Oct. 15, 1935. H. D. YODER 2,017,302

CIRCULATOR

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Fig. 1.

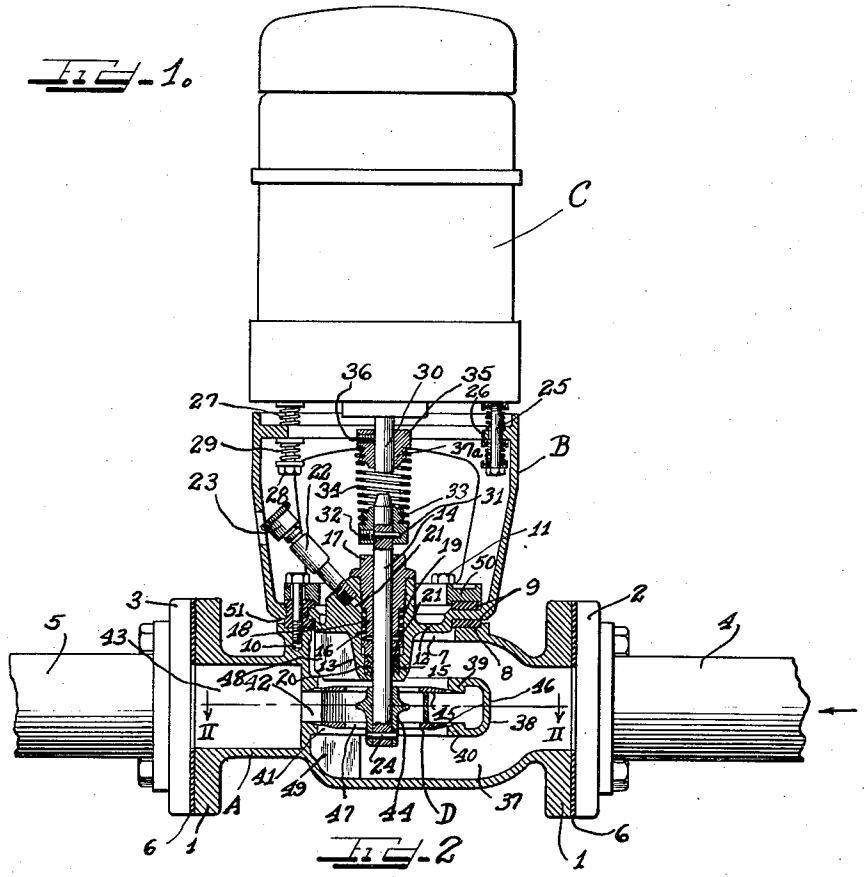
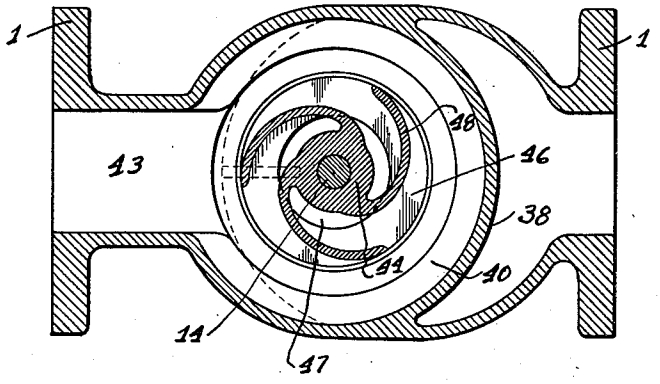


Fig. 2



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UNITED STATES PATENT OFFICE

2,017,302

CIRCULATOR

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4 Claims. (Cl. 103—87)

The present invention relates generally to a circulator, and more particularly to a motor driven pump for boosting the regular fluid flow through a circulating system when desired and so constructed as to avoid flow restriction, on the part of the pump itself, when the same is at rest.

An object of the present invention is to provide a circulator for boosting fluid flow through a circulating system, and which when at rest offers no restriction to flow through the system.

Another object of the present invention is to provide a circulator so constructed as to operate without objectionable noise.

A further object of the present invention is to provide a circulator for circulating systems so constructed as to prevent any lubricant employed in the circulator from reaching or contaminating the fluid in the circulating system.

Another and further object of the present invention is to construct a circulator wherein vibration is dampened and where sound transmission to the circulating pipe or system is prevented.

Generally speaking, the invention contemplates a circulator constructed with means providing a circulating chamber, a bonnet, and a motor, so connected and arranged that all the moving parts are insulated from the circulator body and the motor is floatingly mounted, for dampening vibrations.

The above, other and further objects of the present invention will be apparent from the following description, accompanying drawing, and appended claims.

An embodiment of the present invention is illustrated in the accompanying drawing and the views thereof are as follows:

Figure 1 is a view, partially in elevation and partially in section, of a circulator constructed in accordance with the principles of the present invention, and showing two sections of circulating pipes or lines connected to the circulator body of the apparatus.

Figure 2 is an enlarged, horizontal sectional view taken substantially in the plane indicated by the line II—II of Figure 1.

The circulator of the present invention is particularly useful for forced circulation in the water systems, such as hot water heating systems, domestic hot water supply systems, ice water circulating systems, and the like, although it is not limited to such use.

When a circulator, of the present invention, is installed in a hot water heating system, it is highly desirable that all noise of pump operation be presented from transmission to the circulating pipes, and that all vibration, incidental to operation of the pump, be likewise prevented from passing to the circulating lines.

Such a circulator is especially useful in hot water heating systems for boosting the water circulation of such system where the normal flow is inadequate or too slow or where radiators are disadvantageously placed with respect to the heater or boiler and also where it is desirable to supply hot water to radiators below the boiler room level.

The drawing will now be explained.

The form of circulator chosen to exemplify the present invention is illustrated as comprising means for providing a circulator body, designated generally at A, a bonnet structure B and a motor designated generally at C.

The circulator body A is provided with end flanges 1 for connection by means of bolts to flanges 2 and 3 of connected pipe lines 4 and 5. The usual gaskets 6 are provided between the flanges 1 and 2 and 3, as is common practice.

The circulator body A is provided with an enlarged top opening 7 to receive the bonnet B. The wall of the body adjacent the opening is provided with an annular recess 8 to receive resilient gasket material 9, which may be of rubber, rubber composition or of any other material suitable for the purpose. Suitable threaded bolt holes 10 are provided for receiving securing bolts 11 which fasten the bonnet B to the circulator body A.

The bonnet B is made as a skeleton member, having a lower wall 12 formed as an integral part thereof, which wall includes a casing 13 serving as a bearing casing for the impeller shaft. The casing 13 has its lower end closed except for an opening to receive the impeller shaft 14 which extends below the lower end of the casing 13. The casing 13 is provided with a bored interior having a lowermost bore 15 of least diameter and with the bore 16 thereabove of slightly greater diameter. The upper end of the opening in the casing 13 is threaded to receive a plug 17. The plug 17 has a central bore to surround the impeller shaft 14 to cooperate with the opening through the lower closed end of the casing 13 in providing a long bearing for the impeller shaft. The plug 17 also has a depending skirt portion 18, of less diameter than the body of the plug to receive around it a spring 19. Packing material 20 is arranged within the lowermost bore 15 of the casing 13 surrounding the impeller shaft 14 adjacent the impeller end of the bearing. A follower 21 is placed within the casing and has

a portion bearing against the packing 20 and a collar to be engaged by the spring 19 for normally urging the follower toward the packing to maintain it at all times in compressed relation about the shaft and thus afford a self-adjusting seal at the lower end of the bearing. In order to apply lubricant to the bearing, the casing is bored at 21 for receiving lubricant from a suitable oiler 22 threaded into the casing. The oiler is illustrated as comprising an oil cup 23 of well-known form.

An impeller, designated generally at D is secured to the lower end of the impeller shaft 14 by means of a pin 24, or other suitable coupling means.

The motor C is floatingly supported on the bonnet B by means of bolts 25 threaded into the lower or adjacent face of the motor casing, and which bolts pass through apertures in lugs or eyes 26 formed as part of the bonnet structure B. Interposed about the bolts 25 and between the lugs 26 and the adjacent face of the motor are springs 27 while surrounding the bolts between the lugs 26 and the adjusting nuts 28 are other springs 29. Springs 27 and 29 are so designed that when the adjusting nuts 28 are tightened on the bolts 25 the motor C is maintained in spaced relation to the upper portion of the bonnet and a floating mounting is therefore provided.

The motor shaft 30 is arranged to stop short of the upper end of the impeller shaft 14.

Driving connection between the impeller shaft 14 and the motor shaft 30 is accomplished by a flexible connection which, in the present instance comprises a plug 31 secured to the upper end of the impeller shaft 14 by means of a suitable screw 32 or other means and which plug has a reduced portion 33 to center one end of a coupling spring 34. The plug 35 is adjustably secured to the motor shaft 30 by means of a set screw 36. This plug has a reduced central portion 37a for receiving the upper end of the spring 34. The connection between the motor shaft 30 and the impeller shaft 14, just described is such as to dampen vibrations.

Within the suction chamber 37 of the circulator body A, and formed preferably as an integral part of the body, is an annular wall 38 having inwardly extending top and bottom flanges 39 and 40 and defining a central opening 41 within which the impeller D is operable. The member 38, is preferably centrally disposed between the top and bottom of the circulator body A to serve as a baffle for diverting incoming fluid entering the circulator body A through the pipe 4. A throat 42 establishes communication between the suction chamber 37 and the outlet chamber 43 of the circulator body A.

The impeller, herein illustrated, is preferably a unitary casting and comprises a hub 44, top and bottom shrouds 45 and 46 which are annular in plan providing a central opening 47 through the top and bottom of the impeller. Vanes 48 are formed as spiral vanes, three being illustrated in the drawing, which vanes extend between the shrouds 45 and 46. The parts are arranged to rotate the impeller in clockwise direction as viewed in Figure 2.

In order to prevent whirling of water in the suction chamber 37 of the circulator body A, vertically disposed vanes or baffle plates 48 and 49 are provided within the suction chamber, disposed adjacent the wall separating the suction chamber from the outlet chamber 43 and extending lengthwise of the circulator body. These vanes or baffle plates prevent tendency of the water in the suction chamber to whirl with the impellers D, thus preventing any interference of the water entering the impeller.

The provision of the central opening 47 in the impellers E, as described, permits ready liquid passage through the circulator body A when the pump or circulator is at rest. It will thus be observed that if a circulator of the present invention is included in a circulating system, and adapted for intermittent operation when the circulator is at rest, liquid flow caused by gravity, for instance, is unopposed by the impeller.

In the construction shown the bolts 11, connecting the bonnet C to the circulator body A, pass through a ring bar 50 which is applied over the resilient gasket means 9 interposed between the bonnet and the circulator body A. If desired the gasket means might be formed of two separate arcuate strips, such as shown in Figure 1 or might be constructed as a circular ring with the upper and lower portions separated but joined as by the integral part 51, shown at the left hand of Figure 1, for receiving the securing bolts 11.

It will be observed that the interposition of the resilient gasket means 9, and the plugs 51, all permit relative movement between the bonnet B and circulator body A, and are constructed of material having characteristics of sound insulation so that sound transmission to the pipe lines 4 and 5 is prevented.

The floating mounting of the motor C on the bonnet C prevents vibrations from reaching the pipe lines 4 and 5. Consequently the arrangement provides a circulator or pump so connected in a circulating system as to prevent sound transmission to the circulating line and also prevent vibrations through the line, therefore providing, with all, a quiet and unobjectionable pump unit for such system.

The impeller and impeller shaft may be axially adjusted, to vary the capacity of the pump. Figure 2 shows the impeller adjusted for maximum capacity. If it is desired to reduce the pump capacity, the plug 35 may be moved towards the extremity of the motor shaft 30, by loosening the set screw 36. Such movement lowers the impeller in its relation to the wall 38, so that a smaller quantity of water is subjected to impeller action, thus reducing pump capacity without change of speed of impeller rotation.

The invention has been described herein more or less precisely as to details, yet it is not to be limited thereby, as changes may be made in the arrangement and proportion of parts, and equivalents may be substituted, without departing from the spirit and scope of the invention.

The invention is claimed as follows:

1. An impeller pump structure including in combination, means providing a circulator body, a bonnet adapted for connection with said body, a motor shaft bearing in said bonnet, an impeller shaft extending through said bearing and carrying an impeller at one end, a motor floatingly supported on said bonnet, a flexible coupler between the motor and impeller shafts adapted to dampen vibrations, and sound insulating gasket means interposed between the body and bonnet to prevent sound transmission to connected pipe lines.

2. A circulator adapted for installation in a water system, including in combination, means providing a circulator body having a top opening for a bonnet and having means for connecting the body into a pipe line, a bonnet on said body,

resilient gaskets between said body and bonnet, means for fastening said bonnet to said body, a motor floatingly supported on said bonnet, an impeller shaft bearing forming a part of said bonnet and supporting an impeller shaft, an impeller on said shaft and supported by said bonnet and operable within said body, and a vibration absorbing coupler between the motor shaft and the impeller shaft, the provision of the shaft coupler and the resilient gasket preventing sound transmission to connected pipe lines.

3. A circulator including in combination, means providing a circulator body, a bonnet mounted on said body, resilient gasket means interposed between said bonnet and body to prevent sound transmission therebetween, an impeller rotatable in said body, an impeller shaft bearing formed as a part of said bonnet, an impeller shaft mounted in said bearing for driving the impeller, a motor floatingly mounted on said bonnet, and a flexible drive connection between the motor and impeller shafts for dampening vibrations.

4. An impeller pump structure including in combination, means providing a circulator body, a bonnet adapted for connection with said body, sound insulating means between said gasket and bonnet, a motor floatingly mounted on said bonnet, an impeller shaft supported in a bearing of said bonnet, an impeller on said impeller shaft within said circulator body, and a yielding driving connection between said motor shaft and impeller shaft, said drive connection being adjustable along one of said shafts to axially adjust the impeller to vary the capacity of the pump.

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