Jan. 12, 1932. C. E. EUBANK 1,840,389

MECHANICAL MOVEMENT

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Fig. 1.

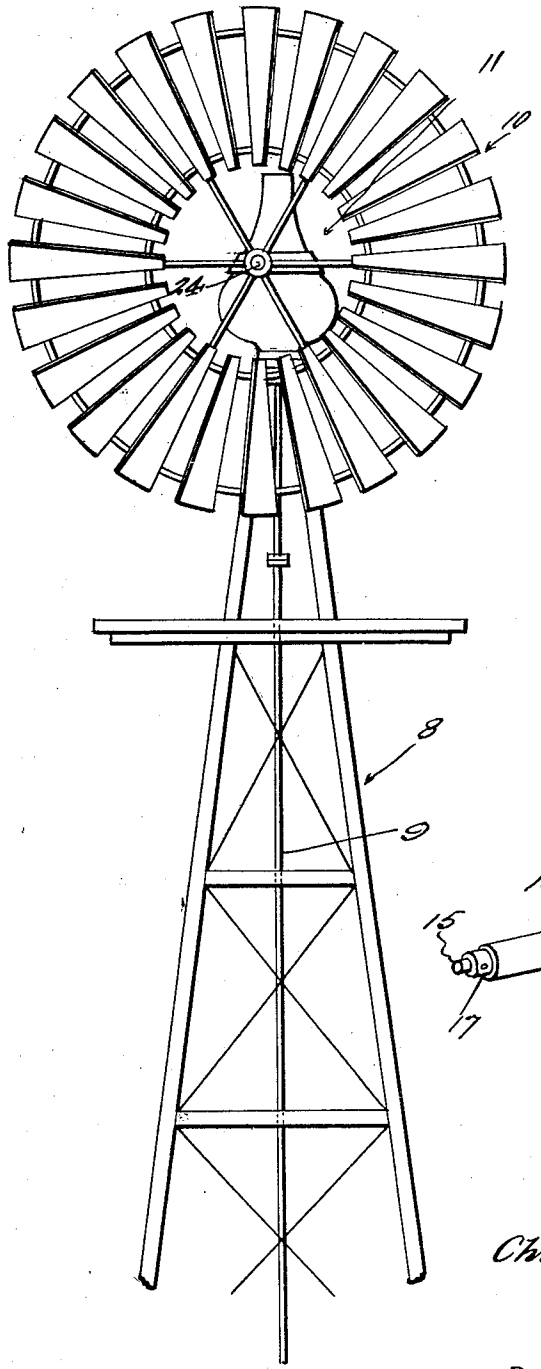


Fig. 7

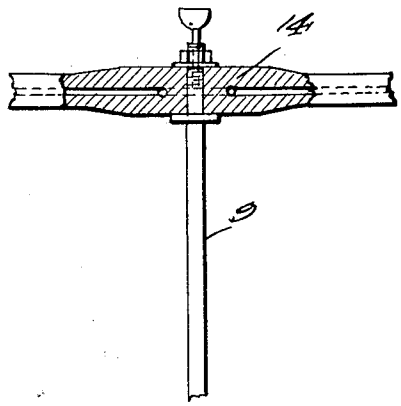
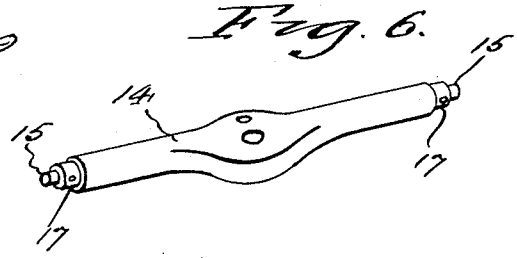


Fig. 6.



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Fig. 2.

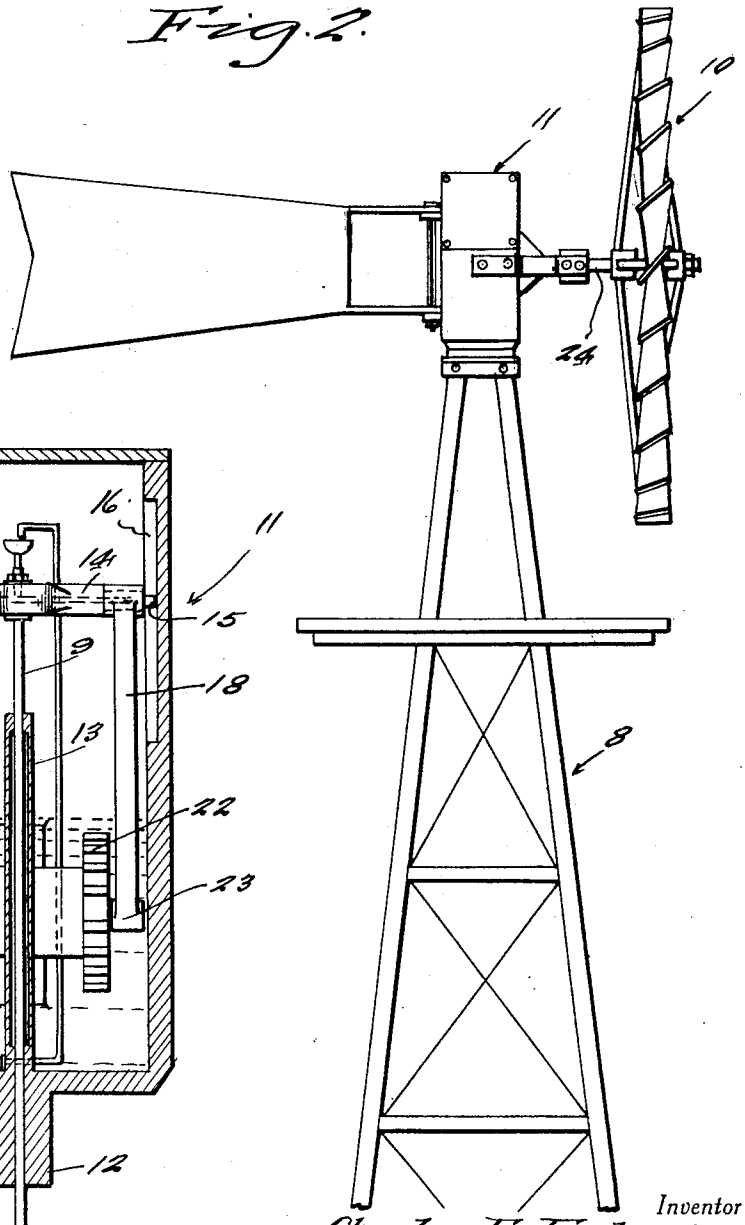
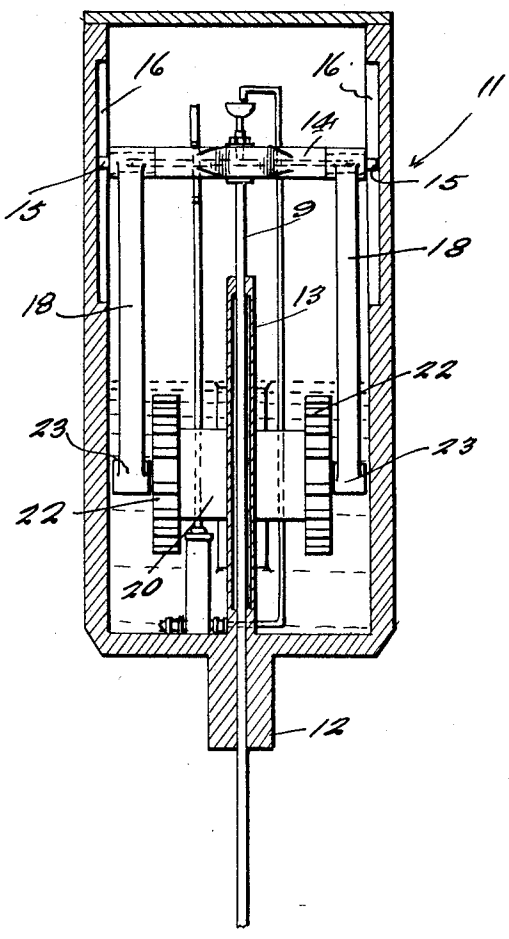


Fig. 3.



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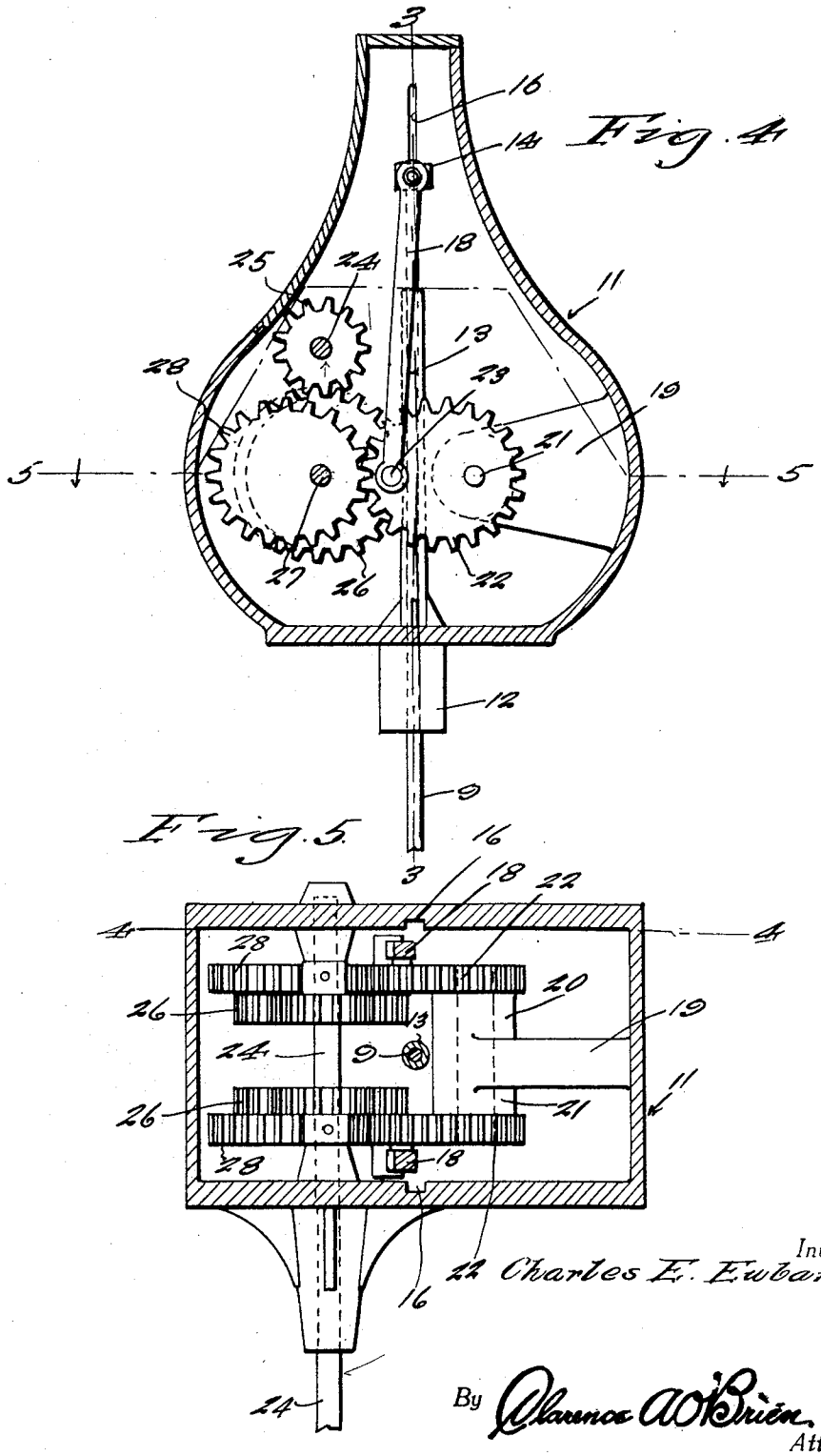


Fig. 4

Fig. 5.

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UNITED STATES PATENT OFFICE

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MECHANICAL MOVEMENT

Application filed February 18, 1930. Serial No. 429,340.

This invention relates to an improved mechanical movement, is expressly, but not necessarily adapted to be utilized as an improved power transmission means in a windmill structure.

It is a matter of common knowledge, among persons skilled in the art of windmill construction, that the reciprocatory sucker rod of the pump has a substantially uniform stroke. In other words, the upstroke is equal in speed to the downstroke.

I have discovered the need for an improved power transmission means or mechanical movement which when properly incorporated will produce a steady and powerful upstroke of the sucker rod, and a comparatively rapid downstroke in appropriate intermittent relationship to afford a more dependable and efficient drive in an assembly of this kind.

Briefly stated, the gist of the invention as devised in accordance with my conception is predicated upon a novel train of gearing providing for a constant motion of an actuating pitman which is connected with the reciprocatory pump rod.

In carrying the invention into effect, I have evolved and produced a novel arrangement of gearing and shafts which when assembled will provide what may be designated as a duplex drive, such drive being efficient in that it is dependable, positive, and sufficiently sturdy to transmit the power in a steady and practical manner, while at the same time avoiding undue strain and unequal stress on the relatively slidable pump rod.

In the drawings:

Figure 1 is an elevational view of a conventional windmill embodying the features of the present invention.

Figure 2 is a side elevation of the same.

Figure 3 is a vertical sectional view on the line 3—3 of Figure 4.

Figure 4 is a view at right angles on the plane of the line 4—4 of Figure 5.

Figure 5 is a horizontal sectional view through Fig. 4.

Figure 6 is a perspective view of one of the details.

Figure 7 is a fragmentary sectional view of a crosshead.

In the drawings in Figures 1 and 2, the reference character 8 designates the derrick, and 9 indicates generally the reciprocatory sucker rod or pump rod as it is generally referred to in the trade. The propeller 10 comprises the usual bladed rotor. This is disposed in close proximity to the substantially pear-shaped gear casing or housing generally represented by the numeral 11.

At its bottom, this housing is formed with a guide 12 for the rod 9, and on the interior is a guide tube 13 for the rod. The rod extends up into the interior of the reduced portion of the housing as seen in Figure 4, where it is connected with a cross head 14. This cross head is of the configuration seen in Figure 6 and is provided at its opposite ends with reduced trunnions 15 which function as guides and which ride in the guide grooves 16 in the opposite walls of the housing.

Attached to the end journals 17 are the pivoted pitman rods or connecting rods 18. I provide a pair of these connecting rods. In fact, the transmission assembly is of a duplex nature to accommodate this double rod arrangement. The gearing in each assembly however is the same, and a description of one will suffice for both.

As seen in Figure 5, a bracket 19 projects into the interior of the housing and terminates in a bearing 20 to accommodate a rotary shaft 21 having substantially ovate gears 22 on its opposite ends. These gears rotate with the shaft. They are provided with pitman pins 23 as seen in Figure 4, and the lower ends of the connecting rods 18 are pivotally connected therewith. This affords the desired eccentric connection of the gears with the pitman rod. The gears themselves are fastened off-center to the rotary shaft 21.

This shaft 21 is hereinafter designated as the driven shaft for sake of distinction. Mounted for rotation in appropriate bearings in the gear housing is the propeller shaft 24 with which the rotor 10 is connected. This shaft is provided with a pair of relatively small spaced driving gears 25. Each gear is in mesh with a companion gear 26

fixedly mounted on a shaft 27 mounted for rotation in the housing directly beneath the shaft 24. This shaft 26 may be distinguished as the secondary driven shaft, of the shaft intervening between the primary driven shaft 21 and the power or propeller shaft 24. Incidentally, there are two of the gears 26 mounted on this secondary driven shaft 27.

In addition, at each end of the shaft 27 I provide an ovate or elongated egg-shaped gear 28. This gear is arranged to have its seat in mesh with the eccentrically mounted gear 22. The gear 28 is also mounted off-center causing its projecting end portion to travel in a path beyond and around the periphery of the adjacent concentric gear 26. Thus, the gears 25 and 26 are concentrically mounted on the superposed shafts 24 and 27 and the gears 22 and 28 are eccentrically mounted on the shafts 21 and 27 respectively.

This arrangement of gearing brings about the desired ratio necessary to cause the rod 9 to travel upwardly in a relatively slow and steady manner and to then immediately drop in a quick manner. The length of the stroke of the rod is the same whether it moves up or down but the speed is different because of the peculiar cooperation of the gearing trains.

Under this arrangement, approximately one and one-half revolutions of the propeller shaft 25 is necessary to produce the complete upstroke of the rod 9, whereas it moves downwardly to its lowermost position during the succeeding half revolution of the shaft. Consequently, two revolutions are necessary to produce the up and down stroke of the rod, bringing about a ratio of three to one. Hence, the rod 9 moves downwardly approximately three times as fast as it travels upwardly, and this is found highly desirable in insuring appropriate transmission of power and scavenging of silt and waste matter from the pump cylinder by ejecting the material forcibly by the quick upward rush of water before the valve is seated.

The fact that the invention is shown and described as being associated with the power transmission means of a windmill pump is not to be regarded as controlling, since this same mechanical movement may be utilized in connection with other drives where rotary motion is converted into reciprocatory motion through the medium of gearing and pitman rod structures.

It is thought that persons skilled in the art to which the invention relates will be able to obtain a clear understanding of the invention after considering the description in connection with the drawings. Therefore, a more lengthy description is regarded as unnecessary.

Minor changes in shape, size, and rearrangement of details coming within the field of invention claimed may be resorted to in actual practice if desired.

I claim:

1. In a structure of the class described, in combination, a gear housing having a vertical guide tube therein, and perpendicular opposed and transversely spaced guide grooves, a pump rod mounted for reciprocation in said vertical guide tube, a transversely disposed cross head connected to the upper end of said pump rod and having groove engaging extensions on its ends, and mounted for reciprocation in a horizontal position in said grooves, a rotary propeller shaft mounted for rotation in the upper part of said housing, a pair of relatively small concentric gears fixedly mounted on said propeller shaft, a secondary driven shaft mounted in perpendicular alinement beneath said propeller shaft, a pair of concentric gears carried by said driven shaft and in mesh with the first-named concentric gears, a pair of eccentrically mounted ovate gears on said driven shaft, a third driven shaft mounted for rotation in the housing in a plane substantially even with said secondary driven shaft, a pair of ovate gears eccentrically and fixedly mounted on said third driven shaft and having their teeth in mesh with the teeth of said first-named ovate gears, and a pair of pitman rods longitudinally eccentrically and pivotally connected with said second-named ovate gears and operatively connected with said cross head near each end thereof for producing an accelerated downward motion and a de-celerated upward motion of said pump rod without imparting any other motion thereto.

2. In a structure of the type described, in combination, a substantially rectangular gear housing having a centrally and perpendicularly disposed pump rod guide tube rising beyond the middle height therein, and a pair of perpendicular longitudinally centered mutually opposed guide grooves on the longitudinal walls of the housing, a pump rod mounted for reciprocation in said pump rod guide tube, a horizontal crosshead connected at its middle to said pump rod and having its ends formed with extensions for slidable engagement in said guide grooves, a propeller shaft mounted transversely for rotation at one side of the upper portion of the gear housing, a pair of concentric gears fixedly mounted and spaced within the ends of the propeller shaft, a driven shaft similarly mounted immediately under the propeller shaft, a pair of concentric gears on the driven shaft and in mesh with the concentric gears on the propeller shaft, and a pair of eccentrically mounted ovate gears symmetrically fixed outside of each of the said concentric gears, and a bracket extending from the near end wall of the casing and carrying a bearing, and a secondary driven

shaft rotatable in the bearing and totally within the gear housing, a pair of ovate eccentrically mounted gears on the ends of the secondary driven shaft meshed with the ovate gears on the said driven shaft, and a pair of connecting rods pivoted one on each end portion of the crosshead and each ovate gear on the secondary driven shaft, the gears arranged and apportioned for imparting to the pump rod an accelerated downward movement and a decelerated upward movement without imparting any other motion thereto.

In testimony whereof I affix my signature.

CHARLES E. EUBANK.