J. NOLL.

ROTARY PUMP.

APPLICATION FILED MAR. 11, 1910.

1,049,387. Patented Jan. 7, 1913.

Fig. 1.

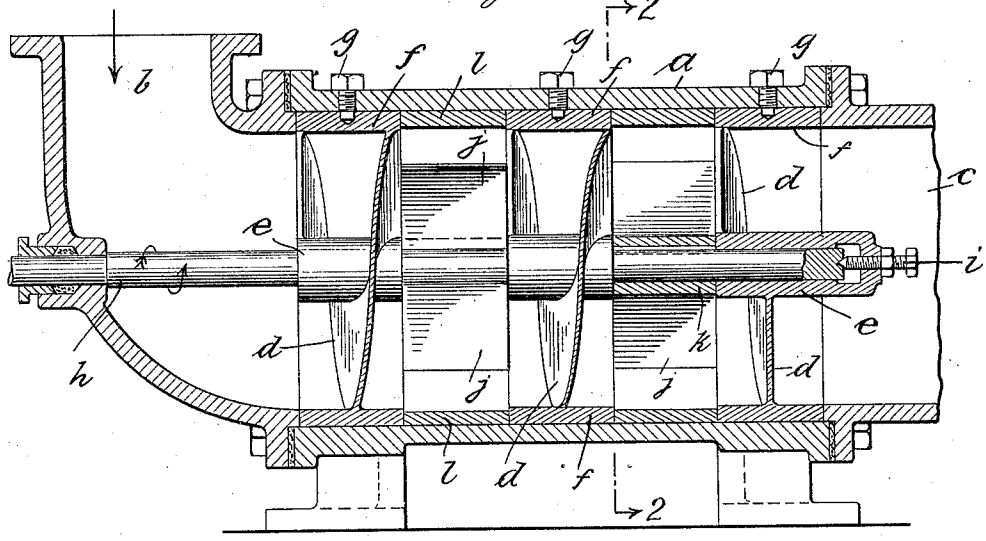


Fig. 3.

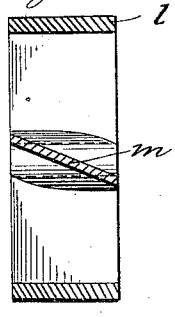
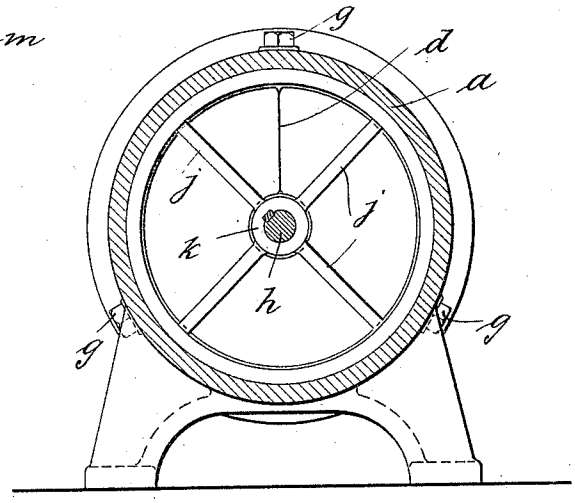


Fig. 2.



Witnesses:
Max P. A. Doring
Rheta M. Clayton

John Noll
Inventor

Attorney
Edward C. Davidson

UNITED STATES PATENT OFFICE.

JOHN NOLL, OF NEW YORK, N. Y., ASSIGNOR TO NOLL PUMP COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ROTARY PUMP.

Specification of Letters Patent. **Patented Jan. 7, 1913.**

1,049,387.

Application filed March 11, 1910. Serial No. 548,573.

To all whom it may concern:

Be it known that I, JOHN NOLL, a citizen of the United States, residing in the borough of Brooklyn, city of New York, State of New York, have invented certain new and useful Improvements in Rotary Pumps, of which the following is a specification.

The rotary pump forming the subject of this invention partakes somewhat of the character of fluid controlled or fluid controlling turbines, and involves as its general and main feature stationary helical partitions arranged in a cylindrical casing and revolving blades, of the nature of paddle wheels, located in the spaces between the helical partitions and carried by a centrally located shaft, the planes containing the blades being parallel, or substantially so, to the axis common to the shaft and the cylindrical casing. The helical partitions act as directors for the fluid, as it is carried around in the casing by the paddle wheels, to cause it to flow longitudinally through the casing, that is to say, the rotating motion imparted to the fluid by the paddle wheels is by the inclined surfaces of the helical partitions converted or translated into a longitudinal motion, or a motion approximating straight lines parallel to the axis of rotation of the paddles, but which may partake of a swirling or helical character in the flow of the fluid as it leaves the apparatus.

To more fully describe the invention and an embodiment of the structural features of the same, the accompanying drawings will now be referred to.

Figure 1 is a longitudinal elevation with the casing and some of the working parts in section. Fig. 2 is a transverse section, taken on the line 2, 2, of Fig. 1, and Fig. 3 is a vertical sectional view through a slightly different form of paddle wheel, taken in a plane slightly removed from the center of the same.

The body of the pump consists of a casing *a* cylindrical in form, to one end of which is shown attached an elbow *b* and to the other end a section of pipe *c*. At intervals throughout the cylinder *a* are located helical partitions *d* provided with central hubs *e* and annular supports *f* formed to fit snugly in the casing *a* and held stationary therein by screws or bolts *g*. Axially arranged in the cylindrical casing *a* is a shaft, *h*, which has a bearing in the elbow *b* and also in the central hubs *e* of the stationary helical partitions *d*; the hub of the last partition, or the one farthest away from the elbow being provided with an adjustable end or thrust bearing *i*.

The moving active part of the pump consists of one or more fluid moving devices of paddle wheel form, each consisting of flat blades *j*, of which there may be any desired number, extending from a central hub *k*, secured by a key, or otherwise, to the shaft *h*, and connected at their ends to an annulus *l* so sized as to rotate freely in the casing *a* and between the annular supports *f* of the stationary helical partitions *d*; the said rotatable paddle wheels occupy the spaces between two of the partitions as fully sidewise as may be desired or deemed expedient. The shaft *h* is driven by any suitable source of power through a gear or pulley attached to its end which extends beyond its bearing in the elbow *b*. The helical partitions *d* are shown as consisting of one full turn with the edges radially arranged included in a plane which includes the axis of the pump, and the width of the spaces between them equal to the longitudinal dimensions of the partitions, which if continued through the spaces would form a continuous helix of uniform pitch throughout the length of the pump. Of course it will be readily understood, without further illustrations, that the pitch and extent of the stationary helices may be varied in all or each of the partitions, the construction here shown being now considered suitable for general purposes. The arrangement of and number of blades in the revolving paddles may also be varied, one modification being shown at Fig. 3, in which the blades are at a slight angle to the axis, as at *m*, instead of being in planes therewith as shown in the main drawings.

The operation of the pump may be described as follows: Assuming it to be full of a fluid, as water, the inflow occurring at the elbow end and the shaft rotated as indicated by the arrows, the fluid in the spaces between the stationary partitions will be carried around therein by the blades *d* and will by molecular friction cause the fluid that is contained in the spaces in which the helical partitions are located to be also moved in the direction of the rotation of the wheels, and in so doing the fluid on the lead-

ing side of a paddle wheel will by the adjacent inclined surface of the partition be forced into the paddle wheel while the fluid in the partition at its discharge side will by the helix at this side be forced or carried away from it and so cause a steady continuous flow of the fluid through the pump. The flow may also possibly be assisted by centrifugal action forcing the fluid against the inner wall of the annulus of the paddle wheel which tends to cause a lateral flow therefrom in both directions, such flow being resisted by the wedging action of the helix at the leading side and assisted by that of the helix at the discharge side of each paddle wheel. The greatest efficiency speed at which the moving parts of the pump are driven will be governed by the viscosity and other conditions of the fluid acted upon.

As before stated the number of paddle wheels employed may be varied as desired. If one only be used, then it will be placed between two helical partitions. If more than one be used then the moving and stationary devices of the pump will alternate and preferably a stationary helix will occupy the ends of the assemblage of paddle wheels and partitions.

I claim:

1. In a pump of the character described, an outer shell provided at both ends with inwardly extending flanges, helical partitions disposed in the outer shell and carrying central hubs and outer rings, the rings of the outermost helical partitions engaging the inwardly extending flanges to prevent water passing between the peripheries of such rings and the inner surface of the shell, a shaft journaled through the central hubs, and paddle wheels rigidly mounted on the shaft between the helical partitions, said paddle wheels comprising central hubs, paddle arms and outer rings rigidly connected with the hubs, the rings of the paddle wheels slidably engaging the rings of the helical partitions and the inner surface of the outer shell, to prevent water passing between the first and second named rings.

2. In a pump of the character described, an outer shell, a plurality of spaced helical partitions disposed therein and carrying central hubs and outer rings fitting snugly within the outer shell, means rigidly connecting the outer rings and shell, a shaft journaled through the central hubs, and paddle wheels rigidly mounted on the shaft between the helical partitions, said paddle wheels comprising paddle arms carrying outer rings fitting suitably snugly between the first named rings, whereby the working parts are subjected to the minimum amount of friction and leakage is prevented, and adjustable means to regulate the extent of end thrust of the shaft.

In testimony whereof, I have hereunto subscribed my name.

JOHN NOLL.

Witnesses:

EUGENE DELMA,

AUGUST TROST.