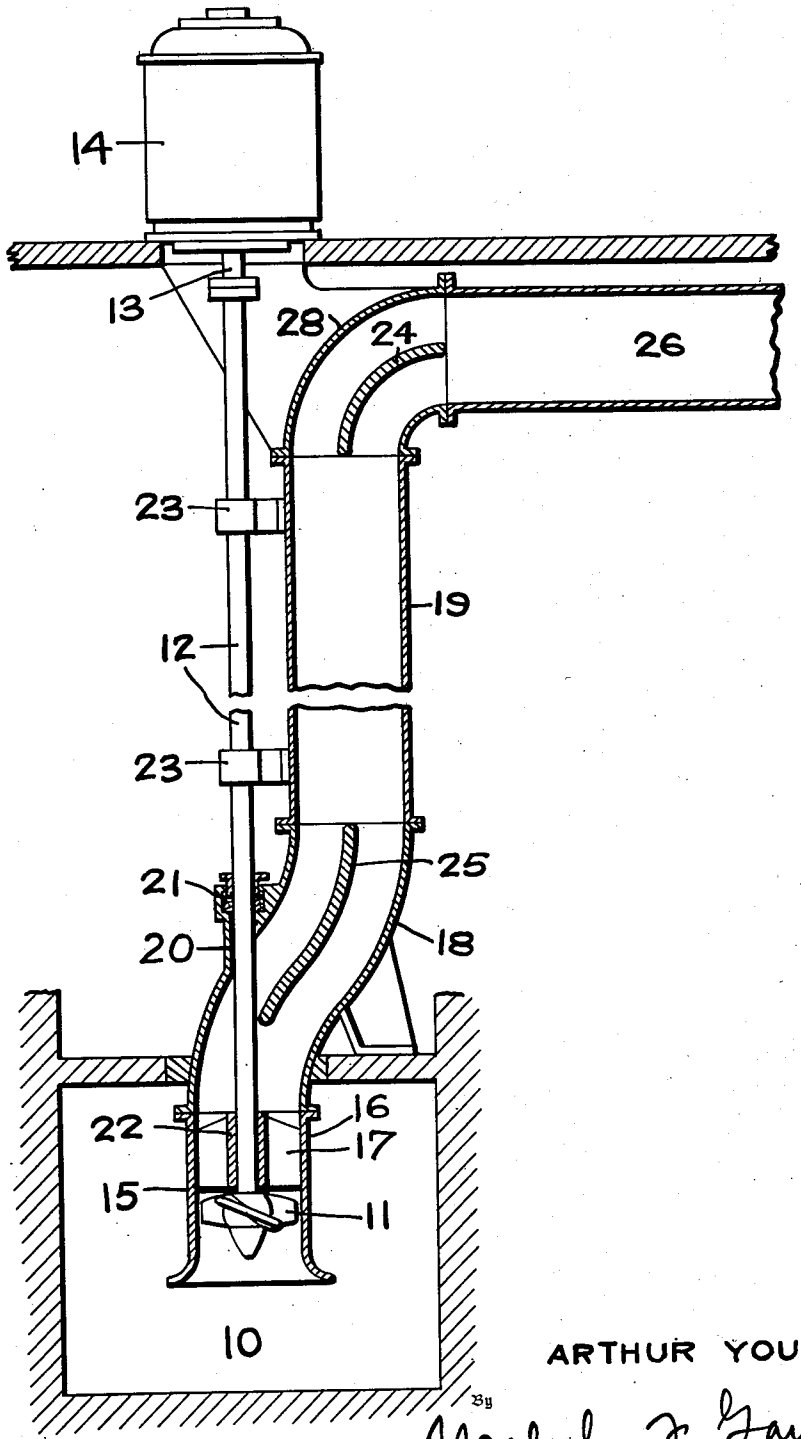
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HYDRAULIC APPARATUS

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HYDRAULIC APPARATUS

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3 Claims. (Cl. 103—89)

This invention relates to hydraulic machines of the axial flow or screw propeller type.

An object of the invention is to provide an improved hydraulic apparatus in which the tube through which the fluid flows is offset with respect to the runner shaft and arranged in parallel relationship with the runner shaft for a suitable distance above the runner.

Another object of the invention is to provide an improved pump in which the discharge tube, at a suitable distance from the impeller, is formed with an offset portion, so that the impeller shaft will be disposed exteriorly of the discharge tube and in parallel relationship therewith.

Another object of the invention is to provide an improved hydraulic machine of the above type in which the impeller shaft is supported by bearings carried by the exterior of the discharge tube.

Other objects and advantages will be readily apparent to those skilled in the art from the following description of the accompanying drawing, in which the single view is a vertical longitudinal section of a pump embodying the present invention.

As shown in the drawing, the complete pumping unit may comprise an impeller or runner 11, having a shaft 12 connected to the armature shaft 13 of an electric motor 14.

The runner 11 is disposed within the inlet portion 15 of a tube 16 mounted in a suction pit 10.

Directly above the runner 11 the tube 16 may be formed with a series of vanes 17 for the purpose of straightening the water delivered to the discharge tube by the runner.

At a suitable point above the runner 11, the tube 16 is formed with a curved portion 18, and this portion is so curved that the upper portion of the discharge tube is located in a plane offset or at one side of the longitudinal axis of the runner shaft 12.

The portion 18 of the discharge tube 16 may be in the form of an ogee curve, and above this curved portion 18, the tube has a straight section 19 which is disposed in parallel relationship to the runner shaft 12.

Since in pumping apparatus there is a vertical lift of a suitable distance, and since it is usually customary in such apparatus to employ a long shaft so that the electric motor 14 can be located at a suitable distance above the runner 11, by constructing the discharge tube with the portion 19, which is located at one side of the shaft 12, a considerable length of the shaft 12 will be exposed.

At the point where the shaft 12 passes through the wall of the tube there is an opening 20, and in order to seal the joint between the shaft and the tube at the opening 20, a suitable packing 21 may be mounted in the opening.

The hub 22 of the vanes 17 may constitute a bearing for the lower end of the runner shaft 12.

Other bearings 23 for supporting the shaft 12 may be carried by the exterior of the tube 19.

Since the shaft 12, from the opening 20 to the motor 14, is not enclosed by the discharge tube, the bearings 23 will be readily accessible for repair and replacement.

Heretofore, in pumping apparatus of the type in which the discharge tube had considerable height and in which the runner shaft was located along the vertical longitudinally center line of the discharge tube, it was necessary to mount the several bearings for the shaft within the tube. Thus, with the shaft bearings enclosed by the discharge tube, such bearings were very inaccessible, and consequently it was difficult to repair or replace the bearings without dismantling the discharge tube. On the other hand, since the discharge tube of the present invention is so constructed that only the lower portion of the shaft 12 is enclosed, obviously an improved construction has been provided by which the runner shaft and its bearings will not hinder the flow of fluid flowing through the discharge tube.

At its upper end the section 19 of the discharge tube may be connected to an elbow 28 formed with a splitter 24, as shown.

Another splitter 25 may also be formed in the curved portion 18 of the discharge tube.

Connected to the outer end of the elbow 28, is a discharge pipe 26.

Having thus described my invention, what I claim is:

1. A hydraulic machine comprising a runner, a shaft for the runner, a tube having an inlet on one side of the runner and an outlet on the other side of the runner, said tube having the portion thereof in which the runner is disposed located with its center on the longitudinal axis of said runner and said shaft, said tube having a portion thereof arranged in parallel relationship with respect to the longitudinal axis of said shaft, the two adjoining portions of said tube being connected by a curved portion of ogee form through which the runner shaft passes, bearings carried by the exterior of the tube for supporting the portion of the shaft which is disposed in parallel relationship thereto, a splitter of ogee

form disposed in the ogee curved portion of said tube and extending from a point adjacent to said runner shaft upwardly to the portion of said tube which is spaced from the runner shaft, an elbow connected to the upper end of the portion of said tube which is spaced from the runner shaft, a splitter formed centrally in said elbow, and a discharge pipe connected to the outer end of said elbow.

2. A pump of the type described comprising a runner having a motor driven shaft, a tube enclosing said runner and having a discharge portion arranged separate of the shaft and in parallel relationship with respect to the longitudinal axis of said shaft, the two adjoining portions of said tube being connected adjacent to said runner by an ogee curved portion through which the shaft passes, bearings carried by the exterior of the portion of the tube which is disposed in parallel relationship to the longitudinal axis of said shaft for supporting the shaft, a splitter of ogee form disposed in the ogee curved portion of said tube and extending from a point adjacent to said runner shaft upwardly to the portion of said tube which is spaced from the runner shaft and disposed in parallel relationship thereto, an elbow connected to the upper end of the portion of said tube which is spaced from the runner shaft, and a splitter formed coaxially in said elbow.

3. A pump of the type described comprising a tube having an inlet portion and a discharge portion, a runner disposed in the inlet portion of said tube, a vertically disposed operating shaft for said runner located on the longitudinal center line of the inlet portion of the tube, the discharge portion of said tube having a portion adjacent to the discharge side of said runner disposed on the longitudinal center line of said operating shaft and a portion arranged in spaced parallel relationship to the longitudinal center line of said operating shaft, the adjoining portions of the discharge portion of said tube being connected by a portion of gradual ogee curvature, an opening formed in the curved portion of said tube through which the runner shaft passes, a packing mounted in said opening, a splitter of ogee form disposed coaxially in the ogee curved portion of said tube and extending from a point adjacent to said runner shaft upwardly to the portion of said tube which is spaced from the runner shaft and disposed in parallel relationship thereto, an elbow connected to the upper end of the portion of said tube which is spaced from the runner shaft, a splitter formed coaxially in said elbow, and a discharge pipe connected to the outer end of said elbow.

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