBAU AKTIENGESellschaft, OF BREMEN, GERMANY, A CORPORATION OF GERMANY

EMPTYING DEVICE FOR LIQUID COUPLINGS

Application filed January 10, 1930, Serial No. 419,916, and in Germany January 3, 1929.

This invention relates to liquid couplings, liquid gearings or the like of the type disclosed and broadly claimed in the Föttinger Patent 1,199,359, and more particularly to that form in which there are apertures at the periphery permitting the discharge of liquid from the operating circuit. For controlling such discharge apertures, it has been proposed to provide a ring at the periphery of the liquid circuit and a control mechanism in the form of a lever or rod serving to displace said ring either in a tangential or in an axial direction.

In contra-distinction to the aforementioned known discharge controlling devices for liquid couplings, my present invention comprises essentially a closing device for each of the aforementioned discharge apertures, and a radially positioned actuating rod or spindle associated with each closing device.

As a further feature I provide a control mechanism for operating said spindle from the central part of the coupling shaft.

By means of my invention, the control of said closing devices is greatly simplified, the safety of operation is enhanced, and there is a considerable reduction in the amount of material and the weight of the control apparatus. This results in an essential reduction in cost as well as in the maintenance of the entire apparatus. The number of control members is materially reduced and both the actuating levers and ring encircling the periphery of the coupling are dispensed with.

A further advantage of my present construction is due to the fact that the rotating parts of the control devices do not come into direct contact with the fixed parts of the liquid coupling. This is of especial importance for the safety of operation. Actuating of the radially directed spindles may be accomplished by hand or by the aid of one or a plurality of control pistons which may be arranged on the coupling shaft or in immediate proximity thereto.

As a further feature of my invention, a combined manual and mechanical control may be provided effecting the emptying of the coupling. In order to further simplify the mode of control as well as the control apparatus, provisions may also be made for causing the control operating piston to simultaneously control the entrance apertures through which the liquid is filled into the circuit of the coupling. The control piston may be operated by means of pressure oil, compressed air or the like, or by means of spring power, and further provisions may be made for permitting operation of the spindle by means of oil under pressure for opening the discharge apertures and by means of spring power for closing said apertures, or vice versa.

A further object of my invention is to simplify the control mechanism and eliminate the necessity for any special plant for generating the pressure oil necessary for the control piston. I accomplish this by utilizing the operating liquid entering the circuit of the liquid coupling under pressure for the control of said piston.

In carrying out my invention the discharge openings of the liquid circuit are preferably controlled by operating the aforementioned spindle or spindles by means of one or a plurality of racks arranged within or upon said control piston. Operation of said spindle may however be effected by other means.

As an important advantage of my present invention the center of gravity of the discharge controlling mechanism is positioned in the central part of the shaft of the liquid coupling.

As a further important feature of my invention a separate control spindle may be provided for each discharge aperture, or each spindle may serve for operating the control devices for a pair of discharge apertures spaced 180° apart around the periphery of the coupling. In order to be able to con-

veniently actuate the closing devices for the discharge apertures by a rotary motion of the spindles, said control valves or closing devices are preferably constructed in the form of equilibrium valves. In case the closing valve or control device is in the form of a rotary valve, said valve may be provided with channels, bores or the like (for instance two) which are evenly distributed around the periphery of the valve body.

In the accompanying drawings I have shown only two examples of an apparatus constructed in accordance with my present invention.

In these drawings:

Fig. 1 is a longitudinal section through a liquid coupling embodying my invention.

Fig. 2 is a longitudinal section through a liquid coupling showing a different form which my invention may assume.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a section on the line 4—4 of Fig. 1, and

Fig. 5 is a section similar to Fig. 4, but showing an alternative form.

The coupling shown has the usual driving and driven members. The member 1 is carried by a hollow shaft 2 and the other member 4 is carried by a shaft 6 in a bearing 5. One of the members includes a casing enclosing the other and the periphery of the casing is provided with a gear member 3 for transmitting power to or from the shaft 2 through the liquid coupling. At the periphery of the member 4 there are provided the usual discharge apertures 7 for permitting the liquid to discharge from the liquid coupling. In carrying out my invention each of these discharge apertures 7 is provided with a separate closing device, for instance, in the form of a rotary valve 8 which may be operated by means of a spindle 9. In the specific construction and arrangement of the closing devices illustrated, these are actuated by rotation of said spindle 9.

The spindle 9 is operated by hand, for instance, by means of a hand lever 10, or also by power means, such for instance as, a control piston 11. Preferably both manual and power means are used. The control piston 11 is shown as arranged directly within a cylindrical bore of the shaft 6 of the liquid coupling, but this is not essential as the control piston and its cylinder may be arranged in other positions if desired, particularly if the shaft be of small diameter.

In the construction illustrated, the spindle 9 is rotated by means of a rack 13 mounted within the interior of the piston 11, said rack engaging with a toothed part 14 of the circumference of the spindle 9. Rotation or other operating movement of the spindle 9 may also be effected by other means.

As one feature the control piston 11 serves

also for controlling the aperture 15 through which the liquid is delivered to the coupling during filling. For this purpose the piston 11 is provided with two channels 16 extending in a longitudinal direction and through which the liquid may flow in the direction of the arrow 17 to the apertures 15 and 18 and into the liquid coupling, if said piston 11 is in proper position.

In order to open the discharge apertures 7 and simultaneously close the entrance apertures 15, the piston 11 is operated by pressure fluid, or the spindle 9 is operated by hand in the form shown in Fig. 1, while for closing the discharge apertures 7 and opening the entrance apertures 15 there is used a spring 19.

In Fig. 2 the control piston 11' and the spindle 9 are operated by means of a spring 19' for opening the discharge apertures, while closing of said apertures is effected by means of liquid pressure, lever 10 or the like.

In Fig. 1 the pressure liquid enters at a pipe connection 20 and passes through a channel 21 to the rear of the control piston 11. A separate pipe connection 22 is provided for the liquid used to fill the coupling, which, as above mentioned, flows in the direction of the arrow 17 through the channel 16 in the periphery of the control piston 11.

In Fig. 2 a common pipe connection stud 23 is provided for the filling liquid for the liquid coupling and for the pressure liquid of the control piston 11', that is to say, the operating liquid of the liquid coupling is used at the same time as a pressure liquid for the piston 11' which serves for controlling the entrance and discharge apertures.

In the construction shown in Fig. 2 there are shown two discharge apertures 7 spaced apart 180°, around the periphery of the liquid coupling. This permits the two discharge apertures to be controlled by means of a single spindle. Instead of using a single discharge aperture controlled by each valve 8 as shown in Fig. 4 there may be provided a plurality of such apertures 7 controlled by a single valve 8 as shown in Fig. 5. In Fig. 5 the controlling valve 8 is shown in the form of a rotary valve adapted to control simultaneously two discharge apertures 7. The liquid is discharged from said closing device or rotary valve 8 by means of ports 24. If a plurality of discharge apertures 7 are used with a common closing valve, the discharge apertures are uniformly distributed around the periphery of said valve. For instance the two discharge apertures 7 are shown in Fig. 5 as arranged opposite to each other, that is, displaced 180° apart on the circumference of the valve. In this way the rotary valve will be relieved of any strain, that is to say, it will act as an equilibrium valve and may be actuated with the least amount of power.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent is:

1. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said coupling having a liquid opening from said chamber at the periphery to permit emptying of said chamber, a rotatable valve having an axis extending radially with respect to the axis of the coupling, for closing said opening, a spindle extending radially of the coupling and connected to and coaxial with said valve for operating the latter, and means for rotating said spindle.

2. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said coupling having a liquid opening from said chamber at the periphery to permit emptying of said chamber, and a liquid inlet to permit filling of said chamber, a member for controlling said opening, a piston coaxial with the coupling and movable in an axial direction to control said liquid inlet, means for operatively connecting said last mentioned member and piston, and manual means for operating said piston.

3. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said coupling having a liquid opening from said chamber at the periphery to permit emptying of said chamber, a member for controlling said opening, a piston coaxial with the coupling and movable in an axial direction, means for operatively connecting said last mentioned member and piston, means for forcing said piston in one direction, and a spring for forcing it in the opposite direction.

4. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said coupling having a liquid opening from said chamber at the periphery to permit emptying of said chamber, a valve for controlling said opening and movable about an axis radial in respect to the coupling, a spindle connected to said valve and extending radially of the axis of the coupling, a shaft connected to one of said first mentioned members for supporting the latter, and means disposed within and coaxial with said shaft for rotating said spindle to operate said valve.

5. A liquid coupling of the Föttinger type, including cooperating driving and driven members defining a liquid circulating chamber, said chamber having an outlet opening at the periphery thereof and having an inlet opening for the admission of filling liquid, a member for controlling said outlet opening, a separate member for controlling said inlet opening, an operating member movable axially of the coupling, and means operable in response to the axial movement of

said operating member for effecting the simultaneous operations of said last mentioned members, said last mentioned means including a member connecting said opening controlling members and movable to transmit simultaneous movement to both of said opening controlling members.

6. A liquid coupling of the Föttinger type, including cooperating driving and driven members defining a liquid circulating chamber, said chamber having an outlet opening at the periphery thereof and having an inlet opening for the admission of filling liquid, a rotary valve for controlling said outlet opening, an axially slidable valve for controlling said inlet opening, and a movable member mechanically connecting said valves to effect simultaneous operation thereof.

7. A liquid coupling of the Föttinger type, including cooperating driving and driven members defining a liquid circulating chamber, said chamber having an outlet opening at the periphery thereof and having an inlet opening for the admission of filling liquid, a rotary valve for controlling said outlet opening, an axially slidable valve for controlling said inlet opening, and a spindle connected to said rotary valve and having rack and pinion connections to said slidable valve.

8. A liquid coupling of the Föttinger type, including coacting driving and driven members forming a liquid chamber therebetween, said coupling having outlet openings at the periphery and disposed at diametrically opposite points in respect to the axis of rotation, a spindle extending along a diameter of said coupling to said openings at diametrically opposite points, and having valve members upon opposite ends thereof for controlling said outlet openings, and means movable axially of the coupling for rotating said spindle.

9. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said coupling having a liquid outlet at the periphery to permit emptying, a valve having an axis extending radially with respect to the axis of the coupling, for controlling said outlet, a radially disposed rod coaxial with and connected to said valve, and means at the axis of rotation of the coupling for rotating said rod to operate said valve.

10. A liquid coupling of the Föttinger type, having driving and driven members coacting to form a liquid circulating chamber, said chamber having a liquid outlet at the periphery, a valve for controlling said outlet, a hollow shaft connected to one of said members, and having a port for the delivery of liquid to said chamber, a piston slidable within said hollow shaft for controlling said port, and means mechanically connecting said piston and said valve.

11. A liquid coupling of the Föttinger

type, having driving and driven members co-
acting to form a liquid circulating chamber,
said chamber having an inlet opening for the
admission of filling liquid, a slidable valve
5 for controlling said inlet opening, yieldable
means normally holding said valve in closed
position, and a chamber at one side of said
valve, said valve being automatically mov-
able into open position when the fluid pres-
10 sure in said last mentioned chamber exceeds
a predetermined amount.

In testimony whereof I affix my signature.

CARL SCHMIESKE.

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