W. J. ZUILL.

LAUNDRYING MACHINE.

APPLICATION FILED MAY 3, 1910.

1,021,498.

Patented Mar. 26, 1912.

3 SHEETS—SHEET 1.

Fig. 5.

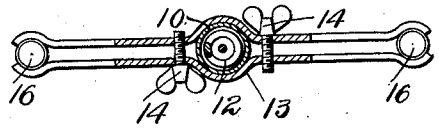
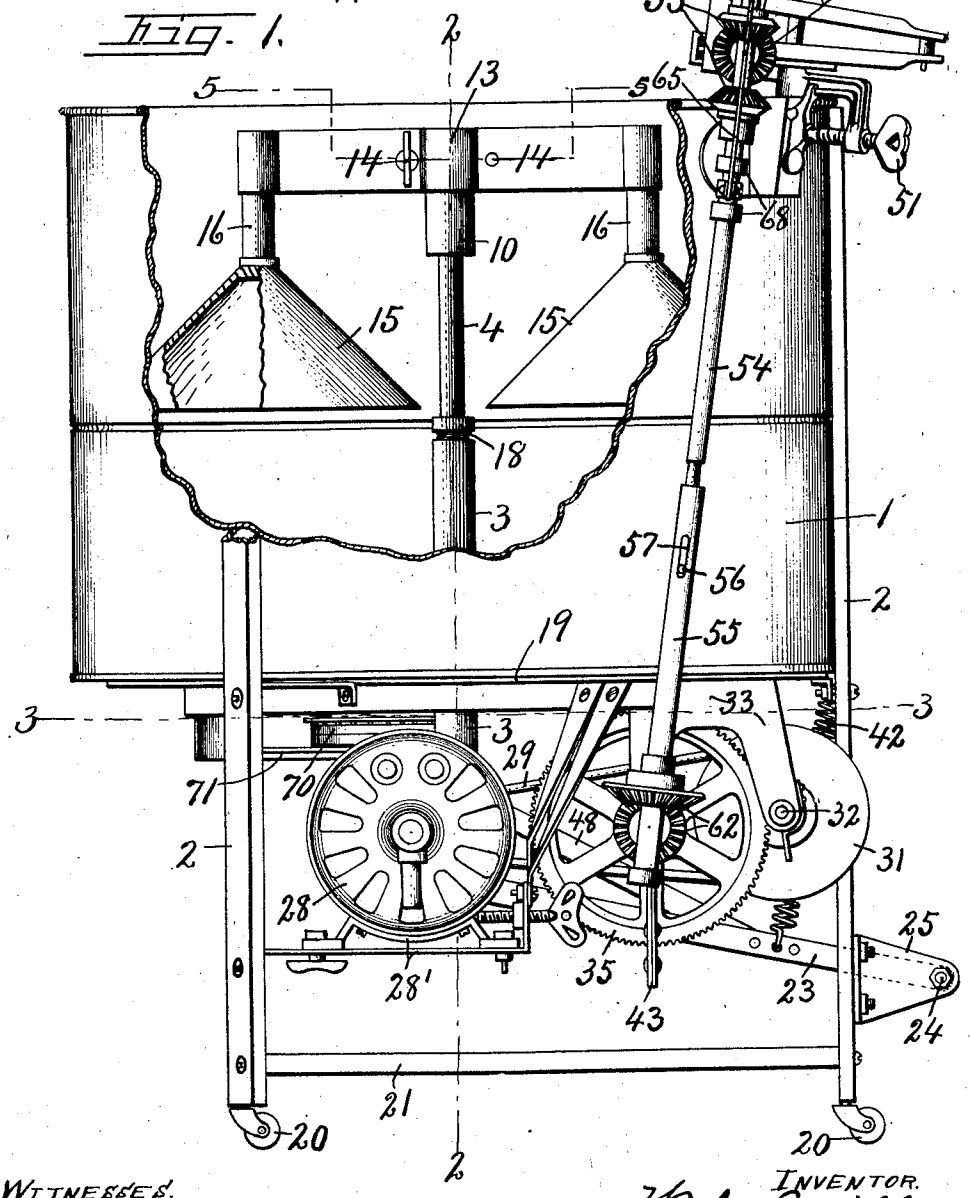


Fig. 1.



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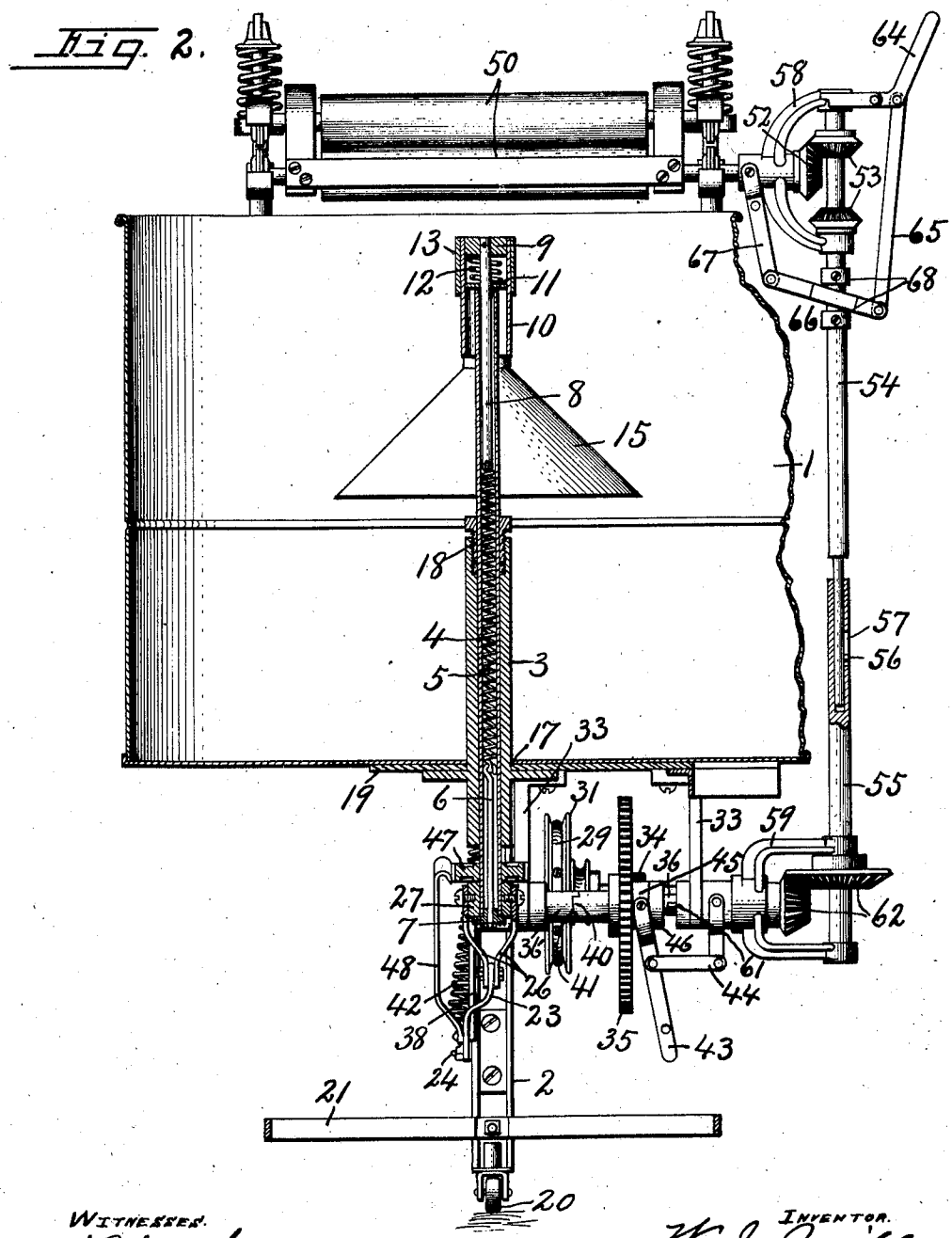
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

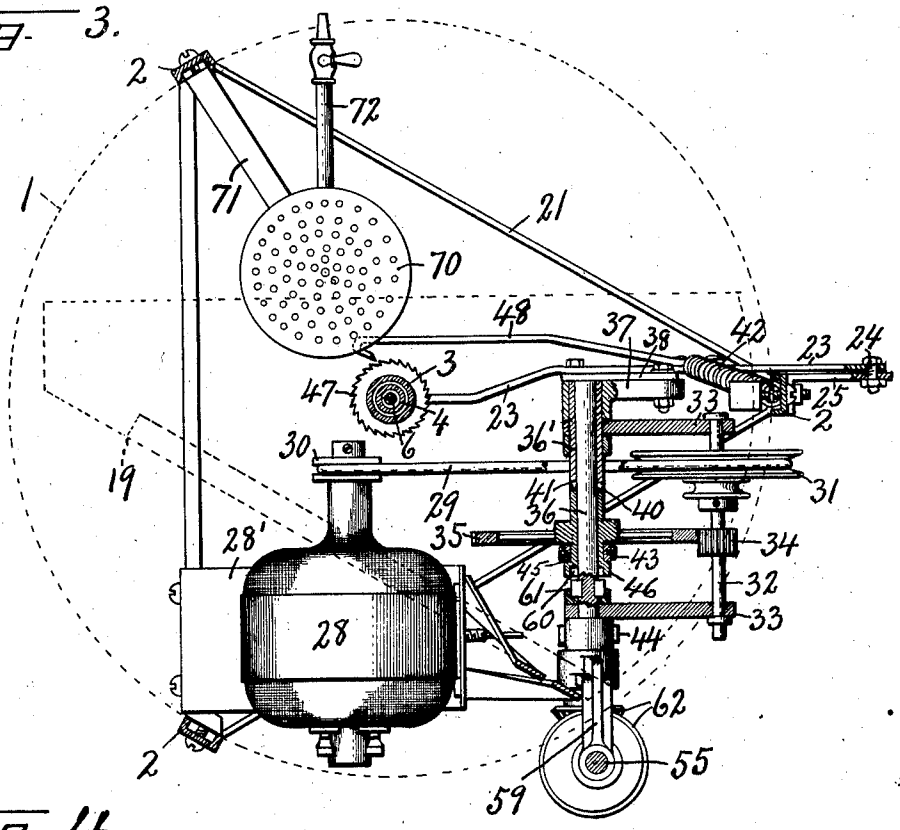
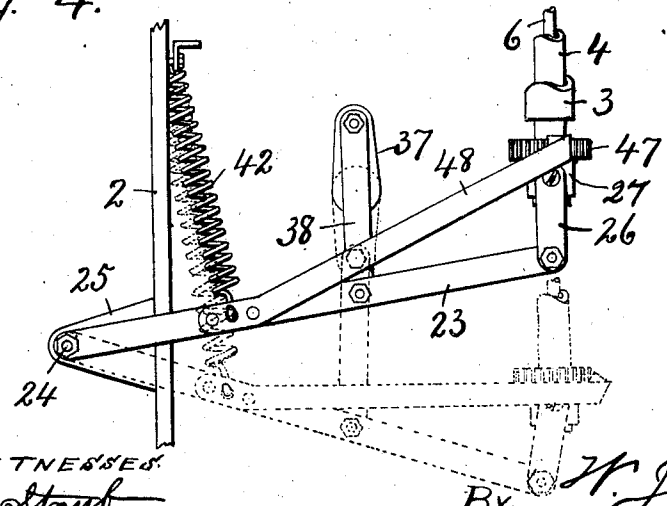


Fig. 4.



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LAUNDRYING-MACHINE.

1,021,498. Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed May 3, 1910. Serial No. 559,168.

To all whom it may concern:

Be it known that I, WALTER J. ZUILL, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Laundrying-Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in laundrying machines and refers more particularly to motor driven "washers" for domestic use.

The main object is to produce a machine which will effectually cleanse the coarsest or finest clothing or fabrics in the least possible time without liability of mutilating or otherwise injuring the fabric. This object is best carried out by the use of inverted cup-shape pistons reciprocally movable in the vat into and out of contact with the clothes, so as to force the cleansing fluid back and forth through the interstices of the fabric by varying air pressures.

Another object is to transmit motion from the motor to the pistons without in any way obstructing or restricting the full opening in the top of the vat for the free insertion and removal of the clothes.

A further object is to provide means for automatically and intermittingly shifting the position of the pistons step by step rotarily so as to bring them into contact with all portions of the clothes during successive compression strokes.

Other objects and uses will be brought out in the following description.

In the drawings: Figure 1 is a side elevation of a motor driven laundrying machine embodying the various features of my invention, portions of the vat being broken away to show the plungers and their supporting yoke and spindle. Fig. 2 is a transverse vertical sectional view taken on line 2—2, Fig. 1, omitting the motor. Fig. 3 is a horizontal sectional view taken on line 3—3, Fig. 1, except that the driving gear of the clutch sections and bearings on the main driving shaft and also the bearings for the counter-shaft are shown in section. Fig. 4 is a side elevation of the detached means for reciprocating and rotating the piston carrying the plunger. Fig. 5 is a detail sectional view taken on line 5—5 Fig. 1 showing the means for adjustably securing the yoke to the head.

In carrying out the objects stated a cylindrical vat or tub —1— preferably of sheet metal for receiving the clothes and a suitable cleansing fluid is mounted upon a series of, in this instance three, supporting legs —2— and is provided with a central upright tubular guide —3— extending through the bottom thereof for receiving and guiding a vertically movable tubular plunger —4— which extends entirely through and some distance beyond the lower and upper ends of the guide —3—. Movable within this tubular plunger —4— is a coil spring —5— having its lower end connected by an eye-bolt —6— to a suitable cap or limiting stop —7— which engages the lower end of the plunger —4—. The upper end of the spring is connected by a similar eye-bolt or rod —8— to a vertically movable head —9— lying directly over the upper end of the plunger —4—. Secured to the head —9— is a pendent sleeve —10— which surrounds and extends downwardly some distance below the upper end of the plunger —4—, so as to prevent as far as possible the water from entering the upper end of said plunger. Within the sleeve —10— is a relatively movable plate or washer —11— which is spring pressed against the upper end of the plunger —4— by a coil spring —12—, the latter being interposed between the plate —11— and under side of the head —9— and together with said plate constitutes a buffer or shock absorber for a purpose hereinafter described, said spring also serving to normally hold the plate —11— across the upper end of the tubular plunger to exclude water therefrom. This plate —11— is provided with a central aperture closely fitting with an easy sliding fit upon the rod —8— to permit relative endwise movement of the plate and rod.

The coil spring —5— within the tubular plunger is tensioned to draw the head —9— and its sleeve —10— downwardly with sufficient pressure to slightly compress the spring —12— and thereby hold the plate —11— in contact with the upper end of the plunger, at the same time permitting the head and sleeve to be held or moved upwardly against the action of the spring

—5— or to permit the plunger to be drawn downwardly against the action of said spring relatively to the head and sleeve.

A yoke —13— is adjustably secured by suitable clamping means, as screws —14—, to the sleeve —10—, so as to move vertically thereon, said yoke being provided with oppositely extending radial arms for receiving and supporting a plurality of, in this instance two, inverted cup-shape pistons —15— which are located at opposite sides of and equi-distant from the plunger —4— and are spaced apart a sufficient distance to easily clear the tubular guide —3— when reciprocated in a manner presently described. These pistons —15— preferably consist of downwardly flaring hollow sheet metal cups or inverted basins having cylindrical stems —16— projecting upwardly from their apexes and rigidly secured to the outer ends of the radial arms of the yoke —13—. The diameter of the lower end of each of the pistons —15— is substantially equal to or slightly less than the radial distance between the periphery of the tubular guide —3— and inner surface of the vat —1— leaving just sufficient clearance to permit vertical movement of the pistons without friction with either the vat or tubular guide.

The tubular guide —3— is secured in a central aperture —17— in the bottom of the vat —1—, so as to form a water tight joint therewith and projects upwardly some distance into the vat, its upper end being provided with a stuffing box or gland —18— to prevent the entrance of water thereto.

The bottom of the vat is reinforced and stiffened by a somewhat heavier flat metal plate —19— which also serves as a convenient means for supporting underlying parts of the machine, hereinafter described.

The supporting legs —2—, which are secured to the sides of the vat, extend downwardly some distance below the bottom thereof for supporting the vat at a convenient height and their lower ends are provided with casters —20— which permit the entire machine to be moved along the floor from place to place, as may be necessary. A triangular frame —21— is secured at its apexes to the lower ends of the legs to brace the latter against relative lateral movement and together with said legs constitute the main supporting frame for the vat and other parts of the machine.

Driving means for the piston supporting plunger.—The means for reciprocating the plunger —4— and pistons connected thereto is applied to the lower end of the plunger and is preferably located directly beneath the bottom of the vat or tub —1—, said means consisting in this instance of a rock arm or lever —23— having its outer end pivoted or fulcrumed at —24— to a bracket —25— on the main supporting frame and its inner end connected by a link —26— to a grooved collar —27— on the lower end of the plunger some distance below the lower end of the sleeve —3—. This rock arm or lever —23— may be operated by any suitable motor driven mechanism and for this purpose I have shown in Figs. 1 and 3 an electric motor —28— as supported upon a bracket or shelf —28′— directly under the bottom of the vat —1—, the bracket —28′— being secured to the main supporting frame. The motor shaft is connected by a belt —29— and pulleys —30— and —31— to a countershaft —32— which is journaled in suitable brackets —33— also forming a part of the main supporting frame and preferably secured to the under side of the bottom of the tub, as more clearly shown in Figs. 1 and 2. Secured to the countershaft —32— is a pinion —34— which meshes with a somewhat larger gear —35—, the latter being loosely mounted upon a shaft —36— for independent rotary and axial movement. Loosely mounted upon the same shaft at the inner end of the hub of the gear —35— is a sleeve —36′— which is journaled in the adjacent bracket —33— and is provided with a crank arm —37— rigid thereon and connected by a link —38— to the intermediate portion of the rock arm or lever —23—. The inner end of the hub of the gear —35— is provided with suitable clutch teeth —40— which are movable into engagement with similar clutch teeth —41— on the sleeve —36′— as the gear —35— is moved in one direction for the purpose of transmitting rotary motion to the crank arm —37— and thereby oscillating the rock arm —23— to impart vertical reciprocal motion to the plunger —4— and pistons —15—.

The downward movement of the pistons and their supporting plunger is aided somewhat by gravity and in order that the motor may be relieved from excessive load in elevating the pistons I provide a retracting spring —42— having one end connected to a portion of the main supporting frame and its other end connected to the intermediate portion of the lever —23—, said spring being tensioned to exert an up-lift on said lever, thereby aiding the motor in elevating the plunger —4— and pistons —15—.

Any suitable means may be employed for shifting the gear —35— axially to lock it to the sleeve —36′—, said means consisting in this instance of a lever —43— which is fulcrumed upon a suitable support —44— and is pivotally connected to a collar —45—, the latter being loosely mounted upon the hub of the gear —35— between said gear and a shoulder —46— on the hub to hold the collar —45— against endwise movement relatively to the gear. It is now clear that when the lever —43— is shifted outwardly

or to the right of Fig. 2, the clutch —40— will be thrown into interlocking engagement with the sleeve —36'—, thereby rotating said sleeve and crank arm —37— and transmitting vertical reciprocal motion to the pistons —15— through the medium of the plunger —4— and rock arm —23—.

Intermitting planetary action of the pistons.—During this reciprocal movement of the pistons the latter are rotarily and intermittently shifted, step by step, a limited distance about the axis of the plunger —4—, so as to bring them into contact with all portions of the clothes during each complete revolution. For this purpose a ratchet wheel —47— is secured to the lower end of the plunger between the adjacent ends of the tubular guide —3— and collar —27— and is adapted to be engaged and operated, step by step, one or more teeth at a time, by a pawl —48— which is rigidly secured to the intermediate portion of the lever —23— some distance inwardly from its fulcrum or pivot —24—, the relative positions of the lever and pawl being such that when the plunger and pistons are elevated to nearly the limit of their up-stroke, the pawl will engage and operate the ratchet wheel one or more teeth, thereby rotating the plunger to shift the position of the pistons rotarily a distance considerably less than their diameters, so as to cause said pistons to travel, step by step, around the entire area of the vat. This partial rotation of the plunger and pistons takes place while the latter are elevated clear from the clothes, the pistons remaining in their shifted positions during their compression stroke.

It will be seen upon reference to the drawings and description that the plunger —4— is positively reciprocated in the guide tube —3— by the operation of the lever —23— and that the yoke —13— and pistons —15— are similarly reciprocated under the yielding tension of the spring —5—, the spring —5— being comparatively stiff so as to cause the pistons to engage the clothes under considerable but yielding pressure, thereby permitting the pistons to conform to varying thicknesses or varying degrees of resistance which may be offered by contact with the clothes.

The throw of the crank arm —37— is sufficient to move the pistons —15— from their extreme up-position, shown in Figs. 1 and 2, to a position in proximity to the bottom of the vat, thereby maintaining the full efficiency of the machine for light or heavy washings, it being understood that when the downward movement of the pistons is limited by pressure upon the clothes the plunger continues through its full downward stroke, thereby increasing the tension of the spring and consequently increasing the pressure of the pistons upon such clothes, that is, when the washing is heavy and greater pressure is required this pressure is provided for in the increased tensioning of the spring under the limited action of the pistons.

As previously stated the pistons are hollow and conical, so that when brought into contact with the clothes the air is trapped and compressed therein, thus producing an air cushion which on the compression stroke forces the cleansing fluid through the interstices of the fabric, while on the other hand during the up-stroke a partial vacuum is formed in the pistons which operates to draw the water back through such interstices. The cleansing fluid is therefore forced back and forth through the fabric by varying air pressures which enables the finest of fabrics to be washed without liability of mutilation.

Wringer and operating mechanism therefor.—Any suitable wringer, as —50—, may be properly secured, as by clamping means —51—, to the upper edge of one side of the vat —1— where it is easily available for use in connection with the washing operation and is adapted to be driven from the same source of power as the motor —28—. For this purpose the shaft of one of the wringer rolls is extended axially some distance beyond the periphery of the vat —1— and provided with a pinion —52— which is adapted to be rotated by one or the other of a pair of axially movable pinions —53— for operating the wringer rollers in reverse directions, when desired. The pinions —53— are secured to another upright axially movable shaft section —54— which is slidably connected to a coaxial shaft section —55—, said shaft sections being locked for simultaneous rotation by a key or pin —56— riding in a slot —57—, as clearly shown in Fig. 2. The upper end of the shaft section —54— and adjacent end of the wringer shaft are journaled in a suitable yoke—58— which serves to hold the shaft section and wringer shaft in operative relation. In like manner the lower shaft section —55— and adjacent horizontal shaft —36— are journaled in a yoke —59—.

The outer end of the hub of the gear —35— is provided with a clutch section —60— which is movable with said gear into and out of engagement with a coaxial clutch section —61—, the latter being secured to the shaft —36—, so that when the gear —35— is shifted axially by the lever —43— to disengage the clutch —40— from the clutch section —41— on the sleeve —36'—, the clutch section —60— is interlocked with the clutch section —61—, thereby rotating the shaft —36— and stopping the reciprocal action of the pistons. This rotary motion of the shaft —36— is transmitted to the upright shaft section —55— by means of inter-

meshing gears —62— for operating the wringer.

The pinions —53— are spaced apart a greater distance than the diameter of the pinion —52— and at opposite sides thereof and together with the shaft section —54— are adapted to be moved axially by a lever —64— which is connected by a link —65— to a shaft engaging lever —66—, the latter being connected by a link —67— to the yoke —58—. The lever —66— is engaged with opposed shoulders —68— on the shaft section —54— for moving said shaft section and its pinions —53— endwise as the lever —64— is operated. It is now apparent that when the lever is shifted to one extreme position, as shown in Fig. 2, the upper pinion —53— will be brought into engagement with the pinion —52— to operate the wringer rollers in one direction as in drawing the clothes from the vat, and when moved from the opposite extreme position the lower pinion —53— will be brought into engagement with the pinion —52— to reverse the direction of rotation of the wringer rolls thus permitting the cloth or garment to be passed back and forth between the rollers as many times as desired by simply shifting the lever —64— from one extreme position to the other; or by shifting the lever —64— to another intermediate position to disconnect both of the pinions —53— from the pinion —52— the operation of the wringer will cease.

Although I have shown and described a wringer and its operating mechanism as associated with a washing machine, it is only to show a complete article of manufacture and is not herein claimed for the reason that it is reserved for a separate application.

Any suitable means may be employed for heating the washing fluid in the vat —1— and for this purpose I have shown a gas burner —70— as mounted upon a supporting bracket on the main supporting frame directly under and in close proximity to the bottom of the tub and adapted to be connected by a valved pipe —72— to a source of supply not shown.

In operation the cup-shape pistons and their supporting plunger are driven wholly from the underside or beneath the vat leaving practically the entire top and interior of the vat open for the reception and removal of the clothes, it being understood that the pistons and their supporting yoke may be removed from the plunger by simply loosening the clamping means —14— and withdrawing the yoke and pistons upward. On the compression stroke of the pistons —15— when they encounter the clothes and their downward movement is temporarily checked, the plunger —4— continues to move downwardly, thereby withdrawing its upper end from the buffer plate or washer —11—, so that when the plunger returns to reëngage said plate it together with the spring —11— acts as a buffer to prevent too sudden jar of the coöperating parts, the pawl —48— being brought into engagement with the ratchet wheel —47— during the up-stroke to shift the position of the pistons and cause them to come into contact with all portions of the clothes throughout the area of the vat. When the washing is finished the lever —43— is shifted to disconnect the pistons and plunger from their operating means, as the motor, and to simultaneously connect said motor to the wringer operating mechanism, thus permitting the clothes to be passed through the wringer backward and forward if necessary to partially dry the same. It is evident, however, that many of the details herein described may be modified without departing from the spirit of my invention and therefore I do not limit myself to such construction and arrangement.

What I claim is:

1. In a laundrying machine, a vat, a plunger extending through the bottom of the vat, a yoke mounted on the plunger and movable relatively thereto, a piston mounted on the yoke, spring connections between the plunger and yoke, and means connected to the plunger for reciprocating the same.

2. In a laundrying machine, a vat, a piston movable in the vat, means extending through the bottom of the vat for reciprocating the piston, said piston having an independent vertical movement relatively to said operating means and a ratchet and pawl action for rotating the piston as it is reciprocated.

3. In a laundrying machine, a vat, a piston movable in the vat, means extending through the bottom of the vat for reciprocating the piston, and further means for intermittingly shifting the position of the piston circumferentially of the vat.

4. In a laundrying machine, a vat, a plunger extending through the bottom of the vat, a yoke on the plunger, pistons secured to said yoke and movable within the vat, means for reciprocating said plunger, and additional means for intermittingly rotating the plunger to change the positions of the pistons circumferentially of the vat.

5. In a laundrying machine, a vat having a tubular guide extending through the bottom thereof, a plunger movable in the guide, a yoke on the plunger, pistons mounted on the yoke and movable in the vat, yielding connections between the plunger and yoke, means applied to the lower end of the plunger for reciprocating the same, and additional means for intermittingly rotating the plunger to shift the positions of the pistons circumferentially of the vat.

6. In a laundrying machine, a vat, a plunger extending through the bottom of

the vat, a yoke adjustably mounted on the plunger, pistons mounted on the yoke at opposite sides of the plunger, yielding connections between the yoke and plunger, and means connected to the lower end of the plunger for reciprocating the same.

7. In a laundrying machine, a vat, a plunger extending through the bottom of the vat, a yoke adjustably mounted on the plunger, pistons mounted on the yoke at opposite sides of the plunger, yielding connections between the yoke and plunger, means connected to the lower end of the plunger for reciprocating the same, and additional means for intermittingly rotating the plunger to shift the positions of the pistons circumferentially of the vat.

In witness whereof I have hereunto set my hand on this 27th day of April 1910.

WALTER J. ZUILL.

Witnesses:
H. E. CHASE,
D. L. HUMPHREY.