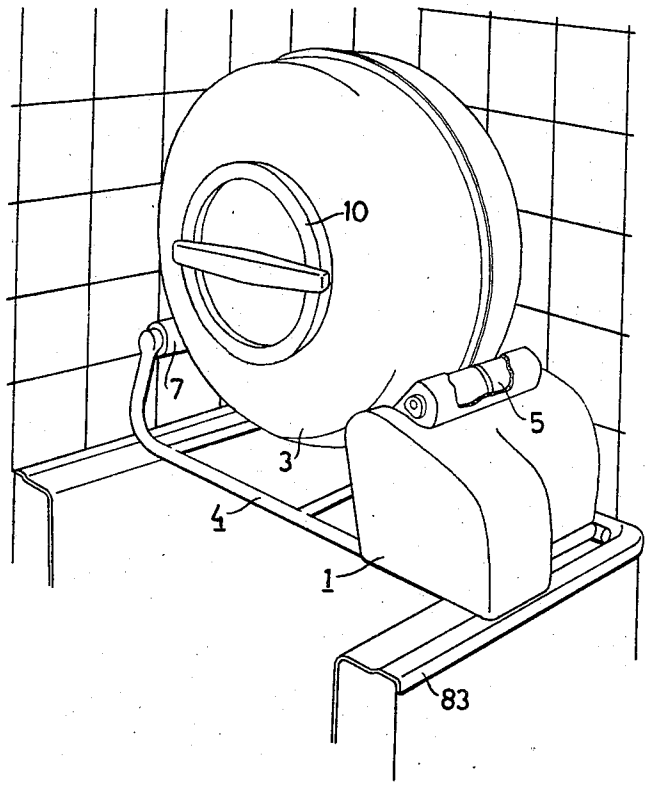
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MACHINES FOR TREATING OR WASHING CLOTHES AND THE LIKE

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Fig. 1



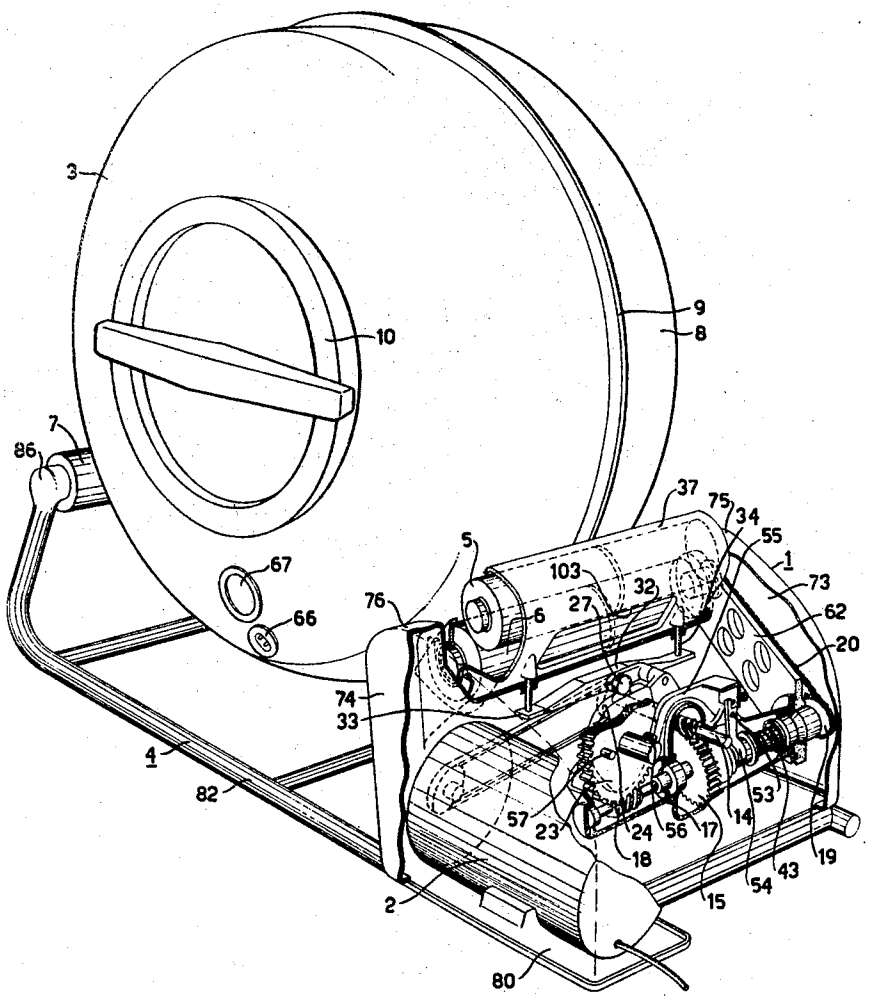
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MACHINES FOR TREATING OR WASHING CLOTHES AND THE LIKE

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Fig. 2



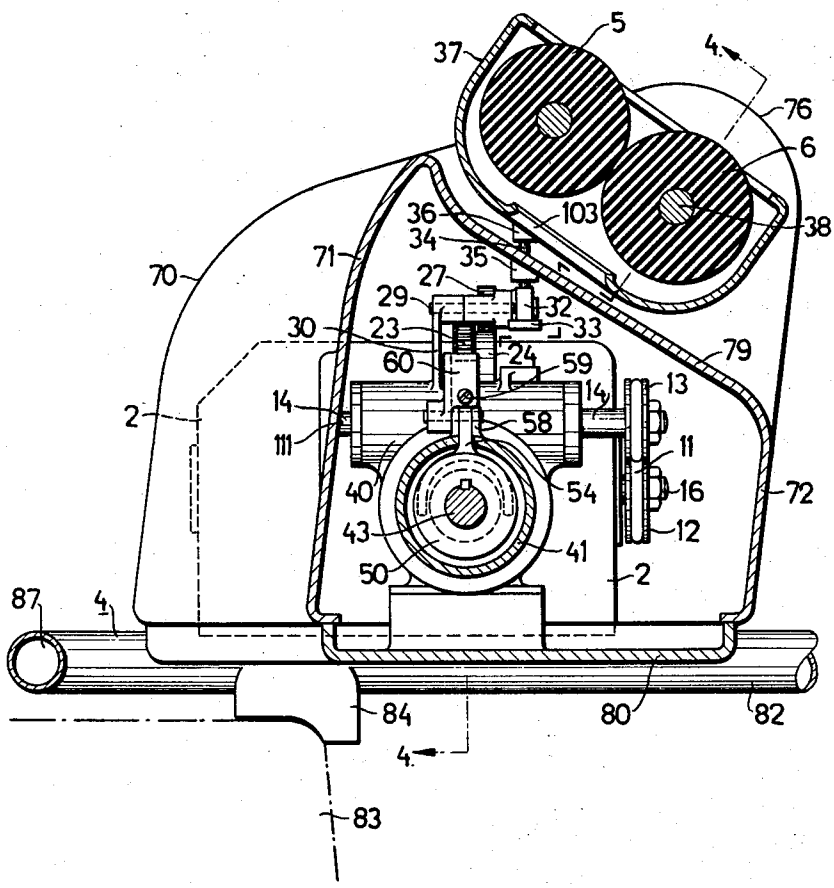
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Fig. 3



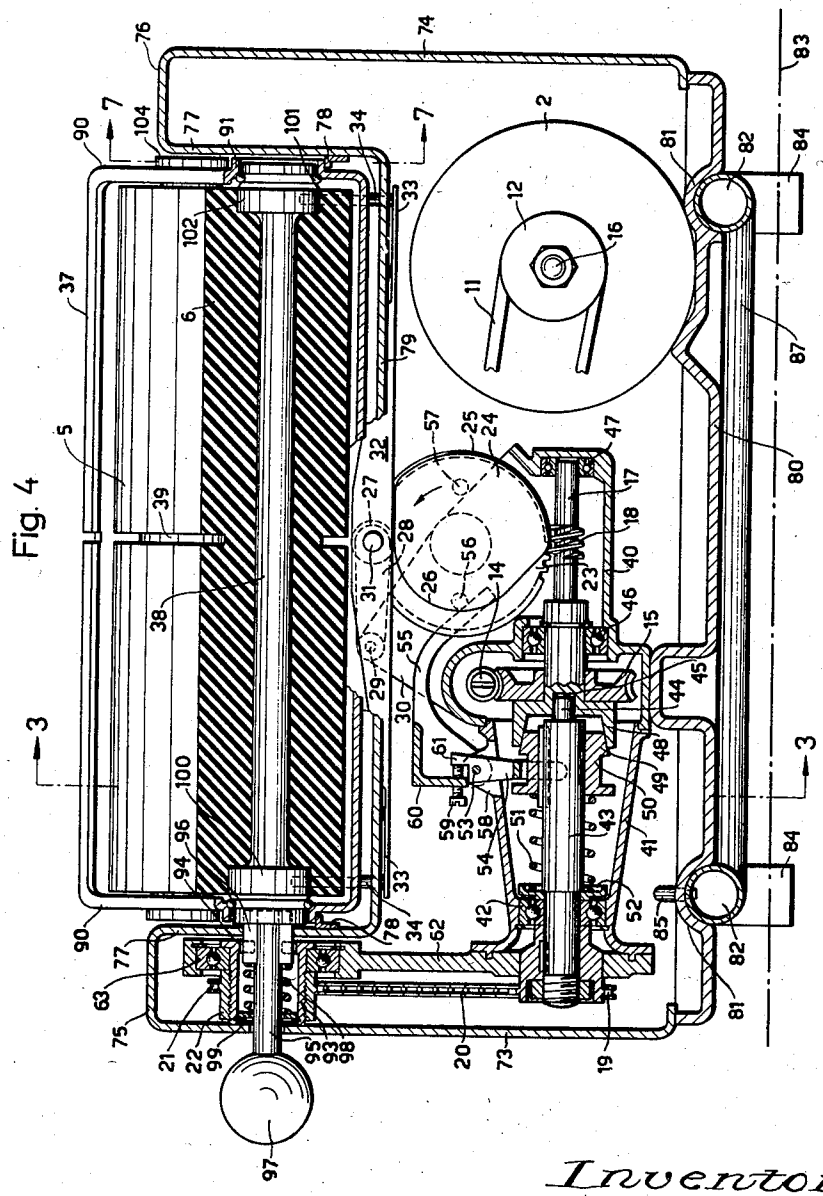
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MACHINES FOR TREATING OR WASHING CLOTHES AND THE LIKE

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Fig. 4



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Fig. 5

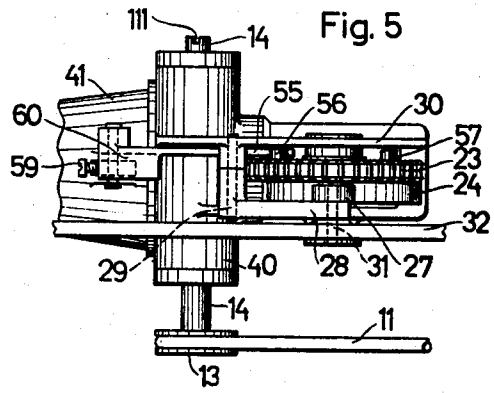


Fig 6.

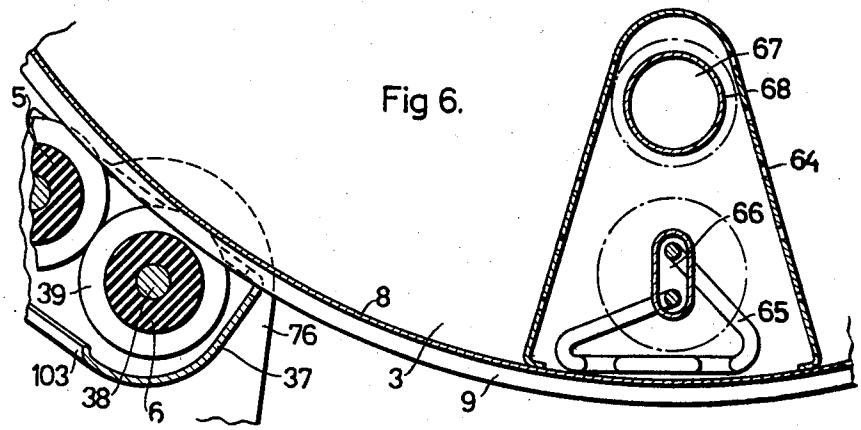
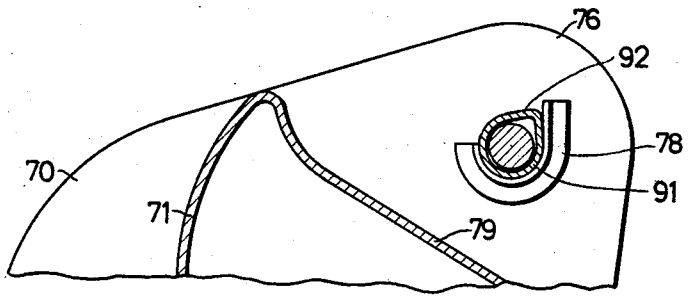


Fig. 7



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Fig. 8

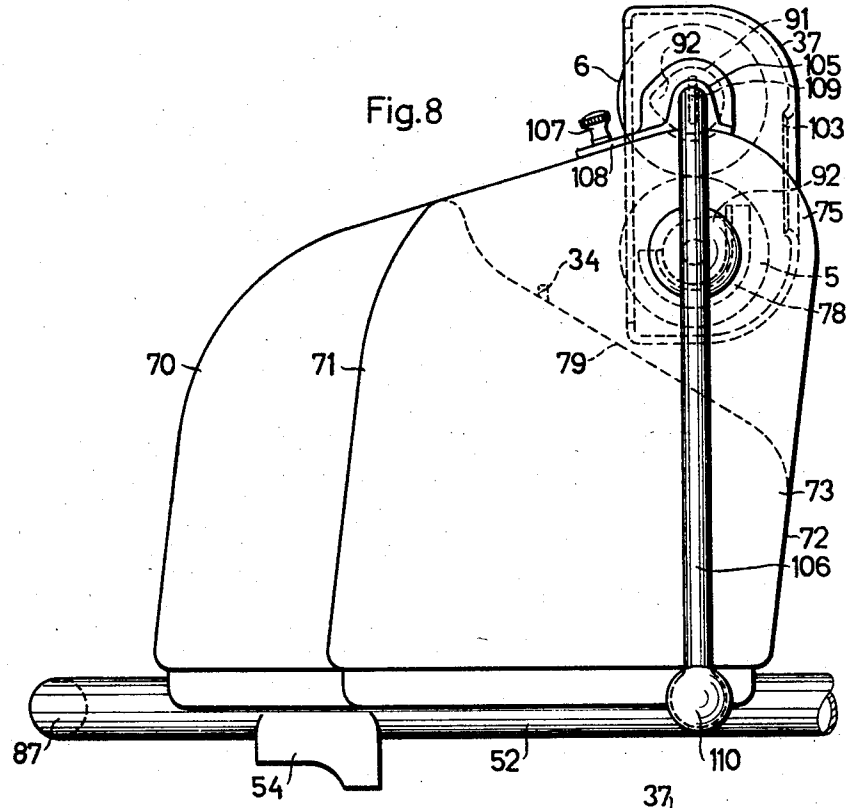
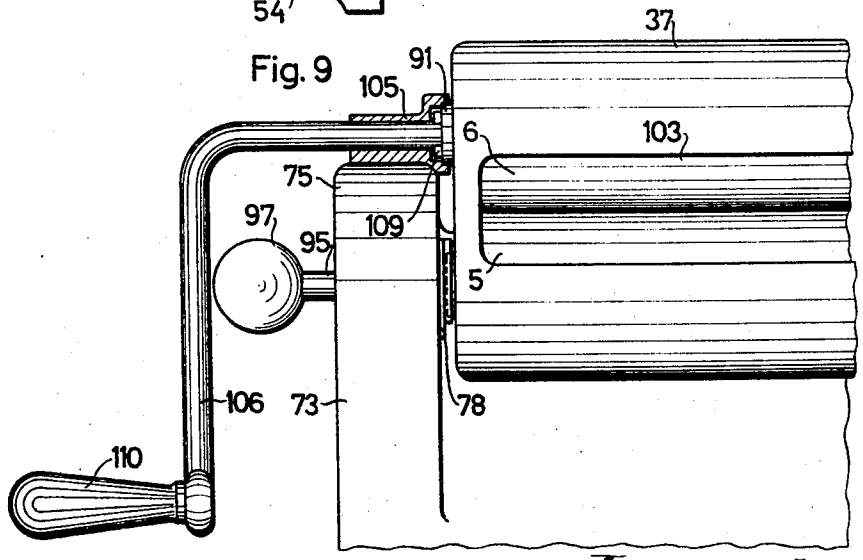


Fig. 9



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MACHINES FOR TREATING OR WASHING CLOTHES AND THE LIKE

Olof Holger Petterson and Gunnar Ivar Fredholm, Bromma, Sweden

Application August 20, 1953, Serial No. 375,423

4 Claims. (Cl. 68—4)

This invention relates to power-driven laundry apparatus and more particularly to a machine for treating or washing clothes and the like in which a rotatable clothes receiving drum is employed.

Apparatus heretofore known for household washing is usually constructed in the form of a complete indivisible unit and is therefore capable of use only for a fixed, definitively given working process. Such apparatus usually suffers from the disadvantage that owing to its bulk, space intended for other purposes must be sacrificed for its use, and difficulties are encountered in moving it from one place to another, e. g. from room to room.

It is a general object of the present invention to overcome these difficulties and disadvantages, and the invention accordingly consists in a machine for treating or washing clothes and the like comprising a drum mounted on two supporting rollers, and adapted to receive the clothes, a stand having rolling members for the drum, and a driving set comprising a motor, one or more reduction gears, and rolling members for the drum, said drum, said stand and said driving set being in the form of units, which are so constructed and arranged that the driving set may be assembled with the stand, and the drum in turn may be mounted on the units thus assembled, in such a way as to be rotatably carried by the rolling members.

A still further object of the invention is to provide a power take-off unit for the clothes receiving drum, which unit comprises two driving rollers so arranged that said unit may be used as a wringer for the washing clothes.

Further objects of the invention will become apparent from the following description when read in conjunction with the accompanying drawings, in which:

Figure 1 is a perspective view of a washing machine;

Figure 2 is a perspective view of a driving mechanism and a rotatable roller driving the drum;

Figure 3 is a cross-section taken substantially along the lines 3—3 of Figure 4, showing the driving mechanism;

Figure 4 is a section taken substantially along the lines 4—4 of Figure 3;

Figure 5 is a plan view of a cam-disc and relative details;

Figure 6 is a fragmentary transverse section through the washing drum;

Figure 7 is a fragmentary section along the lines 7—7 of Figure 4;

Figure 8 is a side view of the driving set combined with a wringer; and

Figure 9 is a fragmentary front view of the wringer.

According to the example shown in Figure 1, the apparatus comprises the following units:

(*a*) A driving set **1** containing an electric motor **2**, reduction gears, transmission members and driving rollers;

(*b*) A rotatable drum **3** adapted to receive the clothes and formed with a cylindrical jacket which may be arranged in frictional engagement with the driving rollers;

(*c*) A tubular stand **4** provided with a supporting roller for the drum.

The driving set **1** is placed on the stand **4** in a fixed position in which the transmission members are capable of transmitting the power to the drum **3** supported on the one hand by driving rollers **5** and **6**, respectively, combined with the driving set and, on the other hand, by a freely running supporting roller **7** carried by the stand. The container **3** is formed as a solid of revolution, the cylindrical jacket of which being, along a centre-line, provided with an annular flange **9** made of two flanges welded together and each belonging to one of the two halves which constitute the container. This container forms a rotatable fluid-tight drum with a centrally arranged opening in one side wall, which opening can be closed by means of a cover **10**.

The driving set shown in Figures 3 and 4 forms a separate unit, in which the driving motor **2**, by means of a belt **11**, belt pulleys **12**, **13** and a worm axle **14** drives a worm wheel **15**. The axle **14** is parallel with the motor shaft **16** and perpendicular to the axles of the rollers **5** and **6**. The worm wheel **15** is rigidly connected to one end of an axle **17** parallel with the rollers, which axle carries a worm **18** of a reversing mechanism which will be hereinafter described. A chain wheel **19** driven by means of the axle **17** is in operative connection with a chain wheel **21** by aid of a chain **20**. The wheel **21** is carried by a sleeve shaped axle **22** which is arranged to drive the roller **6** by the aid of a dog clutch.

The speed of the motor **2** and the diameter of the belt pulleys **12** and **13** are chosen in such a manner that the worm axle **14** runs at a speed of e. g. 5000 revolutions per minute. The axle **17** and thus the chain wheel **19** are driven at approximately 300 revolutions per minute. The roller **6** runs at about the same speed, which means that the drum **3** is rotated at a speed of about 30 revolutions per minute.

From the worm wheel **15** which, as mentioned above, drives the washing drum, power is delivered for driving the worm **18** which is fixed to the axle **17**. The worm **18** runs continually during the entire washing procedure and is arranged to transmit power to the reversing members. Thus, the worm meshes with a worm wheel **23** which rotates at a speed of about 4 revolutions per minute. Carried by the wheel **23** is a cam disc **24** formed by two half-cylindrical surfaces **25** and **26**, the first of which **25** has a greater diameter than the other. The two cylindrical surfaces are in a common way mutually connected to transition surfaces.

A trundle **27** engages the edge of the cam disc and is journalled at one end of an arm **28** swingable about a pivot **29** which is inserted in a flange **30** (Figure 4) provided on a casing which surrounds inter alia the worm gear **14**, **15**. The trundle **27** may be lifted or lowered between two levels by means of the rotating cam disc and is carried by a pin **31** rigidly connected to the arm **28** and is, under free motion, inserted through the mid-portion of a horizontally arranged lever **32**, the two ends **33** of which are extended to the end portions of the driving rollers where each of said ends carries an upwardly directed pin **34**. Each pin is movable in an axial direction in a bore located in a boss **35** of the driving set casing, and abuts against a heel **36** provided on a casing **37** surrounding the driving rollers **5** and **6**. The casing **37** is swingable about an axle **38** carrying the lower driving roller **6** so that the casing can be angularly adjusted by means of the cam disc **24** in such a manner that either the driving roller **6** is in frictional engagement with the cylindrical casing **8** of the drum **3** or the roller **5** transmits the power to said drum. The rollers **5** and **6** are moreover arranged to engage each other under certain pressure and rotate in oppoite directions. The rollers, which are made of rubber and are provided with a central axle, are at the mid-portion formed with an annular slot

39 adapted to receive the flange 9 of the drum so that the drum cannot travel sideways. For the same purpose the supporting roller 7 is formed with a guiding slot for the flange 9.

Because the cam disc 24 is driven at about 4 revolutions per minute and the drum 3 at 30 revolutions per minute the drum is reversed after about each third revolution which corresponds with the practice followed with ordinary washing machines provided with a rotatable drum.

In order to obtain a favourable reversing course in regard to the mass represented by the container 3, the clothes and the contained fluid, the driving set is provided with an automatically engageable and disengageable friction clutch, by means of which the two chain wheels 19 and 21 and thus the sleeve axle 22, driving the lower roller 6, may be disengaged from the worm gear 14, 15 and the driving motor 2.

As shown in Figure 4, the axle 17 and the worm gear 14, 15 are enclosed by a casing 40 which at one end is connected to a casing 41 surrounding a ball bearing 42 for one end of an axle 43 aligned with the axle 17. The other end of the axle 43 is journalled by means of a stub axle 44 freely mounted in a bore 45 centrally arranged in the axle 17. The axle 43 projects beyond the casing 41 and carries at its free end the chain wheel 19. The axle 17 is carried by two ball bearings 46 and 47, and, at the side of the worm wheel 15 facing the axle 43, is connected to an internally conical friction mantle 48 coaxial with the axles 17 and 43 and adapted to receive a clutch cone 49 which is integral with a grooved disc 50 axially displaceable but not turnable on the axle 43. In the friction clutch as described, the clutch cone 49 is normally held in engagement with the mantle 48 under the action of a screw spring 51 which surrounds the axle 43 and is arranged between the disc 50 and a spring bracket 52 rigidly connected to the axle. By this means, the axles 17 and 43 are normally coupled to each other and form a continuous shaft transmission.

The clutch cone 49 may be disengaged by the aid of a fork 54 swingable about a pivot 53, the shanks of said fork being in engagement with the groove of the disc 50. The upper end of the fork is adjustably connected to an operating arm 55 swingably mounted on the same pivot 53 which carries the fork. The free end of the operating arm reaches into the path of rotation of two pins 56 and 57 (Figures 4 and 5) carried by the worm wheel 23 which is rigidly connected to the cam disc. Said pins 56 and 57 alternatively engage the operating arm and cause it to swing clockwise so that the fork displaces the clutch cone 49 out of engagement with the mantle 48. The pivot 53, carrying the fork and the operating arm, is inserted in two ear portions 58 of the casing 41. The moment when the clutch is caused to be disengaged may be adjusted by means of a setting screw 59 in an angle-flange 60 of the operating arm 55. The setting screw abuts against a finger 61 on the fork situated above the pivot 53. The casing 41 is at its outer end portion rigidly connected to a stand wall 62, the upper portion of which carries a ball bearing 63 in which the sleeve-shaped axle 22 and the chain wheel 21 are journalled.

Figure 6 is a fragmentary section through the washing drum 3 taken along the inner side of the end wall of the drum. As shown, the drum is internally provided with agitating ribs 64 designed in usual manner, extending over the entire breadth of the drum and made of perforated sheet metal. The ribs, preferably three in number, have a triangular cross-section and are directed towards the centre of the drum. In the portion of the rib adjacent the jacket 8 of the drum, there is arranged an electrical heating element 65 connected to a countersunk plug contact 66 in the end wall of the drum, which plug contact is adapted to receive a common female contact or a cord connector. During the heating period the drum is kept still standing with the agitating rib, containing the heating element, at the lowest level. In the portion of the end wall located at the top portion of the rib 64 an aperture 67 is provided for controlling the water level in the drum. Said aperture is provided with a glass plate fluidtight mounted in a framing 68. Different levels may be read off by turning the drum through certain prescribed angles.

A draining outlet may be provided in the end wall of the drum adjacent to the jacket 8, which outlet normally is closed by a cover which may be threaded or formed with bayonet clutch members. This outlet may be provided with an automatically closing valve. The outlet may, if desired, be placed in one of the agitating ribs. Under all conditions the outlet opening may be used as a supply opening in which case the drum is turned into such an angular position that the opening serves level controlling purposes.

The casing of the driving set consists of two portions 70 and 71 (Figure 3), the first mentioned of which substantially surrounds the driving motor 2 and the last mentioned surrounds the reduction gears described above. The portion 70 has a greater depth in the axial direction of the motor than the casing portion 71 but the two portions have a common back wall 72 facing the supporting roller 7 on the stand. The end walls of the casing, which are designated as 73 and 74, are vertical and at the upper part are connected to two plinths 75 and 76 respectively (Figure 4), which plinths carry bearing members adapted for the lower driving roller and are provided with walls 77 facing each other. The distance between said walls 77 is somewhat greater than the length of the driving rollers so that horseshoe-shaped bearing flanges 78 on said walls may receive the axle of one of the driving rollers. Between the plinths 75 and 76, the first mentioned of which contains the chain wheel 21 and the sleeve-shaped axle 22, the casing of the driving set having an inclined wall 79 parallel with the plane through the axles of the driving rollers according to Figure 3. The above-mentioned pins 34, by means of which the casing 37 of the driving rollers can be angularly adjusted, extend outwardly through the wall 79 which for the rest is without openings. The lower part of the end walls 73 and 74 is connected to a bottom part 80 designed with two grooves 81 arranged in planes perpendicular to the driving rollers and each adapted to engage one of the tubular side pieces 82 of the stand frame 4.

The above-mentioned frame pieces 82 are parallel to each other and adapted to be placed in a horizontal plane, e. g. on a table or on the opposite edges of a bath tub 83. For said purposes the frame pieces are provided with rubber heels 84 designed in a suitable manner. The driving set is held in a fixed position on the frame by aid of vertical pins 85 on the frame pieces 82, which pins engage bores in the bottom part 80 of the casing. The driving set may in this way be easily placed on the stand at the prescribed distance from the supporting roller 7 which is carried by bearings 86 at the upper ends of upright portions of the frame pieces 82. The supporting roller need not be designed as a roller with an entire cylindrical surface but may e. g. be diivded in a number of mutually parallel discs or rings rolling on the cylindrical jacket 8 of the drum. The portions of the roller 7 which engage the jacket are preferably made of rubber or other sound deadening or resilient material. The stand frame 4 may in a suitable way be strengthened by means of cross stays arranged between the frame pieces 82 which latter, being outside the driving set, are connected to each other by means of a perpendicularly arranged end frame portion 87. The stand frame 4 may according to the foregoing be made of a tube bent in U-form, the mid-portion of said tube constituting the end portion 87. When the machine is not in use the stand 4 may be hung up on a wall or other convenient support in such a manner that the supporting roller 7 in a horizontal position serves as a shelf or a bracket upon which the drum 3 can be placed.

The driving rollers 5 and 6 with the casing 37 constitute a unit which is removable from the driving set and which may be easily replaced in the operating position. As mentioned above the driving set has two plinths between which the lower driving roller 6 may be journalled. For this purpose end walls 90 of the casing 37 are provided with outwardly directed stub sleeves 91 which in cross section have a circular ring portion comprising about 270° connected to a right-angled corner portion 92, the shanks of which are tangentially arranged with respect to the said ring portion, as shown in Figure 7. These sleeves 91 may pass through the open top of the bearing sockets 78 on the inside of the plinths 75 and 76 and rest in said sockets, one shank of which is upright and extends upwardly beyond the centre of the sleeves 91. Considering the form of the sleeves the roller casing can only be put into the operating position in a prescribed manner which will be more closely described in the following. When the roller casing takes the proper position in relation to the driving set the axle 38 of the roller 6 is coaxial with the sleeve-shaped axle 22 carrying the chain wheel 21.

The sleeve axle 22 is attached to an inner sleeve 93 (Figure 4) by means of screw-threads and locks the ball bearing 63 in a fixed position. In a bottom portion 94 of the sleeve 93 there is a diametrically arranged slot with a central bore adapted to receive an axially displaceable axle stud 95 and a plate or vane 96 diametrically inserted into said axle stud. The plate or vane 96 forms the acting members in a claw or dog clutch between the axle stud 95 and the roller shaft 38. The outer end of the axle stud 95 is provided with an operating handle 97 by means of which the vane 96 can be removed from the engaged position against the action of a helical spring 98. This latter surrounds the axle stud and is held between the outer edge of the vane 96 and a ring 99 fixed in the sleeve 93. In the engaged position of the clutch the vane 96 is in engagement with a diametrical slot in the end of the roller axle 38, which end forms a head 100. This head forms moreover the inner path for balls in a ball-bearing, the outer path of which is constituted by the inner side of the sleeve 91 on the roller casing. The other end portion 102 of the axle 38 is designed and journalled by means of balls 101 in the same manner as the above described head 100 only that said end portion 102 lacks clutch members.

When the roller set is to be placed in its operating position between the plinths 75 and 76, the handle 97 must be drawn outwardly. After the sleeves 91 on the roller casing have engaged the bearing sockets 78 the driving roller must be turned so that the slot in the head 100 is in alignment with the clutch vane 96 whereupon the operating handle is liberated. In this way the roller 6 is brought into driving connection with the axle 43 in the friction clutch. The angular position of the roller set in relation to the inclined wall 79 of the driving set casing depends on the position of the cam disc 24 and consequently of the lifting pins 34. The roller set can, however, under all conditions be placed in proper position because the same also in the operating state is swingable about the axle of the roller 6 through a certain angle which as a precautionary measure is limited. This is connected with that condition that the driving rollers are freely available from both sides for the purpose of being used as a wringer (Figures 8 and 9). In accordance herewith the casing 37 is open on that side which in the operating position is turned against the drum 3 while on the opposite side of the rollers there is a slot-shaped opening 103 (Figure 3) in the casing which opening extends over the entire length of the rollers and serves as the supply opening of the wringer. Said supply opening ought not to be freely available when the rollers are in driving connection with the motor. For this reason the corner portion 92 on the sleeves 91 are arranged in such a manner that the upright shank of the sockets 78 serves as a stopping member for the corner portion 92 so that the roller set only can be swung upwardly from the operating position through such a limited angle that the supply opening 103 is still blocked by the casing of the driving set. The above described design of the casing 37 is connected with the direction of rotation of the rollers. According to Figure 3 the roller 6 is adapted to rotate clockwise. Therefore, at the upper side of the roller set there is no risk of the operator's fingers or other objects being pinched between the rollers.

According to the position shown in Figure 3 the roller 6 is the operating roller for driving the drum, which is, moreover, carried by the supporting roller 7. Thus, the drum may be put in rotation in a counter-clockwise direction. The reversing of the movement is initiated by means of a pin 56 on the worm wheel 23 which passes into engagement with the operating arm 55 so that the friction clutch 48, 49 is disengaged. At this moment, the two rollers 5 and 6 run under free motion and are entrained by the drum which, on account of the removal of the motive power, slackens its speed. Meanwhile, the cam disc 24 has begun to lift the trundle 27 and consequently the two pins 34 so that the driving roller 5 is pressed into contact with the jacket surface of the washing drum 3. At this moment, the rollers 5 and 6 have a braking effect on the drum so that this latter is brought to rest. Upon a further rotation of the cam disc, the washing drum is raised by the roller 5 out of engagement with the roller 6 and thus rests only against the upper roller. In the meantime, the pin 56 has passed the operating arm 55 which returns to the position shown in Figure 4, and the clutch cone 49 is forced, by the spring 51, into engagement with the friction sleeve 48 so that power is again transmitted from the axles 17 and 43 via the chain 20 to the roller 6 and from this latter to the roller 5 which, as a result, puts the drum into rotation in a clockwise direction. The next reversing takes place when the pin 57 actuates the operating arm 55 and the cam disc lowers the trundle 27 and thus the roller 5, at the moment when the two driving rollers simultaneously come into contact with the jacket surface of the washing drum, a braking effect being again obtained and the drum being brought to rest. The driving roller 5 is returned to the lower position shown in Figure 4, while the power from the motor is transmitted to the roller 6 and the drum begins to rotate in a counter-clockwise direction. The reversing courses are repeated periodically during the entire washing procedure.

The two rollers 5 and 6 with their casing 37 are, as indicated above, adapted to be used as a wringer. For this purpose, the casing 37 together with the rollers is turned end for end so that the roller 5 will be located in the normal driving position of the roller 6, as shown in Figures 8 and 9, which is rendered possible by the roller 5 being journalled in the casing 37 in the same manner as the roller 6. Supporting sleeves 104 for the axle of the roller 5 are shaped in full conformity to the supporting sleeves 91 for the axle of the roller 6. The corner portion is, however, so directed in relation to the corner portion 92 that the roller set may assume such a position that the roller axes lie in a vertical plane, the roller 6 then being located uppermost, the opening 103 in the casing, which serves as a supply opening for the washing clothes, being turned away from the driving set. In order to fix the roller set in said upright position, a sleeve 105 containing a bearing for a crank 106 is mountable on the plinth 75 by the aid of a screw 107 passing through a mounting plate 108 attached to the sleeve 105 and shaped in conformity with the upper side of the plinth. Said sleeve 105 encloses the supporting sleeve 91 on the roller casing. In a similar way, fixing members may also be provided at the opposite end wall of the roller casing. Preferably, the sleeve 105 together with its bearing is so connected to the crankshaft as not to be removable therefrom. Fastened to the outer end of the crankshaft is a diametrically

disposed clutch vane **109** of the same design as the vane **96** on the stub axle **95** so that the crankshaft may be connected to the roller **6** through displacement in axial direction towards the roller, until the mounting plate **108** comes in the proper position for being screwed on to the plinth. The arm of the crank lies freely along the gable of the driving set and is provided with a handle **110**. Preferably, the driving set together with the stand **4** is disposed above a bath tub, a sink or the like so that the water pressed out by the wringer may flow directly down into the tub etc. If desired, the wall turned downwards of the roller casing **37** may be perforated in order to facilitate the running off of the water.

What is claimed is:

1. A tumbler type washing machine comprising two supporting rollers, a drum rotatably carried by said rollers, a stand associated with one of said supporting rollers and a driving set comprising a motor, at least one reduction gear, the other and driving one of said rollers and a further roller coupled therewith, said stand and said driving set being in the form of units constructed and arranged so that the driving set is detachably mounted on the stand and the drum is loosely placed on the rollers of the units thus assembled, the drum having a substantially cylindrical rolling surface which, in the operative position of the drum is in frictional engagement with one or the other of said coupled rollers, according to the direction in which the drum is to rotate, said driving roller and further roller of the driving set being rotatable in opposite directions, and mechanism operatively connected to the driving set to determine the periodicity of reversal of rotation of the drum by the coupled rollers.

2. A machine as claimed in claim 1 wherein each coupled roller is provided with an axle, a cradle arrangement in which the axles of the coupled rollers are mounted and the mechanism determining the periodicity of reversal of rotation of the drum includes a cam disc driven continuously at a speed which is low in relation to that of the driving rollers, the active cam surfaces of the disc following two arcs extending through approximately 180 degrees and having different sized radii enabling the cradle arrangement to be displaced by means of said cam surfaces for the purpose of causing periodic reversal of the direction of rotation of the drum.

3. A tumbler type washing machine comprising two supporting rollers, a drum rotatably carried by said supporting rollers, a stand associated with one of said supporting rollers and a driving set comprising at least one reduction gear, a loosely mounted cradle arrangement, the other and driving one of said rollers and a third roller coupled therewith, an axle for each of said driving and third rollers mounted in the cradle arrangement, said stand and said driving set being in the form of units constructed and arranged so that the driving set is detachably mounted on said stand and said drum is loosely placed on the units thus assembled, the drum having a substantially cylindrical rolling surface, which in the operative position of the drum is in frictional engagement with one or the other of said coupled rollers, according to the direction in which the drum is to rotate, said driving roller and third roller of the driving set being rotatable in opposite directions, and mechanism operatively connected to the cradle arrangement to determine the periodicity of reversal of rotation of the drum by the coupled rollers.

4. A machine as claimed in claim 3 wherein the mechanism determining the periodicity of reversal of rotation of the drum includes a cam disc driven continuously at a speed which is low in relation to the speed of the driving rollers and suitable for a calender, and coupling members on the cam disc axle for detachable engagement with such a calender which is combined with a stand for mounting of the driving set.

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