[90.]

4 Sheets--Sheet 1.

W. H. WARD'S, ROTARY PUMP.

No. 119,482. Patented Oct. 3, 1871.

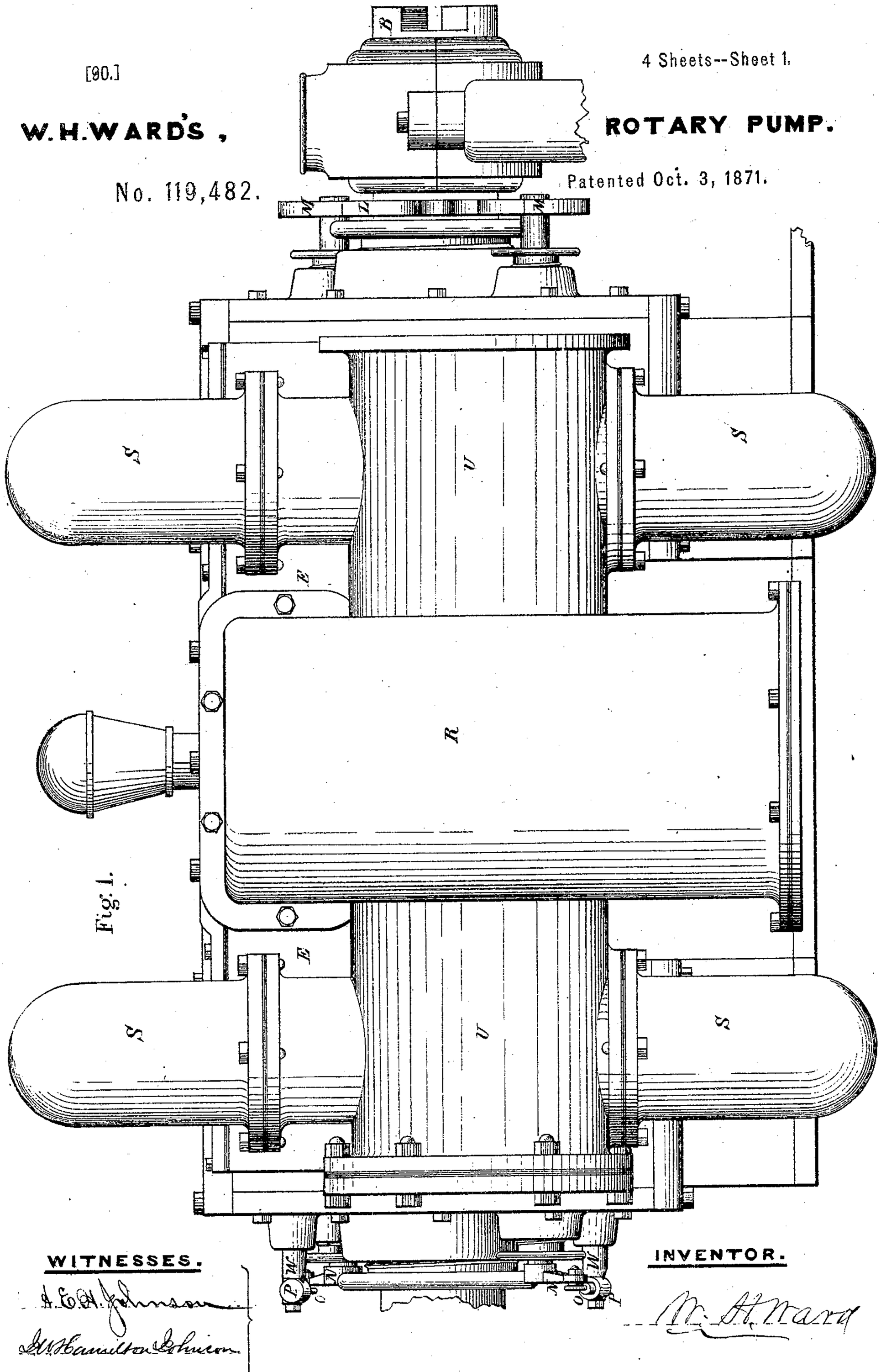

Fig. 1.

WITNESSES.

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D. W. Hamilton Johnson

INVENTOR.

W. H. Ward

[90.]

4 Sheets--Sheet 2.

W. H. WARD.

Rotary Pump.

No. 119,482. Patented Oct. 3, 1871.

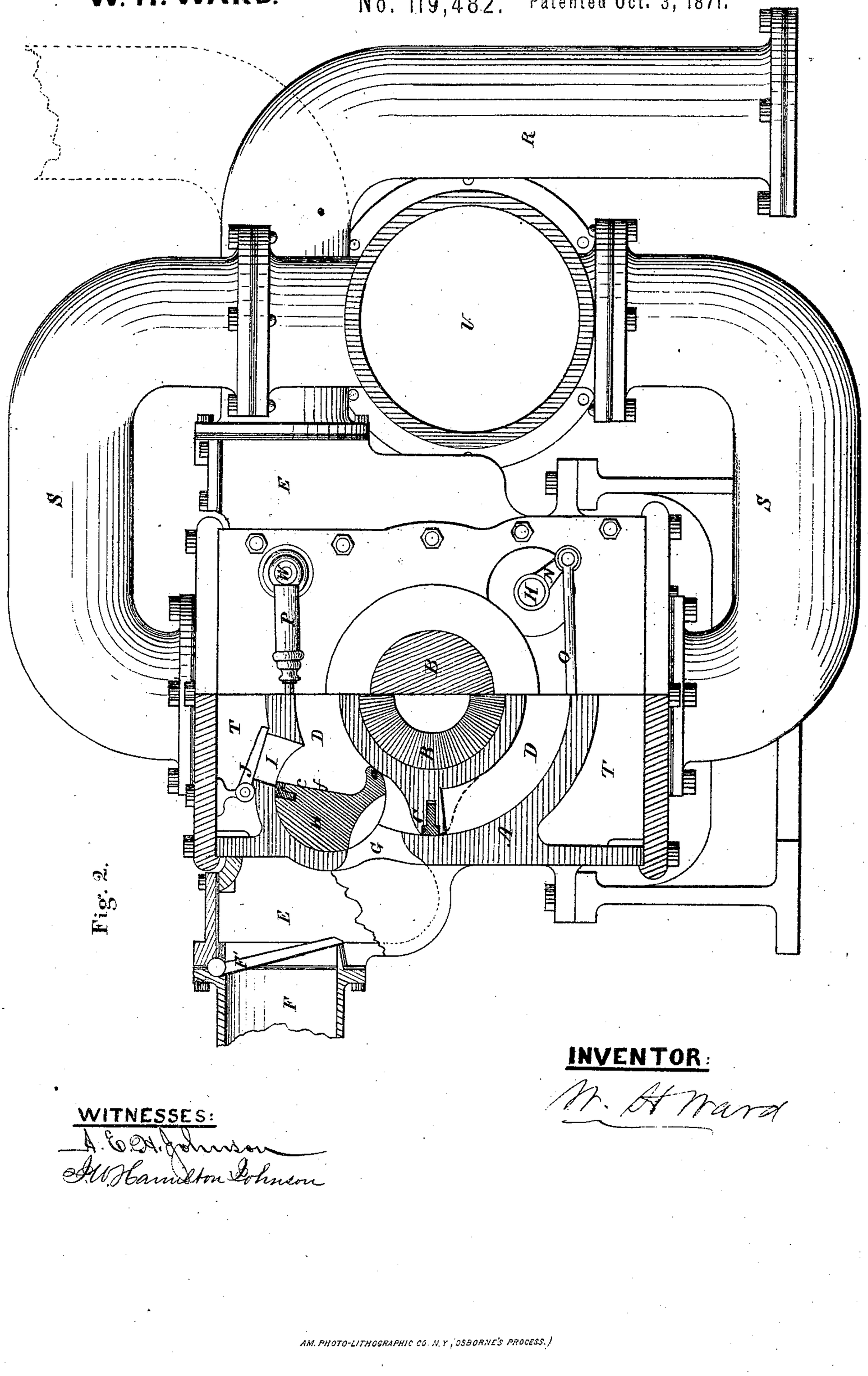

Fig. 2.

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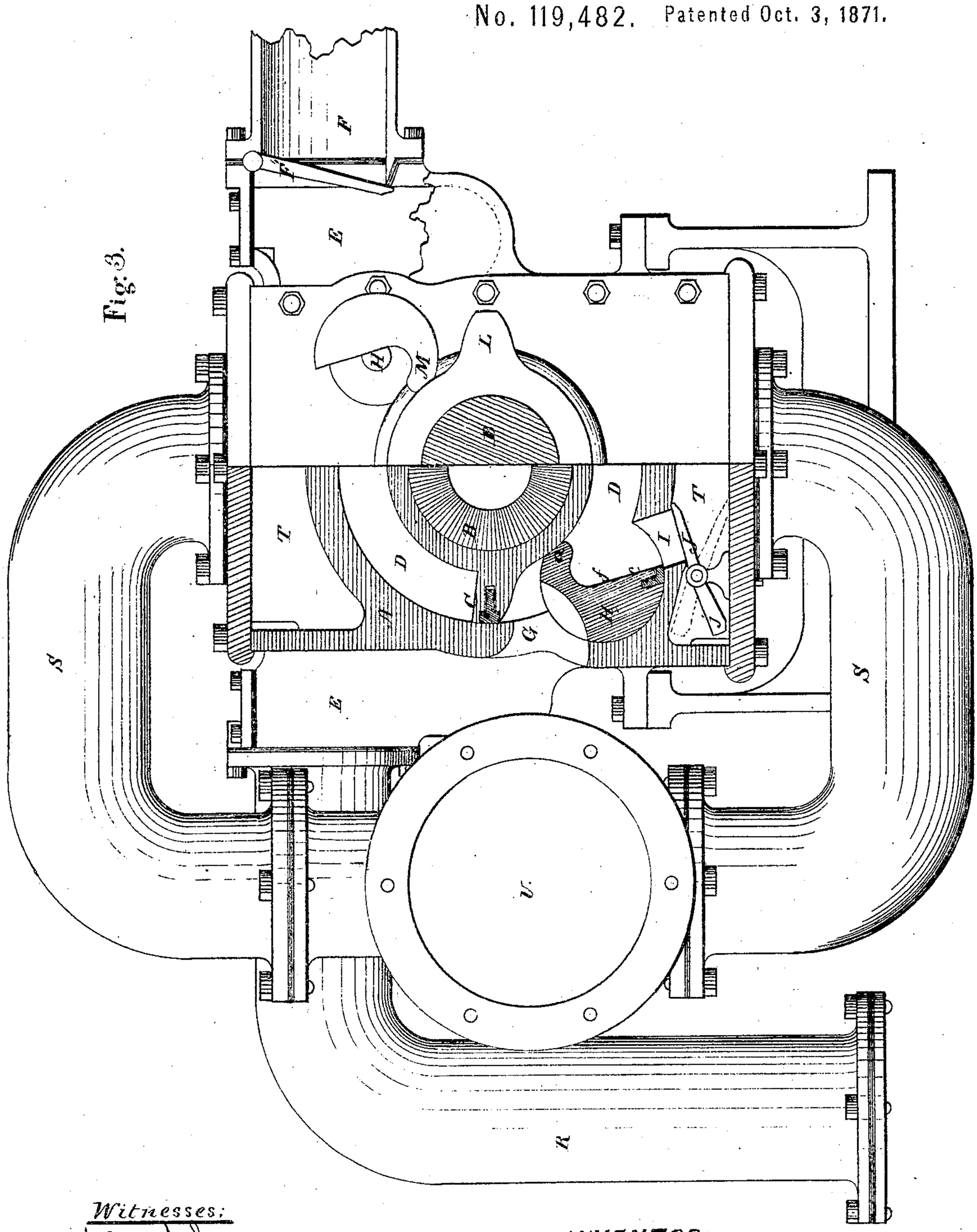
4 Sheets--Sheet 3.

Rotary Pump.

No. 119,482. Patented Oct. 3, 1871.

Fig: 3.



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A. Hamilton Johnson

INVENTOR:

W. H. Ward

[90.]

No. 119,482.

W. H. Ward.

Patented Oct. 3, 1871.

4 Sheets--Sheet 4.

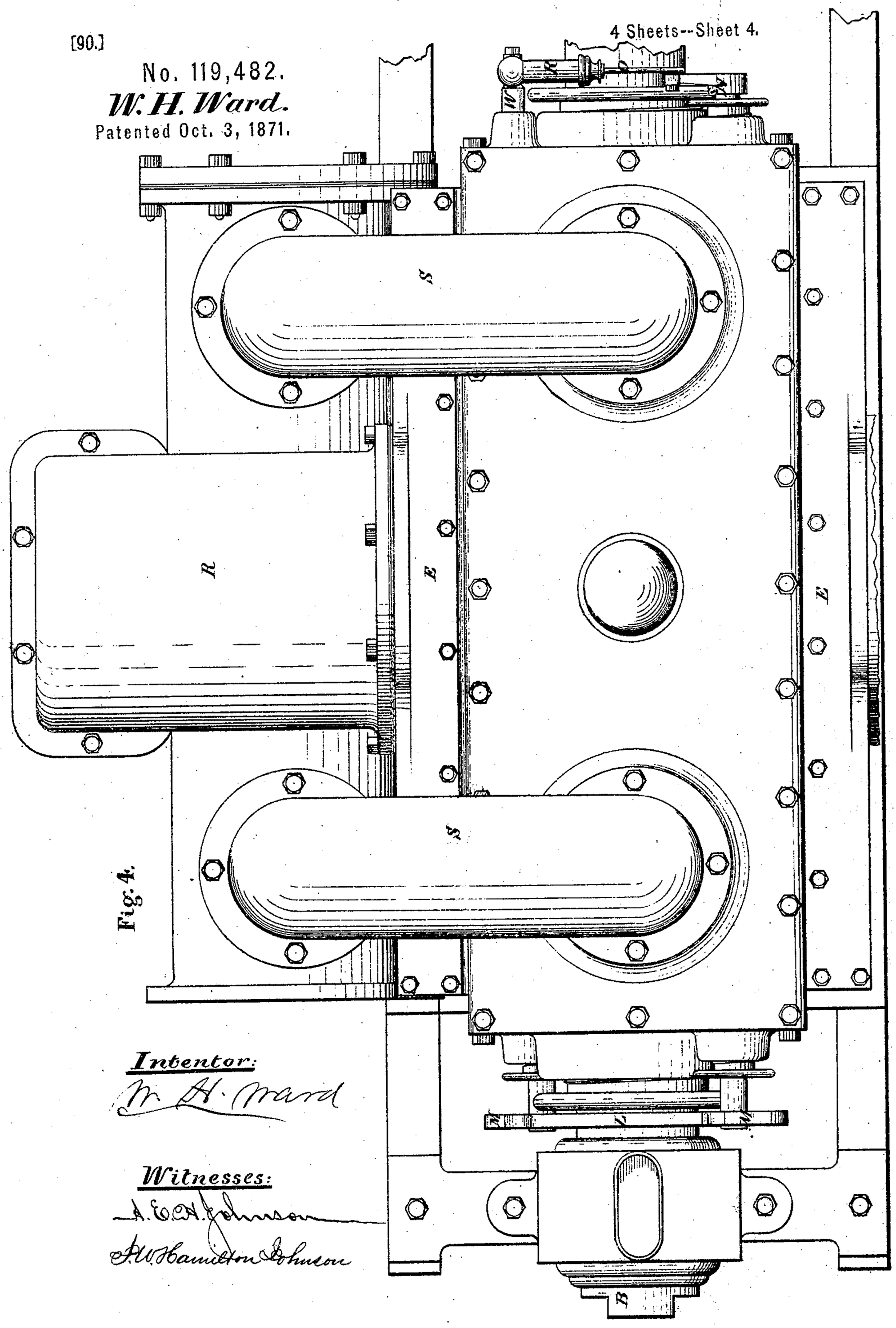

Fig. 4.

Intentor:

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F. W. Hamilton Johnson

119,482

UNITED STATES PATENT OFFICE.

WILLIAM HENRY WARD, OF AUBURN, NEW YORK.

IMPROVEMENT IN ROTARY PUMPS.

Specification forming part of Letters Patent No. 119,482, dated October 3, 1871.

To all whom it may concern:

Be it known that I, WILLIAM HENRY WARD, of Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Rotary Force-Pumps, of which the following is a full, clear, and exact description, which will enable others skilled in the art to which my invention relates to construct and use the same.

My invention relates to that class of pumps in which the water or other fluids or semi-fluids is received into and forced therefrom by a rotary motion. In this class of pumps, as heretofore constructed, the side friction and wear are such that the force required in feeding and forcing the liquid to the required height is so great as to render the pump almost useless in a short time when under heavy pressure. It is one of the objects of my invention to overcome these difficulties; and my said invention consists of a pump having inlet and outlet openings, and oscillating resisters located between each pair of openings, in connection with a revolving winged cylinder. The said openings and resisters being arranged to divide the suction and pressure-chambers so that the fluid shall be received into the case and discharged therefrom simultaneously from opposite sides thereof, and thereby equalize the pressure upon the journals of the cylinder by the joint action of the incoming and outgoing streams. My invention also consists in the arrangement of certain devices by which the return of the resisting and oscillating valves to their proper positions within the pressure water way of the case is effected so as to render their action positive and automatic by the pressure of the fluid in the discharging pressure-chambers of the case.

In the accompanying drawing, Figure 1, Sheet 1, represents a side elevation of a pump embracing my invention. Fig. 2, Sheet 2, represents a partial vertical section and elevation of the same. Fig. 3, Sheet 3, represents a similar view, the parts in section being from opposite ends of the pump in both these figures. Fig. 4, Sheet 4, represents a plan or top view of the same.

The case A has a cylindrical chamber, within which the cylinder B is arranged so that its wings or projections C revolve within an annular suction and forcing chamber D, and in contact with the interior thereof. This chamber or case A is provided with receiving side chambers, E, arranged on opposite sides of the case, having inlet openings, F, provided with valves, F′, arranged to open within the side chambers. These side chambers may be equal in length to that of the revolving winged cylinder, and communicate with the chamber D by ports G, arranged on opposite sides of the axis of the cylinder or rotator B, to accommodate the positions of the resisting devices H, which are fitted in recesses in the case contiguous to said ports G for a purpose to be presently described. The discharge openings I are arranged in the case next the flat sides of each resisting device, H, and are also fitted with valves, J, the lower one of which has a counterbalance, *j*, the tendency of which is constantly to keep the valve closed. The devices H each consists of a semi-cylindrical valve having an oscillating movement in such manner as to bring a portion of the circumference thereof alternately in contact with and retract it from the cylinder, for the purpose of interposing a solid partition within the annular chamber D to force the water out of the discharge openings I, and of being withdrawn within a recess in the case to clear the path of the forcing wings, and in this way divide the chamber into two suction and two forcing divisions, each opened and closed by the automatic action of the accommodating resisting devices. These oscillating division valves H perform three several functions, viz.: To divide the incoming from the outgoing streams; to open and allow the wings C to pass at the moment they reach and pass the outlet openings I, at which point there is neither pressure or suction, thus allowing the said valves H to oscillate freely; they also form a packing with the cylinder without interfering with the revolution thereof. Moreover, the bearing point *a* of the resisting device next the cylinder being the shortest from the center *b*, and the face *c* of the longest part from the center being radial, the greatest pressure is against the longest flat surface *c*, consequently insuring a tight joint in its seat, and also forms a good, tight, and easy joint on the cylinder's surface. The bearing points of the wings C and the oscillating resisting devices may be provided with suitable metallic or other compensating packing, as shown. The opening movement of the oscillating valves H is rendered positive by means of cams L on the outer end of the axis of the revolving cylinder B, which, as they re-

volve, come in contact with the cams M on the outer ends of the oscillating valves H, and the relation which these cams bear to each other and to the wings of the revolving cylinder must be such that the cams will open the resisting valves immediately after the wings C pass the discharge opening I. When the wings pass the oscillating valves H the latter immediately assume their former bearing upon the smooth or bearing surface of the revolving cylinder. This movement is also positive, and is effected automatically by the pressure of the fluid within the pressure discharge chambers T, the means for accomplishing which consists of a crank, N, on the outer end of each oscillating and resisting valve jointed to a plunger, O, of an oscillating cylinder, P, which communicates with the said pressure-discharge chamber T by means of a connecting pipe, W, so that every time the resisting valves are opened by the cams the cranks force the plungers within their cylinders against the pressure of the fluid, and when the cams are released the pressure of the fluid against the ends of the plungers forces them out and thus close the resisting valves at each half revolution of the revolving cylinder. In this movement the short or wearing part *a* of the resisting valves is caused to slide down the curved back of the wings C on a rubbing joint for the purpose of preventing any hard substance from getting between the working parts of these rubbing joints on the wearing surface of the revolving cylinder B and that of the resisters H, and thus prevent channels from being cut in the working surfaces. But by causing them to work on a sliding or rubbing joint prevents the possibility of any hard substance getting between the working points. From the foregoing description it will be seen that at every revolution of the cylinder the fluid will be received from the suction-pipe R at opposing sides of the cylinder simultaneously, and forced from the chamber D through the outlets I into the pressure-chamber T, from thence through the connecting-pipes S into the main receiving or leading pipe U, to be conveyed wherever required. The pump is mounted upon a frame having bearings for the revolving cylinder. The connection of the revolving cylinder with the driving power may be made by the usual method of coupling or otherwise. The pump may be used for pumping thick as well as thin fluids, and may also be used as a bellows or blast blower by making the parts larger and proportionately lighter. In the drawing the pressure surface of each wing is represented as flat and the other side curved to form the rubbing joint with the oscillating resisting device, and in this arrangement the movements of the resisting devices are effected by cams; but, if it should be desired to render the opening as well as the closing movement of the resisters automatic, both sides of the wings C may be curved alike so as to rub on both sides in passing the resisters, and thus push the resisters out of the way; while the latter, in returning to the cylinder, will push themselves down the other side of the wings by the force of the pressure plungers. The cutting out the pressure side of the wings is for obtaining a recess into which any foreign substance would lodge and pass out of the discharge ports.

Having described my invention, I claim—

1. A pump having inlet and outlet openings, G and I, and oscillating valve-resisters, H, arranged contiguous to and between said openings, in combination with a revolving winged cylinder, when said openings and oscillating resisters are arranged in such manner as to divide the suction and pressure-chambers and cause the suction and force pressures to balance themselves, and thereby avoid all side pressure or friction, as described.

2. In a pump having oscillating resisting valves operating in connection with a revolving winged cylinder, said resisting valves made to close by a simultaneous movement upon the said cylinder by means of the pressure of the fluid in the discharging chambers T, acting through the mediums, substantially as described.

3. The auxiliary chambers E of the inlet openings G, neutralizing the current into the working chamber and forming external chambers for the reception of gravels, &c., and prevent them from being drawn into the pump, as described.

4. The case A, forming side receiving chambers E, inlet and outlet ports G and I, and top and bottom pressure discharge-chambers T, as described.

W. H. WARD.

Witnesses:
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J. W. HAMILTON JOHNSON.