F. L. ANTISELL & D. W. BLAIR.

PUMP.

APPLICATION FILED JULY 5, 1906.

981,518. Patented Jan. 10, 1911.

Fig. 1.

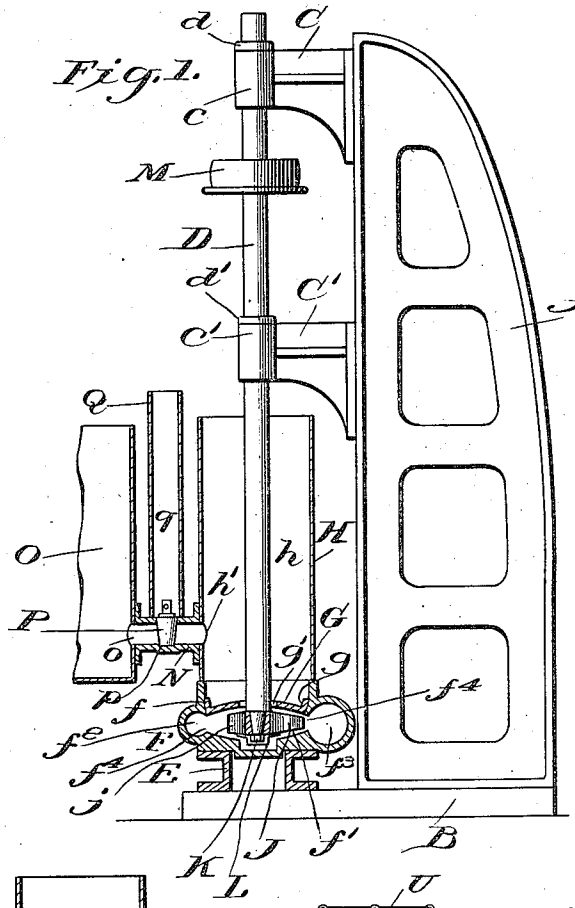
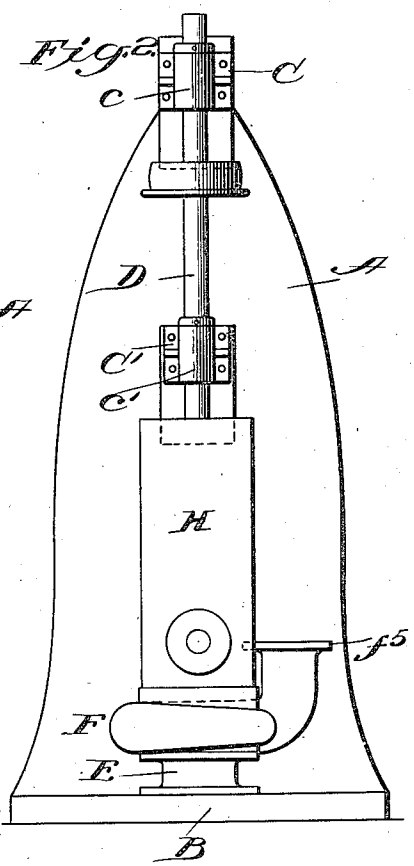


Fig. 2.



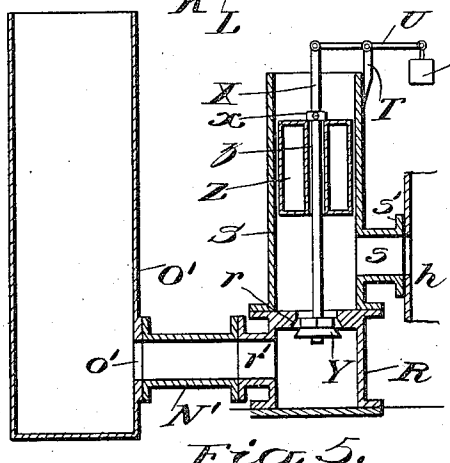


Fig. 5.

Fig. 4.

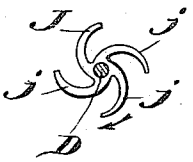
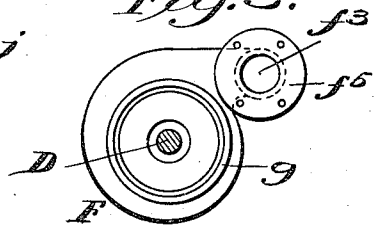


Fig. 3.



Witnesses

Allan A. Goode.

John J. Ramegan

Inventors.

F. L. Antisell and D. W. Blair

By their Attorney

Wm A. Megrath

UNITED STATES PATENT OFFICE.

FRANK L. ANTISELL, OF NEW YORK, N. Y., AND DAVID W. BLAIR, OF PERTH AMBOY, NEW JERSEY.

PUMP.

981,518. Specification of Letters Patent. Patented Jan. 10, 1911.

Application filed July 5, 1906. Serial No. 324,774.

To all whom it may concern:

Be it known that we, FRANK L. ANTISELL, a citizen of the United States, and a resident of the city, county, and State of New York, and DAVID W. BLAIR, a citizen of the United States, and a resident of Perth Amboy, county of Middlesex, and State of New Jersey, have invented a certain new and useful Improvement in Pumps, of which the following is a specification.

Our invention relates to pumps and especially to that class of pumps for pumping acids or acid solutions.

One of the objects of our invention is to produce a pump in which packed joints, the packing of which is affected by acids, are dispensed with so that there will be no leaks in the joints.

Another object is to so produce a pump that the acid will not attack the shaft of the pump.

Another object is to dispense with valves.

Other objects will appear from the hereinafter description.

Referring to the drawing in which the same reference character indicates the same part in the several views: Figure 1 is a side elevation with the parts in vertical section. Fig. 2 is a front elevation with the tank shown in Fig. 1 removed. Fig. 3 is a top view of the pump casing. Fig. 4 is a top view of the pump blades. Fig. 5 is a vertical longitudinal section of a modified construction of means for supplying the pump.

The part marked A on the drawing represents a frame supported on a base B.

C C′ are upper and lower brackets secured to the frame and having bearings *c c′* for the shaft D of the pump.

E is a support secured to the base B and on which the pump casing F is secured. The inner surface of the top portion of the pump casing is tapered at *f*.

G is a cover for the casing having an upturned flange *g* which is tapered to fit snugly against the tapered portion *f* of the casing and to make a tight joint. This cover G is provided with an opening *g′* through which the lower end of the shaft D projects into the pump casing. The cover when fitted in the casing forms the chamber *f′* in which the pump wheel secured to the shaft revolves. The periphery of the casing is provided with the circular channel f^2 enlarged in diameter at the exit end f^3. This channel is opened on the side throughout at f^4 and communicates with the pump chamber *f′*.

H is an open end cylinder secured to the top of the pump casing and forms the well *h*. The shaft D extends through this well and through the opening *g′* in the cover of the pump casing and into the casing as above described.

The pump wheel J secured to the lower end of the shaft by the nut K has a series of curved blades *j* which fit and rotate in the chamber *f′*.

L is a cover, made of or covered with acid resisting material, which fits over the nut K to protect the same from the action of the solution being pumped.

The shaft D is provided with collars *d d′* above and resting on the bearings *c c′*, by which the downward thrust of the shaft is taken up.

M is a pulley secured to the shaft around which passes a belt, not shown, to drive the shaft from any appropriate source of power.

The wall of the cylinder H is provided with an opening *h′* to which is secured one end of the short pipe N. The other end of this pipe is connected to the tank O through an opening *o* therein. This pipe is provided with a valve seat *p* into which is fitted the valve P. Secured to the upper portion of the pipe N is the vertical pipe Q forming a well *q*. This well extends above the top of the tank O and also above the top of the well *h*.

The operation of the above described apparatus is as follows: The tank O, which is preferably made of a height not to exceed that of the well *h* is filled with solution. The valve or plug P is removed and lifted vertically through the pipe Q when the solution will run through the pipe N into the well *h*, through the pump chamber *f′* and said well to ascertained height and also through the well *q* to the height of the liquid in the well *h*. The well *h* is made higher than the tank O and well *h* so that the solution will not overflow from well *q*. The shaft D is now put in operation and the pump blades *j* rotated in the direction of the arrow shown in Fig. 4. The rotation of these blades forces the solution through the enlargement of the pump casing opening f^3 and into a pipe not shown which may be connected to said casing by the flange f^5.

That portion of the shaft which extends into the well and carries the wheel J, and the wheel J itself, is made of or covered with an acid or alkaline resisting material, so that they will not be acted on by the solution passing through the pump. The opening g' in the cover of the casing is larger in diameter than that of the shaft so as to permit the solution to have free access to the chamber of the casing, but on account of the column of the solution in the well above the cover of the casing, a liquid seal is formed which renders a packing between the shaft and the cover unnecessary. The cover G fitting tightly in the casing also renders a packing between the cover and casing unnecessary; in fact, the whole construction is such that we entirely dispense with packing. The cover, however, is so fitted that it may be easily lifted out of the pump case to remove the shaft D and the wheel J when desired. Valves are dispensed with and there are no joints or parts to leak. The construction is simple but very efficient in operation.

In Fig. 5 we have shown a modified construction of connection between the acid supply and the well h of the pump to be used when the supply of solution is above the top of the well h, for example, where the solution is running from a tower in a sulfuric acid process. In this construction we provide a casing R having a valve seat r in the upper part thereof with an inlet opening or pipe r' on the side below the valve seat r. S is another casing secured to the top of the casing R and provided with an outlet consisting of a short pipe s, having a flange s' which is secured to the wall of the well h and communicates therewith through the opening h' shown in Fig. 1 and heretofore described. Secured to the upper end of the casing S is an arm T to which is pivoted a lever U having a weight W on the outer end thereof. To the inner end of this lever is secured a vertical rod X on the lower end of which is secured the valve Y which fits on the valve seat r. Z is a float having an opening z through which the valve stem or rod X passes and on which it moves vertically. The said rod is provided with an adjustable collar x above the float which limits the vertical movement of said float. The flange of the inlet pipe r' is connected to the flange on one end of the short length of pipe N′ which is secured to the tank O′ by the flange on the other end. The opening o' in this tank communicates with the pipe N′ and forms a passageway or channel from the tank O′ to the casing R. The top of the tank O′ or other source of supply is, as shown, above the casing S and is also above the pump well h.

In operation the solution from the tank O′ passes into the casing R and through the valve seat or opening r through the outlet s into the well h. When the solution rises to a predetermined level, which level will also be maintained in the casing S, the float Z rises against the collar x and lifts or carries the valve rod X vertically, closing the valve Y against its seat r, thereby cutting off the supply of solution to the well h. As the solution is pumped out of the pump casing, the level of the solution in the well is lowered, the float descends, the valve Y opens and permits solution to run into the well until the predetermined height is reached, when the valve will again seat. This construction, it is seen, maintains a fixed level in the well, which is feasible where the head of the supply of solution is above the top of the well h.

As many changes could be made in the above construction and many apparently widely different embodiments of our invention could be made without departing from the scope thereof, we intend that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

We desire it also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention, which as a matter of language, might be said to fall therebetween.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, a supply tank, a pump casing; a well extending from the pump casing and having communication with the interior thereof; a second well arranged between the tank and first-mentioned well; valve-controlled means through which the tank and said wells communicate with each other; an impeller in the pump casing, provided with acid or alkaline resisting material; and an impeller shaft extending through the first-mentioned well and into the pump casing and having its portion within the well provided with acid or alkaline resisting material and its bearings arranged to be entirely free from contact with the solution in said well.

2. In a device of the kind described, an impeller and its shaft provided with acid or alkaline resisting material, a casing for the impeller having a discharge aperture and an unobstructed passage for the inlet of liquid around the shaft, said shaft having its bearings so arranged as to be free from contact with the liquid in or outside of the casing; and means for supplying liquid to said casing, comprising a well which extends from the casing and has free communication with the interior of said casing through the inlet passage of the latter, a supply tank,

a second well, means through which the supply tank and said wells communicate with each other; and a valve in the latter means for controlling the flow of liquid therethrough.

3. In a device of the class described, a pump casing, a well extending from the casing and communicating with the interior thereof, a shaft extending through the well and into the casing, bearings for said shaft above the well and casing and out of contact therewith, an impeller in the casing and secured to the shaft, the impeller and the shaft being covered with an acid or an alkaline resisting material, said impeller running sufficiently free in the casing to avoid obstructing the flow of liquid between it and the casing.

4. In a device of the kind described, an impeller provided with acid or alkaline resisting material, its shaft, and a casing for the impeller having a discharge aperture and an unobstructed passage for the inlet of liquid around the shaft, of a supply conduit, a valve in said conduit, and means for automatically governing the valve by the level of the liquid, the impeller shaft having its bearings arranged outside the casing and conduit and free from contact with the liquid.

5. In a device of the kind described, an impeller, provided with acid or alkaline resisting material, its shaft and a casing for the impeller having a discharge aperture and an unobstructed passage for the inlet of liquid around the shaft, of means for supplying liquid to the casing, comprising a plurality of wells, having communication with each other, one of said wells being open to the pump casing and to the other well, means through which said other well is supplied with liquid, a valve controlling such supply and means for governing the supply by the level of the liquid in the last mentioned well.

6. In a device of the class described, a base, a frame secured thereto, a circular pump casing on said base, said pump casing having a circular tapered channel enlarged at its exit end and communicating with said casing, the upper walls of the casing being tapered, a cover having an opening therein and a tapered edge or upturned flange fitting tightly against the tapered portion of the casing and forming a chamber, a wheel consisting of a series of radial blades located in said chamber, an open end cylinder forming a well secured to the casing and communicating with said chamber and carrying on its lower end the said wheel, the wheel shaft and casing being made of or covered with acid or alkaline resisting material, a bracket having bearings therein for the shaft, a collar or collars on the shaft above said bearings adapted to take the thrust of the shaft, a liquid supply connected to said well, and an automatic valve between said supply and the well to regulate the supply of liquid to the well.

7. In a device of the class described, a circular pump casing the upper wall of which is tapered, a cover having an opening therein and a tapered edge or upturned flange fitting tightly against the tapered portion of the casing and forming a chamber, the casing provided on its periphery with a circular tapered channel enlarged at its exit end and communicating with said chamber, a wheel consisting of a series of radial blades located in said chamber, an open end cylinder forming a well secured to and communicating with the chamber, a shaft supported in thrust bearings above said well, said shaft extending through the well and cover into the chamber, and on which the wheel is fastened, a source of solution supply above the well, a casing having a valve seat therein communicating with said supply and automatic valve adapted to rest on said seat, another casing connected to the first mentioned casing and having communication therewith through the valve seat and connected to the well, a rod connected to said valve and extending into said casing, a float through which said valve stem passes, and a collar on said stem above the float to limit the movement of the float on the stem, all substantially as and for the purpose set forth.

8. In a device of the class described, a pump casing, a well extending vertically from the casing and in communication with the interior thereof, a vertical shaft extending through the well and into the casing, bearings for the shaft above the well, an impeller in the casing and connected to the shaft, the impeller and the shaft being out of contact with the casing and the well, and the impeller running sufficiently free in the casing to avoid obstructing the flow of liquid between it and the casing.

9. In a device of the class described, a pump casing, a well extending vertically from the casing and in communication with the interior thereof, an impeller in the casing, a vertical shaft extending through the well and into the casing and having the impeller connected thereto, the impeller and shaft covered with an acid or alkaline resisting material, the impeller and the shaft being out of contact with the casing and well, the impeller running sufficiently free in the casing to avoid contact therewith and avoid obstructing the flow of liquid between it and the casing, and bearings for the shaft, said bearings being above the well and casing and out of contact therewith.

10. In a device of the kind described, an impeller and its shaft provided with acid or alkaline resisting material, a casing for

the impeller having a discharge aperture and an unobstructed passage for the inlet of liquid around the shaft, said shaft having its bearings so arranged as to be free from contact with the liquid in or outside of the casing, the impeller running sufficiently free in the casing to avoid contact therewith and avoid obstructing the flow of liquid between it and the casing and means for supplying liquid to said casing, comprising a well which extends from the casing and has free communication with the interior of said casing through the inlet passage of the latter, a supply tank, a second well, a passage by which the supply tank and said wells communicate with each other and means for automatically controlling the supply to the well from the tank.

11. In a device of the kind described, an impeller provided with acid or alkaline resisting material, its shaft, and a casing for the impeller having a discharge aperture and an unobstructed passage for the inlet of liquid around the shaft, of a supply conduit, the impeller shaft having its bearings arranged outside the casing and conduit and free from contact with the liquid, the impeller running sufficiently free in the casing to avoid contact therewith and avoid obstructing the flow of liquid between it and the casing.

In witness whereof we have hereunto set our hands at Perth Amboy, county of Middlesex and State of New Jersey, this 30 day of June, 1906.

FRANK L. ANTISELL.
DAVID W. BLAIR.

In presence of—
W. S. HIGGINS,
C. C. BURRITT.