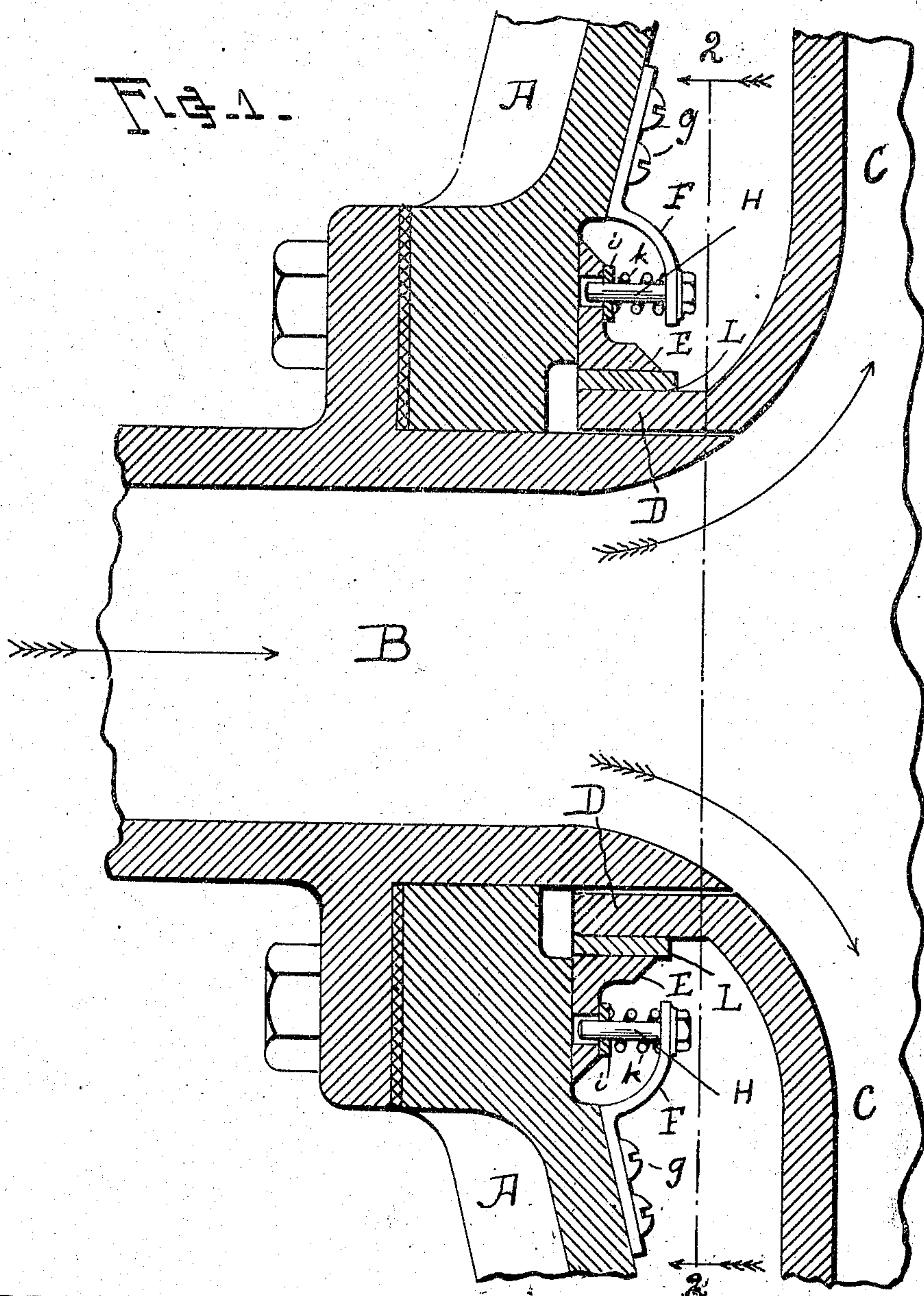


No. 815,540.

PATENTED MAR. 20, 1906.

F. W. KROGH.
CENTRIFUGAL PUMP.
APPLICATION FILED APR. 6, 1904.

3 SHEETS—SHEET 1.



Witnesses
W. S. Bates
Julius H. Smith

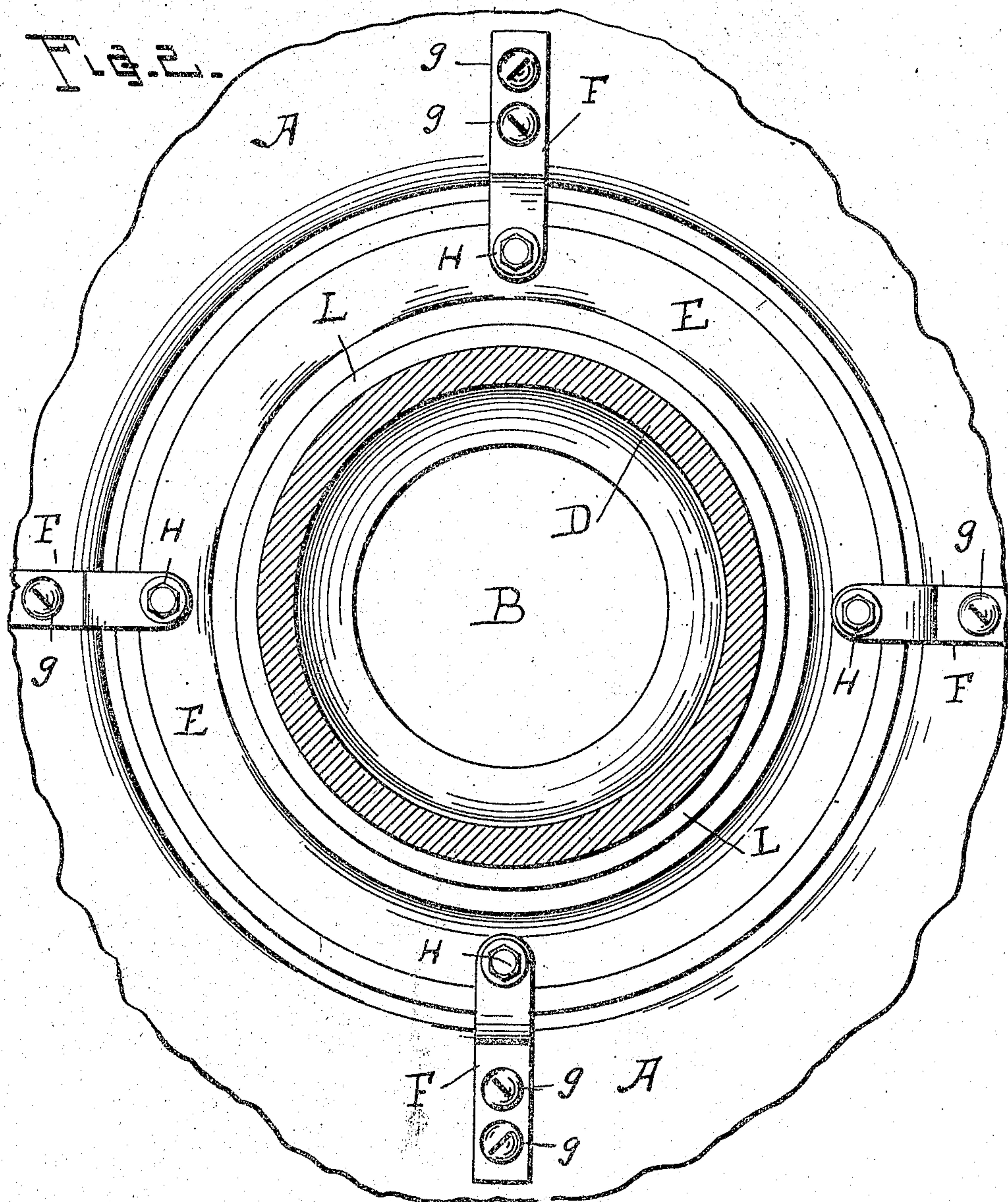
Inventor
Ferdinand W. Krogh
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3 SHEETS—SHEET 2.



Witnesses
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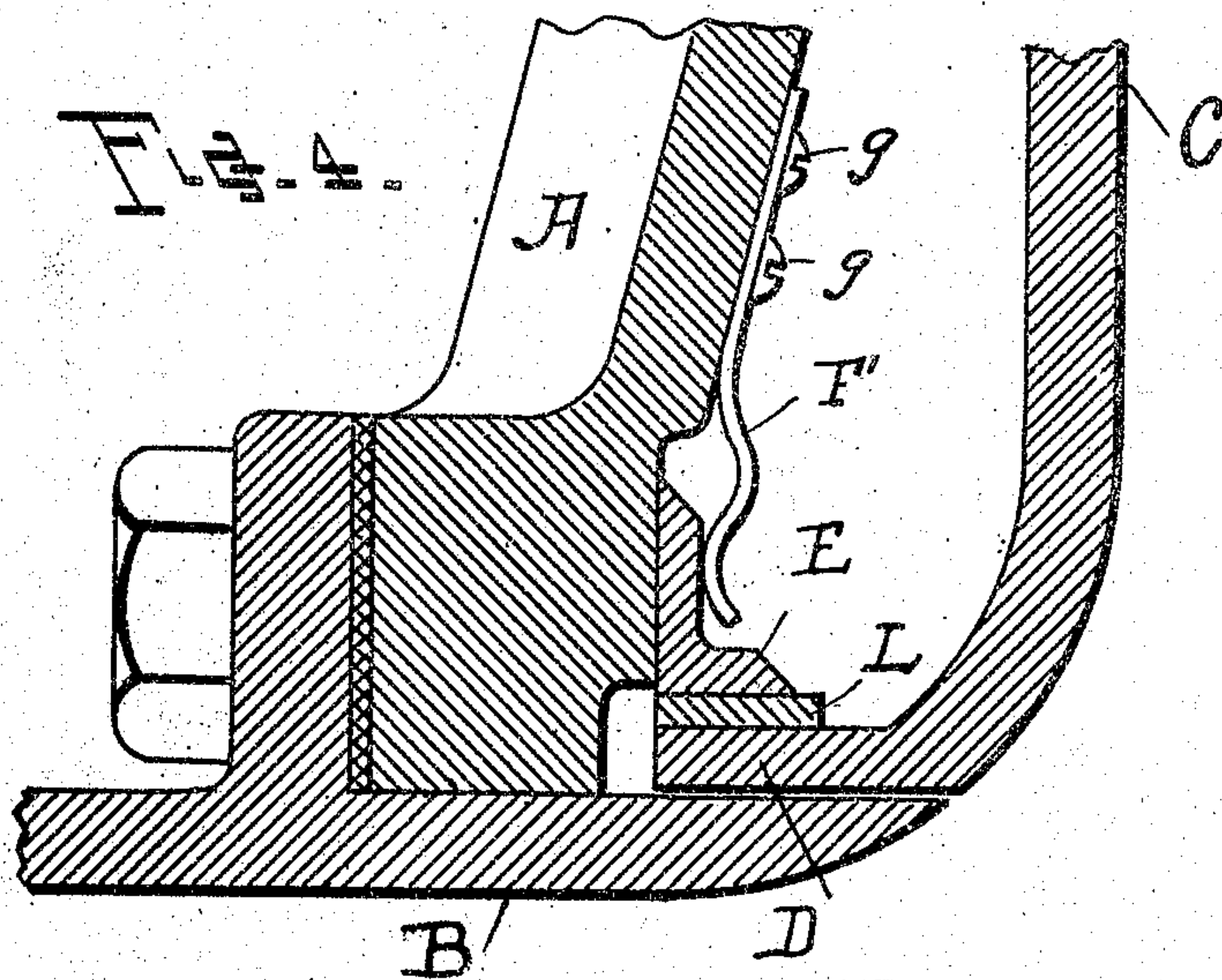
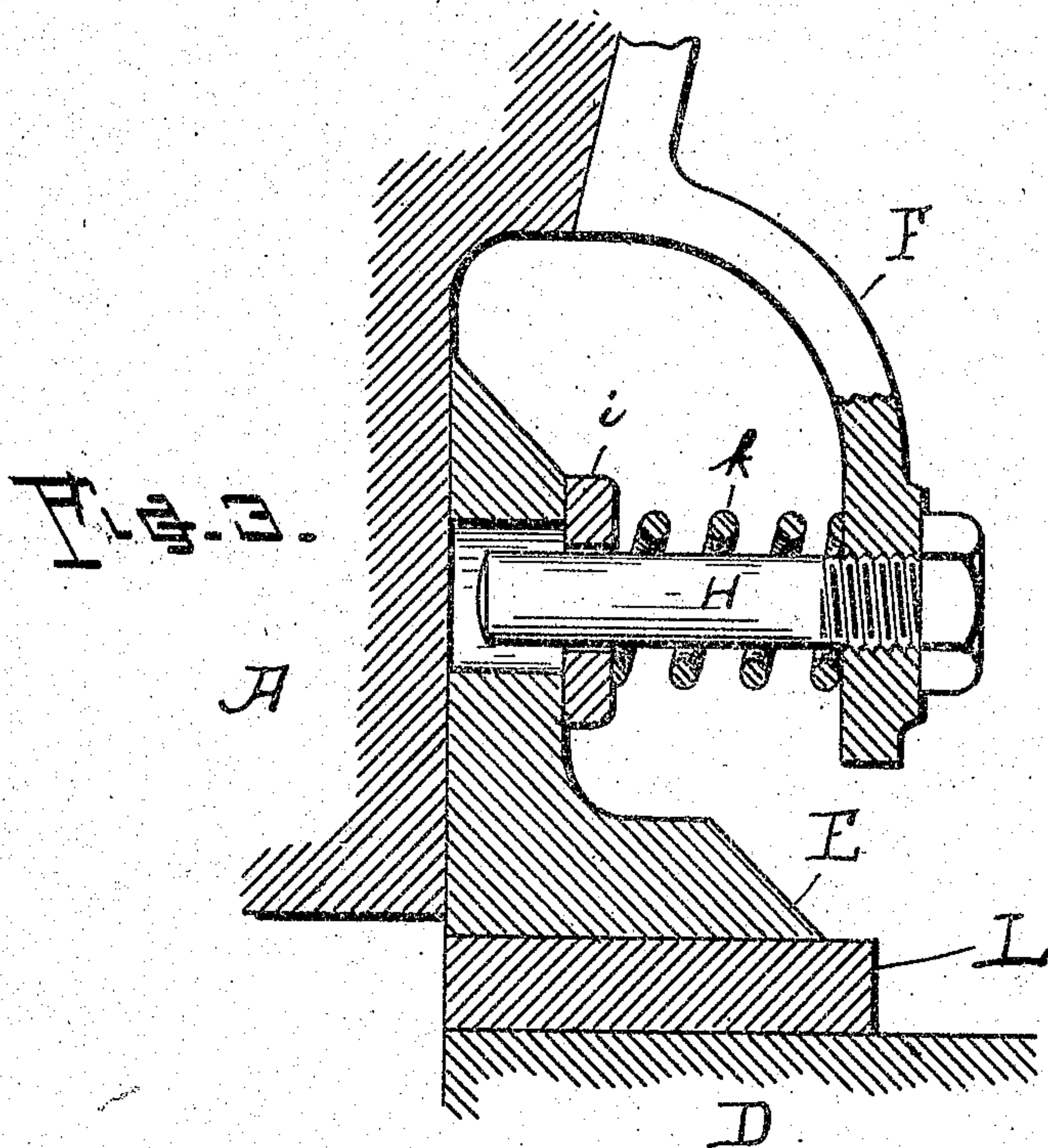
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3 SHEETS—SHEET 3



Witnesses
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UNITED STATES PATENT OFFICE

FERDINAND W. KROGH, OF SAN FRANCISCO, CALIFORNIA.

CENTRIFUGAL PUMP.

No. 815,540.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed April 6, 1904. Serial No. 201,886.

To all whom it may concern:

Be it known that I, FERDINAND W. KROGH, a citizen of the United States, and a resident of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention is intended more particularly to provide centrifugal pumps with means for preventing leakage between the stationary and movable parts while in operation.

In carrying out the invention I make use of an adjustable packing-ring arranged to engage the movable and stationary parts of the apparatus to make a tight joint between said parts and one which may be also renewable to take up wear. Also I make this packing-ring self-adjusting so that it floats, as it were, upon the joint and maintains a perfect closure, while accommodating itself to the relative movement of the parts. Also I provide an adjustable and renewable facing-ring which constitutes a wear-surface in the joint.

Referring to the accompanying drawings, consisting of three sheets, Figure 1 is a fragmentary central section of a centrifugal pump, showing my improvements applied thereto. Fig. 2 is a section taken on dotted line 2 2 of Fig. 1 looking in the direction of the arrows. Fig. 3 is an enlarged section of a part of Fig. 1. Fig. 4 is a modification of the same parts shown in Fig. 3.

In the drawings, A represents the casing; B, the suction pipe or inlet, secured to the casing, and C the impeller, provided with projecting neck D, moving within the casing. The above-described parts are shown in the drawings as applied to one side only of a centrifugal pump, which may be mounted vertically or horizontally or otherwise, as desired, and it will be readily seen that the same can be applied to the other side as well or wherever necessary. However, for the purpose of this application I shall refer to my improvements singularly.

E is a packing-ring within the casing, seated on a prepared surface thereof and mounted also on the neck D of the impeller C. This ring is most practically made of an L-shape, as shown, though of course another form may be used. The object of the ring is, as already stated to make a tight joint between the moving part C and the stationary part A.

For the purpose of maintaining a packing contact between the ring E and the casing A,

I make use of the following construction, viz: F represents brackets secured to the casing by screws g or otherwise, extending to points behind the ring E. H represents bolts or pins extending from the brackets toward the ring and loosely connected to one of those parts, so as not to impede the floating movement of the ring. In the form shown the bolts are tapped through the brackets and extend into holes or sockets in the ring which are larger than the end of the bolts. i represents washers on the bolts, and k represents spiral springs between the heads of the bolts and the washers, which press the ring E constantly against the casing A.

In the modification illustrated in Fig. 4 the brackets F' are made of spring material, each secured at one end, as shown at g g, to the casing A and having its free end bent and engaged with the packing E, so as to press the ring against the casing.

The ring E has a second packing-face which is ordinarily at right angles to the first-mentioned one. This second face engages the neck D of the impeller and prevents leakage at that point. As the motion between the ring and the neck is considerable, I interpose between their engaging surfaces a facing-ring L. This facing-ring L contacts with the faces of the packing-ring E and the neck D and may be made of any suitable material. In case of wear the ring L may be taken out and dressed or replaced by a new one.

In some cases it may be desirable to secure the facing-ring L to the packing-ring E or to the neck D, so that the relative movement is entirely between the ring and the other of said parts to which it is not secured. In general, I consider it desirable to employ ground faces between all contacting parts.

Having thus described the nature and objects of my invention and illustrated its application in practice, and believing I have produced novel and valuable improvements in the class of machinery to which the invention relates, for the purpose of preventing leakage between the stationary and moving parts, I want it understood that the foregoing description and the drawings are illustrative merely and that the invention may be practiced in various forms at the selection of the mechanic, with which understanding

What I claim as new, and desire to secure by United States Letters Patent, is—

1. In the class of machinery described a packing-ring to prevent leakage between the

stationary and moving parts, consisting of a ring having suitable shape; brackets secured to said stationary part, and provided with springs by which said ring is pressed to said stationary part, said springs being placed between said brackets and the ring.

2. In the class of machinery described a packing-ring of approximately L shape to prevent leakage between the stationary and moving parts in combination with a spring-bracket attached to the stationary part to press said ring against said part.

3. In the class of machinery described, a packing-ring to prevent leakage between the stationary and moving parts, consisting of a ring having a right-angle shape; holes bored upon said ring; brackets secured to the stationary part and provided with pins by which said ring is secured to said stationary part, said pins being smaller in diameter than the diameter of the holes upon the ring. washers

on said pins and springs around said pins between the washer and the brackets.

4. In the class of machinery described, a packing-ring of approximately L shape to prevent leakage between the stationary and moving parts in combination with a bracket attached to the stationary part, a bolt tapped into said bracket and extending into holes or sockets in the ring, said holes or sockets being of larger diameter than the bolt, a washer on the bolt and spiral springs between the washer and the bracket, to press the ring into packing contact with the stationary part.

In testimony whereof I have affixed my signature, in the presence of two witnesses, this 8th day of February, 1904.

FERDINAND W. KROGH.

In presence of—

W. S. BATES,
A. S. PARÉ.