

No. 701,982.

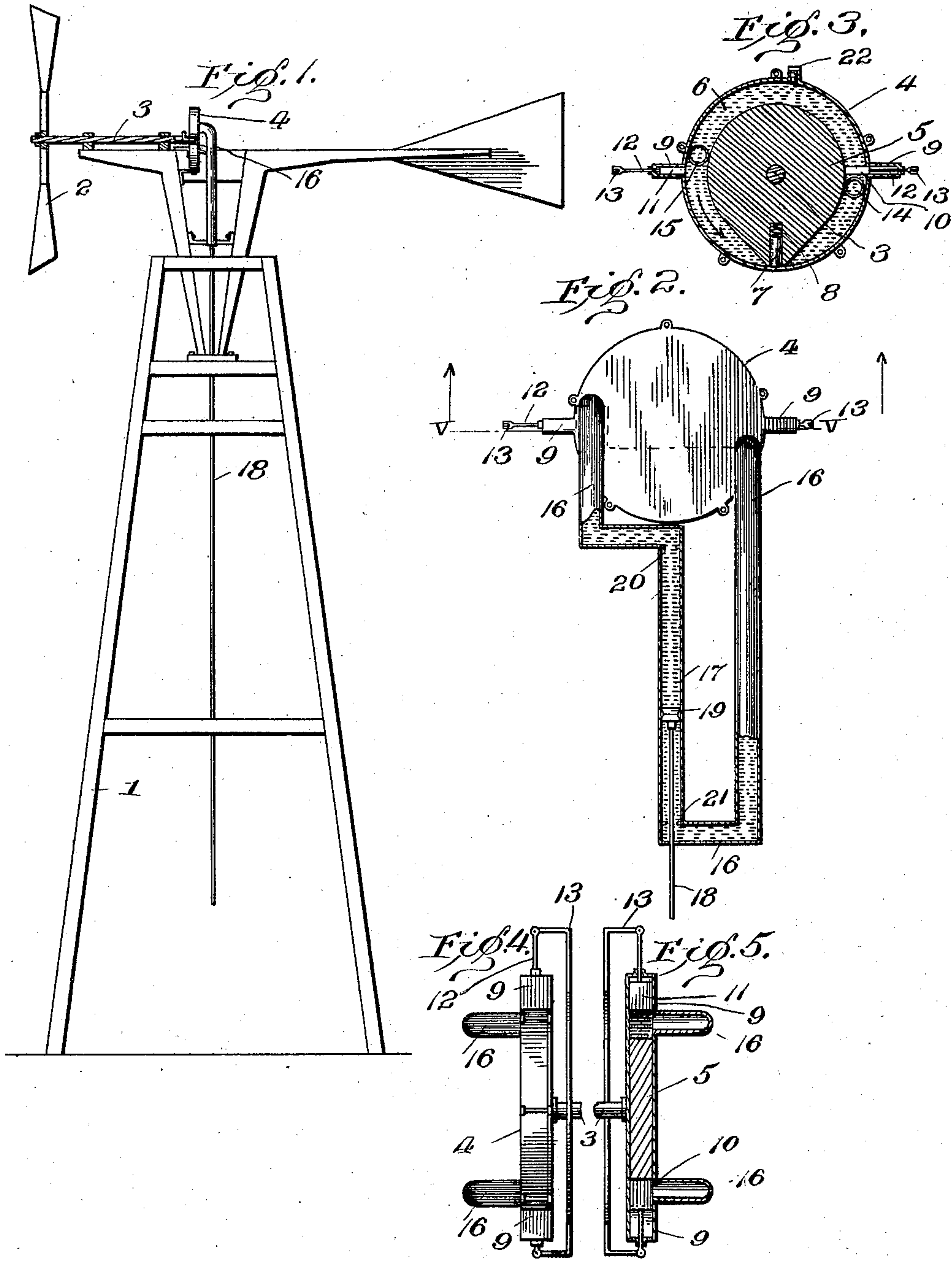
Patented June 10, 1902.

R. H. YALE.

APPARATUS FOR CONVERTING ROTARY INTO RECIPROCATING MOTION.

(Application filed July 29, 1901.)

(No Model.)



Witnesses:  
J. M. Fowler Jr.  
J. P. Hinkel.

Inventor:  
Rodney H. Yale.  
By J. A. Spencer,  
Att'y.



# UNITED STATES PATENT OFFICE.

RODNEY H. YALE, OF BEATRICE, NEBRASKA.

APPARATUS FOR CONVERTING ROTARY INTO RECIPROCATING MOTION.

SPECIFICATION forming part of Letters Patent No. 701,982, dated June 10, 1902.

Application filed July 29, 1901. Serial No. 70,140. (No model.)

*To all whom it may concern:*

Be it known that I, RODNEY H. YALE, a citizen of the United States, residing at Beatrice, in the county of Gage and State of Nebraska, have invented new and useful Improvements in Apparatus for Converting Rotary into Reciprocating Motion, of which the following is a specification.

My invention relates to an apparatus for converting the rotary motion of a shaft driven by a windmill or other power into reciprocating motion and applying the same to the operation of a reciprocating pump or other reciprocating machine or implement.

To this end the invention consists of devices herein fully set forth and described, as follows:

Figure 1 is an elevation, partly in vertical section, of parts of a windmill and the upper portion of the tower on which it is supported, the motion-converter connected to the windmill-shaft, and the reciprocating rod leading down to the pump. Fig. 2 is an elevation of one side of the motion-converter, some portions of the same being broken away to show internal construction. Fig. 3 is an elevation of the same side of the cylinder or casing of the motion-converter as shown in Fig. 2, but with the outer plate and other intervening parts removed. Fig. 4 is a top plan view of the motion-converter when in working position. Fig. 5 is a horizontal section of the same on the line V V of Fig. 2 looking upward.

1 indicates a windmill-frame, 2 a wind-wheel mounted thereon in any preferred manner, and 3 the wheel-shaft.

4 designates a flattened cylindrical closed casing, which is securely mounted in a fixed position at the top of the windmill-frame, and 5 a rotating piston within such casing, fixed on an extension of the shaft 3 or on a shaft operated thereby. Said piston 5 is of generally circular form, of considerably less diameter than that of the casing 4, whereby a substantially annular space or chamber 6 is formed between said piston and the curved inner wall of the casing. Said piston has a tapering projection or protuberance upon one side extending to the inner wall of the casing, and at the apex of such protuberance is provided with a recess containing a sliding head 7 and a spring 8, bearing against said

head and holding it normally in contact with said wall. Said casing 4 is provided on opposite sides of its curved wall with extensions 9, which contain recesses or seats for sliding valves 10 11. Said valves are of such size and form that when projected across the annular space or channel 6, between piston 5 and the wall of casing 4, they will entirely close or obstruct such channel. Each of said valves is provided with a stem 12, extending out through the ends of extensions 9, and said stems are connected to each other, so as to move in unison, by a connecting-rod 13. Said valves are operated by the rotation of piston 5 and are so connected to rod 13 that when one of them is projected outward by contact with said piston the other, upon the opposite side, is drawn inward across the channel 6 by the action of said rod.

In that portion of the end wall of casing 4 which is coincident with the annular channel 6 are provided two openings 14 15 (shown in Fig. 3) in close proximity, respectively, to valves 10 11 and upon that side of said valves from which the latter receive the impact of piston 5 in the course of its revolution. Said openings 14 15 are connected by an irregularly-shaped tube 16 exterior to the casing and suitably supported, extending downwardly and then upwardly, so as to connect said openings in any preferred manner, but having in any case a central portion 17 vertical or in alinement with the reciprocating rod 18 of the pump or other implement to be operated. Said central portion 17 forms or contains a piston-chamber to receive a piston 19 on the upper end of the reciprocating rod 18. Seats 20 21 at opposite ends of said piston-chamber limit the upward and downward movements of said piston.

The annular space or channel 6 and the tube 16, including the piston-chamber 17, are at all times filled with liquid, preferably some variety of oil. Fig. 3 shows a cupped supply-tube 22 for the admission of such liquid.

In operation when the windmill-shaft 3 rotates the piston 5 in the direction indicated by the arrow in Fig. 3 said piston will drive the liquid before it, and as the valve 10 is closed and the liquid is thus prevented from flowing on around the annular channel 6 to be traversed by the piston it will be forced



out of the opening 14 into the tube 16 and will force the liquid in said tube against piston 19, driving it upward, said piston carrying the pump-rod 18 along with it on its upward stroke, and while the movement just described is taking place the liquid in the other branch of tube 16 above piston 19 will be forced upward by said piston, and such portion or its equivalent as is displaced by said piston will be passed through opening 15 into casing 4 and will occupy the space in said casing vacated by piston 5 as it moves toward the closed valve 10. When piston 5 contacts with valve 10, its inclined surface will force said valve open, and connecting-rod 13 will at the same time close valve 11 on the opposite side, piston 19 will have reached the upper limit of its throw, and the movements just described will be reversed, piston 5, having opened and passed valve 10, now forcing the liquid against valve 11, whereby it is deflected through opening 15 into the corresponding branch of tube 16, thus driving piston 19 downward to the lower limit of its throw. The continuous rotation of piston 5 therefore effects a continuous reciprocating movement of piston 19, which is imparted to rod 18.

I have shown and described my device as applied to a windmill-pump; but it is obvious that it may be utilized with equal advantage and effect in other connections where it is desired to convert rotary into reciprocating motion. The details and arrangements of my construction may also be varied considerably from those set forth herein without departing from the spirit and scope of my invention.

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. A device for converting rotary into reciprocating motion, comprising a prime motor, a closed casing containing a rotary-piston chamber, a rotary piston therein actuated by said motor, tubular connections leading out of said piston-chamber, a reciprocating-piston chamber with which said tubes connect, a reciprocating piston within said last-mentioned chamber, a body of liquid within both said piston-chambers and said connecting-tubes, and valves for deflecting said liquid out of said rotary-piston chamber, through said connecting-tubes and against opposite sides alternately of said reciprocating piston, substantially as set forth.

2. A motion-converter comprising a closed casing, an annular rotary-piston chamber therein, a rotary piston within said chamber, tubular connections forming passage-ways leading from opposite portions of said annular chamber, a reciprocating-piston chamber to the ends of which said tubes connect, a reciprocating piston within said last-mentioned chamber, a body of liquid within both said piston-chambers and said connecting-pas-

sages, and sliding valves operated by said rotary piston across said annular chamber, for deflecting the flow of said liquid out of said rotary-piston chamber and against opposite sides alternately of said reciprocating piston, substantially as set forth.

3. A motion-converter comprising a rotary-piston chamber, a rotary piston therein, tubular connections or passage-ways leading out of said chamber, a reciprocating-piston chamber with which said tubes connect, a reciprocating piston within said last-mentioned chamber, a body of liquid within both said chambers and said connecting-tubes, and valves operated by said rotary piston for deflecting the flow of said liquid through said connecting-tubes against opposite sides alternately of said reciprocating piston, substantially as set forth.

4. A motion-converter comprising a prime motor, a rotary-piston chamber, a rotary piston therein, tubular connections or passage-ways leading out of said chamber, a reciprocating-piston chamber with which said tubes connect, a reciprocating piston within said last-mentioned chamber, a body of liquid within both said chambers and said connecting-tubes, valves operated by said rotary piston for deflecting the flow of said liquid through said connecting-tubes against opposite sides alternately of said reciprocating piston, and suitable connections between said valves causing them to operate simultaneously, substantially as set forth.

5. A motion-converter comprising an annular rotary-piston chamber, a rotary piston therein, tubular connections or passages leading from said annular chamber, a reciprocating-piston chamber with which said tubes connect, a reciprocating piston within said last-mentioned chamber, a body of liquid within both said piston-chambers and said connecting-passages, valves operated across said annular chamber for deflecting the flow of said liquid against opposite sides alternately of said reciprocating piston, and a rod connecting said valves to cause them to operate in unison, substantially as set forth.

6. A motion-converter comprising a rotary-piston chamber, a piston within said chamber, a reciprocating-piston chamber, a reciprocating piston therein, passage-ways connecting said chambers, a body of liquid within said chambers and passage-ways, and valves for directing the movement of said liquid out of said first-mentioned chamber through said passage-ways and against opposite sides alternately of said reciprocating piston, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

RODNEY H. YALE.

Witnesses:

HENRY M. HILL,  
A. W. KING.