Oct. 7, 1952 F. A. GRUETJEN 2,612,843

IN-LINE CENTRIFUGAL PUMP WITH FABRICATED VOLUTES

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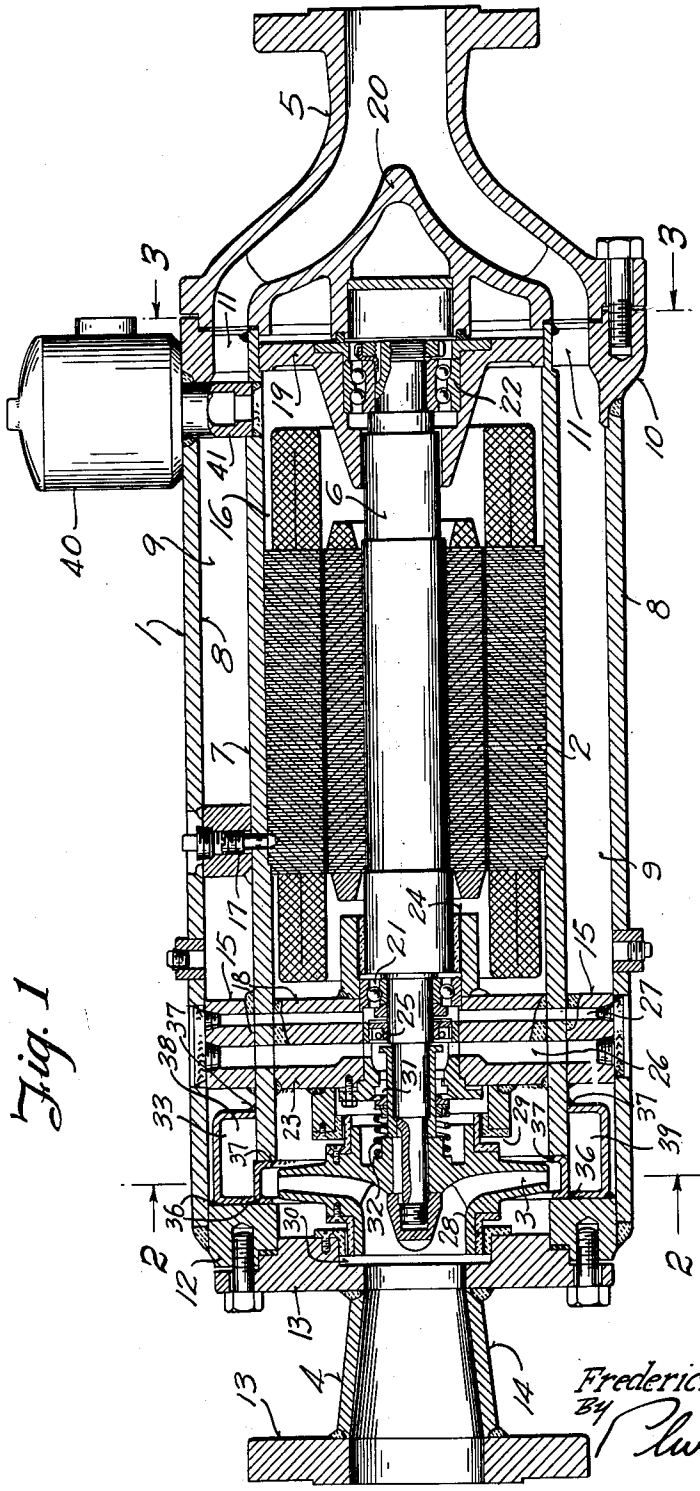


Fig. 1

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Fig. 3

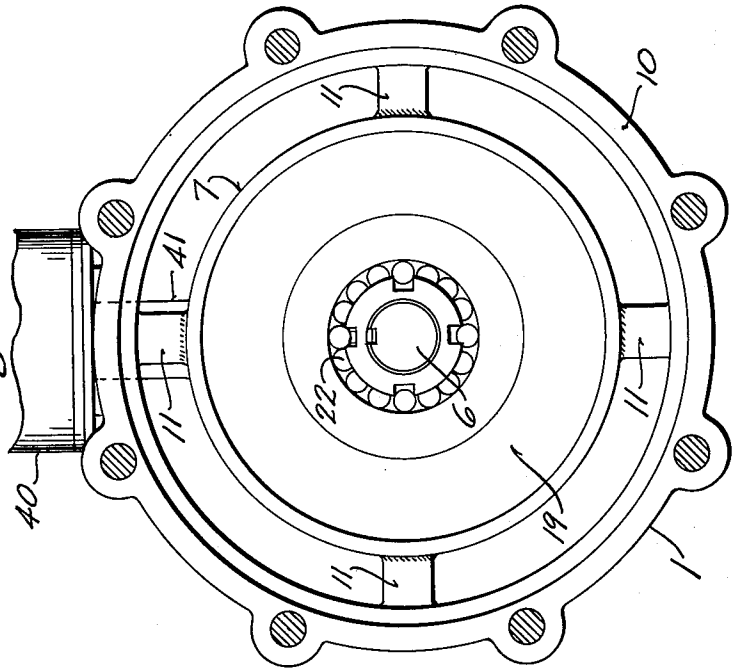
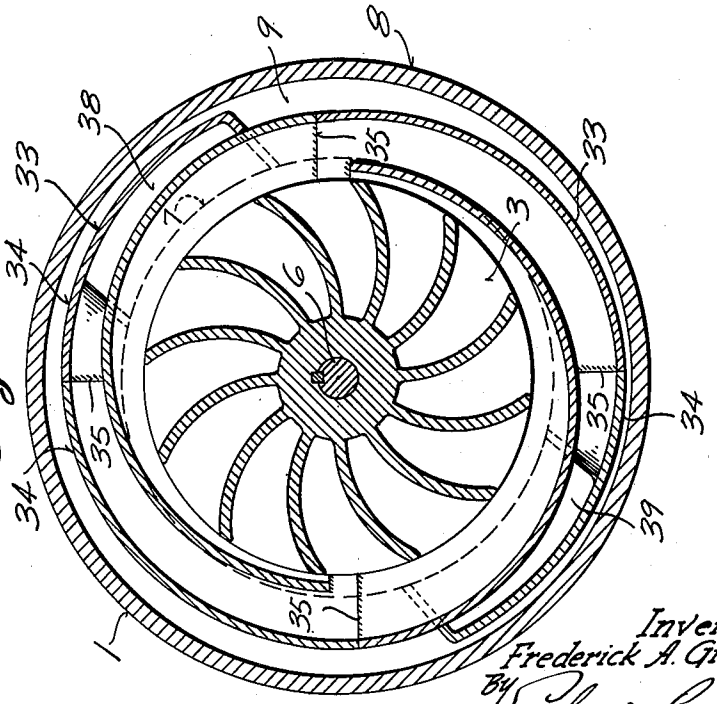


Fig. 2



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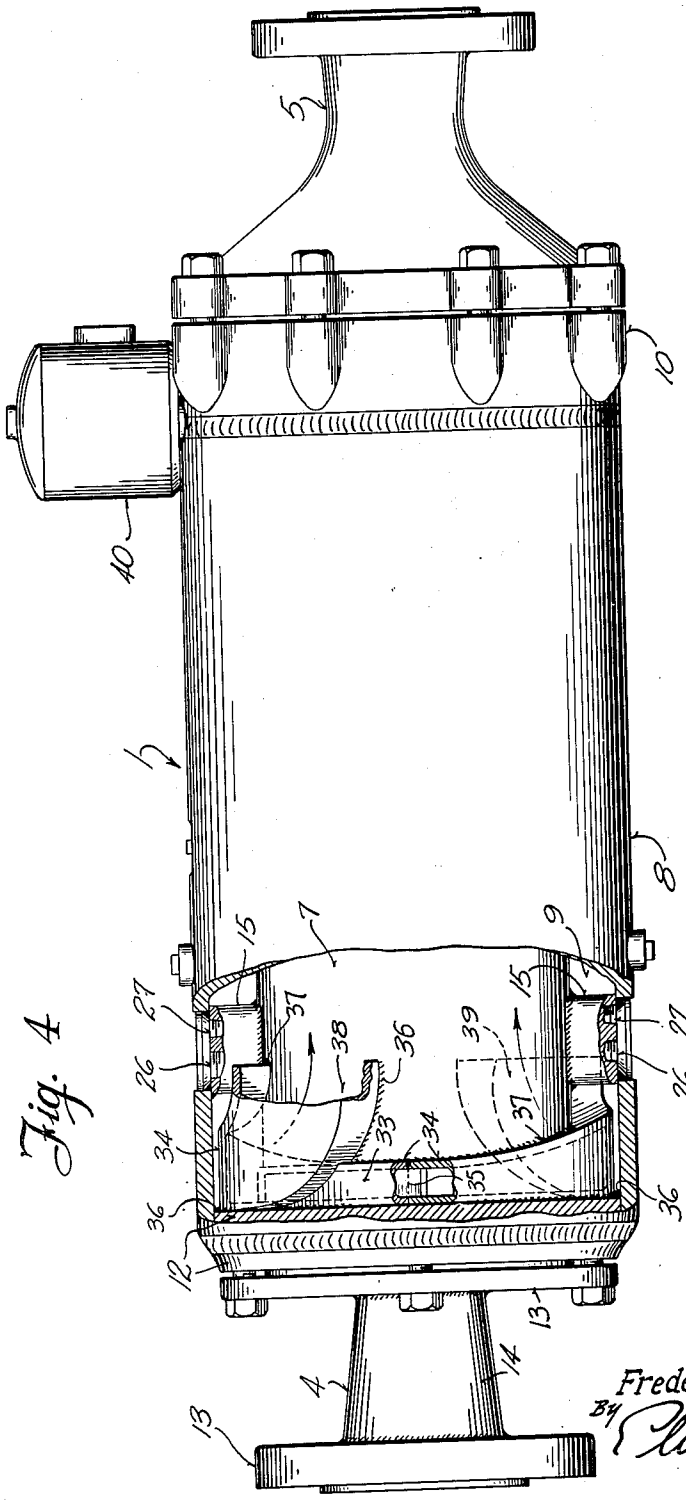


Fig. 4

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IN-LINE CENTRIFUGAL PUMP WITH FABRICATED VOLUTES

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3 Claims. (Cl. 103—87)

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This invention relates to an in-line centrifugal pump and has particular reference to a pump in which the volutes are fabricated in several parts from sheet metal.

The principal object is to provide a pump in which the double volute thereof is of sheet metal fabricated from several parts.

Another object is to provide an in-line centrifugal pump of less costly construction and of lighter weight.

These and other objects of the invention will appear hereinafter in connection with the following description of the drawing illustrating an embodiment of the invention.

In the drawing:

Figure 1 is a longitudinal sectional view of an in-line centrifugal pump constructed in accordance with the invention;

Fig. 2 is a transverse section taken on line 2—2 of Figure 1 and showing the double volute construction;

Fig. 3 is an end view of the housing viewed from the right, with the rear nozzle removed; and

Fig. 4 is an elevational view of the pump with parts broken away to more clearly show the volutes.

The in-line centrifugal pump illustrated in the drawings comprises in general, a double walled fabricated metal housing 1 containing the electric motor 2 and pump impeller 3, and a fabricated suction nozzle 4 at the forward end of the housing and a cast discharge nozzle 5 at the rear end of the housing. The impeller 3 is mounted on the forward end of the motor shaft 6 of motor 2.

The housing 1 is fabricated from a pair of concentrically disposed metal tubes comprising an inner tube 7 and an outer tube 8 spaced apart a substantial distance to provide an annular passage 9 therebetween throughout the extent of the housing.

The annular ring 10 is welded to the rear end of the outer tube 8 and a plurality of flanges 11 extend inwardly therefrom and are welded to the rear end of the inner tube 7. The discharge nozzle 5 is bolted to the ring 10.

The annular ring 12 is welded to the forward end of outer tube 8. The suction nozzle 4 is preferably fabricated by welding the end flanges 13 thereof to the central tubular portion 14 and the inner end flange 13 is bolted to ring 12.

The tubes 7 and 8 of housing 1 besides being spaced by flanges 11 of ring 10 at the rear end thereof are also held in spaced relation by the

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inserts 15 which are welded to the tubes within annular passage 9 adjacent the forward end of the housing and by the ring 12 which lies inside outer tube 8 and is welded thereto and to inner tube 7.

The motor 2 is disposed within motor chamber 16 of housing 1 and is keyed to the inner tube 7 of the housing by key 17.

The motor chamber 16 is closed at the forward end by ring 18 which is welded to the inside of the inner tube 7 at a line slightly removed from the forward end thereof. The chamber 16 is closed at the rear end by radial flange 19 disposed within the end of the tube and cap 20 of the discharge nozzle 5.

The shaft 6 of motor 2 is supported for free rotation within the forward radial bearing 21 and the rear radial bearing 22. Bearing 21 is held by the ring 18 and bearing 22 is secured within flange 19.

The impeller 3 which is mounted on the forward end of motor shaft 6 is disposed within a pump chamber formed between the ring 23 disposed adjacent ring 18, suction nozzle 4, ring 12, flange 13 of nozzle 4, and the forward end portion of inner tube 7.

The motor chamber 16 is sealed off from the pump chamber by the fire seal 24 which comprises a sleeve welded to the inside of ring 18 and concentrically surrounding a flange on shaft 6. The seal 24 prevents sparks or fire in motor chamber 16 from reaching the fluid in the pump chamber.

Passage of fluid from the pump chamber to the motor chamber is prevented by positive seal 25 disposed around shaft 6 to the inside of radial passage 26 formed between rings 18 and 23 and leading through inserts 15. Passage 26 is provided to drain off any fluid such as oil or gasoline that may flow thereto from the pump chamber. Any suitable drain pipe, not shown, may be threaded into passage 26 to carry off fluid therefrom. An oil passage 27 extends through ring 18 and inserts 15 to the inside of seal 25 to lubricate bearing 21.

The cylindrical wear rings 28 are located at the forward side of impeller 3 and cylindrical wear rings 29 are disposed at the rear side of the impeller. The annular passage 30 is provided at the forward side of the impeller for circulation of a small portion of pumped fluid through the wear rings 28 to nozzle 4 for better hydraulic balance of the impeller. The seal 31 is assembled around shaft 6 and is biased away from impeller 3 by spring 32. Seal 31 operates

as a thrust member and also to seal off flow of fluid to the motor chamber 16.

According to the invention the impeller 3 receives the fluid to be pumped from the suction nozzle 4 and discharges the same into the double volute 33 which is axially aligned with the impeller at the entrance end thereto and then curves into annular passage 9 between concentric tubes 7 and 8. The volute is supported within passage 9 on the inner tube 7.

The double volute 33 comprises four separate volute shaped and matching parts 34 fabricated from stainless steel and welded together at the circumferential weld joints 35. The welds 36 join the forward side of volute 33 to the ring 12 and also to the inner tube 7 where the volute curves over tube 7 and is supported thereby. The rear flange of double volute 33 is welded to the inner tube 7 by the welds 37.

The double volute 33 is divided into the upper passage 38 and the lower passage 39. Fluid discharged by impeller 3 enters both passages 38 and 39 and then flows into annular passage 9 between tubes 7 and 8 from whence it flows to discharge nozzle 5 which discharges the fluid from the pump. The double volute 33 provides a stainless steel conduit for the pumped fluid from the impeller discharge to the annular passage 9 between tubes 7 and 8 and turns the fluid from a radial to an axial direction without any excessive turbulence that would restrict the flow.

A conduit box 40 may be provided on the outside of the housing adjacent the rear end thereof. Leads, not shown, extend from box 40 through the plug 41 to the stator or motor 2. Plug 41 is disposed within passage 9 and is welded to tubes 7 and 8 and ring 10.

After the motor 2 and impeller 4 with their respective seals and bearings are assembled with tube 7, the separate parts 34 of double volute 33, after fabrication, are welded to the inner tube 7 by welds 37 and 36 and are joined together in the same welding operation by the circumferential welds 35.

The ring 12 is next assembled at the forward end of the pump and the volute 33 is joined thereto by weld 36 which is continued from the joint between tube 7 and the volute 33 previously made. Ring 12 is later welded to the forward end of outer tube 8 when the latter is finally assembled into place.

The fabricated pump of the invention is light in weight and strong, and fabrication of the volutes from sheet metal overcomes a difficult casting problem and lightens the weight of the pump at the impeller end.

A single volute may be pre-fabricated of several volute shaped parts and welded together and into a pump in the same manner as the double volute described heretofore.

Various embodiments of the invention may be employed within the scope of the accompanying claims.

I claim:

1. In an in-line centrifugal pump of the class described having an impeller mounted on one end of a shaft driven by an electric motor, a housing for said impeller and motor comprising a pair of tubular members provided from standard pipe sections and concentrically disposed to form a passage therebetween circumferentially surrounding said motor and providing an outlet for fluid discharged by said impeller, an annular ring welded to the outer tubular member at the forward end of said pump, a weld fabricated suction nozzle secured to said ring and providing an inlet for fluid drawn into the pump by said impeller, and a weld fabricated double volute welded to said inner tubular member on one side and to said inner tubular member and annular ring on the other side and providing curved passages turning fluid discharged by the impeller from a radial to a longitudinal direction and discharging the same into the passage between the tubular pipe sections.

2. In an in-line centrifugal pump of the class described having an impeller mounted on one end of a shaft driven by an electric motor, a housing for said impeller and motor comprising a pair of tubular members provided from standard pipe sections and concentrically disposed to form a passage therebetween circumferentially surrounding said motor and providing an outlet for fluid discharged by said impeller, an annular ring welded to the outer tubular member at the forward end of said pump, a weld fabricated suction nozzle secured to said ring and providing an inlet for fluid drawn into the pump by said impeller, a weld fabricated channel volute of U-shaped cross-section, a weld joining said volute to the outer surface of the inner tubular member on one side and to the inner tubular member and annular ring on the other side and bridging over an opening disposed between said inner and outer tubular members and providing curved passages to turn fluid discharged by the impeller from a radial to a longitudinal direction to discharge the same into the passage between the tubular pipe sections.

3. In an in-line centrifugal pump having an impeller mounted on one end of a shaft driven by an electric motor, a housing for said impeller and motor comprising a pair of tubular members concentrically secured together with the outer member extending over said impeller and with a passage between said members providing an outlet for fluid discharge by said impeller, a suction nozzle secured to said housing at one end and providing an inlet for fluid drawn into the pump by said impeller, at least one stamped metal volute of substantially U-shaped cross-section disposed circumferentially of said impeller within the end of said outer tubular member to discharge fluid from said impeller into said discharge outlet passage of the housing, weld means securing said volute to the end of said inner tubular member, and a ring secured to said volute and said outer tubular member to close the end of said housing adjacent the impeller.

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