

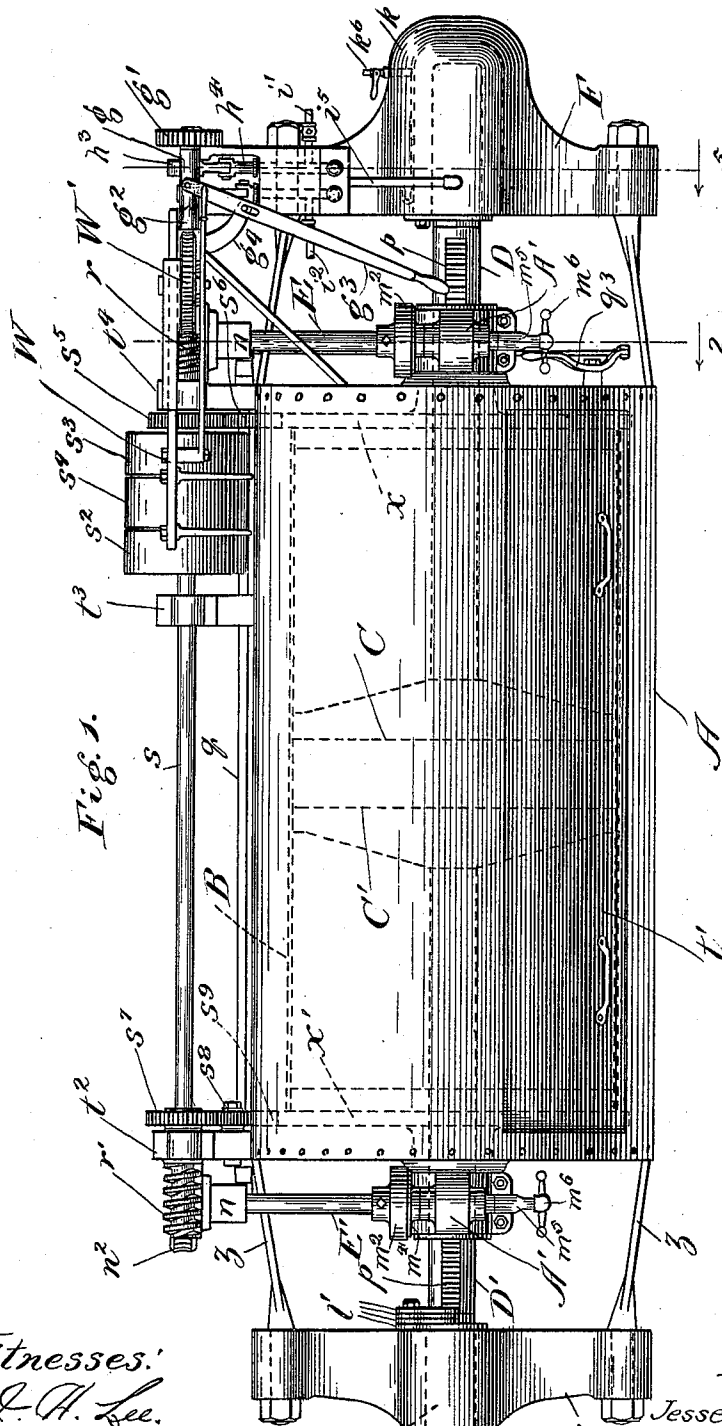
(No Model.)

4 Sheets—Sheet 1.

J. W. SUNDERLAND.
WASHING MACHINE.

No. 570,190.

Patented Oct. 27, 1896



Witnesses:

J. A. Lee.

R. T. Spruce.

Inventor:

Jesse W. Sunderland.

By

Dymfark & Dymfark
Att'ys.

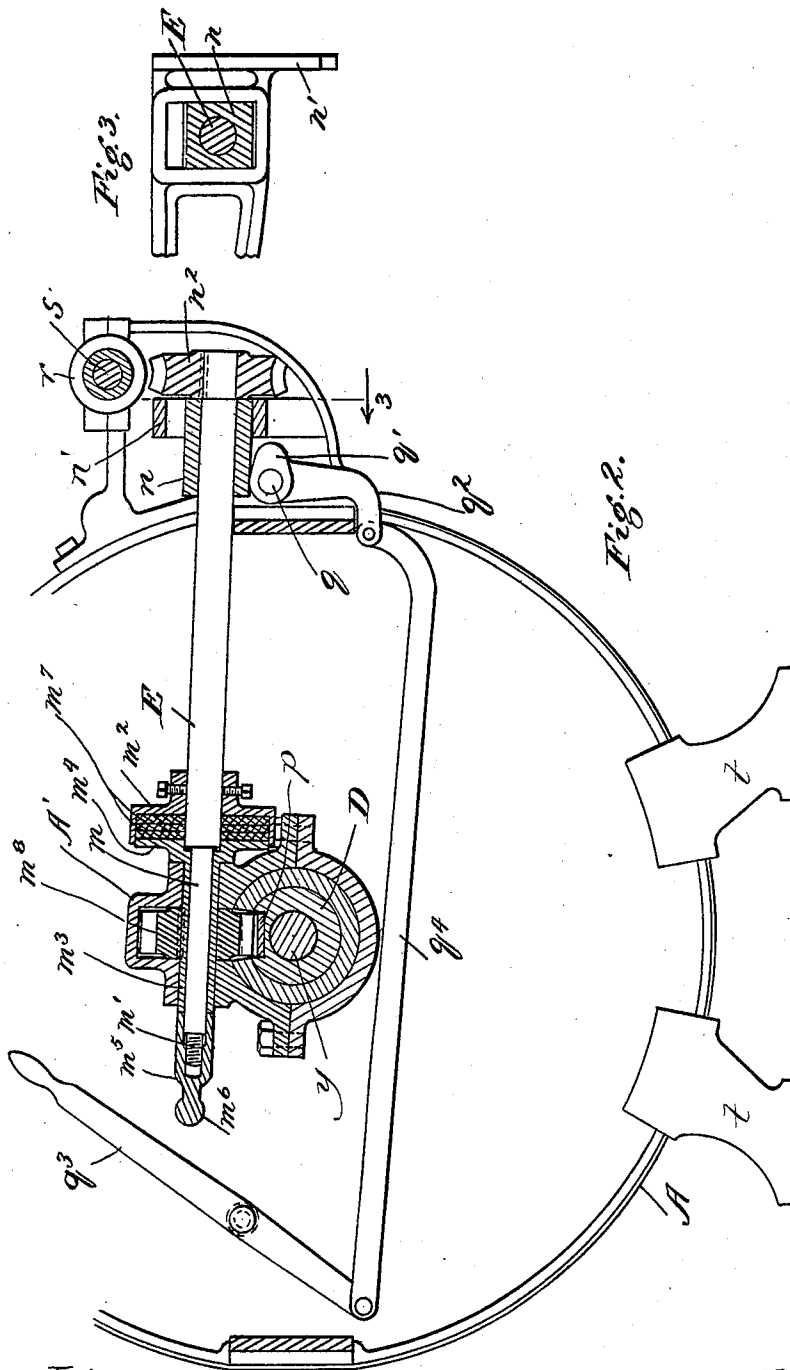
(No Model.)

4 Sheets—Sheet 2.

J. W. SUNDERLAND.
WASHING MACHINE.

No. 570,190.

Patented Oct. 27, 1896.



Witnesses:

J. H. Lee.

R. J. Spencer

Inventor:

Jesse W. Sunderland.

By Dyrenforth & Dyrenforth

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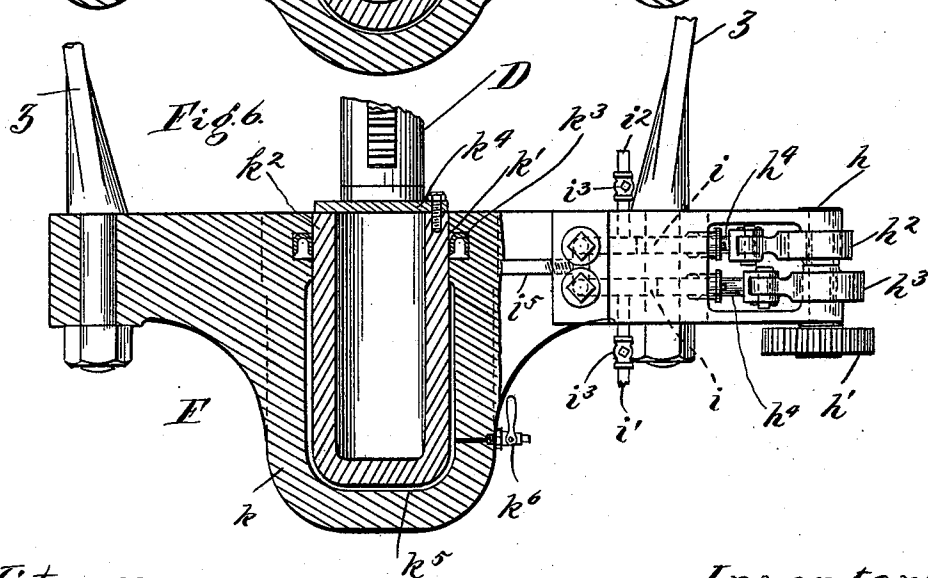
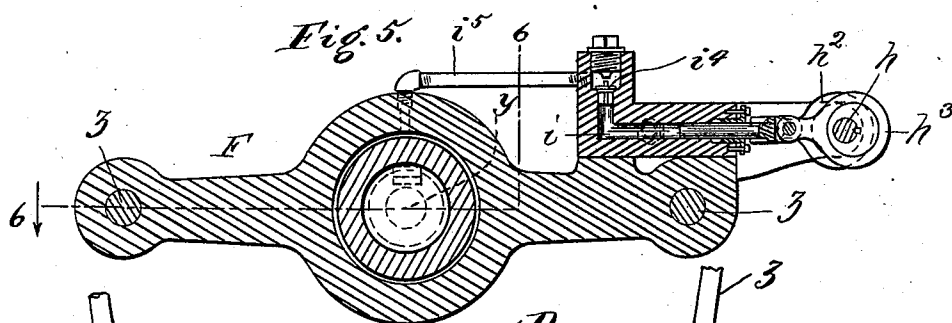
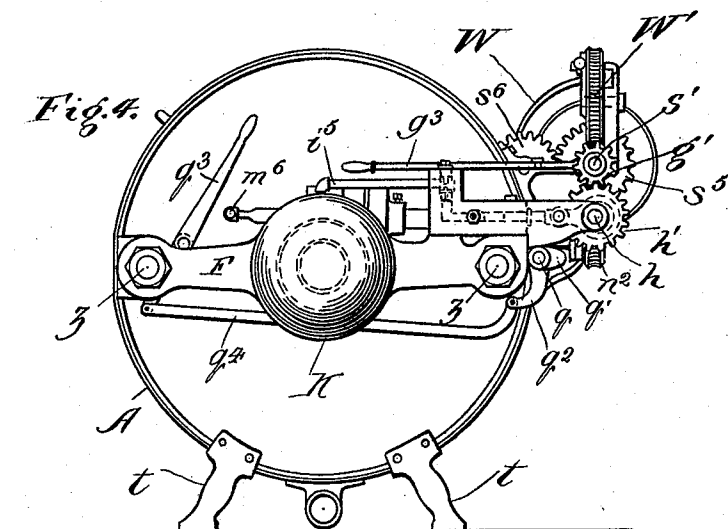
(Nò Model.)

4 Sheets—Sheet 3.

J. W. SUNDERLAND.
WASHING MACHINE.

No. 570,190.

Patented Oct. 27, 1896.



Witnesses:

J. H. Lee.

R. J. Sumner

Inventor:

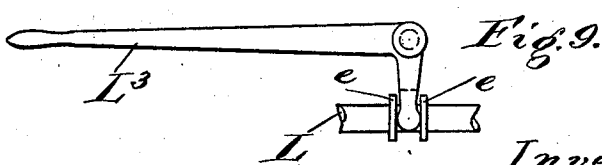
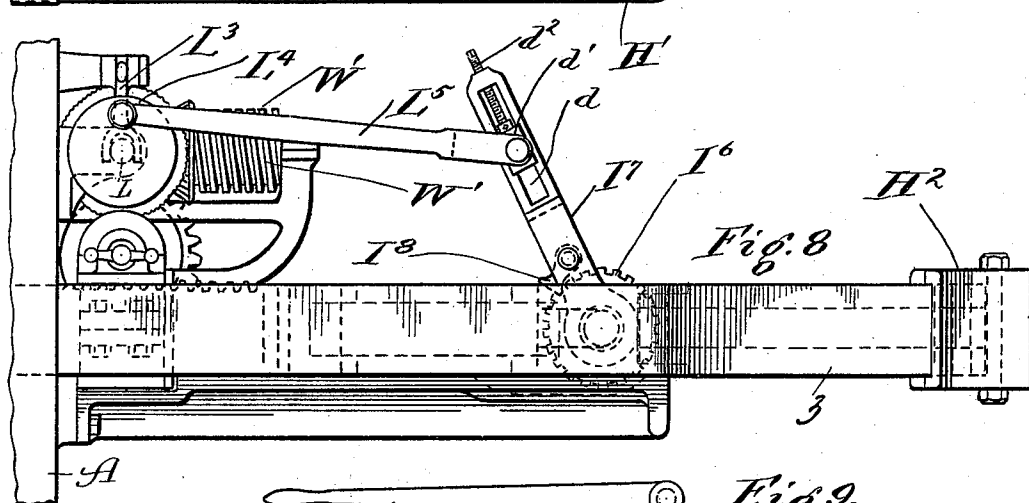
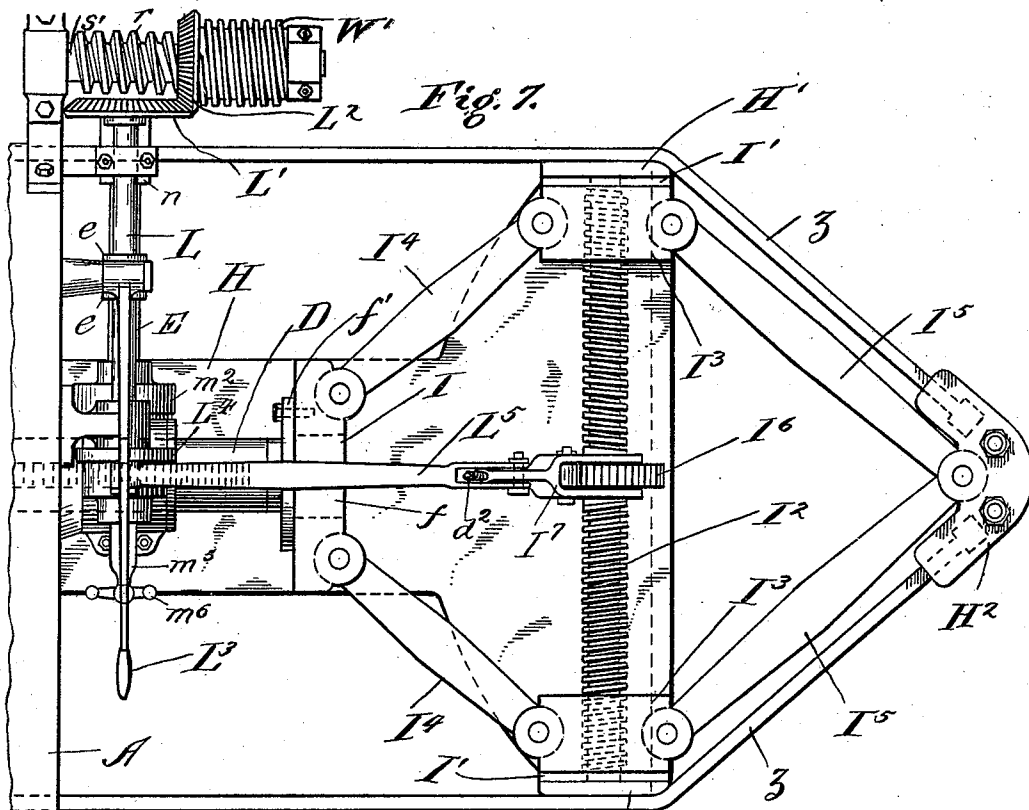
Jesse W. Sunderland,

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Inventor:

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UNITED STATES PATENT OFFICE.

JESSE W. SUNDERLAND, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF
TO ANDREW J. McDUFFEE, OF SAME PLACE.

WASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,190, dated October 27, 1896.

Application filed April 6, 1896. Serial No. 586,291. (No model.)

To all whom it may concern:

Be it known that I, JESSE W. SUNDERLAND, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Clothes-Wringers, of which the following is a specification.

My invention relates to improvements in a clothes-wringer intended more especially as an attachment to or part of a washing-machine.

In the practice of my invention the wringing operation is performed by squeezing the clothes between perforated plates or heads, great power being required for the purpose.

In applying my invention I prefer to provide it as an attachment to or integral part of a washing-machine of the type shown and described in Letters Patent No. 545,747, granted to me September 3, 1895, and which consists, broadly stated, in an outer stationary cylinder or casing provided with a door, an inner cylinder having a perforated circumferential wall provided with a door, and mounted upon trunnions to revolve alternately in opposite directions, and perforated heads or plates mounted upon the ends of plunger-bars in the inner cylinder, the said heads or plates being caused to revolve with the cylinder and to reciprocate toward and away from each other to facilitate the washing operation. In the reciprocation of the heads or plates the clothes being washed are subjected intermittingly to a squeezing operation applied more or less gently for the purpose of discharging a part of the water that has been absorbed by the clothes, and thus by repeated action produce the desired cleansing.

My present object is to bring improved wringing mechanism into action after the washing operation has been performed, the said mechanism operating to force the heads or plates in the direction of each other with great power to squeeze from the clothes or other articles that have been washed as much as possible of the water absorbed thereby, to render them comparatively dry before they are taken from the machine.

In the drawings, Figure 1 is a top plan view of a washing-machine provided with my

improved wringer in the form of a hydraulic jack; Fig. 2, an enlarged broken section taken on line 2 of Fig. 1 and viewed in the direction of the arrow; Fig. 3, a broken section taken on line 3 of Fig. 2 and viewed in the direction of the arrow; Fig. 4, a view in end elevation of the machine provided with the hydraulic-jack wringing device; Fig. 5, an enlarged section taken on line 5 of Fig. 1; Fig. 6, a broken plan view, partly in section, the section being taken on the angular line 6 6 of Fig. 5; Fig. 7, a plan view of wringer mechanism involving a pushing-jack formed with toggle-levers and applied to the end of a washing-machine like that shown in Fig. 1; Fig. 8, a side elevation of the mechanism shown in Fig. 7, and Fig. 9 a broken detail view of a shipping-lever forming a part of said mechanism.

A is a stationary outer cylinder or casing mounted at opposite ends upon legs *t* and provided at one side with a sliding door *t'*. Mounted in brackets *t² t³ t⁴* on one side of the casing are shaft-sections *s s'*, abutting at their ends against each other. On the shaft *s* is a fast pulley *s²*, and on the shaft *s'* is a fast pulley *s³*. Between the said pulleys is a loose pulley *s⁴*.

In the casing A is a washing-cylinder B, (indicated by dotted lines in Fig. 1,) mounted at opposite ends to revolve upon hollow trunnions journaled in the ends of the casing. On one end of the cylinder B is a circumferential gear *x*, and at the opposite end of the said cylinder is a circumferential gear *x'*. On the shaft-section *s'*, adjacent to the bearing *t⁴*, is a pinion *s⁵*, meshing with an idle-gear *s⁶*, which in turn meshes with the gear *x* on the washing-cylinder. On the shaft-section *s*, adjacent to the bearing *t²*, is a pinion *s⁷*, meshing with an idle-pinion *s⁸*, which in turn meshes with a second idle-pinion *s⁹*, the latter meshing with the gear *x'* on the washing-cylinder. The shaft-section *s'* is formed with a worm *r*, and the shaft-section *s* is formed with a worm *r'*. The cylinder B is provided in its circumferential wall with numerous perforations, and in the said cylinder are traveling perforated heads or plates C C', mounted upon the ends of shafts *y*, which extend through and rotate in hollow

sleeves or plunger-bars D and D'. The plunger-bars D D' are each provided with a rack p .

As thus far described the machine is in every essential particular like the machine shown and described in my aforesaid Letters Patent, and more detailed illustration and description are thought, therefore, to be unnecessary.

At opposite ends of the casing are shafts E E', mounted at their free end portions in blocks n , arranged to slide vertically in brackets n' , fastened to the casing. On the free ends of the shafts E E' are worm-gears n^2 . Each shaft E E' is formed with a reduced end portion m , provided at its outer end with a screw-thread m' . Firmly secured upon each of said shafts, near its reduced portion m , is a cup m^2 . Fitting over the reduced end portion of each shaft E E' is a sleeve m^3 , provided at its inner end, adjacent to the cup m^2 , with a head or disk m^4 . Fitting against the end of the sleeve m^3 is a sleeve extension or jam-nut m^5 , provided with a handle m^6 and an internal thread engaging the threaded end m' of the shaft. In each cup m^2 , and interposed between the base thereof and the head m^4 , are one or more friction-disks m^7 . The sleeves m^3 revolve in bearings A' on the ends of the casing, and keyed to the said sleeves, and revolving in housings formed by the bearings A', are pinions m^8 , meshing with the teeth of the racks p . On the side of the casing, below and parallel with the shaft-sections $s s'$, is a rock-shaft q , provided at each end with a cam q' , upon which the vertically-sliding blocks n rest. At one end of the shaft q is a crank q^2 . Fulcrumed between its ends upon the same end of the cylinder A is a lever or handle q^3 , pivotally connected at its lower end to one end of a rod q^4 , which at its opposite end is pivotally connected to the free end of the crank q^2 . Turning of the lever q^3 in the direction to the left in Fig. 2 thrusts the rod q^4 and turns the crank q^2 and rock-shaft q , whereby the cams q' turn and raise the shafts E E' coincidently with the blocks n and cause the worm-gears n^2 to engage, respectively, with the worms $r r'$. At the drive-pulleys is a belt-shifter W, operated by suitable automatic belt-shipping worm-wheel-and-screw mechanism W', which may be substantially like that shown in my aforesaid Letters Patent, to move the driving-belt across the loose pulley s^4 alternately to the fast pulleys $s^2 s^3$.

The general operation of the washing-machine is as described in my aforesaid Letters Patent, and is, briefly stated, as follows: The clothes to be washed are passed through the door t' and a door in the washing-cylinder B into the washing-cylinder, between the traveling heads C C', the latter being withdrawn toward the ends of the cylinder. The casing is filled with water or a washing liquid to the desired level, the doors are closed, and the machine started to rotate the drive-shaft. When the belt is shifted to the pulley s^2 , the

shaft-section s' is rotated to rotate the pinions $s^5 s^6$ and rotate the cylinder in one direction. When the belt-shifting mechanism shifts the belt to the pulley s^3 , the shaft-section s , through its pinion s^7 and two intermediate pinions $s^8 s^9$, rotates the washing-cylinder in the opposite direction. When it is desired to bring the traveling heads C C' into operation, the handle or lever q^3 is turned to move the worm-gears into mesh with the worms $r r'$. It will be understood that when either the shaft-section s or s' is rotated from its drive-pulley it rotates the other shaft-section in the opposite direction, owing to the fact that they are geared, as described, to the opposite ends of the cylinder B. When the worm-gears are caused to mesh with the worms $r r'$, as described, the shafts E E' are rotated in opposite directions, and, through their pinions m^8 , move the plungers D D', and consequently the traveling heads C C', in opposite directions. When one shaft-section is driven directly from the belt, the heads will travel toward each other, and when the power is applied to the other shaft-section the heads will travel away from each other. The belt-shipping mechanism is so adjusted that a reversal of motion will occur when the heads have traveled the desired distance in each direction. The rotation of the inner cylinder, with the clothes, alternately in opposite directions produces the first washing of the clothes, the final washing and rinsing being performed by the same rotations of the cylinder and reciprocations of the traveling heads.

In the pushing-jack construction shown in Fig. 1, beyond one end of the casing A, is a supplemental head F, and beyond the opposite end thereof is a supplemental head G, the said heads being tied together by means of the longitudinally-extending brace-rods $z z$. The head G has a central opening l , through which the adjacent plunger D' may pass freely in its reciprocation. On the inner face of the said head, at the opening l , are pivotally mounted plates or stops l' , adapted to swing into and out of the path of the plunger D'. The hydraulic jack at F consists of a cylinder portion k , closed at its outer end and having a slightly-reduced opening k' at its inner end.

In the cylinder k , and working through the opening k' , is a movable head or piston k^2 , the joint being rendered water-tight by a preferably flexible washer k^3 , as shown. The piston k^2 is hollow or cup-shaped to permit the reciprocation into and out of it of the adjacent plunger D. On the forward end of the piston is a swinging stop or plate k^4 , like the stops l' , and adapted to be swung into and out of the path of the plunger D. At one side of the cylinder k is a pair of pump-cylinders $i i$, having inlet or water-supply pipes $i^1 i^2$, provided with check-valves i^3 , and outlet-valves i^4 , communicating with a pipe i^5 , which leads to the chamber or cylinder k at one side of the piston k^2 . As shown in Fig. 6, the chamber back of the opening k' is

larger than the piston, so that a space k^5 will always exist about the rear end portion of the piston. Journalled in brackets on the end of the head F is a shaft h , provided at one end with a gear-wheel h' . On the shaft h are eccentrics h^2 h^3 , connected with pump-pistons h^4 , working in the pump-cylinders i . On the outer end portion of the shaft-section s' is a loose sleeve g , adapted to slide upon the said shaft-section, and provided at its outer end with a pinion g' , meshing with the gear-wheel h' . The inner end of the sleeve g is serrated to form a clutch member and to slide into and out of engagement with a serrated clutch member g^2 , fixed to the shaft-section s' . A lever or handle g^3 is fulcrumed between its ends upon a bracket g^4 , and at the end of its short arm is provided with a pin which enters a circumferential groove in the sleeve g . By turning the handle g^3 the sleeve g may be slid longitudinally upon the shaft-section s' into and out of engagement with the clutch member g^2 , and when the clutch members engage, the sleeve g will be driven from the shaft-section s' to rotate the shaft h and work the pump-pistons.

When it is desired to wring clothes that have been washed, the plungers are stopped with the perforated heads at the inner limits of their traverse, as indicated in Fig. 1, after which one or more of the stops l' are turned into the path of the plunger D' and the stop k^4 is turned into the path of the plunger D. The handle g^3 is then turned to bring the pumps into operation, as described, causing them to draw water through the pipes i' i^2 and valve i^3 and discharge it through the valves i^4 and pipe i^5 into the chamber or cylinder k at the space k^5 , whereby the pressure of the water will be exerted against the rear end of the head or piston k^2 and force the latter in the outward direction. The head C' will be prevented from receding by the stop l' , and the pressure of the piston k^2 at its stop k^4 against the end of the plunger D will force the traveling head C in the direction of the head C'. The great power which may thus be brought to bear against the clothes or other articles will produce a thorough wringing operation. Said operation may be assisted by the centrifugal force effected by the continued rotation of the inner cylinder and disks. When the wringing operation is completed, the water may be discharged from the cylinder by opening the cock k^6 .

In the operation of the machine care should be exercised by the operator not to cause the plungers to be actuated from the worms r r' when the stops l' k^4 extend across the paths of the plungers. The construction at the friction-disks m^7 is provided to prevent injury to the parts in the event that the operator shall fail to move the stops l' k^4 out of the way before throwing the worm-gears into mesh with the worms r r' . By means of the handles m^6 the sleeves m^3 may be pressed at their heads m^4 against the friction-disks m^7

with desired force, and the adjustment should be such that the frictional engagement produced will be sufficient to insure movement of the plunger-rods during the operation of washing and rinsing the clothes. In the event that the plungers should strike the stops l' k^4 , or a greater resistance than desired should be offered against the movement toward each other of the traveling heads C C', the friction plates or disks will turn upon each other or upon the surfaces afforded by the parts m^4 m^2 , and thus prevent such strain upon the driving parts as would cause injury.

In the pushing-jack construction shown in Figs. 7 and 8 a bed-plate H extends from the end of the casing A and carries two end bearing-blocks H' H'. The tie-bars z z extend across the outer sides of the said bearing-blocks and meet in a toggle-joint bearing-head H². Resting upon the plate H to slide thereon in the direction longitudinal of the machine is a head I, having an opening through it, f , in line with the plunger D, and large enough to permit the plunger to move freely through it. On the head I, at the opening f , is a pivotal stop f' , capable of being swung into and out of the path of the plunger D. At the fixed blocks H' H' are sliding plates or blocks I' I', forming bearings for the opposite ends of a right and left hand screw-shaft I². On opposite sides of the center of the shaft I² are internally-threaded traveling blocks I³ I³. Pivotaly connected at opposite ends, respectively, to the head I and blocks I³ are toggle-arms I⁴ I⁴, and pivotaly connected at opposite ends, respectively, to the blocks I³ and end bearing-block H² are toggle-arms I⁵. Fixed to the center of the screw-shaft I² is a ratchet-wheel I⁶, and I⁷ is a bifurcated lever pivoted at the free ends of its forks upon the shaft I² at opposite sides of the ratchet-wheel I⁶ and provided with a swinging pawl I⁸ to engage the teeth of the ratchet-wheel.

Mounted in brackets on the end of the casing A is a shaft L, carrying at its end a beveled gear-wheel L'. On the shaft-section s' is a beveled gear-wheel L². The shaft L is longitudinally movable in its bearings, and fulcrumed above the shaft is a shaft-shifting bell-crank lever L³, which at the end of its short arm projects between stops e e on the shaft L. Swinging of the lever L³ in the vertical plane causes the shaft L to be moved longitudinally to carry its gear-wheel L' into and out of engagement with the gear-wheel L². On the end of the shaft L is a disk L⁴, to which is eccentrically pivoted a plunger-rod L⁵. In the lever I⁷ is a slot d , movable in which is a sliding block d' , adjustable by means of a set-screw d^2 . The rod L⁵ at its free end is bifurcated and pivotaly connected to opposite sides of the block d' .

In operation, when it is desired to produce wringing of the clothes or other articles that have been washed, the heads C C' are stopped in the position shown in Fig. 1, the stop-

plate *l'* on the head *G* is moved into the path of the plunger *D'*, and the stop-plate *f'* on the sliding head *I* is turned into the path of the plunger *D*. The lever *L*³ is then turned to move the gear-wheel *L'* into mesh with the gear-wheel *L*², when the turning of the shaft *L* and disk *L*⁴ will reciprocate the rod *L*⁵ and oscillate the lever *I*⁷. The swinging pawl *I*⁸ is then turned to engage the ratchet-wheel *I*⁶ and turn the screw-shaft *I*² to cause the sliding blocks *I*³ to move in the direction of each other. As the blocks *I*³ approach each other they extend the arms *I*⁴ *I*⁵, causing the blocks *I*³, screw, and blocks or plates *I*¹ to be moved in the direction of the casing *A* and the head *I* to be slid along the plate *H*. The engagement of the head *I* with the plunger *D* forces the head *C* in the direction of the head *C'* and accomplishes the wringing operation. When the wringing has been performed, the head *I*, blocks, and attendant parts may be moved to their initial position by reversing the pawl *I*⁸.

The pushing-jack mechanism involving the screw and toggle-levers would be the preferred construction when applied to washing-machines of the smaller type, while the hydraulic pushing-jack mechanism would probably be more desirable for machines of the larger type. Either mechanism is capable of greatly multiplying the force over the driving power and affords very desirable means for moving the traveling heads to produce the wringing operation.

Although I prefer to construct my improvements as shown and described, they may be modified in the matter of details of construction without departing from the spirit of my invention, as defined by the claims.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a washing-machine provided with a washing-cylinder, movable perforated heads in said cylinder, plungers carrying said heads, and reciprocating means for said plungers, of wringer mechanism at the said machine comprising a movable plunger-engaging head, and pushing-jack mechanism at the said plunger-engaging head, substantially as and for the purpose set forth.

2. The combination with a washing-machine provided with a washing-cylinder, driving mechanism, movable perforated heads in said cylinder, plungers carrying said heads,

and reciprocating means for said plungers actuated from the said driving mechanism, of wringer mechanism at the said machine comprising a movable plunger-engaging head, and pushing-jack mechanism at the said plunger-engaging head actuated from the said driving mechanism, substantially as and for the purpose set forth.

3. The combination with a washing-machine provided with a washing-cylinder, movable perforated heads in said cylinder, plungers carrying said heads, and reciprocating means for said plungers, of wringer mechanism at the said machine comprising a stop movable into and out of the path of one of said plungers, a movable plunger-engaging head at the other said plunger, and pushing-jack mechanism at the said plunger-engaging head, substantially as and for the purpose set forth.

4. The combination with a washing-machine provided with a washing-cylinder, movable perforated heads in said cylinder, plungers carrying said heads, and driving mechanism, of means for reciprocating said plungers comprising shafts rotated from the said driving mechanism and geared to the said plungers, the shafts being each formed of members in frictional engagement with each other, and means for regulating the frictional engagement, wringer mechanism at the said machine comprising a movable plunger-engaging head, and pushing-jack mechanism at the said plunger-engaging head, substantially as and for the purpose set forth.

5. The combination with a washing-machine provided with a washing-cylinder, movable perforated heads in said cylinder, plungers carrying said heads, and reciprocating means for said plungers, of wringer mechanism at the said machine comprising a movable head provided with an opening through it for the passage of one of said plunger-rods, a stop on the head at said opening movable into and out of the path of the plunger-rod, pushing-jack mechanism at the said movable head, and a stop movable into the path of the other said plunger, substantially as and for the purpose set forth.

JESSE W. SUNDERLAND.

In presence of—
M. J. FROST,
J. H. LEE.