

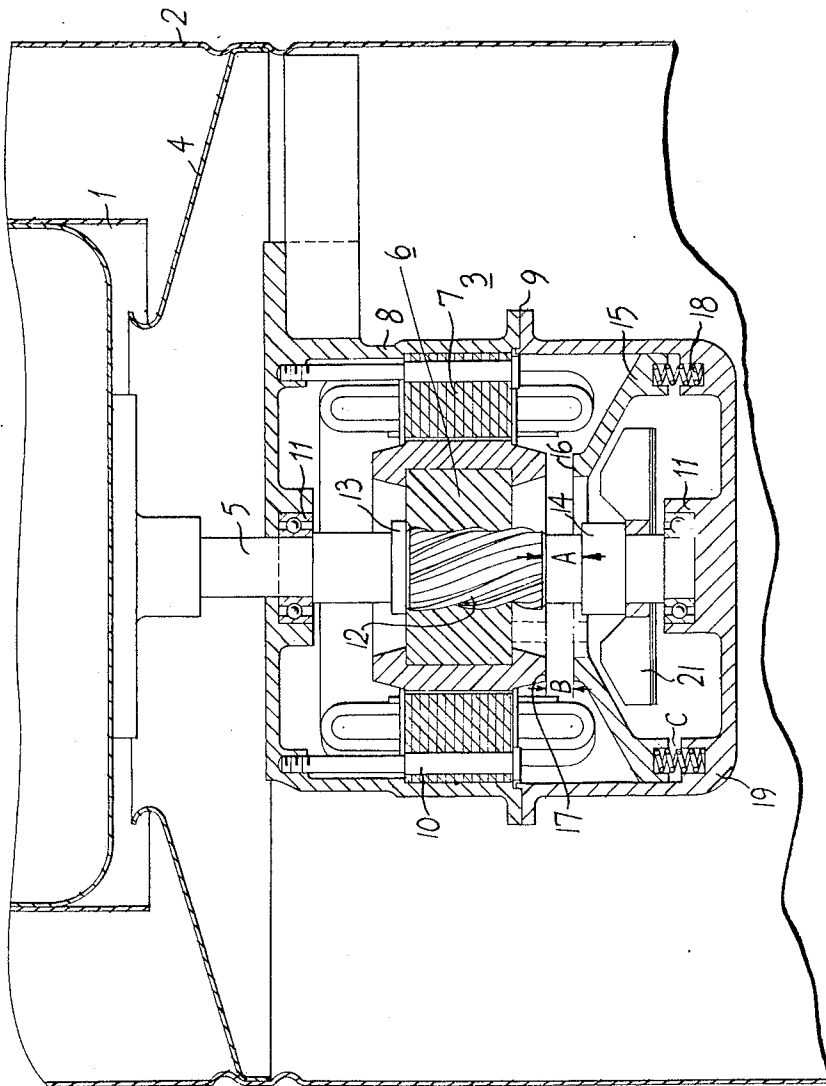
April 30, 1963

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3,088,043

ELECTRIC MOTOR DRIVE FOR CENTRIFUGAL EXTRACTOR MACHINE

Filed Nov. 10, 1958



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ELECTRIC MOTOR DRIVE FOR CENTRIFUGAL EXTRACTOR MACHINE

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Filed Nov. 10, 1958, Ser. No. 772,773
5 Claims. (Cl. 310-76)

This invention relates to electrically driven spin drying machines for use in connection with domestic washing equipment.

Spin drying machines suffer from the disadvantage that when the motor driving the spin basket containing the washed material to be dried is switched off at the termination of the drying period, it continues to rotate at high speed as a result of its inertia. Since it is dangerous for the operator to open the container in which the basket is enclosed until the rotation has diminished to a safe value, which may take as long as 15 minutes, it is customary to provide some form of interlock between the lid of the container and the motor surface and braking means to reduce the speed of the basket.

The present invention is concerned with improved means for enabling automatic application of braking to be effected when the driving motor is switched off.

According to the invention the rotor of the motor driving the spin basket is slidably mounted on the driving shaft and is operatively connected thereto through the intermediary of helical or spiral threads or splines so that axial motion along the shaft is adapted to take place when power is transmitted between the rotor and the shaft, the axial motion produced by power transmitted from the shaft to the motor effecting contact between friction surfaces on, or associated with the rotor and a non-rotatable portion of the machine whereby the rotor and basket are braked substantially to a standstill.

The construction is conveniently such that the weight of the rotor itself is utilised to assist in the application of braking, the non-rotatable friction surface being located below the rotor. The non-rotatable friction surface is preferably provided on a resiliently supported braking member and means is preferably employed to cool the friction surface, e.g. by means of a fan the blades of which are secured to the rotor or the driven shaft.

The motor employed is preferably of the capacitor start induction type, since this type of motor avoids the necessity for brush gear which would otherwise complicate the construction in view of the necessity for axial motion of the rotor and the brush gear.

A constructional embodiment of the invention will now be described with reference to the accompanying drawing which shows, in cross-section, the driving arrangement for a spin-drying machine constructed in accordance with the invention.

Referring to the drawing, the lower portion of the spin-dry basket is shown at 1. It is mounted in an outer housing 2 which surrounds both the basket 1 and the driving motor 3. Below the basket is arranged a deflector 4 which prevents any moisture running down the outside of the basket 1 from intruding into the casing of the motor. The basket is driven by means of a shaft 5 to which the rotor 6 of the motor 3 is connected, the rotor being surrounded by the stator 7, supported within an outer casing 8 secured within the lower portion of the housing 2. The casing 8 is made in two sections assembled at a spigotted joint 9, the stator being held within the upper portion of the casing 8 by means of bolts 10.

The casing 8 is arranged to support the shaft 5 in bearings 11, shown as being of the ball-bearing type. The rotor 6 is slidably mounted on the shaft 5 and is opera-

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tively connected therewith through the intermediary of helical or spiral threads or splines 12, so that relative rotation of the rotor 6 and shaft causes the rotor to move axially along the shaft. This motion is limited by collars 13, 14, on the shaft.

Mounted within the casing 8 and at the lower end thereof is a brake member 15 of frusto-conical form, providing at its upper end a friction surface 16, adapted to co-operate with a corresponding friction surface 17 on the lower end of the rotor 6. The braking member 15 is mounted upon a plurality of spaced spiral springs 18 received in suitable bosses 19 formed within the lower end of the casing 8.

The inclination of the threads or spirals 12 is so arranged that when the motor is first switched on with the basket 1 stationary, the rotor rides up the shaft 5, its axial motion being limited by the collar 13, whereupon the drive is then transmitted to the basket 1 and the basket rotates. At the end of the spin-drying period the motor is switched off. As a result of the inertia of the basket and its contents, the basket continues to rotate, but the rotor 6 drops down the shaft both as a result of its own weight and of the continued rotation of the shaft and the inertia of the rotor, thereby bringing its friction surface 17 into contact with the friction surface on the brake 15. When the friction surfaces come into contact, the braking effect on the rotor in conjunction with the action of the inclined splines increases the downward force, thus adding to the braking force, so that the total braking force can be quite substantial and the braking continues to standstill. The springs 18 permit of limited motion of the braking member 15 as the rotor is forced downwardly by the continuing rotation of the shaft 5. It is desirable, but not essential, that the rotor should come to a stop in the downward position on the shaft before complete compression of the springs 18, otherwise the servo-action described above might result in excessive forces. The dimension A must be less than the sum of the dimensions B+C.

The arrangement may be such that in the static position the rotor 6 rests with the friction surfaces 16, 17 in contact. Preferably in order to prevent over-heating of the braking member, fan blades 21 are provided on the lower end of the shaft to provide a circulation of cooling air within the braking member.

It is advantageous to employ dynamic braking in addition to the mechanical retardation provided as described above. Thus assuming a motor of the capacitor-start type to be employed, we may immediately after switching off, join together the ends of the main winding or the start winding or both, or put them in series. Sufficient current is thus generated by virtue of the residual magnetism to provide a braking torque on the rotor which, whilst adding to the braking torque in its own right, also increases the downward thrust, due to the inclined threads 12, and so adds to the pressure on the brake and therefore to the braking torque.

Apart from the reduction in stopping time, this dynamic braking has the effect of making sure that the rotor drops should the friction be unduly high.

What I claim is:

1. A centrifugal extractor machine comprising a stationary housing, a spin basket rotatable within the housing, an electric motor having a rotor and stator, said rotor having a driving connection with said basket and said stator being fixedly connected with said housing, braking means mounted within said housing, said driving connection including means responsive to the inertia of said basket for causing axial movement of said rotor with respect to said stator in the direction away from said braking means when the motor becomes energized to rotate said rotor, and for causing axial movement of the rotor

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in the other direction when the motor is conditioned to stop driving the rotor and the inertia of the basket causes the basket to tend to continue to rotate faster than the rotor to thereby bring said rotor into frictional engagement with said braking means, whereby to effect a reduction in speed of said rotor and thereby of said basket.

2. A centrifugal extractor machine comprising a stationary housing, a spin basket rotatable within said housing, an electric motor having a rotor and stator, said stator being fixedly connected with said housing and said rotor being rotatable within said stator and having a driving connection with said basket, and braking means for said rotor mounted within said housing, said driving connection including a shaft with which said basket is connected and on which said rotor is mounted with helical splines drivingly connecting said rotor with the shaft and permitting axial shift of the rotor on the shaft, and means limiting axial movement of the rotor on said shaft along said splines, said rotor due to the effect of the inertia of the basket on said shaft being moved axially along said shaft in the direction away from said braking means when the motor becomes energized to drive the rotor, and said rotor being moved axially of said shaft in the other direction toward said braking means when the motor is conditioned to stop driving the rotor and the inertia of the basket tends to rotate the basket and shaft with respect to the rotor, for bringing the rotor into frictional engagement with said braking means whereby to effect a reduction in the speed of said rotor and thereby of said basket.

3. A centrifugal extractor machine comprising a stationary housing, an electric motor having a rotor and a stator, said stator including a casing fixedly connected with said housing, a shaft rotatably mounted in said casing, a spin basket non-rotatably mounted on said shaft, said rotor having a driving connection with said shaft including helical splines permitting limited axial movement of said rotor with respect to said shaft, and braking means

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mounted within said housing, the inclination of the splines being such that when the motor starts to drive the shaft inertia of the basket contributes to cause the rotor to move along the shaft away from said braking means, and when said motor ceases to drive the shaft inertia of basket contributes to move the rotor along the shaft toward said braking means.

4. A centrifugal extractor machine as claimed in claim 3, having means for resiliently mounting said braking means with respect to said housing so as to restrict the braking effect applied to said rotor.

5. A centrifugal extractor machine comprising a stationary housing, an induction motor having a rotor and a stator, said stator including a casing fixedly connected with said housing, a vertical shaft rotatably mounted in said casing, a spin basket secured at the upper end of said shaft, a driving connection between said rotor and said shaft permitting limited initial axial and rotational movement of said rotor with respect to said shaft, a braking member resiliently and non-rotatably mounted in said housing below said rotor, the upper end of said braking member providing a friction surface opposed to a friction surface on the lower end of said rotor, means in said driving connection and responsive to the current inertia of the basket on said shaft for causing said rotor to move along said shaft away from said braking member when the motor starts to drive said shaft, and for moving said rotor along said shaft toward said braking member when said motor ceases to drive the shaft, and a fan secured to said shaft and located within said braking member for cooling said braking member.

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