F. A. & S. W. MILLS.

GEARING.

APPLICATION FILED JAN. 2, 1913.

1,118,210.

Patented Nov. 24, 1914.

5 SHEETS—SHEET 1.

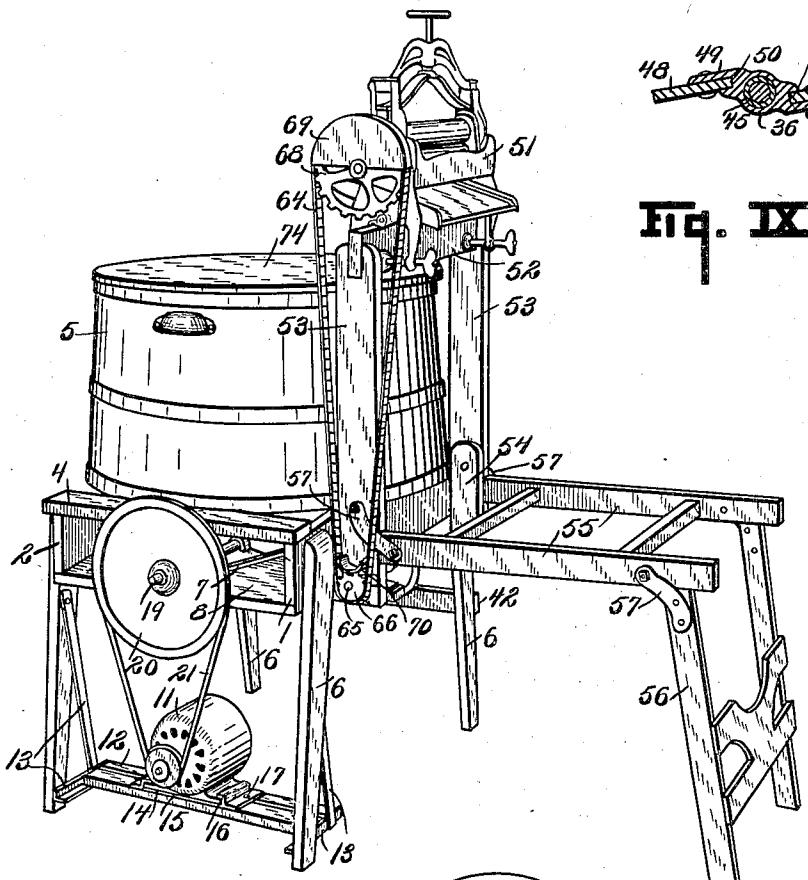


Fig. I.

Fig. IX.

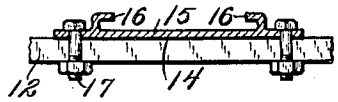


Fig. VIII.

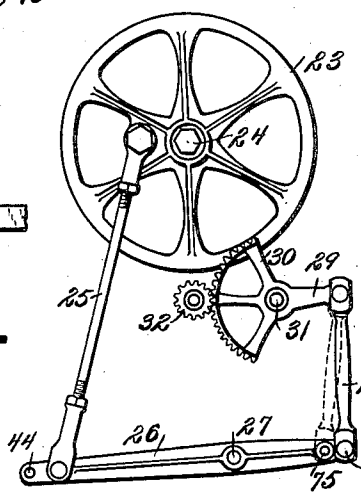


Fig. VII.

Witnesses

M. P. Woodruff.

L. G. Greenfield

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By Chappell & Earl Attorneys

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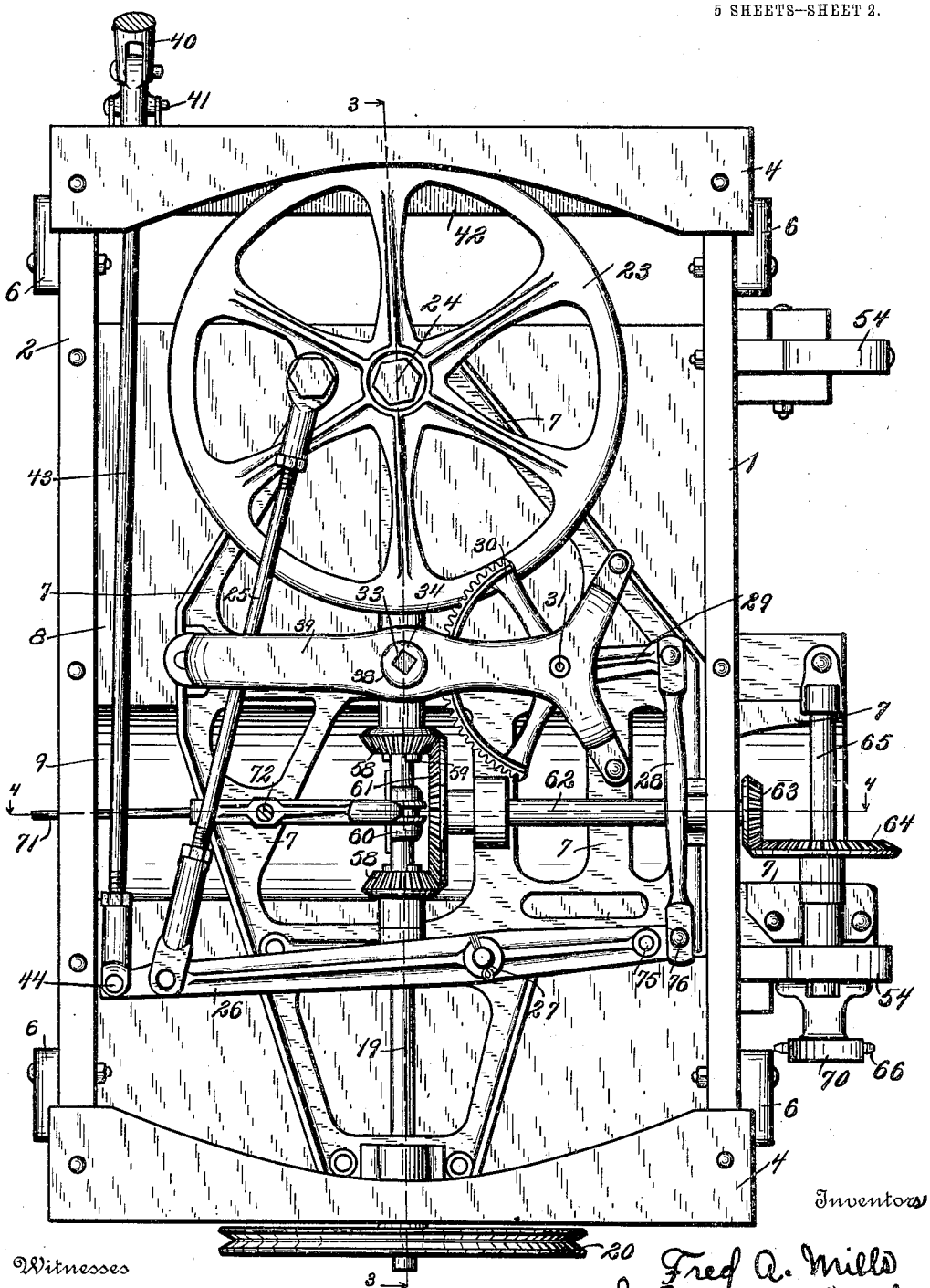
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5 SHEETS—SHEET 2.



Witnesses

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Fig. II.

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5 SHEETS—SHEET 3.

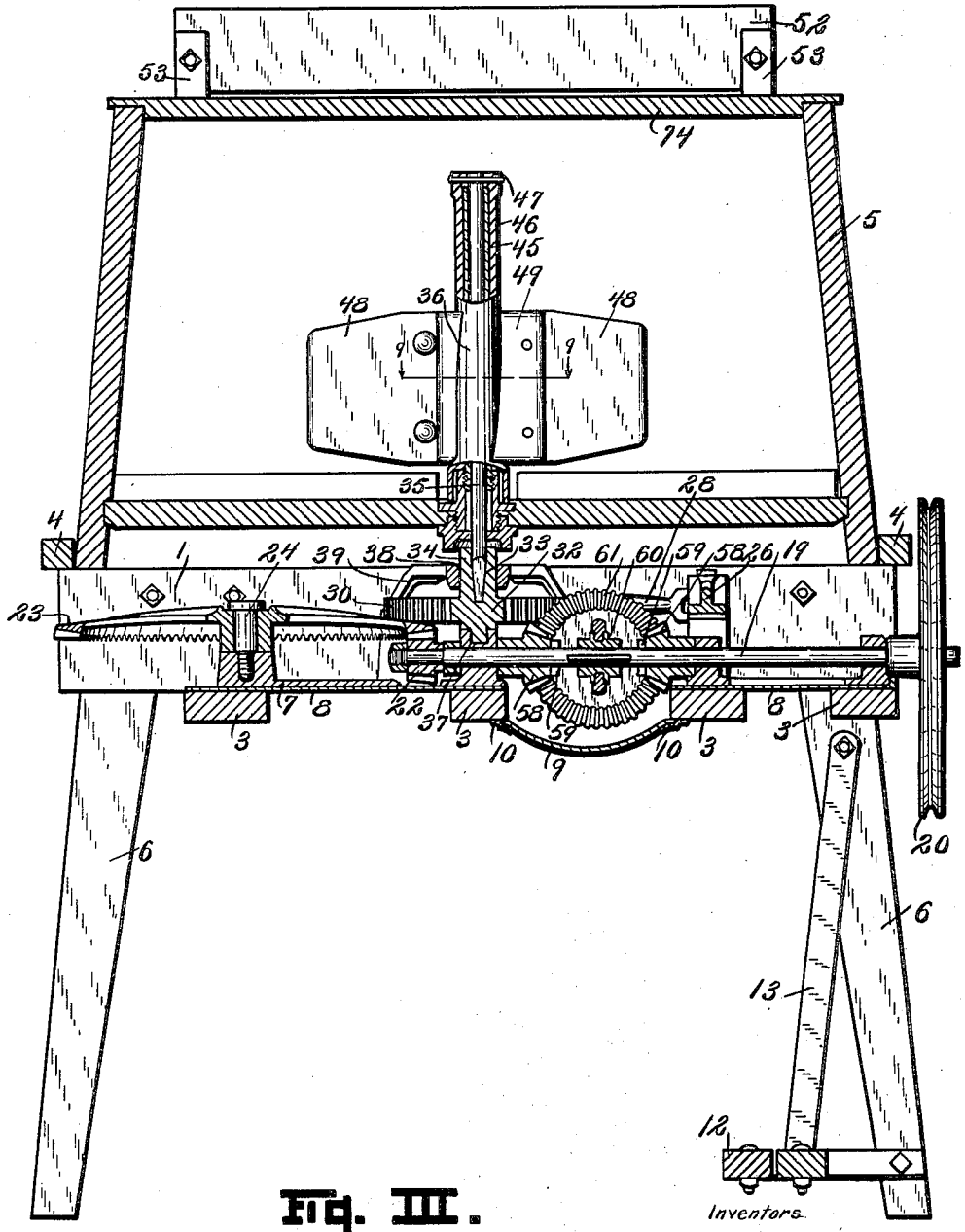


Fig. III.

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5 SHEETS—SHEET 4.

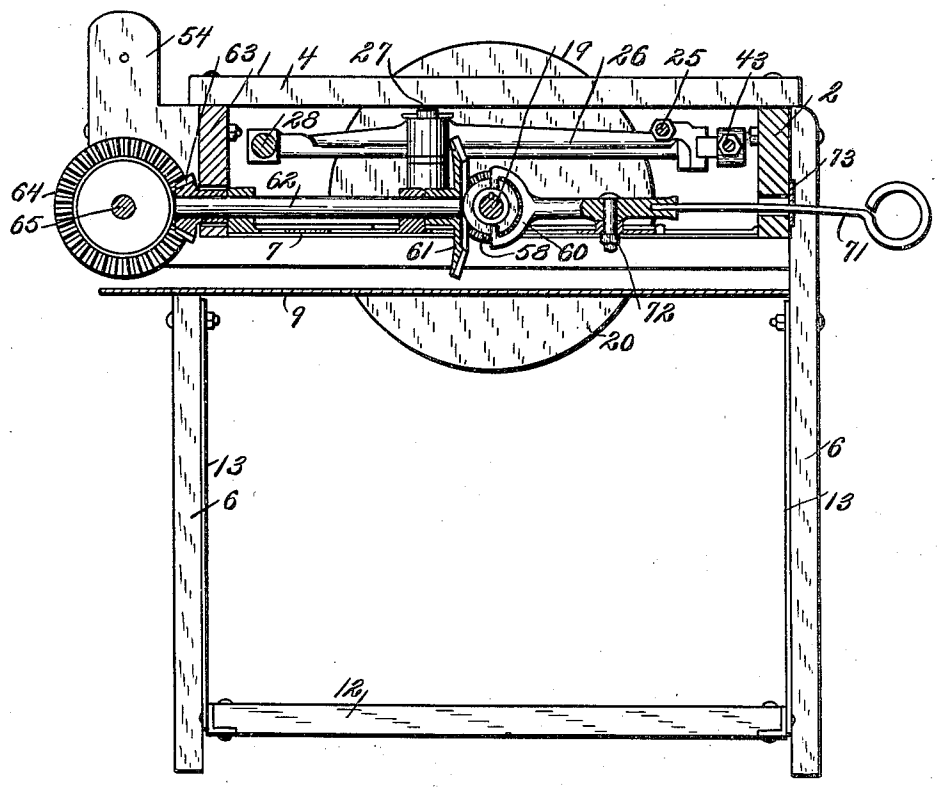


Fig. IV.

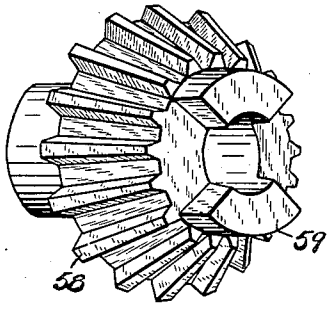


Fig. V.

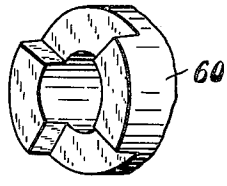


Fig. VI.

Witnesses

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GEARING.

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5 SHEETS—SHEET 5.

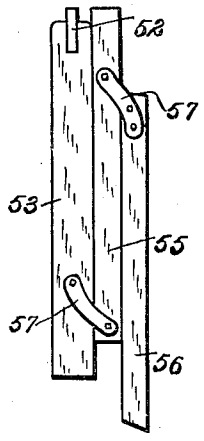


Fig. XI.

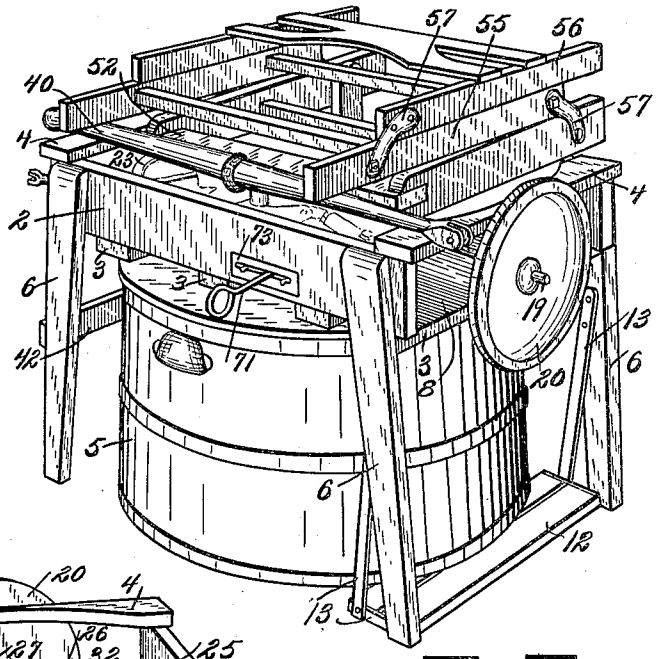


Fig. X.

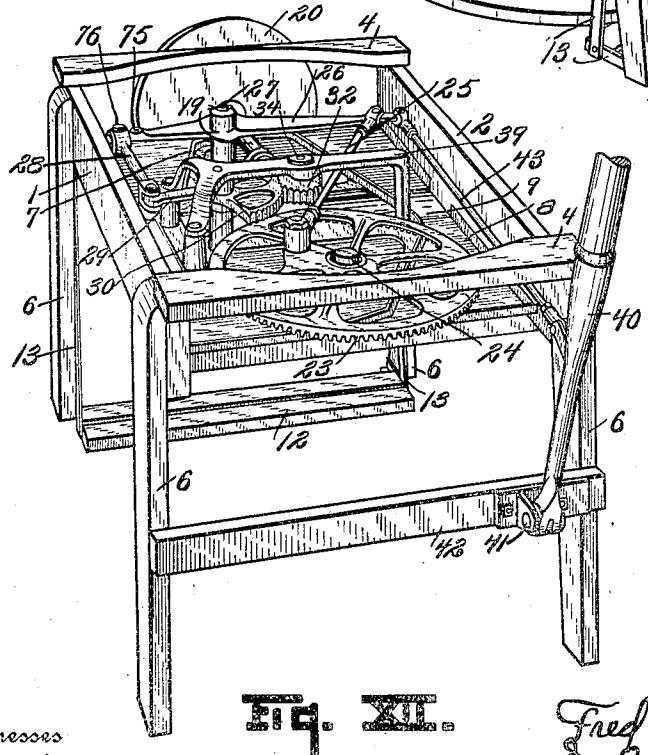


Fig. XII.

Witnesses

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UNITED STATES PATENT OFFICE.

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GEARING.

1,118,210. Specification of Letters Patent. Patented Nov. 24, 1914.

Application filed January 2, 1913. Serial No. 739,746.

To all whom it may concern:

Be it known that we, FRED A. MILLS and SAM W. MILLS, citizens of the United States, residing at Kalamazoo, Michigan, have invented certain new and useful Improvements in Gearing, of which the following is a specification.

This invention relates to improvements in gearing for washing machines.

The main objects of this invention are: First, to provide an improved gearing well adapted for use in washing machines. Second, to provide an improved gearing well adapted as a driving mechanism for washing machines which is adapted for either motor or for manual power. Third, to provide an improved washing machine in which the tub may be readily removed or replaced and the agitator readily connected to or disconnected from the driving mechanism. Fourth, to provide an improved washing machine embodying these advantages, which is easily collapsed for transportation or storage, and one which may be packed in a very compact package and readily set up for use by an inexperienced person.

Further objects, and objects relating to structural details, will definitely appear from the detailed description to follow.

We accomplish the objects of our invention by the devices and means described in the following specification. The invention is clearly defined and pointed out in the claims.

A structure which is a preferred embodiment of our invention is clearly illlustrated in the accompanying drawing forming a part of this specification, in which:

Figure I is a perspective view of a structure embodying the features of our invention. Fig. II is a plan view of the driving mechanism and supporting frame therefor. Fig. III is a detail vertical section on a line corresponding to line 3—3 of Fig. II. Fig. IV is a detail vertical section on a line corresponding to line 4—4 of Fig. II. Fig. V is a detail perspective of one of the gears 58 through which the wringer is driven. Fig. VI is a detail perspective view of the clutch collar 60. Fig. VII is a plan view of a part of the driving mechanism removed from the frame. Fig. VIII is a detail perspective view of the motor supporting plate 14. Fig. IX is a horizontal section through the agitator, on a line corresponding to line 9—9 of Fig. III. Fig. X is a perspective view of the structure collapsed for storage or transportation. Fig. XI is a detail side elevation showing the auxiliary stand collapsed against the wringer standard. Fig. XII is a perspective view of a modified form of the driving mechanism, the wringer driving mechanism shown in the other views being omitted.

In the drawing similar reference characters refer to similar parts throughout the several views, and the sectional views are taken looking in the direction of the little arrows at the ends of the section lines.

Referring to the drawing, we provide a main frame consisting, in the structure illustrated, of front and rear sills 1 and 2 respectively, and cross sills or pieces 3 and 4, the cross pieces 3 being arranged on the under side of the front and rear sills and the cross pieces 4 being arranged on top of the same and curved on their inner edges to receive the tub 5 which is adapted to rest on the sills 1 and 2. The legs 6 are secured to the sills 1 and 2.

The driving mechanism is supported on a suitable skeleton frame 7 disposed horizontally on the cross pieces 3 between the sills 1 and 2. The frame 7 is a casting and is provided with suitable bearings and pivot studs for the driving mechanism. Below the frame 7 are plates or trays 8 and 9 which serve to collect any oil or the like dripping from the bearings. The tray 9 is arranged on the under sides of the intermediate cross pieces 3 in order to accommodate certain of the gears, as clearly shown in Fig. III. This tray 9 is removably supported by slides 10 secured to the under sides of the cross pieces 3.

The motor 11, an electric motor being shown in conventional form, is mounted on the shelf 12 supported under the frame by the brackets 13. The motor is supported by base plate 14 having a seat 15 with overhanging flanges 16 adapted to receive the base of the motor. The base plate is adjustably secured to the shelf by means of the bolts 17 engaging the longitudinal slot 18 in the shelf. The belt 21 may be tightened by adjusting the plate 14 on the shelf.

The driving shaft 19 is provided with a belt wheel 20 for the motor belt 21. The

driving shaft 19 is supported in suitable bearings on the frame 7. On the inner end of the driving shaft 19 is a beveled gear 22 meshing with a gear on the horizontally disposed crank wheel 23 which is supported on the stud bearing 24 on the frame 7. The gear 23 is connected by the connecting rod 25 to the lever 26 pivoted on the stud 27 on the frame 7. The lever is connected by the link 28 to the arm 29 of the segment 30. The segment 30 is journaled on the stub shaft 31. The segment 30 meshes with the agitator gear 32 having a socket 33 in its hub 34 adapted to receive the spindle 35 of the agitator 36. The pinion 32 is supported in a horizontal position, by a socket-like bearing 37, its upper end being supported by a bearing 38 in the spider 39 mounted on the frame 7. The spider 38 also is provided with a bearing for the shaft 31 of the segment 30. With thus the parts arranged, the agitator gear 32 is driven with an oscillating movement and the power is multiplied so that but little motor power is required to operate the machine.

The driving mechanism is compactly arranged and disposed within the main frame between the front and rear sills. The driving shaft 19 is horizontally disposed and the crank wheel 23 is horizontally disposed at the inner end of the driving shaft. The lever 20 is arranged transversely of the frame and driving shaft, it being located above the shaft. The segment 30 is disposed between the crank wheel and the lever, while the agitator gear 32 is centrally disposed above the driving shaft between the crank wheel and lever. The connecting rod 25 is on one side of the driving shaft, while the link 28 is on the other. The hand lever and its connections and the wringer connections are also arranged with a view of economizing space.

The hand lever 40 is pivoted at 41 on the cross piece 42 at one end of the frame and is connected by the link 43 to the lever 26. Ordinarily when driven by a motor, the hand lever is removed. To do this it is only necessary to remove its pivot 41 and the pivot 44 for the link to the lever. It may, of course, be left upon the machine while the machine is driven by the motor as it merely swings back and forth.

On the bottom of the tub we mount a tube 45. The sleeve-like hub 46 of the agitator 36 fits over this tube while the agitator spindle 35 extends through the same into engagement with the agitator gear 32. The spindle is secured to the upper end of the sleeve by means of the pin 47 and projects through the bottom of the tub to engage the socket in the agitator gear 32 as stated. The agitator is not connected in any way to the tube 45. The agitator is supported by the spindle which rests in the socket as stated. The tube projecting up within the agitator sleeve prevents the water escaping from the tub.

The agitator blades 48 are secured to flanges 49 having seats 50 for the inner ends of the blades, the flanges being formed integrally with the sleeve 46. See Fig. IX. This forms a simple but satisfactory structure, for the agitator, and its blades which are preferably of wood, are supported so that they are not likely to split or warp.

The wringer 51 is mounted on the cross piece 52 of the wringer supporting frame by means of suitable clamps. The wringer supporting frame consists of suitable uprights or standards 53 connected at their upper ends by the cross piece 52. The uprights or standards 53 are pivotally mounted on the upwardly projecting brackets 54 on the rear frame piece 2 so as to collapse forwardly upon the main frame when the tub is removed. See Fig. X.

The auxiliary tub bench or stand is pivotally connected to the uprights 53 by straps 57 to collapse against the wringer support, as shown in Figs. X and XI. The legs 56 for the tub bench 55 are pivotally supported by straps 57 so as to collapse, as shown.

The ends of the horizontal or sill members of the bench 55 abut the edges of the uprights 53 when the stand is extended. When collapsed, the stand 55 is raised up and swung on the pivots connecting the same to the straps 57 so that its sill members lie edge to edge with the uprights 53—see Fig. XI—and is supported in this position without additional securing or attaching means. The wringer standard may be collapsed upon the main frame without removing the wringer.

To drive the wringer in either direction, we mount a pair of beveled gears 58 on the driving shaft 19, the gears being rotatably mounted on the shaft. These gears are provided with clutch jaws 59, while the clutch collar 60 is splined to the driving shaft 19 and adapted to be shifted into engagement with either of the gears 58 or to a neutral position, as shown in Fig. II.

Arranged in mesh with both of the gears 58 is a gear 61 mounted upon the end of the driven shaft 62 which is supported in suitable bearings on the gearing frame 7. The outer end of the shaft 62 is provided with a bevel gear 63 meshing with a gear 64 on the shaft 65. The shaft 65 is supported on the ends of the intermediate cross pieces 3 and on arms on the frame 7 which keeps all the parts of the driving mechanism in proper alinement. The shaft 65 is provided with a sprocket 66 connected by the sprocket chain 67 to the sprocket 68 of the wringer. The sprocket 68 is provided with a housing 69 while the sprocket 54 is provided with a gear 70. The clutch collar 60

is shifted by the lever 71 which is mounted on the pivot 72 on the frame 7. The lever projects through a keeper plate 73 on the front sill 1. The keeper plate is suitably notched to hold the lever in its adjusted positions. With these driving connections, the wringer may be driven in either direction so that in use, the articles may be wrung from the washing tub into a rinsing tub on the bench 55 and the wringer reversed and the articles wrung from the rinsing tub and delivered onto the cover 74 of the tub 5 which is adapted to receive the same. This may be done while the second batch of laundry is being washed.

The structure is easily knocked down for storage or transportation as the tub can be lifted off either before or after the agitator is removed although, in practice, it is preferable that the agitator be taken out of the tub before the tub is lifted from the stand.

The wringer is of the ordinary clamp type and can be readily removed from its standard when the stand or bench 55 may be collapsed against the standard and the standard collapsed forwardly onto the main frame, as shown in Fig. X.

When the structure is packed for transportation or storage, the tub 5 may be slipped under the main frame after the motor has been removed. The motor is preferably separately crated as that should be fully protected. By placing the tub under the frame as shown in Fig. X, the frame serves as part of the packing crate and but little additional crating is required. The structure collapsed as illustrated, is very compact.

In the modification shown in Fig. XI, the wringer and driving mechanism therefor is omitted.

To change the stroke of the agitator, we provide the lever 26 with a plurality of holes 75 for the connecting pivot 76 of the link 28 thereto.

The tray or pan 9 is removed when the structure is packed for shipment, as shown in Fig. X.

Our improved washing machine is very simple and easy to operate, as it is only necessary in setting it up to place the tub on the frame and drop the agitator hub over the tube 45.

The structure is very easy to operate and may be readily driven through the hand lever 40. A motor of small horse power is sufficient.

We have illustrated and described our improvements in a form in which we have embodied the same in practice. We have not attempted to illustrate or describe various modifications which we contemplate as being possible, other than the modification in which the wringer is omitted, as we believe the disclosure made will enable those skilled in the art to which this invention relates to embody the same as conditions may require. We desire, however, to be understood as claiming our improvements specifically in the form illustrated as well as broadly within the scope of the appended claims.

Having thus described our invention, what we claim is new and desire to secure by Letters Patent is:

1. In a structure of the class described, the combination with the frame, of a horizontally disposed driving shaft, a horizontally disposed crank wheel provided with a beveled gear arranged at the inner end of the driving shaft, a beveled gear on the inner end of said driving shaft meshing with said crank wheel gear, a horizontally disposed lever pivoted to oscillate above said driving shaft and transversely thereof, a connecting rod connecting said crank wheel and lever, a segment provided with an arm mounted between said crank wheel and lever, a link connecting said arm to said lever, an actuating gear having a hub with a spindle socket therein, meshing with said segment, said gear being mounted centrally above said driving shaft and between said crank wheel and lever, an actuated member provided with a spindle adapted to engage the socket of said actuating gear.

2. In a structure of the class described, the combination with the frame, of a horizontally disposed driving shaft, a horizontally disposed crank wheel provided with a beveled gear arranged at the inner end of the driving shaft, a beveled gear on the inner end of said driving shaft meshing with said crank wheel gear, a horizontally disposed lever pivoted to oscillate above said driving shaft and transversely thereof, a connecting rod connecting said crank wheel and lever, a segment provided with an arm mounted between said crank wheel and lever, a link connecting said arm to said lever, and an actuating gear mounted centrally above said driving shaft and between said crank wheel and lever.

3. In a structure of the class described, the combination with the frame, of a horizontally disposed driving shaft, a horizontally disposed crank wheel provided with a beveled gear, a gear on said driving shaft meshing with said crank wheel gear, a horizontally disposed lever pivotally mounted on said frame above said driving shaft, an actuating gear mounted above said driving shaft between said crank wheel and lever, a link connecting said lever to said crank wheel disposed at one side of said actuating gear, a segment meshing with said actuating gear disposed at the other side thereof, and a link connecting said segment to said lever.

4. In a structure of the class described, the combination with the frame, of a driv-

ing shaft, a crank wheel provided with a beveled gear, a gear on said driving shaft meshing with said crank wheel gear, a pivotally mounted lever, a connecting rod connecting said crank wheel and lever, a segment, a link connecting said segment to said lever, an actuating gear having a spindle socket therein meshing with said segment, a body member having a tube mounted thereon, an actuated member provided with a spindle projecting from the lower end of said tube and engaging the socket of said actuating gear.

5. In a structure of the class described, the combination with the frame of a driving shaft, a crank wheel provided with a gear, a gear on said driving shaft meshing with said crank wheel gear, a lever pivotally mounted on said frame, a spider disposed on said frame between said crank wheel and lever and above said driving shaft, an actuating gear disposed below and having a bearing in said spider, a link connecting said lever to said crank wheel disposed below said spider on one side of said actuating gear, a segment disposed below and having a bearing in said spider at the other side of said actuating gear, and a link connecting said segment to said lever.

6. In a structure of the class described, the combination with the frame, of a crank wheel, means for driving said crank wheel, a lever pivotally mounted on said frame, an actuating gear mounted between said crank wheel and lever, a link connecting said lever to said crank wheel disposed on one side of said actuating gear, a segment meshing with said actuating gear disposed at the other side thereof, and a link connecting said segment to said lever.

7. In a structure of the class described, the combination with the frame, of a driving mechanism, comprising an actuating member mounted on said frame and having a spindle socket therein, a body member removably mounted on said frame having an upwardly projecting tube mounted thereon, and an actuated member with a hub-like sleeve adapted to embrace said tube and with a spindle secured to the upper end of said sleeve and projecting from the lower end of said tube when the actuated member is in position and into engagement with the socket of said actuating member, said actuated member being carried by its spindle, said spindle being unsecured to said actuating member and being freely removable from said tube.

8. In a structure of the class described, the combination with the frame, of a driving mechanism comprising an actuating member mounted on said frame and having a spindle socket therein, a body member having an upwardly projecting tube thereon, and an actuated member provided with a spindle projecting from the lower end of said tube into engagement with the socket of said actuating member, said actuated member being carried by its spindle, said spindle being unsecured to said actuating member and being freely removable from said tube.

9. In a structure of the class described, the combination with the frame, of a driving mechanism comprising an actuating member mounted on said frame, a body member removably mounted on said frame and having an upwardly projecting tube thereon, and an actuated member provided with a hub-like sleeve adapted to embrace said tube and with a spindle secured to the upper end of said sleeve and projecting from the lower end of said tube when the actuated member is in position and having driving engagement with said actuating member, said actuated member being carried by its said spindle, said spindle being freely removable from said tube.

10. In a structure of the class described, the combination with the frame, of a driving mechanism comprising an actuating member mounted on said frame, a body member removably mounted on said frame and having an upwardly projecting tube thereon, and an actuated member provided with a spindle projecting from the lower end of said tube when the actuated member is in position and having driving engagement with said actuating member, said actuated member being carried by its said spindle, said spindle being freely removable from said tube.

In witness whereof, we have hereunto set our hands and seals in the presence of two witnesses.

FRED A. MILLS. [L. S.]
SAM W. MILLS. [L. S.]

Witnesses:
M. PHINA WOODRUFF,
PEARL E. LILLIE.