

Feb. 1, 1938.

S. IHARA

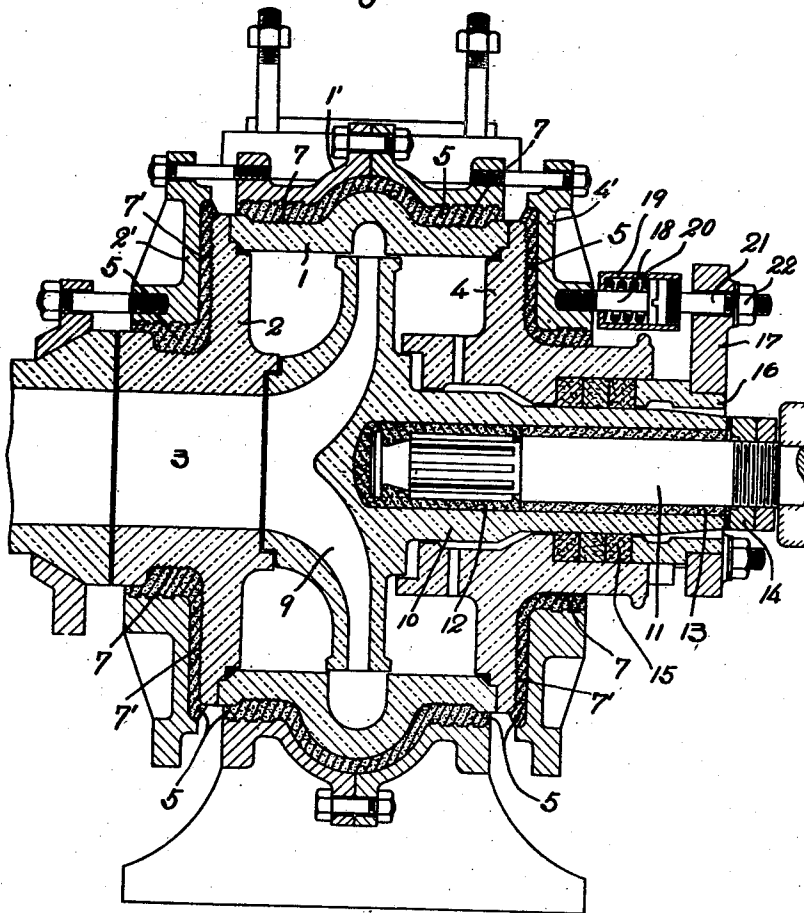
2,107,260

CORROSION RESISTING PUMP AND BLOWER

Filed March 4, 1936

2 Sheets-Sheet 1

Fig. 1



INVENTOR.

Seytaro Ihara

Feb. 1, 1938.

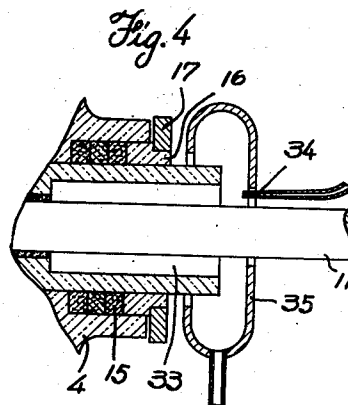
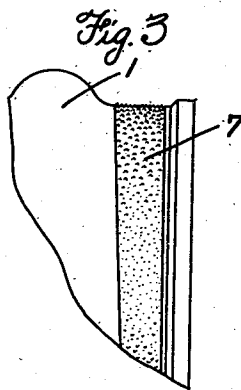
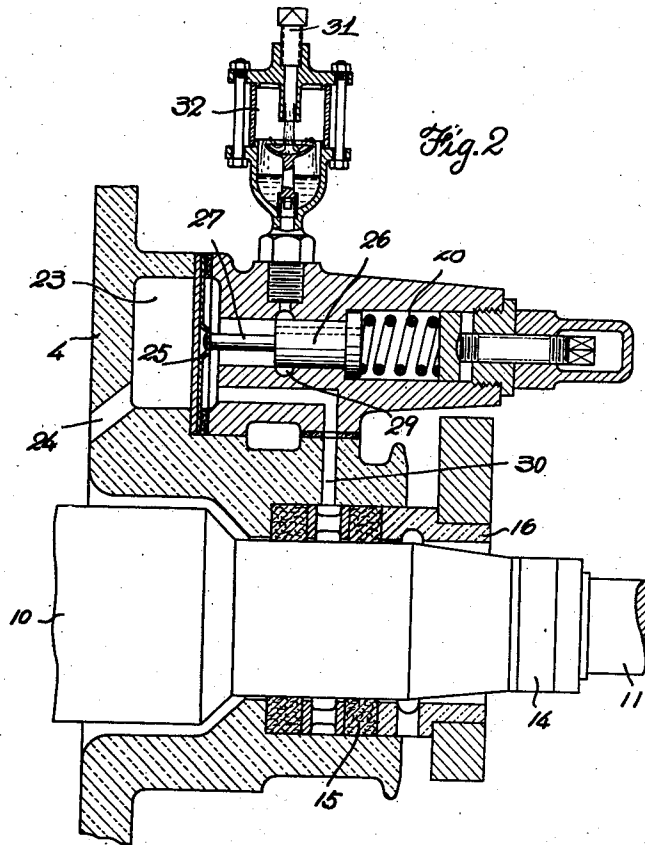
S. IHARA

2,107,260

CORROSION RESISTING PUMP AND BLOWER

Filed March 4, 1936

2 Sheets-Sheet 2



INVENTOR.

Seytaro Ihara

UNITED STATES PATENT OFFICE

2,107,260

CORROSION RESISTING PUMP AND BLOWER

Seytiro Ihara, Nakaku, Nagoya, Japan, assignor
to Nippon Gaishi Kabushiki Kaisha, Nagoya,
Japan

Application March 4, 1936, Serial No. 67,126

3 Claims. (Cl. 103—114)

My invention relates to improvements in the construction of corrosion resisting pumps and blowers such as those operating with acids or corrosive liquids, and more particularly to the construction of casing and shaft sealing means.

Porcelain or stone wares have heretofore been adopted for the main parts of corrosion resisting pumps or blowers proper. Since such material is mechanically weak it is strengthened by a metallic shell. But the combination of metallic and porcelain parts should be very carefully considered, especially the porcelain member constituting a cylindrical casing and having the delivery canal which is often liable to crack at the bent covers owing to the bending stress caused therein. On the other hand the packing is liable to be worn gradually and to cause leakage of corrosive liquid or fluid, thereby deteriorating the working parts to increase the leakage more and more. The leakage prevention is one of the great troubles in operating such corrosion resisting pumps. Heretofore usual means for packing around a shaft is easily attacked by acid and becomes loose to invite leakage.

One object of my invention is to protect the corrosion resisting porcelain lining against the bending stress which is the worst cause for cracking the porcelain cylinder as found by the inventor after numerous actual experiences.

A further object of my invention is to provide an automatic means for sealing the shaft packing with clear water which also cools the packing members, so that the corrosive fluid can not leak out through a small clearance around the shaft and the packing can be well protected against corrosion and hot running.

For a better understanding of my invention reference is taken to the accompanying drawings in which Fig. 1 is a sectional elevation of acid-resisting pump embodying my invention, Fig. 2 is a partial sectional view for illustrating a special construction of water seal for the packing as an embodiment of this invention, Fig. 3 is a partial view of the porcelain cylinder showing the sanded surface, and Fig. 4 is a partial sectional view showing the cooling means of shaft packing.

Referring to the drawings, 1 represents a pump casing; 2 is an end cover having an inlet port opening 3, and 4 is the opposite end cover, all of these parts being made of porcelain and the like acid resisting material. 1' represents a metallic shell of the pump casing; 2' and 4' are end covers made of metal such as cast iron. The metallic shell 1' and metallic covers 2' and 4'

are united together with the porcelain shell 1 and end covers 2 and 4 respectively by means of cementing material 5 as a unit and the metallic parts are connected together by means of bolts to construct a pump casing. In cementing the porcelain parts to the metallic shell or casing the surface of the porcelain to be cemented is roughened by so-called "sanding process", that is, the sanded surface as shown at 7. Such sanding process is effected by attaching small pieces of porcelain to the desired surface with glaze and fusing together by baking so as to produce sanded surface as shown more clearly in Fig. 3. Such sanded surface provides a very good and effective adhesion surface for the cementing material and it may be applied to any desired outer surface of the porcelain lining. The cylindrical surface at 7 of the casing body 1 and also the cylindrical or round portion 7 of the end covers 2 and 4 are the most important parts to which the sanding is to be applied, but it may be applied to the flat surface of the end cover as shown at 7'. Thus according to my invention a pump casing is made of metallic outer shell and metallic end covers entirely lined with corrosion resisting material such as porcelain.

The impeller 9 is made of corrosion resisting material such as porcelain having the cylindrical boss 10 extending through the end cover 4. A metallic shaft 11 is inserted into the boss and secured thereto by means of cementing material 12 and the remaining space inside of packing is filled with metallic powder 13 and tightly sealed by means of nut 14 in order to increase the thermal conductivity. In some cases as shown in Fig. 4 the vacant space 33 is left around the shaft without filling metallic powder 13 and cooling water is injected into the space 33 from the nozzle 34. A casing 35 provides a protective hood for water in the construction shown in Fig. 4. Referring again to Fig. 1, 15 represents packing material; 16 is a packing gland made of porcelain and 17 is its clamping flange. Thus the metallic shaft 11 is entirely covered by the porcelain boss 10 and separated from the interior of the pump and does not make direct contact with acid or other corrosive liquids.

Spaced studs 18 are secured to the end cover, each carrying a cylinder 19 enclosing a spiral spring 20 which is held in compression by the top of the stud 18. A clamping stud 21 is screwed into the top end of the cylinder 19 and acts on the flange 17 by means of the nut 22. By such arrangement the packing gland 16 is always pressed on the packing by the spring 20 acting

on the stud 21 so that the packing 15 is always tightened to compensate the wear of packing during the operation. By arranging the spring device as described above in the space between the end cover 4' and the flange 17 the vacant space is utilized without extending the stud 21 and without increasing the space between the flange 17 and the opposite bearing.

In Fig. 2 I have shown an automatic device for regulating the supply of clean water to the packing around the pump shaft to overcome the leakage of corrosive liquid as an embodiment of this invention. Referring to Fig. 2, a pressure chamber 23 leading to the inside of pump through a passage 24 is made in the porcelain lining 4 of the end cover. The space 23 is covered by means of acid resisting elastic diaphragm 25 to which is secured a piston valve 26 by means of a rod 27. The piston valve 26 is operated by a spring 28 normally to close the port 29 through which clear water is supplied to the space behind the diaphragm 25 and then the water is supplied to the packing through the passage 30 so that the water pressure may be applied to the space around the shaft to overcome the leaking pressure of corrosive liquid. The pressure water is supplied from a pipe 31 through a glass gauge 32 facilitating the inspection of positive supply of pressure water.

In accordance with the above described construction of the acid resisting pump embodying this invention the porcelain linings are very firmly secured to the metallic shell and end covers owing to the sanded surface which is integral with the porcelain body so that when the casing is tightly fastened together by bolts the total axial force can be carried by the sanded portion 7 and the metallic cover and no bending stress is set up therein, but all stresses due to the internal pressure of pump casing can be carried by the metallic outer shell. The troubles at the packing owing to leakage of corrosive fluid can be avoided by the above construction since the packing is always tightly clamped and clear water acts automatically to overcome the internal pressure. Thus the pump embodying this invention is very strong, durable and compact.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A corrosion resisting pump construction comprising an annular porcelain body having laterally projecting end portions and defining a delivery canal and firmly secured to an enclosing metallic shell by cementing material, an end cover and hub made of porcelain having an inlet

opening and having a protecting metal cover secured thereto by cementing material, an opposite end cover and hub made of porcelain and firmly secured to a protecting metallic cover by cementing material, the outer cylindrical surfaces of said porcelain body and end covers being roughened by a sanding process and cemented to said metallic shell and covers which are assembled and connected to form a pump casing, clamping means for securing said end covers with the porcelain sides against the ends of said laterally projecting body portions to maintain an acid proof fluid tight joint, an impeller entirely made of porcelain and having a hollow boss extended through the hub of an end cover, a driving shaft inserted into said hollow boss and fixed thereto by cementing material, and packing means tightly sealing said boss and hub against leakage of corrosive fluids.

2. A corrosion resisting pump casing comprising an annular porcelain body having laterally extending end portions and defining a delivery canal and firmly secured to an enclosing metallic shell by cementing material, an end cover and hub made of porcelain having an inlet opening and having a protecting metal cover secured thereto by cementing material, an opposite end cover and hub made of porcelain and firmly secured to a protecting metallic cover by cementing material, the entire outer surfaces of said porcelain body and end covers being cemented to said metallic shell and protecting covers, clamping means for securing said end covers with the porcelain sides against the ends of said laterally extending body end portions to maintain an acid resisting fluid tight joint, an impeller entirely made of porcelain and having a hollow boss extended through the hub of an end cover, a driving shaft inserted into said hollow boss and fixed thereto by cementing material, and packing means tightly sealing said boss and hub against leakage of corrosive fluids.

3. In a corrosion resisting pump construction having a separable annular metallic housing and an annular hollow porcelain chamber section provided with cylindrical end flanges adapted to be received in said metallic housing, means consisting of small pieces of porcelain fused to the exterior walls of said chamber section for roughening them, and cementing means between said chamber section and metallic casing engaging with said roughening means whereby axial strain on said section is borne by said casing to prevent cracking of said hollow section.

SEYTIRO IHARA. 55