(No Model.) 4 Sheets—Sheet 1.

F. C. MOORE.

MOTOR.

No. 458,776. Patented Sept. 1, 1891.

Fig. 1.

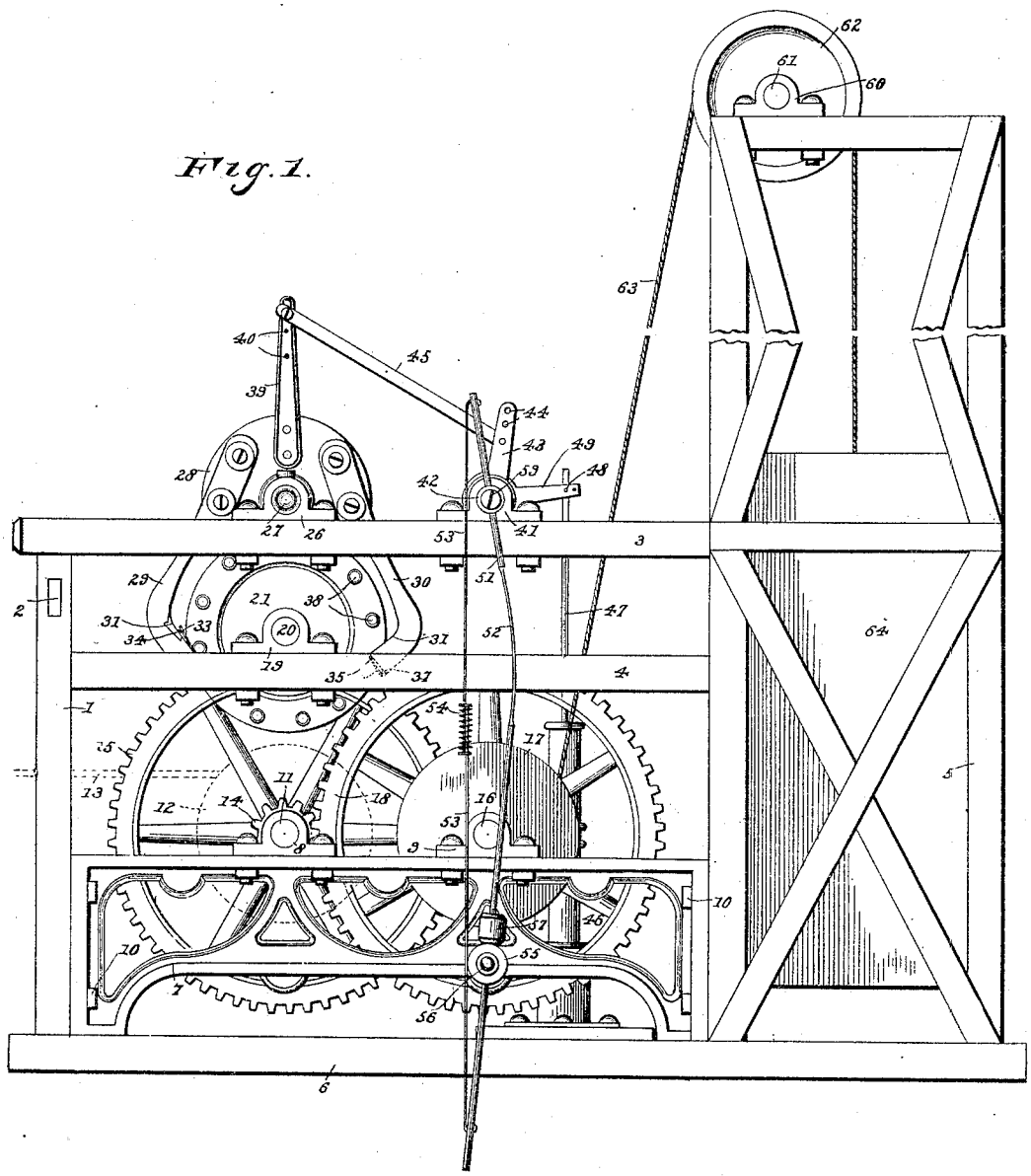

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Fig. 2

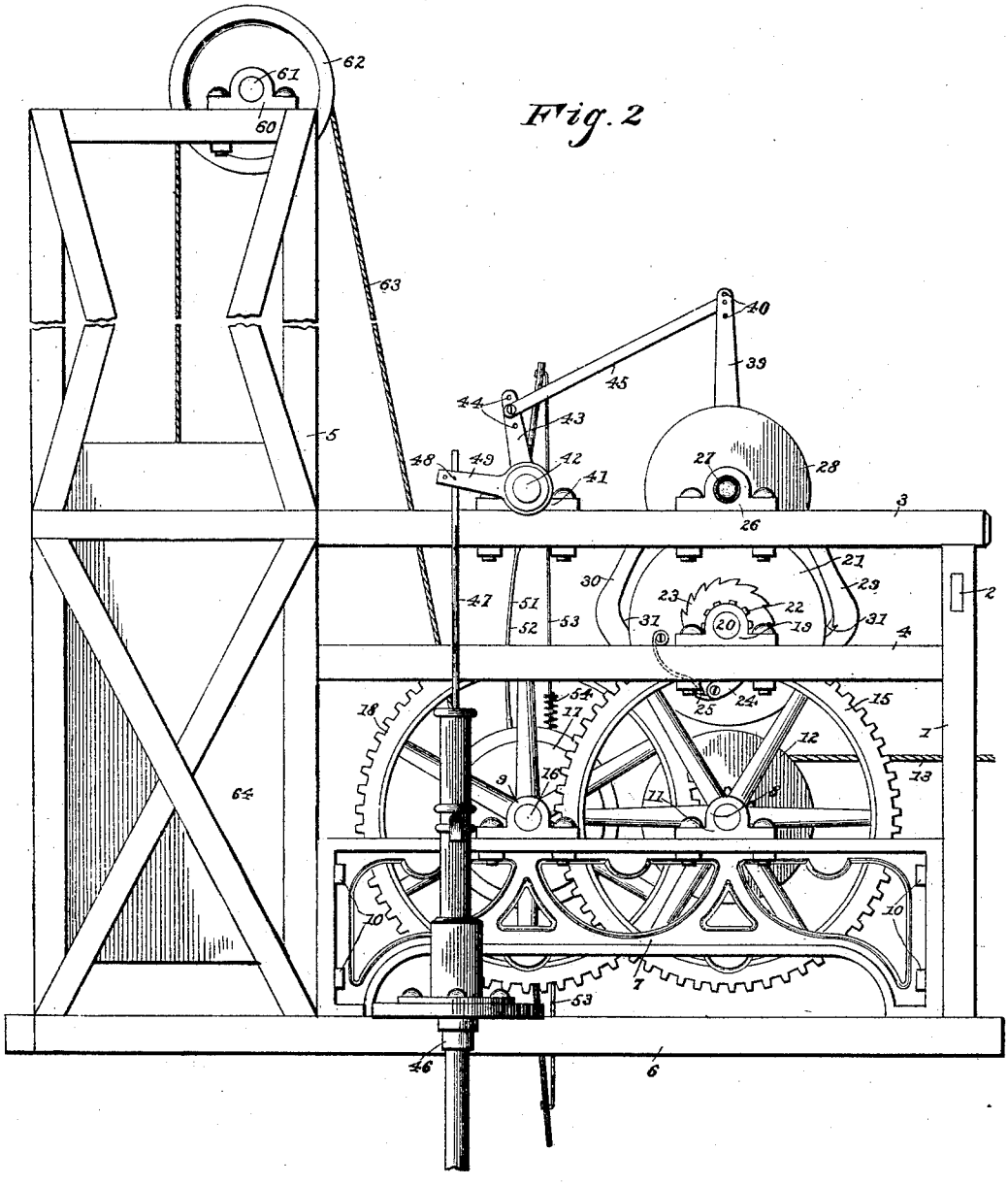

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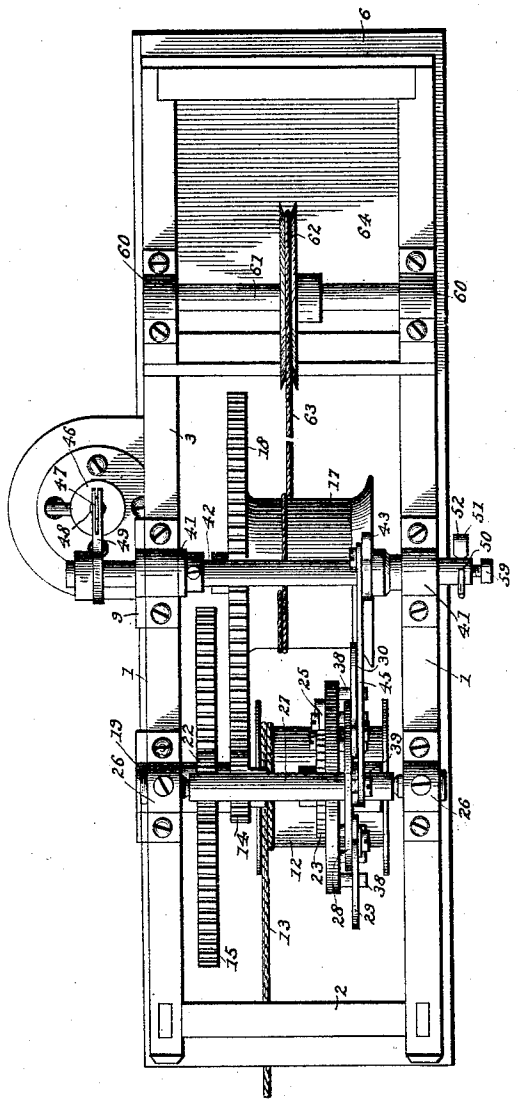
Fig. 3



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(No Model.) 4 Sheets—Sheet 4.

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MOTOR.

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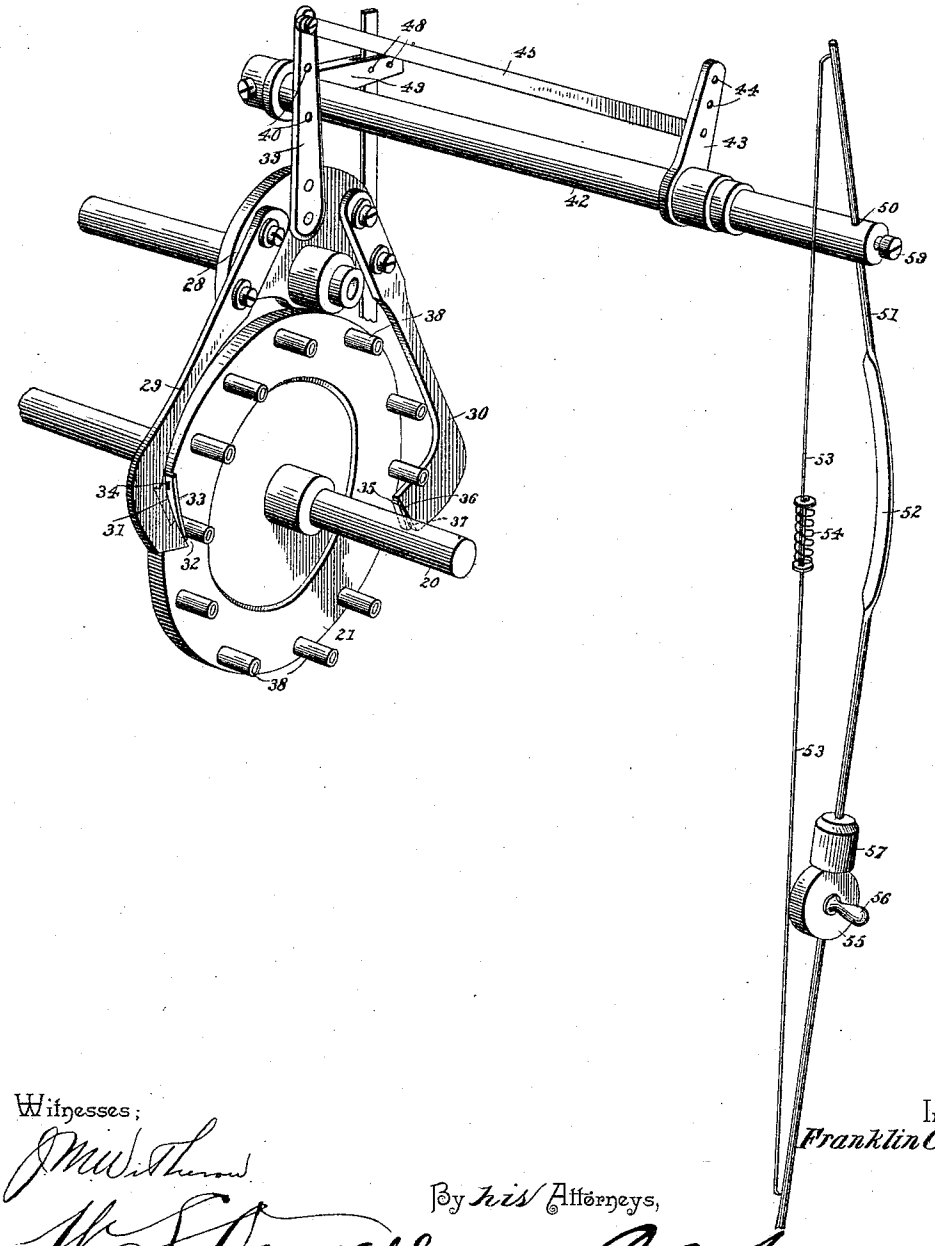
Fig. 4.



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UNITED STATES PATENT OFFICE.

FRANKLIN C. MOORE, OF MONTICELLO, INDIANA.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 458,776, dated September 1, 1891.

Application filed January 31, 1891. Serial No. 379,819. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN C. MOORE, a citizen of the United States, residing at Monticello, in the county of White and State of Indiana, have invented a new and useful Motor, of which the following is a specification.

This invention relates to motors, and to that class thereof more especially designed for operating pumps.

The objects of my invention are to provide a motor of simple construction, adapted to be operated by a suitable power, and to be so constructed as to be operated at a regulated speed by a minimum power.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

Referring to the drawings, Figure 1 is a side elevation of a motor constructed in accordance with my invention, the same being operated by a weight and shown in operative position with a pump, the rod of the pump being elevated. Fig. 2 is a similar view taken from the opposite side. Fig. 3 is a plan. Fig. 4 is a perspective in detail of the escapement-levers, the pump-rod, and the intermediate connections.

Like numerals indicate like parts in all the figures of the drawings.

1 designates the opposite side frames connected by suitable cross-bars 2 and comprising in its make-up the upper horizontal beams or bars 3 and the lower horizontal beams or bars 4. At the rear end of the side frames thus constructed is located an ordinary tower 5, extending to a suitable height, and in conjunction with the side frames 1 mounted upon a base 6.

Between the vertical posts of each of the side frames 1 is located upon the base a journal-frame 7, the two frames 7 being provided at opposite points with journal-boxes 8 and 9, and securely bolted at their ends, as at 10, to the vertical posts of the side frames 1. A winding-shaft 11 is mounted in the journals 8, and upon the same is mounted a winding-drum 12, around which passes a winding-rope 13, a small pinion 14, and a large gear 15 In the journal-boxes 9 is mounted for rotation a shaft 16, upon which is mounted a drum 17, and a large gear 18, the teeth of which engage with the pinion 14 on the shaft 11. Above the boxes 8 journal-boxes 19 are located upon the beams or bars 4, and in the same is mounted for rotation an escapement-shaft 20, which carries an escapement-wheel 21, loosely mounted on the shaft, and near its opposite end a small pinion 22, the teeth of which engage those of the large gear 15. A ratchet-wheel 23 is rigidly mounted on the shaft 20, and a pawl 24 is pivoted to the rear face of the escapement-wheel and is spring-pressed by a spring 25 into engagement with said ratchet-wheel, so that the escapement-wheel moves with the shaft when the latter rotates in one direction.

Above the journal-boxes 19 there is mounted upon the bar or beam 3 a pair of journal-boxes 26, in which is mounted for rotation a shaft 27. The shaft 27 carries a yoke or head 28, and from the same there depend at opposite sides of the shaft escapement-levers 29 and 30. The lever 29 and the lever 30 are each provided with inclined faces 31, formed upon their inner sides or edges and near their lower ends. To the lower inner edge of the lever 31 is pivoted, as at 32, a plate 33, interposed between which and the inclined face 31 is a coiled or other spring 34. To the inner lower edge of the opposite lever 30 there is pivoted, as at 35, a plate 36, which takes under the end of the lever and has interposed between its free end and the end of the lever a coiled or other spring 37. The plates 33 and 36 operate alternately upon the escapement-pins 38 of the escape-wheel 21 as the escape-wheel shaft 20 is rotated and the escapement-lever shaft 27 is rocked. From the head or yoke 28 there extends upwardly a rock-arm 39, provided near its upper end and at intervals with adjusting-holes 40.

At one side of the boxes 26, upon the bars or beams 3, is located a pair of boxes 41, in which is mounted a rock-shaft 42, both ends of which extend beyond their bearings, as shown. A rock-arm 43 is adjustably mounted upon the shaft, and is provided with a series of adjusting-holes 44, one of which is pivotally connected to a pitman 45, the opposite end of which is pivotally connected to any one of the adjusting-holes 40 of the rock-arm 39.

46 designates an ordinary pump, and 47 the pump-rod, the upper end of which is adjustably connected, as at 48, to the outer end of a rock-arm 49, mounted upon the shaft 42, said rock-arm being disposed at an angle to the rock-arm 43 and also adjustable upon the shaft. A perforation 50 is formed in one end of the shaft 42, and through the same is passed a vibrating pendulous lever 51, said arm being in this instance reduced intermediate its ends to form a spring portion 52.

53 designates a pair of wires or rods connected, respectively, to the upper and lower ends of the pendulous spring-lever and having their adjacent ends yieldingly connected by a spring-link 54, said wires or rods being under tension and serving, as shown, to slightly bow the lever 51. An adjustable nut 55 is located upon the lever and is provided with a set-screw 56 for securing it in position at any point, and above said nut upon the lever there is located for movement a weight 57. The nut may be adjusted and with it carries the weight, and the lever 51 is also adjustable by means of a set-screw 59.

In bearings 60, located at the upper end of the tower 5, is a shaft 61, upon which is mounted for rotation a grooved pulley 62. A wire cable 63 passes over the grooved pulley 62, is passed around and made fast to the drum 17 of the shaft 16, and at its other end is connected to and supports a weight 64, mounted for vertical movement within the tower. It will of course be understood that the weight and the mechanism for operatively connecting the same with the motor may be omitted and other power substituted, which will of course require other means for transmitting the same to the motor, and to such details I do not limit my invention.

The above being the construction, the operation of the motor is as follows: A horse or other means may be employed for drawing upon the rope 13, and thus unwinding the same and rotating its drum, the pinion 14, and the gear 15. The gear 15, when thus operated, operates the small pinion 22 and the shaft 20, together with the ratchet-wheel 23, but not the escapement-wheel 21, as the same is loose upon the shaft, and the pawl 24, when the shaft moves in the direction indicated, rides loosely over the teeth of the ratchet, so that the escapement mechanism is not influenced by the act of winding. Motion is imparted by the small pinion 14 to the large gear 18, the drum 17, and its shaft 16, which serves to wind the cable 63 upon the drum and consequently elevate the weight 64. The arrangement of gearing and their relative proportions are such as to necessitate but a few rotations of the winding-shaft 8 to completely elevate the weight 64, which latter is slowly lowered. Taking the parts in the positions shown in Figs. 1 and 2, in which the weight is shown as partially elevated, as the weight descends it rotates the shaft 16, the gear 18, and transmits motion from the gear to the small pinion 14, the shaft 8, and the large gear 15, which latter transmits motion to the small pinion 22 of the escape-wheel shaft, and through the medium of the ratchet and the pawl rotates the escape-wheel. As the escape-wheel rotates it serves to oscillate or rock the shaft 27, the head 28, through the medium of the escape-levers 29 and 30, the inclined faces of which are alternately operated against by the pins 38, which, it will be observed, for the purpose of preventing friction, are provided with small friction-rollers. The pins of the escape-wheel first come in contact with the plates 34 and 36 near the free ends of the same and serve to compress (more or less) the coiled springs supporting said ends, said plates serving as inclined ways over which the friction-rollers glide with very little binding tendency. As the rollers approach near the pivots of the plates, the springs are, in a measure, relieved of the direct pressure of the rollers and exert themselves to suddenly throw out the plates and act as propellers to actuate or aid in operating themselves. The rocking of the escape-lever shaft 27 causes, through the medium of the pitman 45, a similar movement upon the part of the shaft 42, and consequently the rock-arm 49 and the arms 39, 43, and 49 are so relatively disposed that when the arms 39 and 43 are thrown toward the pump the arm 49 is lowered and the rod of the pump is in the act of descending or has descended, and when these arms are thrown in the opposite direction or away from the pump the pump is lifting or operating, so that the perforation 50 is nearly in a vertical position when the pump-rod is lowered; or, in other words, when the pump-rod assumes its lowest position the lever 51 is elevated or swung outwardly, and when the rod is at its uppermost position the lever 51 has assumed such a position as will bring the weight 57 thereof vertically below the shaft 42, and such is the limit of its downward movement. As the lever 51 reaches the limit of its movement in either direction and is suddenly arrested, it yields by reason of the spring 52 and the yieldingly-connected rods 53, so that, as will hereinafter appear, it exerts a throwing force. Taking the parts in the position shown in Fig. 1, in which the pump-rod is elevated, it will be seen that the pump-rod 47 and the pump-bucket aid the weight 64 to elevate the lever 51 and its weight 57, so that the lever and rod are not elevated merely by the weight 64, as would be the case if said lever swung back of a point vertically below its fulcrum. Therefore it will be obvious that by reason of the parts being so arranged as to utilize the weight of the rod 47 and bucket to aid in raising the lever 51 and its weight the weight 64 is to this extent relieved of this office, and hence need not be so heavy as would be the case if the lever 51 passed back of its fulcrum-point.

In addition to the aid rendered the weight 64 by the weight of the pump-rod and bucket

the lever also has the momentum of itself and weight, as when said lever reaches the end of its movement it is necessarily slightly sprung and reacts at the opposite side when regaining its normal position or form. When the pump-rod has descended and the lever 51 is elevated, it will be seen that the momentum of the lever suddenly overcome will cause the lever to bend or become sprung, and when suddenly sprung back the spring acts to throw the lever on its return movement. This throw of the lever, together with its weight, is added to the power of the weight 64 to elevate the pump-rod, its bucket, and the column of water supported by the bucket. By this construction—namely, by arranging the parts so that the pump-rod and bucket serve to aid in elevating the pendulous lever and its weight, and the latter in turn employs its momentum in aiding to elevate itself and its momentum and weight to aid the power employed to elevate the pump-rod and column of water—I have demonstrated by actual practice that I am enabled to decrease the power necessary to operate my motor at least one-third than were a stiff or rigid lever employed and one having movement at each side of its fulcrum. The parts are also arranged so as to reduce to a minimum friction, and by the employment of the escape-levers, as herein constructed, I materially aid the weight or other employed power, the pendulous lever, and the pump-rod.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a motor, the combination, with an escapement-shaft and escape-wheel mounted thereon and having its face provided with an annular series of pins, of an escape-lever shaft, a head thereon, opposite escape-levers depending from the head and having their lower inner faces oppositely inclined, a rock-shaft having a rock-arm, a rock-arm mounted on the head, a pitman connecting the two arms, and means for operating the escapement-wheel, substantially as specified.

2. In a motor, the combination, with the escape-shaft and its escape-wheel, of a head mounted thereon, opposite escapement-levers depending from the head and having opposite inclined faces, plates pivoted to the inner lower corners of the levers, one of said plates overlapping the end of one lever and the other of said plates overlapping the inclined face of the remaining lever, springs interposed between the plates and levers, a rock-shaft, a rock-arm extending from the head of the escapement-lever shaft, a pitman connecting the two rock-arms, and means for operating the escapement-wheel shaft, substantially as specified.

3. In a motor, the combination, with a rock-shaft and means for operating the same, of a resilient pendulous lever carrying a weight and yielding connections between the ends of the lever and adapted to bow the latter, substantially as specified.

4. In a motor, the combination, with a rock-shaft and means for operating the same, of a resilient lever fulcrumed on the shaft and having an adjustable weight, rods connected to the ends of the lever at each side of the shaft, and a spring-link connecting the adjacent ends of the rod, substantially as specified.

5. In a motor, the combination, with a rock-shaft and means for operating the same, of a rock-arm, a rod depending therefrom, a resilient lever secured to the shaft at a right angle to the rock-arm, a weight on the lever, and a yielding connection between the ends of the lever and serving to bow the lever, substantially as specified.

6. In a motor, the combination, with the rock-shaft 42, having the rock-arms 43 and 49 disposed at an angle to each other, of the rod connected to the rock-arm 49, the resilient lever fulcrumed on the shaft and disposed at a substantial right angle to the arm 49, a weight mounted on the lever, an escapement-lever shaft, a rock-arm extending therefrom, an escapement-wheel for operating said shaft and its levers, and a pitman connecting the rock-arm of the escapement-lever shaft with the rock-arm 43 of the shaft 42, substantially as specified.

7. In a motor, the combination, with the opposite side frames, the winding-shaft 11, the drum 12, the pinion 14, the large gear 15, and the rope 13, the shaft 16, the cable-drum 17, and the gear 18, operated by the pinion 14, the tower 5, the pulley 62, the cable 63, secured to the drum 17, and the weight 64, mounted in the tower and secured to the cable, of the shaft 20, the escapement-wheel 21, the pawl spring-pressed and mounted on the rear side of the wheel, the ratchet, the small pinion at one side of the ratchet and engaging the gear 15, the escapement-lever shaft 27, the head 28, mounted thereon and having the rock-arm 39, the escapement-levers 29 and 30, the rock-shaft 42, having the arms 43 and 49, the pitman 45, connecting the arms, the rod 47, and the resilient weighted pendulous lever 51, fulcrumed in the shaft 42 and disposed at a right angle to the arm 49, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

FRANKLIN C. MOORE.

Witnesses:
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