Aug. 19, 1958 W. M. JACKSON 2,847,941

AXIAL FLOW PUMPS

Filed Nov. 2. 1953

FIG. 1.

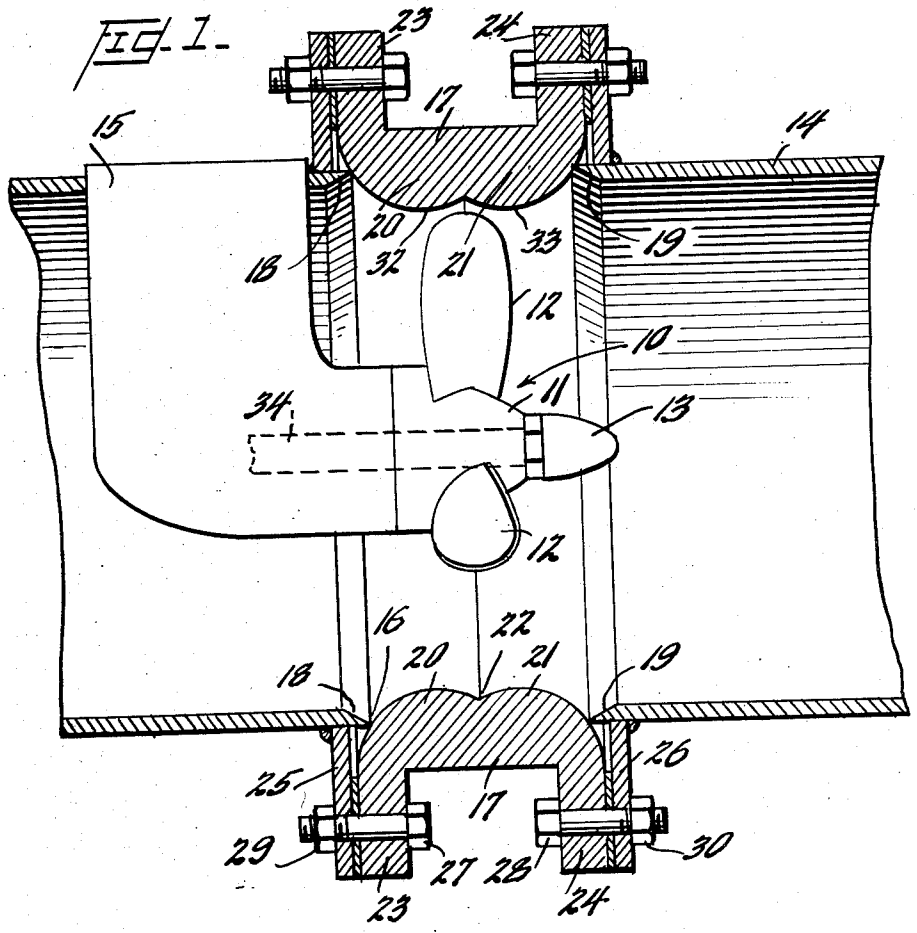
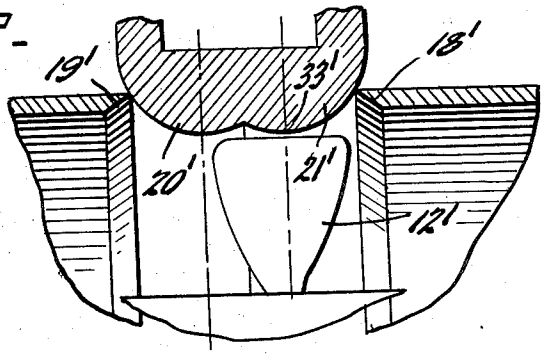


FIG. 2.



INVENTOR

William M. Jackson,

BY Watson, Cole, Grindle & Watson

ATTORNEYS

United States Patent Office 2,847,941
Patented Aug. 19, 1958

2,847,941

AXIAL FLOW PUMPS

William M. Jackson, Montgomery, Ala.

Application November 2, 1953, Serial No. 389,718

3 Claims. (Cl. 103—89)

This invention relates to hydraulic pumps and more particularly to axial flow pumps.

It is the primary object of this invention to provide a pump which is compact in nature, light in weight, and which has the pumping capacity of much larger than bulkier pumps.

It is another object of the present invention to provide a pump in which the increased pumping capacity is accomplished by the shape of the pump housing adjacent the tips of the blades.

Another object of the invention is to provide a pump in which back flow pressure which is normally present in axial flow pumps is substantially eliminated.

A further object of the invention is to provide a pump having a shroud structure comprising two venturi sections lying adjacent each other and circumferentially disposed adjacent the path followed by the tips of the impeller blades to eliminate the aforementioned backflow pressure.

Other objects and advantages will be apparent from the following more detailed description of a preferred embodiment of the present invention read in connection with the accompanying drawings in which:

Fig. 1 is a view partly in side elevation and partly in vertical section showing the pump housing and an impeller positioned therein; and

Fig. 2 is a fragmentary similar view of a modification.

In order to facilitate an understanding of the present invention, reference is now made in more detail to the drawings. Reference numeral **10** designates a fluid reaction device or impeller comprising a hub **11** and a plurality of radially extending blades **12**. The hub **11** of the impeller is mounted on a drive shaft **34** shown by dotted lines in Fig. 1, by any suitable means such as a lock nut **13**. Any suitable motor may be used to rotate the shaft and impeller, however, since the details of the drive mechanism form no part of the present invention, they are not illustrated herein.

The pump housing is made up of a generally cylindrical casing **14** into which a housing **15** extends, preferably on the inlet side of the pump, to accommodate the drive mechanism. It is apparent that the position of the said mechanism is a matter of choice and that it could just as well be positioned on the outlet side of the pump. Casing **14** also has a circumferential opening **16** to accommodate the shroud structure **17** which will be described in detail later. Adjacent opening **16**, the cylindrical casing **14** has inclined surfaces **18** and **19** for purposes hereinafter set out.

The shroud structure **17** comprises two venturi sections **20** and **21** having internally diverging convex surfaces. These venturi sections form a concavity **22** between them. The venturi sections **20** and **21** have externally extending annular flanges **23** and **24** which engage annular flanges **25** and **26** provided externally of the casing **14** adjacent opposite sides of opening **16**. The shroud structure is rigidly held in place by means of a suitable connection such as bolts **27**, **28** and nuts **29**, **30** securing the respective flanges **23**, **24** of the shroud structure to the respective flanges **25**, **26** of the casing. In this way the shroud structure is held firmly against the edges of the opening **16** in the casing to prevent any leakage.

In the embodiment shown in Fig. 1 impeller **10** is so positioned that the center lines lie in the plane in which the venturi sections **20** and **21** meet. The width of the blades in this embodiment is such that the leading and trailing edges do not overlie the points **32** and **33** on the minimum diameters of the venturi sections **20** and **21** respectively. The length of the blades **12** of the impeller is less than half of the minimum diameter of the sections so that there is a small clearance between the blades and the shroud structure. The impeller thus acts within the shroud structure to pump the fluid through the dual restricted area from left to right as viewed in Figure 1.

The venturi section **20** acts on the intake side of the pump while the venturi section **21** acts on the discharge side of the pump to prevent backflow around the tips of the impeller blades. It can readily be seen that the flow of fluid is brought into contact with venturi section **20** on the intake side at a point of greater diameter than the internal diameter of casing **14**, due to the tapering portion **18** of the casing and the flow of fluid follows the curve of venturi section **21** on the discharge side to a like point due to the taper of portion **19** of the casing. Advantage is thus taken of the greatest possible length of the surfaces of the venturi sections.

Figure 2 illustrates a modification of the pump of the instant invention showing the impeller mounted with its center line further to the outlet side of the pump with the blades **12** of the impeller positioned so that edges extend axially to a point beyond the minimum diameter **33'** of the venturi section **21'** on the outlet side of the pump. Experiment has shown that the efficiency of the pump is not substantially affected with the blades positioned as in Fig. 2 or, on the other hand, with the blades positioned so that their trailing edges extend axially beyond the point of minimum diameter of the venturi section on the inlet side of the pump.

The axial flow pump illustrated and described above is by way of example only, and any changes which might occur to one skilled in the art are contemplated by the present invention, within the scope of the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an axial flow pump, a shroud structure having two axially juxtaposed annular inwardly directed convex surfaces comprising venturi sections having a common axis, said surfaces defining between their loci of minimum diameter an annular depression of shallow generally V-shaped cross-section, and a propeller rotatably mounted within said shroud section, said propeller having radially extending blades, said blades having a center line normal to the propeller axis, said center line being located between the points of minimum diameter of said venturi sections, said propeller blades having a diameter less than the minimum diameter of said surfaces.

2. An axial flow pump as in claim 1 wherein the center line of the propeller blades coincides with a transverse plane through the locus of maximum diameter of said depression.

3. In an axial flow pump, a shroud structure having co-terminous annular surfaces of inwardly directed arcuate cross-section comprising venturi sections having a common axis and a propeller having blades of lesser diameter than said minimum diameter and mounted for rotation within said shroud structure, said blades having a center line located between the points of minimum diameter of said venturi sections.

(References on following page)

References Cited in the file of this patent

UNITED STATES PATENTS

1,067,690	Stewart	July 15, 1913
1,282,734	Blackburn	Oct. 29, 1918
1,502,862	Menk	July 29, 1924
1,528,083	Schmidt	Mar. 3, 1925
1,554,472	Ulmann	Sept. 22, 1925
1,683,949	Bergdoll	Sept. 11, 1928
1,762,708	Allred	June 10, 1930
2,013,078	Slocum	Sept. 3, 1935
2,030,560	Adams	Feb. 11, 1936
2,382,535	Bauer	Aug. 14, 1945
2,494,772	McElroy	Jan. 17, 1950

FOREIGN PATENTS

915	Great Britain	of 1867
50,882	Norway	May 18, 1932
323,658	Great Britain	Jan. 9, 1930