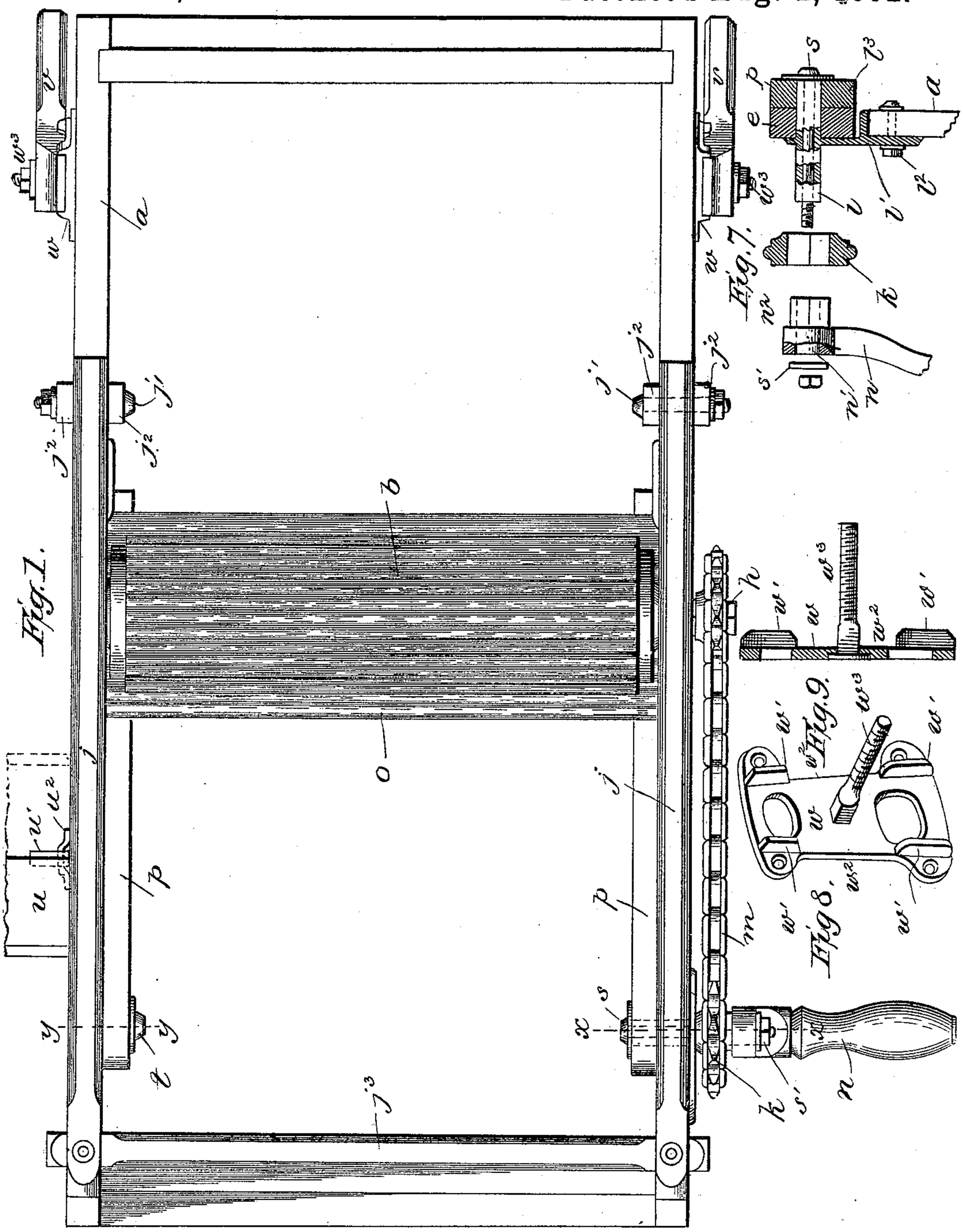
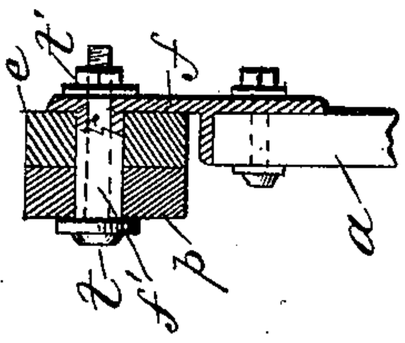
(No Model.) 4 Sheets—Sheet 1.

J. W. SPANGLER.

WASHING MACHINE.

No. 480,214. Patented Aug. 2, 1892.





WITNESSES

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his Attorney

(No Model.)

4 Sheets—Sheet 2.

J. W. SPANGLER.

WASHING MACHINE.

No. 480,214. Patented Aug. 2, 1892.

Fig. 1c.

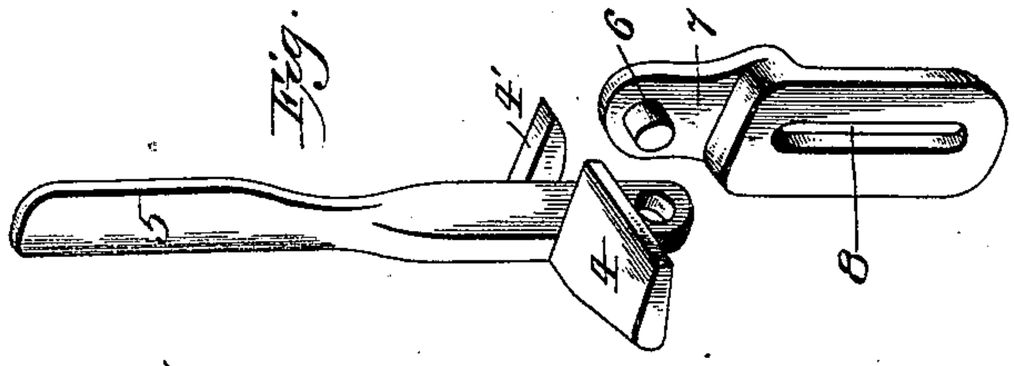


Fig. 1d.

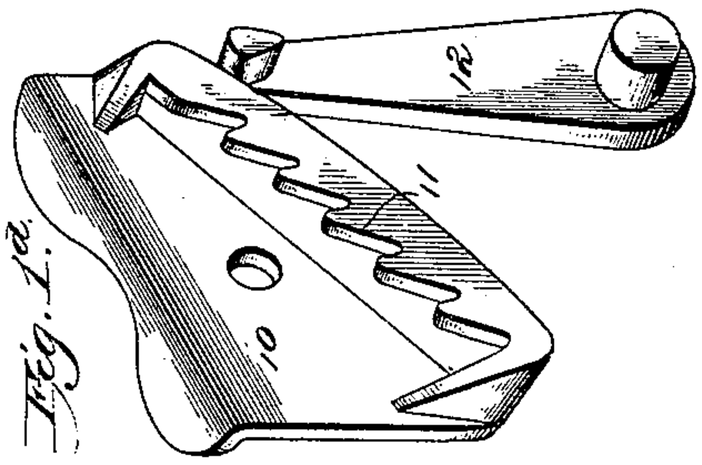
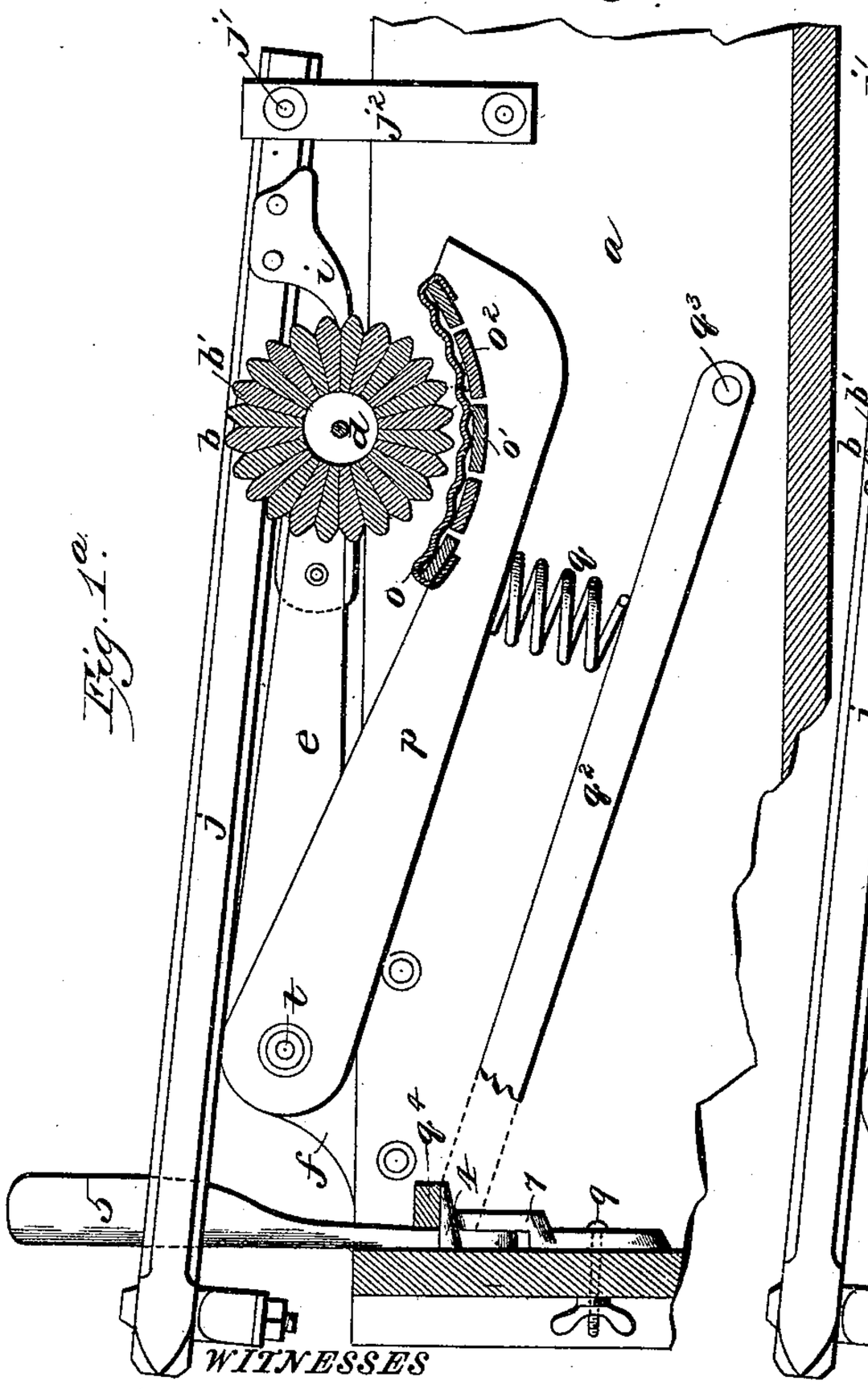
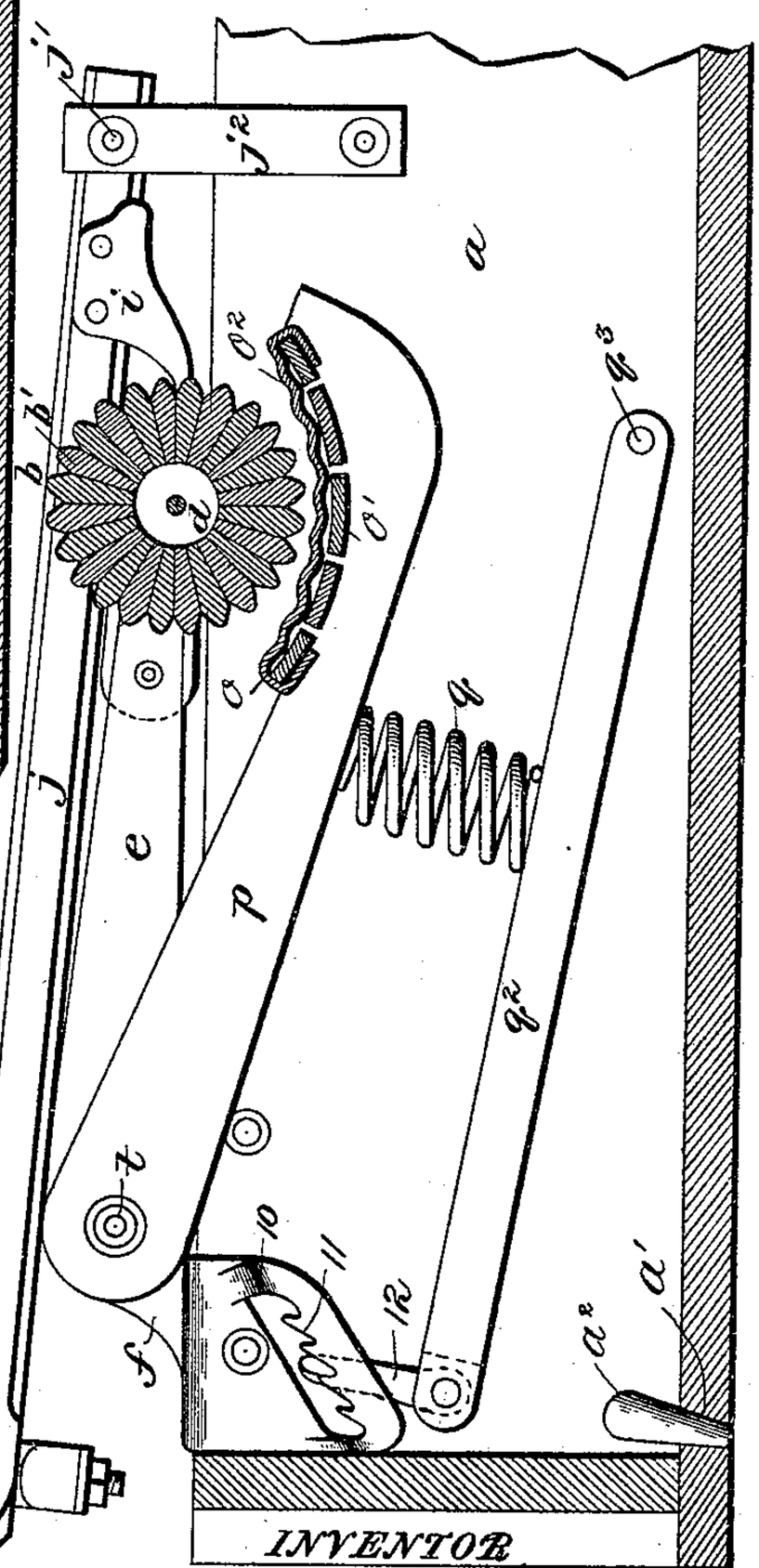


Fig. 1a.





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4 Sheets—Sheet 3.

J. W. SPANGLER.

WASHING MACHINE.

No. 480,214. Patented Aug. 2, 1892.

Fig. 2.

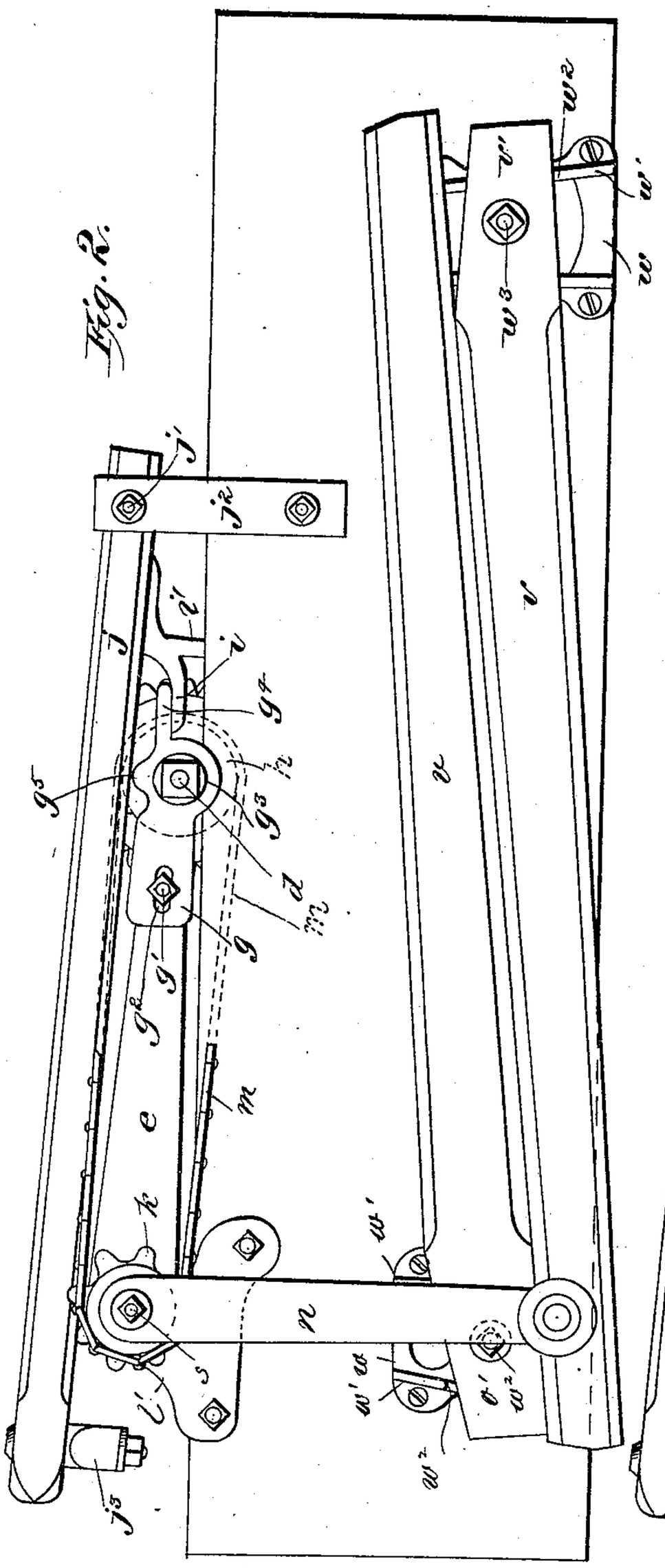
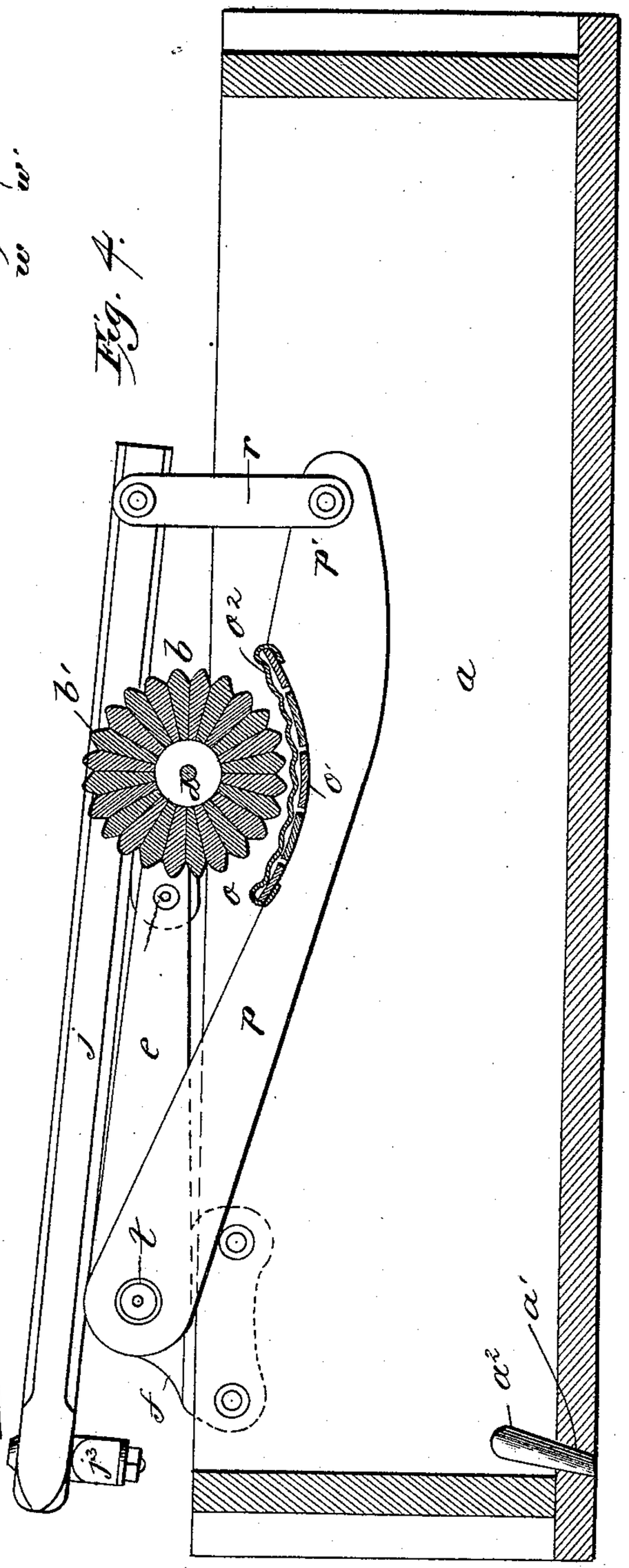


Fig. 4.



WITNESSES
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(No Model.)

4 Sheets—Sheet 4.

J. W. SPANGLER.

WASHING MACHINE.

No. 480,214. Patented Aug. 2, 1892.

Fig. 6.

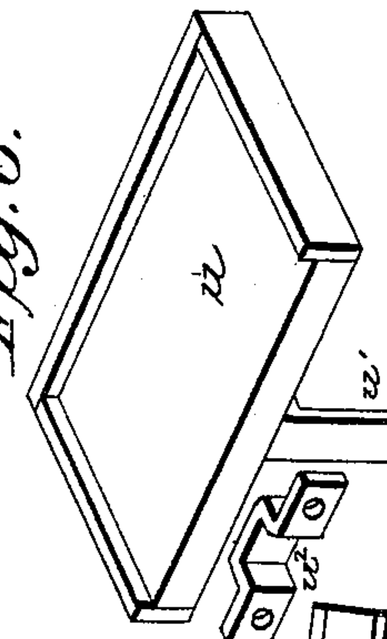

Fig. 3.

Fig. 5.

WITNESSES

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UNITED STATES PATENT OFFICE.

JACOB W. SPANGLER, OF YORK, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO MOSES E. HARTZLER, OF SAME PLACE.

WASHING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 480,214, dated August 2, 1892.

Application filed June 12, 1891. Serial No. 396,005. (No model.)

To all whom it may concern:

Be it known that I, JACOB W. SPANGLER, a citizen of the United States, residing at York, in the county of York and State of Pennsylvania, have invented a certain new and useful Improvement in Washing-Machines, of which the following is a full, clear, and exact description.

This invention relates to that class of washing-machines in which a positively-driven rubbing-cylinder is combined with an opposed rubbing-surface, between which cylinder and rubbing-surface the clothes to be washed are passed and rubbed. I have found that where the rubbing-surface is composed of rollers there is insufficient adhesion to move the clothes, and consequently the rubbing is imperfect, and the clothes are not properly acted upon to remove the dirt, and I have found that where a smooth surface or a surface of smooth substance or material is employed and such surface is stationary—that is to say, non-rotary—sufficient adhesion is developed under the action of the rotary cylinder to force the clothes through and give them a rubbing action that is nearly like that of the human hands upon a wash-board. The surface that I prefer to employ is zinc corrugated in the direction of the length of the rubbing-cylinder, although I do not limit my invention to the employment of zinc or a corrugated surface, as other material may be employed so long as its surface is smooth.

In practicing my invention I employ a longitudinally ribbed or corrugated cylinder and means to drive it rotarily, and I provide movable bearings for the cylinder and for the rubbing-surface and combine therewith a pressure-regulator. Either the cylinder or the rubbing-surface, or both of them, may be turned up out of the tub or trough in which they are arranged. These features constitute one portion of my invention.

Washing-machines which include a tub or trough are ordinarily provided with fixed legs to support them at a proper height for use. These legs add to the cubic space occupied by the machine in transportation and storage and in this aspect are an element of considerable expense to shippers and in storing. Another part of my invention consists in providing foldable legs.

In the accompanying drawings, illustrating my invention, in the several figures of which like parts are similarly designated, Figure 1 is a plan view. Figs. 1^a and 1^b are sectional elevations of preferred forms of pressure-regulators. Figs. 1^c and 1^d are perspective views, respectively, of the pressure-regulators of Figs. 1^a and 1^b, detached. Fig. 2 is a side elevation of the form of machine illustrated in Fig. 1, showing the machine in position for transportation or storage, the sprocket-wheel *h* and part of the chain being shown in dotted lines in order to show clearly and fully the parts behind them. Fig. 3 is a longitudinal section of one form of the machine, and Fig. 4 is a similar view of a modification. Fig. 5 is a longitudinal section of the cylinder. Fig. 6 is a perspective view of the soap-dish and its socket detached. Fig. 7 is a section in detail taken in the plane of line *x x*, Fig. 1. Fig. 8 is a perspective view, and Fig. 9 a vertical section, of the leg-socket. Fig. 10 is a section of a portion of the machine on line *y y*, Fig. 1.

Without thereby limiting my invention to the details of construction, excepting as hereinafter claimed, I will proceed to describe my invention with reference to the illustrations in the drawings.

The letter *a* designates a tub or trough or box rectangular in outline and of sufficient length and depth and by preference made of wood and adapted to contain water for washing purposes. This tub may be provided with an outlet-hole a' and a stopper a^2 therefor. Instead of making a complete tub to contain water, I may mount my apparatus upon a frame such as shown in the drawings, but without a bottom, and adapt it to be used upon any common tub or other vessel. The cylinder *b* may be of any approved construction; but I prefer, for many reasons, to construct it as follows: A number of sectors b' are cut from a flat piece of wood in such shape that when assembled they will form a cylinder whose periphery is fluted or corrugated. The inner angles of these sectors are removed, so as to make a hollow cylinder. The ends of

these sectors are provided with tongues b^2. These sectors are fitted between heads c and c', and each head is provided with an annular socket c^2, which receives the tongues b^2 of the sectors and holds them in place. The heads c and c' are provided with hollow gudgeons c^3 and c^4, and a bolt d is passed through these hollow gudgeons through the central opening of the cylinder and supplied with a nut and washer d' to bind the heads and sectors together. Arms e are pivoted to brackets f and l', mounted on opposite sides of the tub, and the other ends of these arms are provided with castings g, either or both of which may be adjustably secured to the arms e by means of bolts g' and slots g^2. These castings g are provided with journal boxes or bearings g^3, which receive the gudgeons c^3 and c^4 of the cylinder. The gudgeon c^3 is provided with a squared portion c^5 to receive a sprocket-wheel h, so that the said sprocket-wheel when rotated will rotate the cylinder. The sprocket-wheel is first applied to the squared portion c^5 before the nut and washer d' are applied to the bolt d, and therefore the said nut and washer bind all these parts together. It will be observed that, the arms e being pivoted, it is possible to move the cylinder in and out of the tub when desired. The castings g, in which the cylinder is supported, are provided with projections g^4. These projections rest in brackets i, which are secured to a lever-frame j, pivoted at j' in standards j^2, secured to the tub on each side. The lever-frame is provided with a cross-bar j^3. By means of the engagement of the projections g^4 with the brackets i the upward movement of the cylinder may be controlled, and by means of the engagement of the side arms of the lever-frame j with knobs g^5 on the castings g any degree of downward pressure may be applied to the cylinder for purposes of the work in hand.

The power sprocket-wheel k is mounted upon a laterally-projecting stud l on a bracket l', made fast to the side of the tub, as by a bolt l^2, and a chain belt m connects the two sprocket-wheels h and k. The stud l is cylindrical, while the sprocket-wheel k is made with an angular opening or hub, and the power handle or crank n is made with a circular opening n' to fit the cylindrical stud l, while the said crank is provided with an externally-angular projection n^2 to fit in the angular hub of the sprocket-wheel k, so as to rotate the said sprocket-wheel and drive the chain, while at the same time the said crank revolves freely upon the stud l. The bracket l' is provided with a stud l^3, projecting from its other side, and this stud receives one of the arms e, which support the cylinder, the other arm e being supported upon a stud f' of the bracket f. (See details in Fig. 10.) Should the chain belt m stretch, such stretch may be taken up by adjustment of the casting g by means of its bolt g' and slot g^2.

The rubbing-surface o is composed of a foundation o' of boards spaced to permit of swelling without distortion, which boards are mounted upon arms p, pivoted, respectively, to the studs l^3 and f' of the brackets l' and f. The foundation o' is supplied with an active surface o^2 of corrugated zinc or other material, the surface of the said material being smooth, for the reason already stated.

In one form of my invention the arms p rest upon springs q, which are secured to blocks q', made fast to the sides of the tub. The brackets i, which are carried by the lever-frame j, are provided with toes i', extending downwardly and resting upon the ends of the arms p, so as always to keep the rubbing-surface at a proper working distance from the cylinder. This is necessary in order to get the proper traction, and when the parts are in this position the cylinder has a free vertical movement in its arms until its knobs g^5 come in contact with the side arms of the lever-frame. When a considerable thickness of clothes is introduced between the cylinder and the rubbing-surface and the toes i' are lifted from the arms p, or, in other words, the springs q yield to permit the descent of the rubbing-surface, then the proper pressure to secure the travel of the clothes back and forth between the cylinder and the rubbing-surface as the said cylinder is rotated back and forth is secured by pressure upon the lever-frame j.

As shown in Fig. 4, I may omit the springs q and the bearings j^2 for the lever-frame and may extend the arms p beyond the rubbing-surface, as at p', and connect the ends of the lever-frame and these ends of the arms p by means of links r. In this form of my invention the knobs g^5 become pivots or fulcra for the lever-frame, and the requisite pressure is obtained by bearing upon the cross-bar j^3 of the lever-frame, the arms p and the lever-frame following one another in accordance with the pressure that is put upon the lever-frame.

The arms e and p and the sprocket-wheel k and crank n are secured to the hollow studs l^3 and l by means of the bolt s and its nut and washer s', and the other arms e and p are secured to the hollow stud f' of the bracket f by means of a bolt and its nut and washer t. A considerable economy in construction and assembling of the parts is effected by this manner of uniting the parts.

The soap-dish u is provided, having a bracket u' fixed to it which engages a socket u^2, secured to the side of the tub. This soap-dish is made removable, so that it may be taken from its socket and nailed to the inside of the tub for transportation purposes.

In order to bring the machine within the smallest possible compass for purposes of economy in the cost of transportation and for storage, I provide foldable legs v. These legs by preference are made with beveled ends v'. Sockets w to receive these beveled ends of the legs are secured to the sides of the tub, and these sockets are provided with

flanges w', which are cut away at w^2. When the legs are in the upright position, as shown in Figs. 1 and 3, the beveled ends are secured to the sockets between the flanges w' and securely held therein by means of bolts and nuts w^3. These bolts are countersunk in the backs of the sockets, as clearly indicated in Figs. 8 and 9. By removing the nuts the legs may be disengaged from the flanges w' of the sockets w, and the legs then turned up into the position indicated in Fig. 2, so that their beveled ends fit in the cut-away portions w^2 of the flanges, and then, the nuts being reapplied to the bolts, the legs may be securely bound to the sides of the tub, and so be in position for safe transportation.

My invention in foldable legs may be extended to other apparatus than washing-machines.

In using my machine the clothes are soaked and soaped and then one end introduced between the cylinder and the rubbing-surface and a rotary motion given to the cylinder, such as will impel the clothes in one direction between them back into the tub, and by passing the clothes first in one direction and then in the other without at any time releasing the grip of the cylinder upon them a very thorough rubbing action may be given them which more closely resembles the action of the human hands upon clothes on a wash-board than is possible with any machine known to me. It is also possible with my machine to rub any portion of a garment independently of the whole. By using the smooth rubbing-surface the machine is less liable to fracture and tear off buttons than other machines to me known. With my machine the degree of pressure upon the clothes being washed is wholly under the control of the operator through the medium of the lever-frame j, and thus a rubbing action of greater or less severity may be applied to the clothes. Inasmuch as the clothes are being passed back and forth in the water constantly as they are being rubbed the clothes are thereby constantly supplied with the washing fluid and the dirt released by the rubbing action is carried away by the water. By rotating the lever-frame j in the direction of arrow 2 in Fig. 3 the cylinder and its arms are lifted until the brackets i are freed from the projections g^4, and then the said lever-frame by continued rotation in the same direction may be moved to the other end of the tub. Then by swinging the cylinder and its arms in the direction of the arrow 3 the said cylinder may be removed from the tub to the left-hand end. The rubbing-surface at this time and under these circumstances is also movable in the same direction as the cylinder, and thus the tub is wholly free and may be used for rinsing or other purposes. When the cylinder and rubbing-surface are folded outside of the machine, heavy garments may be washed by placing a tub beneath the roller and running the garments between the cylinder and rubbing-surface. Pressure can be obtained by applying the hand to the rubbing-surface. By arranging the power-crank at one end of the machine and off of the cylinder itself, I obtain the self-adjusting feature in the cylinder, and in addition I remove the power appliance to one end of the machine, so that an operator may stand at one end instead of at the side of the machine and have the whole apparatus under control at that one point, and in addition a considerable economy of power is obtained, and an accelleration of speed.

In Figs. 1^a, 1^b, 1^c, and 1^d I have shown the preferred forms of pressure-regulator. I specially prefer that form shown in Figs. 1^a and 1^c. Instead of rests q' for the springs q, I employ arms q^2, pivoted at q^3 to the sides of the tub and having their opposite ends connected by a cross-bar q^4, which rests upon the toes 4 and 4′ of a rock-lever 5. This lever 5 is pivoted to a fulcral pin 6 of a casting 7, and this casting is made adjustable as to height by a slot 8 and bolt 9, in accordance with the strength of the springs q. By lateral movement of the rock-lever 5 the toe 4 is caused to raise and lower the bar q^4, and consequently the arms q^2, and thereby put more or less tension on springs q and so modify the pressure exerted between the rubbing-surface and roller. The lever 5 extends upwardly and alongside of the pressure-bar j^3, so as to be within easy and convenient reach of the operator. In the form of pressure-regulator shown in Figs. 1^b and 1^d, instead of the lever 5 and casting 7, I employ castings 10, each of which is provided with a toothed rack 11, adapted to be engaged by the hooks 12, which are pivoted to the arms q^2. By adjusting the hooks 12 in the toothed racks more or less pressure may be put upon the springs q and so upon the rubbing-surface. Obviously the form of pressure-regulator shown in Figs. 1^a and 1^c is preferred over that last described because it is adjusted instantly and by one movement, while the others require an adjustment of each arm. By means of the pressure-regulator, and more particularly that form of it shown in Figs. 1^a and 1^c, a light tension may be put upon the springs to bring the rubbing-board up against the roller, so as to operate on thin garments having buttons without injuring them. If more pressure is required upon such garments at places where there are no buttons, it may be readily given through operation of the lever 5.

While herein specifically claiming the form of pressure-regulator shown in Figs. 1^a and 1^c, I mean to include within my broad claims all of the various forms of pressure-regulators herein shown and described.

What I claim is—

1. A rubbing-cylinder, pivoted arms in which it is mounted to rotate, and a lever-frame for supporting said cylinder and its arms and for imparting downward pressure thereupon, combined with a rubbing-surface, substantially as described.

2. A rubbing-cylinder, pivoted arms in which it is mounted to rotate, and a lever-frame for supporting said cylinder and its arms and for imparting a downward pressure thereupon, combined with a rubbing-surface supported upon pivoted arms and made yielding with the cylinder, substantially as described.

3. A rubbing-cylinder, pivoted arms in which it has bearings, and a lever-frame supporting the said arms and consequently the cylinder and adapted to impart a downward pressure thereupon, combined with the rubbing-surface, pivoted arms supporting the same, and springs tending normally to force the said arms upwardly, substantially as described.

4. In a washing-machine, a rotary cylinder, pivoted arms in which it is mounted to rotate, and a lever-frame for supporting the cylinder and arms and for regulating the pressure thereupon, combined with an exposed rubbing surface or bed arranged wholly below said cylinder, whereby the clothing being washed is taken from the tub and passed between the cylinder and rubbing-surface back into the tub at the other end and then returned, being exposed to view and subjected to the variable pressure of the cylinder in such passage, substantially as described.

5. In a washing-machine, a rotary corrugated or fluted cylinder adapted to be revolved in either direction, pivoted arms in which it is mounted to rotate, and a lever-frame for supporting the cylinder and arms and for regulating the pressure thereupon, combined with an exposed rubbing surface or bed arranged wholly below said cylinder and yielding supports therefor, whereby the clothing may be run back and forth between the tub and cylinder and bed and rubbed and wet, being exposed to view and subjected to the variable pressure of the cylinder in its passage, substantially as described.

6. The cylinder and its end gudgeons, castings having boxes to receive the said gudgeons, end projections from said castings, a lever-frame having brackets to receive the said projections, and supports for said castings, substantially as and for the purpose described.

7. A body *a*, provided with sockets *w*, having flanges *w'* cut away at w^2, and legs adapted to fit said sockets longitudinally to support the body and to be turned up transversely of the said sockets and secured thereto, so as to fold the legs substantially within the compass of the body for the purposes of transportation and storage, and bolts to unite the legs and sockets in either position, substantially as described.

8. A rubbing-cylinder, pivoted arms in which it is mounted to rotate, a lever-frame for supporting it and its arms, a rubbing-surface, and pivoted arms in which it is supported, combined with a pressure-regulator comprising springs interposed between the pivoted arms of the rubbing-surface and supports therefor and an adjusting mechanism for raising and lowering the spring-supports to increase and diminish the tension of the springs, substantially as described.

9. A rubbing-cylinder, pivoted arms in which it is mounted to rotate, a lever-frame for supporting it and its arms, a rubbing-surface, and pivoted arms in which it is supported, combined with a pressure-regulator comprising springs, pivoted supports for such springs, the said springs being interposed between the pivoted arms of the rubbing-surface and the pivoted supports, a cross-bar connecting the free ends of the pivoted supports, and a rock-lever engaged by the cross-bar by which the cross-bar may be raised and lowered, substantially as described.

10. A rubbing-cylinder, pivoted arms in which it is mounted to rotate, a lever-frame for supporting it and its arms, a rubbing-surface, and pivoted arms in which it is supported, combined with a pressure-regulator comprising springs, pivoted supports for such springs, the said springs being interposed between the pivoted arms of the rubbing-surface and the pivoted supports, a cross-bar connecting the free ends of the pivoted supports, a rock-lever engaged by the cross-bar, by which the cross-bar may be raised and lowered, and an adjustable fulcrum-piece for said rock-lever, substantially as described,

In testimony whereof I have hereunto set my hand, this 8th day of June, A. D. 1891.

JACOB W. SPANGLER.

Witnesses:
DAVID O. PRINCE,
J. T. M. SMITH.