Nov. 22, 1938. H. A. THRUSH 2,137,791

ROTARY PUMP

Filed Dec. 7, 1934

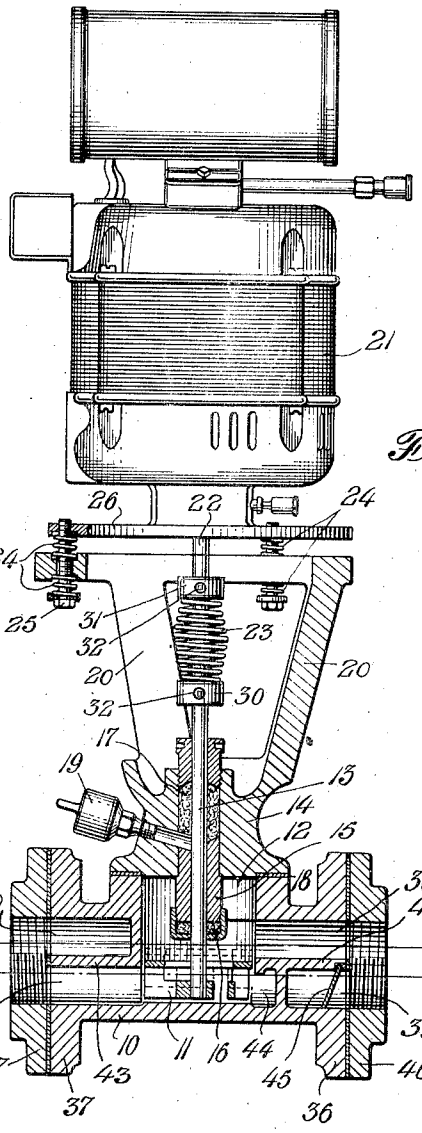


Fig. 1.

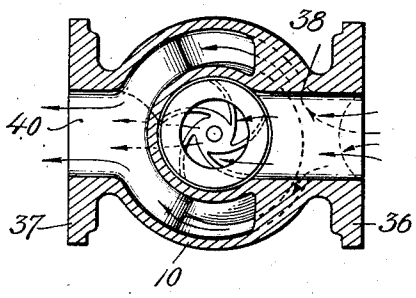


Fig. 2.

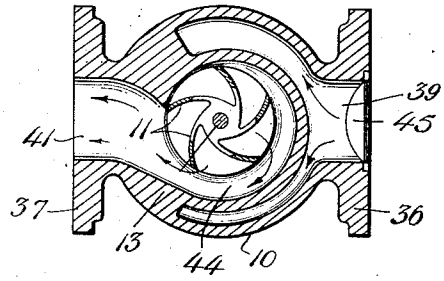


Fig. 3.

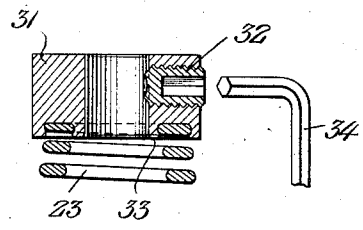


Fig. 4.

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ROTARY PUMP

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Application December 7, 1934, Serial No. 756,557

2 Claims. (Cl. 103—97)

This invention relates to pumps, and more particularly to fluid pumps of the rotary-impeller type.

It is an object of the invention to provide a simple and efficient pump of this character adapted to be inserted in a system of piping such, by way of illustration, as a heating system to circulate fluid through the system. A pump is useful in such systems employing furnaces of the type wherein the heat input to the boiler may be relatively large when a supply of heat is required, as for example in systems utilizing an oil burner, as the boiler heat input is rapidly transferred by circulation of the fluid to the heating radiators or other appliances connected to the piping system. Obviously the pump is capable of other uses however and may be utilized in various fluid-circulating systems.

Another object of the invention is to reduce the noise and vibration resulting from the use of a high-speed driving motor, such as an electric motor, since the fluid in the system transmits such noise and vibration throughout the system. In the case of a heating system it is possible by the use of the invention to reduce the noise in the piping and heating radiators to a point where it is inaudible.

A further object of the invention is to improve the construction of the drive mechanism of a rotary device, as a pump, particularly with reference to the connection between the drive shaft and the shaft of the pump or driven device.

A further object of the invention is to provide a rotary pump with improved means for varying the capacity or the volume of fluid circulated thereby.

A further object of the invention is to provide a rotary pump of improved construction embodying a rotary impeller which is readily adjustable in relation to the pump casing.

A still further object of the invention is to improve the details of construction of a pump embodying a rotary impeller, including a compact pump casing provided with inlet and outlet openings and a valve-controlled bypass around the impeller and communicating with said openings, the impeller being journaled in a closure member overlying an opening in the pump casing, said member being adapted to support the driving motor attached to the impeller.

Other objects and advantages of my invention will be apparent from the following description of the embodiment thereof shown in the accompanying drawing wherein:

Fig. 1 is a side elevational view of a pump or hot-water circulator embodying the invention, the pump casing and motor supporting bracket being shown in section;

Fig. 2, a sectional view through the pump casing on the line 2—2 of Fig. 1;

Fig. 3, a similar view on the line 3—3 of Fig. 1; and

Fig. 4, a detail view to an enlarged scale of one end of the flexible coupling.

Referring to the drawing, the rotary pump shown comprises a casing 10 having a central cavity forming an impeller housing containing the rotary impeller 11, said casing further being provided with an opening 12 in the side wall thereof through which the shaft 13 of the impeller projects. A closure member 14 overlies the opening 12 and is provided with a bearing 15 for the rotatable impeller shaft 13. Suitable packing means as indicated at 16 and 17 is provided to prevent leakage from the pump casing around the impeller shaft. A gasket 18 of lead or any other suitable material may be interposed between the closure member 14 and the pump casing. This gasket 18 seals the casing against leakage and, as any gasket of like character would do, acts to a certain extent to deaden sound and vibration between the closure members and the casing. Suitable lubricating means such as the grease cup 19 is provided for the bearing 15.

The closure member 14 is further provided with integral motor supports including the brackets 20 extending outwardly and substantially parallel to the impeller shaft 13. In the construction shown, three equally spaced brackets 20 are provided but obviously the arrangement and form of the bracket may be widely varied if desired. A motor 21, such as a single-phase or polyphase induction motor, is carried on the bracket support, the shaft 22 of said motor being connected through a flexible coupling 23 with the impeller shaft 13 of the pump. A series of coiled springs 24 are disposed between the motor 21 and the supporting bracket 20 in order to prevent the noise and vibration of the motor from being transmitted to the impeller 11 and to insure constant alignment of the motor shaft with that of the impeller. Three or more sets of springs 24 may be provided, equally spaced around the shaft 22 and each set comprising two springs surrounding a bolt 25 which is in turn threaded into a plate member 26 upon the motor 21.

Since the bolts 25 are rigid with respect to the motor, but are yieldingly supported with respect to the bracket 20, it is evident that the motor

21 is free to move longitudinally of the impeller shaft and also radially thereof to a limited extent. It is found that by supporting the motor in this manner and connecting the same to the pump impeller through a resilient driving connection as indicated at 23, the noise and vibration of the pump and driving motor are reduced to such an extent as to be inaudible in rooms having hot-water heating radiators connected to the piping system in which the pump is arranged.

It is also found that the life of the pump is substantially increased, as heretofore difficulty has been encountered in connection with the bearing for the impeller shaft. The impeller is rotated at high speed by reason of its direct connection to an ordinary high-speed electric motor, and a slight disalignment of the motor and impeller resulted in rapid wear of the bearings, causing vibration and noise which necessitated an early replacement of the pump.

The flexible coupling 23 may comprise a coil spring secured at the ends to the collars 30 and 31 adapted to be clamped to the impeller shaft and motor shaft respectively, as for example, by means of set screws 32. As shown in Fig. 4, the end of the spring 23 extends into a recess in the end of the collar 31 and the lip or edge of the recess may be swaged over the end of the spring, as indicated at 33. Either of the collars 30 or 31 may be adjusted in relation to the shaft 13 or 22 by loosening set screw 32 with a wrench 34.

The impeller 11 is adjustable in the impeller housing as indicated in dotted lines in Fig. 1. The position of the impeller is determined by the location of the collars 30 and 31 on the shafts 13 and 22, since the flexible coupling 23 has a definite normal length in the direction of the axis of the impeller during operation. The axial adjustment of the impeller 11 in the pump casing changes the capacity or volume of the liquid handled by the pump and thus the capacity of the pump may be readily adjusted by moving one or both of the collars 30 and 31 along their respective shafts.

The pump casing 10 may be variously modified in form and size but a preferred form which is compact and satisfactory in operation is illustrated in the drawing. As shown, the casing is provided with diametrically opposed flanged portions 36 and 37 surrounding inlet openings 38 and 39 and outlet openings 40 and 41, respectively. The inlet openings 38 and 39 are separated by a central partition member 42 and the outlet openings by a similar partition member 43. The upper inlet opening 38 communicates with the impeller housing above the impeller 11 so that fluid is supplied to the impeller axially thereof. The rotation of the impeller discharges fluid tangentially to the space 44 and thence through the outlet opening 41. The inlet opening 39 is connected with the outlet opening 40 through a bypass around the impeller housing as shown in Figs. 2 and 3. A check valve 45 is provided in said bypass to prevent backward circulating fluid therethrough. If the pump is not operating, fluid may circulate through said bypass in the normal direction of flow through the pump. As shown in Fig. 1, the flanged portions 36 and 37 may be provided with threaded coupling members 46 and 47 in order to connect the pump in the piping system. The coupling members 46 and 47 are bolted or secured in any desired manner to the flanged ends 36 and 37 of the pump casing.

Various modifications in the construction shown and described above will occur to those skilled in the art and may be made without departing from the scope of the invention as defined in the appended claims.

I claim:—

1. A rotary pump comprising a casing having diametrically opposed inlet and outlet openings and an intermediate impeller housing, a rotatable impeller in said housing, said inlet and outlet openings being divided by partitions substantially perpendicular to the axis of said impeller to form separate fluid passages at each end of the casing, said casing being provided with fluid passages connecting the upper of said separate passages at one end and the lower of said separate passages at the other end of said casing to said impeller housing and provided with a by-pass passage around the impeller housing connecting the remaining separate passages, and a check valve in said by-pass passage.

2. A rotary pump comprising a casing having an impeller housing formed therein, inlet and outlet openings, longitudinal inlet and outlet fluid passages communicating with said inlet and outlet openings respectively and with said impeller housing, and a by-pass passage extending between said inlet and outlet openings including longitudinal inlet and outlet fluid passages communicating with each other through said casing and outside of said impeller housing and lying above one and below the other of said fluid passages communicating with the impeller housing, a rotatable impeller in said housing, means for rotating said impeller and a check valve in said by-pass passage adjacent said inlet opening.

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