

March 18, 1930.

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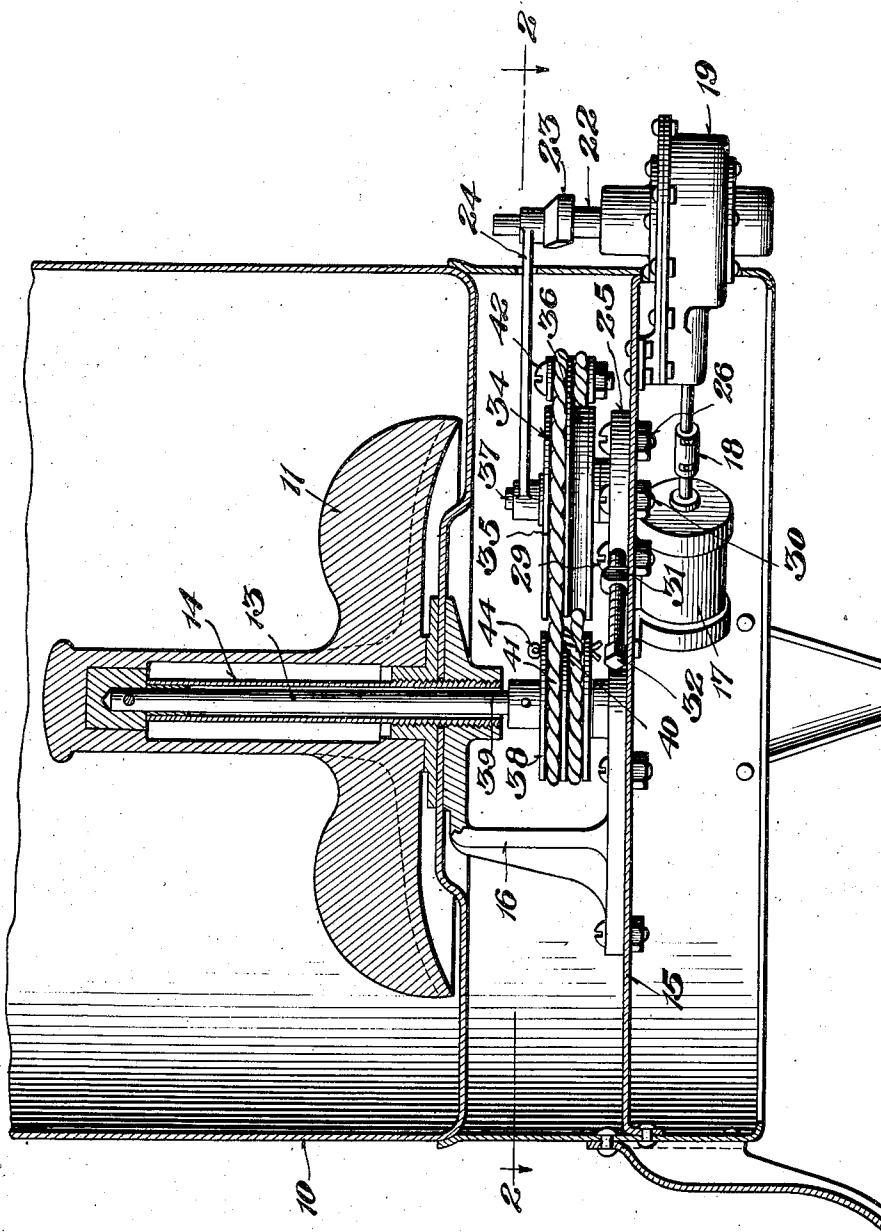
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WASHING MACHINE

Filed June 21, 1929

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Fig. 1.



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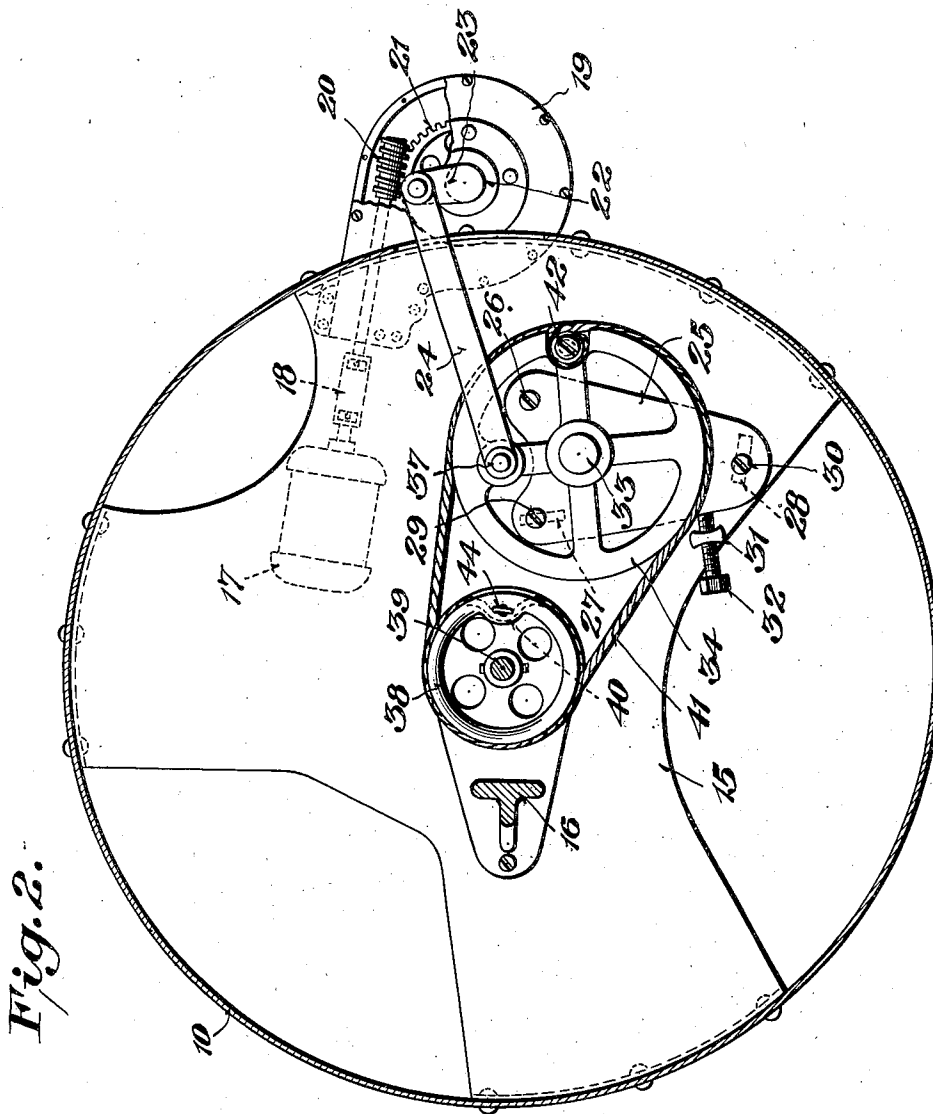
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WASHING MACHINE

Application filed June 21, 1929. Serial No. 372,629.

This invention relates to washing machines and more particularly to driving mechanism therefor.

One of the objects of the invention is in the provision of a flexible cable drive for the agitator portion of a washing machine.

Another object lies in the provision of a connecting means between the agitator portion of a washing machine and the power driven oscillating mechanism therefor, said connection including plural sheave members and a flexible cable connecting said sheaves in an operative relationship.

Still another object lies in the provision of a washing machine including an agitator member therein and mechanism for oscillating the agitator including a power driven reciprocating crank and a flexible cable connection between the reciprocating mechanism and agitator portion, which permits noiseless reciprocatory movement of the oscillator within the washer, with a minimum of vibration.

Other objects will appear in the following specification, taken in connection with the annexed drawings, in which—

Fig. 1 is an elevational view, partially in section, showing the manner of connecting the flexible cable driving mechanism to the agitator of the washer as well as to the power drive mechanism; and

Fig. 2 is a cross-sectional view taken on the line 2—2 of Fig. 1.

Before referring particularly to the drawings, it might be well to describe generally the conventional character of drive mechanism for washing machines of the agitator type. In this well known type of washer, there is ordinarily utilized either a rack bar connection with a pinion secured to the bottom of the shaft carrying the agitator or oscillatable segment member meshing with a pinion secured to the agitator drive shaft. Various attempts have been made to obviate the vibration and noise which attend such character of drive.

It is well known that washing machines are now manufactured in mass production and in exactly the same manner that automobiles are built, and the resulting economies that attend

such production accrue greatly to the benefit of the public. However, even in automobiles a greater degree of precision in manufacture is in almost every instance used than in the production of washing machines which must be sold at a comparatively low price.

The assignee of the applicant herein is not only one of the largest manufacturers of washing machines in the country, but also has been a manufacturer of washing machines for a great number of years, and has experienced the resistance and complaints that attend the placement on the market of a machine which when thoroughly broken in, begins to give evidence, both by its noise and vibration, of the manner in which it has been produced, namely, in mass production.

The present applicant has devised a drive wherein a flexible cable is used, the same being connected in an operative relationship with dual sheave members, to the end of reducing to a minimum not only the noise but also any vibration. Because of the flexible connection, there is provided a means for taking up the cable which may become slightly flexed after considerable use.

Now, referring specifically to the drawings, there is shown in Fig. 1 a conventional tub member 10 having disposed therein a well known type of water agitating mechanism 11. This agitator is mounted in the usual manner within the tub, with a vertical drive shaft 13 projecting through the bottom center of the tub and a surrounding column or cylinder 14, which acts not only as a support for the vertical drive shaft, but also as a means for sealing the tub and drive mechanism against leakage. Disposed beneath the tub is a frame portion 15 which has an upstanding bracket 16, into which the before mentioned column member is adapted to be threaded for purposes of support and sealing against leakage. Secured to the frame portion 15 is a conventional electric motor 17 which provides the power, through a flexible coupling 18, to the well known worm drive mechanism now to be described.

An oil-tight housing 19 also secured to the frame, has suitably supported therein a worm 20 which meshes with the worm gear 21 also

having suitable bearing supports within the housing. To this worm is secured a stub shaft, 22, projecting upwardly through the before mentioned housing.

Attached to the stub shaft is a conventional crank member 23 which in turn transmits, during its continuous rotary movement, reciprocatory movement to an arm 24.

Secured to the frame 15 is a plate 25 pivoted at the point 26 and having a degree of adjustment with respect to said frame, due to the slots 27 and 28 therein and bolt members 29 and 30 respectively. Additional means for holding this plate in a fixed position is provided in a lug 31 formed integrally in the frame, said lug being threaded to receive a threaded adjustable nut 32.

Obviously, with the above described adjustment means, the plate 25 may have a degree of pivotal movement.

Projecting upwardly from the plate 25 is a stub shaft 33, upon which is pivoted a sheave 34 having two grooves 35 and 36. The reciprocating arm 24 is pivoted at 37 to the sheave 34 in an off-center relationship, as clearly shown in Fig. 2 of the drawings. It is apparent that continuous movement of the worm gear and crank will result in the reciprocation of the sheave 34.

Secured to the bottom of the vertical drive shaft 13 is a second and smaller sheave 38 pivoted upon a second stub shaft 39, which in turn is either securely attached to, or forms a part of, the frame. This second sheave 38 also has two grooves which are in the same planes as grooves in the sheave 34. This second and smaller sheave 38, however, has a cross-over portion 40 which, as will be explained, permits the flexible cable to pass from the lower groove in sheave 38 to the upper groove therein.

A flexible cable 41 provides connecting means between the two sheaves and permits transmission of the reciprocating movement from the arm 24 to the vertical drive shaft, and thence to the agitator within the washing machine tub.

The manner of connecting this flexible cable is novel and will now be described.

A bolt and clamping means 42 is adapted first to secure one end of the cable 41 in a manner to permit the cable to be carried partially around the upper groove in the sheave 34, thence around the upper groove in the smaller sheave 38. The cable finally passes into an indented or anchor slot 43, at which point a key member 44 passing through the sheave acts as a means for holding the cable in a fixed position and prevents slippage of the cable upon the smaller sheave. The cable then passes down or over the before mentioned cross-over portion into the lower groove on the sheave 34, around same, and finally partially around the lower groove on the larger sheave 34, the cable finally being

caught and held firmly by means of the before mentioned bolt and clamping portion 42.

Obviously, this cable is drawn very tightly in the first place. However, in case of hard and continued use, it is very possible that the cable may flex slightly and in order to provide a take-up for the flexing of same, the before mentioned adjustable mechanism has been provided to permit a degree of movement of the larger sheave away from the smaller one. This adjustment mechanism obviously may be manually set at any point desired.

As respects the operation of my flexible cable drive for the agitator portion of a washing machine, it is apparent, as previously described, that a reciprocatory movement will be given to the arm 24. This reciprocation is obviously transmitted to the larger sheave 34, which in turn, through the flexible cable 41, transmits oscillation to the smaller sheave 38 and thus satisfactory movement of the agitator within the tub is accomplished, as stated before, not only quietly but with a minimum of vibration. This cable is sufficiently flexible to take up the jar which normally attends reciprocation of the agitator, this jar usually occurring at the end of the reciprocating power stroke.

Applicant realizes that double pulleys have heretofore been used in connection with drives for washing machines, the same usually utilizing plural V-belt members. However, applicant in the present instance has provided practically a direct connection between the two sheaves by means of the flexible cable and therefore a drive which is less liable to slippage. Further, the manner of carrying the cable about the smaller sheave in a plural fashion not only provides a very positive drive, but also one which practically obviates slippage.

Due to the particular fashioning of the cross-over as well as the use of the dual pulleys, all wear upon the flexible cable is distributed practically throughout its length, thus insuring long life for the cable. Possibly the cross-over might be formed with considerably more spiral, but even in this instance, larger sheaves would necessarily have to be used in order to accomplish same for the rise and fall of the cable which would attend the use of such structure.

The use of the anchor slot eliminates to a large degree any possibility of slippage, except in extreme instances, between the cable and agitator mechanism.

What I claim is:

1. In a washing machine, a tub, an agitator disposed therein, driving mechanism for the agitator including a power driven reciprocating arm, a double grooved sheave adapted to be reciprocated by said arm, a second and smaller double grooved sheave connected to the agitator mechanism, and a single flex-

ible cable cooperating with the double grooves in the sheaves to permit a quiet and vibrationless drive of the agitator.

2. In a washing machine, in combination, a tub, an agitator therein, a driving mechanism therefor including power driven reciprocating mechanism, a plural grooved sheave connected to the agitator mechanism, a plural grooved sheave connected to the power reciprocating mechanism, and a single flexible cable secured at both ends to the sheave connected to the reciprocating power drive, the same being adapted to engage the plural grooves of the sheave connected to the agitator mechanism as well as to be anchored in a slot formed therein.

3. In a washing machine, in combination, a tub member, an agitator disposed therein, a vertical drive shaft projecting through the bottom of the tub and connected to said agitator, a sheave secured to said vertical shaft below the bottom of the tub and having double grooves formed therein, with a cross-over portion connecting the two grooves as well as an anchor slot formed therein, means for reciprocating said sheave to accomplish movement of the agitator including a power driven reciprocating crank driven arm, a second double grooved sheave adapted to be reciprocated by said arm and connecting means between the two sheaves including a single flexible cable secured at its ends to the second mentioned sheave, said cable being adapted to partially surround the grooves in the second sheave but adapted to engage both grooves in the first mentioned sheave.

4. In a washing machine, in combination, a tub member, an agitator therein, driving mechanism for said agitator including reciprocating mechanism, a plural grooved sheave adapted to be reciprocated thereby; a second plural grooved sheave attached to the agitator mechanism and a single flexible cable connection adapted to be secured at its ends to the first mentioned sheave and to be received in the plural grooves in the second sheave in such manner as to transmit reciprocatory movement from the first mentioned sheave to the second sheave in a quiet and vibrationless manner.

5. In a washing machine, in combination, a tub, an agitator disposed therein, driving means for oscillating said agitator including power driven mechanism, dual sheave members; the first being connected to the agitator mechanism and the second to the power driven mechanism, means for reciprocating said second sheave, dual grooves formed on the first and second sheaves, the grooves on the first mentioned sheave having a cross-over connection therebetween, an anchor slot disposed in the first sheave and a single flexible cable adapted to be received in the dual grooves of both sheaves, said flexible cable having its ends secured in the second sheave

and being anchored intermediate its ends in the anchor slot in the first mentioned sheave.

6. In a clothes washing machine, in combination, a container for clothes and liquid, an agitator disposed therein, a vertical drive shaft projecting through the bottom of said container and connected to said agitator, a double grooved sheave secured to said vertical drive shaft beneath said container, and means for reciprocating said sheave to oscillate said agitator, said means comprising a second double grooved sheave, a power driven reciprocating crank arm connected to said second double grooved sheave and a flexible cable joined at a point on said second sheave to form an endless cable passing from said point on said second sheave around both grooves of said first sheave and back around a portion of one of the grooves of said second sheave to the point of securing.

In testimony whereof I have hereunto affixed my signature.

CLIFTON C. CAMMACK.