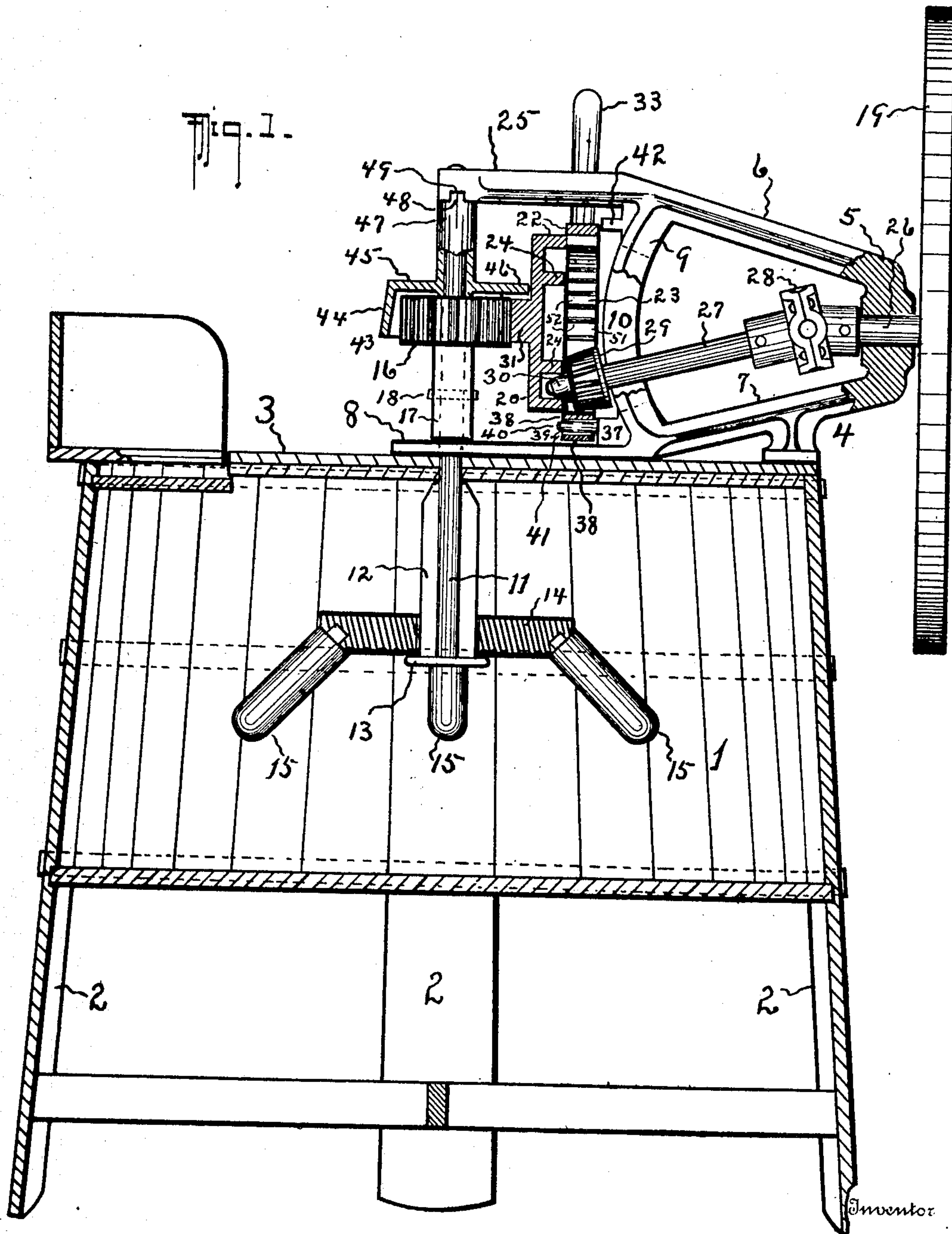


J. D. A. JOHNSON.  
MECHANICAL MOVEMENT.  
APPLICATION FILED JAN. 6, 1908.

913,145.

Patented Feb. 23, 1909.  
3 SHEETS—SHEET 1.



Witnesses *Arthur Sturges*  
*H C Compton*

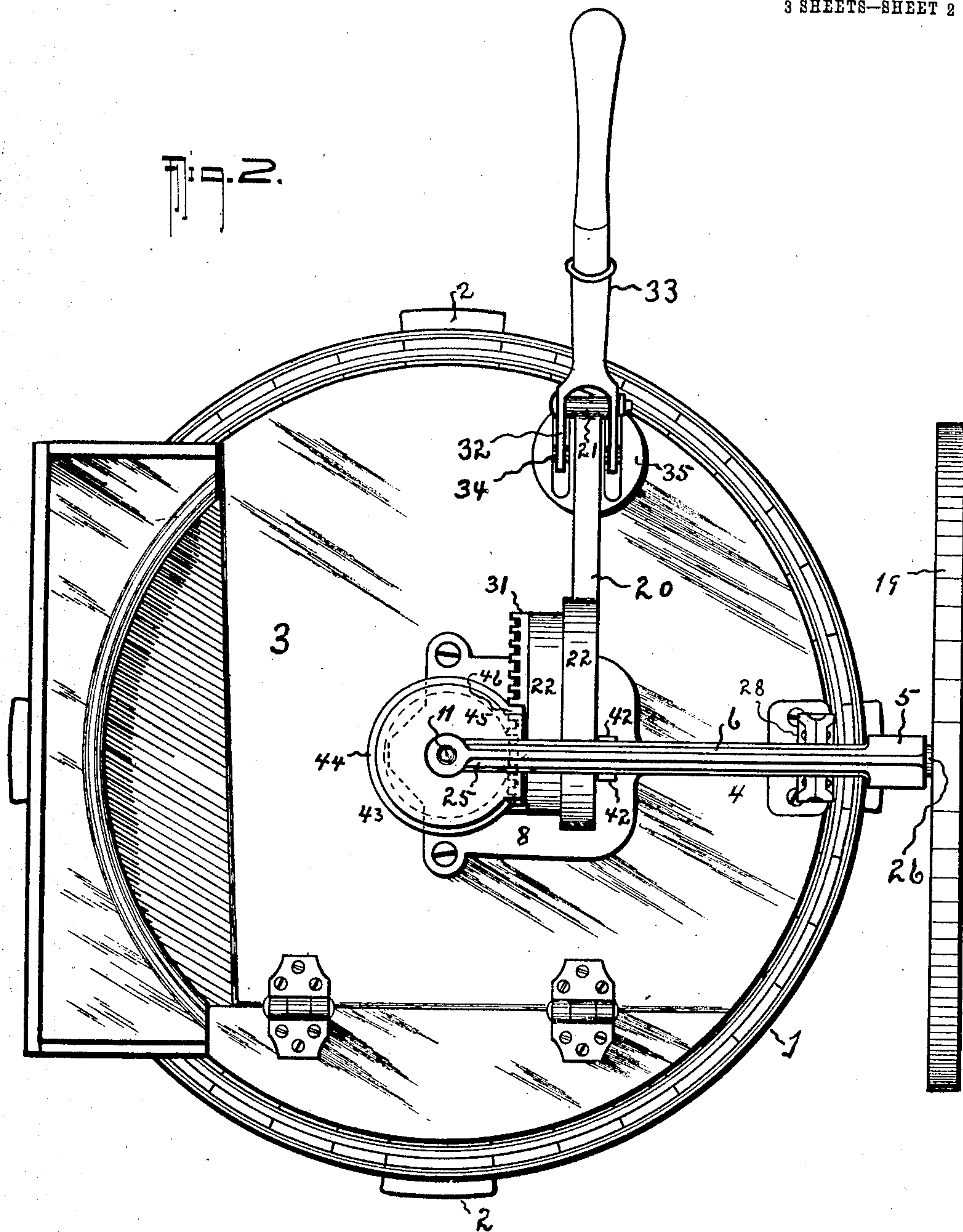
*John D. A. Johnson,*  
By *Hiram A. Sturges,*  
Attorney

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3 SHEETS—SHEET 2



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By

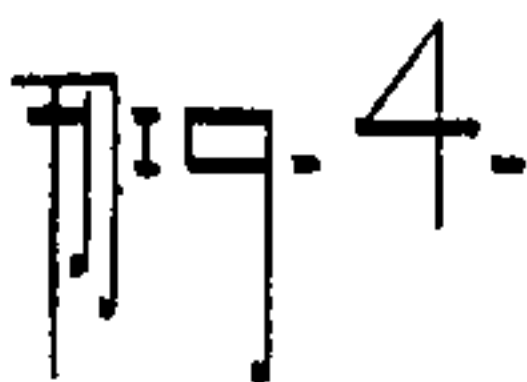
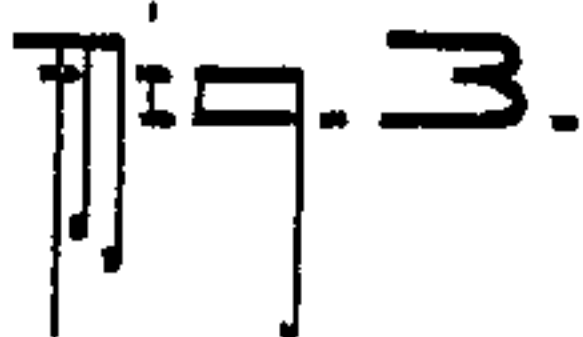
John D. A. Johnson,  
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Inventor

Attorney

**913,145.**

3 SHEETS—SHEET 3.



Attorney



# UNITED STATES PATENT OFFICE

JOHN D. A. JOHNSON, OF OMAHA, NEBRASKA.

## MECHANICAL MOVEMENT.

No. 913,145.

Specification of Letters Patent.

Patented Feb. 23, 1909.

Application filed January 6, 1908. Serial No. 409,374.

*To all whom it may concern:*

Be it known that I, JOHN D. A. JOHNSON, a citizen of the United States, residing at Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Mechanical Movements, of which the following is a specification.

This invention relates to a mechanical movement particularly adapted for use in the construction of washing machines, and has for its principal object the provision of a structure for causing reciprocatory rotation of a vertical shaft upon which is secured an agitator or dasher for engaging the clothes, and for causing rotary movement of a governor or balance wheel, said structure to be reliable in operation, and durable for use.

The invention includes the employment of a rack bar and means for actuating the same, the rack bar having a casing or mangle-rack secured thereon, the casing containing a curved or endless gear and other devices; these means are employed for actuating the vertical shaft and balance wheel.

The novel construction and arrangement of parts are fully explained herein and in the appended claims, and illustrated in the drawing, wherein,—

Figure 1 is a vertical, side view, partly in section, of a mechanical movement embodying my invention, operatively mounted for use as a washing machine. Fig. 2 is a plan view of Fig. 1. Fig. 3 is a side view, partly in section of the casing, the parts mounted therein, and the connecting arm. Fig. 4 is a plan view of a part of the mangle-rack or elliptical gear, to show form of end teeth and pinion, parts being in section.

Referring to the drawing for a more particular description, numeral 1 indicates a wash tub supported upon legs 2, and provided with a hinged cover 3; upon the cover is secured frame 4, conveniently formed as an integral casting, and having an outer bearing head 5 with divergent arms 6 and 7 extending inwardly therefrom; the casting is continued inwardly from arms 6 and 7, substantially parallel, the extension of arm 6 forming the shaft-supporting arm 25 and terminating at, substantially, the center of cover 3, the extension of arm 7 forming the base-plate 8. Between arms 6 and 7, at their greatest divergence, is provided the segmentally-formed guide-arm 9, having

therein the longitudinal slot 10, which permits shaft 27 to move upon a vertical plane.

A vertical shaft is indicated at 11, which traverses cover 3, its upper end having a bearing within and supported by the terminal of arm 25, the lower end of this shaft passing within the tub, and having secured thereon, vanes or fins 12; in engagement with fins 12, and resting transversely upon detaining-plate 13 is the removable disk 14, with outwardly extending prongs secured thereon. Upon vertical shaft 11 is provided pinion 16, having sleeve 17 secured thereon, by key 18. For the purpose of obtaining a reciprocatory rotary movement of vertical shaft 11, and for causing rotary movement of a governor member or balance wheel 19, the lengthwise movable arm 20 is employed, together with certain devices connected therewith, all presently to be explained. Arm 20 is pivotally mounted at 21 near the rim of the tub, upon the lower end of yoke-arms 32, as shown in Fig. 2; these yoke arms are a part of operating lever 33, and are pivotally mounted at 34 in any convenient base 35, the latter being secured to cover 3. Arm 20 extends partly across cover 3 from its pivotal mounting 21 at, substantially, a right angle to frame 4, its opposite or inner end terminating in the oval casing 22 and disposed adjacent vertical shaft 11. Upon the inner side of casing 22 is provided the curved, internal gear or endless rack 23, preferably formed elliptical, and vertically disposed. Within casing 22, upon a vertical plane adjacent to gear 23 and disposed centrally of the gear, is the elliptical rim, trackway or ridge 24, its entire outer wall, of course, being located at a uniform distance from the teeth of gear 23, disposed immediately adjacent thereto.

Shaft 26 of balance wheel 19 is supported in bearing-head 5 of the frame, and I employ the intermediate shaft 27 having a connection, at its outer end with shaft 26, by the universal joint 28. Near the opposite terminal of shaft 27, is secured pinion 29, and at said opposite terminal of shaft 27 is secured roller 30. The teeth of pinion 29 make engagement with the teeth of elliptical gear 23, and, by manually operating lever 33, arm 20 will have a longitudinal movement, and as is obvious, will move the rack bar and casing, unitedly, backward and forward, to correspond with the movements of the operating lever. At the time of these



movements, roller 30 is in engagement with the wall of trackway 24, thereby causing the teeth of pinion 29 to engage the teeth of elliptical gear 23, and the movements of arm 20 thereby cause the revoluble movement of pinion 29, shaft 27 and the balance wheel; by these means the balance wheel is caused to have a rotation in one direction, which is one of the objects to be attained. During this operation, shaft 27 swings in a vertical plane in slot 10, the teeth of pinion 29 engaging, successively, all of the teeth of the internal gear.

Upon a vertical plane adjacent to and outwardly of elliptical rim or ridge 24, and disposed parallel with arm 20 and formed longitudinally upon the outer wall of casing 22, is rack-bar 31, the teeth of which engage the teeth of pinion 16, and an alternate forward and rearward movement of arm 20 will cause a limited rotatable movement of vertical shaft 11, first in one direction and then in a reverse direction, whereby the clothes or articles to be laundered are moved by prongs 15, and are stirred or agitated, as described.

It will be seen by referring to Fig. 2, that arm 20 will have a limited swinging movement when actuated forwardly or rearwardly, and therefore certain guides are employed, now to be explained, intended to cause casing 22 to move without undue vibration while the internal gear and rack bar are in contact with the pinions mentioned.

Upon the lower part of the frame at the junction of guide-arm 10 and base-plate 8, is formed side-guide 37, the vertical wall of which may make contact with the vertical wall of the side guide 38, said guide 38 having a length equal to the length of gear 23, and formed as an integral part of casing 22. I provide roller 39, having a mounting upon pintle 40, which extends transversely within slot 41 of guide 38 from its mounting upon side-guide 37, and roller 39, therefore, has a seating within slot 41. By the construction as described, casing 22 may move freely in a forward or rearward direction during its rocking movements; but that part of the casing, or in other words, that part of guide 38 which is in contact with roller 39, is held at a uniform altitude during the forward or rearward movements of gear 23, and therefore it may be said, that during the swinging movements of casing 22, the parts thereof when passing the vertical plane of roller 39, pass said roller at a uniform altitude. It will be understood that pinion 29 and shaft 27 are disposed, substantially, upon the same vertical plane as roller 39, shaft 27 being in vertical slot 10, and therefore, the swinging movement of shaft 27, during operation, will be uniform, and the teeth of pinion 29 will be reliably actuated by gear 23.

Upon the upper part of the frame at the

junction of the shaft-supporting arm 25 and guide arm 9, is formed the transverse side-guide 42, and this guide may make contact with one of the sides of and near the upper part of casing 22 to cooperate with side-guide 37 for the purpose of preventing the casing from moving sidewise in a direction from vertical shaft 11.

I construct the housing-plate or shield 43, having a downwardly extending annular side wall 44 to overhang pinion 16, and preferably having a flat annular roof 45, this side wall and roof having their inner sides cut away to allow a longitudinal movement of rack-bar 31, and to form the guide 46, this guide being adapted to make contact with the outer side of casing 22 to prevent a sidewise movement of casing 22 in a direction of vertical shaft 11; shield 43 is extended upwardly from roof 46 to form sleeve 47, preferably having lugs 48 which engage notches 49 formed in arm 25. As thus described, the shield, in a measure, prevents exterior objects from entering the space between the pinion and rack bar; and lugs 48 in connection with notches 49, prevent rotation of sleeve 47, and holds guide 46 to a correct alinement with the side wall of casing 22, to prevent the teeth of rack bar 31 from passing too far between or resting their weight upon the teeth of pinion 16, thereby allowing this pinion to rotate freely.

In order that the teeth of pinion 29 may make an effective presentation to the teeth of the elliptical gear, they are formed in a manner to define a "bevel" pinion, the longitudinal wall of each tooth being formed inclinedly toward the center of the pinion from its rear to its front end. It is evident that those teeth comprising the upper and lower parts 50 of gear 23 must be reached by the pinion of shaft 27 while this shaft is in an inclined position, and unless the teeth of pinion 29 are formed as described, they would not make an effective contact with those particular teeth, and would not wear durably. The teeth of elliptical gear 23 are not uniform, generally speaking. The teeth upon the upper and lower parts 50 of said gear are uniform, and, horizontally considered, have no longitudinal inclination. It will be noted that when pinion 29 is passing the ends 51 of the elliptical gear, shaft 27 is horizontal or nearly so, and therefore teeth 52 at the ends of said elliptical gear are formed flaringly, that is to say, these teeth have a longitudinal pitch, so that the distance between their outer ends, measured on the greater diameter of the ellipse, will be greater than the distance between their inner ends; and therefore these end teeth, by this construction, permit an effective contact with the teeth of the pinion.

From the description thus given, opera-



tion will be readily understood. Actuation in a forward or rearward direction of lever 33 will cause corresponding movements of arm 30. While casing 22 has a rocking movement, it is guided and controlled by means of the devices described, so that the contacting parts which communicate motion to shaft 27 and to pinion 16, operate reliably to cause a reciprocatory rotary movement of shaft 11, and also to actuate the balance wheel. During operation, shaft 27 rotates in one direction, and also has a swinging movement within vertical slot 10, as it contacts with the curved sides and ends of the internal gear, the movement being smooth and regular.

While I have shown and described an elliptical gear, operation, in a measure, would be effective if a circular, internal gear was employed, and it is considered that various minor details of construction could be modified without departing from the scope of the invention.

Having fully described the parts, what I claim as new and desire to secure by Letters Patent is,—

1. A mechanical movement, comprising a vertical shaft with a pinion thereon; a casing provided with a horizontal rack-bar in engagement with said pinion, and provided with a vertically-disposed elliptical gear and with an elliptical rim having its body disposed vertically within the plane of the elliptical gear; a shaft-mounted governor member; an actuating shaft having a universal joint connection with the shaft of the governor member and engaging the elliptical rim of the casing, a pinion thereon engaging the elliptical gear; and means to cause an endwise movement of the rack-bar.

2. A mechanical movement, comprising a vertical shaft, a pinion mounted on said shaft; a casing provided with a reciprocating rack adapted to operate said pinion, and provided with a curved, endless gear and with a curved, endless trackway; a shaft-

mounted balance wheel; an intermediate shaft having a universal joint connection at one of its terminals with the shaft of said balance wheel, its opposite terminal engaging said curved, endless trackway, and a pinion intermediate its ends engaging the curved, endless gear of said casing.

3. A mechanical movement, comprising a vertical shaft; a pinion mounted upon said shaft; a casing provided with a reciprocating rack adapted to operate said pinion, and provided with an endless longitudinal gear, an endless longitudinal trackway and a longitudinal slot; a shaft-mounted balance wheel; an intermediate shaft, a pinion thereon, and having a universal joint connection at one of its ends with the shaft of the balance wheel, its opposite end engaging said endless longitudinal trackway; said intermediate shaft adapted to have a swinging and a vertical bodily movement for engagement of its pinion with said endless longitudinal gear; a stationary guide member in the vertical plane of said intermediate shaft and engaging the longitudinal slot of said casing.

4. A mechanical movement, comprising a vertical shaft, a pinion thereon; a vertically disposed mangle-rack; a shaft-mounted balance wheel; an intermediate shaft, a pinion thereon and having a universal joint connection at one of its terminals with the shaft of the balance wheel; one side of said mangle rack making engagement with the pinion and opposite terminal of said intermediate shaft, the other side having a horizontal rack-bar secured thereon in engagement with the pinion of said vertical shaft; means to cause an endwise movement of the mangle rack to actuate said intermediate shaft and horizontal rack-bar.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN D. A. JOHNSON.

Witnesses:

GEORGE W. COVELL,  
HIRAM A. STURGES.