V. C. J. ORTMANS.
Rotary-Pumps.

No. 197,166. Patented Nov. 13, 1877.

FIG. 2.

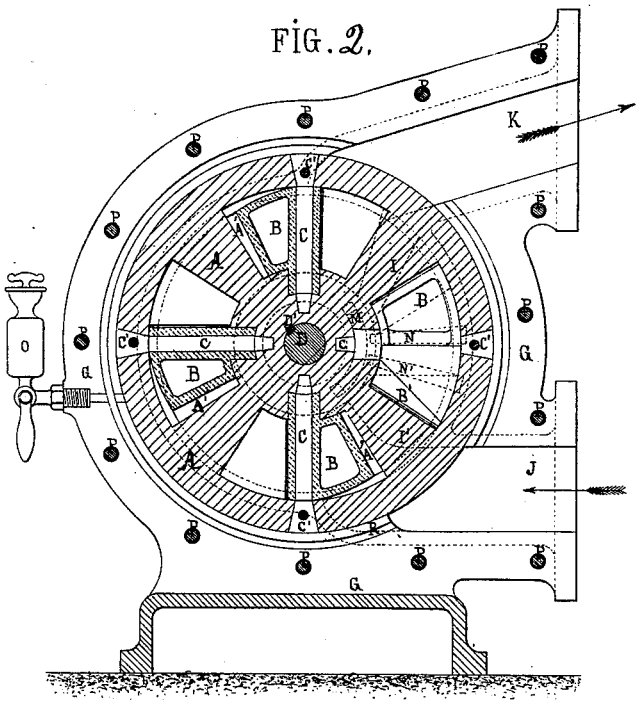

FIG. 3.

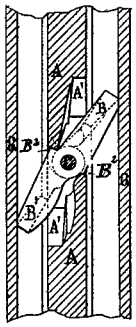

FIG. 1.

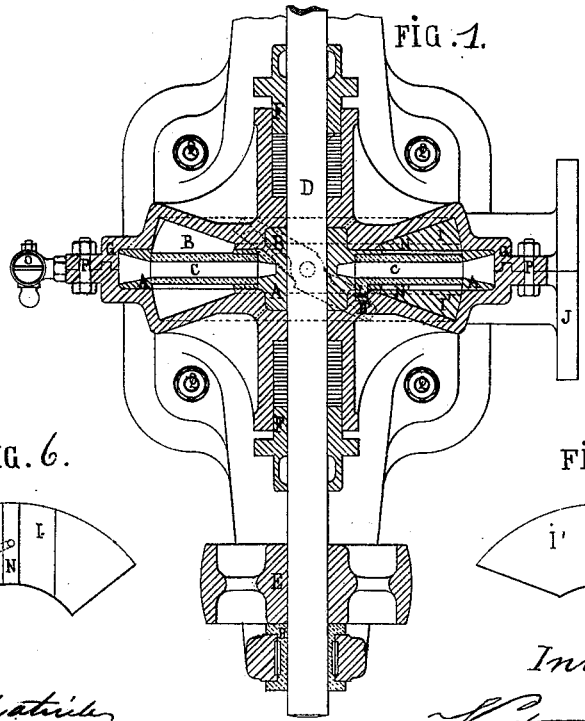

FIG. 4.

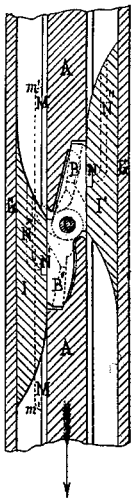

FIG. 5.

FIG. 6.

FIG. 7.

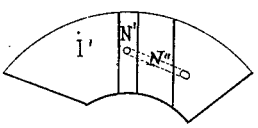

FIG. 8.

Witnesses
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VICTOR C. J. ORTMANS, OF BRUSSELS, BELGIUM.

IMPROVEMENT IN ROTARY PUMPS.

Specification forming part of Letters Patent No. **197,166**, dated November 13, 1877; application filed May 22, 1877.

To all whom it may concern:

Be it known that I, VICTOR CLEMENT JOSEPH ORTMANS, of Brussels, in the Kingdom of Belgium, civil engineer, have invented an Improved Rotary Pump or Apparatus for Raising and Forcing Fluids, and for other purposes, of which the following is a specification:

My invention relates to a novel construction and arrangement of rotary pumps or apparatus for raising and forcing cold or hot water, or other liquids, or for exhausting and forcing or compressing air or gas, which apparatus is also applicable as a motor or a meter.

The said rotary pump or apparatus consists of an outside circular case or shell mounted on a suitable frame or bed-plate. The inner part of the said case or shell forms a chamber of suitable size, provided with an inlet and an outlet passage or pipe. The body or shell of the apparatus is wider at its periphery than at its center, having in transverse section the form of a double cone. From the central part of the said body projects on each side a stuffing-box, which stuffing-boxes are traversed by a shaft, upon which is affixed the nave of a central circular disk or plate, made of cast-iron or other suitable metal, which disk or plate extends from the said central shaft to the periphery of the chamber, forming a partition, which divides the said chamber into two parts, and by its periphery fits into a depression or groove formed round the said chamber. In the said disk or plate are formed four or a suitable number of depressions or cavities, each of which is fitted with a butterfly-valve, mounted upon a pivot or axis traversing the middle of the said depression or cavity radially to the center of the said plate.

The depressions or cavities in the plate or disk are formed so that the butterfly-valves mounted upon their axes, as hereinbefore described, may be turned in one direction, so as to lie in and fill the said depressions or cavities, and be completely embedded therein. And the said butterfly-valves are formed so that when caused to rotate partially upon their axes in another direction they will extend on each side of the said plate or disk as far as the inner sides of the body of the apparatus, and will form a series of movable radial partitions dividing the inner chamber of the apparatus into as many compartments.

The advance or fore side of the said butterfly-valve is heavier and of larger area than its rear or trailing side, so as to produce a tighter joint as the pressure upon it increases. In order to avoid any injurious friction caused by the unequal surfaces of the two sides of the butterfly-valves, the said valves are provided with shoulders, which, when the valves are open to their full extent, rest against abutments formed upon the said plate or disk.

If, when the butterfly-valves are open, as described, the said disk or plate be caused to rotate, it is evident that the said butterfly-valves would force before them the fluid contained in the apparatus, and draw or suck in the fluid behind them. But, as it is essential that the fluid actuated by the butterfly-valves should not pass entirely round the apparatus so as to return to the inlet-passage I provide inside the apparatus, and between the inlet and outlet passages, an obturator formed of two solid partitions, projecting one from each side of the chamber to the central disk or plate, and leaving between them only sufficient space for the central disk or plate to pass when its butterfly-valves are closed and embedded in the depressions or cavities hereinbefore described. The ends of the said partitions are curved, so as to act upon and close or shut down into the depressions or cavities of the central plate or disk the butterfly-valves as their ends come in contact with the said curved parts; and it is to be remarked that from the peculiar arrangement of the parts of the apparatus the said butterfly-valves have no strain upon them at that part where the inlet and the outlet of the fluid takes place. They are, therefore, free to rotate partially upon their axes. The opening of the said butterfly-valves is effected, and they are kept closed when required, by means of a cam or projection, which, when the butterfly-valve passes through the obturator, takes into a groove formed to receive it. As soon as the butterfly-valve passes out from the obturator the said cam, coming in contact with the end of the said groove, is actuated thereby to open the butterfly-valve by causing

it to perform about one-eighth of a revolution round its axis. To render the obturator perfectly fluid-tight on each side of the said plate or disk, I let into the side of the said obturator a small plate of metal. A suitable passage, opening at one end behind the said obturator and at its other end behind the said plates, causes the fluid in the apparatus to press the said plates against the central disk or plate, and thus to make a tight joint. The said apparatus is provided with suitable lubricators.

It will be readily understood that, according to the nature of the fluid acted on, my apparatus may be used as a suction and force pump for liquids, as an apparatus for exhausting and forcing or compressing air or gas, and, by reversing the action of the fluid, as a motor and a meter for measuring the flow of fluids.

Having described the nature of my invention, I will proceed to describe, with reference to the accompanying drawings, the manner in which the same is to be performed.

Figure 1 represents, in cross-section, a pump for elevating and forcing liquids constructed according to my invention. Fig. 2 is a longitudinal section of the same. Figs. 3, 4, 5, 6, 7, and 8 represent parts of said pump separately, as hereinafter described.

Similar letters of reference are used to indicate like parts where they occur in the different figures of the drawing.

G represents the body or case of the pump, which is supported by a suitable bed-plate. The said pump is provided with an inlet or suction tube or passage, J, and an outlet-passage, K, and also with stuffing-boxes F F, traversed by the driving-shaft D, which shaft receives rotatory motion from a driving-pulley, E, and is carried by suitable bearings, one of which is represented at H, Fig. 1. Upon the driving-shaft D, at D′, is keyed or otherwise affixed a circular cast-iron plate or disk, A, extending to the circumference of the inner chamber of the pump G, and fitting into it, so as to be capable of rotating in a groove formed to receive it in the periphery of the said chamber. In the said plate or disk A are formed depressions or cavities A′, the sectional shape of which is seen best in Fig. 3, which is a section of a portion of the said pump at that part where the butterfly-valves, hereinafter described, are open, and in Fig. 4, which is a section of a portion of the said pump, where the said butterfly-valves are closed into the said depressions or cavities A′. In the said depressions or cavities A′ are mounted butterfly-valves B B^1 upon steel axes or pivots C, each of the said axes or pivots traversing a hole in the said plate or disk A radially to the center thereof, and being affixed in position by a pin, C′. The said butterfly-valves B B^1 have in section the shape represented in Figs. 3 and 4. Their advance or fore side B^1 is heavier and of rather larger area than their rear or trailing side B, so as to increase the pressure of the fluid on that side, and to render the joint tighter as the pressure increases; and in order to avoid any injurious friction caused by the unequal surfaces of the two sides B B^1 of the said butterfly-valves, each of the said butterfly-valves is formed with shoulders B^2 B^2, which rest against the plate or disk A when the said valve is open to its full extent, as represented in Fig. 3.

I and I′, Fig. 4, represent two projecting blocks forming the obturator. The ends of the said blocks are curved, so as to cause the butterfly-valves to deviate and turn into their cavities or depressions A′ in the plate or disk A when in the rotation of the said plate or disk A they come in contact with the curved ends of the obturator. The two blocks I I′, which are represented separately in section and elevation in Figs. 5 6 and 7 8, respectively, fill up the space between the sides of the pump and the plate or disk A, so as to prevent the fluid from passing.

L are cams, one on each of the butterfly-valves B B^1, for the purpose of keeping the said valves closed in the disk or plate A when passing through the obturator, and also to cause the said valves to open when they issue therefrom, and to keep them open until they again come round to the obturator.

M is a groove formed in the side of the pump and in the path of the cams L. The ends of the said groove M are inclined, so as to form inclined planes, down and up which the cams L slide on entering and leaving the said groove. The butterfly-valves B B^1, coming in contact with the curved ends of the obturator-blocks I I′, are closed thereby, and at the same time the cams L pass into the said groove just as the butterfly-valves B B^1 close, and they keep the said valves closed until they pass out from the obturator. The cam L then slides up the inclined plane *m′*, at the end of the groove M, and in so doing causes its butterfly-valve B B^1 to open by performing about an eighth of a revolution round its axis C. The cam L then continues to move with the disk or plate A, sliding over a plane surface until its butterfly-valve B B^1 again comes in contact with the curved end of the obturator, when the action just described is repeated. The obturator has similar curves at each end, so as to enable the action of the pump to be reversed.

N N′ are plates or strips of metal fitting into corresponding depressions or slots, formed one in each block of the obturator. The said plates or strips N N′ are pressed against the disk or plate D by the fluid in the pump, which fluid, passing through the passages N″, presses upon the back of the said plates or strips N N′. The respective positions of the plates or strips N N′ are indicated by dotted lines in Fig. 2.

O is a self-acting lubricator. P are bolts by which the two halves of the body of the pump are joined together. Q are bolts fixing the pump to its bed. R is a curved part of

the shell or body of the pump, for preventing any solid matters from getting in between the plate or disk A and the body of the pump.

The action of the said pump is as follows: When the pump is at rest, as represented in Fig. 2, it will be seen that three of the butterfly-valves B are open and form partitions in the body of the pump. The fourth butterfly-valve is closed and embedded in the disk or plate A, between the projecting blocks I I′, which constitute the obturator. None of the fluid can, therefore, pass between the outlet K and inlet J in that direction. As soon as rotatory motion is communicated to the disk or plate A, the butterfly-valve embedded therein on issuing from the obturator opens and forms a partition in the body of the pumps, and, driving before it the fluid in front of it, forms a vacuum and draws in the fluid behind it. The said butterfly-valve, continuing to be carried round by the plate or disk A, finally forces the fluid before it through the outlet-pipe K. It then closes and passes through the obturator, as hereinbefore described. The action of all the butterfly-valves is similar to that just described.

It will be observed that in the rotation of the central disk or plate A, the butterfly-valves open and close—they open on issuing from the obturator, and they close on entering the said obturator. The opening of the said valves is effected by the cams L rising out of the groove M, and they are kept open by the said cams L sliding over a plain surface more elevated than the groove M, and by the difference of area and weight of the two sides B and B^1 of the said butterfly-valves. The shutting down of the said valves into the disk or plate A is effected by their coming in contact with the curved ends of the obturator. The parts of the said pump subject to friction, such as the groove M and its inclined surfaces, the cam L, and the central part and periphery of the plate or disk A, are continually lubricated, thus preventing the introduction of earthy matters between the parts, and the wear which would be produced thereby.

Having thus fully described my apparatus, what I claim as new therein, and desire to secure by Letters Patent, is—

1. The combination, with the shell, of the disk A, running at its periphery in a groove in said shell, and the butterfly-valves, adapted to close into cavities in the sides of such disk, substantially as described and shown.

2. The combination, with the shell, of the disk A, running at its periphery in a groove in said shell, the butterfly-valves closing into cavities in the sides of such disk, and the obturator-block I I′, pressing close against the sides of the disk, substantially as described and shown.

3. The combination, with the disk A, having the depressions or cavities A′, of the butterfly-valves, provided with the advance and trailing ends B B^1, and the shoulders B^2, substantially as described and shown.

4. The combination, with the disk A, of the butterfly-valves B B^1, the cams L, and the groove M, substantially as described.

5. The combination, with the obturator-blocks I I′, of the plates N N′, and the pipes N″, for utilizing the pressure of the fluid in the pump, substantially as described and shown.

VICTOR ORTMANS.

Witnesses:
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