

Aug. 5, 1930.

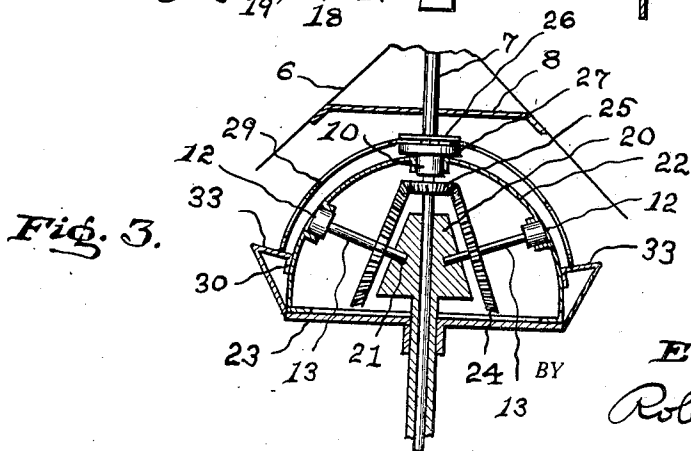
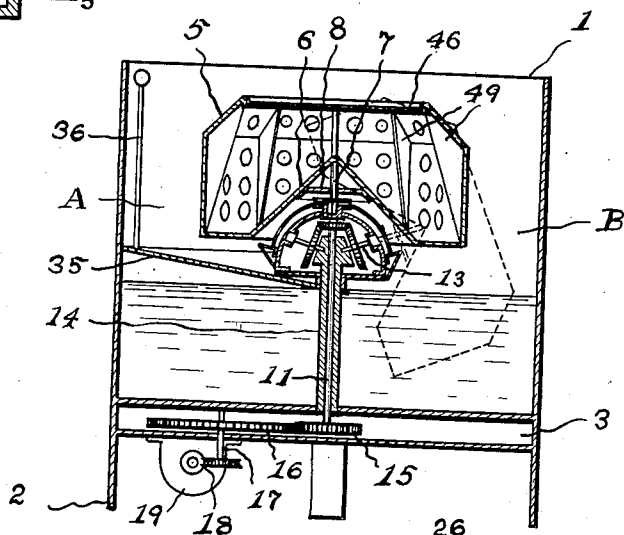
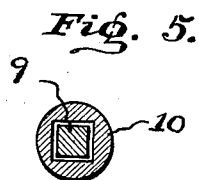
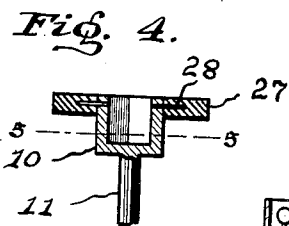
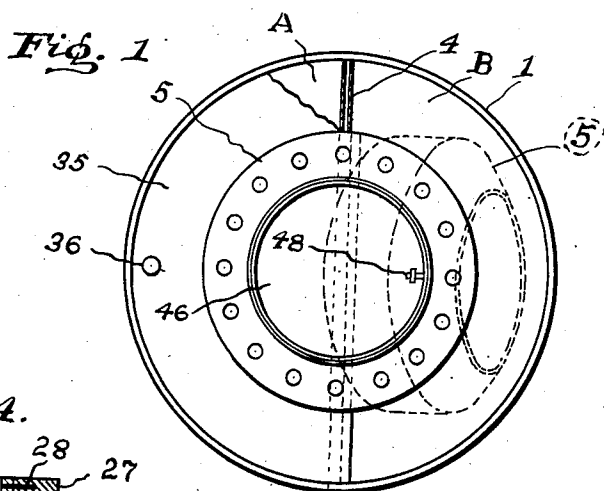
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1,772,207

WASHING MACHINE

Filed July 31, 1925

2 Sheets-Sheet 1



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WASHING MACHINE

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2 Sheets-Sheet 2

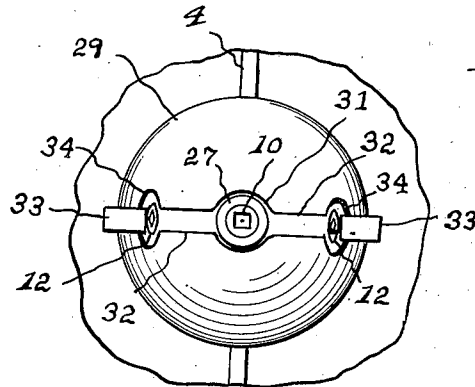


Fig. 6.

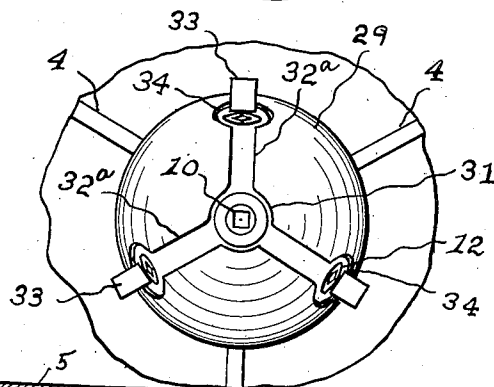


Fig. 7.

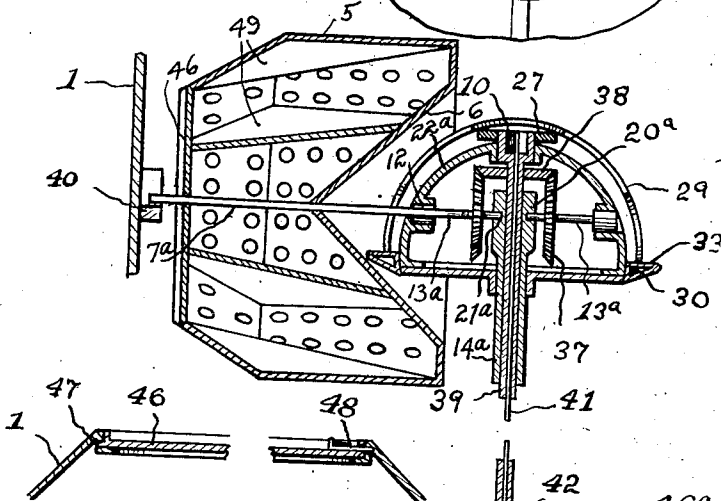


Fig. 8.

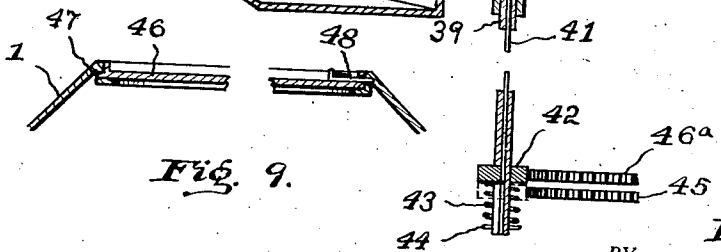


Fig. 9.

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WASHING MACHINE

Application filed July 31, 1925. Serial No. 47,205.

The present invention relates to certain new and useful improvements in washing machines of that general type in which a clothes or fabric receiving drum is mounted so that it can be either brought into an upright position and rapidly rotated about a vertical axis to expel the moisture from the contents of the drum by centrifugal force, or tilted into a different position and moved at a slower rate of speed for subjecting the contents of the drum to the action of a cleansing fluid or the like.

Among the objects of the invention are to provide a washing machine of this character which is so constructed that the clothes or fabric containing drum can be readily moved into the proper position for washing or drying and positively connected to the drive shaft in either position.

The invention further contemplates a washing machine of this character in which the clothes or fabrics to be treated can be successively subjected to the action of several fluids without being removed from the drum. For instance, clothes being washed can be washed and rinsed or washed, rinsed and blued without being handled or removed from the drum.

The invention also contemplates a mounting for the drum in which the drum has a limited universal movement about its connection with the vertical drive shaft when it is in an upright position. This is advantageous for the reason that it enables the operator to distribute the clothes evenly in the drum when placing them therein and also for the reason that when the drum is rapidly rotated the center of gravity of the drum and load therein can be brought over the axis of the vertical shaft, thereby obtaining a proper balance of the load upon the shaft and enabling the drum to be rotated at the high rate of speed necessary for the drying of the clothes without the shocks and strain upon the bearings which would be occasioned by an unevenly balanced load.

This application is a continuation in part of my prior application for a washing machine which was filed on February 16, 1925, and has Serial No. 9,622.

For a full understanding of the invention reference is to be had to the following description and accompanying drawings, in which

Figure 1 is a top plan view of a washing machine which is constructed in accordance with the invention, the clothes receiving drum being shown by full lines in an upright position and by dotted lines in a tilted position.

Figure 2 is a vertical sectional view through the washing machine.

Figure 3 is an enlarged detail sectional view of the gearing for rotating the clothes receiving drum in its different positions.

Figure 4 is an enlarged detail view of the socket element at the upper end of the upright drive shaft.

Figure 5 is a sectional view through the socket taken on the line 5-5 of Figure 4 and showing the polygonal stud of the drum shaft within the socket.

Figure 6 is a top plan view of the gear casing and guide plate at the upper end of the drive shaft.

Figure 7 is a similar view showing a slight modification.

Figure 8 is a sectional view similar to Figure 3, showing a modified construction of the driving gears.

Figure 9 is a detail view showing the manner of securing the cover to the drum.

Corresponding and like parts are referred to in the following description and indicated on all of the views of the drawings by like reference characters.

Referring to the drawings, the numeral 1 designates a tub which may be of any desired size and shape, although in the present instance it is circular in cross section. This tub is supported upon the legs 2 and a gear compartment 3 is shown as arranged under the bottom of the tub. A transverse partition 4 which extends partially up from the bottom of the tub divides the interior of the tub into two separate compartments A and B. These compartments may contain different fluids with which it is desired to treat the fabrics or clothes, and for washing purposes one of the compartments would ordi-

narily contain hot soapy water, while the other compartment would contain clear water for rinsing purposes. The partition is shown as comprising two walls with an air space between the same, such a construction being desirable where the fluids in the different compartments are at different temperatures, since with a thin metal partition the heat would be quickly transferred from the hot fluid in one compartment to the cooler fluid in the other compartment.

The clothes receiving drum 5 is circular in cross section and has the usual perforated walls. The bottom of the drum is pressed upwardly at 6 to provide a conical pocket. A drum shaft 7 is arranged at the axis of the drum and projects downwardly within the conical pocket in the bottom of the drum. A transverse partition 8 extends across the pocket at an intermediate point in the length thereof and the shaft 7 is firmly anchored in the said partition and at the apex of the pocket. The lower end of the drum shaft terminates in a polygonal stud 9 which is adapted to engage either a socket 10 at the upper end of a vertical drive shaft 11, or one of the sockets 12 at the outer ends of the laterally inclined shafts 13, depending upon the position in which it is desired to support the drum.

The vertical drive shaft 11 is journaled within a tubular bearing 14 which extends upwardly at the center of the tub and is rigid with the transverse partition 4. Power may be applied to the drive shaft in any suitable manner, and for this purpose the lower end of the drive shaft is shown as extending into the gear compartment 3 and provided with a pinion 15 meshing with a gear wheel 16, the shaft 17 of the said gear wheel 16 extending downwardly below the compartment 3 and being connected by a worm-gearing 18 with the shaft of an electric motor 19. This is merely a conventional way of driving the shaft and any other suitable mechanism may be employed for that purpose.

The upper end of the tubular bearing 14 terminates in an enlarged head 20 having bearings which receive the inner ends of the lateral shafts 13. The sockets 12 at the outer ends of the lateral shafts are shown as journaled within bearings 21 formed in connection with a substantially semi-spherical gear casing 22. The lower edge of this gear casing 22 is flanged and suitably connected to a plate 23 which is mounted upon the tubular bearing. The lateral shafts 13 are provided with comparatively large gear wheels 24 which mesh with a smaller gear wheel 25, whereby the lateral shafts are driven from the vertical shaft but rotated at a slower rate of speed. The sockets 12 of the lateral shafts have the mouths thereof substantially flush with the exterior of the gear casing member 22 so that the polygonal stud 9 of the drum

shaft can be readily inserted in either of the sockets.

The drum shaft 7 is provided at a point above the polygonal stud 9 with a circular plate 26 which is rigidly applied thereto, and when the polygonal stud of the drum shaft is in engagement with the socket 10 of the vertical shaft this plate 26 is slightly spaced from a yieldable flange 27 which surrounds the mouth of the upright socket 10. This yieldable flange 27 may be formed of some suitable material such as rubber and secured to the socket by pins 28, as indicated by Figure 4. The upright socket 10 is larger in cross section than the sockets 12 of the lateral shafts, and the polygonal stud 9 of the drum shaft is slightly smaller than the upright socket 10, although it fits the lateral sockets 12 with a fair degree of accuracy.

When it is desired to spin the drum about a vertical axis for the purpose of centrifugally drying the contents thereof, the polygonal stud of the drum shaft is placed in engagement with the upright socket 10 of the vertical shaft, whereby the drum shaft is supported in substantial alignment with the vertical shaft. The flange or plate 26 of the drum shaft is then just slightly spaced from the yieldable flange 27 of the socket, and owing to the looseness of the stud within the socket the drum has a limited universal tilting movement about the joint. When the clothes are being placed in the drum the latter will bear down on one side or the other according to the disposition of the weight of the clothes and the operator is thus enabled to obtain an approximately uniform distribution of the clothes. After the clothes have been placed in the drum and the latter is caused to be spun at a high rate of speed the loose joint between the drum shaft and the drive shaft permits the drum to assume the proper position to bring the center of gravity of the drum and load on the axis of the vertical shaft so that the drum can spin without excessive vibration or undue strain upon the shaft and bearing. It will be observed that the lower end of the drum shaft 7 terminates within the conical pocket and above the bottom of the drum, so that the point of support is as high within the drum as possible, thereby obtaining greater steadiness in the mounting of the drum.

When it is desired to subject the contents of the drum to the action of the fluid in one of the compartments of the tub, the drum is bodily lifted until the lower end of the drum shaft is disengaged from the upright socket 10, after which the drum is tilted downwardly into an angular position until a portion of the periphery thereof is submerged in the fluid of the compartment and the polygonal stud 9 of the drum shaft can be moved into the socket 12 of the corresponding lateral shaft 13. In order to facilitate the shifting

of the position of the drum a guide plate is arranged over the top of the gear casing 22. The guide plate is substantially semispherical in shape and the peripheral edges thereof are provided with a flange 30 which is secured to the gear casing. The top of the guide plate is formed with a clearance opening 31 which is arranged above the mouth of the vertical socket 10 and which is sufficiently large to admit of the flange or plate 26 of the drum shaft passing freely through the same. Guide slots 32 are formed in the guide plate and extend radially from the clearance opening 31 toward the sockets 12 of the lateral shafts. An outwardly projecting rest 33 is provided at the end of each of the guide slots 32. When the lower end of the drum shaft 7 is lifted out of the socket 10 of the vertical shaft it can be moved laterally into one of the slots 32 of the guide plate, the flange or plate 26 of the drum shaft engaging the top of the guide plate and sliding over the same. The drum can then be moved in the direction of the guide slot 32 until the flange 26 of the drum shaft engages the rest 33 at the end of the guide slot. The drum may be handled or tilted so that the drum shaft is then inclined with respect to the lateral shaft, and with the flange 26 of the drum shaft supported by the rest 33 the polygonal head at the end of the drum shaft can be brought into registry with the socket 12 of the lateral shaft, whereupon the drum can be slightly lifted to bring the drum shaft into alignment with the lateral shaft and given a shove to move the polygonal head into the socket. In order to permit this action clearance openings 34 are provided at the ends of the guide slots, said clearance openings being sufficiently large to admit of the free passage of the flange 26 of the drum shaft therethrough. It will also be observed that the formation of the guide plate is such that the marginal portions thereof are brought closer to the top of the gear casing than the central portion thereof. Where the tub is formed with two compartments, such as that shown by Figures 1 and 2, the guide plate will be provided with two of the guide slots 32, as shown by Figure 6, there being one of the guide slots for each of the compartments. Should the tub be subdivided into three compartments the guide plate would be provided with three of the guide slots 32, as shown by Figure 7, there being one of the guide slots for each of the tub compartments.

A drain plate 35 is provided for covering all of the tub compartments with the exception of the one that is in use. The drain plate is pivotally mounted upon the upper end of the tubular bearing 14 and is provided with a handle 36 by means of which it can be swung around within the tub into the desired position. The drain plate is inclined downwardly toward the free edge thereof so

that when the drum is being used as a centrifugal dryer the fluid which is expelled thereby from the clothes will be drained back into the compartment from which it was taken.

A modification is shown by Figure 8 in which the lateral shafts 13^a are horizontally disposed instead of being arranged at an inclination to the horizontal as shown by Figures 2 and 3. The inner ends of the horizontal shafts are journaled in the enlarged head 20^a of the tubular bearing 14^a, the outer ends of the horizontal shafts terminating in sockets which are journaled in bearings 21^a in the gear casing 22^a. The horizontal shafts are provided with gears 37 which mesh with a gear 38 on a tubular upright shaft 39. The drum shaft 7^a may extend entirely through the drum so that when the drum is moved downwardly to bring the drum shaft into horizontal position the outer end of the shaft will engage a seat 40 on the walls of the tub to assist in supporting the drum. The polygonal stud 9 at the end of the drum shaft 7^a is adapted to be engaged with the sockets of the respective shafts, just as in the previously described construction. The guide plate 29 which is arranged over the gear casing 22^a operates exactly as previously described to assist in bringing the polygonal stud of the drum shaft into engagement with the sockets 12 of the horizontal shafts. When the drum is swung upwardly with the drum shaft in a vertical position it can be spun rapidly to expel moisture from the contents thereof by centrifugal action, while when the drum is moved downwardly to bring the axis thereof into a horizontal position the outer end of the drum shaft is supported by the seat 40 and the drum is rotated at a comparatively slow speed. The change in the speed at which the drive shaft is driven may be caused automatically by the shifting of the position of the drum. A gear shifting rod 41 extends loosely through the tubular shaft 39, the upper end of the rod projecting into the base of the socket 10, while the lower end thereof is connected to a pinion 42 which is slidably mounted upon the lower end of the tubular shaft, being keyed to the shaft so that it is rotatable therewith. A spiral spring surrounds the lower end of the tubular shaft and is interposed between the pinion and a stop member such as a pin 44. The spiral spring normally tends to slide the pinion 42 upwardly into the full line position shown by Figure 8. The upper end of the gear shifting rod 41 then projects into the base of the socket 10 so that it will be engaged by the polygonal stud 9 of the drum shaft and pushed downwardly thereby if the drum is moved upwardly with the axis thereof in a vertical position. When the gear shifting rod is thus pushed downwardly the pinion

42 is moved into the position indicated by dotted lines on Figure 8. When the pinion 42 is at the lower limit of its movement it engages a suitable gear member 45, while when it is at the upper limit of its movement it engages a gear member 46^a. These gear members may be driven from any suitable source of power, and the gear member 45 operates to revolve the vertical shaft at a high rate of speed, while the gear member 46 operates to revolve the shaft at a comparatively low rate of speed. The shifting of the gears to change the speed is thus accomplished automatically, since the gear shifting rod 41 is pushed downwardly by the weight of the drum when the latter is in an upright position, and the spiral spring 43 automatically moves the gear upwardly when the polygonal stud 9 is withdrawn from the socket 10 preparatory to swinging the drum downwardly.

The drum is provided with a suitable cover 46 which fits in a suitable seat at the mouth of the drum. Any suitable means may be provided for securing the cover in position, and in the present instance the cover is shown as provided at one side thereof with a tongue 47 which interlocks with a suitable opening at the mouth of the drum, a suitable latch member 48 being provided at the opposite side of the cover. With the construction shown by Figure 8 the cover would be provided with a central opening to receive the projecting end of the drum shaft.

The interior of the drum is provided with suitable baffle plates 49 and these plates are preferably substantially triangular in shape with the inner edges thereof inclined downwardly and away from the axis of the drum. With this construction the clothes have a tendency to slide toward the narrow end of the baffle plates as they are being carried up by the rotation of the drum, and after being lifted by the baffle plates the clothes slide off and drop on the conical projection in the center of the drum. The triangular baffle plates and conical projection in the center of the drum thus cooperate with each other to bring about an effective cleansing of the clothes.

In all forms of the invention the drum is adapted to be detachably connected with either a vertical shaft or a lateral shaft, being driven at a high rate of speed for centrifugally drying the contents thereof when it is connected to the vertical shaft, and being driven at a comparatively slow rate of speed while connected to the lateral shaft, a portion of the periphery of the drum being submerged in a fluid in one of the tub compartments so that the contents of the drum will be subjected to the action of the said fluid when the drum is in the latter position.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A machine of the character described, including an upright shaft, a lateral shaft, means for driving the shafts, sockets at the ends of said shafts, a clothes receiving drum, a drum shaft having a head adapted to be detachably fitted in either of the sockets, a flange at the mouth of one of the sockets and a flange upon the drum shaft which has a slightly spaced relation to the flange of the socket when the drum is mounted upon the shaft of the flanged socket, one of the flanges being yieldable.

2. A machine of the character described, including a shaft provided with a socket, a yieldable flange at the mouth of the socket, a drum, a drum shaft having a head adapted to enter the socket, and a flange projecting from the drum shaft and arranged to be slightly spaced from the yieldable flange when the head is fitted in the socket.

3. A machine of the character described, including an upright shaft provided with a polygonal socket, a yieldable flange at the mouth of the polygonal socket, a clothes receiving drum, a drum shaft having a polygonal head which is slightly smaller than the socket and is adapted to be fitted removably therein, and a flange applied to the drum shaft and arranged to be slightly spaced from the flange of the socket when the head of the drum shaft is fitted in the socket.

4. A machine of the character described, comprising a hollow casing, angularly disposed sockets opening through the casing, means for driving the sockets, a clothes receiving drum, a drum shaft having a head adapted to detachably engage either of the sockets, a guide plate arranged over the casing and having a slot for receiving the head of the drum shaft to direct it from one socket to the other socket, and a rest for supporting the drum in approximate position for engagement of the head with one of the sockets.

5. A machine of the character described, comprising a hollow casing, angularly disposed sockets opening through the casing, means for driving the sockets, a clothes receiving drum, a drum shaft having a head adapted to detachably engage either of the sockets, and a guide plate arranged over the hollow casing and having a slot therein for receiving the head of the drum shaft to direct it from one socket to the other socket, a rest at one end of the slot and a flange on the drum shaft adapted to engage the rest to support the drum in approximate position for engagement of the head with the adjacent socket.

6. A machine of the character described, comprising a hollow casing, angularly disposed sockets journaled on the casing, means for driving the sockets, a clothes receiving drum, a drum shaft provided with a head adapted to detachably engage either of the sockets, a guide plate arranged over the casing and having a guide slot for receiving the head

of the drum shaft to direct it from one socket to the other socket, a rest at one end of the slot, and a flange on the drum shaft adapted to engage the rest to support the drum in approximate position for engagement of the head with one of the sockets, the ends of the guide slot being provided with clearance openings through which the flange can pass.

7. In a combined washing and drying machine, the combination of a plurality of compartments for different fluids, an upright high speed shaft, a plurality of lateral low speed shafts, means for driving the shafts, a drum, and means for detachably mounting the drum upon any selected one of the shafts, the drum being mounted on the upright shaft for rapid spinning to centrifugally dry the contents thereof, and being received within the respective compartments for washing when it is applied to the lateral shafts.

8. A washing machine comprising a tub, a vertical driving shaft rotatable at relatively high speed, a pair of oppositely inclined driving shafts extending on substantially opposite sides of the first said shaft and rotatable at relatively low speeds, a partition for dividing the tub into two separate compartments for containing washing fluids, a drum for containing fabrics adapted to operatively engage the said shafts and to be supported for rotation about a vertical axis above the compartments when in engagement with the vertical shaft, and supported in an inclined position when in engagement with either of the inclined shafts, whereby a portion of the drum is immersed in the washing fluids in either compartment, and means for selectively draining washing fluid from the drum into either compartment.

In testimony whereof I affix my signature.
ERIC D. CLARKE.