C. C. LAMB.

WASHING MACHINE.

APPLICATION FILED APR. 14, 1913.

**1,099,985.**

Patented June 16, 1914.

3 SHEETS—SHEET 1.

Fig. 1.

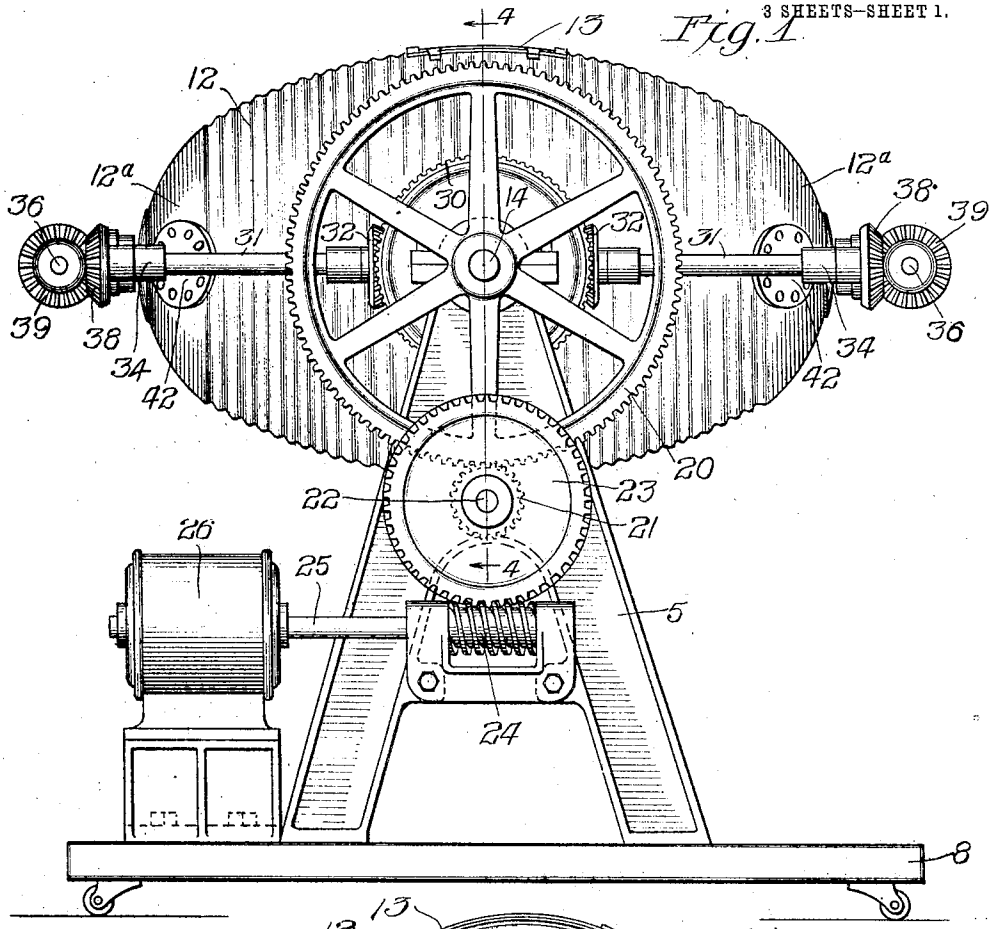
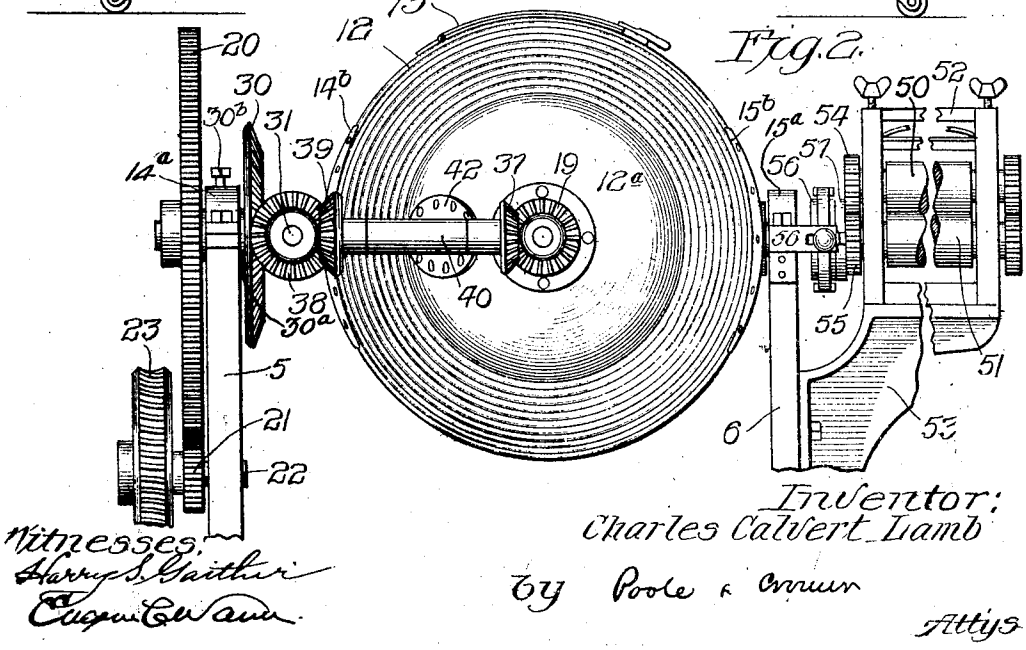



Fig. 2.




Witnesses:
Harry S. Gaither
Eugene E. Lamb

Inventor:
Charles Calvert Lamb
by Poole & Crown
Attys

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3 SHEETS—SHEET 2.

Fig. 3.

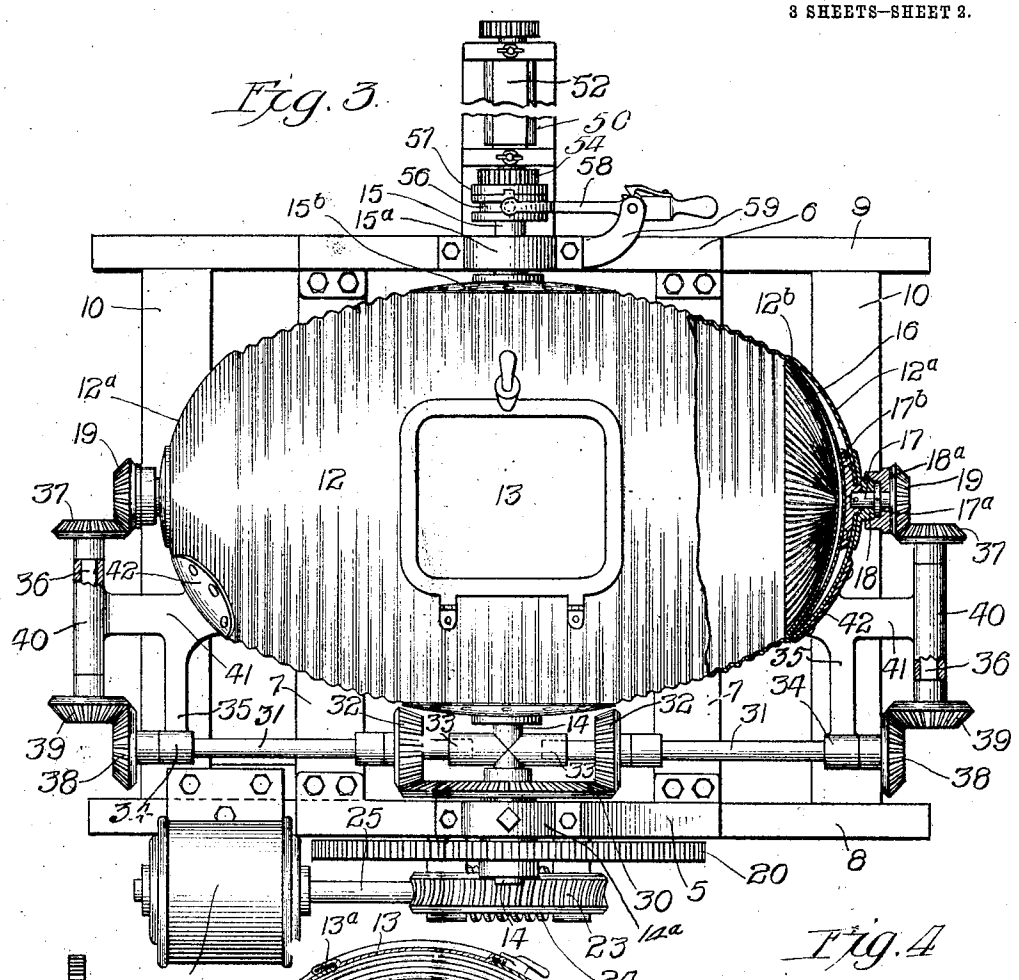
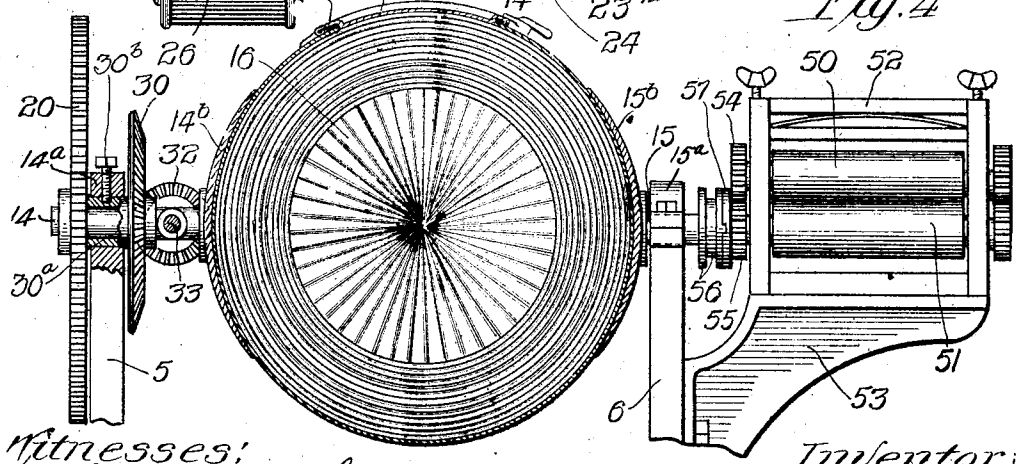



Fig. 4.




Witnesses:
Harry S. Gaither
Eugene Elbaum

Inventor:
Charles Calvert Lamb
by Poole & Crowen
Attys

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3 SHEETS—SHEET 3.

*Fig. 5.*

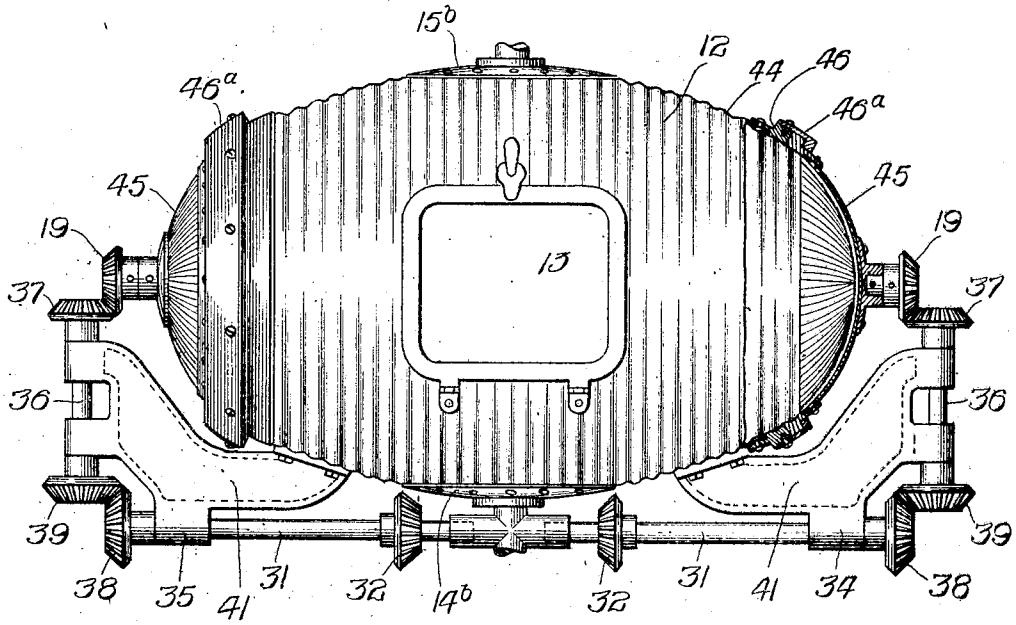
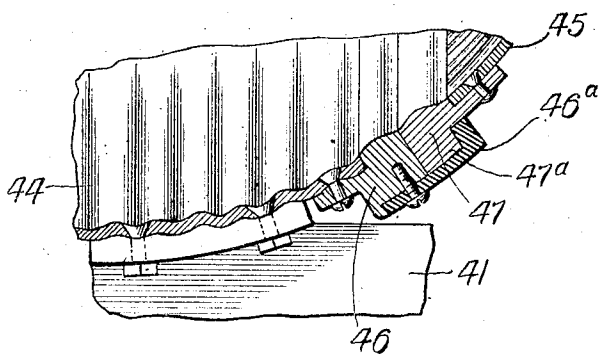



*Fig. 6.*




Witnesses:
Harry S. Gaither
Eugene C. Wann

Inventor:
Charles Calvert Lamb
by Poole & Bowie
Attys

# UNITED STATES PATENT OFFICE.

CHARLES CALVERT LAMB, OF CHICAGO, ILLINOIS.

## WASHING-MACHINE.

1,099,985. Specification of Letters Patent. Patented June 16, 1914.

Application filed April 14, 1913. Serial No. 760,855.

*To all whom it may concern:*

Be it known that I, CHARLES CALVERT LAMB, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Washing-Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to washing machines of that class in which the clothes or the articles to be cleansed are inserted with the cleansing water in a closed tub or receptacle, which is given rotative movement during the cleansing operation.

A washing machine embodying the principal features of my invention embraces a tub or receptacle, which is completely closed while in use, but which is provided with a door for the insertion and removal of the cleansing water and the articles to be cleansed. Such tub or receptacle is so supported or mounted that it may be turned or rotated about an axis of rotation extending transversely thereof. Said tub or receptacle embraces or includes in its construction, circular, rotative head-members, adapted to turn or rotate about an axis of rotation at right angles to the axis of rotation of the receptacle itself, and the inner faces of which form the end walls of the interior space of the receptacle, in which are contained the articles to be cleansed and the water. Both the tub or receptacle and the head-members are turned or rotated during the operation of the machine; the receptacle being rotated on its transverse axis and the heads being turned in opposite directions about their own axes. As a result of these features of construction, in the operation of the machine, the receptacle is reversed in position at each rotation thereof, first one and then the other of its head-members being brought upwardly, with the result that the contained water and articles are carried, or fall by gravity, in a direction transverse to the axis of rotation of the receptacle, twice during each complete rotation of the receptacle, and as they descend toward or in contact with first one and then the other of the rotative head-members, are given rotary motion, alternately in opposite directions.

A washing machine embodying my invention also embraces other novel features of construction, as shown in the accompanying drawings and hereinafter described.

My invention consists in the matters hereinafter set forth and pointed out in the appended claims.

As shown in the accompanying drawings: Figure 1 is a view in side elevation of a washing machine embodying one practical form of my invention; Fig. 2 is a view in end elevation of the parts shown in Fig. 1 with the base portion of the supporting frame omitted; Fig. 3 is a plan view of the machine, with a part of the receptacle in longitudinal section; Fig. 4 is a transverse vertical section, taken on line 4—4 of Fig. 1; Fig. 5 is a view of the receptacle of the machine, with one end thereof in longitudinal section, showing a different construction in the rotative head-member thereof; Fig. 6 is an enlarged, detail, sectional view of the joint between the body and head of the receptacle, when made as shown in Fig. 5.

As shown in said drawings, the frame of the machine embraces two upright, parallel, side frame members 5, 6, which are connected with each other by horizontal cross members 7, 7, and are attached to a horizontally disposed base frame consisting of side members 8, 9, which are joined at their ends by horizontal cross members 10, 10. The tub or receptacle of the machine, within which are placed the cleansing water and the clothes or other articles to be cleansed, consists of an elongated closed receptacle 12, which is circular in cross-sectional form, and provided in its side wall with a hinged door 13 which is normally closed, but which may be opened for the insertion and removal of water and the articles to be cleansed. Said door 13 is shown as provided with a marginal gasket $13^a$ so as to prevent leakage of water at its edges in the operation of the machine. The receptacle 12 is so mounted in the frame that it may rotate on a horizontal axis extending diametrically of the receptacle and transverse to the longitudinal axis of the same. For so mounting the receptacle, horizontally arranged shafts or trunnions 14, 15, are rigidly secured to and extend outwardly from the opposite sides of the receptacle; the same being mounted in bearings $14^a$, $15^a$, on the upper ends of the frame uprights 5 and 6, respectively.

In the preferred construction of the receptacle illustrated, the same is made fan-

siderably smaller in diameter at its ends than at its middle part, and is convexly rounded at its ends tapering from its larger central part toward its rounded ends. As preferably constructed, said receptacle is made of sheet metal, circumferentially corrugated in its main part, and the trunnions 14 and 15 are secured to the metal wall or shell of the receptacle by means of disks $14^b$, $15^b$, on the trunnions, secured by rivets to the wall of the receptacle, as clearly seen in Figs. 2, 3 and 4.

At each end of the receptacle 12 is located a circular head member 16, which is adapted to turn or rotate on an axis of rotation coinciding with the central longitudinal axis of the receptacle, and the inner face of which forms one end wall of the interior space of the receptacle, within which the articles to be cleansed are held during the cleansing operation. As shown in Figs. 1 to 4, said head member is located inside of the end wall $12^a$ of the receptacle, and has its annular margin arranged closely adjacent to an interior annular surface $12^b$ of the receptacle, so that no opening or space will be left within which articles of clothing or the like, may enter or be caught in the rotation of the head member. Moreover, the inner surface of said head member 16 is made of concave form and is preferably provided with radial ribs or corrugations. To afford rotative support for the head member, arranged as described, upon the end wall $12^a$ of the receptacle, said head member is attached to a shaft 17 which passes through a bearing aperture in a bearing block 18 secured to the said wall $12^a$; said shaft 17 extending outwardly beyond the said bearing block 18 and being provided at its outer end with the gear pinion 19 through the medium of which rotary motion is given to said shaft and to the head-member 16.

In order to prevent the escape of water between the shaft 17 and the bearing block 18 and to enable these parts to be easily assembled, these parts are made as follows: Said bearing block 18 has its outer end portion made of cylindric form and exteriorly screw-threaded, and a cap member $18^a$, apertured for the passage of the outer end of the shaft 17, is provided with internal screw threads engaging those on said block 18. Applied to the said shaft 17 and secured thereto by a cotter pin or like means, is an apertured disk or collar $17^a$ arranged to occupy the annular space between the outer end of the block 18 and the inner face of the cap $18^a$. Said collar $17^a$ serves both to hold the shaft 17 from endwise movement, and also, by its close fitting contact with the parts between which it is placed, serves to prevent the leakage of water between said shaft and its bearing. Said shaft 17 is secured at its inner end to a disk or plate $17^b$, which is secured by rivets or otherwise to the head member 16, which latter is shown as made of sheet metal and as consisting of closely spaced inner and outer walls.

In the operation of the washing machine embracing the features described, the receptacle 12 is continuously turned or rotated on its transverse, horizontal axis of rotation, while the heads 16, 16 are also continuously rotated. The two heads 16, 16 at opposite ends of the receptacle, are, moreover, not only rotated relatively to the receptacle, but are also rotated in opposite directions with respect to each other. The result of these features of construction in the receptacle is that in the operation of the machine, first one end and then the other end, of the receptacle is carried upwardly as the receptacle revolves so that the cleansing water and the articles within the receptacle are caused to drop or fall by gravity from the rising to the descending end of the receptacle. Moreover, the water and the articles, as they descend, are brought into contact with the rotating head member 16, which is at any time at the lower end of the receptacle, and are by the action of such head member, given rotative or swirling movement tending to agitate and effect thorough cleansing of the articles. Furthermore, by reason of the opposite rotary motion given to the head members, the rotative or swirling motion given to the water and the articles will be alternately in reverse directions, as such water and articles are brought alternately into contact with one revolving head and then the other, so as to more thoroughly agitate the articles and move them through or relatively to the water.

The machine illustrated is provided with actuating mechanism for giving rotary motion to the receptacle itself, and to the head members 16, 16, relatively to the receptacle, as follows: Rigidly secured to the trunnion 14 exterior to its bearing $14^a$ is a gear wheel 20, which meshes with a gear pinion 21 mounted on a stub shaft 22, which is affixed to the frame member 5 and projects beyond the outer face of the same. Rigidly attached to and turning with the gear pinion 21 is a gear wheel 23. Said gear wheel 23 forms one member of a worm gear, the other member of which consists of a cylinder 24 provided with a spiral rib or worm and secured to a horizontal shaft 25, which is driven by a motor 26. Said motor may be an electric motor and is shown as mounted on the base frame member 8 of the machine. Located at the inner face of, and rigidly secured to the frame member 5, concentrically with the shaft or trunnion 14 is a beveled gear wheel 30. Said gear wheel 30

is shown as provided with a rigidly attached, outwardly extending sleeve $30^a$, which is inserted and held in the bearing $14^a$ on the frame 5. A set screw $30^b$, or like means, may be employed to hold the sleeve $30^a$ from turning in said bearing. In this construction, the shaft 14 does not directly engage the bearing $14^a$, but turns in the sleeve $30^a$. Mounted on the receptacle, in position parallel with the central, longitudinal axis of the same, are two rotative shafts 31, 31, to which are rigidly secured beveled gear pinions 32, 32, arranged to intermesh with the beveled gear wheel 30 at diametrically opposite sides of the same. The shafts 31, 31 have bearing at their inner ends in bearing recesses formed in oppositely extending hubs 33, 33, which are secured to, and preferably made integral with, said shaft or trunnion 14. At their outer ends said shafts 31, 31 pass through bearing sleeves 34, 34, which are rigidly connected with the end portions of the receptacle 12 by bracket arms 35, 35. Mounted on the ends of the receptacle and extending at right angles to the central, longitudinal axis of said receptacle are rotative shafts 36, 36, provided with rigidly attached, beveled gear pinions 37, 37. Said gear pinions 37, 37 intermesh with the gear pinions 19, 19, that are connected with the rotative head members 16, 16, as hereinbefore described. The longitudinal shafts 31, 31 are provided at their outer ends with beveled gear wheels 38, 38, arranged to intermesh with corresponding beveled gear wheels 39, 39 secured to the adjacent ends of the transverse shafts 36, 36. Said transverse shafts 36, 36 are mounted in bearing sleeves 40, which are supported from the wall or shell of the receptacle 12, by means of bracket arms 41, 41. As preferably constructed, the bracket arms 41 and 35 are made integral with each other and with attaching plates 42, 42, which are secured by rivets to the end walls $12^a$, $12^a$ of the said receptacle.

In the operation of the parts described, the rotary motion communicated by the motor 26 to the driving shaft 25 is transmitted by the worm cylinder 24, the worm wheel 23, the gear pinion 21 and gear wheel 20, to the shaft or trunnion 14 of the receptacle 12, and said receptacle is thereby given a rotary motion on its transverse axis. As the receptacle rotates, carrying with it the shafts 31 and 36, the pinions 32, by their engagement with the fixed gear wheel 30, are given rotation in opposite directions, and the said shafts 31, 31 are thereby oppositely turned or rotated. The rotary motion of said shafts 31 is transmitted by the gears 38 and 39 to the transverse shafts 36, and the rotary motion of the latter shafts is transmitted to the beveled gears 19, 19, so that the rotative head members 16, 16 are constantly turned in opposite directions during the rotation of the said receptacle 12.

In Figs. 5 and 6 I have shown a somewhat different form of construction in the receptacle 12, wherein the end walls $12^a$, $12^a$ are omitted, and the rotative head-members have bearing engagement at their annular margins with the adjacent end of the body portion of the receptacle and constitute the end walls of the same. In this instance, the central body portion 44 of the receptacle is provided at its ends with rotative head members 45, 45, which form with the body portion the complete receptacle. The said body member is provided at each end margin with an annular bearing member or ring 46, with which a like annular bearing member or ring 47 on the margin of the head member 45 has bearing engagement. The bearing member 47 is provided with an outwardly extending, annular rib $47^a$, which enters or engages an inwardly facing annular groove, formed by or between the end face of said ring 46 and a flanged ring $46^a$, secured to said ring 46. This construction provides a connection between the head member 45 and the body 44, by which the head member is held upon and permitted to rotate relatively to the body, while at the same time, a joint is provided between these two parts, adapted to prevent the escape of water from the interior of the receptacle. The ring $46^a$ is so made that it may be slipped over the rings 46 and 47, when the latter are placed in contact with each other; said ring $46^a$ being attached to the ring 46 by screws or the like. In the construction shown in said Figs. 5 and 6, the head member 45 is driven or rotated in the same manner and with the same result as hereinbefore described in connection with the form of receptacle shown in Figs. 1 to 4. Moreover, the driving means employed for giving motion to the head member 45 is the same as that hereinbefore described; the beveled gear pinion 19, in this instance, being secured directly to the outer face of the said head member 45.

As shown in the accompanying drawings, a clothes wringer attachment for the washing machine described is provided, the same having the usual wringer rolls 50, 51. Said rolls are mounted in a wringer frame 52, which is mounted on a supporting bracket 53 secured to the outer face of the frame upright 6. The shafts of the rollers 50 and 51 are provided with the usual intermeshing gear wheels 54, 55, and the shaft of the lower roller 51 is arranged in axial alinement with the bearing shaft or trunnion 15 of the receptacle 12. A clutch connection is provided between said trunnion 15 and the shaft of the lower roller, comprising a movable clutch member 56 having sliding connection with the trunnion 15 and held from rotation thereon by a spline (not shown) or

like means. Said clutch member is adapted to engage a clutch-disk 57, rigidly secured to the shaft of said lower roller 51; the clutch member and clutch disk being provided with clutch teeth and notches, adapted for interlocking engagement, in the usual manner. A hand lever 58, pivoted to a bracket arm 59 on the frame 6, is adapted to engage the shifting clutch member 56 to move the same into and out of engagement with the clutch disk 57.

By the construction and arrangement of the clothes wringer described, the same is driven directly from the rotative shaft or trunnion of the receptacle 12 and a simple and inexpensive construction in the wringer attachment is thereby provided.

It is to be understood that a washing machine embodying the several features of my invention may be variously constructed so far as the form and details of the parts are concerned, and I do not, therefore, desire to be limited to the specific features of construction illustrated in the accompanying drawings except so far as the same are herein claimed as part of my invention.

I claim as my invention:

1. A washing machine, comprising a closed receptacle, mounted to turn on a horizontal axis, extending transversely thereof between its ends, and a circular, rotative head member, the inner face of which forms an end wall of the interior space of the receptacle, said head member being mounted to turn about the central longitudinal axis of the receptacle, and means for giving rotary motion to said receptacle and to the said head member relatively to the receptacle.

2. A washing machine comprising a closed receptacle, circular in cross sectional form, mounted to turn on a horizontal axis transverse to its longitudinal axis, and two circular, rotative head members, the inner faces of which form the end walls of the interior space of the receptacle, said head members being mounted to turn about the central longitudinal axis of the receptacle.

3. A washing machine, comprising a closed receptacle, circular in cross-sectional form, mounted to turn on a horizontal axis transverse to its longitudinal axis, two circular, rotative head members, the inner faces of which form the end walls of the interior space of the receptacle, said head members being mounted to turn about the central longitudinal axis of the receptacle, means for giving rotary motion to said receptacle, and means for giving rotary motion to the said head members, relatively to the receptacle, in opposite directions relatively to each other.

4. A washing machine, comprising a closed receptacle, mounted to turn on a transverse, horizontal axis, two circular head members, each mounted on one end of the receptacle and adapted to turn, relatively to the receptacle, about the central, longitudinal axis of said receptacle, the annular margins of said head members being located adjacent to corresponding annular surfaces of the receptacle, and the inner surfaces of said head members and the inner surfaces of the receptacle between the same, forming the interior walls of the receptacle, in which the water and articles to be cleaned are contained.

5. A washing machine, comprising a closed receptacle, mounted to turn on a transverse, horizontal axis, two circular head members, each mounted on one end of the receptacle and adapted to turn, relatively to the receptacle, about the central, longitudinal axis of said receptacle, the annular margins of said head members being located adjacent to corresponding annular surfaces of the receptacle, and the inner surfaces of said heads and the inner surfaces of the receptacle between the same, forming the interior walls of the receptacle, in which the water and articles to be cleaned are contained, said inner faces of the head members being of concave form.

6. A washing machine comprising a closed receptacle, mounted to turn on an axis transverse to the longitudinal axis of said receptacle and embracing in its construction a body member and a head member, said head member being mounted to turn about an axis transverse to the axis of rotation of said receptacle, and means permitting rotative motion of the head members relatively to the body member.

7. A washing machine comprising a closed receptacle, circular in cross-sectional form, two circular, rotative head members mounted on said receptacle at opposite ends of the same, a supporting frame, journals attached to the opposite sides of said receptacle intermediate its ends and having bearing in said frame, driving means acting on one of said journals to give rotative movement to the receptacle, and means acting to give rotary motion in opposite directions to said head members simultaneously with the rotary motion of said receptacle.

8. A washing machine comprising a supporting frame, and an elongated receptacle, circular in cross sectional form, mounted on said frame to turn on a transverse, horizontal axis, said receptacle being provided with circular head members, adapted to rotate about the central, longitudinal axis of the receptacle, said head members being convexly rounded and the side wall of the receptacle between said head members being rounded and tapered from the center toward the ends of the receptacle.

9. A washing machine comprising a rotatively mounted closed receptacle, embrac-

ing in its construction two oppositely disposed head-members adapted for rotation on an axis transverse to the axis of rotation of the receptacle.

10. A washing machine comprising a rotative, closed receptacle, embracing in its construction a head member adapted for rotation on an axis transverse to the axis of rotation of the receptacle, and means operated through the rotative motion of the receptacle acting to give rotative motion to said head member.

11. A washing machine comprising a rotative, closed receptacle, embracing in its construction two oppositely disposed head members adapted for rotation on an axis transverse to the axis of rotation of the receptacle, means for giving rotative motion to the receptacle, and means for giving rotative motion to the said head members simultaneously in opposite directions.

12. A washing machine comprising a frame having two lateral frame members, a rotative receptacle mounted between said frame members and provided at its opposite sides with horizontal, oppositely extending trunnions having bearing in said frame members, said receptacle embracing in its construction two rotative head members which turn on an axis of rotation transverse to the axis of rotation of the receptacle, and means for actuating said head members, embracing a fixed gear wheel on one of said frame members, and gearing carried by said receptacle, and embracing a gear pinion intermeshing with said fixed gear wheel.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 26th day of March A. D. 1913.

CHARLES CALVERT LAMB.

Witnesses:
EUGENE C. WANN,
CHARLES H. POOLE.