March 7, 1944. A. J. STEPANOFF 2,343,486

PUMP

Filed April 23, 1943

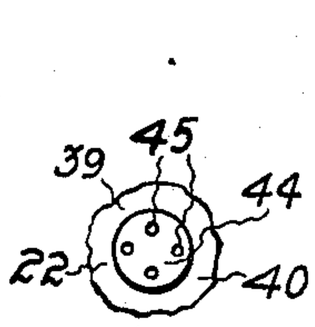

FIG.-2.

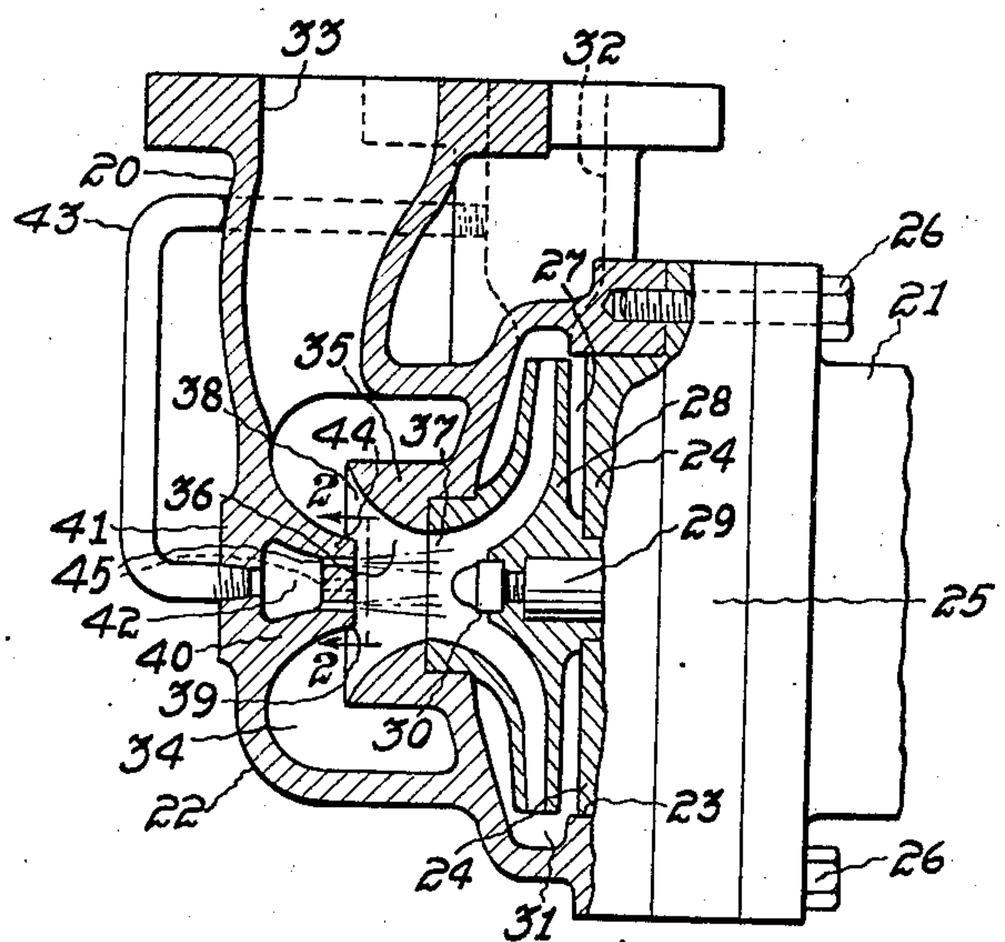

FIG.-1.

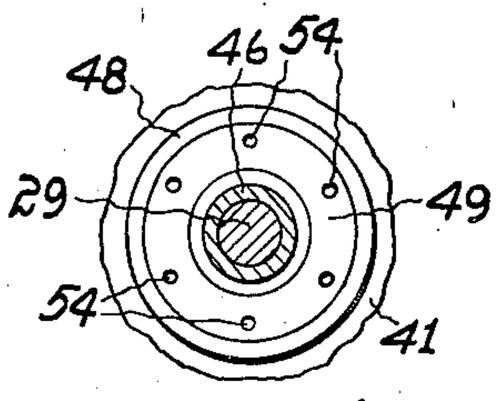

FIG.-4.

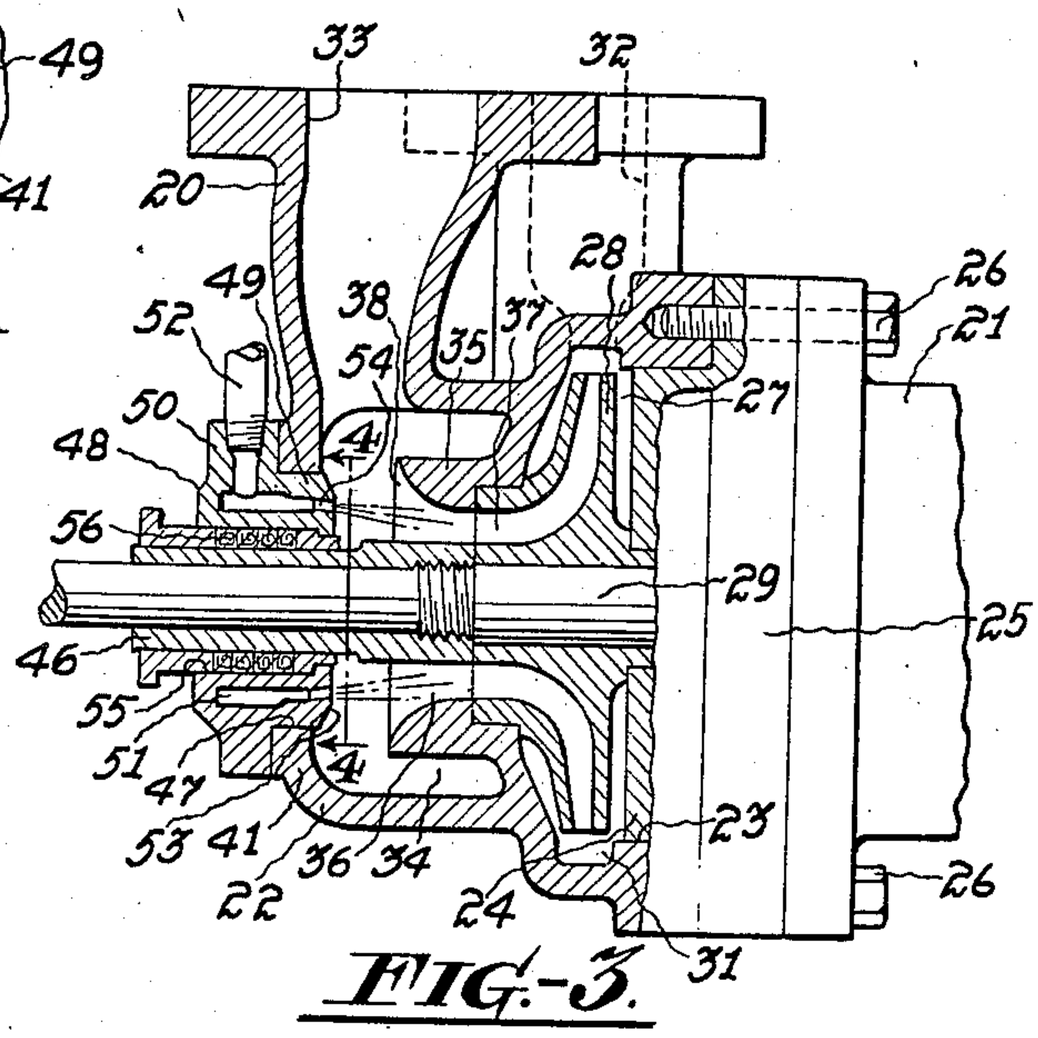

FIG.-3.

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PUMP

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1 Claim. (Cl. 103—5)

This invention relates to pumps, and more particularly to improvements in pumps of the centrifugal type.

One object of the invention is to increase the suction capacity of the pump.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation, partly broken away, of a pump embodying the invention,

Figure 2 is a transverse view taken through Figure 1 on the line 2—2,

Figure 3 is a view similar to Figure 1 showing a modified form of the invention, and

Figure 4 is a view similar to Figure 2 taken through Figure 3 on the line 4—4.

Referring more particularly to the drawing and at first to the form of the invention shown in Figures 1 and 2, 20 designates a pump of the centrifugal, horizontal type, and 21 a portion of a motor for driving the rotative elements of the pump.

The pump 20 comprises a casing 22 having an opening 23 in the end adjacent the motor 21 to receive an extension 24 of a head 25 that is clamped between the casing 22 and the motor 21 by bolts 26.

The casing 22 is recessed to provide a pumping chamber 27 for the accommodation of an impeller 28 that is mounted on the end of the shaft 29 of the motor 21 and secured thereto by a screw 30. The marginal portion of the pumping chamber constitutes a discharge chamber 31 and opens into a discharge passage 32 through which the discharge liquid may pass from the pump.

The casing 22 also defines an inlet passage 33 that opens into an inlet chamber 34 shown as being arranged coaxially with the impeller and within the inlet chamber, preferably as an integral portion of the casing 22, is an inlet tube 35 for the impeller 28. The passage 36 through the tube 35 opens into the eye 37 of the impeller and is flared at its inlet end 38 to provide a wide area of communication between the inlet chamber 34 and the passage.

In accordance with the practice of the invention, means are provided for augmenting the suction capacity of a pump for maintaining it at normal when the pump is required to operate under unusual conditions as, for example, when pumping boiling liquids. To this end the pump 20 is provided with a jet pump designated in its entirety by 39. The jet pump 39 may, as shown, form an integral part of the casing 22. It comprises a projection 40 on the outer wall 41 of the inlet chamber 34 in axial alignment with the passage 36 and, therefore, with the eye 37 of the impeller.

Within the projection 40 is a chamber 42 to which liquid under pressure is conveyed by a conduit 43 leading from the discharge conduit 32. In the inner end wall 44 of the projection 40 is a group of orifices 45 that are arranged in circular fashion about the axial plane of the projection 40 and the passage 36 to direct jets of high pressure liquid into the passage 36 at points spaced from the wall and the axis of the passage 36 for driving the liquid into the eye 37 of the impeller.

The projection 40 may, as illustrated, extend part way into the passage 36 or be otherwise positioned with respect to the passage to assure the desired driving force against the liquid flowing into the impeller.

From the foregoing description it will be readily apparent that when the pump is in operation some of the discharge liquid will flow from the conduit 32 through the conduit 43 into the chamber 42, thence spout from the orifices 45 in the form of jets against the liquid in the passage 36 and augment the suction pressure at the eye 37 of the impeller.

The form of the invention shown in Figures 3 and 4 is particularly suitable for use in pumps where the shaft 29 projects from the pump casing, as when it is supported by an outboard bearing (not shown). In such case the shaft 29 extends through the passage 36, the inlet chamber 34 and through the outer wall 41 of the inlet chamber, and the impeller may, as shown, be held against endwise movement relatively to the shaft by a wearing sleeve 46 that is threaded upon the shaft to abut the hub of the impeller.

The sleeve 46, in the present instance, also extends through the wall 41 which is provided with an opening 47 of considerably larger diameter than the sleeve 46 to accommodate a head 48 that may be secured to the wall 41 in any well known manner.

The head 48 comprises a body 49 that seats in the opening 47 and has a flange 50 on its periphery to seat against the outer surface of the wall 41. Within the head 48 is an annular chamber 51 into which high pressure liquid is conveyed by a pipe 52. In the inner end wall 53 of the head confronting the passage 36 is a group of circularly arranged orifices 54 that are suitably

positioned to direct jets of liquid into the passage 36 to drive liquid therethrough into the impeller.

The bore 55 in the head 48, and through which the shaft and the sleeve 46 extend, is of suitable size to receive packing material 56 for checking leakage from the inlet chamber along the surface of the sleeve 46.

I claim:

A pump, comprising a casing having inlet and discharge chambers, an impeller in the casing to pump fluid from the inlet chamber to the discharge chamber, an inlet tube to convey fluid from the inlet chamber to the impeller and having a flared inlet opening, and nozzle means in the wall of the inlet chamber having a group of outlet openings arranged in circular fashion and positioned to direct a plurality of jets of fluid into the flared inlet opening at points spaced from the wall and the axis of the flared inlet opening for driving fluid through the tube into the eye of the impeller.

ALEXEY J. STEPANOFF.