K. KIEFER.

CENTRIFUGAL PUMP.

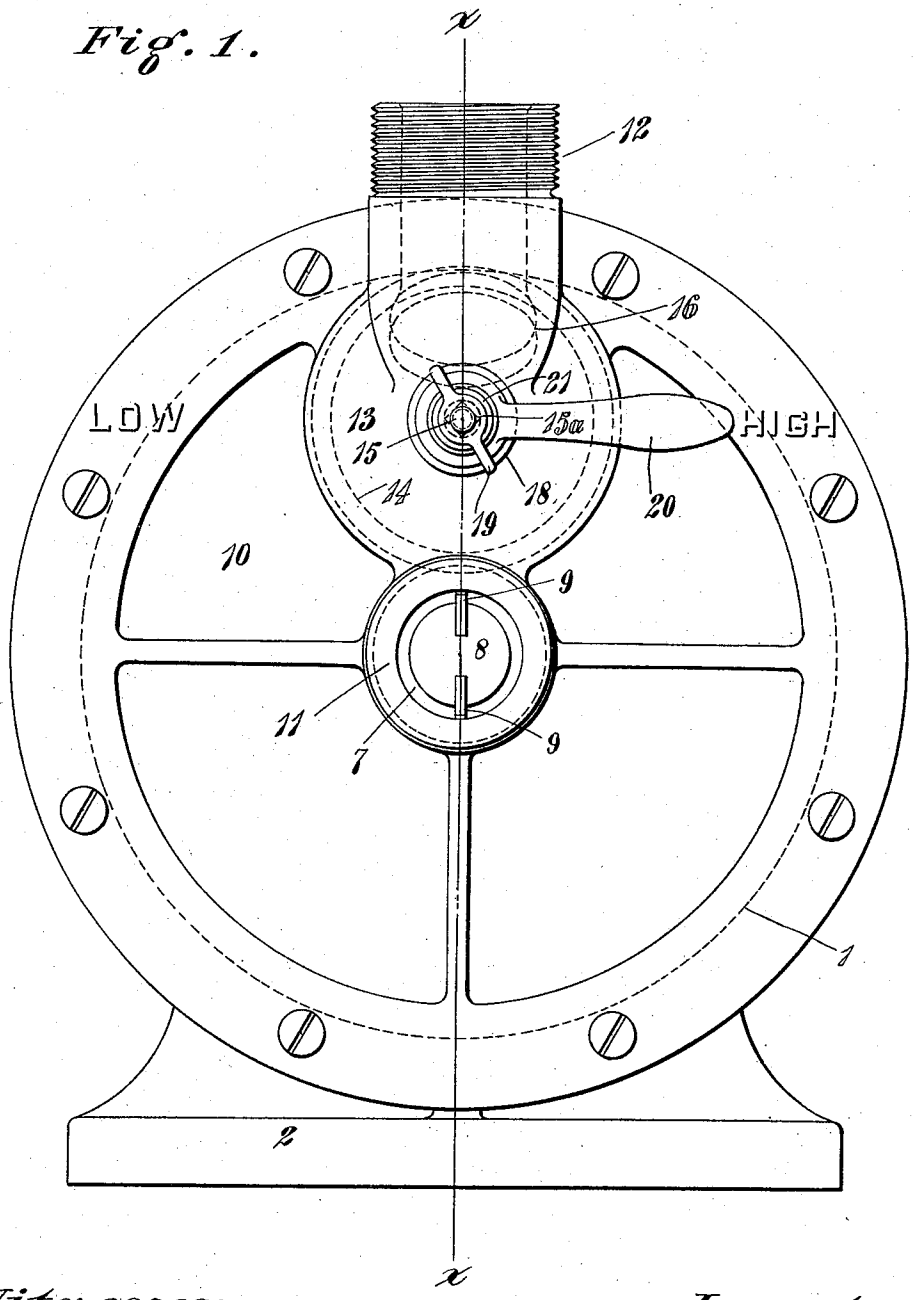
APPLICATION FILED NOV. 29, 1912.

1,162,373.

Patented Nov. 30, 1915.

2 SHEETS—SHEET 1.

Fig. 1.



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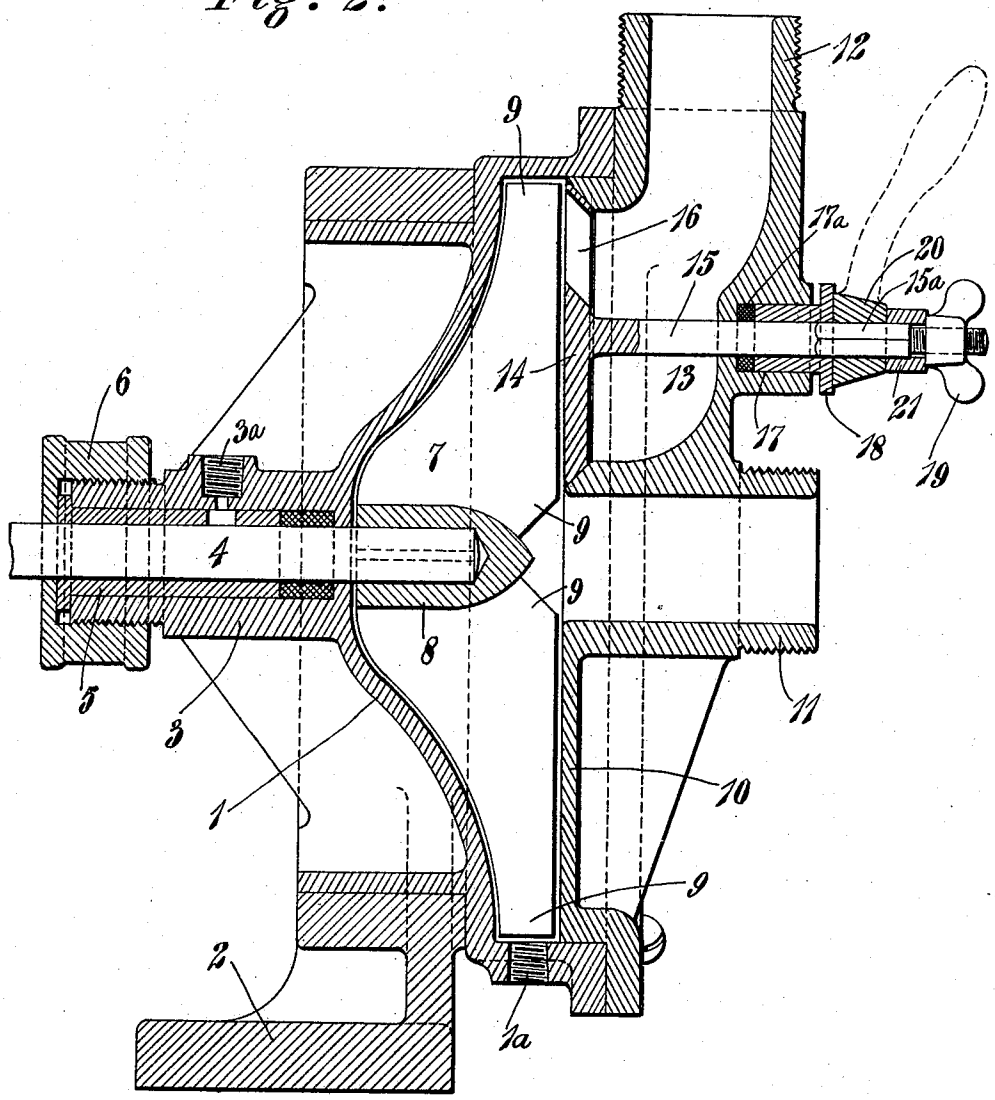
2 SHEETS—SHEET 2.

Fig. 2.



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UNITED STATES PATENT OFFICE.

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CENTRIFUGAL PUMP.

1,162,373. Specification of Letters Patent. Patented Nov. 30, 1915.

Application filed November 29, 1912. Serial No. 734,043.

To all whom it may concern:

Be it known that I, KARL KIEFER, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Centrifugal Pumps, of which the following is a specification.

My invention relates to pumps, and its object is to obtain various pressures from the operation of a centrifugal pump at constant speed.

My invention consists in the parts and in the details of construction and arrangement of parts hereinafter more fully described and claimed.

In the drawings: Figure 1 is a front elevation of a pump embodying my invention. Fig. 2 is a vertical section on the line *x*—*x* of Fig. 1, the regulating handle being shown in vertical position in dotted lines, to illustrate the shape of this handle.

The pump casing 1 is suitably mounted in a base bracket 2, and carries a bearing 3 for the pump shaft 4, provided with a gland 5, compressed into a stuffing box in the bearing by means of a cap nut 6. Inside the casing 1, the rotor 7 is fixed on the shaft 4 by means of its hub 8, and comprises the two diametrically opposite blades 9.

The casing 1 has, in its lower part, a drain opening 1^a, and the bearing 3 has a lubricating opening 3^a. The shaft 4 is indicated as being broken away; it may be suitably connected to some motive apparatus for driving the pump.

The front cover of the casing, as illustrated by the example in this application, carries the outlet as well as the inlet of the pump. Thus, the cover 10 has the inlet neck 11 centrally located, leading directly to the center of the rotor 7. This neck is threaded, as shown, to receive a suitable hose or pipe connection. The outlet neck 12 leads from the upper side of the cover, being continuous with a chamber 13 formed on the outside of the cover, above the inlet neck 11. The outlet neck 12 is also threaded, to receive a hose or pipe connection.

The back of the chamber 13 is made up of a disk 14 that fits into a circular opening in the cover. This circular opening has a beveled edge that forms a conical seat, facing inwardly of the pump, on which seat the disk 14 rests, it having its edge beveled to fit the seat. This disk has, centrally of it, a stem 15, preferably integral with it, as illustrated. This disk 14, as will be seen, will be pressed down on its conical seat by the pressure of the fluid as impelled in the casing. This disk 14 has an opening or orifice 16 through it, at one side of its stem 15; and it is this orifice that constitutes the outlet of the pump casing 1 into the chamber 13, and to the outlet neck 12. By rotating the disk 14, this orifice 16 may be brought near to the center of the casing, and, consequently, to the center of the rotor 7; or the orifice may be brought out near the periphery of the rotor, in the position indicated in the drawings.

For rotating the disk 14, and forming the means of keeping it in position at any adjustment, the stem 15 extends outside the chamber 13, through a stuffing box bearing 17. This bearing is made up of the gland 18, held into the bearing by means of a wing-nut 19 screwed onto a reduced end part of the stem 15. This nut 19 does not make direct contact with the gland 18, however. Between the nut and the gland, an adjusting handle 20 is mounted, having a square opening fitting onto a squared part 15^a of the stem, which extends from the reduced end part of the stem some distance inward; and between the nut and this handle is a thimble 21, covering the stem. The use of this thimble will be explained later.

With the parts combined as above described, the nut 19 may be screwed inward on the stem, and will draw the gland 18 into the bearing, compressing the packing 17^a into the bearing around the stem; it will also draw the disk 14 tightly against its seat, thus confining the outflow of fluid to the orifice 16, whatever its position may be, due to the rotary adjustment of the disk. At the same time, the disk will be held against displacement from the position to which it was adjusted. Then, if it be desired to change the adjustment, it is necessary to only loosen the nut 19, which loosens the disk from its seat, and, to some extent, loosens the packing 17^a, permitting the disk to be turned freely by the handle 20.

The thimble 21, before alluded to, is convenient when the bearing 17 is being packed. It may be omitted while the packing is uncompressed, just after being inserted into

the bearing, so that the nut will make contact directly with the handle 20; and after the desired amount of packing is inserted and partially compressed, the thimble is interposed, and the parts clamped to their normal operative positions, fully compressing the packing, and making the machine ready for operation, as above described.

It will be noted that the orifice 16 in the disk is inclined from the inside of the pump outward and downward through the disk, at an angle of about forty-five degrees; and that it is placed very close to the periphery of the disk. This is preferable, so that, when adjusted to its outermost position, it will permit egress of fluid from the extreme inner peripheral wall of the casing, at the highest velocity; and when adjusted to the innermost position, it will be very close to the center of the casing, in fact, as close as it is practicable to make it to the inlet of the pump. This latter position allows it to permit escape of the fluid from the extreme inner region of the casing, adjacent to the hub of the rotor, at the lowest velocity. To this highest and lowest velocity will correspond the highest and lowest pressure developed by the pump under the various adjustments. Any intermediate pressure may be obtained by rotating the disk between these two extreme positions just described.

When the orifice is adjusted to any position except its extreme outer one indicated in the drawings, the fluid lying radially outside this position, in a zone extending completely around the casing, will simply be whirled around the casing in this zone, unable to escape; while all fluid radially inside this position will escape through the orifice, making room for more to enter through the inlet, so that a continuous flow is produced, at the pressure due to the velocity of the fluid at the position of the orifice radially of the casing and rotor. The farther radially inward the orifice is adjusted, the greater will be the zone of merely whirling fluid in the outer part of the casing, and the less will be the volume and pressure of the fluid that is discharged through the orifice. At the extreme outer position, illustrated in the drawings, the full output of the pump will be realized, at the highest pressure and the greatest volume; and the zone of merely whirling fluid will be eliminated to such an extent as to be negligible.

My invention is especially applicable to small pumps wherein nice adjustments of pressure are required. Electrical pumps may be operated, and any desired pressure up to the maximum capacity of the pump and motor may be obtained, without the use of a rheostat or controller. Furthermore, pumps, even of the larger sizes, may be economically operated merely by belt drive at uniform speed, and the pressure variation obtained through the operation of my device.

Numerous modifications of the construction of a pump may be made, involving the principle of my invention. Therefore, I do not wish to be understood as limiting myself to the illustration and description of the example herein given, but

What I claim as new and desire to secure by Letters Patent is:

1. In a centrifugal pump, a casing, a rotor, and a rotatable part having the outlet orifice of said casing, and adapted to bring the orifice nearer to or farther from the center of rotation of the rotor, for the purposes set forth.

2. In a centrifugal pump, a casing having a single outlet, a rotor to impel fluid in the casing, and means to change the location of egress of the impelled fluid from the casing into said outlet.

3. In a centrifugal pump, a casing having a single outlet, a rotor to impel fluid in the casing, and means to cause egress of the impelled fluid to said outlet at an indefinite number of locations radially of the rotor.

4. In a centrifugal pump, a casing having a single outlet, a rotor to impel fluid in the casing, and means to change the pressure of fluid discharged from said outlet, while said rotor is rotated at constant speed.

5. In a centrifugal pump, a casing inclosed on all sides, one of the sides having an inlet and the opposite side having an opening forming a bearing for a shaft, a shaft entering through said bearing, a rotor fixed on the shaft, to be rotated thereby and impel fluid in the casing, as admitted through the inlet, a part of one of said sides, loose therefrom, and having the outlet orifice for the casing, and being movable to change the location of egress of fluid from the casing, and means for moving said movable part, for the purposes set forth.

6. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, and one of the sides of the casing having a bearing through which said rotor is rotated, and a part of one of the sides of the casing, loose therefrom, and having the outlet orifice for the casing, and being movable to change the location of egress of fluid from the casing, for the purposes set forth.

7. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, and a part of one of the sides of the casing, loose therefrom, having the outlet orifice for the casing, and being movable to change the location of egress of fluid from the casing, for the purposes set forth.

8. In a centrifugal pump, a casing, a rotor

to impel fluid in the casing, a cover for the casing having an inlet for the fluid, and a part in said cover, forming part of the side of the casing, having the outlet orifice for the casing, and being movable to change the location of egress of fluid from the casing, for the purposes set forth.

9. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, a cover for the casing having an inlet for the fluid, and a part of said cover, forming part of the side of the casing, having the outlet orifice for the casing, and being rotatable to change the location of egress of fluid from the casing, for the purposes set forth.

10. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, and one of the sides of the casing having an outlet chamber, a movable part closing the outlet chamber from the interior of the casing and the rotor, except through an outlet orifice in said part, and means for moving said part, extending through said chamber to the exterior of the pump, to change the location of said outlet orifice radially of said rotor, for the purposes set forth.

11. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, and one of the sides of the casing having an outlet chamber, a disk closing the outlet chamber from the interior of the casing and the rotor, except through an outlet orifice in said disk, a stem on said disk, extending through said chamber to the exterior of the pump, and means for turning said disk by said stem, to change the location of said outlet orifice radially of said rotor, for the purposes set forth.

12. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, and a loose disk forming part of one the sides, and having a conical seat therewith and being adapted to be pressed down on its seat by the pressure of the fluid inside the casing, as impelled by the rotor, said disk carrying the outlet orifice of the casing, and being rotatable on its seat to change the location of said orifice radially of said rotor, for the purposes set forth.

13. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, a loose disk forming part of one of the sides, and having a conical seat therewith and being adapted to be pressed down on its seat by the pressure of the fluid inside the casing, as impelled by the rotor, said disk carrying the outlet orifice of the casing, and being rotatable on its seat to change the location of said orifice radially of said rotor, a stem fixed to said disk and extending outside the pump, and means on said stem whereby said disk is clamped on its conical seat, for the purposes set forth.

14. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, a loose disk forming part of one of the sides, and having a conical seat therewith and being adapted to be pressed down on its seat by the pressure of the fluid inside the casing, as impelled by the rotor, said disk carrying the outlet orifice of the casing, and being rotatable on its seat to change the location of said orifice radially of said rotor, an outlet chamber outside said disk, into which the outlet orifice leads at any position of the disk, a stem on said disk, extending through said outlet chamber to the outside of the pump, packing means for said stem where it extends outside the pump, a handle on the stem, and clamping means on said stem where it extends outside the pump, to tighten said packing means and to hold the disk on its seat, for the purposes set forth.

15. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one of the sides of the casing having an inlet for the fluid, a loose disk forming part of one of the sides, and having a conical seat therewith and being adapted to be pressed down on its seat by the pressure of the fluid inside the casing, as impelled by said rotor, said disk carrying the outlet orifice of the casing, and being rotatable on its seat to change the location of said orifice radially of said rotor, an outlet chamber outside said disk, into which said outlet orifice leads at any position of the disk, a stem on said disk, extending through the outlet chamber to the outside of the pump, a stuffing box around said stem where it extends outside the pump, a gland in said stuffing box around the stem, said stem being of circular cross-section where it extends through the stuffing box, but having a part of angular cross-section immediately outside the stuffing box, a handle fitting slidably on said part of angular cross-section and bearing against said gland, a reduced end part to said stem, and a clamping nut screwed onto said reduced part to push against said handle, whereby the gland is pressed into the stuffing box and the disk is pulled against its conical seat, and whereby said handle is held on said stem, and the parts are secured stationary as adjusted, for the purposes set forth.

16. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, and a rotatable part in one side of the casing, having the outlet orifice for the casing located eccentrically in it, so that when this part is rotated, said orifice will be adjusted radially of said rotor, for the purposes set forth.

17. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, and a rotatable part in one side of the casing having an outlet orifice for the casing located eccentrically in it, near its periphery, said part being of such diameter, relative to the diameters of said casing and said rotor, that when the part is rotated it may carry said orifice close to the periphery of said rotor, or close to the center of said rotor, for the purposes set forth.

18. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, one side of said casing having an inlet, and a rotatable part in said side of the casing, having an outlet orifice for the casing located eccentrically in it, near its periphery, said part being of such diameter, relative to the diameters, respectively, of said casing, said rotor, and said inlet, that when the part is rotated it may carry said orifice close to the periphery of the rotor, or close to the center of the rotor, adjacent to the inlet, for the purposes set forth.

19. In a centrifugal pump, a casing, a rotor to impel fluid in the casing, a disk forming part of one side of the casing, with beveled edges, and the side of the casing thereabout having beveled edges forming a conical seat for said disk, on which it may turn, and said disk having an outlet orifice for the casing in it, near the periphery of the disk, and inclined through the disk substantially parallel to the bevel of the adjacent part of the periphery, said disk being rotatable to carry said orifice, for the purposes set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

KARL KIEFER.

Witnesses:
CLARENCE PERDEW,
E. E. FINCH.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."