

No. 692,345.

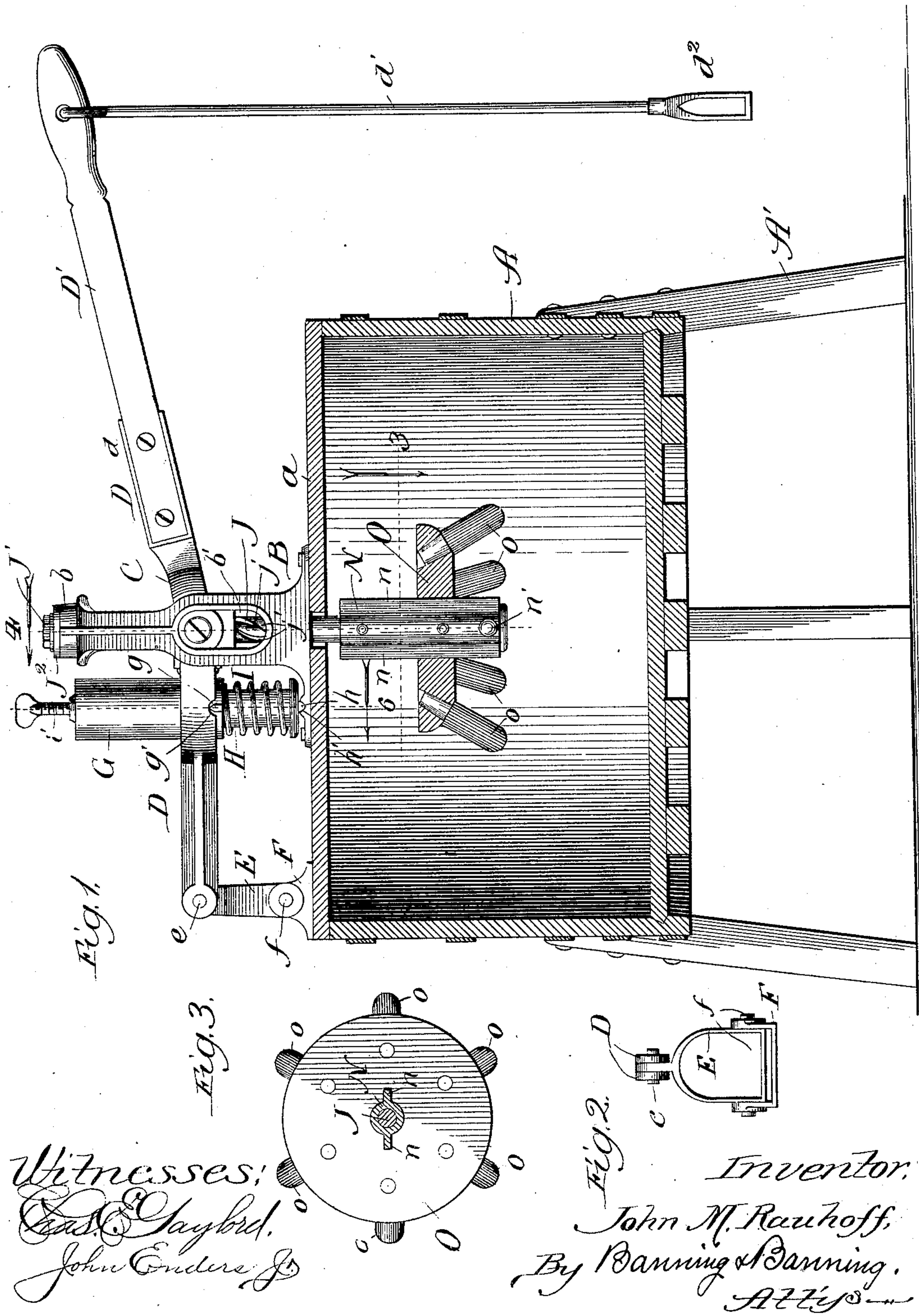
Patented Feb. 4, 1902.

J. M. RAUHOFF.  
WASHING MACHINE.

(Application filed July 5, 1900.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
E. C. Gaylord,  
John Enders, Jr.

Inventor:  
John M. Rauhoff,  
By Danning & Danning,  
Attorneys

**No. 692,345.**

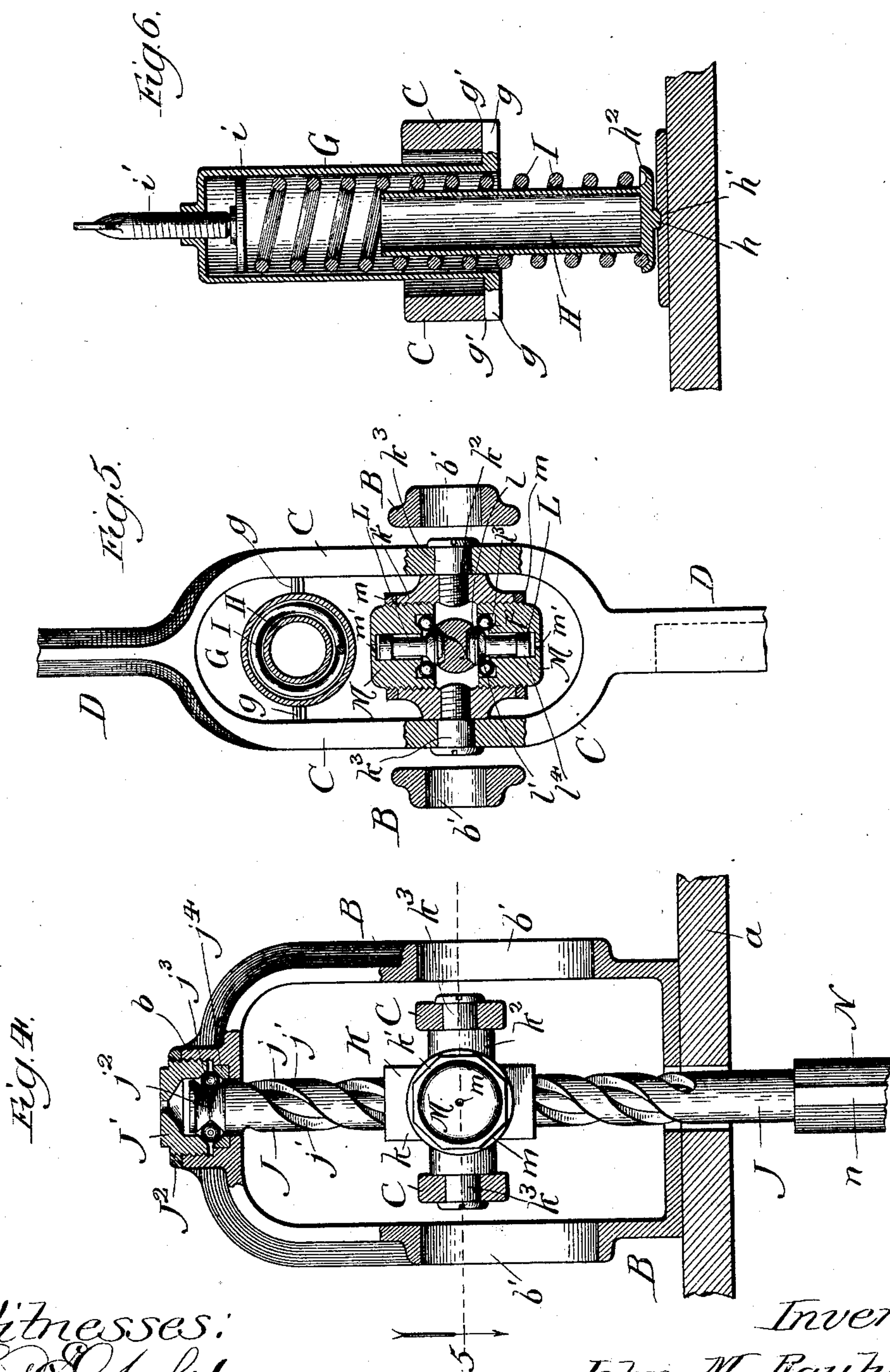
**Patented Feb. 4, 1902.**

**J. M. RAUHOFF.**  
**WASHING MACHINE.**

(Application filed July 5, 1900.)

(No Model.)

**2 Sheets—Sheet 2.**



Witnesses:  
Eas. Clayford,  
John Enders Jr.

Inventor:  
John M. Rauhoff,  
By Banning & Banning,  
Attys.



# UNITED STATES PATENT OFFICE.

JOHN M. RAUHOFF, OF CHICAGO, ILLINOIS.

## WASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 692,345, dated February 4, 1902.

Application filed July 5, 1900. Serial No. 22,557. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN M. RAUHOFF, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Washing-Machines, of which the following is a specification.

This invention relates to that class of washing-machines in which a rotary stirrer or dasher or a rotary cylinder is employed for the purpose of producing the requisite action for a rubbing effect to cleanse the clothes; and the object of the invention is to improve the driving means for rotating the stirrer or dasher or the cylinder and to furnish a driving means and a power therefor by which the labor required will be greatly reduced.

The invention consists in the features of construction and combination of parts herein-  
after described, and pointed out in the claims.

In the drawings illustrating my invention, Figure 1 is an elevation with the tub or receptacle for the clothes and the body of the stirrer or dasher in section; Fig. 2, an end elevation of the swinging support for one end of the operating or power-applying lever; Fig. 3, a top or plan view of the stirrer or dasher with the driving-shaft and the sleeve thereon in section; Fig. 4, an elevation, partly in section, showing the driving-shaft and the reciprocating head for transmitting rotation to the shaft; Fig. 5, a cross-section on line 5 of Fig. 4, and Fig. 6 a sectional elevation of the spring and its holder for returning the operating or power lever.

The washing-machine of my invention is to have a tub or receptacle A of any suitable construction, and, as shown, the tub or receptacle is supported in an elevated position on standards or legs A' and is provided with a top or cover a, on which are mounted the operating parts of the machine.

I provide a standard or support of a yoke or U shape, having side arms B and a suitable base, which is mounted on the cover and attached thereto by bolts or screws passing through the base, and, as shown, the top of the standard has a head b, and each arm of the standard is provided with an elongated slot b' for a purpose hereinafter explained. A loop C of a lever D is entered between the side arms or posts of the standard or upright, and this lever

at its free end has a socket or recess d for the attachment of a handle or lever continuation D', the outer end of which, as shown, has a hole for the admission of a hook or loop on the end of a rod d', at the lower end of which rod is a stirrup d<sup>2</sup>, by means of which the lever can be operated by the foot, or, if desired, the rod and stirrup can be detached and the lever operated by hand. The lever is pivotally connected to a swinging support E by a pin or pivot e, and the support is pivotally mounted on a base F by a pin or pivot f, by which arrangement the lever will adapt itself to a straight-line movement at the point of applying the power for driving the shaft, and such straight-line movement is had by the swinging or oscillating of the support E and the pivotal connection of the lever to the support and the support to the base, which permits the pivot end of the lever to move in or out, as required for the position of the body of the lever in making the strokes to apply the power.

The down stroke or movement of the actuating or power lever is by hand or by foot power, and some provision should be made for automatically returning the lever to its normal position. The return of the lever is accomplished by a push-spring in the arrangement shown, and for holding and operating the spring a tube or casing G is located within the opening of the loop C and has at its lower end side projections g, which enter notches g' on the lower edge of the sides of the loop, as shown in Figs. 1, 5, and 6. A second tube or casing H is entered into the tube or casing G, and this tube or casing H, on its bottom face, has a rib or flange h, which enters a recess h' in the face of the standard or upright B. Around the inner tube or casing and extending up and into the outer casing or tube is a coil-spring I, the lower end of which rests in an annular flange h<sup>2</sup> on the bottom of the tube or casing H and the upper end of which is in contact with a follower i in the upper end of the tube or casing G and carried by a threaded stem i', so that by adjusting the follower up or down the tension of the spring can be regulated so as to give the required upward force or pressure to return the power-actuated lever. The lower tube or casing is free to swing or oscil-



late on its support formed by the rib or notch, and the upper tube is likewise free to swing or oscillate at the point of its connection with the lever by the side lugs and notches, and this connecting of the spring support or holder with the lever and the mounting thereof at its lower end enables the support or holder to swing or oscillate and conform to the position of the lever without bending or twisting the spring and so as to maintain the spring in proper position to have its force exerted and return the lever.

The driving-shaft J has around its exterior a spiral groove  $j$  with tapered or inclined side walls  $j'$  and is of that class of shafts which are rotated by means of a reciprocating head, which produces a rotary motion from a reciprocating movement. The upper end of the shaft has a groove  $j^2$  around its exterior, which groove forms one side of a race in which are placed balls  $j^3$ , and the opposite wall of the race is furnished by a ring  $j^4$ , entered into a recess in the head  $b$  around the shaft. The race is completed and the balls held therein by a plug or cap  $J'$ , screw-threaded into the head  $b$ , and when in proper position locked and held by a ring-nut  $J^2$ , screw-threaded onto the plug to engage with the end face of the head of the standards. This furnishes a support for the upper end of the shaft by means of which the shaft is suspended and is free to revolve without any excessive frictional effect from its end support.

A reciprocating head K is mounted on the shaft, and this head has its body formed of two tubes  $k$  and  $k'$ , one of which,  $k$ , receives the shaft. The head also has on opposite sides lugs or bosses  $k^2$ , into which are screw-threaded journals  $k^3$ , which journals enter suitable bearings therefor in the arms of the loop C, as shown in Figs. 4 and 5, and in order to assemble the parts and attach the head to the loop access is had to the journal or pivots  $k^3$  through the openings  $b'$ , the heads of the journals or pivots having a nick for a screw-driver or being otherwise formed so that they can be screwed into and out of the head.

On each side of the driving-shaft is a journal or stem L, and each journal or stem has a contact or bearing end  $l$ , having an incline or taper coinciding with the incline or taper of the side walls  $j'$  of the spiral groove of the shaft, so that the contacts or bearings can enter into the spiral groove and by their engagement with the side faces or walls of the grooves at opposite sides cause the shaft to be rotated with the reciprocating of the head. Each stem or journal adjacent to the contact or bearing end has a cone  $l'$ , forming one side of a race, in which are balls  $l^2$ , and the race is completed by a groove or recess  $l^3$  in the end of a screw-threaded plug M, and, as shown, the body of each stem is reduced in diameter, so as to leave a bearing  $l^4$  of little width, and thereby reduce the friction.

The ends of the tube  $k'$  have an interior

screw-thread, and each end receives the plug M, screw-threaded into the end, and when adjusted as required to furnish the necessary contact for the balls and cone the plug is locked and held by a ring-nut  $m$ , screw-threaded onto the plug and engaging the end face of the tube, and, as shown, each plug has an opening  $m'$  for the admission of oil or other lubricant. The head K is entered onto the shaft J, and the stems or journals L are placed in the head for the contacts or bearings to enter the spiral groove of the shaft. The balls are placed in the race and the plugs screw-threaded into the tube, thereby mounting the head on and connecting it with the shaft. The head is brought into alignment with the journal-openings in the loop, and the journals or pins are screw-threaded into the bosses connecting the head with the lever, assembling the parts ready for use, it being understood that the upper end of the shaft has been properly mounted in the supporting-head of the standard, as already described.

The lower end of the shaft extends through the cover of the tub or receptacle and has secured thereto a guide or sleeve N, having on each side ribs or flanges  $n$  and having at the lower end, as shown, a stop  $n'$ . On the guide or sleeve is loosely mounted a head O, having therein arms  $o$ , which head and arms form the stirrer or dasher for operating on the clothes. This stirrer or dasher is free to rise and fall on its guide or sleeve, so as to accommodate itself to the height of clothes in the tub for proper action in doing the washing.

The operation is as follows: The clothes to be washed are placed in the tub or receptacle and the cover placed on the tub or receptacle, entering the stirrer or dasher thereinto. The moving of the power or actuating lever, either by hand or foot, causes the head to be reciprocated, and the reciprocating movement of the head through the engagement of the bearings or contacts with the spiral groove rotates the shaft, and the rotation of the shaft operates the stirrer or dasher and moves the clothes around for a washing effect. The head is kept in a straight line of reciprocation by means of the pivoted support at its end, as already described, and the lever returned after each downstroke by the action of the return-spring, and such spring maintains its direct-line action, as already described. The mechanism for driving the shaft and operating the stirrer or dasher is simple and at the same time is effective and reliable, as with the movements of the lever the head must be reciprocated and such movement of the head must rotate the shaft. The connection between the head and shaft reduces the friction in operation to a minimum, and the suspending of the shaft at its upper end by the balls also reduces the friction at that point to a minimum, the result being that the shaft is operated without the requirement of an excessive expenditure of power.



While the driving power is shown and described in connection with a washing-machine, it is evident that such power can be utilized in the operating of stirrers, dashers, or beaters which depend upon a rotary motion for their operation. The lever or other power-supplying means connected with the reciprocating head mounted on a shaft having in its outer face a spiral groove with a connection by rotatable stems or journals carried by the head will give rotation to the shaft, and as a matter of course such rotation will drive or operate the stirrer, dasher, or beater on the shaft. It is not the intention to confine the application of the spirally-grooved shaft and the reciprocating head to the operation of a stirrer or dasher for a washing-machine; but the devices are shown in connection with a washing-machine for the purpose of illustration as well as for improving the operation of washing-machines.

I claim—

1. The combination of a rotatable shaft having on its exterior a spiral track, a reciprocating head or guide, a rotatable journal or stem having its body mounted and axially revolving in the head or guide and having an acting end integral with and revolving only with the body and arranged in a fixed relation to directly and axially abut the spiral track and impart rotation to the shaft, means for reciprocating the head to travel the integral acting end of the journal or stem in direct engagement with the track and revolve the shaft, and means for maintaining the parts in definite relation to each other, substantially as described.

2. The combination of a rotatable shaft having around its outer face a spiral track, a head or guide slidable on the shaft, a rotatable journal or stem having its body mounted and axially revolving in the head or guide and having an acting end integral with and revolving only with the body and arranged in a fixed relation to continuously and directly abut the spiral track for the engagement of the integral acting end to revolve the shaft and having the journal or stem and its integral acting end adjustable as one toward and from the track, and a lever connected with and operating the sliding head, substantially as described.

3. The combination of a rotatable shaft having around its outer face a spiral track, a reciprocating head carried on the shaft, a journal or stem rotatably mounted in the head, a contact or bearing on the rotatable journal or stem engaging with the spiral track of the shaft, a lever connected with the head, a swinging support having the end of the lever pivoted thereto, a tube or casing engaging the lever, a second tube or casing entering into the first tube or casing and having a rocking support at its lower end, and a coiled spring surrounding the second tube or casing entered into the first tube or casing for en-

gagement therewith to return the lever to normal position, substantially as described.

4. The combination of a rotatable shaft having around its outer face a spiral track, a reciprocating head carried on the shaft, a journal or stem rotatably mounted in the head, a contact or bearing on the rotatable journal or stem engaging with the spiral track of the shaft, a lever pivotally connected with the head, a swinging support having one end of the lever pivoted thereto, a swinging tube or casing connected with the lever, and a spring carried by the swinging tube or casing, substantially as described.

5. The combination of a rotatable shaft having around its outer face a spiral groove with tapered or inclined side walls or faces, a reciprocating head carried by and endwise slidable on the shaft, a journal or stem rotatably mounted in the head and having a contact or bearing with a face adapted for engaging the inclined or tapered side faces or walls of the groove, and a lever pivotally connected with the head and operating to move the head bodily endwise on the shaft and cause a rotation of the shaft, substantially as described.

6. The combination of a rotatable suspended shaft having a body of uniform diameter its entire length and having on its exterior a spiral track for a portion of its length, a continuous frame or support formed of a vertical standard or upright on each side, a cross-bar at the top and a cross-bar at the bottom, both bars integral with the side standards or uprights and the top cross-bar having a carrying-head into which the upper end of the shaft enters, and the bottom cross-bar having an opening corresponding in diameter to the diameter of the shaft for the passage of the shaft endwise to enter its upper end in the carrying-head of the top cross-bar and furnishing a support against lateral play of the shaft, a circumferential groove in the upper end of the shaft within the carrying-head, balls in the circumferential groove of the shaft, a ring entered into the head and forming with the groove a track or race for the balls, and an adjustable plug-screw threaded into the head for suspending the shaft from the head mounted on ball-bearings and maintained in a vertical line, substantially as described.

7. The combination of a rotatable suspended shaft having a body of uniform diameter its entire length and having on its exterior face a spiral track or bearing-face for a portion of its length, a circumferential groove in the upper end of the shaft, balls entered into the circumferential groove, a continuous frame or support formed of a standard or upright on each side, a cross-bar at the top and a cross-bar at the bottom, both bars integral with the side standards or uprights and the top cross-bar having a central carrying-head receiving the upper end of the shaft and the



balls and the bottom cross-bar having an opening corresponding in diameter to the diameter of the shaft for the passage of the shaft endwise to enter its upper end in the carrying-head of the top cross-bar and furnishing a support against lateral play of the shaft, a reciprocating head carried by and encircling the shaft and endwise slidable thereon and having a bearing and guide on the shaft, journals or stems rotatably mounted in the head on opposite sides thereof, each journal or stem having its acting end maintained constantly endwise in relation to the shaft, furnishing a contact or bearing continuously engaging with the spiral track or bearing-face of the shaft axially of the journal or stem, and a lever located between the vertical side standards or uprights of the frame or support and connected with and operating to move the head bodily up and down on the shaft in a straight line within the space of the continuous frame, giving the shaft a support on two sides, substantially as described.

8. The combination of a rotatable shaft spirally grooved on its exterior to form a track or bearing-face, a reciprocating head carried by and encircling the shaft and endwise slidable thereon and having a bearing and guide on the shaft, journals or stems each having its body rotatably mounted and axially revolving in the head and on opposite sides thereof, each journal or stem having an acting end integral with and coincidingly revolving with its body with the body maintained constantly endwise in relation to the shaft for the head to furnish a fixed contact or bearing continuously engaging with the spiral groove of the shaft and revolving axially with the journal or stem, a horizontal lever pivotally connected with the head on each side and having an oscillating movement, a swinging support having one end of the lever pivoted thereto, and a spring arranged to

engage the lever between the free end and the pivoted end thereof and operating to return the lever to normal position, substantially as described.

9. The combination of a rotatable shaft spirally grooved on its exterior to form a track or bearing-face, a reciprocating head carried by and encircling the shaft and endwise slidable thereon and having a bearing and guide on the shaft, journals or stems each having its body rotatably mounted and axially revolving in the head and on opposite sides thereof, each journal or stem having an acting end integral with and coincidingly revolving with its body with the body maintained constantly endwise in relation to the shaft for the head to furnish a fixed contact or bearing continuously engaging with the spiral groove of the shaft and revolving axially in a fixed relation with the journal or stem, a horizontal lever pivotally connected with the head on each side and having an oscillating movement, and operating to move the head bodily back and forth on and cause a rotation of the shaft from the engagement of the integral acting ends of the journals or stems with the spiral track or bearing-face of the shaft continuously endwise, substantially as described.

10. The combination of a rotatable shaft having around its upper face a spiral track or bearing-face, means engaging with the spiral track or bearing-face and operating to rotate the shaft, a lever actuating the means for rotating the shaft, a spring for retracting the lever and a swinging guide carrying the spring and maintaining the spring in proper relation to the lever, substantially as described.

JOHN M. RAUHOFF.

Witnesses:

THOMAS B. MCGREGOR,  
BELLE W. BARRY.