

G. SULZER.
CENTRIFUGAL, TURBINE, AND SIMILAR PUMP.
APPLICATION FILED MAR. 28, 1910.

990,507.

Patented Apr. 25, 1911.

2 SHEETS-SHEET 1.

Fig. 1.

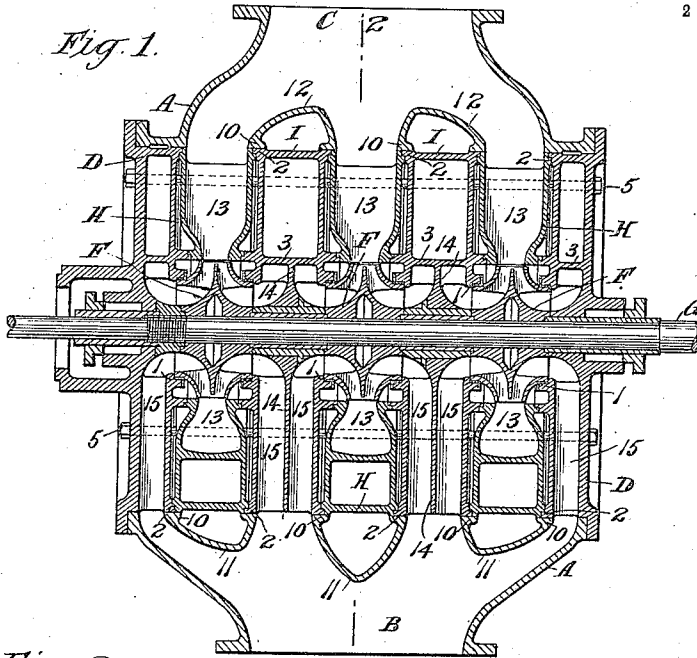


Fig. 2.

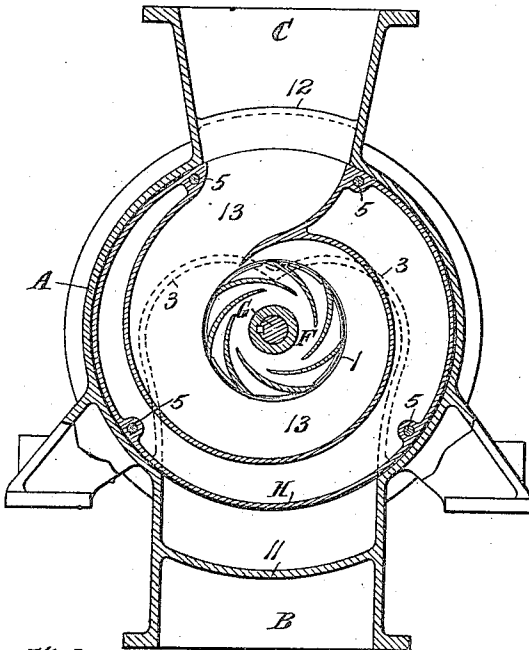
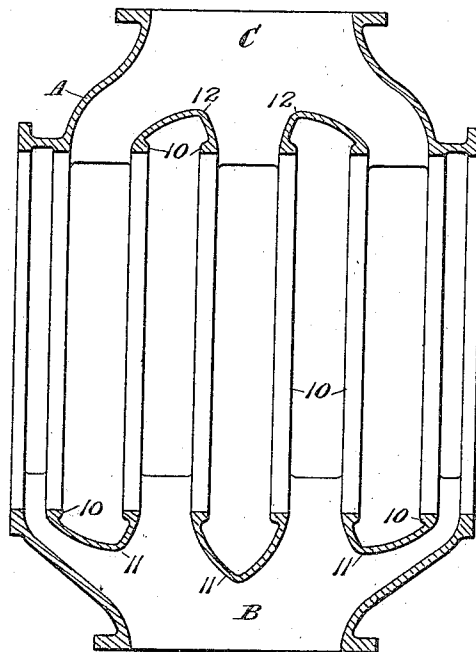


Fig. 3.



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2 SHEETS-SHEET 2.

Fig. 4.

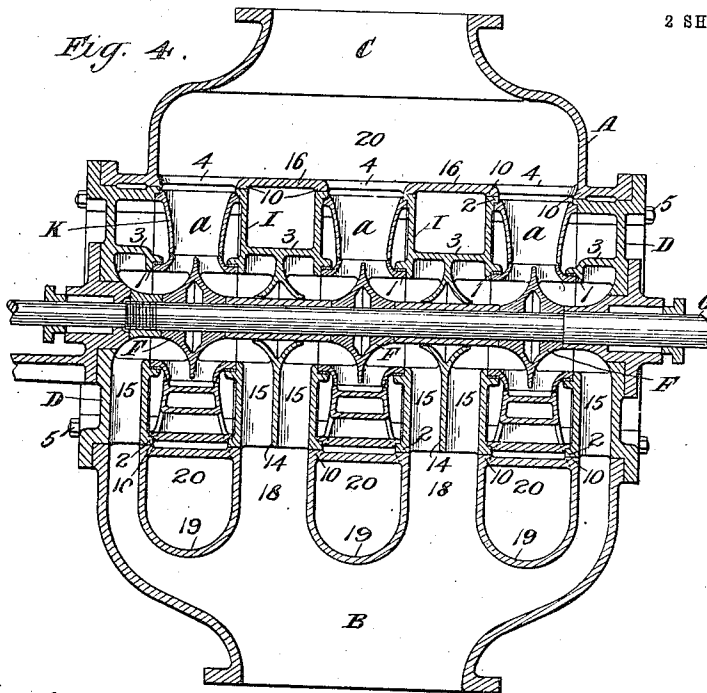


Fig. 5.

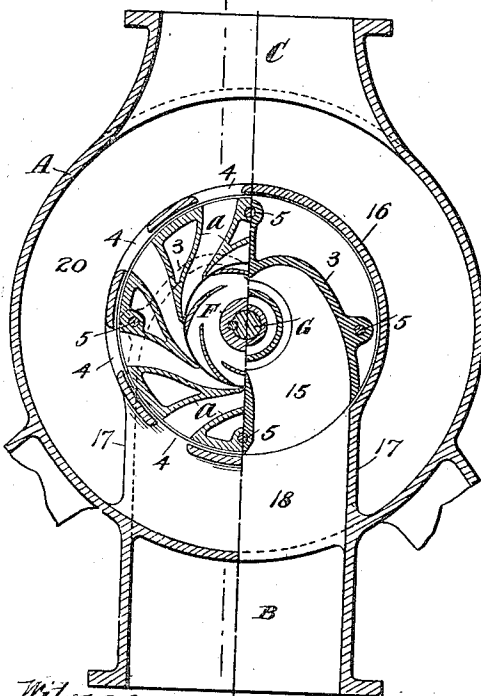
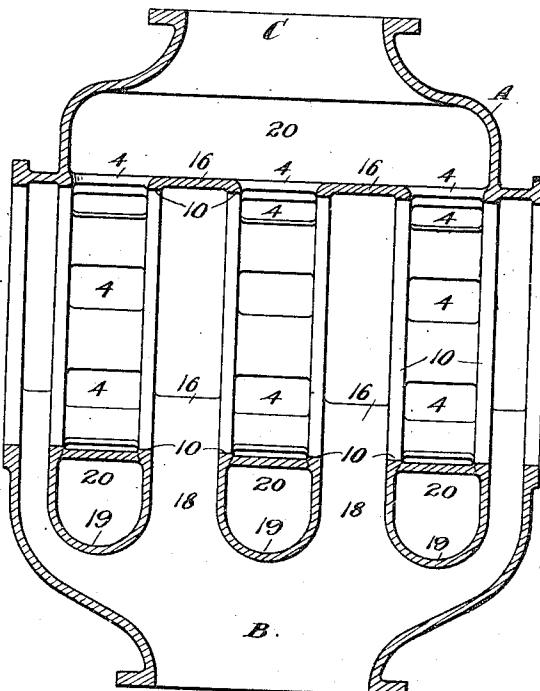


Fig. 6.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL, TURBINE, AND SIMILAR PUMP.

990,507.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, GEORG SULZER, a citizen of Switzerland, residing at Harrison, county of Hudson, and State of New Jersey, have invented certain new and useful Improvements in Centrifugal, Turbine, and Similar Pumps, fully described and represented in the following specification and the accompanying drawing, forming a part of the same.

This invention relates to an improved construction for centrifugal, turbine or similar pumps of that type known as multi-rotor pumps, in which a number of impellers are arranged side-by-side and operate in parallel, as distinguished from multi-stage pumps in which the impellers operate in series, the especial object of the invention being to simplify and cheapen the manufacture of such pumps while securing large capacity and high efficiency.

The invention is especially intended for pumps having small impellers, so that the latter can be run at a very high rate of speed, as, for instance, when the impellers are directly connected to a steam turbine or other high speed motor, but may be used with impellers of any size.

The invention consists in various features of construction and combination of parts, as fully described and particularly claimed hereinafter.

In the accompanying drawings forming part of this specification, the invention is illustrated as applied in preferred forms in a pump having volute diffusing chambers and a pump having diffusing vanes, and these constructions will now be described in detail and the features forming the invention then specifically pointed out in the claims.

In the drawings, Figure 1 is a central, longitudinal section of a pump with diffusing chambers. Fig. 2 is a cross section on the line 2 of Fig. 1. Fig. 3 is a central, longitudinal section of the casing. Fig. 4 is a view similar to Fig. 1 showing a pump with diffusing vanes. Fig. 5 is a cross section of the pump shown in Fig. 4, the section being taken one-half through a delivery section and one-half through a suction section. Fig. 6 is a central longitudinal section of the casing of Figs. 4 and 5.

Referring now particularly to Figs. 1, 2

and 3, A is a cylindrical casing having on the side the suction connection B and delivery connection C for the suction and discharge pipes, and open at the ends to receive the heads D by which the pump casing is closed and all the parts of the pump secured together. The casing A has interior ribs 10 the inner surfaces of which receive the outer edges of the pump sections so that the sections may readily be inserted and removed and proper joints formed without finishing the whole inner surface of the cylinder. Across the suction and delivery the ribs 10 are preferably connected in pairs by webs 11, 12, the webs 11 forming guides for the liquid to the suction of the respective impellers, and the webs 12 forming similar guides for the liquid from the diffusing chambers to the delivery, these guides securing the proper flow of the liquid and increasing the efficiency of the pump. Within the casing A are arranged impellers F, three impellers being shown, these impellers being carried by shaft G, and being of the double suction type, that is, provided with suction openings on opposite sides. Outside the impellers are the diffusing chamber sections H through which the impellers deliver, these being shown as formed to provide the usual volute diffusing chambers 13, and between these delivery or diffusing sections are suction and partition sections I, which have walls 14 extending inward to sleeves on the shaft G and dividing the adjacent suction chambers and passages 15 of the successive impellers. These suction sections are formed with side shoulders which form running joints, 1, with the impellers, the running joints 1 for the outer sides of the end impellers being formed by similar shoulders on the heads D. These diffusing chamber sections H and partition sections I are preferably formed with interlocking shoulders as shown, so as to form tight joints when pressed together, and are finished on their outer surfaces so as to form proper joints with the surfaces on the inner edges of the ribs 10, the sections I being preferably provided with side shoulders 2 finished to engage the ribs 10 so that the whole outer surface of the section need not be finished. The suction sections I have interior walls 3 inclosing the suction passages 15 and extending upward from the opposite sides of the

suction B, these walls 3 extending about the impeller suction and forming, as shown, the common double volute chamber about the impeller suction. The suction passages 15 are all formed in the sections I, except the suction passages for the outer side of the end impellers which are formed in the heads D, the passages in the heads being provided with walls 3 of the same form as in the sections I.

The method of assembling the parts will readily be understood from the drawings, the impellers, delivery or diffusing chamber sections, and suction or partition sections being assembled on the shaft and inserted in the casing A, and the pump heads and all the parts being secured together within the casing by the bolts 5 passing through the heads and pump sections, as shown clearly in Figs. 1 and 2.

The casing A obviously may be used with different impellers, it being necessary only to change the other parts according to the impellers used, the casings remaining unchanged. This provides a standard casing which may be used in making up pumps for different conditions.

Referring now to Figs. 4, 5 and 6, in which the invention is shown as applied in connection with a turbine pump employing diffusing vanes, the general arrangement of the parts and the form of the casing is substantially the same as in the construction shown in Figs. 1 to 3, except as modified for use of the diffusing rings shown. In place of the volute diffusing chambers H, however, diffusion rings K are inserted between the suction sections I and between the end suction sections and the heads, these diffusion rings having diffusing vanes *a*, which may be of any suitable form, and are shown as of a well known type. The diffusion rings K in this construction form the delivery sections and are held in place by, and make tight joints with, the suction sections and heads, the parts being provided with shoulders for this purpose, as in the construction previously described. In this construction, however, an inner casing 16 is used, extending about and inclosing the pump sections, this casing being formed integral with the outer casing and having downwardly extending walls 17 running longitudinally of the pump and merging into the outer casing at the opposite sides of suction B and forming suction chamber 18 for the impellers, and this inner casing 16 also has downwardly extending walls 19 running transversely to the pump and forming delivery chambers or passages extending through the suction portion of the pump, forming continuations of the delivery chamber 20 surrounding the casing 16. The casing 16 has openings 4 opposite the diffusing passages between the vanes *a*, through which

openings 4 the liquid passes from the diffusing vanes to the delivery chamber 20. The walls 3, which form double volute suction chambers as in the construction previously described, are carried by the suction sections I and form continuations of the side walls 17 on the casing, as shown in Fig. 5. The ribs 10 with their finished surfaces are formed on the inside of the inner casing 16, and these ribs form bearing surfaces for and joints with the finished surfaces on the outer edges of the suction sections I, as in the construction previously described.

The parts of the pump shown in Figs. 4 to 6 are assembled and secured together in the same manner as in the pump shown in Figs. 1 to 3, and the casing may be used with different impellers, as in the construction previously described, it being necessary only to change the diffusion rings according to the impellers used.

It will be understood that the invention is not to be limited to the exact form or arrangement of parts in either of the constructions shown, but that modifications may be made therein while retaining the invention defined by the claims.

What I claim is:—

1. In a centrifugal or similar pump, a cylindrical open ended casing having suction and delivery connections on the side, in combination with a plurality of impellers therein, delivery sections surrounding said impellers, suction sections between said delivery sections forming suction passages for successive impellers, pump heads closing the cylinder ends, and means for securing the pump sections and heads together within the casing.

2. In a centrifugal or similar pump, a cylindrical open ended casing having suction and delivery connections on one side, in combination with a plurality of double suction impellers therein, delivery sections surrounding said impellers, suction sections between said delivery sections forming suction passages for adjacent suction sections of successive impellers, pump heads closing the cylinder ends and providing suction passages for the outer sides of the end impellers, and means for securing the pump sections and heads together within the casing.

3. In a centrifugal or similar pump, a cylindrical open ended casing having suction and delivery connections on the side, in combination with a plurality of double suction impellers therein, delivery sections surrounding said impellers, suction sections between said delivery sections forming suction passages for adjacent suction sections of successive impellers, pump heads closing the cylinder ends and providing suction passages for the outer sides of the end impellers, and means for securing the pump sections and heads together within the casing, said casing hav-

ing formed integral therewith walls dividing the suction and force chambers of the pump and walls forming delivery passages extending through the suction chamber.

5 4. In a centrifugal or similar pump, a cylindrical open ended casing having suction and delivery connections on the side, in combination with a plurality of double suction impellers therein, diffusion sections surrounding said impellers having diffusing vanes with diffusing passages between them, suction sections between said diffusion sections forming suction passages for adjacent
15 suction sections of successive impellers, pump heads for closing the cylinder ends, said casing having integral therewith an inner casing surrounding the pump sections and formed with openings opposite the diffusing passages and walls dividing the suction and
20 force chambers of the pump and forming delivery passages extending through the suction chamber.

5 5. In a centrifugal or similar pump, a pump casing having suction and delivery connections at opposite sides and having interior walls dividing the casing into a suction chamber of substantially the width of the suction inlet and extending through the length of the casing and a delivery chamber
30 for a plurality of impellers operating in parallel with the casing, and having interior walls forming delivery passages for the impellers extending through the suction chamber.

35 6. In a centrifugal or similar pump, a pump casing having suction and delivery connections at opposite sides and having interior walls dividing the casing into a suction chamber of substantially the width of the suction inlet and extending through the length of the casing and a delivery chamber for a plurality of impellers and having interior walls forming delivery passages extending through the suction chamber, in
40 combination with a plurality of impellers and pump sections therein, and heads closing the opposite ends of said casing.

7. A centrifugal pump casing consisting of an open ended cylinder having suction
50 and delivery connections at opposite sides, and having interior walls dividing the cas-

ing into a suction and a delivery chamber for a plurality of impellers operating in parallel within said casing.

8. In a centrifugal or similar pump, a pump casing consisting of an open ended cylinder having suction and delivery connections at opposite sides, and having interior walls dividing the casing into a suction and a delivery chamber for a plurality of impellers, in combination with a plurality of double suction impellers operating in parallel within said casing, and heads closing the opposite ends of the casing.

9. A centrifugal or similar pump comprising in combination a plurality of double suction impellers constructed to operate in parallel, a casing having supply passages for said impellers and having also a single discharge chamber inclosing all of said impellers, diffusers located between said impellers and discharge chamber and arranged to receive the discharge from said impellers radially and to deliver said discharge radially into said discharge chamber, said casing being adapted to receive interchangeably impellers and diffusers of different design and with the impellers of different diameters to suit different conditions.

10. A centrifugal or similar pump comprising in combination a shaft, a plurality of double suction impellers thereon, and a casing having supply passages for said impellers and a single discharge chamber for said impellers and having, between said impellers and discharge chamber, diffuser passages arranged to receive radially discharge from said impellers and to deliver such discharge radially into said discharge chamber, said casing having a free space outside of said diffuser passages to receive such discharge and adapted to receive interchangeably impellers and diffusers of different design and with the impellers of different diameters to suit different conditions.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

GEORG SULZER.

Witnesses:

J. A. GRAVES,
C. J. SAWYER.