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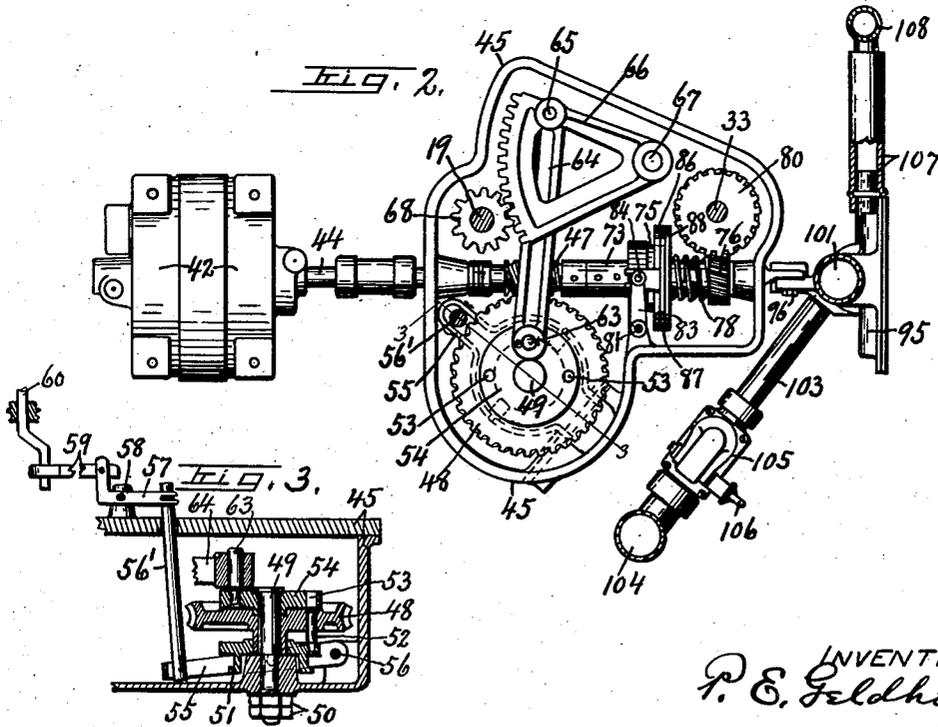
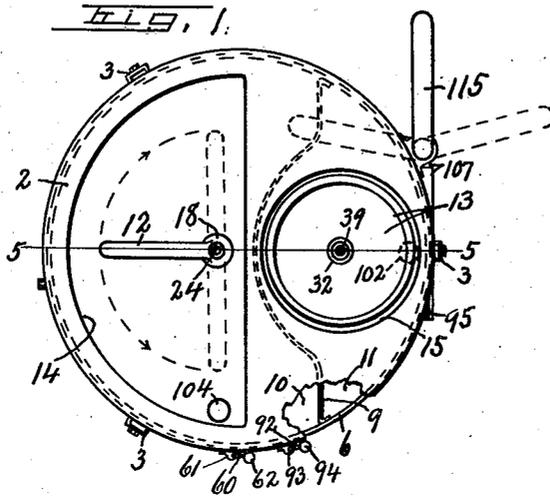
P. E. GELDHOF

1,787,243

MECHANICAL CLOTHES WASHER AND DRIER

Filed Dec. 27, 1927

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WITNESS
J. J. Mains

INVENTOR
P. E. Geldhof
BY
Denison & Thompson
ATTORNEYS

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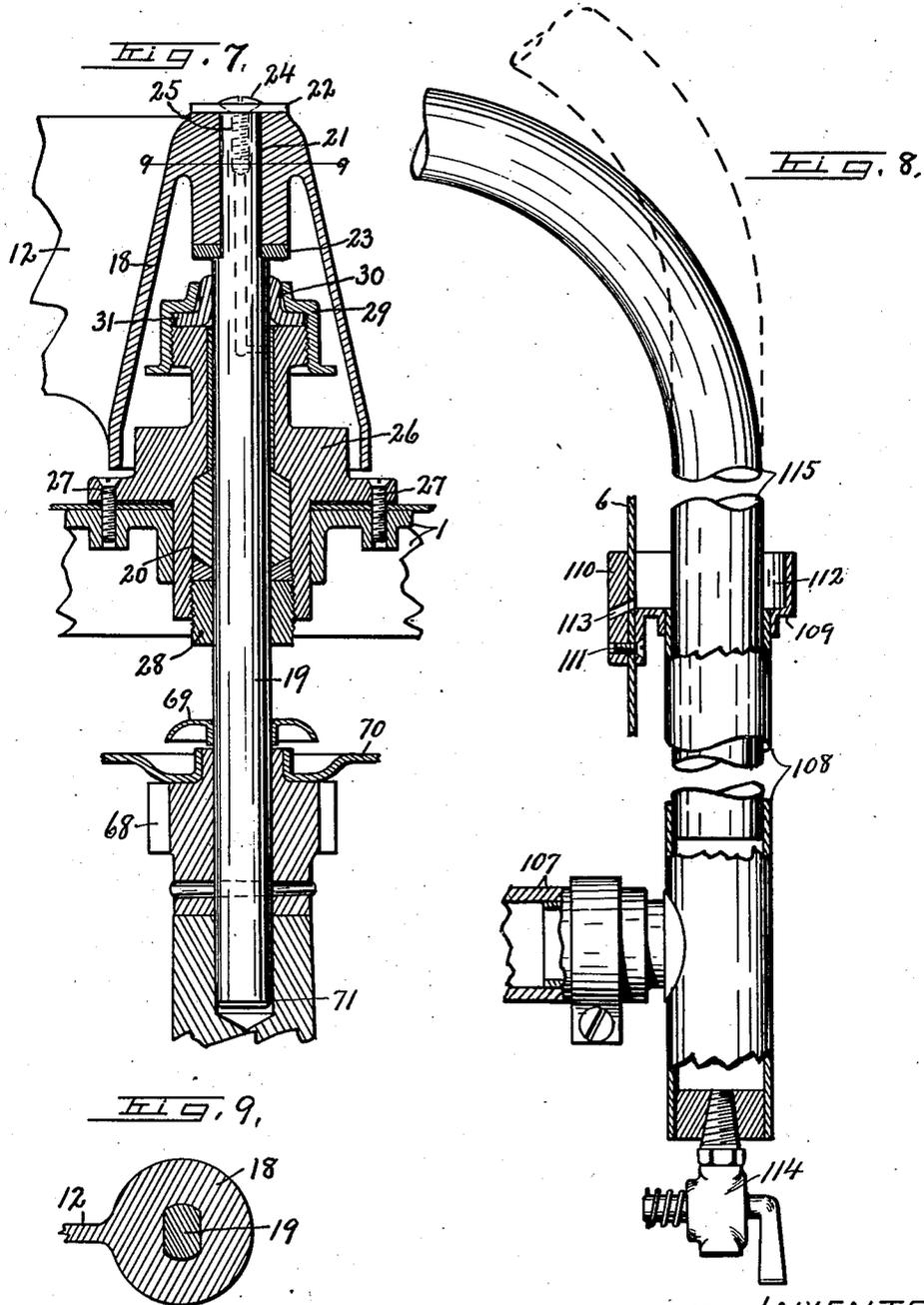
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P. E. Geldhof
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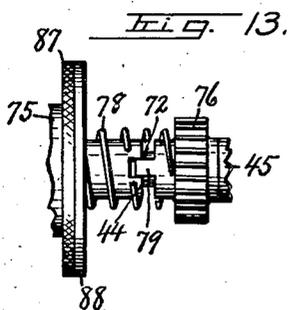
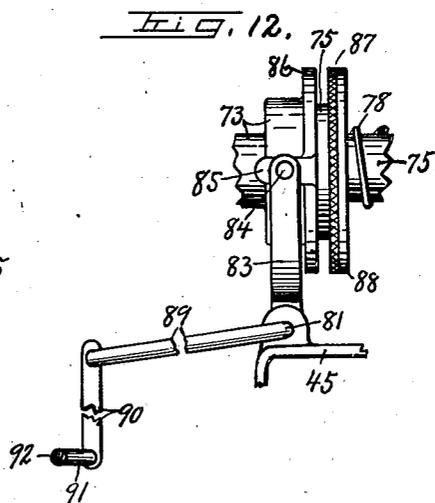
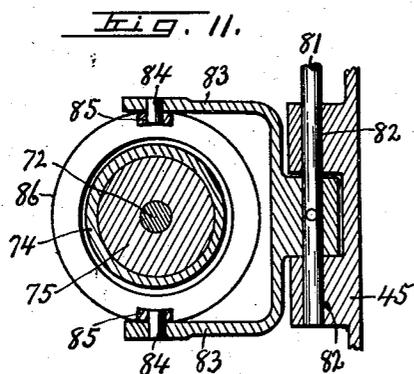
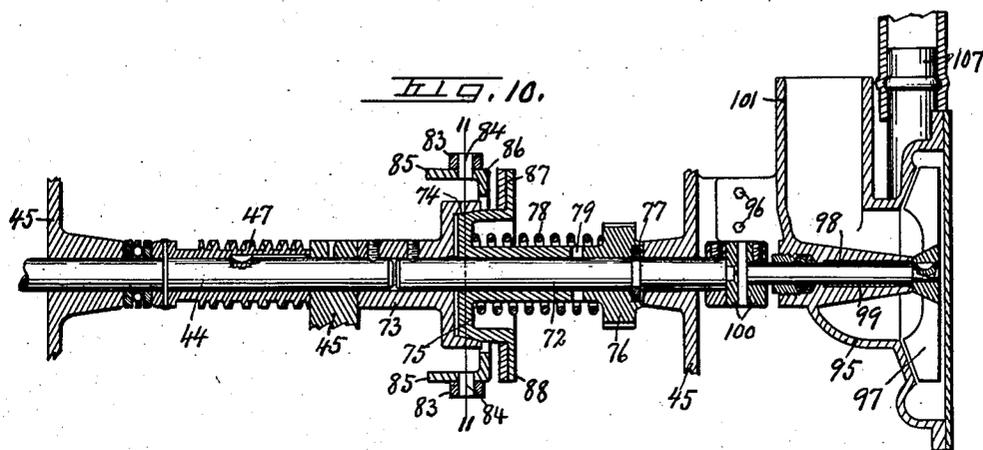
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5 Sheets-Sheet 5



WITNESS

J. S. Gains

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ATTORNEYS

UNITED STATES PATENT OFFICE

PETER E. GELDHOF, OF SYRACUSE, NEW YORK, ASSIGNOR TO SYRACUSE WASHING MACHINE CORPORATION, OF SYRACUSE, NEW YORK, A CORPORATION OF DELAWARE

MECHANICAL CLOTHES WASHER AND DRIER

Application filed December 27, 1927. Serial No. 242,613.

This invention relates to a mechanical clothes washer and drier in which the interior of a single vat is divided into separate upright compartments of unequal capacity, the larger compartment being adapted to receive a suitable washing mechanism and the smaller compartment a centrifugal drying mechanism, both mechanisms being operated by a unit power plant mounted on the frame of the machine at the underside of the vat through the medium of upright shafts extending through openings in the bottom of the vat and operatively connected respectively to the washing mechanism and to the drying mechanism.

The main object is to provide a more compact machine for both washing and drying purposes at a lower cost than has heretofore been practised so that it may be installed in less space and more conveniently operated than machines of this type as heretofore made.

Other objects and uses relating to specific parts of the apparatus will be brought out in the following description.

In the drawings:—

Figure 1 is a top plan of a combined clothes washing and drying machine embodying the various features of my invention.

Figure 2 is a horizontal sectional view taken in the plane of line 2—2, Figure 4.

Figure 3 is a detail vertical sectional view taken in the plane of line 3—3, Figure 2, showing more particularly a part of the clutch controlled driving mechanism for the washer.

Figure 4 is an enlarged side elevation of the machine shown in Figure 1, the dotted lines indicating different positions of adjustment of the discharge end of the pipe leading from the pressure side of the pump.

Figure 5 is an enlarged vertically sectional view of the machine taken in the plane of line 5—5, Figure 1.

Figure 6 is a detail sectional view of the connection between the drier and its operating shaft taken in the plane of line 6—6, Figure 5.

Figure 7 is an enlarged detail vertical sectional view taken in the plane of line 7—7, Figure 5.

Figure 8 is an enlarged vertical sectional view, partly broken away, and partly in elevation, of the outlet pipe leading from the pressure side of the pump.

Figure 9 is a detail horizontal sectional view taken in the plane of line 9—9, Figure 7, showing more particularly the connection between the washer and its operating shaft.

Figure 10 is an enlarged detail horizontal sectional view taken in the plane of line 10—10, Figure 5.

Figure 11 is a transverse vertical sectional view taken in the plane of line 11—11, Figure 10.

Figure 12 is a side elevation of the combined clutch and brake mechanism, shown in Figures 10 and 11 for controlling the operation of the pump.

Figure 13 is a face view of the detached spline connection between the brake disk and driving pinion for the drier cage.

As illustrated, the main supporting frame comprises lower and upper horizontal decks —1— and —2— supported in vertically spaced parallel relation upon suitable legs —3— having their lowered ends secured to the angles of a triangular brace —4— and provided with suitable casters —5— to facilitate the movement of the machine along and upon a floor or other suitable support, the brace —4— being disposed in a horizontal plane some distance below the lower deck —1— and above the casters —5— to constitute a part of the frame for additionally bracing the legs and holding them in fixed relation.

The legs —3— are also bolted or otherwise secured to the lower and upper decks —1— and —2— to hold the latter in fixed spaced relation.

The decks —1— and —2— are preferably circular and co-axial and are of substantially the same diameter for receiving and supporting a cylindrical vat —6— of approximately the same diameter co-axial therewith. The upper surface of the lower deck —1— and bottom of the vat resting thereon are substantially flat while the upper edge of the vat is beaded at —7— for reinforcing purposes and is adapted to receive and support the upper deck —2— which is provided with

a depending annular flange —8— extending around the upper end of the vat to assist in holding the vat and upper deck against relative lateral movement.

5 The tub or vat —6— is provided with an upright transverse partition —9— at one side of its vertical axis for dividing the interior of the vat into separate compartments —10— and —11— of unequal capacities, the larger
10 compartment —10— serving to receive a suitable washing mechanism —12— while the smaller compartment is adapted to receive a drying mechanism —13— hereinafter more fully described.

15 The upper deck —2— is provided with separate openings —14— and —15— registering with the corresponding compartments —10— and —11— to permit the entrance and removal of clothes to and from said compartments, the opening —15— for the compartment —11— being of sufficient size to permit
20 the removal and replacement of the drying mechanism —13— therethrough.

25 These openings —14— and —15— are normally closed by suitable lids —16— and —16'— to protect the user against contact with the washing and drying mechanisms and also to prevent the escape of washing fluid through the corresponding openings when
30 said mechanisms are in action for washing or drying purposes, it being understood that the lids are movable, when desired.

The lower end and opposite upright edges of the partition —9— are welded or otherwise
35 permanently secured to the bottom and upright sides of the vat —6— to extend from said bottom to the underside of the upper deck which is provided with a groove —17— for receiving the upper edge of the partition.

40 The intermediate portion of the partition —9— is arched inwardly about a vertical axis parallel with the axis of the vat some distance beyond the transverse plane of the opposite upright edges of the partition and slightly
45 beyond the adjacent portion of the drying mechanism —13— to allow the operation of the latter without friction therewith and, therefore, the circumferential length of the compartment —10— between the ends of the
50 partition —9— is somewhat greater than half the entire circumference of the vat to allow angular movement of the washing mechanism —12— in reverse directions through an arc of at least one hundred and eighty de-
55 grees as will be hereinafter more fully explained.

Washing mechanism

60 As illustrated, this washing mechanism comprises an impeller blade having an inverted frusto-conical hollow hub —18— secured to the upper end of a vertical shaft —19— which extends through a gland —20— in the bottom of the vat —6— and underlying
65 deck —1—. The upper end of the hub —18—

is provided with a vertical opening —21— for receiving the corresponding end of the shaft —19—, the opposite sides of said opening and adjacent sides of the shaft being flattened and engaged with each other for transmitting
70 rotary motion from the shaft to the impeller blade —12— which is held upon the shaft against axial displacement by collars —22— and —23— and a clamping screw —24— which engages the upper collar —22— and a
75 central threaded opening —25— in the upper end of the shaft so that by removing the screw —24— the impeller may be displaced upwardly from the shaft when desired.

The gland —20— comprises a hollow upright post —26— surrounding the shaft —19— and secured to the upper face of the bottom of the vat —6— and to the lower deck
80 —1— by clamping screws —27—, Figure 7.

The lower end of the post —26— is reduced in diameter and extended through registering openings in the bottom of the vat —6— and deck —1— and is threaded internally for receiving an externally threaded
85 collar —28— by which the packing of the gland —20— may be tightened to prevent leakage of the water from the interior of the vat downwardly along the shaft —19—.

The upper end of the post —26— extends upwardly some distance into the interior of
90 the hub —18— of the impeller —12— and is threaded externally for engagement by an internally threaded collar —29— which is adapted to receive a packing collar —30— of leather or equivalent material having an
95 outwardly flared base portion —31— firmly clamped between the upper end of the collar —20— and adjacent end of the post —26— and its remaining portions extended upwardly through the collar for direct engagement
100 with the adjacent portion of the shaft —19—.

The interior walls of the upper end of the collar —29— are tapered upwardly and engage the periphery of the upwardly extending portion of the packing collar —30— so
105 that when the collar —29— is screwed downwardly or tightened upon the upper end of the post —26— the packing collar —30— will be wedged by said tapered walls against the periphery of the shaft —19— to additionally prevent leakage of water from the interior of the vat downwardly along the shaft.

The hub —18— of the impeller —12— is flared outwardly and downwardly and surrounds the upper gland comprising the collars —20— and —30— and also extends
110 downwardly around the post —26— to a level just above the bottom of the vat to assist in deflecting the water outwardly
115 away from the shaft and post and, therefore, away from both of the glands and also serving to keep the clothes out of contact with the upper gland and post as the impeller
120
125
130

is oscillated by the angular movement of the shaft.

The impeller —12— is movable in a horizontal plane near the bottom of the tub and about the vertical axis of the shaft —19— and when oscillated in a manner hereinafter described, serves to impart a similar motion to the washing fluid and clothes which, by reason of their inertia, offers more or less resistance to such movement so that the oscillation of the impeller produces more or less pressing action upon the wet clothes to remove dirt and other foreign matter therefrom.

Drier mechanism

The clothes drying mechanism is preferably of the centrifugal type and comprises, in this instance, a cylindrical foraminous cage or basket —13— open at the top and closed at the bottom and having its lower end provided with an upwardly extending central hub —32— secured at its upper end to the upper end of an upright shaft —33— which extends vertically through registering openings in the bottom of the vat —6— and underlying portion of the deck —1— as shown more clearly in Figure 5.

A tubular post —34— is secured at its lower end to the bottom of the vat —6— and underlying portion of the lower deck —1— by clamping screws —35— and extends upwardly into the hub —32— of the cage or basket —13—.

The shaft —33— extends through and some distance above and below the tubular post —34— and has its upper end extended through an opening —36— in the adjacent upper end of the hub —32—, said opening and adjacent portion of the shaft being provided with opposite flattened sides engaging each other to transmit rotary motion from said shaft to the cage, Figure 6.

The cage is held against vertical movement by lower and upper collars —37— and —38— and a clamping screw —39— which engages in a threaded aperture in the upper end of the shaft —33— in a manner similar to that described for the clamping screw —24— for the impeller —12—.

Suitable bearings —40— and —41— are interposed between the post —34— and lower end of the hub —32— and between the upper end of the post —34— and shaft —33— respectively to steady the shaft and impeller in their rotary movements.

The basket —13— extends nearly the full height of the compartment —11— between the lower and upper decks —1— and —2— with sufficient clearance at the bottom and top to avoid friction with said decks. The diameter of the basket is nearly equal to the distance across the widest portion of the compartment —11— between the partition —9— and outer wall of said compartment with sufficient clearance at the sides to avoid

friction with those parts while the diameter of the hub —32— is relatively small as compared with that of the interior of the basket to allow ample capacity for the placing of clothes within the basket and around the hub which latter extends from the bottom of the basket a trifle more than half the height thereof so that the clothes may be filled in from the bottom upwardly around the hub and across the top thereof to the full height of the basket for drying purposes as the basket is rotated.

Driving mechanism

The power unit for driving the washer shaft —19— and drier shaft —33— is mounted upon the underside of the lower deck —1— as shown more clearly in Figures 4 and 5 and comprises a horizontal electric motor —42— having its case secured by bolts —43— to the underside of the deck —1— and its armature shaft —44— extended laterally and horizontally into a gear case —45— which is also secured to the underside of the deck —1— by bolts —46—.

The main driving shaft —44— is journaled in suitable bearings in the gear case —45— and is provided with a worm —47— engaged with a worm gear —48—, Figure 2, said worm gear being journaled upon a stationary upright shaft or stud —49— within the gear case —45—.

The shaft or stud —49— is removably secured to the bottom of the gear case —45— by clamping nuts —50— to hold the same against rotation and also to permit it to be removed when desired, as shown more clearly in Figure 3. A peripherally grooved clutch collar —51— is mounted upon the hub of the gear —48— for axial movement relatively thereto and for rotary movement therewith and is provided with one or more clutch pins —52— guided in suitable openings in the gear —48— at one side of the axis thereof for movement into and out of engagement with apertures —53— in a superposed clutch disk —54— which is also loosely mounted upon the stud —49— coaxial with the gear —48—.

Any suitable means may be employed for shifting the clutch collar —51— into and out of clutching engagement with the disk —54— and for this purpose is provided a lever —55— pivoted at —56— at one side of the axis of the shaft —49— to extend around and in engagement with the groove collar —51—. The other end of said lever is connected by a link —56— to one arm of a bell crank lever —57— which is pivoted at —58— to a suitable boss on the exterior of the top of the gear case —45— and has its other arm connected by a link —59— to a crank shaft —60—.

This crank shaft —60— extends upwardly from the top of the gear case —45— along

the outside of the decks —1— and —2— and vat —6— and is journaled in suitable bearings —61— on the lower and upper decks, the upper end of the crank shaft —60— being provided with a crank —62— by which it may be rotated to effect the shifting of the clutch collar —51— into and out of clutching engagement with the disk —54—.

The disk —54— is provided with an upwardly projecting pin or stud —63— eccentric to the axis of the shaft —49— for receiving one end of a pitman link —64— having its other end pivotally connected at —65— to a toothed segment —66—.

This segment —66— is pivoted at —67— upon and within the gear case —45— some distance to one side of its connection with the link —64— to move about a vertical axis parallel with the axis of the shaft or stud —49— and meshes with a pinion —68— which is secured to the washer shaft —9— within the gear case —45—.

The gear —48— may be driven continuously by the motor —42— and when the crank shaft —60— is operated to disengage the clutch collar —51— from its companion clutch disk —54— the washing mechanism will be at rest even though the gear —48— may continue to rotate, but when the crank shaft —60— is again operated to shift the clutch collar —51— into clutching engagement with its companion disk —54— the resultant rotation of the disk —54— will cause a corresponding oscillation or angular movement of the toothed segment —66— which, in turn, will effect a corresponding angular movement of the impeller —12— through the medium of the pinion —68— and shaft —19—.

In order to further prevent the leakage of water from the interior of the vat along the shaft —19— and into the gear case the portion of the shaft between the top of the gear case and underside of the lower deck —1— is provided with an outwardly and downwardly inclined deflecting plate —69— while the top of the gear case is provided with a receptacle —70— underlying the outer edges of the deflecting plate —69— to receive any water which may be deflected from said plate and to conduct the same away from the shaft —19— as shown more clearly in Figure 7 which also shows the lower end of the shaft —19— as stepped in a suitable bearing —71— within and upon the gear case.

An additional shaft —72— is journaled in suitable bearings within the gear case —45— co-axial with the armature shaft —44— and is operatively connected to said armature shaft by a coupling member —73— which is secured to both shafts to cause them to rotate in unison and is provided at its inner end with a socket —74— adapted to

receive a co-axial axially movable cone clutch collar —75—.

This collar —75— is loosely mounted upon the shaft —72— and is provided with an axially elongated hub splined to the hub of a gear —76— which is also loosely mounted upon the shaft —72— and is provided with a hardened end-thrust bearing —77— engaging the shaft bearing on the adjacent end of the gear case —45—.

As previously stated, the clutch collar —75— is movable axially into and out of engagement with its companion clutch —74— and is spring-pressed to its clutching position by a coiled spring —78— which surrounds the hubs of the parts —75— and —76— as shown in Figure 10, the spline connection between the clutch member —75— and gear —76— being shown at —79— and consisting of a tongue on the gear engaging in a groove on the adjacent end of the hub of the clutch section —75—.

The gear —76— meshes with a companion gear —80— on the upright drier shaft —33— and serves to rotate the drier cage —13— when the clutch —75— is engaged with the clutch section —74—.

Suitable means is provided for shifting the clutch member —75— axially against the action of the spring —78— and for simultaneously breaking or retarding the rotation of the clutch member —75— and drier mechanism driven thereby and for this purpose, a rock shaft —81— is journaled in suitable bearings —82— on one side of the gear case —45— and is provided with crank arms —83— pivotally connected at —84— to axially extending lugs —85— on diametrically opposite sides of a clutch-shifting and brake ring —86—.

The ring —86— is substantially circular and loosely supported around the adjacent portions of the clutch sections —74— and —75— by means of the crank arms —83—, said ring being movable into and out of frictional engagement with a brake surface —87— which is secured to an outwardly projecting annular flange —88— on the clutch section —75—, as shown more clearly in Fig. 10.

The outer end of the rock shaft —81— is provided with a crank arm —89— which is connected by a link —90— to the crank arm —91— of an upright crank shaft —92—.

This crank shaft —92— is journaled in suitable bearings —93— on the peripheries of the lower and upper decks —1— and —2— at the same side of the machine as the clutch-operating shaft —6— for the washing mechanism and is provided at its upper end with a handle —94— adjacent the handle —62—, both handles being located near the top of the machine where they are easily accessible for operation.

Pump mechanism

Suitable power driven means is provided for withdrawing the washing and rinsing fluids from the washing compartment —10— and drying compartment —11— and, for this purpose, a centrifugal pump case —95— is secured by bolts —96— to the outer end of the gear case —45— and is provided with a rotary impeller —97— on the outer end of a rotary shaft —98— which is journaled in a suitable bearing —99— in the pump case —95— co-axial with the shaft —72— to which it is connected by a coupling —100— to rotate therewith as shown in Figure 10.

The suction side of the pump case —95— is connected by an open conduit —101— to an outlet —102— in the bottom of the drier compartment —11— and is also connected by a branch conduit —103— to an upright outlet conduit —104— leading downwardly from the bottom of the washing compartment.

The branch conduit —103— leading from the washing compartment —10— to the suction side of the pump is provided with a valve —105— having an operating handle —106— by which the valve may be opened and closed for controlling communication between the washing compartment and pump, the drying compartment being in constantly open communication with the suction side of the pump through the conduit —101—.

The pressure side of the pump —95— is connected by a conduit —107— to the lower end of an upright conduit —108— which extends vertically along the outside of the vat —6— and has its upper end secured to a cup-shaped collar —109— which, together with a clamping plate —110—, are secured by screws —11—, to the inner and outer surfaces respectively of the adjacent portion of the vat —6— as shown more clearly in Figure 8.

The collar —109— is provided with a chamber —112— communicating through a passage —113— with the interior of the vat to receive and drain off any fluid which may escape through the top of the conduit —108— into said vat.

The conduit —108— extends downwardly some distance below the level of the conduit —107— and is provided with a drainage cock —114— adapted to be opened at will for draining the pump and any water or sediment which may lodge therein from the washing compartment or from the drying compartment.

An extension conduit or nozzle —115— is telescopically mounted in the upper end of the conduit —108— for angular and axial movement relatively thereto and has its upper end curved laterally for projecting the fluid expelled therethrough from the pressure side of the pump in different directions as, for

example, for returning said fluid to the washing compartment or to other receptacles or waste pipe as shown by dotted lines in Figures 1, 4 and 5, or, if desired, the upper end of the nozzle may be directed to discharge clean water from the pump into the drying compartment for rinsing purposes.

Operation

It will be observed from the foregoing description that the washing mechanism and pump may be operated simultaneously independently of the drier mechanism and that the drier mechanism and pump may be operated simultaneously independently of the washing mechanism.

For example, assuming that the motor shaft —4— is being driven continuously in one direction and that it is desired to operate the washing mechanism independently of the drier mechanism, then the hand crank —94— will first be operated to disengage the clutch section —75— from its companion clutch member —73— at which time the brake ring —86— will engage the brake surface —87— to prevent the operation of the drying mechanism.

The hand crank —62— will then be adjusted to engage the clutch pins —52— with the clutch disk —54— for rotating said disk and thereby transmitting oscillating motion to the impeller shaft —19— and impeller —12— through the medium of the pitman —64— and toothed segment —66—.

When the batch of clothes in the washing compartment —10— has been completed they may be transferred into the drier cage —13— for drying them by centrifugal force due to the rotation of the cage.

When the clothes to be dried are properly placed in the drier cage —13— the hand crank —94— may be adjusted to allow the clutch section —75— to be spring-pressed into engagement with its companion clutch member —74— for rotating the drier cage —13— through the medium of the pinion —76— and gear —80—, it being understood that the cage —13— will be at rest while the clothes to be dried are placed therein and that the hand crank —62— will have been adjusted to disconnect the clutch members —52— and —54— to stop the rotation of the washing member —12—.

Now, while the washing mechanism is at rest a fresh batch of soiled clothes may be placed in the washing compartment —10— preparatory to washing after which the hand crank —62— may be adjusted to engage the clutch pins —52— with the clutch disk —54— for effecting the operation of the washing mechanism upon the fresh batch of clothes while the previously washed batch is being dried in and by the rotation of the case —13—.

During the washing of the clothes in the

washing compartment —10— the valve —105— is preferably closed to retain the washing fluid in the vat, but, on the other hand, the washing fluid expelled from the clothes by centrifugal force within the cage —13— will gravitate through the outlet —102— to the suction side of the pump —95— from which it will be expelled through the conduits —108— and —115— to be returned to the washing vat or to any other desired receptacle according to the position of the nozzle —115—, it being understood that the pump impeller will continue to operate as long as the shaft —44— is rotated.

When the washing operation is completed or at any time during the operation of the washing mechanism the valve —105— may be operated to allow the washing fluid to drain from the compartment —10— to the pump from and by which it will be expelled through the conduits —108— and —115— into any suitable waste or receptacle, not necessary to herein illustrate or describe, or may be returned to the washing compartment by a proper adjustment to the nozzle —115—.

Or, by opening the drainage cock —114— the water may be drained from pump and drier compartment and from the conduit —108— and when the valve —105— is opened water from the washing compartment may also be drained through the same drainage cock.

The mechanism herein shown and described is particularly simple, compact and efficient, but obviously various changes may be made in the detail construction without departing from the spirit of this invention.

I claim:—

1. Apparatus of the character described comprising a cylindrical vat having a circular bottom, a vertical partition wall extending transversely of the vat and providing two chambers arranged side by side within the vat, a power driven vertical shaft extending upwardly into one chamber, a centrifuge on the upper end of the shaft, a second power-driven vertical shaft extending upwardly into the other chamber closely adjacent the partition wall and substantially midway of its transverse extent, a clothes washing element on the upper end of the second shaft, said element oscillating through an arc of substantially 180° toward and from the partition wall.

2. Apparatus of the character described comprising a cylindrical vat having a circular bottom, a vertical partition wall having a bowed portion extending transversely of the vat and providing two chambers arranged side by side within the vat, a power-driven vertical shaft extending upwardly into one chamber, a centrifuge on the upper end of the shaft and having a wall conforming substantially to the curvature of the

bowed portion of the partition and positioned closely adjacent thereto; a second power-driven vertical shaft extending upwardly into the other chamber closely adjacent the partition wall and substantially midway of its transverse extent, a clothes washing element on the upper end of the second shaft, said element oscillating through an arc of substantially 180° toward and away from the partition wall.

3. Apparatus of the character described comprising a cylindrical vat, a vertical partition wall extending across the vat and providing two chambers arranged side by side within the vat, the partition being centrally bowed toward one chamber, a power driven vertical shaft extending upwardly into each chamber in spaced relation to the bowed portion of the partition, a centrifuge on the upper end of the shaft in one chamber and conforming substantially to the curvature of the bowed portion of the partition and positioned closely adjacent thereto and a clothes washing element on the upper end of the shaft in the other chamber having one end fixed to the shaft and a free end movable toward and away from said partition at each side of the shaft carrying the same.

In witness whereof I have hereunto set my hand this 13th day of December, 1927.

PETER E. GELDHOF.