No. 862,162. PATENTED AUG. 6, 1907.

A. HONIG.

ROTARY MACHINE.

APPLICATION FILED AUG. 23, 1906.

Fig. 1.

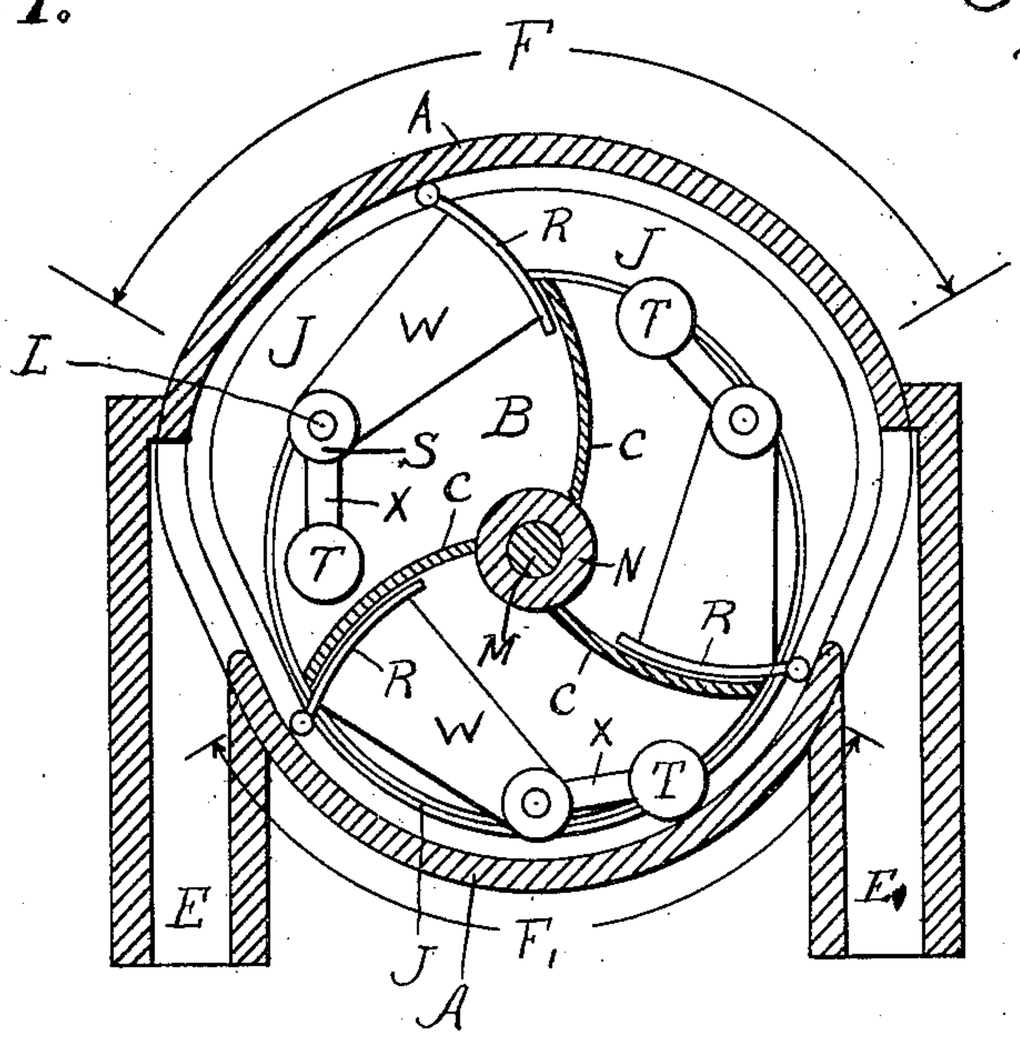


Fig. 2.

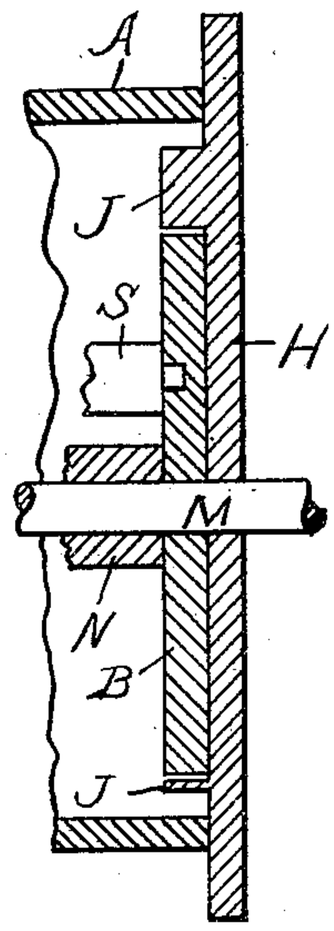


Fig. 3.

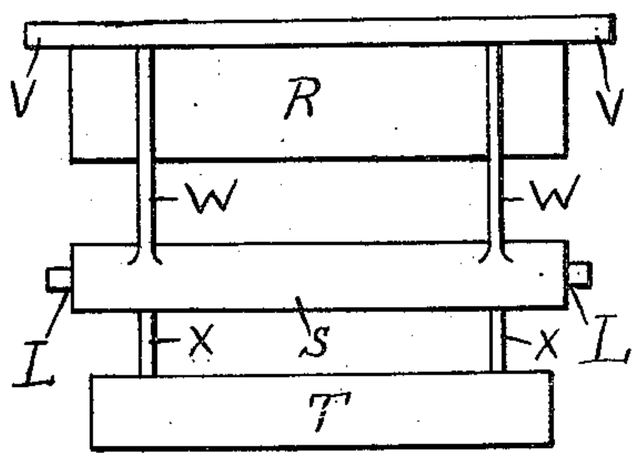
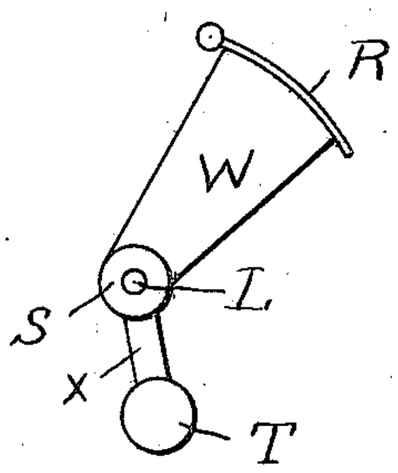


Fig. 4.



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ROTARY MACHINE.

No. 862,162. Specification of Letters Patent. Patented Aug. 6, 1907.

Application filed August 23, 1906. Serial No. 331,703.

To all whom it may concern:

Be it known that I, ARTHUR HONIG, a subject of the King of Great Britain, and a resident of Anvers, in the Kingdom of Belgium, (with post-office address 25 Rue de Moy,) have invented certain new and useful Improvements in Rotary Machines, of which the following is a specification.

My invention relates to that class or rotary machines employed as motors, pumps, meters, blowers and the like in which the rotary element, termed the "rotor" is provided with pistons, wings or vanes moving in a suitable casing having proper inlet and outlet ports.

My invention applies more particularly to that type of said machines in which pivoted wings, pistons or vanes are employed and its object is to so construct the machine that it may be run without excessive friction or mechanical jar and yet have a positive and steady movement and action as will be readily understood by those skilled in the art.

My invention may be employed for machines working with steam, gas, air, water or other liquids or fluids and either as a motor or as a pump or blower.

When delicately constructed, the machine is especially suited for use as the motor portion of a water or other fluid meter.

The principal part of my invention relates to the construction and manner of giving positive movement to the wings, vanes or pistons, and consists firstly of a pivoted counterweighted or counterbalanced piston or vane as hereinafter more particularly described.

Another part of my invention consists of a cylindrical or specially curved outer shell for the rotor element, furnished with side or end plates or pieces fastened together by suitable nuts to form the shell or working chamber and provided with suitable guiding grooves or cams which are engaged by runner pins or projections extending from the counterbalanced pistons.

My invention consists also of an improved rotor comprising two end plates, a sleeve, through which passes the shaft of the machine and a number of web pieces or partitions dividing the spaces in which the vanes or pistons work, the whole forming a carrier or cage for supporting the counterbalanced swinging pistons which are pivoted in the said end plates.

The balanced pistons themselves consist of curved piston vanes suitably guided and each mounted on a suitable rock shaft or spindle by means of projecting arms, spokes or web pieces carrying the vanes proper. Said rock shaft also carries suitable counterweights. The axis of rotation of the rotor is eccentric to the outer or specially curved shell in which the rotor works.

My invention consists further in details of construction and combination of parts more particularly hereinafter described and then specified in the claims.

In the accompanying drawings: Figure 1 is a vertical cross section through a machine embodying my invention taken at right angles to the shaft thereof. Fig. 2 is a vertical section of one end of the machine taken parallel to the shaft. Fig. 3 is an end elevation of one of the rotary vanes or pistons and Fig. 4 is a side elevation thereof.

M is a shaft upon which the rotor turns and A is an outer shell provided with end plates H closing the ends of the shell A to form the casing in which the rotor revolves.

E, E′ are the pipes or conduits connected with suitable ports or openings properly disposed in any desired manner in the walls of the casing and forming the inlet and outlet passages for the fluid or liquid passing or passed through the machine.

B indicates the end plates of the rotor portion of the device, which plates are properly secured to a sleeve or hub N adapted to turn on shaft M.

From the hub or sleeve N project radially outward the curved webs or partitions C, forming the divisions between the pockets or spaces in which the pivoted counterweighted vanes or pistons work. These partitions C are omitted from Fig. 2, which shows also the pivot end only of one of the balanced pistons pivoted in an end plate B of the rotor.

The vanes or pistons proper are marked R. They are fastened upon spokes or arms W fixed to and projecting from a rock shaft or spindle S whose pivot ends L turn in sockets in the end plates B of the rotor.

The vanes or pistons are provided with suitable runners V which project laterally therefrom, and work, as will be presently described, in suitable guide cams or grooves formed in the end walls of the casing in which the rotor turns.

X indicates arms or projections extending from the rock shaft or spindle S and carrying the counterbalanced weights T. The guide grooves or cams for working the vanes or pistons positively as they rotate may be formed by the outer shell A and the projecting part J of the end plates H. This projection J is countersunk for reception of the rotary end B of the rotor. The runner pins V work upon the outer edge of the projection J and between the same and the inner wall of the peripheral casing or shell A at its edge or end next the end plate H. The guide grooves thus formed or provided in any other suitable way describe two arcs F, F′, Fig. 1, connected opposite the ports of the casing by tangents or straight portions that merge gradually in the arcs as shown in said figure. The arcs are of differ-

ent radii, yet concentric with the shaft, the arc marked F′ having the smaller radius. The arc marked F has the larger radius and embraces that part of the working chamber wherein the balanced pistons or vanes are to be maintained in an extended position or swung out so as to be in condition for doing work. The guide groove embraced in the arc marked F′, which has the smaller radius, retains the vanes in closed position or in position for doing no work. As the guide pins V leave the smaller arc and pass into the tangential portion of the groove, they are forced outwardly and finally extended to their outermost position, when they reach the arc F in which they are maintained in working position. In passing from the latter arc to the arc F′, they are drawn in thus opening communication with a port of the shell or casing. The raised portions of the end plates having the cams or guides J serve to close the gap which would otherwise be formed when the vanes or wings R are swung out to position shown in Fig. 1.

The action of the machine when run as a motor is as follows: The direction of rotation of the rotor depends upon which pipe or conduit the motive agent enters and can be controlled by any suitable appliance such as the slide valve of a slide valve engine or by a four way cock which admits the motive agent to one pipe and connects the other to exhaust and vice-versa. The motive agent entering the working chamber by the conduit marked E would produce a clockwise rotation of the rotor or by entering by the conduit marked E an anti-clockwise rotation. The motive agent entering the machine finds a closed chamber, but in coming into contact with the vanes of the balanced pistons it would find the path of least resistance on that side where the vanes were extended, (*i. e.*, the side marked F, Fig. 1), and in continuing in this direction would find no outlet except by moving the vanes of balanced pistons forward and the vanes being attached to the rotor and shaft, produces rotation of same. Owing to the particular shape of the shell A, Fig. 1, and the raised guide pieces J, Fig. 2, and the projecting ends of runners V, Fig. 3, the vanes are always in their proper relative positions, and in any position of rotation of the rotor one vane at least of a balanced piston is in each part of the arcs of the shell designated by the arcs F and F′, Fig. 1. It will be seen from the above that the piston vanes being in the positions above stated are always in a position to be acted upon, and while being acted upon are in a stable position in their relation to the rotor and shaft, and by rotating produce a regular increase or decrease of the capacity of the chamber which they form, and therefore with a regular supply of motive agent, would rotate with a regular and even motion, the vanes changing their position in relation to the shaft only at those times when they are not under the direct action of the motive agent or when not doing work. In the drawing, gaps are shown between the surfaces of the balanced piston vanes and the web pieces of rotor, but this is only for clearness, as in an actual machine all the working surfaces would be sliding fits, and in the case of the balanced piston vanes, and the web pieces of rotor, the sliding surfaces being large and in close proximity, the resistance offered to any escape of this path would be great and the loss consequently practically negligible, otherwise, packing strips may be interplaced.

The cross section of the runners, or the runner ends can be round or oval or they can be furnished with rollers or slides for facility of running, should same be deemed necessary.

The inlet or outlet conduits to the working chamber are not confined to that shown in the drawing, but can be made in the side plates and of any suitable shape; also the inlet of the motive agent in the case of a motor can be controlled by a cam fastened to the shaft and working suitable cocks for the permitting of the entry of the motive agent only at certain periods of the cycle of rotation of the rotor and so as to regulate the speed.

The number of balanced pistons is not limited to the number shown in the drawing, but the higher the number of balanced pistons used the smaller they must be made, and the difference between the two radii of the external shell must be diminished or when using a plain cylindrical outer shell the difference between its diameter and that of the rotor end plates must be diminished.

For cheap machines the outer shell can be made cylindrical, thus cutting down the expense of a specially curved outer shell. It is possible by attaching a suitable contrivance to employ this machine as a gas engine. By attaching a motor to the shaft of the above described machine, it can be used as a pump. By making the running parts delicate and gearing the same to a suitable clockwork, the above described machine can be used as a meter.

What I claim as my invention is:

1. A reversible rotary machine having single vane type balanced pistons provided with runners or projections engaging in grooves formed by the outer cylinder and side plates.

2. In a rotary machine of the character described, the combination of pivoted counterbalanced pistons or vanes, and guides for swinging the same into and out of working position, said guides being shaped as described to maintain the vanes or pistons in a stationary condition upon their pivotal axes while said vanes are passing through the arc of revolution in which they are doing work.

3. In a rotary machine of the character described, the combination with rotary counterbalanced pivoted vanes or cams, of a curved shell formed with two peripheral arcs located between the inlet and outlet ports respectively and so shaped as to maintain the pistons stationary in relation to their pivotal axes, while they are in direct action or position to do work, and to close said pistons and maintain them in closed position in relation to the axis of the rotor when they are not acting or being acted upon by the fluid passing through the machine, as and for the purpose described.

4. In a rotary machine of the character described, a casing or shell having end plates or pieces provided with raised portions constructed to act as cams in combination with counterbalanced pivoted pistons or vanes provided with runner pins working on said cams, said raised portions operating also to close the gap which would otherwise be open when the pistons or vanes are swung outward away from the axis of rotation of the rotor portion of the machine, as and for the purpose described.

5. In a rotary machine of the character described, the combination substantially as set forth, of a rotor frame comprising end plates attached to a rotary sleeve, a rock shaft having pivot ends adapted to turn in sockets in the end plates, arms extending from said rock shaft, a wing or vane attached to said arms, and curved plates or parti-

tions projecting from said sleeve and forming the partition between the working spaces for vanes.

6. In a rotary machine of the character described, the combination of a shell or casing having end pieces or plates provided with raised portions or cams, a rotor having an end plate working in a cavity or depression formed in the end plate within said cam or projection, and pivoted vanes or pistons mounted in the rotor and provided with runners projecting laterally therefrom and engaging the outer edge or cam portion of said projection.

7. In a rotary machine of the character described, the combination of counterbalanced pivoted vanes or pistons, a rotor in which the said vanes or pistons are pivotally mounted, a curved shell within which the rotor is mounted eccentrically, end plates for said shell provided with raised portions which serve as cams for the pivoted pistons and rotor end plates working in the countersunk portion of the end plates for the shell within said cam projections, thus forming a closed chamber whatever position the pistons or vanes may occupy, as and for the purpose described.

Signed at Antwerp, in the county of Antwerp and State of Belgium, this 2nd day of July, A. D. 1906.

ARTHUR HONIG.

Witnesses:

BAIN L. CAMPBELL,

H. LUCTHTUM.