J. S. SLOVER.

PUMP AND WINDMILL CONNECTION.

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1,067,848.

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Fig. 1.

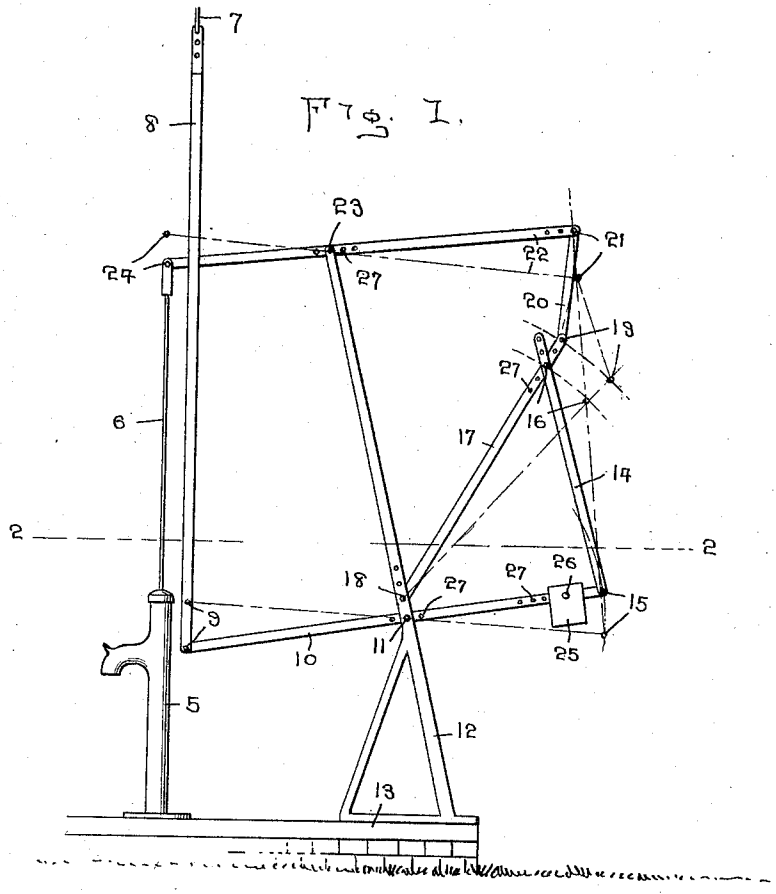
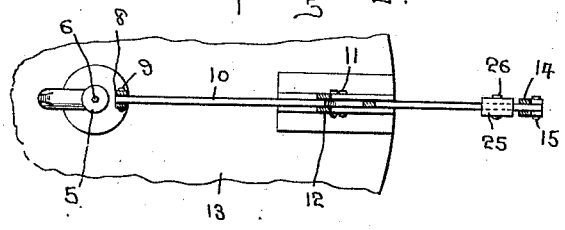


Fig. 2.



Witnesses

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PUMP AND WINDMILL CONNECTION.

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To all whom it may concern:

Be it known that I, JAMES S. SLOVER, a citizen of the United States, residing at Lubbock, in the county of Lubbock and State of Texas, have invented certain new and useful Improvements in Pump and Windmill Connections; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to power transmission mechanisms, and it more particularly relates to a pump and wind mill connection.

An object of the invention is to vary the relative strokes of the driving rod and the pump plunger rod.

Another object of the invention is to accelerate and retard the motion of the pump plunger rod.

A further object of the invention is to provide an adjustable device of this character which may be easily and properly applied to pumps and wind mills of different kinds.

A still further object of the invention is to provide a device of this character which may be applied to a pump and wind mill without materially altering or changing the position of any of the principal elements of said pump or wind mill.

Other objects and advantages may be recited hereinafter and in the claims.

In the accompanying drawings which supplement the following specification, Figure 1 is a side elevation view of a pump having my improved transmission mechanism attached thereto and to a wind mill of ordinary construction, only a fragmental element of the latter being shown, and, Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1.

Referring to these drawings, in which similar reference numerals correspond with similar parts throughout the several views, the pump stock is designated by the numeral 5, the numeral 6 designating the plunger rod of the pump. To the driver rod 7, of the wind mill, is connected a driver link 8 which is pivoted at 9 to the lower substantially horizontal lever 10, the latter being pivoted at 11 to an oblique standard 12 which is secured on the platform 13, which covers the well and supports the pump stock.

At one end of the lever 10 is pivotally connected the lower link 14, the pivotal connection being indicated at 15, the upper end of the link 14 being pivotally connected at 16 to an oblique lever 17 while the latter is pivoted at 18 to the standard 12. The upper end of the lever 17 is pivoted at 19 to the upper link 20, the latter being pivoted at 21 to the upper horizontal lever 22. The lever 22 is pivoted at 23 to the upper end of the standard 12, one end of said lever 22 being pivotally connected at 24 to the plunger rod 6. The arrangement of the several links and levers is such as to produce the greatest increase of power, consistent with compactness, for raising the plunger 6, and this arrangement is made possible by the employment of the oblique standard which is inclined upward in the direction of the pump plunger rod. It will be noted that the pivotal point 23 is considerably nearer to the pivot 24 than it is to the pivot 21. In other words, considering the lever 22 as comprising two sections on the right and left, respectively, of the pivot 23, the left section is about two-fifths of the entire length of the lever. The lower lever 10 has its pivotal point near the center, but slightly offset therefrom, so that the left-hand section is longer than the right-hand section, considering the pivotal point 11 as dividing this lever into two sections.

Where a pump is connected with a wind mill in the usual way, the rods 6 and 7 are in substantially vertical alinement, and one or both rods are extended or supplemented by a suitable connecting link for securing them together. However, in attaching the transmission mechanism of this character, it becomes necessary to deflect the rod 7 slightly out of vertical alinement with the rod 6, so that the pump stock 5 will not interfere with the vertical movement of the driver link 8. Therefore, the lever 22 is extended laterally beyond the link 8, so as to overhang the end of the lever 10 and to bring its pivotally connected end directly over the center of the pump stock.

In order to compensate for the weight of the members 6, 7 and 8, a weight 25 is provided near the end of the lever 10, opposite to the end which supports the link 8, and said weight 25 is slidably mounted on the lever 10 and adapted to be adjusted in either of several alternate positions by means of a

pin 26, in engagement with one of the apertures 27 through said lever 10. Similar apertures 27 are provided near the pivotal points 11, 19, 21 and 23, so that the leverage of the levers 10, 17 and 22 may be regulated according to the attending circumstances.

In order that the objects and operation of my improved transmission mechanism may be better understood, it may be stated that the driver rod 7, when actuated by a wind mill of ordinary construction, moves with a uniformly accelerated and retarded stroke, on account of the usual crank (not shown), with which the driver rod connects; the greatest speed of said driver rod occurring at the middle of its stroke, the speed being reduced to the minimum as it approaches the ends of its stroke. Moreover, more power is required for moving the driver rod through the middle of its stroke than at the ends thereof, as is well known to persons familiar with the art. The arrangement of links and levers constituting my invention partially counteracts the foregoing variableness of the stroke as follows: Assuming that the driver rod 7 is in its lowermost position when the pivots 18, 19 and 21 were in alinement and that said rod 7 is now making its upward stroke, in Fig. 1, while the left-hand end of the lever 10 is being drawn upward, and its right-hand end is moving downward and drawing the lever 17 downward, by means of the link 14, and drawing the right-hand end of the lever 22 downward by means of the link 20 and lever 17. It is obvious that this operation causes the left-hand end of the lever 22 to move upward and carry the plunger rod 6 therewith. It will be seen that the lever 17, while moving downward, also moves rightward, as indicated by the arcuate broken lines through the pivots 16 and 19. Because of the excess of leverage in favor of the wind mill connecting or driving rod 7 and link 8, it will be seen that the pivot 9 travels approximately twice the distance of the pivot 24, or in other words, the link 8 and rod 7 travel approximately twice as fast as the plunger rod 6, and hence, neglecting friction and weight, the power required for lifting the driver link equals approximately one-half of the load carried by the plunger rod 6. Obviously, the ratio of the power and load may be varied by transferring the pivot 23 to other of the apertures 27, or by similarly transferring the pivot 11. While the pivots 18, 19 and 21 were in alinement the link 8 began to move upward, and this upward movement was uniformly accelerated throughout the first half of its upstroke, or throughout the first 90 degrees travel of the driver crank (not shown), until said link reached its medial position, which approximately agrees with the full line position in Fig. 1. At the beginning of the upstroke, the pivot 19 begins to move out of alinement with the pivots 18 and 21, and at this point the movement of the pivot 21 is imperceptible, but as the pivot 19 moves laterally and downward, the downward movement of the pivot 21 and the upward movement of the pivot 24 and rod 6 are accelerated. Now we have seen that the movement of the link 8 is accelerated, and hence the accelerated movement of the several levers, and this accelerated motion of the link 8 in addition to the accelerated motion imparted to the pivot 21 by the laterally downward movement of the pivot 19 approximately doubles the rate of acceleration of the rod 6 until the driver crank starts into the second quarter of its revolution, whereupon, the upward motion of the link 8 changes from uniformly accelerated to uniformly retarded motion while the motion imparted to the pivot 21 by the link 20 and pivot 19 continues to be uniformly accelerated, or in opposition to the uniformly retarded motion of the link 8. It will be seen that these two opposing accelerations of motion counteract each other so as to cause the rod 6 to move with approximately invariable speed throughout the upper half of its stroke. It will now be seen that while the average speed of the rod 6 is only approximately half of that of the rod 7 and link 8, the beginning of the upward movement of said rod 6 is very slow and becomes very rapidly accelerated until it attains the approximate average speed of the link 8. Therefore, the minimum power is required for starting the pump-rod 6 upward, while the usual jerk and jar, which attains this stage of operation in pumps of ordinary construction, are reduced to a minimum.

It will be seen that I have provided a power transmission mechanism which, while of simple construction, is fully capable of attaining the foregoing objects in a thoroughly practical and efficient manner.

I do not limit my invention to the exact details of construction, combination and arrangement of parts as herewith illustrated and described, but my invention may only be limited by a reasonable interpretation of the claims.

I claim:

1. In a transmission mechanism for connecting a pump and a wind mill, an oblique standard having upper and lower substantially horizontal levers pivoted thereto, the lower lever being adapted for connection with a wind mill, the upper lever being adapted to connect with a pump, an oblique lever pivotally connected to the oblique standard, the obliquity of the oblique lever being opposite to that of the standard, a link pivotally connected to said lower lever and to the oblique lever, and a link pivotally connecting an end of said upper lever

with the upper end of the oblique lever, substantially as described and for the purpose specified.

2. In a power transmission mechanism, a standard, a lower lever and an upper lever pivoted to the standard and extending substantially horizontally, a driver link pivotally secured to the longer arm of the lower lever and adapted to connect with a wind mill driver rod, the shorter arm of the upper lever being adapted to pivotally connect with a pump, an oblique lever pivoted to the standard, a link connecting the oblique lever with the upper lever, and a link connecting the oblique lever with the lower lever, whereby the leverage of the upper lever is varied when the several levers are moved on their respective pivots.

3. In a transmission mechanism for reciprocating a driven element by means of a reciprocatory driver element and converting accelerated and retarded motion into substantially uniform motion, a lever pivoted to the driver element and extending approximately at right angles therefrom, a second lever pivoted to the driven element and extending approximately at right angles therefrom, a fixed element to which the levers are pivoted intermediately of their ends, an oblique lever pivoted to the fixed member and extending therefrom at an angle to the first said lever, a link pivoted to the first said lever and to the oblique lever and extending in the direction of the said second lever, and a link connecting the oblique lever with the said second lever.

4. In a transmission mechanism for reciprocating a driven element by means of a reciprocatory driver element and converting accelerated and retarded motion into substantially uniform motion, a lever pivoted to the driver element and extending approximately at right angles therefrom a second lever pivoted to the driven element and extending approximately at right angles therefrom, a fixed element to which the levers are pivoted intermediately of their ends, an oblique lever pivoted to the fixed member and extending therefrom at an angle to the first said lever, a link connecting an end portion of the oblique lever with an end portion of the second said lever, and a link pivotally connected to the first said lever.

5. In a device for converting uniformly accelerated and retarded motion from a source of power into substantially uniform motion for effecting work and for increasing the length of the power stroke relative to the working stroke, a fixed member, substantially parallel levers pivotally connected to the fixed member, a driver member pivotally connected to one of said levers and adapted to connect with said source of power, a driven member pivotally connected to the other said lever, an oblique lever pivotally connected to the fixed member, means pivotally connecting the oblique lever with the lever which connects with the driven member, and means connecting said oblique lever with the lever which connects with the driver member, said oblique member being adapted to be drawn downward and outward by the last said means for changing the leverage of the lever which connects with the driven member.

6. In a power transmission mechanism for connecting a pump and a wind mill, a standard in fixed relation to said pump and wind mill, and lower and upper substantially horizontal levers pivoted to the standard intermediately of their ends, means pivoted to the lower lever for connecting with the wind mill, said upper lever having means for connecting with the said pump, an oblique lever pivoted to the standard, a link connecting the oblique lever with the upper lever, a second link pivoted to the oblique lever between its pivotal connection with said standard and the first said link and having its other end pivoted to the lower lever, and a weight adjustably secured on the lower lever.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES S. SLOVER.

Witnesses:
J. K. MILBURN,
GEO. R. BEAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."