(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 154 857**
A2

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **85101907.5**

(22) Date of filing: **21.02.85**

(51) Int. Cl.⁴: **D 06 F 37/20**

(30) Priority: **12.03.84 IT 3401684 U**

(43) Date of publication of application: **18.09.85**
Bulletin 85/38

(84) Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

(71) Applicant: **INDUSTRIE ZANUSSI S.p.A., Via Giardini Cattaneo 3, I-33170 Pordenone (IT)**

(72) Inventor: **Bergomo, Luigi, via della Chiesa 33/A, I-33170 Pordenone (IT)**
Inventor: **Ceschin, Anteo, via Libia 17, I-33170 Pordenone (IT)**

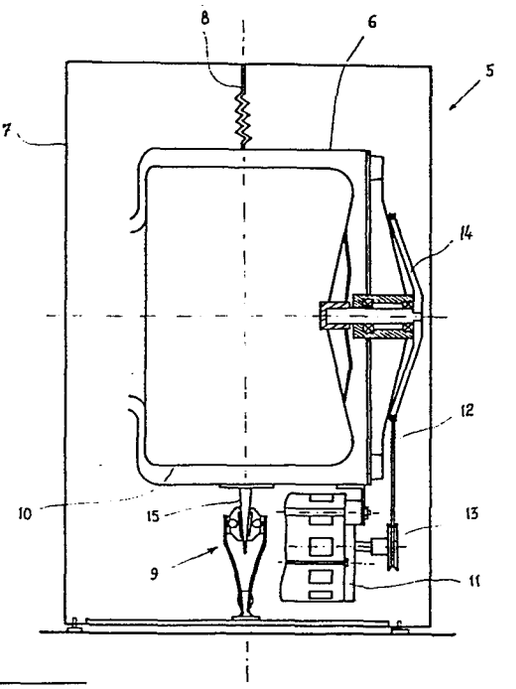
(74) Representative: **Patentanwälte Grünecker, Dr. Kinkeldey, Dr. Stockmair, Dr. Schumann, Jakob, Dr. Bezold, Meister, Hilgers, Dr. Meyer-Plath, Maximilianstrasse 58, D-8000 München 22 (DE)**

(54) Improvements in a frictional dampening device for a laundry washing machine.

(57) A frictional dampening device for the resilient suspension of the laundering tub in the housing of a laundry washing machine comprises at least one plate member having one of its ends secured to a bottom portion of the tub and having its other end retained between a pair of friction jaws biased into engagement therewith by spring means anchored to the housing of the machine.

Known dampening devices of this type suffer from the disadvantage that the dampening force remains substantially constant irrespective of the amplitude of the oscillations of the tub.

In order to solve the problems arising therefrom, the invention provides that the plate member (15) is formed with friction surfaces diverging from the zone contacted by the friction jaws (16, 17) in the rest position of the tub (6), and that said friction jaws (16, 17) are connected to respective ends (18, 19) of the spring means (20) by means of ball-and-socket joints (21), resulting in said jaws being continually kept in full surface contact with said plate member (15), and in the dampening effect increasing in proportion to the amplitude of oscillation.



EP 0 154 857 A2

Improvements in a Friction Dampening Device for a Laundry Washing Machine

Description

The present invention relates to a friction dampening device for the washing assembly of a laundry washing machine, particularly a laundry washing machine for domestic use, and specifically to an improved dampening device adapted to render operation of a laundry washing machine more reliable and comfortable.

As generally known, laundry washing machines for domestic use have an outer housing surrounding a resiliently mounted laundering tub itself housing a rotatable drum adapted to contain the laundry.

In particular, the laundering tub is usually connected to the outer housing of the machine by upper suspension springs and an arrangement of lower dampener devices effective to dampen oscillations resulting from rotation of the drum during various laundering phases, which would otherwise be transmitted to the outer housing so as to set up undesirable vibrations therein.

The dampening devices most commonly used in domestic laundry washing machines comprise at least one plate member secured to a lower portion of the tub and received between a pair of friction jaws anchored to the bottom of the outer housing and spring-biased into engagement with the plate member. Although dampening devices of this type are employed with satisfactory results, they are unable to efficiently absorb oscillations of the laundering assembly within a particular amplitude range.

These oscillations may for instacne result from the centrifugation of a reduced charge of laundry in a laundry

washing machine of the type in which the actuating motor does not provide a laundry distribution or equilibration phase preceding the centrifuging phase proper.

In this case, the reduced charge of laundry remains concentrated at an excentric position within the drum, resulting in a considerably unbalanced state of the laundering tub.When the component of this desequilibrium is directed downwards, it induces an oppositely directed reaction of the suspension springs, resulting in vertical oscillations of such an amplitude that the entire laundry washing machine starts jumping, with the consequent shocks and countershocks which are particularly damaging to the electric and mechanic components of the machine.

This disadvantage is also due to the fact that the braking effect exerted by the friction jaws on the plate member is always constant and independent of the loads to which the tub and the associated dampening plate members are subjected.

As a result, the greater these loads, and thus the greater the number of oscillations of the plate member, the longer is the duration of the braking effect, resulting in increased wear of the components in frictional engagement.

Also known, for instance from German Patent Application No. 32 16 152, are dampening devices in which the dampening capacity of a piston displaceable in frictional engagement with a central guide bar and with the interior walls of a cylindrical housing is variable by forming the upper portion of the guide bar with inclined grooves cooperating with resilient elements of the piston so as to increase the friction between the latter and the surfaces in frictional engagement therewith.

It is evident, however, that dampening devices of this type are composed of numerous parts, thus requiring numerous

operations for manufacture and assembly and rendering maintenance operations difficult.

It is therefore a main object of the present invention to provide a dampening device capable of ensuring a dampening effect that is proportional to the intensity of oscillations to which the tub is subjected.

A further object of the invention is the provision of a dampening device which in addition to the advantage set forth above offers the advantage of a particularly simple construction so as to facilitate the manufacture and operation of a laundry washing machine for which it is intended.

These and other objects are attained according to the invention by a frictional dampening device for the tub of a laundry washing machine, particularly for a laundering tub housing a rotatable drum for containing the laundry to be laundered and resiliently mounted in the housing of a domestic laundry washing machine, comprising at least one plate member secured at one and to the bottom surface of the tub and having its other end retained between a pair of friction jaws biased into engagement therewith by the ends of a compression spring anchored to the bottom of the housing of the laundry washing machine, and characterized in that said plate member is foremd with friction surfaces diverging from the zone contacted by said friction jaws when said laundering tub is in its rest position, and in that said friction jaws, formed with friction surfaces continually contacting said plate member over their full area, are connected to the respective ends of said compression spring by means of ball-and-socket joints.

The characteristics and advantages of the invention will become more clearly evident from the following description, given by way of example with reference to the accompanying drawings, wherein:

fig. 1 shows a sectional sideview of a laundry washing machine provided with a frictional dampening device according to the invention, and

fig. 2 shows an enlarged sectional view of the dampening device employed in the machine of fig. 1.

Shown in fig. 1 is a conventional laundry washing machine 5 having a laundering tub 6 resiliently mounted within a housing 7 by means of suspension springs 8 and a frictionaL dampening device 9, and a drum 10 for containing the laundry to be laundered. Drum 10 is mounted for rotation within tub 6 by the action of a motor 11 and a transmission belt 12 connecting a pulley 13 of motor 11 to a pulley 14 of drum 10.

Secured to the bottom portion of tub 6 in a per se known manner are at least two dampening plate members 15.

Associated to each plate memebr 15 is a pair of friction jaws 16, 17 biased into engagement with opposing surfaces of plate member 15 by respective ends 18, 19 of a compression sprign 20 secured to the bottom of housing 7 of laundry washing machine 5 (Fig. 2). According to the invention plate member 15 is formed with friction surfaces progressively diverging from bottom to top. As a result, the frictional force between the divergent surfaces of plate member 15 and the two jaws 16, 17 increases in direct proportion to the downward movement of plate member 15, and thus of laundering tub 6 to which it is secured.

To this purpose each friction jaw 16, 17 is connected to the respective end 18, 19 of compression spring 20 by means of a ball-and-socket joint 21 permitting the friction surfaces 22 of the jaws to be kept in continuous and uniform contact with the facing friction surfaces of plate member 15.

In this manner the problems possibly arising from a desequilibrated condition of the laundering assembly caused by a reduced charge of laundry to be laundered are solved in a simple manner.

The dampening device 9 according to the invention is additionally effective to reduce the amplitude and thus the duration of the oscillations of the laundering assembly in direct proportion to the force causing such oscillations, so as to ensure an improved stability of the laundry washing machine in any operating condition.

The frictional dampening device 9 according to the invention may of course be modified in various manners. Plate memebr 15 may thus be formed with substantially concave friction surfaces, so as to achieve a proportional increase of the friction between the friction jaws and the plate member in any direction of displacement of tub 6, these and other modifications being included within the scope of the patent claims.

GRÜNECKER, KINKELDEY, STOCKMAIR & PARTNER

PATENTANWÄLTE
EUROPEAN PATENT ATTORNEYS

A. GRÜNECKER, DIPL.-ING
DR. H. KINKELDEY, DIPL.-ING
DR. W. STOCKMAIR, DIPL.-ING. AE.E (CALTECH)
DR. K. SCHUMANN, DIPL.-PHYS
P. H. JAKOB, DIPL.-ING
DR. G. BEZOLD, DIPL.-CHEM
W. MEISTER, DIPL.-ING
H. HILGERS, DIPL.-ING
DR. H. MEYER-PLATH, DIPL.-ING
DR. M. BOTT-BODENHAUSEN, DIPL.-PHYS
DR. U. KINKELDEY, DIPL.-BIOL

*LICENCIÉ EN DROIT DE L'UNIV. DE GENÈVE

8000 MÜNCHEN 22
MAXIMILIANSTRASSE 58

EP 2173

Febr. 21, 1985

TRANSLATION OF PRIORITY DOCUMENT

INDUSTRIE ZANUSSI S.p.A.
via Giardini Cattaneo 3
33170 Pordenone, Italy

Improvements in a Frictional Dampening Device for a Laundry Washing Machine

Patent Claims

1. A frictional dampening device for the laundering tub of a laundry washing machine, particularly for a laundering tub housing a rotatable drum for containing the laundry and resiliently mounted within a housing of a domestic laundry washing machine, comprising at least one plate member secured at one of its ends to a bottom surface of said tub and having its other end retained between a pair of friction jaws biased into engagement with said other end by the ends of a compression spring secured to the bottom of a housing of said laundry washing machine, characterized in that said plate member (15) is formed with friction surfaces diverging from the zone contacted by said friction jaws (16, 17) in the rest position

of said tub (6), and in that said friction jaws (16, 17), formed with friction surfaces (22) continually contacting said plate member (15) over their total area, are connected to the respective ends (18, 19) of said compression spring (20) by means of ball-and-socket joints (21).

2. A dampening device according to claim 1, characterized in that the friction surfaces of said plate member (15) are planar and diverge progressively from bottom to top.

0154857

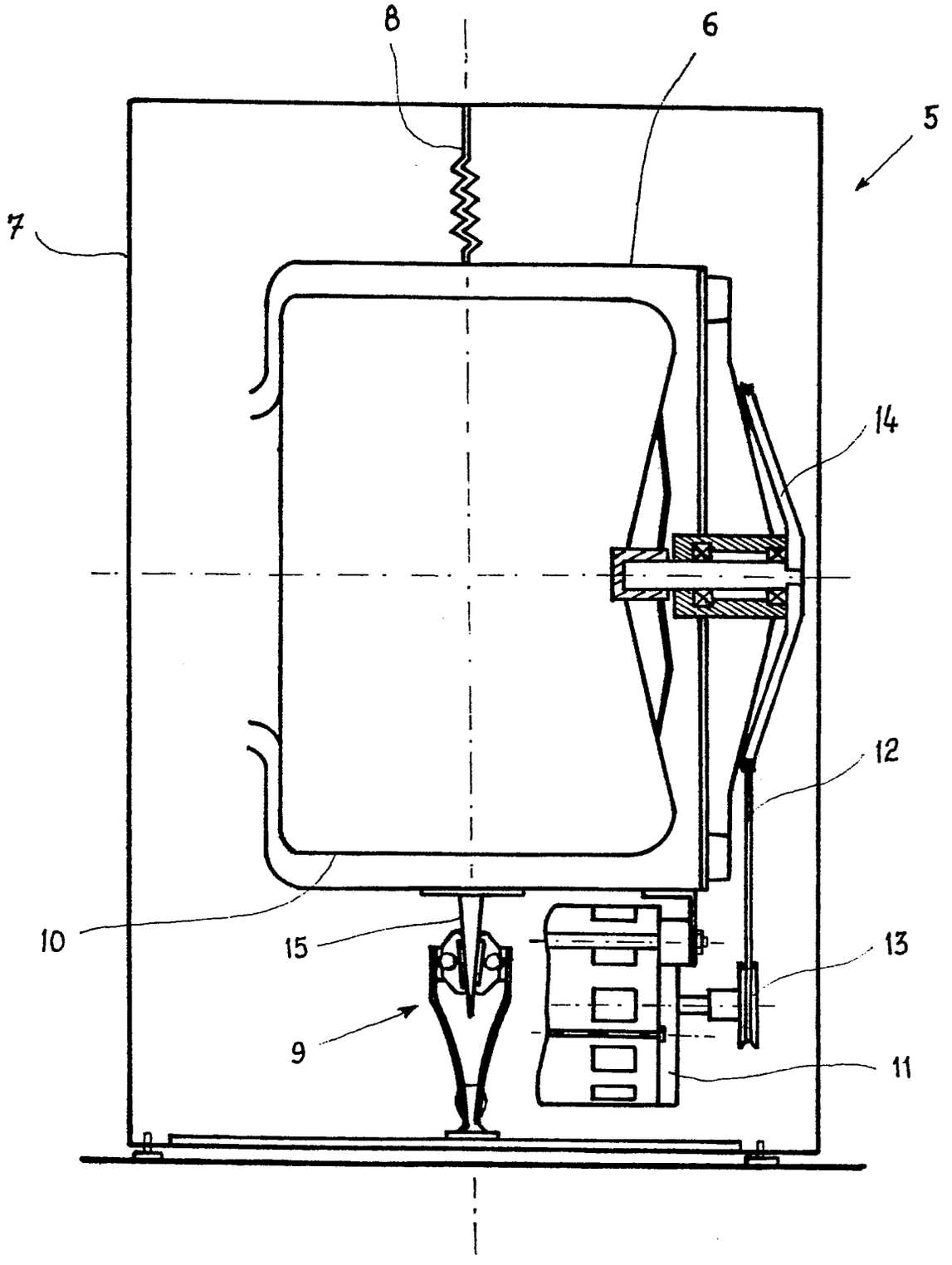


FIG. 1

0154857

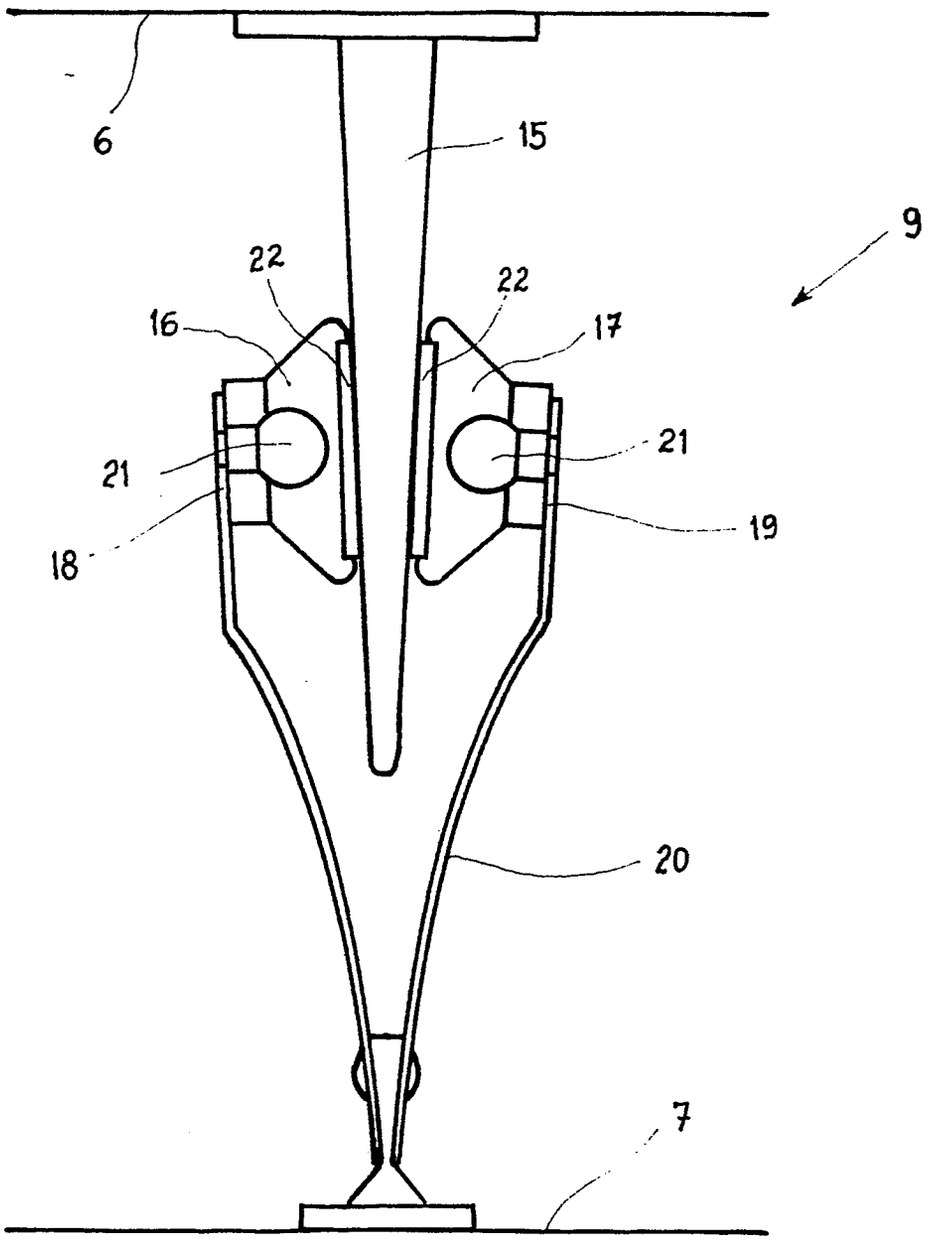


FIG. 2