No. 810,396 PATENTED JAN. 23, 1906.

C. W. CRAMER & H. C. HAAK.

MOTOR.

APPLICATION FILED JAN. 18, 1902.

3 SHEETS—SHEET 1.

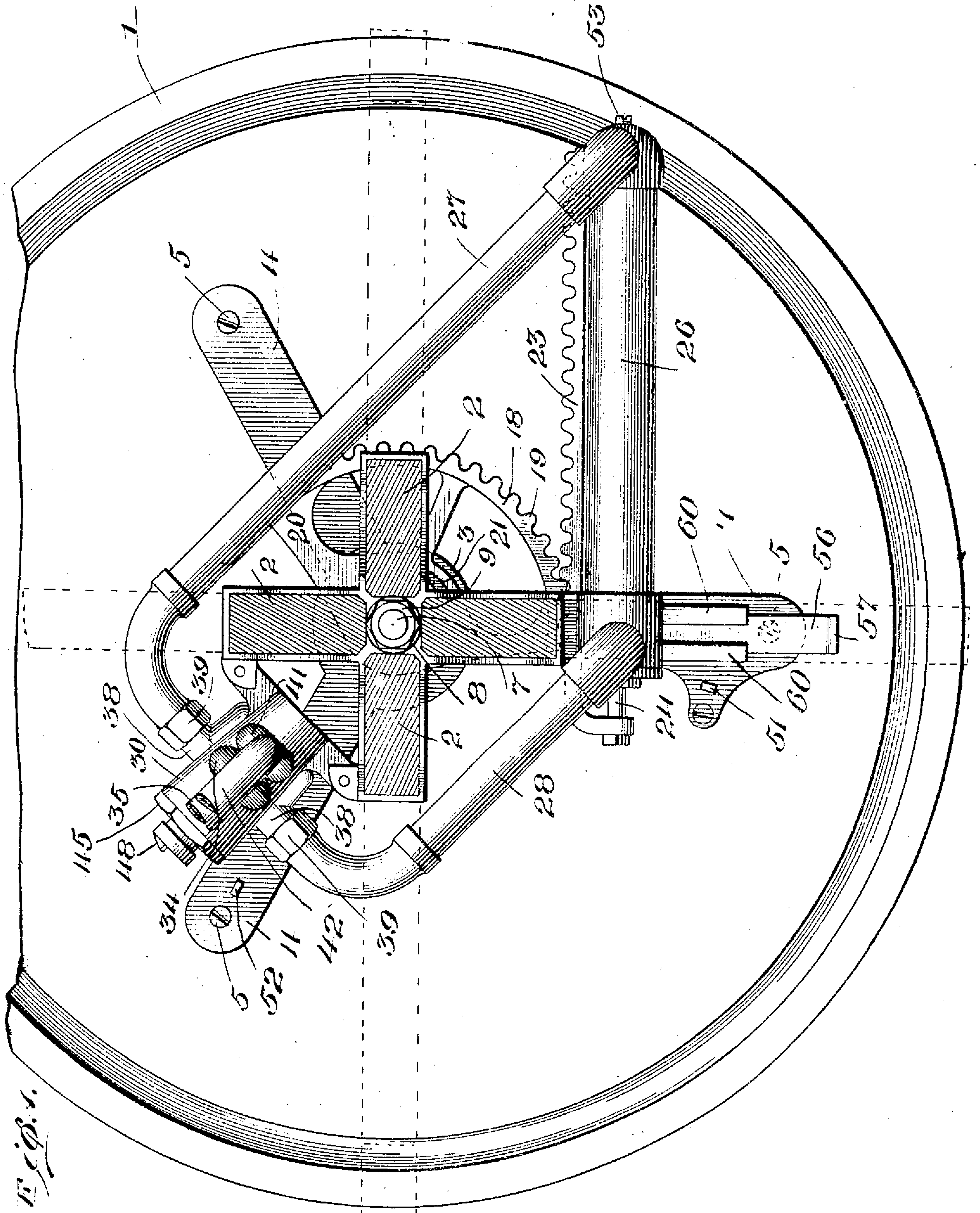

Fig. 1.

Witnesses

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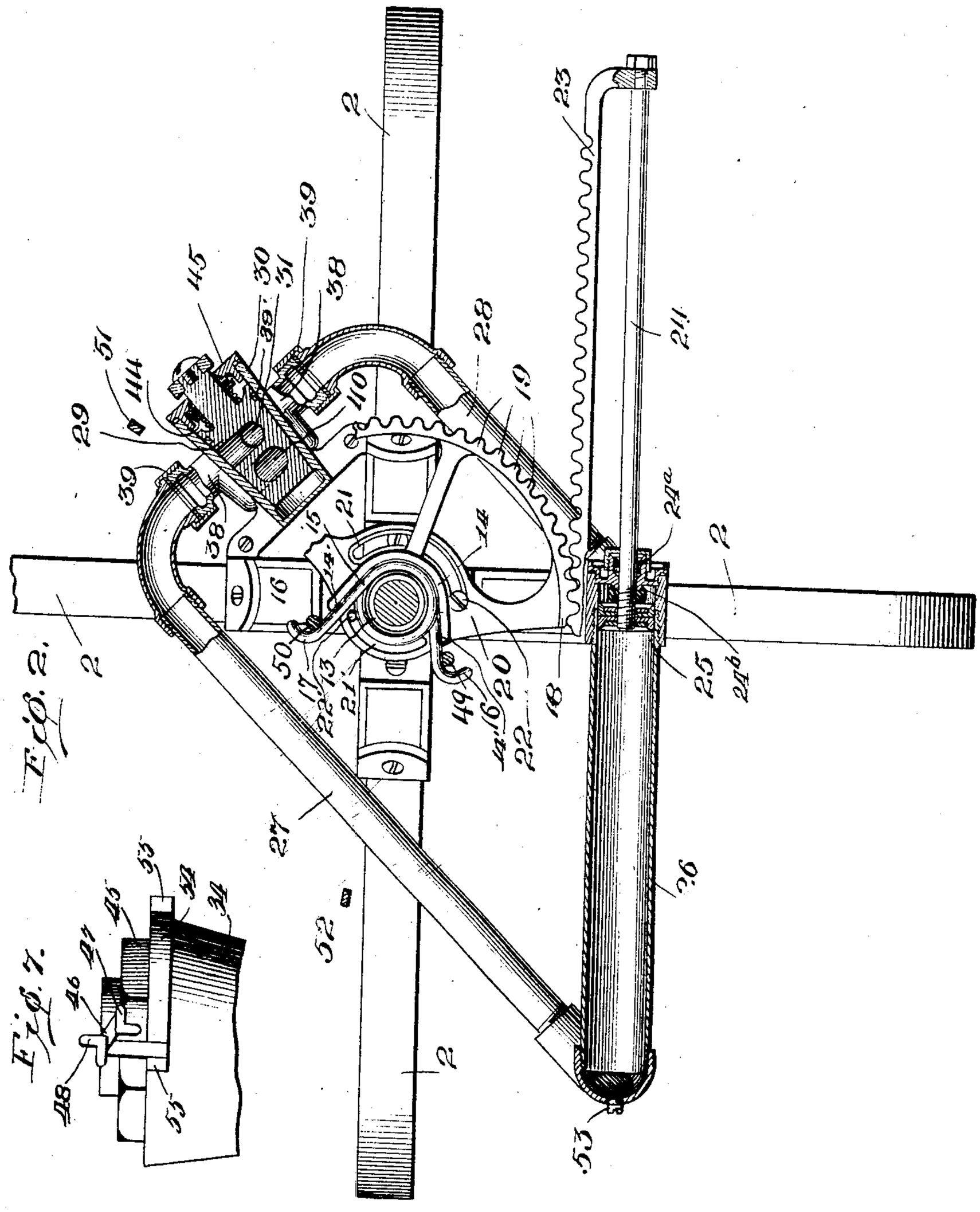

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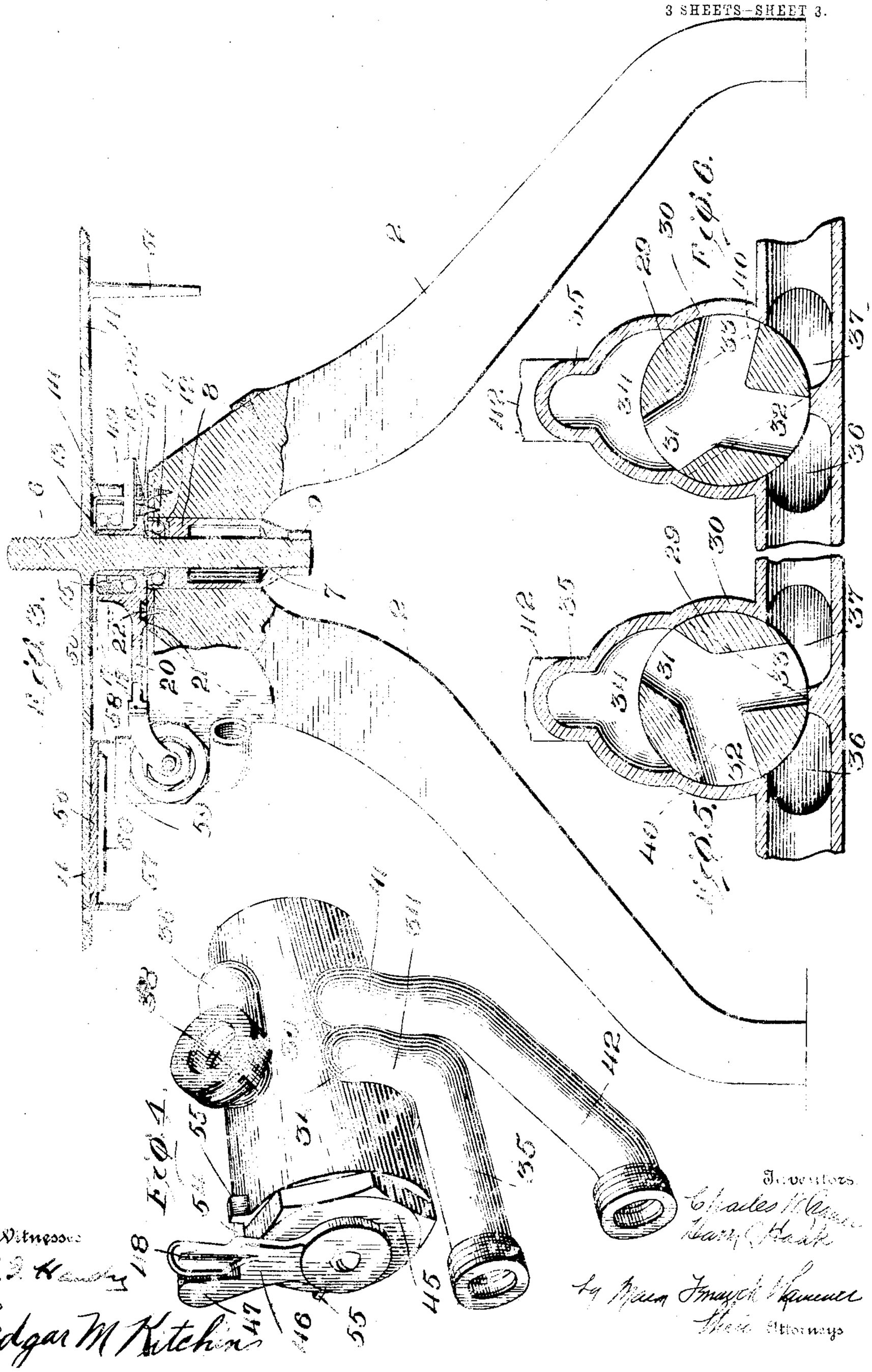

UNITED STATES PATENT OFFICE.

CHARLES W. CRAMER AND HARRY C. HAAK, OF SCRANTON, PENNSYLVANIA.

MOTOR.

No. 810,396. Specification of Letters Patent. Patented Jan. 23, 1906.

Application filed January 18, 1902. Serial No. 90,353.

To all whom it may concern:

Be it known that we, CHARLES W. CRAMER and HARRY C. HAAK, citizens of the United States, residing at 938 Webster avenue, Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Motors; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in motors, and more particularly to a form of motor designed to be applied to a washing-tub.

It consists in certain novel constructions, combinations, and arrangements of parts, as will hereinafter be more fully described and claimed.

In the accompanying drawings, Figure 1 represents an inverted plan view of a tub with the present improved motor applied thereto, the supporting-legs being shown in section. Fig. 2 represents a top plan view of the motor, parts being shown in horizontal section in order to more clearly disclose the entire structure. Fig. 3 represents a transverse vertical section through the tub-supporting frame and a part of its operating mechanism, the cylinder and supporting-legs of the tub being shown in elevation Fig. 4 represents an enlarged detail perspective view of the pressure-governing valve and its casing. Fig. 5 represents a transverse vertical section through said valve and casing, the valve being set to communicate with one end of the cylinder. Fig. 6 represents a similar view of the same with the valve set to communicate with the opposite end of said cylinder. Fig. 7 represents a fragmentary top plan view illustrating a portion of the valve-casing and the relation of the lugs carried by the valve-stem.

In the art to which the present invention relates it has been found desirable to provide means for oscillating a tub, whereby the clothes within the same are moved to and fro and caused to be gently rubbed against any suitable corrugated formation on the face of the tub, and to accomplish this result to the best advantage and in order to attain other desirable ends we employ, as seen in the accompanying drawings, in connection with any preferable form of tub 1 and suitable supporting-legs 2 2, a casting 3, formed with radially-projecting arms 4 4, being secured to said tub 1 by any preferred means, as screws 5 5 and a threaded upwardly-projecting lug 6, designed to be threaded centrally in the bottom of the tub 1. Projecting downwardly from the casting 3 and formed integral therewith is a suitable shaft 7, extending in the same vertical plane with lug 6 and being designed to be passed through a center well of the supporting-casing 8, which casing incloses the legs 2 and firmly holds the same in position. A nut 9 is preferably threaded on the lower end of the said shaft 7 for retaining the same in position. Surrounding the shaft 7 and preferably engaging an annular shoulder intermediate the length thereof is a suitable cone 10, which cone is designed to engage ball or other suitable antifriction-bearings 11, the said bearings running in any preferred or well-known form of cup 12, the said cup preferably being supported by the center or well portion of the casing 8. It will thus be seen that the tub is mounted and rotated freely and with a minimum friction. A collar 13 surrounds the shaft 7 above the cone 10 and carries a second collar 14, spaced therefrom and formed integrally therewith at its lower end, the outer collar 14 only partially inclosing the inner collar 13, the said collar 14 being concentric with the collar 13 for less than one hundred and eighty degrees, each end being straight for the remainder of its length, as best seen in Fig. 2 of the drawings. It will be seen that the construction of the two collars 13 and 14, spaced apart and formed integral with each other, provides a suitable well for the reception of the coiled spring 15, designed to be retained between the two collars and have its free ends 16 and 17 extending beyond the flared portions of collar 14, for purposes hereinafter mentioned, suitable lugs 14′ 14′ extending inwardly from said flared portion for retaining said spring in position. Also formed integrally with the base of collars 13 and 14 is a segmental rack 18, provided with outwardly-projecting teeth 19 and formed with a suitable web 20 and provided with a segmental slot 21, designed to be engaged by the head of a screw, as 22, secured in one of the legs, whereby the web 20 will be guided and prevented from having lateral movement. A suitable segmental slot

21′ is formed in that portion of web 20 extending beyond the flare of the collar 14, and any suitable lug, as 22′, projects upwardly from one of the legs 2 into said slot for limiting the length of stroke of rack 18.

A straight rack-bar 23 is provided and formed with teeth designed to mesh with teeth 19, the said bar being secured to a piston-rod 24, carrying the head 25, within a suitable cylinder 26, whereby movement of the piston is designed to move segmental rack 19, suitable pressure-supply pipes 27 and 28 communicating with the opposite ends of cylinder 26 for operating the piston within said cylinder, the supply of pressure being controlled by a suitable valve 29. Said valve 29 is inclosed in a suitable casing 30 and is provided with a three-way bore having an opening 31 and openings 32 and 33, the opening 31 being designed at all times to communicate with an enlargement 34 of the valve-casing 30, which enlargement is connected with a suitable supply-pipe 35, designed to supply pressure to the valve, said pressure being in the form of water, steam, compressed air, or any other suitable motive fluid. The openings 32 and 33 are designed to be brought alternately into register with the enlargements 36 and 37, respectively, of the valve-casing 30, the said enlargements preferably extending longitudinally of the valve-casing for a suitable distance and each being formed with a laterally-projecting tube 38, the said tube being secured to its respective pipe 27 or 28 by means of any suitable inclosing nut 39. The rear portion of valve 29 is provided with an enlarged transversely-arranged bore 40, designed to communicate at all times at its lower end with enlargement 41, formed in the casing 30, and communicating with any suitable tube 42 for purposes hereinafter mentioned, the said bore 40 having its upper end brought alternately into register with enlargements 36 and 37, respectively, as indicated in dotted lines in Figs. 5 and 6. It will be seen by reference to these two figures that when the opening 32 is registering with enlargement 36 the upper end of bore 40 is registering with enlargement 37, and when opening 33 is in register with the enlargement 37 said upper end of the bore 40 will register with enlargement 36, these alternate registrations being accomplished by oscillations of the valve 29 by means hereinafter set forth. In order to retain valve 29 snugly in its position in its casing, we preferably surround the stem of said valve with a suitable spring pressing the said valve at one end and a washer 44 surrounding the said valve-stem at the other end, whereby the valve is cushioned against longitudinal displacement. Any suitable cap 45 may be threaded on the outer end of casing 30 for closing the same, the washer 44 preferably resting against suitable packing interposed between the same and said cap, as seen in Fig. 2, the said cap being apertured centrally for the passage of the stem of valve 29. Rigidly secured to the outer end of the stem of said valve 29 is a laterally-projecting arm 46, provided at its outer end with lugs 47 and 48. The lugs 47 and 48 extend in different vertical planes, so that an arm moving in one vertical plane may strike one of said lugs and swing arm 46 in one direction and another arm moving in another vertical plane may strike the other lug and swing the arm 46 in an opposite direction, whereby the oscillating movement of the valve 27 may be accomplished.

The casting 3 is formed, preferably, with downwardly-extending lugs 49 and 50, which engage the bent ends 16 and 17, respectively, of the spring 15, whereby movement of the segment 18 is designed to move said casting 3 and the tub 1, carried thereby. Downwardly-depending lugs 51 52 are carried by two of the arms 4, the said lugs being spaced at different distances from the pivot-point of the casting 3, so as to move in different circular lines and positioned for engaging lugs 47 and 48, respectively, as they are alternately brought into contact therewith by the movement of said tub. Screw 53 is preferably threaded in the end of cylinder 26 and is designed to be removed for introducing lubricant thereto.

In the operation of our improved motor power is supplied to connection 35, passed through front bore of valve 29 either into pipe 27 or 28, and moves piston-head 25 to the opposite end of the cylinder 26 to that at which it is at the time of starting, and during said movement rack 23 operates segment 18 through the medium of spring 15 and its ends 16 and 17, communicating motion to lugs 49 and 50, swings the tub in one direction, brings one of the lugs 51 or 52 into contact with its respective lug 47 or 48, throwing the valve 29 to an opposite position to that formerly assumed, whereby the pressure will be caused to enter the opposite pipe 27 or 28 to that formerly entered, the bore 40 being brought into register with the pipe formerly employed for communicating the power medium, the lower end of said bore 40 being always in communication with enlargement 41, whereby as the pressure causes piston-head 25 to move back to its former position, and the former active pressure is exhausted through bore 40, and the casting 3 swings about again and brings its lug 51 or 52 into register with its corresponding lug 47 or 48, and the operation is again repeated. This operation may be continued as long as desired, the pipes 27 and 28 being alternately used as supply-pipes for a power medium and as exhaust-pipes, the valve 29 being alternately swung, as described, so that its bore will be properly brought into register with the con-

nection of the said pipes for causing them to become active or passive, as required for producing the desired result.

It will be seen from the foregoing that a cushioned oscillating movement of the tub will be produced, the spring 15 conveying the movement from the motor to the tub, thereby cushioning said movement, said spring tightening and recoiling at each stroke of the piston-rod 24.

The front head of cylinder 26, through which piston-rod 24 passes, is removably threaded into the end of the cylinder and is provided with a packing-chamber 24ª about said piston and formed with an inwardly-projecting cone 24ᵇ, surrounding said piston-rod for preventing to some extent admission of pressure to the packing within said chambers.

It will be seen by reference to Fig. 4 that a laterally-extending lug 54 is formed upon arm 46, designed to move in contact with or just above the outer periphery of the front end of the valve-casing 30, and suitable lugs 55 55 are formed upon said valve-casing for limiting the movement of said arm 46, whereby the said valve cannot be thrown past a given position.

At times we find it desirable to lock the tub 1 against movement, and a form of lock is illustrated in the accompanying drawings, in which 56 represents a suitable slide having a preferably outwardly-bent portion 57, designed to serve as a handle, and a downwardly-extending bar 58, designed to be passed between a pair of upwardly-extending preferably parallel plates 59, carried upon the cylinder 26. While the bar 58 is moved out of contact with said plates the tub is free to oscillate. We prefer to employ suitable brackets 60 60, inclosing the edges of slide 56 for supporting the same in position.

As best seen in Fig. 2, a suitable circumferential packing-groove 39′ is provided around the valve 29 and designed to contain any preferred form of packing-ring whereby the escape of pressure is prevented.

As clearly seen in Figs. 1 and 2, the legs 2 are inclosed by suitable connected casings, which casings carry the oscillating valve and its case and also carry the pipes 27 and 28 and cylinder 26 and all connecting parts between said valve-casing, pipes, and the cylinder, a general frame being thus formed of which the cylinder 26 is a part, said frame forming one head to the cylinder and the other head being in the form of a plug (clearly seen in Fig. 2) threaded into and removably secured within the end of the cylinder.

It is to be observed that the spring 15 not only serves the valuable function of cushioning the stroke of the tub or other frame actuated by the motor, but said spring also has the advantage of imparting to the tub or frame a relatively long stroke, even though a comparatively short cylinder is employed, the extent of rotation of the tub or frame at each stroke of the piston being considerably greater than the length of stroke of the segmental rack due to the compression of the spring at each limit of the stroke, the compression and recoil materially increasing the swinging of the tub or frame. It is further to be observed that while the spring 15 is coiled under the inertia of the tub or frame sufficient time is given for the exhausting of pressure from one end of the cylinder and the starting of the admission of pressure to the other end, which action obviates the possibility of back pressure in the cylinders, and thus prevents waste of power. The coiling of the spring under the inertia of the tub after the piston has arrived at the limit of the stroke permits of the lapse of sufficient time prior to the return stroke for permitting the accumulation of pressure on the opposite side of the piston from that previously acted upon. In other words, when the tub is thrown in one direction by the pressure upon one side of the piston the tub continues to move after the piston has completed its stroke, and during such movement the valve is opened for releasing the pressure at one side of the piston and admitting pressure to the other side thereof, the opening and closing of the valve tending to reduce the maximum pressure admitted to the cylinder until the pressure fluid has been permitted to accumulate within the cylinder, and such accumulation is permitted by the piston being left free to remain at rest momentarily during the continued stroke of the tub at the limit of the stroke of the piston. Thus when the tub returns sufficiently for permitting the beginning of the stroke of the piston the pressure on the piston will be at the maximum or equal to the pressure of the main supply. Thus the return stroke of the tub is given the benefit of the total pressure of the main supply. Of course many other advantages may be observed in the structure involving the cylinder, piston, and tub and spring, permitting a greater movement of the tub than is imparted by the piston; but the above advantages are mentioned in order that the utility of the present invention may be understood, to such extent at least as to be appreciated.

In this application we are not presenting claims covering the attaching of the oscillating frame to the actuating means by a fixedly-connected spring, such structure being covered by the claims of our copending application filed April 2, 1904, and designated by Serial No. 201,360.

Having thus fully described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a motor, the combintion with an oscillating frame, a suitable support therefor,

and a shaft retaining the frame in position, of a suitable collar surrounding said shaft, a spring surrounding said collar, means retained by the said frame engaging said spring, means for oscillating said spring, and devices for controlling said oscillating means, substantially as described.

2. In a motor, the combination with an oscillating frame, supporting means therefor, and a shaft retaining the frame in position, of a spring surrounding said shaft, devices carried by said frame engaging said spring, means for oscillating said spring, and means carried by the frame controlling said oscillating means, substantially as described.

3. In a motor, the combination with an oscillating frame, of a spring, means on the frame engaging said spring, means for oscillating the spring, said means comprising a collar about which the spring is coiled, and devices carried by the frame controlling said oscillating means.

4. In a motor, the combination with an oscillating frame, of a suitable mounted collar, a collar spaced therefrom, a spring arranged between said collars, connections between said frame and spring, means for oscillating said collars, and means carried by the frame controlling the oscillating means, substantially as described.

5. In a motor, the combination with a suitable frame, of inner and outer connected collars, a spring carried by said collars, means for imparting movement from said spring to said frame, means for oscillating said collars, and devices on said frame controlling said oscillating means, substantially as described.

6. In a motor, the combination with an oscillating frame, a suitable support therefor, and a vertical shaft retaining said frame in position upon its support, of a collar surrounding said shaft, a coil-spring surrounding said collar, means depending from said frame engaging the ends of said spring, means for oscillating said spring, and means carried by said frame controlling said oscillating means, substantially as described.

7. In a motor, the combination with an oscillating frame, supporting means therefor, and a shaft retaining said frame in position upon its support, of a spring coiled about said shaft, a collar partially inclosing said spring, means carried by said frame engaging the ends of said spring, means for oscillating said collar whereby said spring will be moved, and means carried by said frame controlling said oscillating means, substantially as described.

8. In a motor, the combination with an oscillating frame, a support therefor, and a shaft retaining said frame in position upon its support, of a collar surrounding said shaft, a collar spaced from the first-mentioned collar and formed integral therewith and partially inclosing the same, a coil-spring surrounding the first-mentioned collar and being partially inclosed by the second-mentioned collar, means carried by said frame engaging the said spring, means for oscillating said collars, and means carried by the frame for controlling the oscillating means, substantially as described.

9. In a motor, the combination with an oscillating frame, and a shaft supporting the same in position, of a collar surrounding said shaft, an outer collar spaced from and formed integral with said collar and partially inclosing the same, a coil-spring interposed between said collars and having its ends projecting beyond the outer collar and bent, lugs depending from said frame and engaging the bent ends of said spring, means for oscillating said collars, and means carried by said frame controlling said oscillating means, substantially as described.

10. In a motor, the combination with a suitable oscillating frame, a shaft supporting the same, a spring spaced from said frame and coiled about said shaft, connections between said frame and spring, means for oscillating said spring, and governing devices carried by said frame for controlling the oscillating means, substantially as described.

11. In a motor, the combination with an oscillating frame, a shaft carried thereby, of a collar surrounding said shaft, a second collar spaced outside the first collar and partially inclosing the same, a spring disposed between said collars and having its ends projecting beyond the outer collar, devices arranged on the frame engaging said projecting ends, means for oscillating said collars, and means on the frame controlling said oscillating means, substantially as described.

12. In a mechanism of the class described, the combination with a suitable oscillating frame, of a cylinder, a piston operating therein, a segment actuated thereby, a slot being formed in said segment, guiding means extending through said slot and engaging the segment for retaining the same against lateral play, means for limiting said segment in its movement, and means for communicating motion from said segment to said frame, substantially as described.

13. In a motor, the combination with a suitable oscillating frame, of a cylinder and piston operating therein, a segment operated by said piston formed with a segment-slot, guiding means extending through said slot and limiting said segment against lateral play, a second slot being formed in said segment, limiting means projecting through said last-mentioned slot, and means for communicating motion from said segment to said frame, substantially as described.

14. In a mechanism of the class described, the combination with a horizontal oscillat-

ing frame, adapted to move on a vertical axis, cylinder, piston, and means communicating motion from said piston to said frame, of a valve having its axis of movement at right angles to the axis of said frame controlling the supply of power medium to said cylinder, an arm carried by the stem of said valve, lugs projecting from said arm in different vertical planes, and lugs carried by said frame at different distances from the pivot-point thereof and moving in different circular lines, each in its movement crossing the vertical plane of one of the lugs upon the said valve-arm, substantially as described.

15. The combination with a frame, of a cylinder, a detachable plug inserted in the frame and forming one head to the cylinder, the other head being formed by the frame; a valve-seat and valve in the frame, ports in said valve and seat adapted to register and communicate with said cylinder, and outlet and inlet ports to said valve-seat.

16. The combination with a frame, of a cylinder, a screw-plug inserted in the frame and forming one head of the cylinder, the other head being formed by said frame; a piston in the cylinder, ports at each side of the piston communicating with a valve-seat in the frame, inlet and outlet ports to the valve-seat and a rotatable valve located in said seat and having ports adapted to register with the ports in said seat whereby communication may be established with the ports in the cylinder.

17. The combination of a support or frame carrying a tub adapted to be oscillated, of a cylinder having a piston, piston-rod, and ports therein, a frame for said cylinder, said cylinder secured in the frame, a screw-plug forming one head of the cylinder, the other head being formed by said frame, a valve-seat communicating with said cylinder-ports, a rotatable valve having ports located in said seat, projections on said valve and means on the tub for striking said valve projections and revolving said valve, whereby communication may be established between said valve and cylinder.

18. The combination of a support or frame carrying a tub adapted to be oscillated, a cylinder secured in a motor-frame, a detachable plug forming one head of the cylinder, the other head being formed by the frame, piston, piston-rod, and ports in said cylinder, a valve-seat communicating with said cylinder-ports, a rotatable valve located in said seat and provided with ports, a bearing-rod located in the center of the support, connections from the piston-rod to the tub, whereby said tub is oscillated, projections on said valve, and means on said tub for striking said projections and actuating the valve for the purpose set forth.

19. The combination with a frame, of a cylinder seated therein, detachable means securing said cylinder in the frame and forming one head of the cylinder, a piston and piston-rod in the cylinder, ports at each side of the piston, a valve-seat in the frame, passages connecting said valve-seat and cylinder at each side of the piston, a rotatable valve located in said seat and provided with ports, means for revolving the valve, and means for limiting the movement of the valve, whereby communication is established between the valve and the ports in the cylinder.

20. The combination of a support or frame carrying a tub adapted to be oscillated, a cylinder seated in a motor-frame and secured thereto, a detachable plug forming one head of the cylinder, a piston and piston-rod, ports in said cylinder and a valve-seat communicating with said ports, projections on said valve in the path of movement of a part on said tub, for rotating said valve, a pointer on the rotatable valve and stops on the fixed part of the motor against which said pointer contacts to limit the movement of the valve in its revolutions.

21. The combination with the frame, of a cylinder, a piston, a detachable plug inserted in the frame and forming one head of the cylinder, the other cylinder-head being formed by the frame; a valve-seat and valve in the frame, ports in said valve and seat adapted to communicate with the cylinder, devices on the valve for opening and closing communication on either side of said piston and means for operating said devices.

22. The combination with the frame, of a cylinder, a detachable plug secured in the frame and forming one head thereof the other cylinder-head being formed by the frame, a valve-seat and valve in the frame, said valve consisting of the tapered portion provided with ports, a stem extended from said tapered portion, a sleeve having spurs rigidly connected to said stem, an immovable bearing-sleeve to the stem, a pointer on the first-mentioned sleeve, and lugs for limiting the movement of the valve.

23. The combination with the frame, of a cylinder, a screw-plug secured in the frame and forming one head of the cylinder, the other head being formed by the frame, a valve and valve-seat in the frame communicating with the cylinder, said valve consisting of the valve portion proper provided with ports, a stem, the spurred sleeve connected to said stem, a bearing-sleeve between the spurred sleeve and valve portion, and means for limiting the movement of the valve.

24. The combination with the frame, of a cylinder, said cylinder being detachably connected to the frame, one head containing a stuffing-box, the other head being formed by the frame, a valve and valve-seat in the frame communicating with the cylinder, a sleeve secured to the stem of the valve having spurs thereon and means for striking said spurs to rotate the valve, a pointer on said sleeve, a

bearing-sleeve, and lugs for limiting the rotation of the valve.

25. In a mechanism of the class described, the combination of a frame having a horizontal oscillating movement, a vertical shaft, a segmental rack mounted on said shaft, a spring between the rack and the frame, to move said frame in reverse or opposite directions, a cylinder, piston, and means for controlling the piston, and a rack connected to the piston for actuating the segment.

26. In a mechanism of the class described, the combination with a pivoted frame, a cylinder, a piston within said cylinder a spring interposed between said frame and piston for imparting motion to the frame from the piston, means for controlling the pressure-supply to the cylinder, and means actuated by said frame for operating said controlling means.

27. The combination with an oscillating frame, a cylinder, and a reciprocating piston operating in said cylinder, of means for transforming the reciprocatory movement of said piston to an oscillating movement, a spring for conveying movement from said transforming means to said frame, and means actuated by the frame for governing the pressure supplied to said cylinder.

28. The combination with an oscillating frame, a relatively short cylinder, and a piston therefor, of a spring interposed between said piston and frame for conveying movement from the piston to the frame, whereby said frame is free to move to a greater extent than the extent of movement imparted by the piston.

29. In a mechanism of the class described, the combination with an oscillating frame, of a piston, means for supplying pressure thereto, means governing the pressure-supply of the piston, a spring for imparting movement from the piston to the frame, whereby the frame, by acting against the pressure of the spring, is free to move to a greater extent than the movement imparted directly by the piston, and means carried by said frame for actuating said pressure-controlling means, at each stroke of the frame, prior to the completion of the stroke thereof.

In testimony whereof we hereunto affix our signatures in presence of two witnesses.

CHARLES W. CRAMER.
HARRY C. HAAK.

Witnesses:
A. M. NEUFFER,
CHAS. D. NEUFFER.