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May 11, 1943. K. O. SISSON ET AL 2,318,806

CLEANING MACHINE

Filed Aug. 8, 1940 2 Sheets-Sheet 1

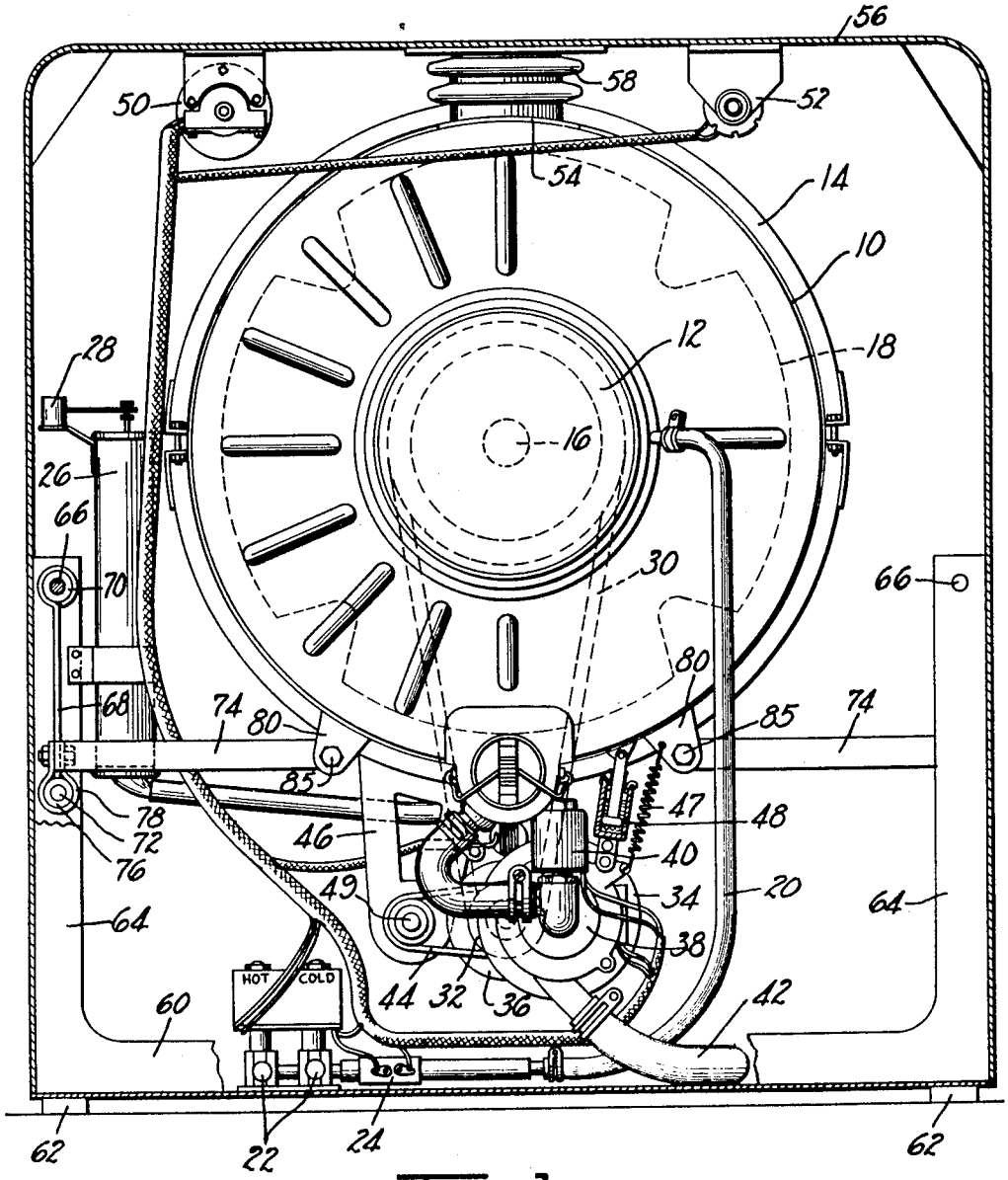


FIG. 1

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Filed Aug. 8, 1940 2 Sheets-Sheet 2

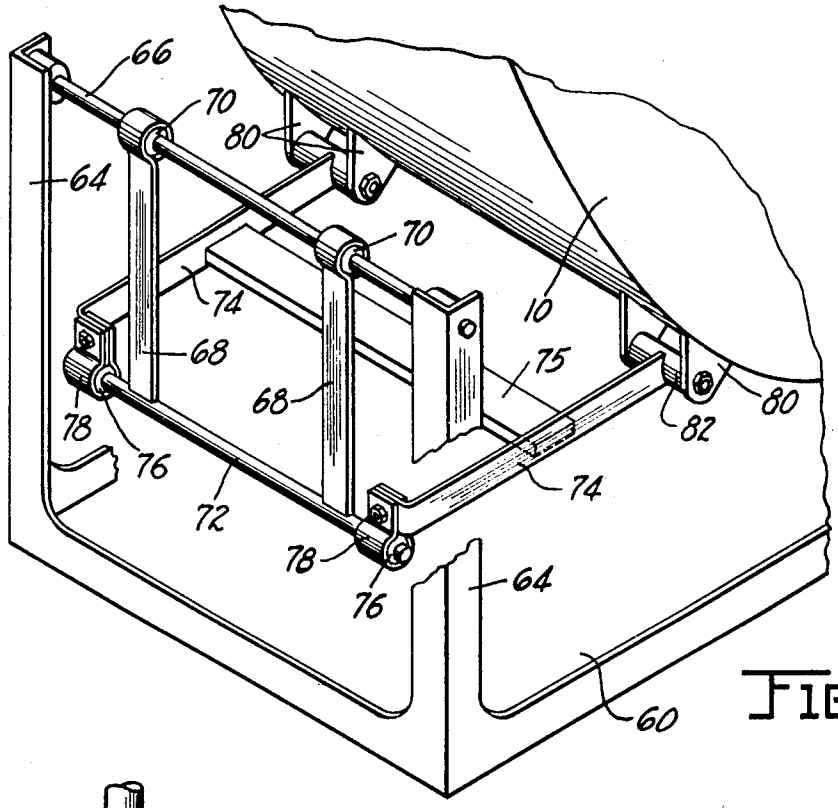
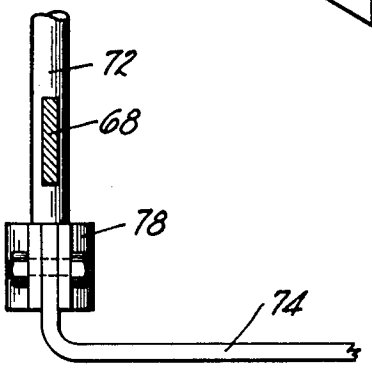


FIG. 2



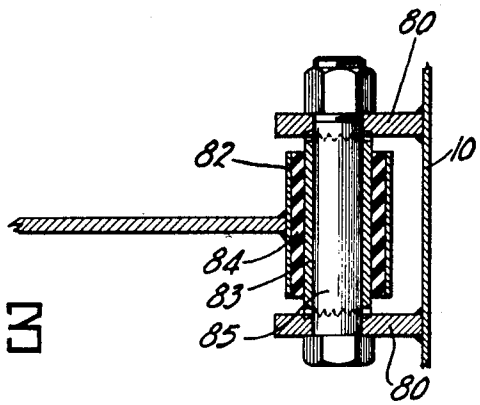


FIG. 3

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Patented May 11, 1943 2,318,806

UNITED STATES PATENT OFFICE

2,318,806

CLEANING MACHINE

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Application August 8, 1940, Serial No. 351,884

7 Claims. (Cl. 248—18)

This invention relates to laundry machines and more particularly to machines in which cleaning liquid is extracted from the cleaned material without handling the material between the cleaning and the extracting stages.

One of the objects of the invention is to provide a laundry machine including a centrifugal extraction operation in which transmission of vibrations to the base of the machine is substantially prevented. This enables the machine to rest loosely on the floor without the necessity of anchoring it and without vibrating the floor to an objectionable extent.

Another object of the invention is to provide a laundry machine including an extracting unit rotating upon a relatively horizontal axis for centrifugal extraction mounted upon a base for frictionally yielding movement relative to the base in all directions normal to the axis of rotation of the extracting unit. The motor for driving the extracting unit may be mounted to move with the extracting unit or may be mounted upon the relatively stationary base with suitable transmission means to permit relative movement.

Another object of the invention is to so mount the tub in which the extracting unit rotates and the bearings and such other operating parts of the laundry machine as are not impaired by vibration to receive force and consequent movement from the out-of-balance forces derived from the shaft of the centrifugal extractor and to mount such other parts as are impaired by vibration upon the relatively stationary base which rests upon the floor.

There are three types of forces imparted to the base of a horizontal axis centrifugal extractor; namely, an up and down or vertical force which tends to vibrate the floor of the building, a horizontal force which tends to slide the base on the floor and cause the laundry machine to creep laterally and a torsional force that tends to cause the laundry machine to pivot about a center on the floor and then to gradually change its facing position in the room.

It is only the first of these effects that is of great objection. The lateral and torsional forces are easily restrained on the floor and ordinarily do not cause objectionable building vibration. However, it is not always convenient to restrain the lateral and torsional forces and it is an object therefore, of this invention to minimize all of these forces to such an extent as to make them entirely unobjectionable.

Still another object of the invention is to provide movable supporting means for a laundry machine in which movement between the rotating extracting unit and the base is yieldingly resisted by rubber or the like in shear. This type of support provides simple, convenient and inherent dampening which prevents resonant oscillations.

Other objects, advantages and novel features of the invention will appear from the following description of the embodiment shown in the accompanying drawings, in which:

Figure 1 is a front elevation of a machine embodying the invention with parts in section;

Figure 2 is a perspective of the yielding supporting linkage; and

Figure 3 is a partial section of an arm and rubber trunnion of the supporting linkage.

The invention is illustrated as applied to an automatic washing machine of the type particularly described in Patent No. 2,173,603 issued September 19, 1939 to Adiel Y. Dodge. This machine includes a tub 10 adapted to contain a detergent liquid such as soapy water and having an axial opening 12 in one end through which material to be washed may be inserted. The opposite end of the tub is closed by a pair of conical stampings secured together at their edges by a band 14 and which have bearings at their centers in which a shaft 16 is journalled. The shaft 16 is rigidly secured to one end of a perforated container 18 which is rotatable in the tub and which has an opening in register with the tub opening 12.

Water may be supplied to the tub through a flexible conduit 20 which discharges into the tub adjacent the opening 12. Water is supplied to the conduit 20 through a pair of control valves 22 controlling respectively hot and cold water inlets. One of these valves, for example the cold water valve, may be intermittently controlled by a thermostatic member 24 in order to provide the desired temperature of mixed water in the tub. A float chamber 26 communicates with the lower portion of the tub and has a float therein operating a switch 28 to shut off both of the valves 22 when the water in the tub reaches the desired level.

The container 18 is driven by a V-belt 30 engaging a pulley on the shaft 16 outside of the tub and a second pulley 32 driven by a motor 34 through a two-speed transmission 36. A drain pump 38 is also secured to and driven by the motor and receives fluid past a valve controlled by a solenoid 40 and pumps the water out through a discharge hose 42. The motor, transmission, pump and drain valve are all secured

together in a unit which is pivotally supported by arms 44 from brackets 46 depending from the tub 10. A spring 47 serves partially to support the weight of this unit and the remainder of its weight is carried by the belt 30 to insure that the belt will be kept tight at all times.

A dashpot 48 preferably containing castor oil is interposed between the motor unit and the tub to cause the motor unit to vibrate the tub and to prevent undue periodic independent movement of the motor about its support 49.

The transmission and the inlet and drain valves are controlled by a sequential controller 50 driven by a small synchronous motor and operating the several switches and solenoids to provide any desired sequence of operation. A manual switch 52 is also provided for varying the circuits so that the solenoid valves 22 may operate to admit either mixed hot and cold water or untempered hot water as desired.

In one cycle of operation the controller 50 may be manually moved to a starting position in which one or both of the valves 22 are opened to admit water to the tub and in which the container 18 is driven at a low washing speed by the motor and transmission. When the water reaches the desired level in the tub it will be shut off by the float switch 28. Soap or other desired detergent may be inserted in the tub through an opening 54 in the top thereof. The clothes may then be washed for a desired length of time after which the controller 50 will cause the drain valve 40 to open to drain the soapy water from the tub. Additional water may then be added by again opening the inlet valves 22 to rinse the clothes after which the transmission may be shifted to its high speed position to run the container 18 at high speed centrifugally to extract the water from the clothes. At the conclusion of this operation the controller 50 will shut off the current to the motor and the clothes may be removed.

The mechanism above described is preferably inclosed in a cabinet indicated at 56. The cabinet is provided with an opening in one side in register with the opening 12 in the tub which is preferably provided with a door to close the opening during the washing operation. If desired, openings in the tub and cabinet may be connected by a flexible sleeve member as more particularly described and claimed in the copending application of Rex Earl Bassett Jr., Serial No. 199,808, filed April 4, 1938, or if preferred, separate doors can be provided for the tub and cabinet. As shown, the soap opening 54 in the tub is connected to a registering opening in the top of the cabinet by a flexible sleeve member 58.

The cabinet 56 incloses and is supported on a base or supporting frame 60 provided with feet 62 which are preferably of rubber or the like to rest on the floor. The base is generally rectangular in plan and has an upstanding supporting post 64 at each of its corners on which the operating assembly may be supported.

According to the present invention the operating assembly including the tub and its connected parts, such as the driving mechanism, is mounted on the supporting frame so as to be movable relatively thereto, both vertically and horizontally sidewise but preferably not forwardly and backwardly. For this purpose two cross rods 66 are rigidly secured between the front and rear vertical legs 64 at the opposite sides of the casing. A pair of links 68 are pivoted on each of the cross rods, the pivotal connections as shown being formed of sleeves 70 of resilient material such as rubber compressed around the rod by a bent over portion of the links 68, as best seen in Figure 2. To the lower ends of the links 68 there are welded or otherwise secured two floating rods 72 which may move in arcs about their respective supporting rods 66. Links 74 are each pivoted at one end to a cross rod 72 and at the other end to the tub assembly. The links 74 at each side of the machine are attached together by a plate 75 welded to each of the links 74 to form a substantially rigid structure. As shown, the pivotal connections between the links 74 and the cross rods 72 are formed by rubber sleeves or bushings 76 compressed around the rods by clamps 78 to which the bent ends of the links 74 are secured. The connection at the tub is formed by a pair of brackets 80 welded to the tub and supporting between them a torsion rubber bushing. The bushing, as shown, includes an outer sleeve 82 welded to the link 74 and an inner sleeve 83 having rubber 84 vulcanized between them and adhering to each.

The inner sleeve 83 has notched or toothed ends which are clamped against the inner faces of the brackets 80 by means of a bolt 85 which passes through the sleeve 83 and aligned openings in the brackets 80. The two sleeves 82 and 83 with the bonded rubber 84 between them yieldingly support the tub with the rubber under a normal strain produced by the weight of the tub and associated parts mounted thereon.

In operation of the machine it sometimes occurs that clothes or other material in the container 18 are not perfectly or uniformly distributed around the surface of the container when the container is driven at high speed for extraction of the liquid. This condition creates an unbalance of the container giving rise to vibration thereof in response to rotation. This vibration is transmitted through the shaft 16 to the tub 10 and its associated assemblies, and tends to set the whole of the tub assembly into a gyratory motion. If this assembly could be freely supported in space it would tend to find its own center of vibration and move about it, the radius of gyration depending upon the relative weights of the tub assembly and of the unbalanced load.

The present construction provides a relatively free mounting for the tub unit by which it may seek its own center of gyration and move about it without transmitting objectionable vibrational forces to the supporting frame or the casing. The provision of the rubber bushings yieldingly resists the gyration and tends to dampen it out. At the same time these bushings provide a means for yieldingly supporting the weight of the tub unit so that it may move vertically. Thus when an unbalanced load occurs the tub unit can move within the casing to dissipate the vibrational forces without causing motion of the outer casing. At the same time the only forces transmitted to the supporting frame are those transmitted through the several rubber bushings and if these bushings are made soft or flexible enough the forces will be so small as to be unobjectionable. The machine may thus rest freely on a floor and may be operated with an unbalanced load without creating sufficient forces to move the machine across the floor or to cause vibration of the floor due to the transmission of vertical impulses.

Since the two links 74 and the associated cross plate 75 form a substantially rigid structure the tub is caused to move in the same path of gyra-

tion at the front and at the rear even though the out of balance load may be located either nearer the front or nearer the rear of the rotating cylinder. However, the slight bending or twisting of the plates 75 permits a very slight torsional movement of the tub relative to the base so that torsional forces sufficient to move the base on the floor are prevented.

The deflections of the rubber bushings 76 and 84 are mainly responsible for dampening the vertical movement of the tub while the rubber bushings 70 are mainly responsible for dampening the lateral movements of the tub. The fact that the tub is suspended below the rods 66 also aids in preventing large lateral movement.

The words "laundry machine" as used herein include dry cleaning machines as well as machines using water and water soluble detergents.

While one embodiment of the invention has been shown and described in detail it will be understood that this embodiment is intended to be illustrative only and is not to be taken as a definition of the scope of the invention, reference being had for this purpose to the appended claims.

What is claimed is:

1. A mounting for an out-of-balance load rotatable about a relatively horizontal axis comprising a container member through which said axis extends, said container member being movable responsive to the forces created by the rotation of the out-of-balance load contained therein, a base member, a pair of links pivoted together at one end of each at a substantial angle to one another, the remote end of one link being pivoted to the container member and the remote end of the other link being pivoted to a portion of the base member at least one of the pivotal connections with the link pivoted to the container member, including a rubber sleeve in normal torsion sufficient to keep the links of the pair at a substantial angle to one another.

2. A mounting for an out-of-balance load rotatable about a relatively horizontal axis, a supporting journal member for the axis movable responsive to the forces created by the rotation of the out-of-balance load, a base member, a pair of links pivoted together at one end of each at a substantial angle to one another, the remote end of one link being pivoted to the supporting journal member and the remote end of the other link being pivoted to a portion of the base member, and a yielding torsion member at the pivot between one of said links and said supporting journal member held under normal torsion by the weight of the supporting journal member and the rotating mass.

3. A mounting for an out-of-balance load rotatable about a relatively horizontal axis, a supporting journal member for the axis including parts having a considerable mass movable responsive to the forces created by the rotation of the out-of-balance load, a base member, a pair of links pivoted together at one end of each at a substantial angle to one another, one of said links extending substantially horizontally and having its remote end pivoted to the supporting journal member, the remote end of the other link being pivoted to a portion of the base member, the pivot at one end of the substantially horizontal link including a flexible and dampening torsion member.

4. A mounting for an out-of-balance load rotatable about a relatively horizontal axis, a supporting journal member for the axis including parts having a considerable mass movable responsive to the forces created by the rotation of the out-of-balance load, a base member, a pair of links pivoted together at one end of each at a substantial angle to one another, one of said links extending substantially horizontally and having its remote end pivoted to the supporting journal member, the remote end of the other link being pivoted to a portion of the base member, and a yielding torsion member at the pivot between one of said links and said supporting journal member held under normal torsion by the weight of the mass of the supporting journal member and the weight of the rotating mass.

5. A mounting for an out-of-balance load rotatable about a relatively horizontal axis along which the center of mass of the out-of-balance load assumes different positions, a supporting journal member for the axis of the out-of-balance load movable responsive to the forces created by the rotation of the out-of-balance load, means to cause the axis of the rotating mass to move only to positions substantially parallel to the normal position of said axis comprising a pair of substantially rigid links, said links being pivoted together at positions which are remote from one another along the axis of said pivotal connection, a base member, one of said links being pivoted to the base member at positions which are remote from one another along the axis of the pivotal connection of said link with the base member, the other of said links being pivoted to the supporting journal member at positions which are remote from one another along the axis of the pivotal connection between said link and the supporting journal member, and a yielding torsion connection at the pivot between one of said links and said supporting journal member held under normal torsion by the weight of the mass of the supporting journal member and the weight of the mass of the rotating part.

6. A mounting for an out-of-balance load rotatable about a relatively horizontal axis along which the center of mass of the out-of-balance load assumes different positions, a supporting journal member for the axis of the out-of-balance load movable responsive to the forces created by the rotation of the out-of-balance load, means to cause the axis of the rotating mass to move only to position approximately parallel to the normal position of said axis comprising two pairs of substantially rigid links, the two links of each pair being pivoted together at positions remote from one another along the axis of said pivotal connection, a base member, one of said links of one pair being pivoted to the base member sidewise of the supporting journal member at positions which are remote from one another along the axis of the pivotal connection of said link with the base member, the corresponding link of the other pair being correspondingly pivoted to the base member on the opposite side of the supporting journal member, one of said links of each pair being pivoted to the supporting journal member at positions which are remote from one another along the axis of the pivotal connection between said link and the supporting journal member, the corresponding link of the other pair being pivoted to the supporting journal member on the opposite side of a vertical plane through the axis of the supporting journal member, and yielding torsion connections at the pivots between said links and said supporting journal member held under normal torsion by the weight of the mass of the supporting journal

member and the weight of the mass of the rotating part.

7. A mounting for an out-of-balance load rotatable about an axis along which the center of mass of the out-of-balance load assumes different positions, thereby applying differing forces to the opposite ends of said axis, a non-rotating supporting journal member for the axis having a mass comparable with the mass of the rotating part and its out-of-balance load, a stationary base, said mounting comprising a plurality of articulated links arranged in pairs, the links of each pair being pivoted together along an axis of such length that the links may move relative to one another only in a plane substantially normal to the axis of the pivotal connection, the remote end of one link of each pair being connected to the base along an axis of sufficient length that each such link may move relative to the base only in a plane substantially normal to the axis of the connection between each such link and the base, the remote end of each of the other links of each pair being connected at different positions on the supporting journal member, the axis of each such connection being of such length that said links may move only in planes substantially normal to the axis of the rotating out-of-balance load, and rubber torsion members for two or more of the axes between said links and said supporting journal member, whereby movement of the supporting journal member due to the rotation of the out-of-balance load is dampened and whereby the axis of the out-of-balance load is caused to move only in positions substantially parallel to one another.

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