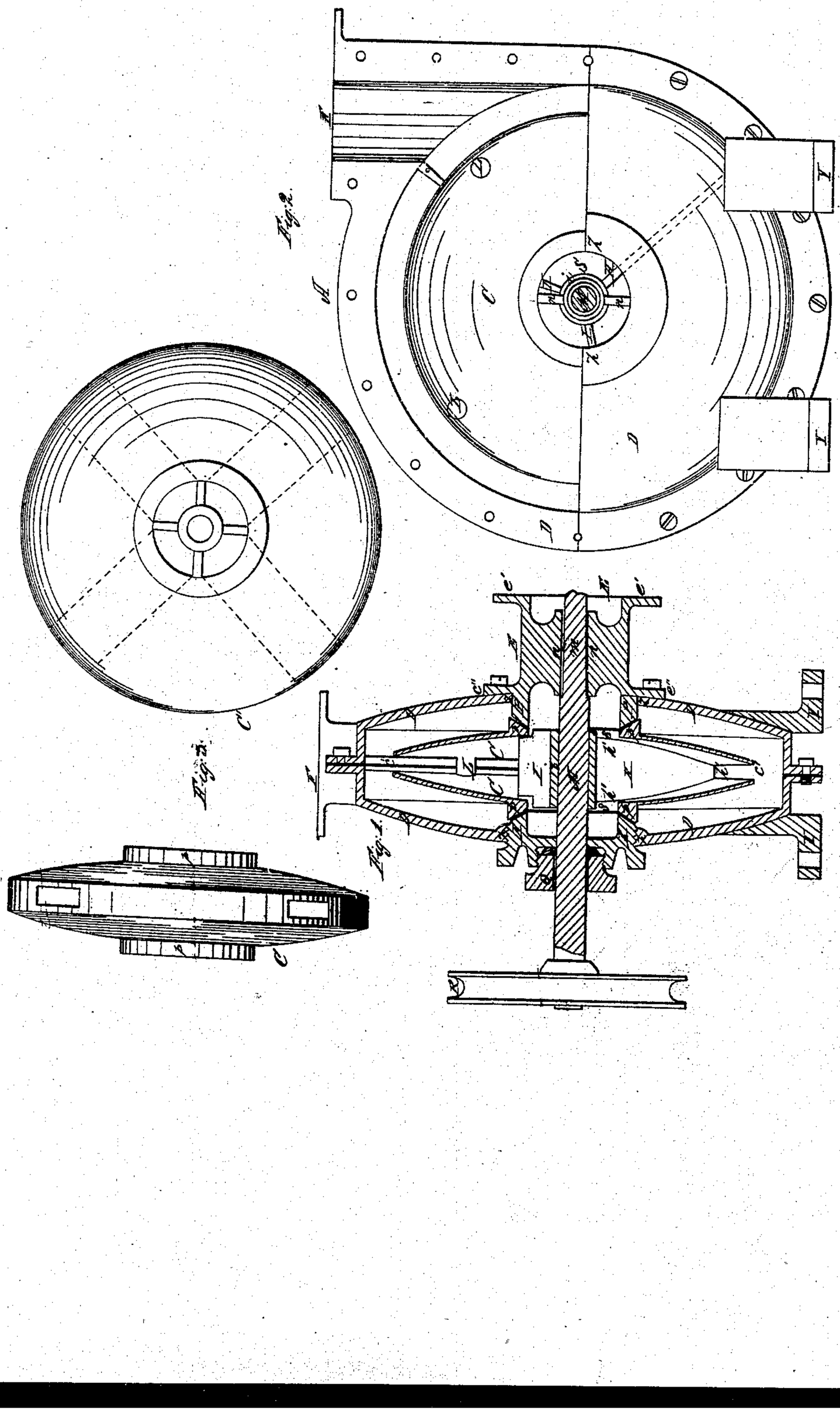
J. S. Guynne,

Centrifugal Pump,

No. 7,901. Patented Jan. 14, 1851.



UNITED STATES PATENT OFFICE.

J. S. GWYNNE, OF NEW YORK, N. Y.

ROTARY PUMP.

Specification of Letters Patent No. 7,901, dated January 14, 1851.

To all whom it may concern:

Be it known that I, J. STUART GWYNNE, of the city of New York, State of New York, have invented a new and useful Improvement in Centrifugal Pump, and that the following is a full, clear, and exact description thereof.

The general features of the machine are a hollow revolving piston within which the water is received at the center and from the periphery of which it is thrown by centrifugal power, into an outer and stationary case whence it passes into the outlet pipe through which it is discharged.

The improved construction adopted by me is as follows;—The piston consists of two concave disks C, C, Figure 1, C, Fig. 2, with openings S, S, Fig. 1, S, Fig. 2, (regulated in size by the quantity of water to be discharged) in their centers, where a hub *i*, much smaller than the openings is sustained and connected with the disks by three equidistant arms I, H, Fig. 1, I, I, H, Fig. 2, two of which I, I, Fig. 2, extend but a short distance within the disks while the other H, Figs. 1, 2, extends, narrowing as it does so, to their outer edges its greatest width *h'*, *h'*, being between the hub and the disks and its least at the periphery of the disks *h''*, Fig. 1. This arm I call the impeller H. Through the hub, and fastened thereto by keys or otherwise passes the shaft or axis of rotation M. The piston is strengthened by studs L, L, suitably distributed between the disks. At the outer edges of the disks there is an annular space C', C', Fig. 1, for the passage of the water—the area of which is equal to the area of one of the center openings, which I call the inlet opening, less the space occupied by the arms and hub:—and the inner surface of the disk is of such form, that whatever the diameter of the piston, the inlet opening remaining the same, the area of the annular opening at the periphery would be equal to the area of the latter. Thus, the same volume of water that enters the inlet opening passes through an opening of uniform size to be discharged at the periphery. I consider this essential to the best performance of the machine, where large bodies of water are to be discharged at high velocities. The piston including disks, arms and hub may be cast in one piece or made in several. The case of the piston H, H, corresponds with it in shape, the space between its inner surface and the outer or convex face of the piston, being greater than the annular opening, and greater also than the area of the outlet pipe F, which is tangential to the case as represented in the drawing. To prevent the water in the case from revolving with the piston I place a stop *o*, Fig. 2, near the outlet pipe cast with the case and sometimes extending radially to near the openings in the piston—this case is cast in two parts, with flanges that it may be bolted together, and having a suitable stand or foot Y so that it may be held firm. It is provided also with an opening near the bottom to be closed when the pump is at work, through which the dirt collecting in the case may be removed when necessary. In the sides of the case are openings *z*, *z*, *z*, *z*, corresponding with those of the piston but larger. In these openings are placed the contrivances for supporting the piston, and through one of them the water to be discharged enters the machine. This last is a cylinder E (forming a part of the suction pipe) within which is a concentric hub *n*, *n*, Fig. 1, supported by two arms *n*, *n*, Fig. 2, through which hub passes the piston shaft M, the bearing lengthwise being thrice the diameter of the shaft—the area of the cylinder should be equal, after deducting the space occupied by the arms and hub, to the clear area of the inlet opening in the piston and the opening at the periphery of the piston, the object being an unobstructed flow of a given volume of water, on the outside of the cylinder a flange is cast *e'' e''* Fig. 1 so that it may be bolted to the opening in the case, into which it partly projects, the inner edge P, P, Fig. 1, being beveled so as to correspond with the beveled surface *p*, *p*, Fig. 1, of a projection (or flange) surrounding the inlet opening of the piston as represented in the drawing. The outer edge of the cylinder has a flange *e' e'* Fig. 1, screw or other convenient contrivance for the attachment of the pipe that is to supply the machine with water, at the lower end of which pipe I place a retaining valve, and below that again a strainer—on the opposite side of the case, there is also a cylinder K K Fig. 1, with a bottom, however in which is an opening just large enough to admit the piston shaft—the inner edge of which cylinder is beveled like the opposite one, and for the same purpose, as shown in the drawing. This cylinder, however, instead of being bolted to the case, is

screwed into it, as shown in the drawing, the side of the case being sufficiently thickened to admit of the proper cutting of the female screw. To prevent the water from escaping around the shaft, a stuffing box and gland Q are used, made as shown in the drawing. The screw fastening of this cylinder, as will be seen at once, makes it perfectly easy to steady, adjust and regulate the motion of the piston. On the shaft M Fig. 1 projecting at this side of the case is placed the pulley R, which connects the machine with the motive power.

The machine instead of being placed vertically, may be placed horizontally, or at any intermediate angle. There may be two or more machines using a common shaft, or there may be two suction pipes, one on each side, to the same machine, in which last case the axis of the piston would be supported in the same way on each side, extending on one side through a stuffing box, to carry the driving pulley. Where but one suction pipe is used, the water entering the piston on that side, at a high velocity, presses it necessarily with more or less force against the adjusting nut, and with a wear proportionate to the friction thus created. Hence the necessity of the adjusting nut to "take up" this wear, and to maintain the rubbing surfaces always in proper relation to each other. But where the water is introduced through two suction pipes, one on each side, in equal quantities, and at the same velocities, the piston may be said to be balanced between the two streams, and prevented from pressing in its rapid revolution more on the one side than the other. The friction is thus materially reduced, if not almost entirely done away with, and while a mode of adjustment would still be convenient and might be readily devised if necessary, the machine would be an efficient one without it. Hence the distinct character which the use of the two suction pipes gives to the machine. The use of the adjusting nut, in enabling me to obviate the ill effect of the water when introduced on one side only, and when the piston is not balanced between the two streams has led me to call it the balancing as well as the adjusting nut. These changes would involve changes of arrangement and construction which would at once suggest themselves to any competent mechanic, without affecting the principle of my improvement. A modification of construction is represented in the drawing Fig. 3, where instead of an annular opening at the periphery of the disks, the space there is closed, with the exception of the openings represented, the sum of whose areas is equal to the clear area of the inlet opening.

To cause the machine to pump water, when placed above the surface of it, a retaining valve must be inserted in the lower end of the supply-pipe, and the pump filled to at least the upper edge of the piston. Turning the shaft M, now, in the direction of the outlet pipe, the water will rise in the latter in proportion to the velocity of the periphery of the piston—if the periphery moves 42 feet per second, the water will be elevated about 30 feet, double that velocity or 84 feet per second and the water will be raised 120 feet, and so in proportion. It will thus be seen that my piston is balanced on its axis of rotation, the weight being equal on either side of a plane equidistant from the disks and at right angles to the shaft and so supported while revolving as to insure a motion perfectly uniform at the same time that the rubbing surfaces between the piston and the case, represented as beveled in the drawing, though they may be curved as ball and socket joints, may be so accurately adjusted as to be for all practical purposes watertight, while the freest motion of the piston is not impaired. I do not claim to be the inventor of the centrifugal pump.

I do not claim simply using collars extending from the openings in the outer case to the openings in the piston case to prevent the water or air from passing between said cases—nor extending the inlet or suction pipe inward in such a manner as to supply the place of one of said collars this having already been done; but

I only claim thus extending said pipe when the collar on the opposite side is made adjustable and the parts so arranged that the joints of the piston case with said pipe and collar may be tightened as they wear by tightening the adjustable collar only as described, the piston and case and the suction pipe being constructed substantially as herein described.

J. STUART GWYNNE.

Witnesses:
JOHN LAMB,
N. SAWYER.