S. W. GILLILAND.

WEIGHT MOTOR.

APPLICATION FILED APR. 23, 1910.

1,021,749.

Patented Mar. 26, 1912.

6 SHEETS—SHEET 1.

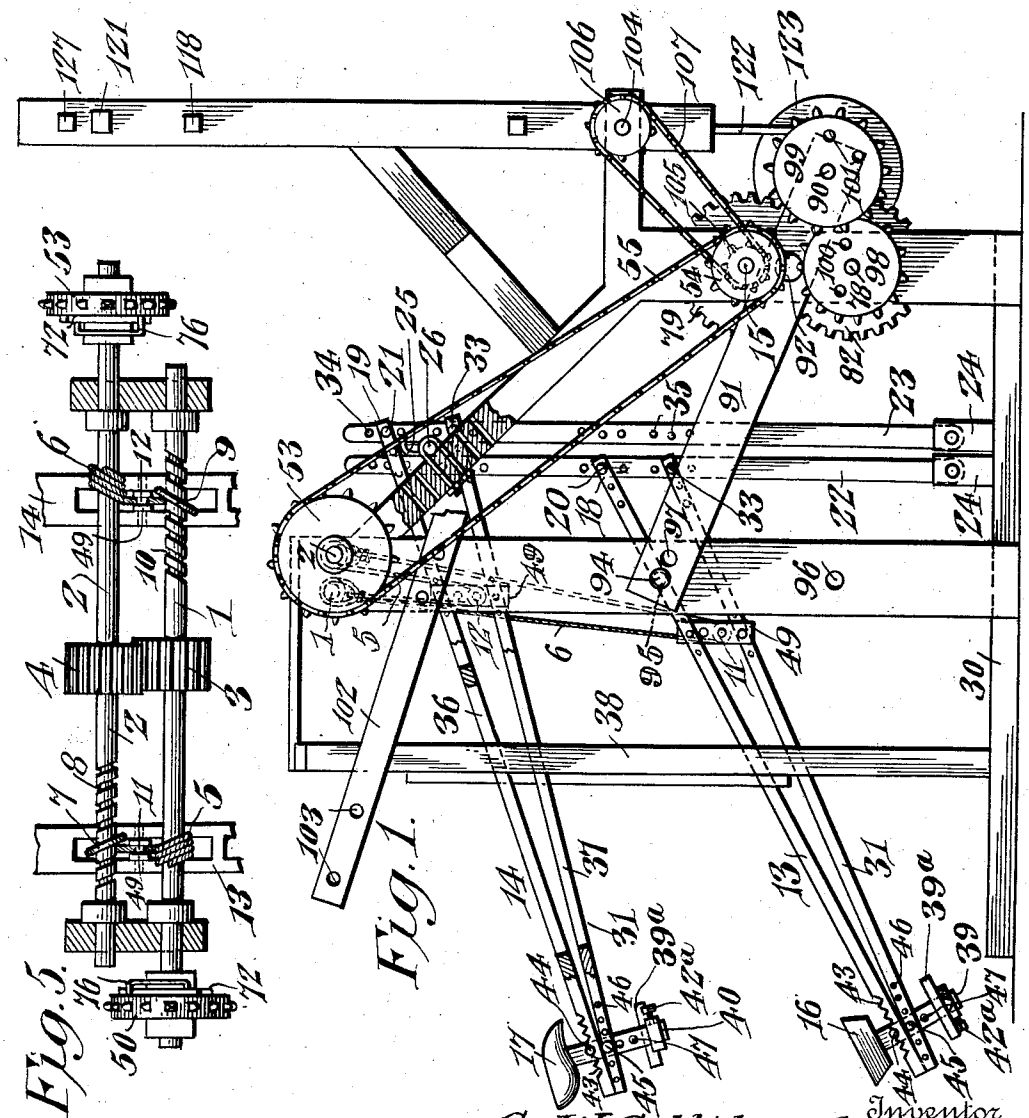

Fig. 1.

Fig. 5.

Witnesses

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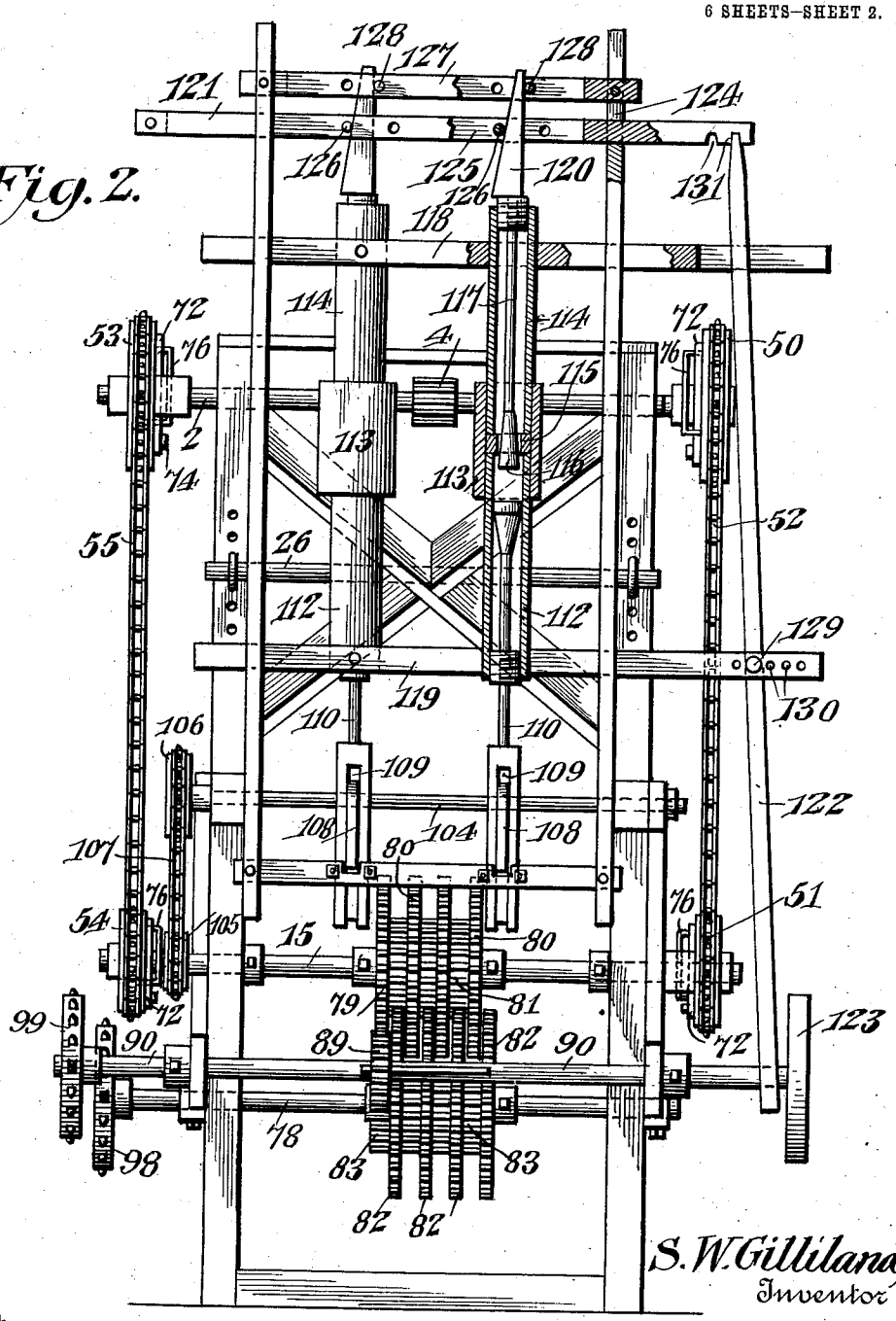
6 SHEETS—SHEET 2.

Fig. 2.



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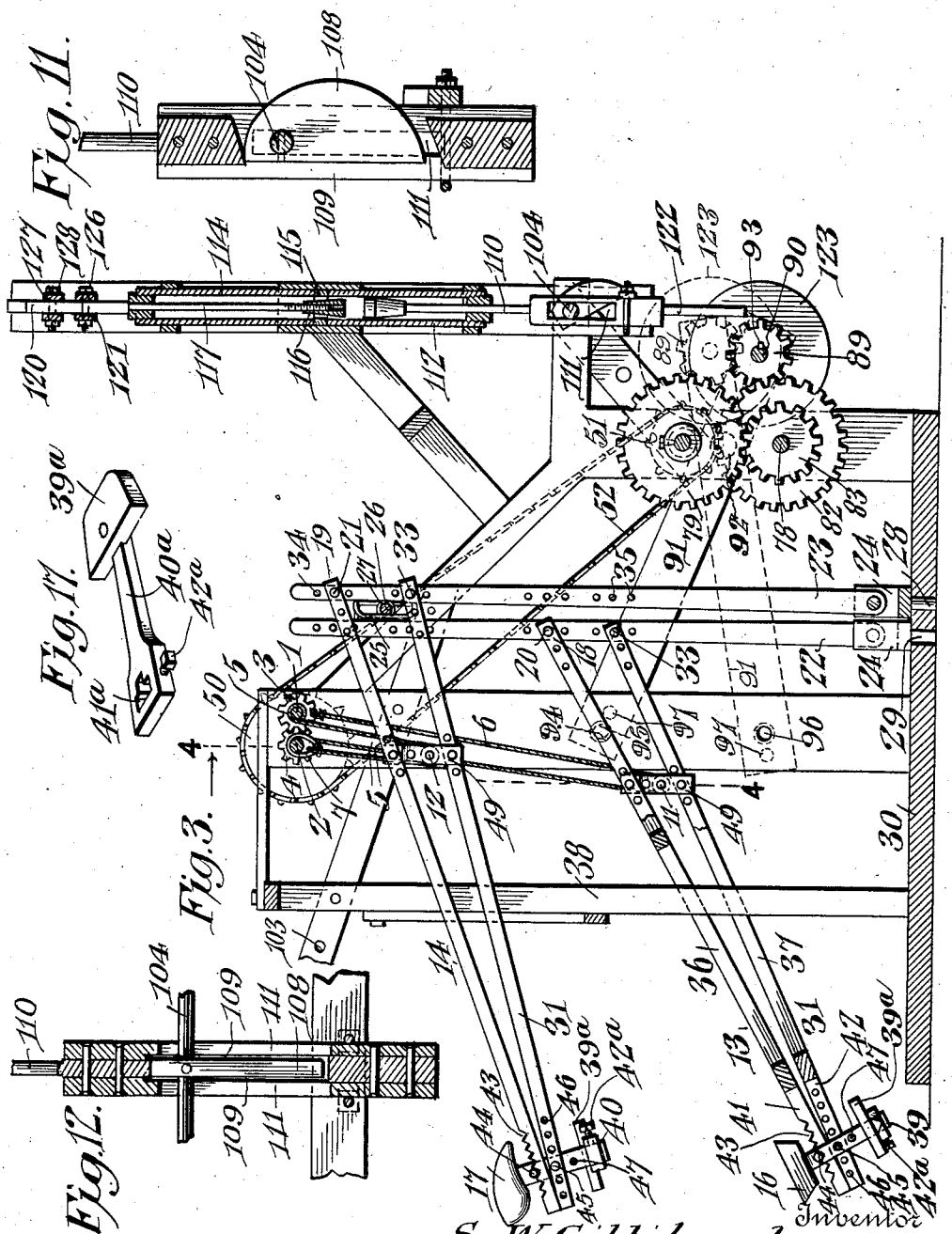

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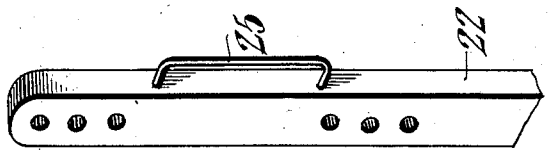

Fig. 9.

Fig. 10.

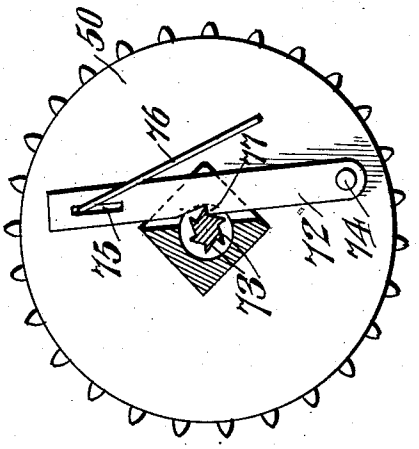

Fig. 8.

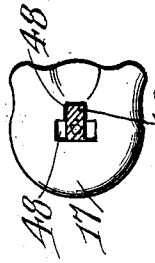

Fig. 16.

Fig. 7.

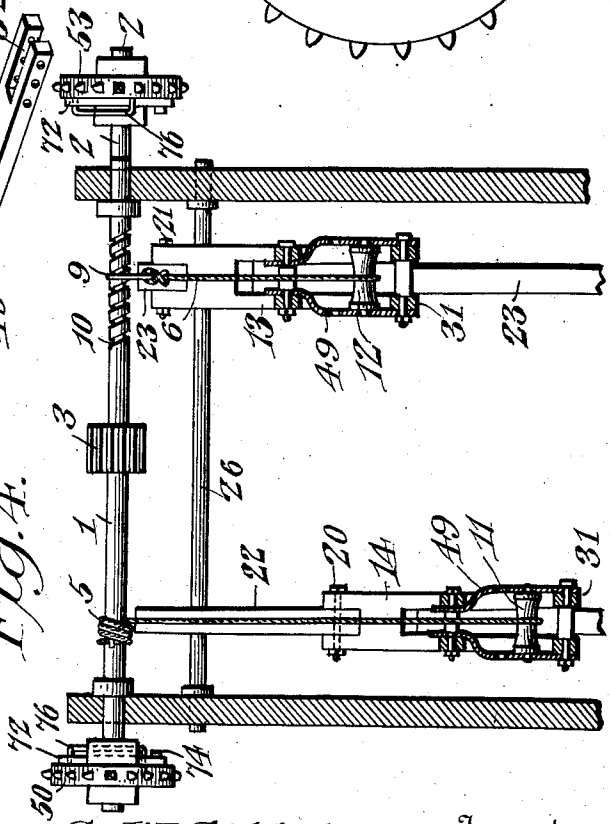

Fig. 4.

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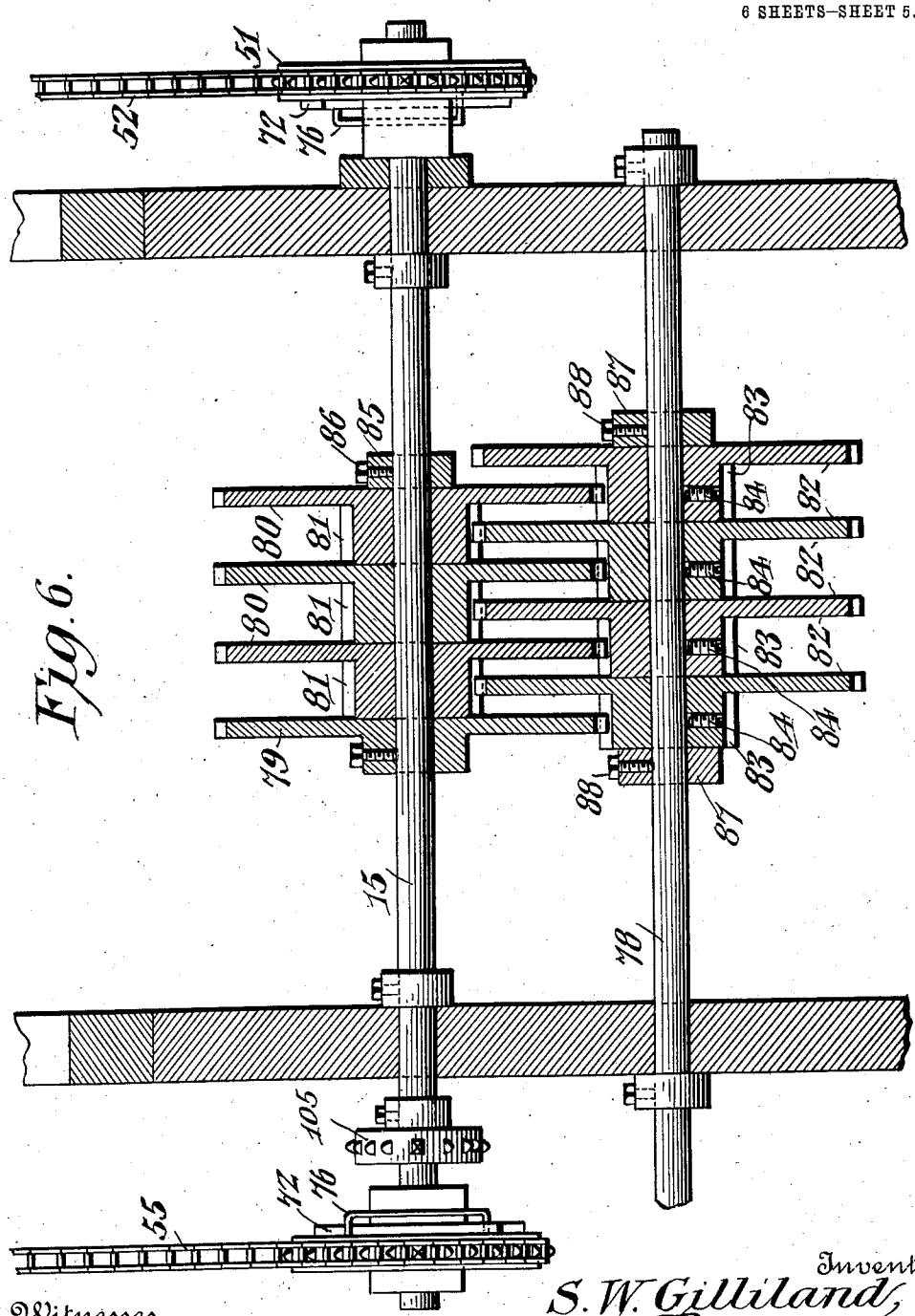
6 SHEETS—SHEET 5.

Fig. 6.



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6 SHEETS—SHEET 6.

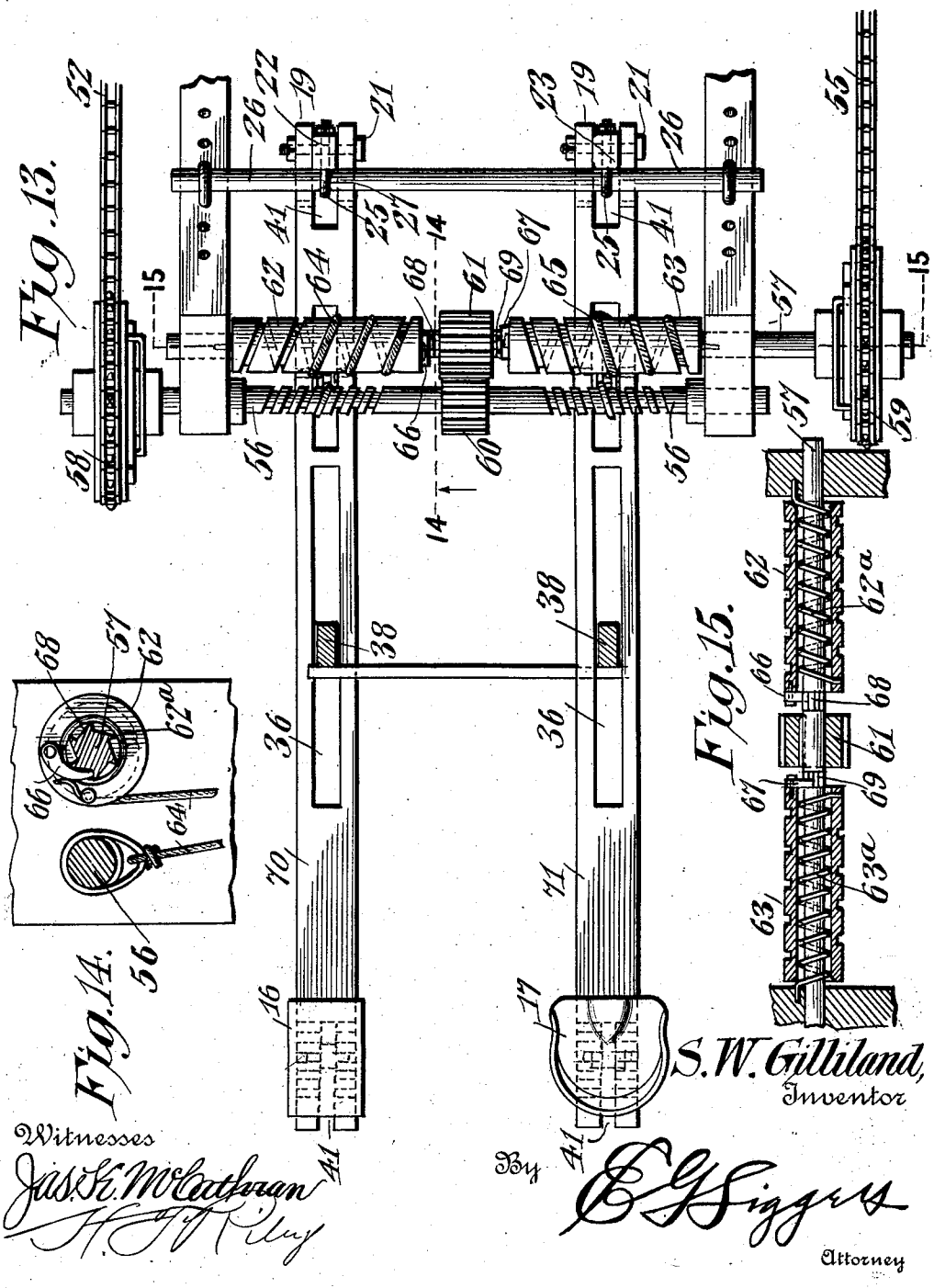

Fig. 13.

Fig. 14.

Fig. 15.

Witnesses

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UNITED STATES PATENT OFFICE.

SAMUEL WALTER GILLILAND, OF BATES COUNTY, MISSOURI.

WEIGHT-MOTOR.

1,021,749. Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed April 23, 1910. Serial No. 557,242.

To all whom it may concern:

Be it known that I, SAMUEL WALTER GILLILAND, a citizen of the United States, residing in the county of Bates and State of Missouri, have invented a new and useful Weight-Motor, of which the following is a specification.

The invention relates to a weight motor.

The principal object of the present invention is to provide an efficient and comparatively inexpensive weight motor, adapted to be operated by the weight of a person shifted from one actuating lever to another, and provided with means for converting the downward movement of a pair of oscillatory levers into a continuous forward rotary motion.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawings:—Figure 1 is a side elevation, partly in section, of a weight motor, constructed in accordance with this invention. Fig. 2 is a rear elevation of the same, partly in section. Fig. 3 is a longitudinal sectional view. Fig. 4 is a transverse sectional view, taken substantially on the line 4—4 of Fig. 3. Fig. 5 is a detail plan view, partly in section, illustrating the arrangement of the transverse cord actuated shafts. Fig. 6 is an enlarged transverse sectional view of the variable speed mechanism. Fig. 7 is a detail perspective view of one of the actuating levers. Fig. 8 is a detail view of one of the gear wheels, illustrating the construction of the clutch. Figs. 9 and 10 are detail views of the means for supporting the oscillatory operating or actuating levers. Figs. 11 and 12 are detail sectional views, illustrating the construction of the cams for actuating the lower plungers of the governor. Fig. 13 is a plan view, showing another form of the actuating mechanism. Fig. 14 is a detail sectional view on the line 14—14 of Fig. 13. Fig. 15 is a transverse sectional view on the line 15—15 of Fig. 13. Fig. 16 is a detail sectional view, illustrating the manner of adjustably mounting the seat on its standard. Fig. 17 is a detail perspective view of a foot rest.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

In the embodiment of the invention illustrated in Figs. 1 to 12 inclusive, the weight motor comprises in its construction a pair of transversely disposed cord actuated shafts 1 and 2, connected together by a pair of spur pinions 3 and 4 and rotated by cords 5 and 6, reversely wound around the shafts 1 and 2 at opposite sides of the center thereof, and adapted to alternately actuate the motor. When one of the cords is being unwound from its respective shaft, the other shaft is rewinding its cord on it, so that one of the cords and the operating means, hereinafter described, will always be in position for operating the motor. Although I have used the term "cord," it will be apparent that under the same is comprehended a rope, cable, band, or any other equivalent flexible connection. The transverse shafts 1 and 2 are journaled in suitable bearings of a supporting frame-work, which may be of any desired construction to suit the character of the motor and the work to be performed by the same.

The cords 5 and 6 are each secured at one end to the shaft around which it is wound and from which it is unwound, and the other end of the cord 5 is equipped with a hanger ring 7, arranged in a spiral groove 8 of the shaft 2, while the cord 6 is provided with a hanger ring 9, operating in a spiral groove 10 of the front transverse shaft 1, which is arranged in advance of the other transverse shaft 2. The hanger rings move along the spiral grooves through the rotation of the shafts and the cords are kept straight and free from twisting by this construction. As each cord unwinds from its respective shaft, its hanger ring is carried along the spirally grooved portion of the opposite shaft, so that the two flights or stretches of the cord are maintained opposite each other. The arrangement of the cords in this manner forms a pair of depending loops, which receive grooved pulleys 11 and 12 of a foot lever 13 and a seat lever 14. The pulleys are carried by the said levers in the oscillation thereof, and when weight is applied to either of the levers, its cord is unwound from one of the

transverse shafts 1 and 2 and the motor is thereby actuated. One or more loops may be formed in the cords to enable the operator to exert the desired power on the cords. By increasing the number of loops between the shafts and the levers, the number of revolutions of the power shaft 15 and the consequent time the motor will run with a given length of movement of the operating levers 13 and 14, will be correspondingly increased, which will be compensated for by a decrease in the power of the said shaft 15. By varying the number of loops, the speed and the power of the shaft 15 may be controlled to suit the required conditions. The foot and seat levers 13 and 14 are similarly constructed, but are fulcrumed at different elevations, and the lever 13 is equipped at its front end with a foot rest 16, and the seat lever is provided with a seat 17. The rear ends 18 and 19 of the levers 13 and 14 are bifurcated and are pivoted by pins 20 and 21 to vertical posts 22 and 23, pivotally mounted at their lower ends in brackets 24 and equipped at their upper portions with loops 25, through which a transverse rod 26 passes. The rod 26 extends across the frame and is suitably secured to the same and is provided with grooves 27, receiving the loops 25 of the posts or uprights 22 and 23. The loops 25 preferably consist of approximately U-shaped fastening means having shanks, piercing the posts and secured to the same by nuts, or other suitable fastening means. This provides a detachable connection as the fulcrum posts or uprights are reversible, and are adapted to be arranged at either side of the transverse rod, and the supporting brackets 24, which are bifurcated to receive the lower ends of the posts or uprights 22 and 23, are provided with depending shanks 28, adapted to be fitted in perforations 29 of the base 30 of the frame of the motor. The reversal of the posts or uprights is necessary when the form of cord-actuating mechanism is changed, as hereinafter more fully explained. The reversal of the posts 22 and 23 is for the purpose of arranging the same to suit the different forms of the mechanism for converting oscillatory movement of the levers 13 and 14 into a rotary movement, and the adjustment of the levers on the posts or uprights is for the purpose of arranging them at different heights to suit the operator. Each actuating or operating lever is equipped with a lower member 31, bifurcated at its rear end 32 and pivoted by a pin 33 to its respective fulcrum post or upright. The fulcrum posts or uprights are equipped with upper and lower perforations 34 and 35, arranged at intervals and adapted to permit an adjustment of the operating levers for arranging the same at the desired elevation to suit the size of the operator. The levers and their members are also provided at their rear ends with perforations to receive the fulcruming pins or pivots, and they have intermediate longitudinal slots 36 and 37 for the reception of vertical guide bars 38, arranged in spaced relation with the transverse shafts, and adapted to prevent lateral movement of the operating levers. The operating levers may be of any desired length, and the guiding means maintain the levers in a vertical position.

The foot rest and seat are provided with standards 39 and 40, arranged in outer slots 41 and 42 of the operating levers and their members. The operating levers are provided at opposite sides of their slots with grooves or notches 43, adapted to receive transverse pins 44 of the standards, which are also pivotally connected with the lower levers or members 31 by transverse pins 45. The outer portions of the lower members or levers are provided at intervals with perforations 46, and the standards are also provided at intervals with perforations 47, the pins being adapted to be arranged in any of the said perforations. The lower members or levers operate to maintain the standards of the foot rest and the seat in an upright position. The seat is provided in its lower face with an approximately T-shaped socket 48 to receive the upper rectangular end of the standard 40, and it is reversible to arrange it either longitudinally or transversely of the seat lever 14, so that the operator may sit facing the machine or sidewise. Any suitable fastening device may be employed for securing the seat in either position. The operating levers and their lower members are connected at their rear portions by metallic links or plates 49, between which the grooved pulleys 11 and 12 are mounted. Each of the standards 39 may be equipped with a foot rest 39^a, secured to the outer end of a stem or bar 40^a, which is provided at its inner end with an opening 41^a to receive the standard. The opening 41^a is approximately T-shaped, similar to the said socket 48 to permit an adjustment of the foot rest, which is secured in its adjustment by a screw 42^a, or other suitable fastening device. The standards 39 when equipped with the foot rests are designed to extend a considerable distance below the operating levers and their lower members, and the foot rests are adjustable on the standards 39 and are adapted to be raised or lowered to suit the operator. Instead of providing a T-shaped socket for the seat and T-shaped openings for the foot rests, the standards may be made round and the seats and foot rests provided with circular openings to conform to the round standards. This latter construction will permit the seat and the foot rests to be adjusted around the standards and arranged in any desired direction.

The foot rests 39ª are provided for the purpose of enabling both levers 13 and 14 to be actuated by the legs of the operator, and they are adjustable to suit the operator and to enable them to be turned out of the way when not needed.

The operating levers oscillate vertically and when one of the levers is moved to the limit of its downward movement under the weight of the operator, he transfers his weight to the other lever, which has been raised during the aforesaid downward movement. When the foot lever 13 is moved downward, the front transverse shaft 1 is rotated and motion is communicated to the power shaft 15 through sprocket gearing consisting of an upper sprocket wheel 50, a lower sprocket pinion 51 and a connecting sprocket chain 52. Simultaneously with this operation, motion is also communicated through the spur pinions or gears 3 and 4 to the transverse shaft 2, the motion being reversed by the direct connection of the spur gearing to wind up the cord 6. When the seat lever is moved downward under the weight of the operator, the rear transverse shaft 2 is rotated in the same direction as the transverse shaft 1, when the same was actuated by its foot lever 13, and this direct motion is communicated through sprocket gearing to the upper power shaft, which is continuously rotated in a forward direction by the cord actuated shafts 1 and 2. The sprocket gearing for connecting the rear transverse shaft 2 to the power shaft consists of an upper sprocket wheel 53, a lower sprocket pinion 54 and a connecting sprocket chain 55. The rear transverse shaft also rotates the front transverse shaft, which has its motion reversed through the connecting spur gearing, so that its actuating cord 5 is wound around it, while the other actuating cord 6 is unwinding from the rear shaft. The operator by simply shifting his weight from one actuating element or lever to the other is adapted to operate the motor and develop considerable power.

The cord-actuating mechanism may be arranged in a variety of ways, and in Figs. 13 to 16 of the drawings is illustrated another form of cord-actuating mechanism, in which a pair of transverse shafts 56 and 57 are employed, similar to the form of cord-actuating mechanism heretofore described and connected at opposite sides of the motor with the power shaft by sprocket gearing 58 and 59. Motion is communicated from one transverse shaft to the other by spur gears 60 and 61. The rear transverse shaft has mounted on it a pair of drums 62 and 63, and actuating cords 64 and 65 are reversely wound around the said drums. These drums, however, may be arranged on and fixed to the transverse shafts 1 and 2 to increase the power or leverage of the motor. The drums are equipped at their inner ends with spring actuated cords 66 and 67, which engage reversely arranged ratchet teeth 68 and 69. The cords are looped to receive the pulleys of a foot lever 70 and a seat lever 71, and when the foot lever is depressed to unwind its cord from the drum 62, the latter through its clutch, composed of the pawl 66 and the ratchet teeth 68, actuates the rear transverse shaft 57. Within the drum are arranged coiled springs 62ª and 63ª. These springs are connected with their respective drums and with the frame, and are placed under tension by the unwinding of its respective cord, so that when the weight is removed from its actuating lever, the spring will operate to rewind the cord and elevate the lever. When the rear transverse shaft is actuated by the drum 63, motion is communicated directly to the power shaft through the sprocket gearing, but when the rear transverse shaft 57 is reversely rotated by the other drum 62, the motion is reversed through the spur gears 60 and 61, and motion in the proper direction is transmitted to the power shaft by the sprocket gearing, which connects the front transverse shaft 56 with the said power shaft. In the form of invention illustrated in Fig. 13, the cords are reversely wound around the drums, and the two shafts 56 and 57 are thereby utilized, but it will be apparent that a single shaft may be used by employing the spring actuated drums and arranging the winding cords around the latter in the same direction, so that when one cord is operating to actuate the shaft, the spring will rewind the other cord and both parts will rotate the shaft in the proper direction. The single transverse shaft may be arranged for this operation by simply loosening one or both of the spur gears 60 and 61, so that they will not operate to communicate motion from one transverse shaft to the other.

The sprocket wheels of the sprocket gearing at opposite sides of the motor are each equipped with a clutch consisting of a spring actuated dog 72 and a series of ratchet teeth 73. The dog is pivotally mounted at one end on the sprocket wheel by a pin 74 and the teeth, which are cut in the shaft, may be provided in any other desired manner. The other end of the dog is provided with a slot 75 for the reception of a spring 76, secured to the sprocket wheel and arranged to maintain the dog in engagement with the teeth. The dog is provided at an intermediate point with a shoulder or tooth 77 for engaging with the ratchet teeth. Any other form of clutch, however, may be employed, and by providing a clutch for each of the sprocket gears, the sprocket gearing at one side of the motor will remain stationary while that at the opposite side is operating to rotate the power shaft.

The motor is equipped with variable speed mechanism comprising an upper set of gear wheels, mounted on the power shaft 15 and a lower set of gear wheels mounted on a lower transverse shaft 78. The upper set of gear wheels consists of a fixed end gear 79 and a plurality of loose gears 80, equipped with a pinion 81, preferably formed integral with the gear wheel 80, but it may be rigidly connected therewith in any other desired manner. The lower gears 82 are equipped with similar pinions 83, and are provided with means for fixing any one of them to the lower transverse shaft 78, so that a train of gears of any length within the capacity of the variable speed mechanism may be provided for transmitting motion from the power shaft 18 to the lower transverse shaft 78. The gears of the upper set mesh with the pinions of the lower set, and the gears of the lower set mesh with the pinions of the upper set, so that the speed is increased by increasing the number of wheels in the train employed for transmitting motion from one shaft to the other.

The gears and the pinions may be of any desired diameter and their number may be varied as readily understood. In the form of invention shown in Fig. 6, the pinions of the lower set of gears are provided with set screws 84, adapted to engage the shaft 78 for securing any one of the gears to the same. The upper gears are held in place by a collar 85, having a set screw 86 and cooperating with the end gear 79, and the lower set of gears is maintained in its proper position by adjustable collars 87, having set screws 88 and located at the ends of the set of gears, as clearly shown in Fig. 6. The upper and lower gears are also adapted to mesh with a shiftable gear 89, mounted on a transverse shaft 90, which is carried by opposite levers 91, fulcrumed at an intermediate point by pins 92 and adapted to be oscillated on the pins for swinging the shiftable gear from one set of gear wheels to the other. The shiftable gear 89 is also slidably interlocked with the shaft 90 by means of a feather or spline 93, and it is adapted to be arranged in mesh with any of the said gear wheels, thereby affording eight different speeds. The levers 91 incline downwardly and rearwardly, when the shiftable gear is in mesh with one of the gears of the lower set, and they are secured in such position by removable pins 94, adapted to fit in upper and lower perforations 95 and 96 of the frame of the motor and to engage perforations 97 of the front ends of the levers. By this means the levers 91 may be shifted from the position shown in full lines in Fig. 3 to the dotted line position illustrated in the said figure.

The lower transverse shaft 78 and the shiftable counter shaft 90 are equipped with sprocket gears 98 and 99, adapted to be connected by sprocket chains with any suitable device or mechanism designed to be operated by the motor. Also other forms of gearing may be employed for this purpose, and the sprocket wheels 98 and 99 are equipped with eccentrically arranged perforations 100 and 101, located at different distances from the center and adapted to receive wrist pins for converting the sprocket gears into crank elements for transmitting reciprocatory motion to the mechanism to be operated. Changes of speed may also be obtained by changing the positions of the sprocket wheels and the sprocket pinions of the sprocket gearing for transmitting motion from the upper transverse shafts to the power shaft. The frame of the machine is also equipped with arms 102, extending upwardly and forwardly at the front of the machine and provided with bearings 103, adapted to receive a transverse shaft for enabling a grinding wheel, saw, fan, or other rotary device to be operated at the front of the machine. Such shaft may be connected by sprocket or other gearing with the motor.

In order to render the speed of the motor uniform, it is equipped with a governor provided with a transverse shaft 104, journaled in suitable bearings with the frame and connected with the power shaft by sprocket gearing consisting of a sprocket pinion 105, a sprocket wheel 106 and a sprocket chain 107. The sprocket pinion 105 is mounted on the power shaft, and the sprocket gear 106 is carried by the governor shaft 104, but they may be interchanged if desired. The governor shaft is equipped with oppositely disposed cams 108, operating in openings 109 of lower vertically movable plungers 110. The slots 109 are formed in bars or enlargements carried by the plungers 110, and also provided with slots 111 through which the governor shaft passes, whereby the plungers are guided in their vertical reciprocation. The lower plunger extends through stuffing boxes of the lower ends of lower cylinders 112, connected by suitable couplings 113 with upper cylinders 114. The upper cylinders 114 are equipped at their lower ends with valve seats 115, preferably consisting of rings interposed between the adjacent ends of the cylinders, and are adapted to receive valves 116 formed by tapered heads or plugs, located at the lower ends of the upper plungers or stems 117. The lower ends of the upper plungers or stems 117 are threaded, and the tapered heads or plugs are interiorly threaded, and are adapted to be screwed upward or downward on the said stems or plungers 117, whereby the valves 116 are positioned properly with relation to the valve seats. This construction will also enable the size of the opening leading into the upper cylinder to

be made larger or smaller, as the valve 116 may in its normal or lowermost position constrict the opening at the valve seat to a greater or less extent. The same result may be accomplished by shortening the stems or plungers 117, as hereinafter more fully explained. The size of the opening at the valve seats may also be varied by changing the rings or valve seats 115 and substituting others having openings of different sizes. The effect of the governor may in this manner be controlled and varied to obtain the proper action of the same on the motor.

The upper and lower cylinders are supported in openings of upper and lower transverse bars or braces 118 and 119, and the upper cylinders are provided at their upper ends with stuffing boxes through which the upper plungers or valve stems pass. The cylinders are provided with a quantity of oil, or other suitable liquid, which, when the valves are open, passes downward into the lower cylinder. The liquid is forced upward by the lower plungers and caused to pass through the openings of the valve seats, and when the machine is running at a normal speed, there is no resistance to the passage of liquid and the governor exerts no influence on the motor, but when the speed of the motor increases beyond a predetermined point, the pressure on the liquid increases and causes a closing or partial closing of the valves, and an upward movement of the valve stems or upper plungers, which carry wedge-shaped members 120, is adapted to actuate a slidable bar 121 and thereby operate a crank lever 122 to cause the same to engage a combined balance and brake wheel 123, mounted on the shiftable counter shaft, but it may be arranged on either the power shaft or the lower transverse shaft 78 and at either side of the machine, a corresponding change in the arrangement of the other parts being of course necessary. The slidable bar 121, which is disposed horizontally, operates in guide openings 124 at opposite sides of the frame, and it is provided with a longitudinal slot 125 and is equipped with pins 126, or other suitable means arranged in the path of the wedge-shaped members 120, whereby the slidable bar is positively moved in one direction by the upward movement of the said wedge-shaped members. The upper ends of the wedge-shaped members are steadied and guided by a transverse top bar 127, provided with slots to receive the wedge-shaped members and having pins 128, arranged contiguous to the vertical edges of the wedge-shaped members. The wedge-shaped members are provided at one side with the said vertical edges to coöperate with guide pins 128, and they have inclined edges at the opposite sides for actuating the slidable bar. The pins, which are engaged by the wedge-shaped members, may, if desired, be equipped with suitable anti-friction devices, such as rollers or wheels. The upper ends of the stems or plungers 117 may screw into the wedge-shaped members to enable them to be varied in length to adjust the valves 116 with relation to the valve seats.

The brake lever 122, which is arranged in an upright position, is fulcrumed at an intermediate point on the lower transverse bar or brace 119 by means of a pin 129, adapted to be placed in any one of a series of perforations 130, arranged at intervals at the adjacent end of the bar or brace 119. The upper end of the brake lever is tapered, and the longitudinally slidable bar 121 is provided with a plurality of notches 131 to receive the brake lever and to permit an adjustment thereof. The lower end of the brake lever, which engages the inner face of the combined brake and balance wheel, may be equipped with a suitable brake shoe if desired. When the speed of the motor is sufficient to produce an operation of the motor, the rotation of the reversely arranged cams produces an intermittent pressure on the brake wheel, and thereby effectively retards the operation of the motor.

In the operation of the motor the operator sits on the seat 17 with his feet on the foot rest 16, and the levers 13 and 14 are alternately actuated by the operator transferring his weight from one lever to the other. Also the machine may be operated by the operator standing on the foot rests 39ª and alternately transferring his weight from one lever to the other. By this means the motor may be conveniently operated simply by the weight of the person using it.

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

1. A motor of the class described including upper and lower independent levers fulcrumed at their inner portions and movable vertically in opposite directions and located sufficiently close to permit a person to transfer his weight from one lever to the other, pivoted members extending longitudinally of the upper and lower levers adjacent to each of the same, mechanism connected with the inner portions of the levers and the members for transmitting motion from the same, standards connected with the outer portions of the levers and the pivoted members, a seat connected with the standard of the upper lever, and a foot rest mounted on the standard of the lower lever.

2. A motor of the class described including a vertically movable lever fulcrumed at its rear end, a lower member arranged beneath and extending longitudinally of the lever, an upright standard adjustable along

the lever and the said member and pivotally connected to one of the parts and detachably engaged with the other part, means carried by the standard for supporting a person, and mechanism for transmitting motion from the lever.

3. A motor of the class described including a vertically movable lever fulcrumed at its rear end, a lower member arranged beneath and extending longitudinally of the lever, an upright standard adjustably pivoted to the said member and detachably engaged with and adjustable along the lever, means carried by the standard for supporting a person, and mechanism for transmitting motion from the lever.

4. A motor of the class described including vertically movable levers pivoted at their rear portions and provided at their front portions with notches, lower members located beneath the levers and pivoted at their rear ends, upright standards adjustably pivoted to the said lower members and provided with means for detachably engaging the notches of the levers, means carried by the standards for supporting a person, and mechanism for transmitting motion from the levers.

5. A motor of the class described including a pivoted operating lever provided with a longitudinal slot, a pivoted member located below the lever and having a corresponding slot, a standard extending through and operating in the slots and adjustably and pivotally connected with the lever and the member, means carried by the standard for supporting a person, and mechanism for transmitting motion from the lever.

6. A motor of the class described including a pivoted lever provided with a slot, and notches arranged at opposite sides of the slot, a pivoted member arranged beneath the lever and also provided with a slot, a standard operating in the slots and provided with means for engaging the notches of the lever, means for adjustably pivoting the standard to the lower member, means carried by the standard for supporting a person, and mechanism for transmitting motion from the lever.

7. A motor of the class described including foot and seat levers pivoted at different elevations, pivoted members located beneath the levers, standards pivotally and adjustably connected to the levers and to said members, a foot rest carried by one of the standards, a seat detachably interlocked with the other standard and adjustable to arrange it longitudinally or transversely of the motor, and mechanism for transmitting motion from the levers.

8. A motor of the class described including a pair of adjustable brackets, posts or uprights pivotally mounted in the brackets, means for bracing the posts or uprights, operating levers fulcrumed at their rear ends on the posts or uprights and provided at their front portions with means for supporting a person, and mechanism for transmitting motion from the operating levers.

9. A motor of the class described including a pair of adjustable brackets, posts or uprights mounted in the brackets and provided with vertical loops, a transverse bracing rod extending through the loops and having means for engaging the same, operating levers fulcrumed on the posts or uprights and provided with means for supporting a person, and mechanism for transmitting motion from the operating levers.

10. A motor of the class described including a pair of pivoted posts or uprights provided with loops, a transverse bracing rod extending through the loops and provided with grooves to receive the same, operating levers fulcrumed on the uprights and provided with means for supporting a person, and mechanism for transmitting motion from the operating levers.

11. A motor of the class described including a base provided with sockets, adjustable brackets having shanks fitted in the sockets, posts or uprights pivotally mounted in the brackets and provided with loops, a transverse bracing member extending through the loops and provided with means for engaging the same, a pair of operating levers fulcrumed on the posts or uprights and arranged at different elevations and provided with means for supporting a person and arranged to permit the weight of a person to be transferred from one lever to another, and mechanism for transmitting motion from the levers.

12. A motor of the class described comprising vertically movable operating levers, pivoted members located below the levers, spaced connecting means pivoted to the levers and to the said members, pulleys mounted between the spaced connecting means, and mechanism for transmitting motion from the operating levers, said mechanism including looped cords receiving the said pulleys and actuated by the levers.

13. A motor of the class described including a pair of operating levers movable upwardly and downwardly and pivoted at their rear ends and provided at their front ends with means for supporting a person, said levers being also provided between their ends with slots, said levers being arranged to permit the weight of a person to be shifted from one to the other, guides passing through the slots and holding the levers against lateral movement, and mechanism for transmitting motion from the levers.

14. A motor of the class described including posts or uprights, a pair of levers movable upwardly and downwardly and fulcrumed at their rear ends on the said posts or uprights, means located beneath

and extending longitudinally of the levers and pivoted at their rear ends to the said posts or uprights, said levers and means being also provided between their ends with registering slots, guides passing through the slots of the levers and the members for holding the same against lateral movement, means connected with the levers and the members and located at the front ends of the same for supporting a person and arranged to permit the weight of a person to be transferred from one lever to the other, and mechanism for transmitting motion from the levers.

15. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft.

16. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of separate flexible connections having loops connected with the levers, and rotary means on which the flexible connections are reversely wound, whereby when one lever is depressed to unwind its flexible connection the other member will be elevated by the rewinding of its flexible connection.

17. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of flexible connections having loops connected with the levers, a pair of transverse shafts geared together and receiving the flexible connections, said flexible connections having reversely wound portions adapted to be unwound by the levers and arranged to elevate one lever when the other is depressed.

18. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of flexible connections having loops connected with the levers, a pair of transverse shafts receiving the flexible connections, said flexible connections having reversely wound portions adapted to be unwound by the levers and arranged to elevate one lever when the other is depressed, sprocket gearing connecting the transverse shafts with the power shaft, and spur gearing connecting the shafts with each other.

19. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of flexible connections having loops connected with the levers, a pair of transverse shafts receiving the flexible connections, said flexible connections having reversely wound portions adapted to be unwound by the levers and arranged to elevate one lever when the other is depressed, sprocket gearing connecting the transverse shafts with the power shaft, spur gearing connecting the shafts with each other, and clutches for connecting the sprocket gearing with the power and transverse shafts and adapted to permit the gearing of one transverse shaft to remain stationary when the other transverse shaft is actuating the power shaft.

20. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of transverse shafts, gearing for connecting the same with the power shaft, other gears for connecting the transverse shafts with each other, and a pair of flexible connections having loops connected with the levers, said flexible connections being also connected with the transverse shafts and having portions reversely wound around the same.

21. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of transverse

shafts, flexible connections provided with loops connected with the levers, each of the flexible connections having one end connected with one of the transverse shafts and having its other end portion wound around the other transverse shaft, the winding of the flexible connections around their respective shafts being in reverse directions, gears connecting the transverse shafts with each other, and gearing for connecting the shafts with the power shaft.

22. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of transverse shafts having reversely arranged spiral grooves, flexible connections having loops connected with the levers, each of the flexible connections being wound around one of the shafts and having means for engaging the spiral groove of the other shaft, gears connecting the shafts, and gearing for transmitting motion from the transverse shafts to the power shaft.

23. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including a pair of transverse shafts provided with reversely arranged spiral grooves, flexible connections having loops connected with the levers, each of the flexible connections being provided at one end with a ring arranged on one of the transverse shafts and engaged by the groove thereof, the other end of such flexible connection being wound around the other transverse shaft, and gearing connecting the transverse shafts with each other and with the power shaft.

24. A motor of the class described comprising a pair of operating levers movable upwardly and downwardly and arranged to permit a person to transfer his weight from one to the other, a power shaft, and mechanism connected with the levers and with the power shaft for converting the oscillatory movements of the levers into a continuous rotary motion of the power shaft, said mechanism including transverse shafts, gears connecting the shafts, flexible connections connected with the transverse shafts and with the levers and having reversely wound portions adapted to be unwound by the levers for actuating the shafts, gearing for transmitting motion from the transverse shafts to the power shaft, and clutches for connecting the gearing with the said shafts, each clutch being composed of a ratchet wheel, a dog pivotally mounted at one end and provided at the other end with a slot, and a spring secured at one end and having its other end free and engaging with the slot of the dog.

25. In a motor of the class described, the combination of a pair of seat and foot levers arranged at different elevations and in different vertical planes movable upwardly and downwardly and adapted to permit a person to transfer his weight from one lever to the other, a power shaft, mechanism connected with the levers and with the power shaft for converting the oscillatory movement of the levers into a rotary motion of the shaft, and a variable speed mechanism connected with the power shaft and including a pair of shafts, separate sets of gears mounted on the said pair of shafts, the set of each of such shafts having pinions meshing with the gears of the other sets, and a gear shiftable from one set of gears to the other and adjustable to mesh with any one of the gears.

26. In a motor of the class described, the combination of a pair of seat and foot levers arranged at different elevations and in different planes movable upwardly and downwardly and adapted to permit a person to transfer his weight from one lever to the other, a power shaft, mechanism connected with the levers and with the power shaft for converting the oscillatory movement of the levers into a rotary motion of the shaft, and a variable speed mechanism connected with the power shaft and including a pair of shafts, separate sets of gears mounted on the said pair of shafts, each set of gears being provided with pinions meshing with the gears of the other set, and the end gear of one of the sets being fast to its shaft and the gears of the other set being provided with means for rigidly connecting them with their shaft.

27. In a motor of the class described, the combination of a pair of seat and foot levers arranged at different elevations and in different vertical planes movable upwardly and downwardly and adapted to permit a person to transfer his weight from one lever to the other, a power shaft, mechanism connected with the levers and with the power shaft for converting the oscillatory movement of the levers into a rotary motion of the shaft, and a variable speed mechanism connected with the power shaft and including a pair of shafts, separate sets of gears mounted on the said pair of shafts, each set of gears being provided with pinions meshing with the gears of the other set, and the end gears of one set being fast to its shaft and the gears of the other set being provided with means for rigidly connecting

them with their shaft, and a shiftable gear arranged to be moved into mesh with any one of the gears of either of the said sets.

28. In a motor of the class described, the combination of a pair of seat and foot levers arranged at different elevations and in different vertical planes movable upwardly and downwardly and adapted to permit a person to transfer his weight from one lever to the other, a power shaft, mechanism connected with the levers and with the power shaft for converting the oscillatory movement of the levers into a rotary motion of the shaft, and a variable speed mechanism connected with the power shaft and including a pair of shafts, separate sets of gears mounted on the said pair of shafts, each shaft being provided with pinions meshing with the gears of the other set, an oscillatory lever having a bearing, a shaft mounted in the bearing, and a gear arranged on the last-mentioned shaft and adapted to be shifted by the movement of the lever into and out of mesh with either set of gears and movable along its shaft to mesh with any one of the gears of either set.

29. In a motor of the class described, the combination of a pair of seat and foot levers arranged at different elevations and in different vertical planes movable upwardly and downwardly and adapted to permit a person to transfer his weight from one lever to the other, a power shaft, mechanism connected with the levers and with the power shaft for converting the oscillatory movement of the levers into a rotary motion of the shaft, and a variable speed mechanism connected with the power shaft and including a pair of shafts, separate sets of gears mounted on the said pair of shafts, each set being provided with pinions meshing with the other set, opposite levers provided with bearings, a shaft mounted in the bearings, a shiftable gear carried by the latter shaft, and means for adjusting the levers to swing the shiftable gear into mesh with either of the said sets of gears.

30. A motor of the class described including a pair of operating levers movable upwardly and downwardly, a pair of transverse shafts geared together and having reversely arranged spiral grooves, separate flexible connections having loops connected with the levers, the sides of the loops being connected with the said transverse shafts and one side of each loop operating in one of the spiral grooves, and means for transmitting motion from the said shafts.

31. A motor of the class described including a pair of operating levers movable upwardly and downwardly, a pair of transverse shafts geared together and having reversely arranged spiral grooves, separate flexible connections having loops connected with the levers, the sides of the loops being connected with the said transverse shafts and one side of each loop operating in one of the spiral grooves, a power shaft, and sprocket gearing located at opposite sides of the motor and connecting the said transverse shafts with the power shaft.

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

SAMUEL WALTER GILLILAND.

Witnesses:
CHAS. F. GARDNER,
H. H. LISLE.