Oct. 28, 1947. F. V. CHENEY 2,429,610

WASHING MACHINE HAVING INDEPENDENTLY ACTUATED VERTICALLY RECIPROCATING AND OSCILLATING AGITATORS

Filed Oct. 24, 1945 3 Sheets-Sheet 1

FIG. 1

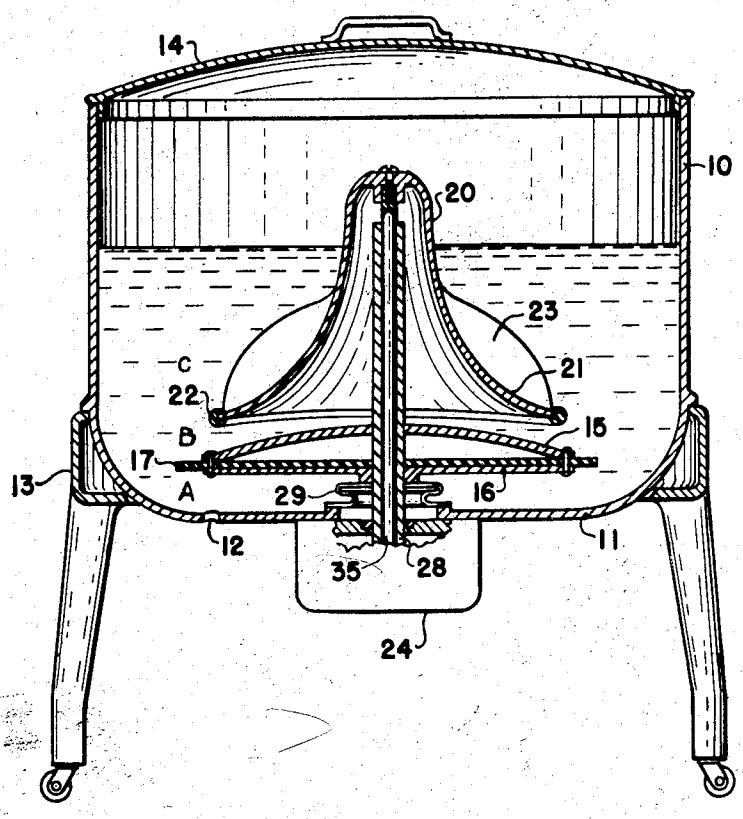
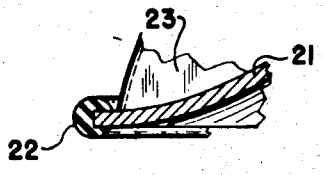


FIG. 9



Inventor

FRANKLIN V. CHENEY

By Cushman, Darby & Cushman

Attorneys

Oct. 28, 1947. F. V. CHENEY 2,429,610

WASHING MACHINE HAVING INDEPENDENTLY ACTUATED VERTICALLY RECIPROCATING AND OSCILLATING AGITATORS

Filed Oct. 24, 1945 3 Sheets-Sheet 2

FIG. 3

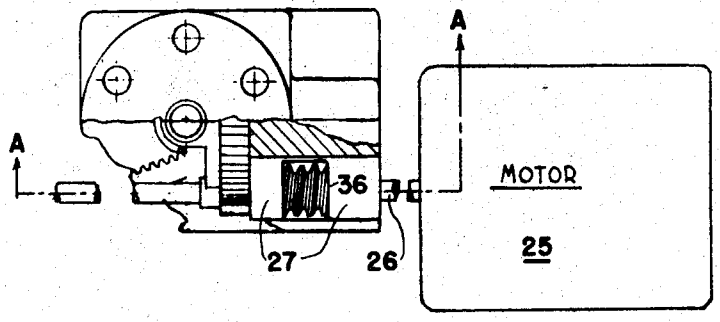


FIG. 2

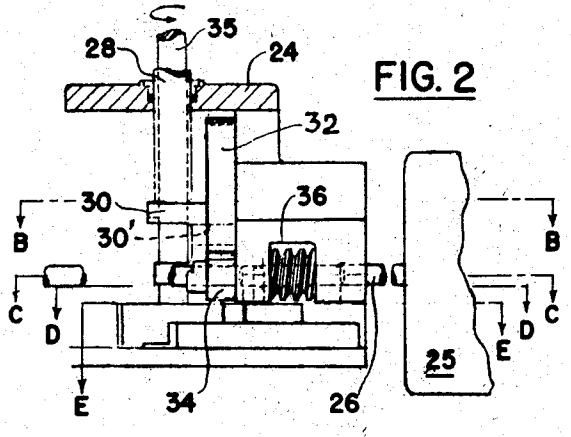
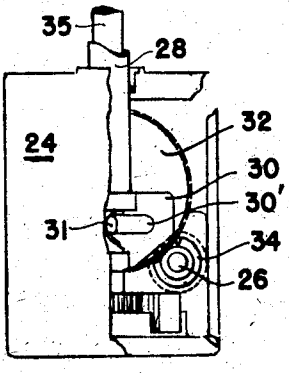


FIG. 8



SECTION A-A

Inventor

FRANKLIN V. CHENEY

By Cushman, Darby & Cushman

Attorneys

Oct. 28, 1947. F. V. CHENEY 2,429,610

WASHING MACHINE HAVING INDEPENDENTLY ACTUATED VERTICALLY RECIPROCATING AND OSCILLATING AGITATORS

Filed Oct. 24, 1945 3 Sheets-Sheet 3

Fig. 4.

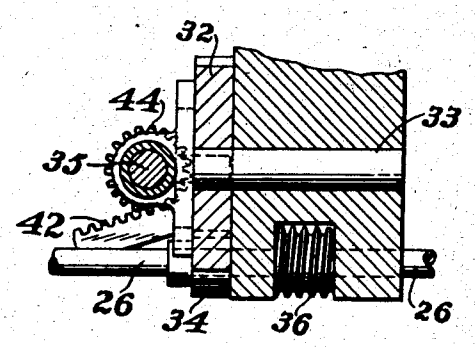


Fig. 5.

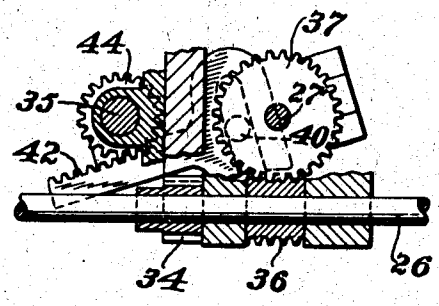


Fig. 6.

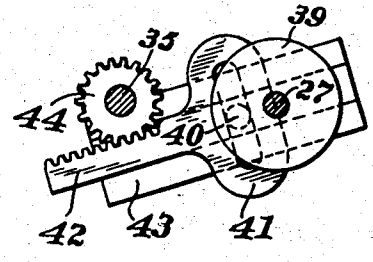
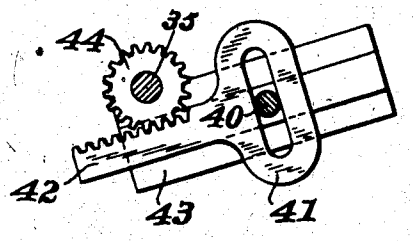


Fig. 7.



Inventor:

Franklin V. Cheney,

By Cushman, Darby & Cushman

Attorneys.

Patented Oct. 28, 1947 2,429,610

UNITED STATES PATENT OFFICE

2,429,610

WASHING MACHINE HAVING INDEPENDENTLY ACTUATED VERTICALLY RECIPROCATING AND OSCILLATING AGITATORS

Franklin V. Cheney, New York, N. Y., assignor of thirty percent to Charles Gross, Sputen Dyvul, and John Jay McKelvey, New York, N. Y., as trustees

Application October 24, 1945, Serial No. 624,256

9 Claims. (Cl. 68—131)

1

This invention relates to clothes washing machines and is designed thoroughly to cleanse garments which are substantially soiled, such as artisans' and children's outdoor apparel. The machine is, however, capable of handling and cleansing the most delicate fabrics without undue wear.

In some agitator types of washers there is a single agitating action and a single zone washing area. While this cleans clothes which are not badly soiled, the action of the one-zone type of machine is ineffective in the cleansing of badly soiled clothing.

The present invention comprises mechanisms which are adaptable to various sizes and shapes of tubs, and has as a novel and distinctive feature three (3) washing zones disposed one above the other, in which zones the garments are thoroughly agitated without any undue strain or wear, the action being such as to pass the clothes from zone to zone, and gently scrub, squeeze, and flex the garments in the several zones during washing.

One of the objects of my invention is to provide mechanism having two movable and cooperating instrumentalities so disposed as to be manipulable and effective in the washing zones.

Another object of my invention is to produce alternating and oppositely directed currents of washing liquid above one another, operating successively on the garments.

A further object is to provide mechanism which creates vigorous currents of liquid flowing in irregular paths so as to maintain the respective articles being washed in a separated condition and eliminate the objectionable tangling of the clothes which obtains in some of the usual types of washing machines.

Another object is to provide a mechanism which flexes, rubs, and squeezes the garments without undue wear, which results are very desirable, either in the handling of delicate fabrics, or in the washing of badly soiled articles.

Another object is to provide a mechanism in which the successive currents of liquid in the two lower washing zones are substantially equal in force, although opposite in direction, as distinguished from some of the one-zone types in which a reciprocating agitator is provided which imparts to the liquid impulses which are much greater in one direction than in the opposite direction, such unequal action causing a unidirectional flow of the washing liquid and clothes, which results in massing the clothes, instead of keeping them in separated condition. In the

2

machine herein disclosed, the articles move in a definitely irregular zig-zag direction in their travel through the different zones of the machine, and do not, therefore, become entangled with one another. Further, the surfaces of the garments are subjected individually to a gentle rubbing, flexing, and squeezing action.

In the drawings herewith, one embodiment of my invention is disclosed, and in said drawings:

Figure 1 is a view in vertical section of a washing machine embodying my invention, some of the parts being shown in elevation.

Figure 2 is a view substantially on the line A—A of Figure 3, parts being in section, showing the actuating mechanism for the washing instrumentalities.

Figure 3 is a top plan view of the actuating mechanism, parts being in section.

Figure 4 is a detail sectional view substantially on the line B—B of Figure 2.

Figure 5 is a detail sectional view substantially on the line C—C of Figure 2.

Figure 6 is a detail view on substantially the line D—D of Figure 2, showing the deflector oscillating mechanism.

Figure 7 is a view of the oscillating mechanism on substantially the line E—E of Figure 2.

Figure 8 is an end view of the housing for the actuating mechanism partially broken away to show the interior.

Figure 9 is a detail view of the border of the deflector showing the rubber edge protector.

Referring to the drawings by numbers, like numbers indicating like parts in the several views, 10 indicates a tub which may be of any suitable size and shape, a round tub being preferable, having a bottom 11. The side walls of this tub slope to the bottom wall 11, and the bottom may be provided with a drain 12 of any suitable character. The tub rests upon a frame 13 having supporting legs, and it is provided with a cover 14.

Mounted within the tub is an agitator made up of a convex plate 15 of a rigid non-corrosive material, preferably cylindrical in shape, with its convex wall facing upwardly. The plate 15 is secured in any suitable manner, as by riveting, to a lower plate 16. Between plates 15 and 16 is secured a flexible member 17. Convex plate 15 and the plates 16 and 17 will be held rigidly in place on a vertically reciprocable hollow shaft by any suitable means. The hollow shaft carrying the agitator is mounted so as to reciprocate through the bottom of the tub and give up and down movements to the agitator, as will be pointed out in describing the operating mechanism.

Mounted above the agitator plate heretofore described is a cone-shaped deflector **20** carried by an oscillating shaft so as to oscillate therewith. The central portion of this deflector cone extends above the water line in the tub and has a recess. Extending from that central portion is a border or margin **21** which overlies the convex surface of plate **15**. The outer edge of this border is preferably provided with cushioning means, such as a rubber protecting ring **22** so as to provide a rubbing and squeezing clothes-engaging edge which will not tear the articles when the deflector is oscillated, and when the clothes are acted upon between the deflector and agitator on the upward stroke of the agitator. This deflector is of rigid non-corrosive material, and is provided on its upper surface with fins **23** which may be of rigid or semi-flexible material, but which do not extend above the top of the deflector. These fins have no sharp corners or angles and their upper edges are rounded, as indicated in Figure 9, so that the garments under treatment cannot be injured.

When the machine is in operation with both the agitator and the deflector in action, the agitator will reciprocate vertically under the action of its driving mechanism. Movement of the agitator downward creates an outward impulse in the liquid between the agitator and the bottom of the tub. At the same time, there will be an inward impulse or current between the top of the agitator and the border of the deflector. On upward movement of the agitator the currents or impulse actions will be reversed. These currents set up by the rising and falling agitator move liquid inwardly and outwardly, and the flexible member **17** aids materially in setting up these currents. Further, this flexible flange protects the garments from engagement with the rigid agitator and eliminates the chances of injury to the garments.

This action of the agitator is effective in two zones, namely, in the zone A (see Figure 1) between the agitator and the bottom **11** of the tub, and in the zone B between the agitator and the deflector. With this arrangement of the parts, very effective washing is produced and the clothes will be flexed, squeezed, and rubbed, but the irregular and independent impulses will keep them from becoming entangled and tend to advance them in an irregular, zig-zag path, first downwardly from the top surface of the liquid, into zone C, thence into zone B, and finally into zone A. It will be understood that the action starts in zone A, and under the impulses generated by the reciprocating agitator and the oscillating deflector, the liquid and the clothes will pass successively through the different zones.

The movement of the liquid and clothes under the influence of the agitator will be supplemented by the action of the deflector. This deflector, as stated, does not move vertically, and, therefore, cooperates with the upward movement of the agitator which imparts impulses to the washing liquid and the clothes. The deflector, however, is effective in the zone C of the tub, in that its oscillations, by reason of the fins **23**, create successive impulses laterally, tending to drive the washing fluid into and through the articles being cleansed. Further, the action of the deflector fins setting up the successive lateral impulses, insures the separation of the articles of clothing as they come within the zone of the oscillating deflector.

With the instrumentalities operating jointly, the washing fluid and the garments are subjected to a thorough agitation in the two different zones A and B, the travel of the garments being in a zig-zag path upwardly to the surface of the liquid. They will then descend into the zone C which flexes, separates, and spreads, by the action of the fins, the liquid and the garments, which are then drawn downwardly and inwardly by suction between the top of the agitator and the skirt of the deflector, so that in the zone B the garments are subjected to a gentle rubbing and squeezing action against the rubber ring **22**. On the upstroke of the agitator the fluid and the clothes will be forced outwardly past the flexible periphery of the skirt **17** of the deflector, and subjected to a squeezing action and also to the rubbing and flexing action of the flexible periphery of the member **17**. On this upward stroke of the agitator the inward impulse created below the agitator will draw the liquid and clothes inwardly into zone A, between the agitator and the bottom of the tub, where they will be subjected to further cleansing action.

The agitator and deflector hereinbefore described may be driven by any suitable mechanical instrumentalities. One desirable type of driving means is here shown. The mechanism will be encased in a housing **24** suspended in any suitable manner below the bottom of the hub. Such housing may be oil-tight, so as to provide for sealing the mechanism which runs in oil.

A prime motor **25**, herein shown as an electric motor, although any suitable type may be used, is provided, the shaft **26** of which is supported in bearings **27** in the housing **21**. Shaft **26** carries the driving means for actuating agitator and deflector in the tub.

The agitator is mounted for vertical movement on a hollow shaft **28** which passes through an oil seal in the top of the housing **24** and a seal **29** in the bottom of the tub. The seal **29** should be of such construction as to permit the shaft **28** to reciprocate and at the same time prevent water from escaping from the tub. The seal here shown is a bellows seal formed of suitable material and secured in any suitable fashion to the lower plate **16** of the agitator at its upper end and to the bottom **11** of the tub about the opening therein. Attached to hollow shaft **28** is a bracket **30** having a slot **30'** which is engaged by a drive pin **31** on a gear **32** rotatably mounted in a bearing **33** in the housing. Gear **32** is actuated by pinion **34** on shaft **26**, and through pin **31**, bracket **30**, and vertically reciprocating sleeve **28**, agitator is reciprocated. The speed of reciprocation may be adjusted to particular needs. From 400 to 450 vertical reciprocations per minute have been found useful.

A shaft **35** extends vertically through hollow shaft **28** and supports the deflector **20** above the agitator. Shaft **35** is held against vertical movement but is oscillated to impart oscillating movement to the deflector **20**. One means of effecting these oscillating movements is here shown, this mechanism being actuated from the shaft **26** of motor **25**. On power shaft **26** between the bearings **27'** is mounted a worm **36** which engages a horizontally disposed worm gear **37** on a shaft **27'**. The shaft **27'** carries a drive disc **39** provided with a pin **40**. Said pin **40** engages a slotted arm **41** on a rack bar **42** mounted in a fixed guide **43** which directs the movements of the rack bar. Said rack bar **42** meshes with a drive gear **44** on deflector shaft **35**, so that when the rack bar **42** is reciprocated through the pin and slot connec-

tion 40 and 41 on drive disc 39, oscillating movements will be imparted to deflector 20.

The oscillations of deflector 20 may be adjusted as to arc and speed of movement to suit the needs of any particular installation. An arc of oscillation of 90° and a speed of between fifty and sixty oscillations per minute have been found useful.

Arranged as described the mechanism is effective to impart the required vertical reciprocations to the agitator and oscillations to the deflector, all from one motor and its drive shaft, eliminating the necessity of complicated mechanism, to bring about the vertical movements of the agitator and the horizontal oscillations of the deflector.

In operation the agitator reciprocates between the bottom of the tub and the deflector so that at opposite movements lateral impulses are imparted to the liquid, one outwardly in zone A as the agitator moves down toward the bottom, and one inwardly as the agitator moves away from the deflector. One outwardly in zone B as the agitator moves up toward the vertically fixed deflector, and one inwardly between the agitator and the bottom as the agitator moves away from the bottom. When the deflector is oscillated the fins on the deflector set up lateral impulses in zone C, these impulses being intermittent as the oscillations of the deflector are reversed.

These several impulses effect distinct and successive actions on the garments with the result that they are subjected to thorough cleansing. The impulses in the several zones create currents outwardly and inwardly, and the pulsating actions give the liquid and garments a zig-zag movement in a path which leads outwardly, then upwardly, returning toward center at or near the surface of the liquid, and then the garments sink downwardly to be again acted on by the washing instrumentalities. The cone of deflector 20 extending above the water line prevents entanglement of the clothes and tends to direct them downwardly.

With a tub from twenty-two and to twenty-four inches in diameter, which is about standard for present day machines, the following dimensions and distance of travel strokes of the agitator and deflector have been found to be satisfactory.

The full stroke of the agitator will be one and three-fourths inches. On its down-stroke it will travel to within one inch of the bottom of the tub. On its up-stroke it will travel to within one-half to three-fourths of an inch of the edge of the deflector. In diameter the plates of the agitator will be six inches and the flange of the flexible plate between the agitator plates will extend one and one-fourth inches beyond the peripheries of the agitator plates, giving an overall diameter of eight and one-half inches.

The border of the deflector will have an overall diameter substantially equal to the diameter of the agitator plates, that is, six inches.

The dimensions of the agitator and deflector and the distances and the speed of the travel strokes of each, as here given, have been worked out in connection with a tub of standard dimensions, that is twenty-two to twenty-four inches in diameter. It will be understood that for larger or smaller tubs substantially the same relative proportions will be maintained, the dimensions and travel strokes of the moving parts being proportioned to meet the dimensions of the particular tub.

It will be understood that while a particular

type of mechanism is here shown, such variations from the construction disclosed as are within the skill of the mechanic, and which fall within the scope of the appended claims, may be made without departing from the purview of the invention.

I claim:

1. A washing machine comprising a tub, a vertically reciprocable article contacting agitator positioned near the bottom of said tub, an oscillating deflector having liquid impulse-creating means independent of said reciprocable agitator, said deflector being vertically spaced from said agitator and fixed against vertical movement, means for reciprocating said agitator to create lateral liquid impulses in different zones on each up and down movement, and means for oscillating said deflector to create lateral liquid impulses in a zone vertically spaced from the agitator zones.

2. A washing machine comprising a tub, an article contacting agitator mounted for alternating vertical movements in said tub, means for reciprocating said agitator, an independent deflector fixed against vertical movement disposed above said agitator and having a horizontally extended border, said deflector being provided with vertical fins, and means for oscillating said deflector.

3. A washing machine comprising a tub, an agitator mounted for vertical movement in said tub and having a convex upper surface, means for reciprocating said agitator, a circumferential flange of flexible material extending horizontally beyond the outer edge of said agitator, a deflector fixed against vertical movement disposed above said agitator and having a central recessed dome and a horizontally extended border provided with vertical fins, and means for oscillating said deflector.

4. A washing machine comprising a tub, a vertical shaft mounted for reciprocation in said tub, means for reciprocating said shaft, an agitator carried by said shaft, a flange of flexible material extending horizontally beyond the outer edge of said agitator, a second shaft mounted for oscillation in said tub, means for oscillating said second shaft, and a deflector having a horizontally extended border provided with vertical fins mounted on said second shaft.

5. A washing machine comprising a tub, a vertical hollow shaft mounted for reciprocation in said tub, means for reciprocating said shaft, an agitator carried by said shaft, a flange of flexible material extending horizontally beyond the outer edge of said agitator, a second shaft mounted for oscillation in said tub and traversing said vertical hollow shaft, means for oscillating said shaft, and a deflector having a horizontally extended border provided with vertical fins mounted on said second shaft.

6. A washing machine comprising a tub, a vertically reciprocable agitator positioned near the bottom of the tub and having a convex upper surface, means for reciprocating said agitator, a flange of flexible material extending horizontally beyond the outer edge of said agitator, a deflector having a recessed central dome and an extended substantially horizontal border having a cushioned edge, vertical fins on said deflector, and means for oscillating said deflector.

7. A washing machine comprising a tub, a vertically reciprocable agitator positioned near the bottom of the tub and having a convex upper surface, means for reciprocating said agitator, a flange of flexible material extending horizontally beyond the outer edge of said agitator, a deflector

having a recessed central dome and an extended substantially horizontal border having a rubber-covered edge, and means for oscillating said deflector.

8. A washing machine comprising a tub a vertically reciprocable agitator and an oscillatable coned deflector in said tub, a hollow agitator-reciprocating shaft coupled to said agitation and extending through the bottom of said tub and into said coned deflector to a point above the normal water line of the tub, a seal between said hollow shaft and the bottom of said tub, an oscillating shaft traversing said hollow shaft and connected to said deflector, means for reciprocating said hollow agitator shaft, and means for oscillating said deflector shaft.

9. A washing machine comprising a tub a vertically reciprocable agitator and an oscillatable coned deflector in said tub, a hollow agitator-reciprocating shaft coupled to said agitator and extending through the bottom of said tub and into said coned deflector to a point above the normal water line of the tub, a bellows seal between said hollow shaft and the bottom of said tub, an oscillating shaft traversing said hollow shaft and connected to said deflector cone at a point above the range of movement of said hollow agitator shaft, means for reciprocating said hollow agitator shaft, and means for oscillating said deflector shaft.

FRANKLIN V. CHENEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,275,444	Kuhn	Mar. 10, 1942
2,367,408	Kuhn	Jan. 16, 1945
475,339	Otto	May 24, 1892