Sept. 19, 1961 J. COENDERS 3,000,483

CLUTCHING DEVICE FOR WASHING AND DRYING MACHINES

Filed Dec. 1, 1959

Fig. 1

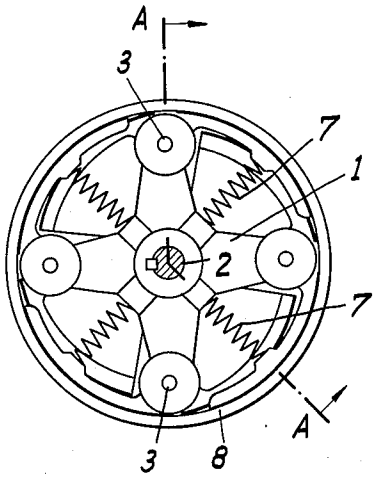
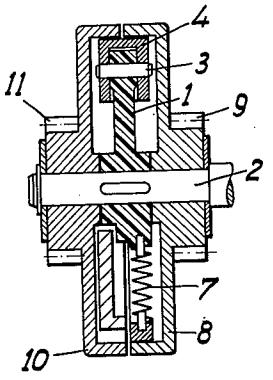


Fig. 2 (A-A)



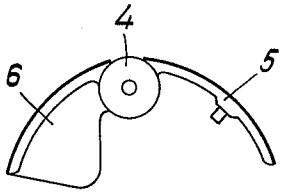


Fig. 3

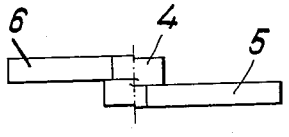


Fig. 4

Inventor:
JOHANN COENDERS

by Mestern & Rollin
ATTORNEYS

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CLUTCHING DEVICE FOR WASHING AND DRYING MACHINES

Johann Coenders, Haus Waldesheim, Krefeld-Traar, Germany

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In washington machines which are provided with a drum both for washing and for centrifuging, the drum must be rotated at a relatively low speed during the washing process to obtain satisfactory results, but the speed of rotation must be much higher for the centrifugal drying process in order to achieve satisfactory extraction of the water. In general, the speed of the drum should not exceed 45 revolutions per minute during the washing process but should rotate at about 600 revolutions per minute during centrifuging. Consequently, the ratio between speed of rotation during washing and speed of rotation during centrifuging is about 1 to 13. This ratio cannot be achieved by using only the known drive motors for automatic washing machines such as two-stage, pole-reversible motors, on their own.

A driving mechanism for washing and centrifuging machines has therefore become known in which the drum is driven at the differing speeds required for washing and centrifuging by means of a driving motor which operates only over a small speed range, for example a pole-reversible motor, and which operates through either one of two reduction gear trains arranged in parallel. A centrifugally operated control device automatically causes the motor to drive through one gear train or the other in dependence on the speed of the driving motor. By means of such a driving mechanism, it is possible to increase the relatively small range of speeds of the driving motor to such an extent that the washing and centrifuging drum is driven at the required speeds for the different operations. The centrifugally operated control device automatically effects the changing over of the gearing in dependence on the speed of revolution of the drive motor. The present invention relates to a washing machine having a driving mechanism of this nature.

Known driving mechanisms of this nature have the disadvantage that the reduction gearing is complex and requires an overriding clutch to be incorporated to allow the gear train for the washing process to run idly when the gear train for centrifuging is in operation. This is avoided by the present invention. To this end, according to the present invention, the centrifugally operated control device comprises centrifugal control weights radially movably mounted on members fixed to a shaft which rotates at a speed dependent on that of the motor, the weights being acted upon by springs in a direction opposite to that of the centrifugal forces, and two driving rings connected one to each of the gear trains and arranged to co-operate with the centrifugal weights, the strength of the springs being such that at a lower speed of rotation of the shaft the weights are moved inwardly by the springs and contact one driving ring to transmit a drive from the shaft to one reduction gear train and at a higher speed of rotation of the shaft the weights are moved outwardly against the springs by centrifugal force and contact the other driving ring to transmit a drive from the shaft to the other reduction gear train.

This ensures that when one gear train is coupled to the driving motor, the centrifugally operated control device will at the same time uncouple the other gear train, which dispenses with the arrangement, which has hitherto been necessary, of providing an overriding clutch in the reduction gearing. This results in a considerably simpler driving device, which is also less liable to break-downs.

Preferably, the rings are in the form of drums which are rotatably mounted side by side on the shaft and enclose the members fixed to the shaft, the members being radially extending arms on the ends of which the weights in the form of two-armed levers are pivoted, the arms being of unequal weights, the lighter of which lie inside one drum and are urged outwards by springs and the heavier of which are axially offset from the lighter arms and lie inside the other drum. This results in a very space saving arrangement for the centrifugally operated control device which, owing to the offset arrangement of the lever arms which act as centrifugal weights, will act alternately on the drive drum of one gear train or the other, according to the speed of the driving shaft, while the drive drum of the other gear train is uncoupled.

A clutching device for a washing machine in accordance with the invention will now be described, by way of example, with reference to the accompanying drawings in which:

FIGURE 1 is a side elevation of the centrifugally operated control device with parts removed;

FIGURE 2 is a section as seen in the direction of the arrows on the line A—A in FIGURE 1;

FIGURE 3 is a side elevation of a part of the device shown in FIGURES 1 and 2; and,

FIGURE 4 is a plan of the part shown in FIGURE 3.

As shown in FIGURES 1 and 2, four driving arms **1** of the centrifugally operated control device are rigidly connected on a shaft **2** of the driving motor, which is not shown in the drawing. A two-armed centrifugal weight lever **4** is pivotally mounted on the end of each of the driving arms **1** by means of a bolt **3**. The form of the centrifugal weight levers is indicated in FIGURES 3 and 4. The arms **5** of the levers are lighter than the arms **6**, and each of the lighter lever arms **5** is acted upon by a radially disposed compression spring **7**. Driving drums **8**, **10** which are rotatably mounted on the driving shaft **2**, are disposed one on each side of the driving arms **1**. The arms **5** and **6** of each centrifugal weight lever **4** are axially offset from one another as seen in FIGURE 4, in such a manner that each arm can lie with its outer surface against the inner surface of its associated driving drum **8** or **10**. The light lever arms **5** are inside the inner circumference of the driving drum **8** towards which they are pressed by the compression springs **7**. When the forces of the springs **7** overcome the centrifugal forces on the arms **6** the driving shaft **2** is frictionally connected to the driving drum **8** and, by way of a toothed wheel **9** integral with the drum **8**, the rotation of the motor, for example 750 revolutions per minute, is transmitted with the necessary speed reduction for the washing process to the washing drum, which is not shown. The compression in the springs **7** is such that the pressure required between the arms **5** and the driving drum **8** to transmit the power of the washing drum is produced and in addition the centrifugal force on the heavier arms **6** produced at a motor speed of 750 revolutions per minute is overcome.

If the driving motor, which is preferably a two-speed or variable speed motor which may also be reversible, is switched over from 750 to 1500 revolutions per minute by changing the speeds, then the heavier arms **6** of the centrifugal weight levers **4** will be pressed against the driving drum **10** because the springs **7** are overcome by the increased centrifugal force on the arms **6** which is proportional to the square of the speed of revolution of the shaft **2**. Thus the shaft **2** is frictionally connected to the drum **10** and the speed of the motor of 1500 revolutions per minute is transmitted with the necessary reduction in speed, through a toothed wheel **11** on the drum **10** to the washing drum which now carries out the centrifugal drying process. As the arms **6** are pressed against

the drum **10**, the arms **5** are automatically released from the drum **8**.

I claim:

1. Centrifugal force coupling comprising a shaft, drive members secured radially to said shaft with one of their ends, the other of their ends being free, two-armed weight levers pivotally secured to respective free ends of said members, one of the arms of each of said levers being lighter and the other being heavier and offset from said one arm, a pair of driven drums rotatably mounted on said shaft and having inner peripheral faces adjacent respectively to said heavier and said lighter arms, compression spring means for urging the lighter of said arms into engagement with the peripheral face of its respective drum during a low rate of revolutions, said other heavier arms being adapted to engage by centrifugal force with the peripheral face of its respective drum at a higher rate of revolutions.

2. Centrifugal force coupling according to claim 1, wherein said weight levers are of the shape of a "comma."

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