W. O. CROCKER.

ROTARY-PUMP.

No. 171,651. Patented Jan. 4, 1876.

Fig. 1

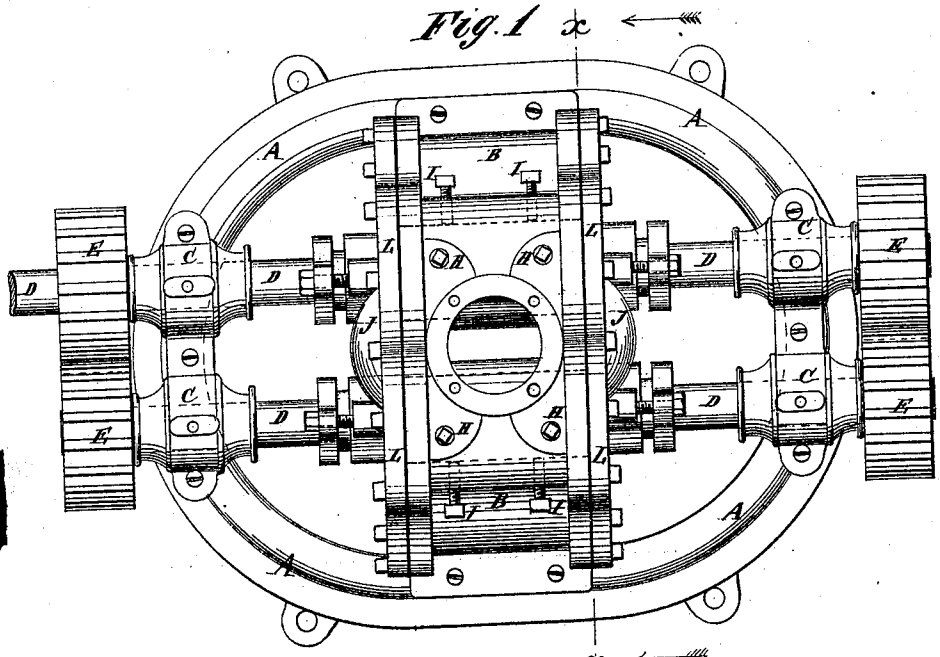


Fig. 3

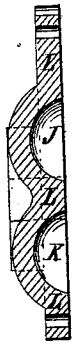


Fig. 2

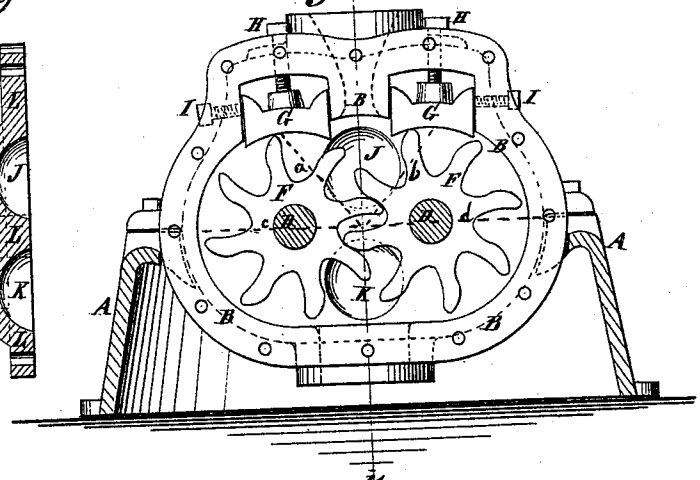
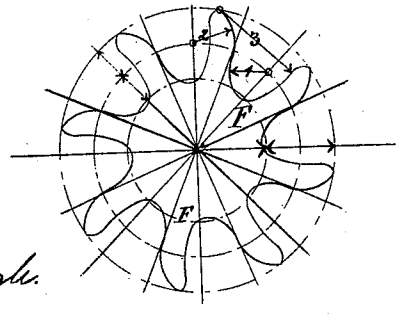


Fig. 4



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UNITED STATES PATENT OFFICE.

WILLIAM O. CROCKER, OF TURNER'S FALLS, MASSACHUSETTS.

IMPROVEMENT IN ROTARY PUMPS.

Specification forming part of Letters Patent No. **171,651**, dated January 4, 1876; application filed September 25, 1875.

To all whom it may concern:

Be it known that I, WILLIAM O. CROCKER, of Turner's Falls, in the county of Franklin and State of Massachusetts, have invented a new and useful Improvement in Rotary Pumps, of which the following is a specification:

Figure 1 is a top view of my improved pump. Fig. 2 is a cross-section of the same, taken through the line *x x*, Fig. 1. Fig. 3 is a detail section of one of the cylinder-heads, taken through the line *y y*, Fig. 2. Fig. 4 is a view illustrating the construction of one of the rotary pistons.

Similar letters of reference indicate corresponding parts.

The object of this invention is to reduce the pressure upon the shafts, prevent the grinding of the pistons upon the case, and the consequent wear, and thus diminish the amount of power required to run the pump.

The invention will first be described in connection with drawing, and then pointed out in the claims.

A is the base, to which the pump-cylinder B and the bearings C for the shafts D are bolted. The shafts D are parallel with each other, pass through the pump-cylinder B, and are connected at each end by gear-wheels E, so that they both may always revolve with the same velocity. One of the shafts D projects at one end, so that the power may be conveniently applied to it. The shafts D pass through stuffing-boxes in the heads L of the pump-cylinder B, and have rotary pistons F, meshing into each other, formed upon or attached to them within the said cylinder B.

The pistons F are constructed as follows: A circle is drawn of a diameter equal to the required diameter of the piston, and within it is drawn a concentric circle of half its diameter, and another of three-fourths its diameter. The circles are then divided into sixteen equal parts by radii. From the points of intersection of each alternate radius, with the intermediate circle as centers, and with a radius equal to the distance apart of said radii upon said circle, is struck the inner part of one side of the teeth, as indicated by arrow 1, the outer part of said side being struck from the corresponding point of the next alternate radius, and with the same radius as the last arc. From the intersection of the arcs last drawn, with the outer circle as centers, are struck the other sides of the adjacent teeth, as indicated by arrow 3. The pistons are made of such a diameter that their teeth or wings cannot come in contact with the inner surface of the case B, so that there can be no grinding and friction between said pistons and case.

In the walls of the case B, upon the opposite sides of the discharge-opening in said case, and directly opposite the shafts D, are formed chambers extending the entire length of the case B, in which are placed blocks or abutments G, the inner surfaces of which are concaved upon the arc of the circumference of the pistons F.

The peculiar construction of the teeth of the pistons F enables the said teeth to be made so small that at least one tooth may always be in contact with each abutment G, while at the same time having sufficient water-space. To each of the abutments G are swiveled the forward ends of two or more set-screws, H, which pass in through screw-holes in the walls of the case B, so that by turning the screws H the abutments G may be set up to take up wear, and may be adjusted at any desired closeness to the pistons F. The abutments G are set up against the sides of their chambers next the discharge-opening by two or more set-screws, I, which pass in through screw-holes in the walls of the case B, and rest against the sides of said abutments farthest from the said discharge-opening.

By this construction the shafts D are relieved to a great extent from the pressure of the water. The said pressure, being between the abutments G, cannot so press the shafts as to bring the pistons F into contact with the inner surface of the case B.

A vent-chamber, J, and a suction-chamber, K, are formed in each head upon the opposite sides of a line joining the shafts D, to allow the water to pass out of and into said spaces freely.

The dotted lines *a b* of Fig. 2 illustrate the area and direction of pressure by my arrangement of blocks, while those marked *c d* exhibit the result of placing the blocks opposite to each other. The sum of the lines *a b* is less by a third than that of lines *c d*, indicating a

reduction of pressure on the piston in the same proportion by the arrangement of my blocks over that sometimes employed. This is an important matter in large power or water or fire pumps, where the dimensions of piston are often twelve inches in diameter by the same in length, being exposed to a pressure of one hundred pounds to the square inch; hence my arrangement lessens wear of bearings, and saves much power. Another point in the arrangement of these blocks is their location above the pistons, and in a direction contrary to the tendency of drift in the pistons. This prevents the latter from coming in contact with the blocks, and is an advantage which cannot be produced by any other arrangement of the blocks.

It will be observed that these blocks are provided with an adjusting-screw, by which they are moved very close to, but not in contact with, the pistons, to prevent the parts from grinding together and producing wear, while the check-screws in the sides of the chambers are necessary to force the blocks tightly against the walls of the exit, to prevent the air from passing over the blocks and into the pipe, as well as the blocks themselves from vibrating, so as to get out of adjustment. I thus render the blocks adjustable in both directions, and independent of the pistons.

The function of the vent and suction chambers can be understood by supposing the pistons under water, so that as the tooth of one enters a cavity of another, the water is forced out of the latter, and as the same tooth leaves the cavity there is an ingress of water; but the entrance of the tooth will cause some of the water to flow out at the end, while its departure will be followed by an inflow of water from the end; hence the necessity for the vent and suction chambers.

By practical experiment I find that with my pistons a large pump will not operate properly without these head-chambers.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The abutments G G, arranged above and directly over shafts D D, one on each side of discharge, as and for the purpose described.

2. The combination, with pistons F, of the chambers J K, arranged in the heads L, as and for the purpose set forth.

3. The combination, with abutments G G, of holding-screws at top and side to act upon said abutments, in the manner described.

4. The pistons F, provided with teeth convex on one side and concave on the other, as and for the purpose specified.

WILLIAM O. CROCKER.

Witnesses:

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JOHN D. FARWELL.