

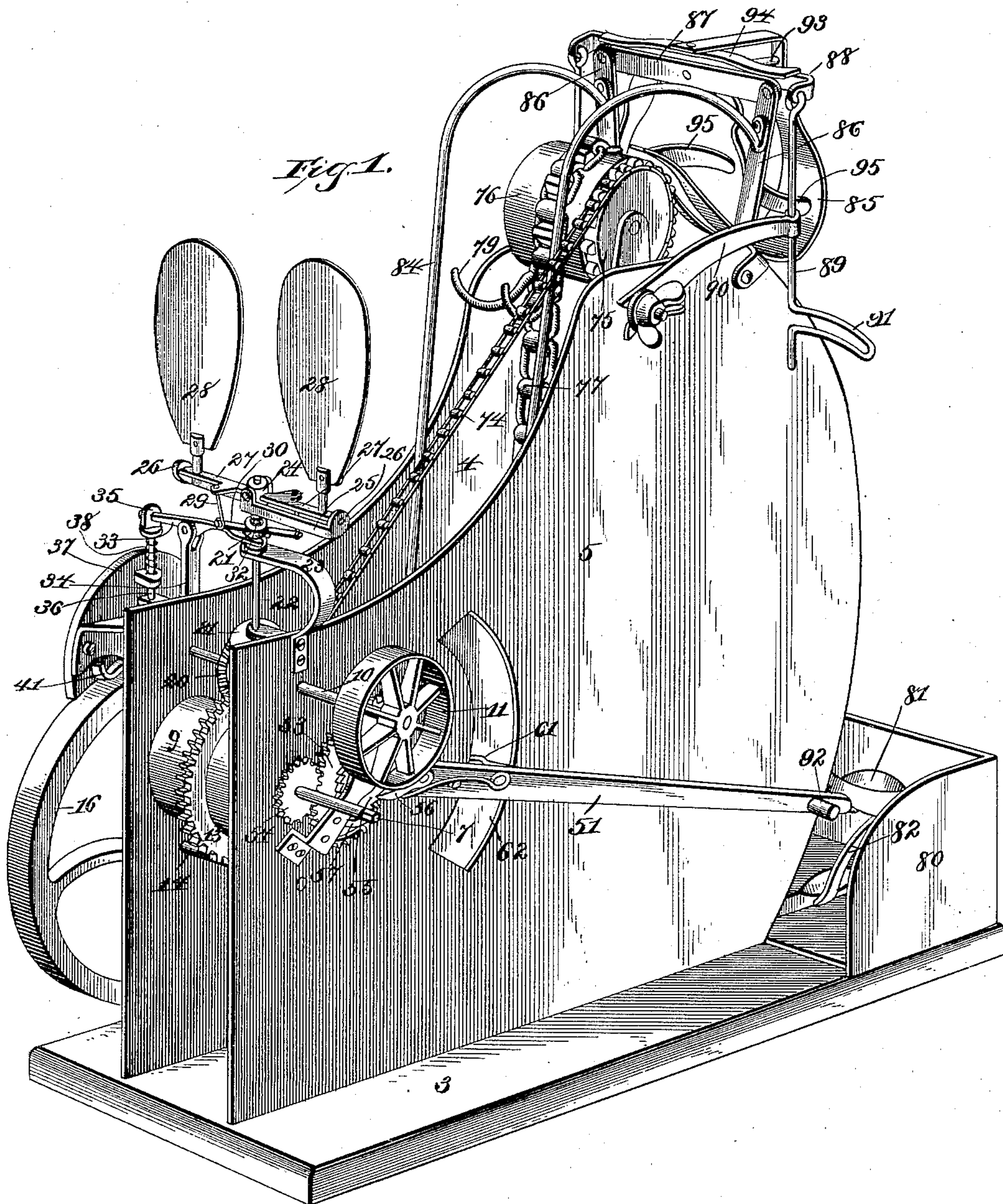
(No Model.)

5 Sheets—Sheet 1.

J. C. REUTER.
MOTOR.

No. 475,799.

Patented May 31, 1892.



Witnesses

E. H. Mordeman

N. J. Collamer

Inventor

By *his* Attorneys, *John C. Reuter*

C. A. Snow & Co.

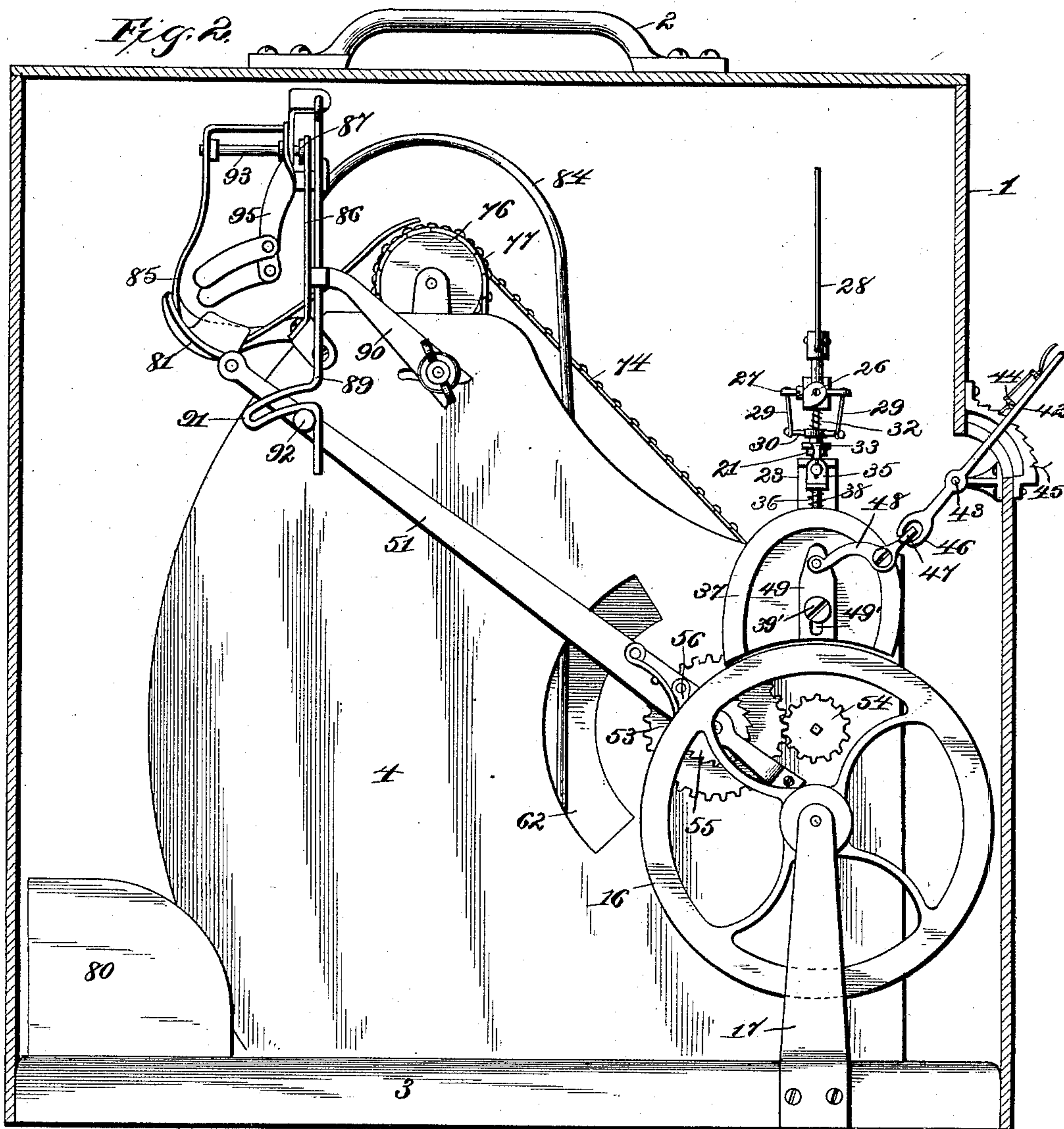
(No Model.)

5 Sheets—Sheet 2.

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Inventor

E. C. Mordeman

John C. Reuter,

By *his* Attorneys,

W. Hollamer,

C. A. Snow & Co.

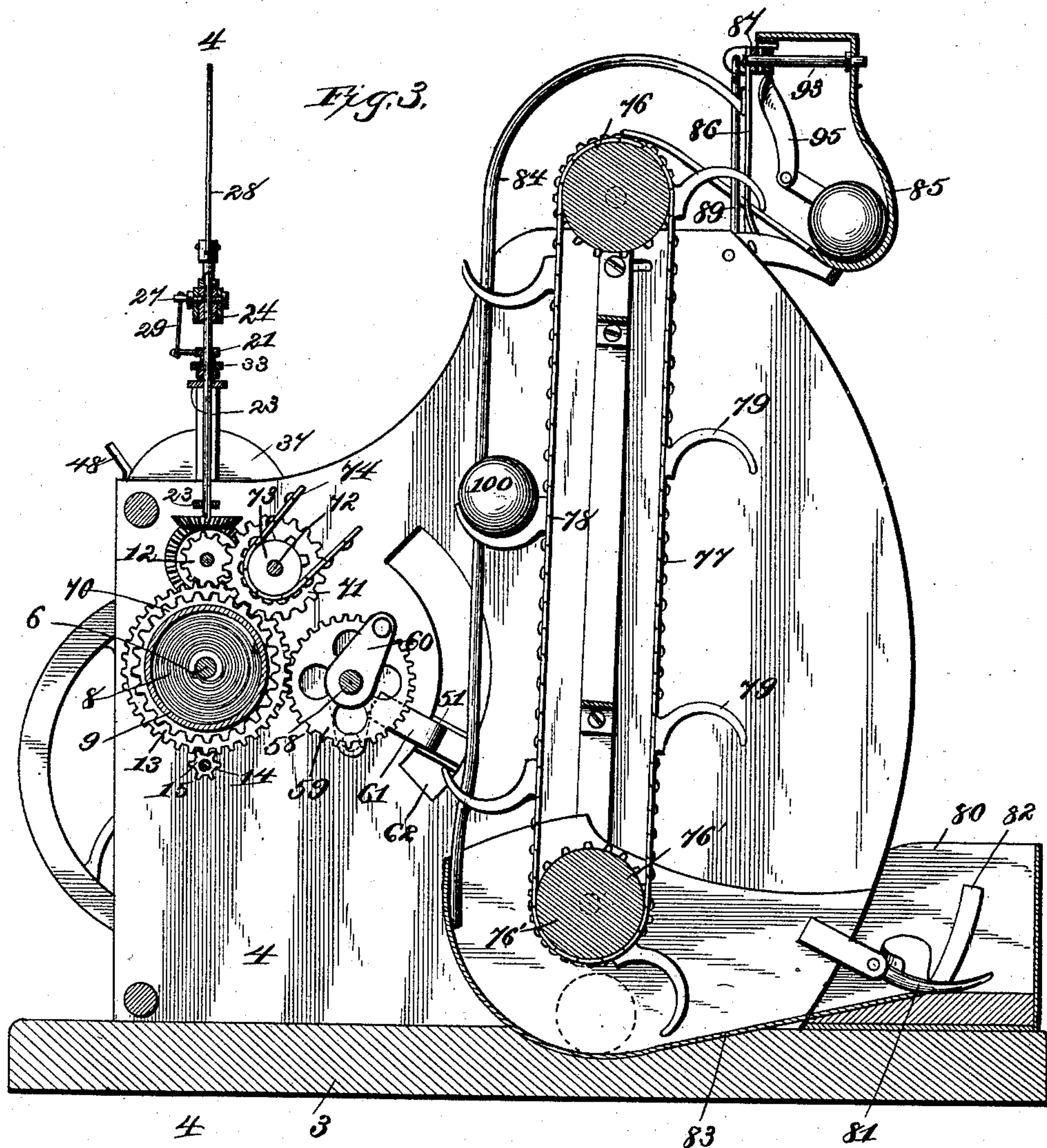
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Witnesses

E. C. Wurdeman,

A. J. Collamer,

Inventor

John C. Reuter.

By *his* Attorneys,

C. A. Snow & Co.

(No Model.)

5 Sheets—Sheet 4.

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Fig. 4.

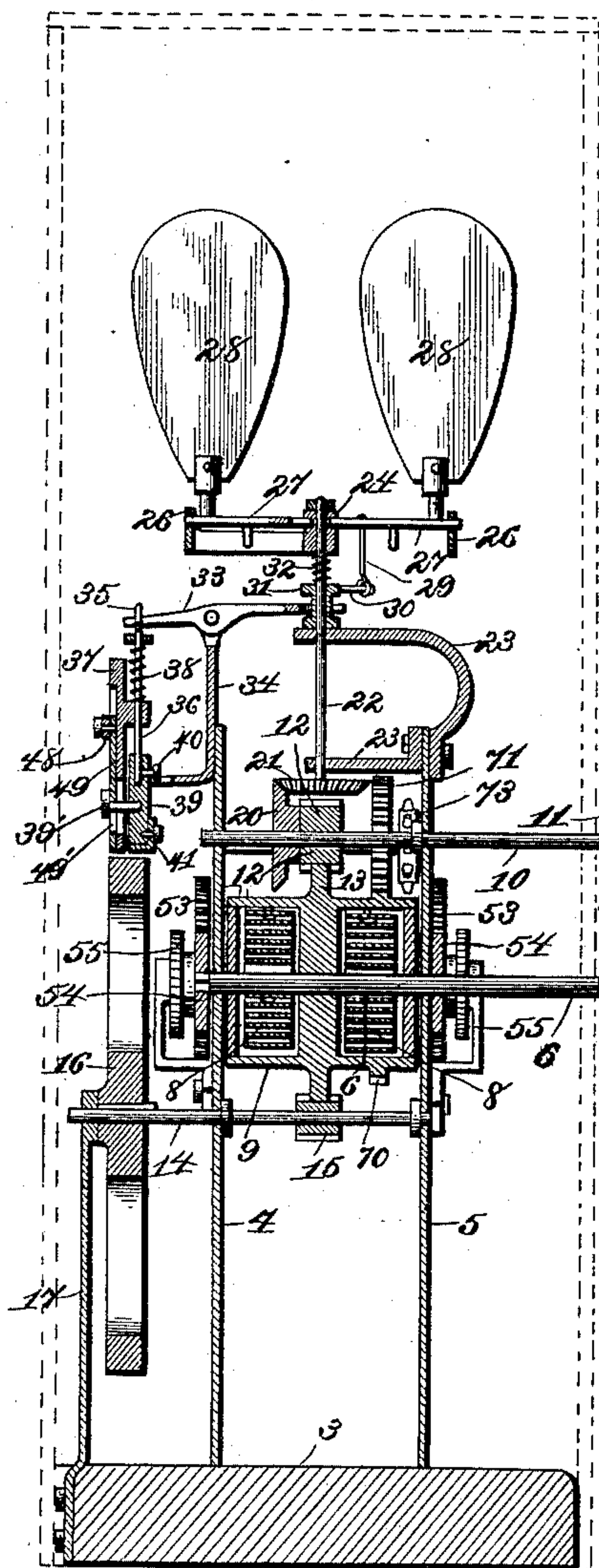
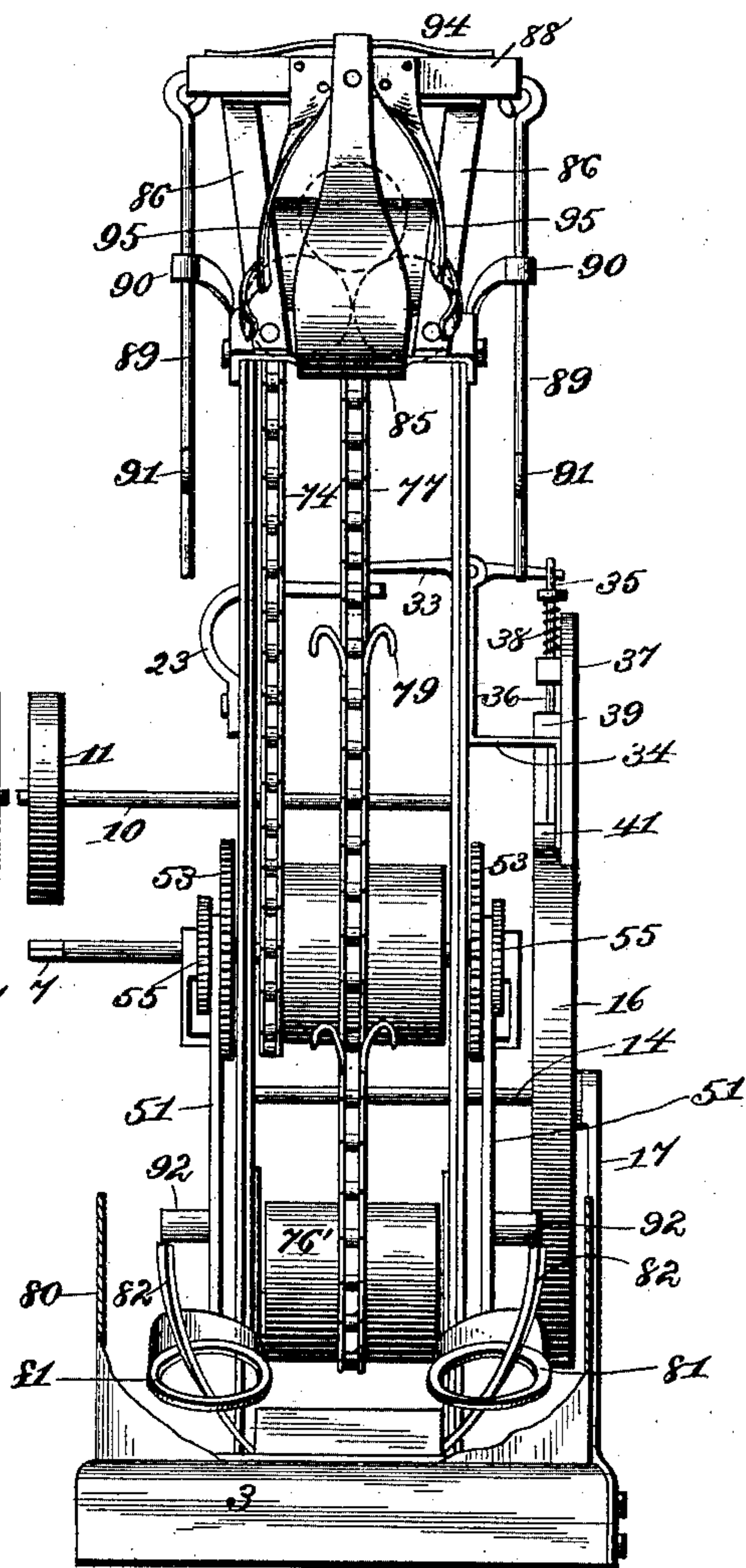


Fig. 5.



Witnesses

E. C. Mordeman,

A. J. Collamer,

Inventor

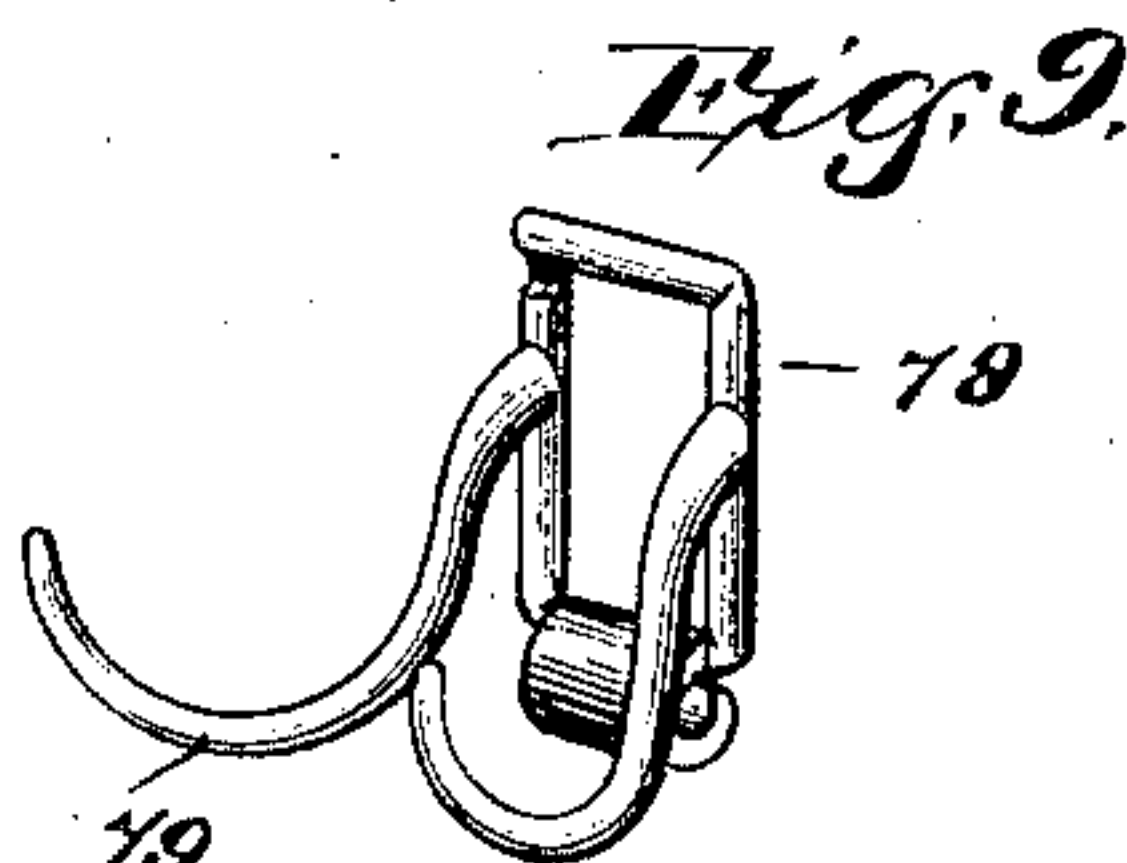
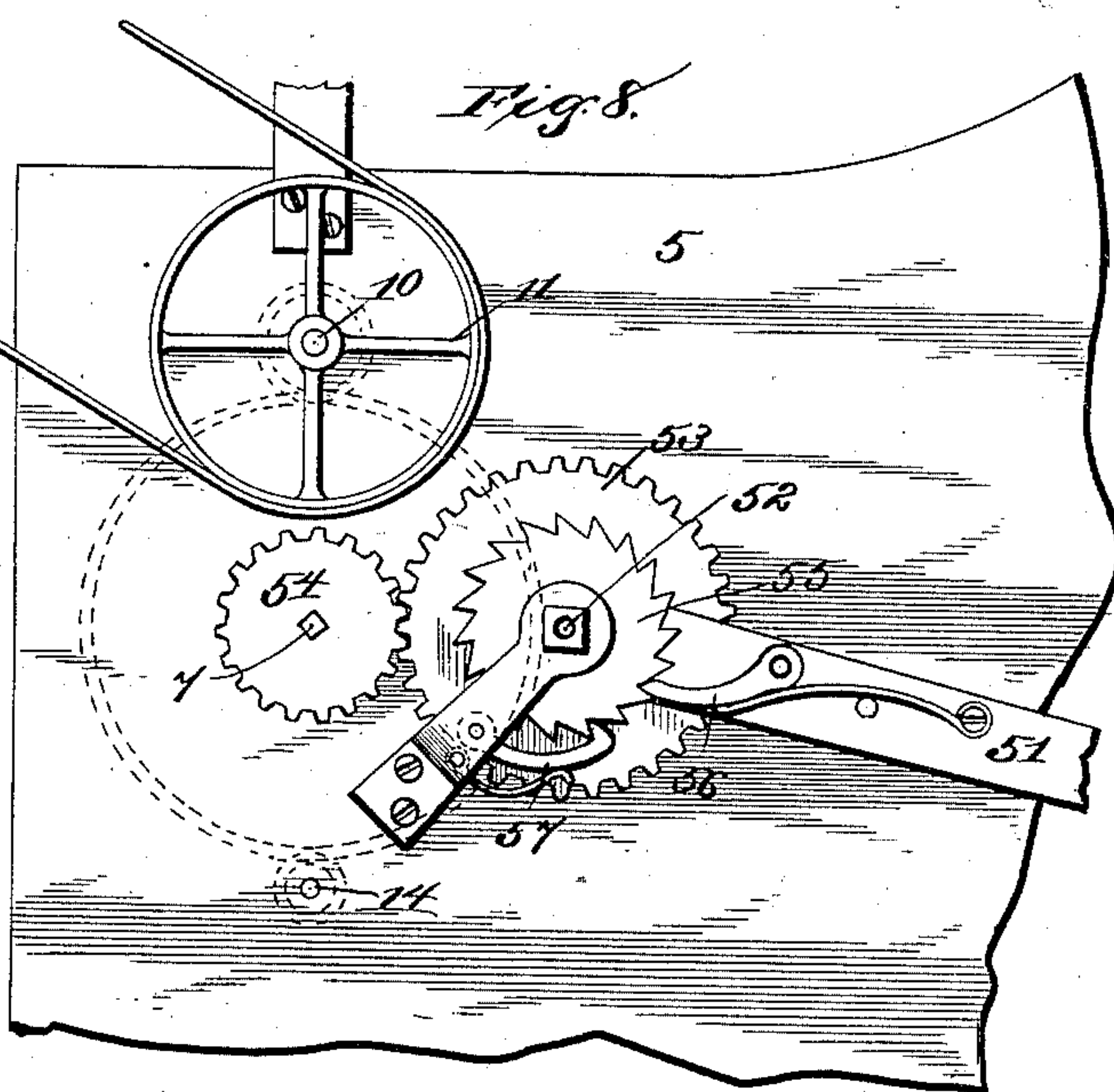
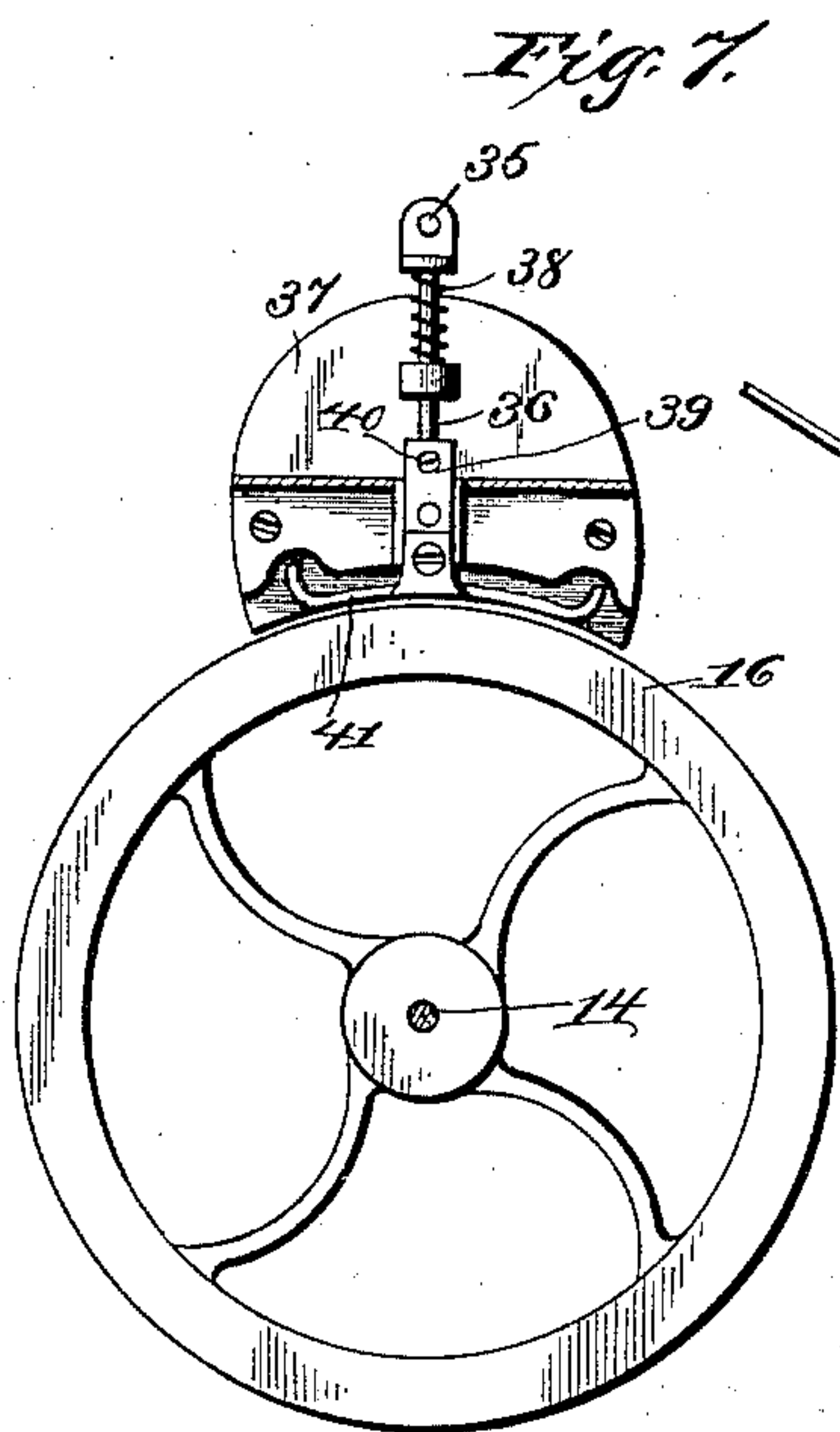
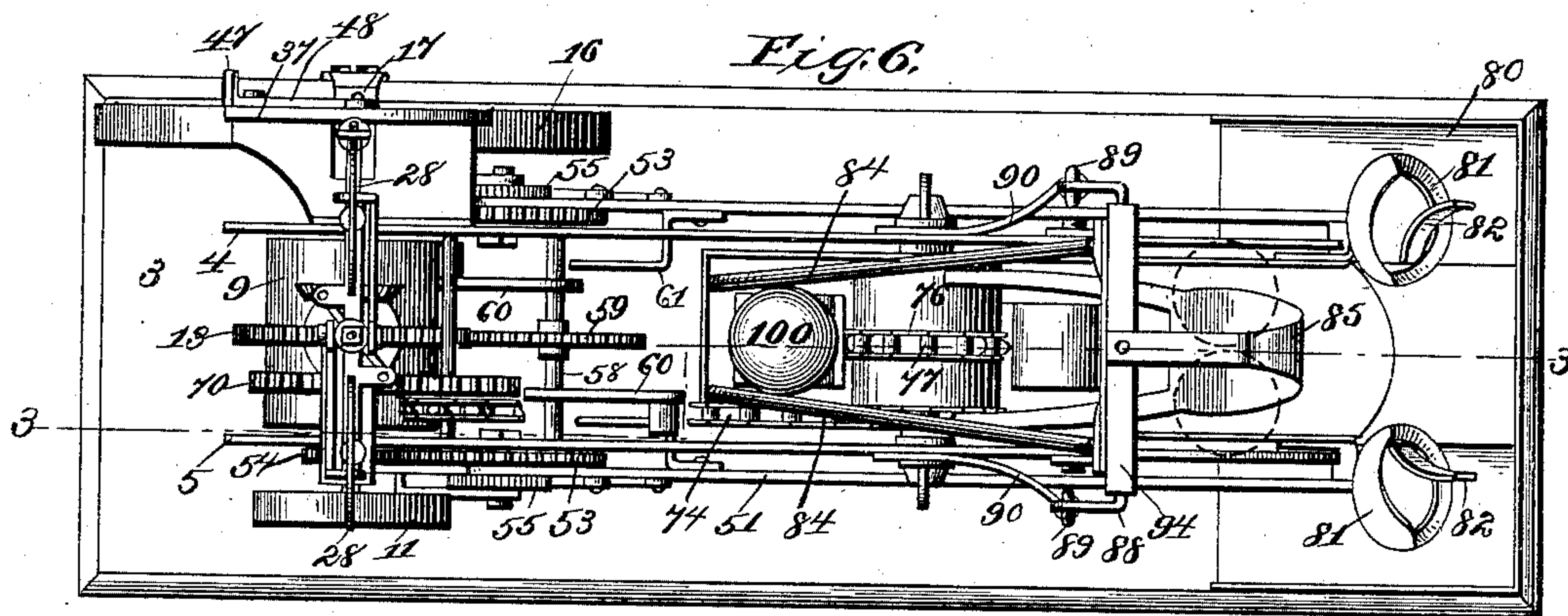
John C. Reuter,

By *his* Attorneys,

C. A. Snow & Co.

No. 475,799.

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Witnesses

E. C. Widdeman,

N. Hollander,

Inventor

John C. Reuter.

By *his* Attorneys,

C. A. Snow Geo.

UNITED STATES PATENT OFFICE.

JOHN C. REUTER, OF SAVANNAH, GEORGIA, ASSIGNOR OF ONE-EIGHTH TO
MOSES S. BYCK, OF SAME PLACE.

MOTOR.

SPECIFICATION forming part of Letters Patent No. 475,799, dated May 31, 1892.

Application filed August 15, 1891. Serial No. 402,734. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. REUTER, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented a new and useful Motor, of which the following is a specification.

This invention relates to mechanical motors, and more especially to that class thereof whose motive agent is a spring; and the object of the same is to provide means for automatically winding the spring nearly as fast as it unwinds, whereby the initial and strongest force of the spring is employed and the machine will run for a longer period.

To this end the invention consists in the construction hereinafter more fully described and claimed, and as illustrated on the five sheets of drawings, wherein—

Figure 1 is a general perspective view of the machine, the casing being omitted. Fig. 2 is a section through the casing, showing the machine in left-side elevation. Fig. 3 is a central longitudinal section through the machine alone on the line 3 3 of Fig. 6. Fig. 4 is a transverse section on the line 4 4 of Fig. 3, illustrating nothing to the right of the parts there shown in section and showing the casing in dotted lines. Fig. 5 is a rear elevation of the machine alone. Fig. 6 is a plan view thereof omitting the driving-sprocket. Fig. 7 is an inside elevation of the brake. Fig. 8 is an enlarged side elevation showing the connection between one of the levers and the winding-arbor. Fig. 9 is a perspective detail of one bucket.

In the said drawings, 1 is a suitable casing, which may have a handle 2, by which it can be carried and which rises from a base 3. The latter also supports two side plates 4 and 5, in which most of the mechanism of this machine is journaled or by which it is supported. Journaled through the said plates near their front edges is the winding-arbor 6, one of whose ends 7 is squared, as seen, and projects through the casing 1, so as to receive a key. Secured to the said arbor at their inner ends are preferably two strong coiled springs 8, which are located within a drum 9, to which their outer ends are connected, the said drum being mounted loosely on the arbor 6 between

the side plates, as seen in Fig. 4, and the revolution of this drum by the uncoiling of the springs furnishes the motive power for the machine.

10 is the main shaft, which is journaled through the side plates above the drum 9 and which extends through the casing 1 and carries a power-wheel 11, from which may be led a belt to any mechanism it is desired to drive, as a sewing-machine, and this main shaft has a gear 12, which intermeshes with a toothed ring 13 on the exterior of the drum 9. Beneath the said drum is journaled another shaft 14, having a gear 15, also meshing with said ring, and on the outer end of this shaft, at the left side of the machine, is keyed a heavy fly-wheel 16, an additional support 17 being provided, if desired, for the outer extremity of the shaft.

The governor for controlling the speed of this motor comprises the following elements:

20 is a bevel-gear on the main shaft, which intermeshes with another bevel-gear 21 on a vertical shaft 22, which is journaled in brackets 23, secured to one of the side plates, and at the upper end of this shaft is a hub 24, having radially-projecting arms 25 with up-turned perforated ears 26 at their outer ends.

27 are bell-cranks, (two in number,) one arm of each of which is pivoted at its ends respectively in said hub and one of the ears, and 28 is a fan-blade rising from this arm between the pivots. The other arm is connected by a link 29 with a rod 30, projecting from a spool 31, which slides on the vertical shaft 22 and is borne normally downward by a spring 32 beneath the hub 24.

33 is a lever having a forked end loosely engaging said spool, pivoted between its ends to a bracket 34, rising from one of the side plates and its outer end taking loosely through an eye 35 in the upper end of a rod 36, which slides through a frame 37, that is supported by the lower end of the bracket 34 directly over the rim of the fly-wheel 16, the said rod 36 being held normally elevated by a spring 38.

39 is the brake-block, which is secured by a set-screw 40 to the lower end of said rod and which has at its lower edge a brake-shoe 41, conforming to the shape of the fly-wheel.

With this construction the main shaft will drive the upright shaft and the latter will move the fans, and when the resistance of such fans against the air becomes too great
 5 the crank-arms will oscillate, the spool will be raised, and the brake will be applied to the fly-wheel.

For stopping and starting the machine I provide a hand-lever 42, pivoted at 43 to the casing 1, through which its outer end projects, the lever preferably having a catch 44, of the usual construction, moving over a toothed segment 45. The inner end of this lever is forked, as at 46, and loosely engages over the
 15 outturned tip 47 of a short lever 48, pivoted to the frame 37 and connected at its inner end with a sliding block 49, having a slot 49', which loosely embraces a screw or pin 39', that projects outward from the brake-block
 20 39. Thus it will be seen that the lever 42 may be operated from the outer side of the casing, and its inner end will move the short lever 48, so as to raise or lower the sliding block 49, and although the latter is loosely
 25 connected through said slot and pin with the brake-block, yet it can be moved to a sufficient degree to raise or lower the brake-block, as may be desired, the catch 44 holding the parts in position.

30 The machine so far described is simply a spring-motor whose winding-pinion and power-wheel extends outside its casing, which has a fly-wheel inside the casing, and which has a fan-blade governor connected with a brake and adapted to be automatically applied to
 35 the face of said fly-wheel. It also has an operating hand-lever extending outside the casing and by which the brake can be applied to or taken from the fly-wheel to stop or start the
 40 machine; but it is well known that the greatest strength possessed by coiled springs is when they are most tightly wound, and they grow weaker and weaker as they uncoil.

The object of the present invention is to
 45 provide means for keeping the coiled springs tightly wound as long as possible, and this object I accomplish by the mechanism described below.

51 are levers pivoted at their inner ends
 50 each on a shaft 52 at the outside of one of the side plates. This shaft has a gear 53, intermeshing with another gear 54, keyed on the winding-arbor 6, and the shaft 52 also carries a ratchet-wheel 55, operated by a spring-actuated pawl 56 on the lever and held by a retaining-pawl 57, the construction being such
 55 that when the lever is reciprocated around its pivotal point 52 the winding-arbor 6 will be turned to wind the springs from their inner
 60 ends.

58 is a shaft journaled between the side plates and rotated by a gear 59 thereon, which intermeshes with the toothed ring 13, as best seen in Fig. 6, and this shaft has cranks 60,
 65 which engage arms 61, projecting inward from the levers 51 and passing through arc-shaped slots 62 in the side plates. The cranks 60 are

so located that the levers will be raised and lowered alternately and almost but not quite oppositely, so as to avoid the production of 70 dead-centers.

70 is a second toothed ring on the drum, or it may be a gear keyed on the winding-arbor at the end of the drum, and this ring or gear intermeshes with a gear 71 on a shaft 72. 75 The latter has a sprocket-wheel 73 connected by a chain belt 74 with a sprocket-wheel 75 on a drum 76, journaled at the top and near the rear ends of the side plates. Over this drum and over a similar drum 76', journaled 80 directly below it, passes an upright endless chain 77, Fig. 3, certain of whose links 78 are provided with outwardly-extending and diverging-curved fingers 79, forming buckets, as best seen in Fig. 9. 85

80 is a receptacle mounted on the base across the rear edges of the side plates and open at its top and front side, and when the levers 51 descend they pass into this receptacle at their free ends. Said ends carry 90 cups 81, which pass over discharge-fingers 82, rising from the base within the receptacle, so that when a ball 100 rests in a cup and the latter passes over the finger the finger will push the ball out of the cup into the recep- 95 tacle, and thence it travels down an inclined chute 83 to a point beneath the drum 76', as seen in dotted lines in Fig. 3. From this point it can be grasped by one of the buckets 79 and carried up the front side of the 100 chain 77, guides 84 being provided to prevent the ball becoming accidentally displaced as it rises and passes over the upper drum and which are curved over said drum and diverge at such point to the discharging point or 105 basket for the buckets, and are so disposed that the buckets always project through and beyond the same, so that the weights are held in the buckets from the chute to the basket.

85 is a metallic strap secured to the upper 110 rear corners of the side plates and curved so as to form a basket whose ends are open and whose outer side extends upwardly and inwardly and is supported by brackets 86, connected by a cross-bar 87. Pivoted to the 115 center of the latter is a rocking arm 88, to whose ends are linked depending rods 89, passing loosely through eyes 90, rising from the side plates and having curved cams 91 at their rear sides, these cams being struck 120 by studs 92 on the levers 51, as described below. The rocking arm 88 is preferably mounted on an oscillating shaft 93, and a leaf-spring 94 is connected at its center to the front end of the strap 85 and bears at its ends on the 125 rocking arm 88 near the ends of the latter. To the oscillating shaft or to the arm 88, as shown, are secured depending retaining-arms 95, which close both open ends of the basket when the arm 88 is horizontal; but when the 130 latter is inclined they open the end of the basket under the then elevated end of the arm.

The operation of this improved motor is as

follows: In the normal position of parts, with the two levers down and three balls in the basket and the other ball in the chute, as seen in Fig. 3, the power-wheel is connected by a belt with the machine which is to be driven, a key is applied to the squared end of the winding-arbor and the latter wound, and the hand-lever 42 is moved in the proper direction to withdraw the brake from the fly-wheel and allow the motor to start. The fan-blades of the governor rotate and apply the brake to the periphery of the fly-wheel as may be necessary to retard the motion thereof and keep the speed of the motor within the desired limits. The shaft 58, which is revolved by its gearing with the winding-arbor, (although it might be connected with the power-shaft, if desired,) brings the cranks 60 successively under the arms 61 and alternately raises the levers. The parts are so timed that the fourth ball which stood in the chute is caught and raised by one of the buckets simultaneously with the rising of the cup at the free end of the moving lever. When the latter reaches the position shown in Fig. 2, its stud engages under the cam 91, whereby that end of the rocking arm 88 is elevated and the adjacent retaining-arm 95 is moved outwardly to open that end of the basket and allow one of the three balls therein to drop out into the cup of the then elevated lever. The latter of course descends under the weight of the ball as soon as its arm 61 clears the crank 60 and the leaf-spring 94 returns the retaining-arms to their normal position, when the two balls in the basket will move to the ends thereof, owing to the shape of the bottom of the basket, and just at this moment the ball which has been raised by the chain passes over the upper drum and drops into the basket, resting on the two balls therein and above the bottom thereof, as seen in Fig. 5. The descent of the free end of the lever causes the spring-pawl 56 to turn the ratchet 55, and as the latter is connected through the shaft 52 and gears 53 and 54 with the winding-arbor the arbor is of course turned in the proper direction to wind up the springs at their inner ends. Upon reaching the lower extreme of its movement the cup (which I should have said was open at the bottom, but slightly smaller than the diameter of the ball) passes over the discharge-finger 82, and the latter by moving up through the cup pushes the ball out, when it rolls down the chute to the position indicated in dotted lines in Fig. 3. From this point the operation is repeated by the lever at the other side of the machine, it being understood that the buckets are to be so arranged on the chain as to cause the balls to be raised simultaneously with the cups, even though the levers carrying the cups may not have precisely opposite movements, owing to the peculiar disposition of the cranks 60 on the shaft 58. However, I do not confine myself to the described arrangement of these cranks.

While I am of course well aware that a ma-

chine or motor involving the principle of perpetual motion is a practical impossibility, it will be admitted that it is possible to construct devices of the character above described whereby not only will the friction of the elements be reduced and the driving-power increased, but also wherein by certain mechanical arrangements and constructions a better and more serviceable machine results and more work is accomplished than would be otherwise possible. Omitting the levers and coacting devices, and assuming that the spring-motor has an additional force of one horse-power, it will be acknowledged by those familiar with this class of machines that such force gradually decreases as the springs uncoil, because obviously there must come a time when the force of the spring is so far spent that it will no longer drive the motor. It is true that when we add the drums, chain, balls, and levers we decrease the working force of the motor by just so much additional friction as must then be overcome, but not more, because the weight of the descending ball is of course the same as that of the ball when rising. Hence to utilize the winding devices for storing power in the springs appears simply to be winding the inner ends of the springs while their outer ends uncoil to drive the winding devices without any resulting advantage; but this benefit does accrue, viz: that the spring is wound constantly while it is unwinding, and hence from the start the initial and strongest tension of the spring is maintained as far as possible and the spring does not uncoil as rapidly as it would if the winding devices were not employed. Furthermore, as the arms are operated by the gravity of the balls and each ball is heavy enough to wind the spring at any time, it is immaterial whether the spring be then tightly coiled or not, and the force of the spring, whether initial or otherwise, is always strong enough to drive the winding devices, as will be clear. It is true that one ball is not descending at the same moment another is rising, whereby a complete counterbalance is secured; but the heavy fly-wheel will store power at one time and expend it at another, and hence this fact is immaterial.

I do not confine myself to the exact details of construction, as considerable change can be made therein without departing from the spirit of my invention. Neither do I wish to be limited to the sizes, shapes, or materials of parts, as they have no mechanical effect upon the device or its operation.

The mechanical details of the above-described machine have not been elaborated herein, for the reason that while they form an important part of the structure they do not enter into the invention itself and may be left to the discretion of the skilled manufacturer. However, I might state that all the bearings or boxes for the journals of the shafts and other parts of this machine are preferably arranged in such manner that they may be

adjusted to take up the slacks in the several belts or to make up for the wear of parts.

With respect to the so-called "buckets," while I may of course use any form of bucket desired, I prefer the construction above described—that is, the curved and divergent hooks connected to occasional links of the chain belt. A bucket constructed in this form is extremely light and easy to make and the ball has a firm bearing against the inner faces of the two arms, which are struck on curves corresponding with the curvature of the ball.

What is claimed as new is—

1. In a motor, the combination, with the spring-driving mechanism and a ratchet-wheel connected with the winding-arbor thereof, of a lever carrying a cup, a pawl on the lever engaging said wheel, a ball, devices for moving the lever to raise the cup, devices for raising the ball and lodging it in the cup when elevated, and connections between both said devices and the driving mechanism, the whole operating substantially as described.

2. In a motor, the combination, with the spring-driving mechanism having a gear on its winding-arbor, a shaft having a gear meshing therewith and also having a ratchet-wheel, and a retaining-pawl for said ratchet, of a lever pivoted at one end on said shaft and having a cup at its other end, a pawl on the lever engaging the ratchet, devices for turning the lever on its pivot to raise the cup, devices for raising the ball to lodge it in the cup when elevated, and connections between both said devices and the driving mechanism, the whole operating substantially as described.

3. In a motor, the combination, with the spring-driving mechanism, ratchets connected with the winding-arbor thereof, a shaft connected by gearing with said arbor, and cranks on said shaft, of levers having cups, pawls on the levers engaging said ratchets, weighted balls, devices for raising the balls and lodging them in the cups when elevated, connections between said devices and the driving mechanism, and arms on the levers which are struck by said cranks to raise the cups alternately, the whole operating substantially as described.

4. In a motor, the combination, with the spring-driving mechanism having a gear on its winding-arbor, a shaft having a gear meshing therewith and also having a ratchet-wheel, a lever pivoted at one end on said shaft and having a cup at its other end, raising devices for said lever driven by the winding-arbor, a pawl on the lever engaging the ratchet, and a ball, of an upright endless belt having a bucket, a chute at the lower end and a basket at the upper end of said belt, a shaft connected by gearing with the winding-arbor, and a wheel on this shaft connected by a belt with one of the drums of said upright belt, as and for the purpose set forth.

5. In a motor, the combination, with the spring-driving mechanism and winding-levers connected with the winding-arbor thereof and

having cups, of an upright endless belt driven from said arbor, buckets on said belt, weighted balls, a chute at the lower end of the belt receiving the balls from said cups, a basket at the upper end of the belt receiving the balls from the buckets, said basket having open ends adapted to deliver into the cups when raised, retaining-arms normally closing said ends, and means for moving an arm when a cup rises, so as to deliver a ball thereinto and for returning it on the descent of the cup, as and for the purpose set forth.

6. In a motor, the combination, with a lever moving in an upright plane and having a cup whose bottom is open, a receptacle into which the cup descends, and a discharge-finger in said receptacle over which the cup passes, of a weighted ball resting in said cup, and means for raising the ball and delivering it into the cup when elevated, substantially as described.

7. In a motor, the combination, with two levers moving in upright planes and carrying cups, weighted balls resting in said cups, and means for elevating the balls, of a basket receiving the balls when raised and having open ends adapted to deliver into the cups when elevated, a rocking arm having retaining-arms normally closing the ends of the basket, and rods connected to the ends of said rocking arm sliding through guiding-eyes and having cams adapted to be struck by studs on the levers as the latter rise, as and for the purpose set forth.

8. In a motor, the combination, with two levers moving in upright planes and carrying cups, weighted balls resting in said cups, a basket standing between said planes and having open ends, and means for elevating the balls and delivering them into the center of the basket, of retaining arms normally closing the ends of the basket, and means for moving one of said arms outwardly on the ascent of the levers, as and for the purpose set forth.

9. In a motor, the combination, with two levers moving in upright planes and carrying cups, weighted balls fitting said cups, a basket standing between said planes and having open ends, and means for elevating the balls and delivering them into the center of the basket, of an oscillating shaft above the basket, a rocking arm on said shaft, a leaf-spring bearing the ends of said arm downwardly, retaining-arms depending from said rocking arm and normally closing the ends of the basket, rods linked to the ends of said rocking arm, and studs on the levers adapted to raise said rods as the levers are elevated, as and for the purpose set forth.

10. In a motor, the combination, with an upright endless moving belt having buckets, of an inclined chute at the lower end of said belt for holding the weights which are to be elevated by the buckets, opposite uprights, guides parallel with the belt adjacent the ascending side thereof on each side of the buckets and curving over the upper end of the

belt and diverging at such point to the discharging-point of the buckets, and a basket to which the buckets deliver, said guides being so disposed that the buckets always project through and beyond the same to hold the weights in position from the chute to the basket, substantially as set forth.

11. In a motor, the combination, with a drum having a toothed ring and means for revolving said drum, of a fly-wheel connected by gearing with said ring, a fan-governor also driven by said ring, a brake adjacent said fly-wheel, and connections between said governor and brake for operating the latter from the former, substantially as described.

12. In a motor, the combination, with a power-driven drum, a fly-wheel connected therewith, a brake adjacent said fly-wheel, and a lever connected at one end with the brake, pivoted between its ends to a support and having its other end forked, of an upright shaft driven by said drum, a hub on said shaft having radially-projecting arms with upturned perforated ears, bell-cranks, each pivoted in one ear and the hub, a fan-blade rising from one arm of each crank, and a spool sliding on said upright shaft within the forked end of said lever and connected with the other arm of each crank, as and for the purpose set forth.

13. In a motor, the combination, with the driving-drum, a wheel connected therewith, a brake adjacent said wheel, a vertically-movable spool, connections between said spool and brake, and a spring normally raising the

latter, of an uprightshaft driven by the drum, a hub on said shaft, cranks extending radially from and pivoted in said hub, fan-blades rising from the outer ends of said cranks, links depending from their inner ends, and transverse rods projecting from said spool and connected with the links, substantially as described.

14. In a motor, the combination, with the driving-drum, a fly-wheel connected therewith, a brake-block sliding in a frame, and a short lever connected at one end with said brake-block and having an outturned tip at its other end, of a hand-lever pivoted in and projecting to the outside of the casing, the inner end of said lever being forked and loosely engaging the tip of the short lever, and a catch for holding one lever, substantially as described.

15. In a motor, the combination, with the driving-drum, a fly-wheel connected therewith, a brake-block adjacent said fly-wheel, and a governor driven by the drum and operating said block, of a pin in the brake-block, a sliding block having a slot loosely embracing said pin, and a lever for operating said sliding block, substantially as hereinbefore set forth.

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

J. C. REUTER.

Witnesses:

N. L. COLLAMER,
W. H. BARNES.