(12) UK Patent Application (19) GB (11) 2 129 072 A

(21) Application No **8314752**
(22) Date of filing **27 May 1983**
(30) Priority data
(31) **53865**
(32) **27 Oct 1982**
(33) **Italy (IT)**
(43) Application published
10 May 1984
(51) **INT CL³**
F16H 11/06 9/12 55/56
(52) Domestic classification
F2D 4A
U1S 1226 F2D
(56) Documents cited
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GB 0742914
GB 0592141
(58) Field of search
F2D
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(54) Expanding pulley

(57) A pulley comprises a support sleeve (26) having a reaction disc (22) and a first half-pulley (18) rigidly secured at each end thereof, a second half-pulley (20) sliding on the sleeve between the reaction disc and the first half-pulley, and centrifugal weights (24) inserted between the reaction disc and the second half-pulley in such a way that the movement of the centrifugal weights away from the sleeve, on rotation of the pulley, causes the second half-pulley to slide along the sleeve and the wrapping diameter of the pulley to be varied. The confronting faces of the disc (22) and second half-pulley (20) are formed with radial channels (32, 34) to guide the weight (24). The half-pulleys and disc may be of plastics. The first half-pulley and disc may be secured to the sleeve by force fitting or embedding during moulding.

FIG. 2

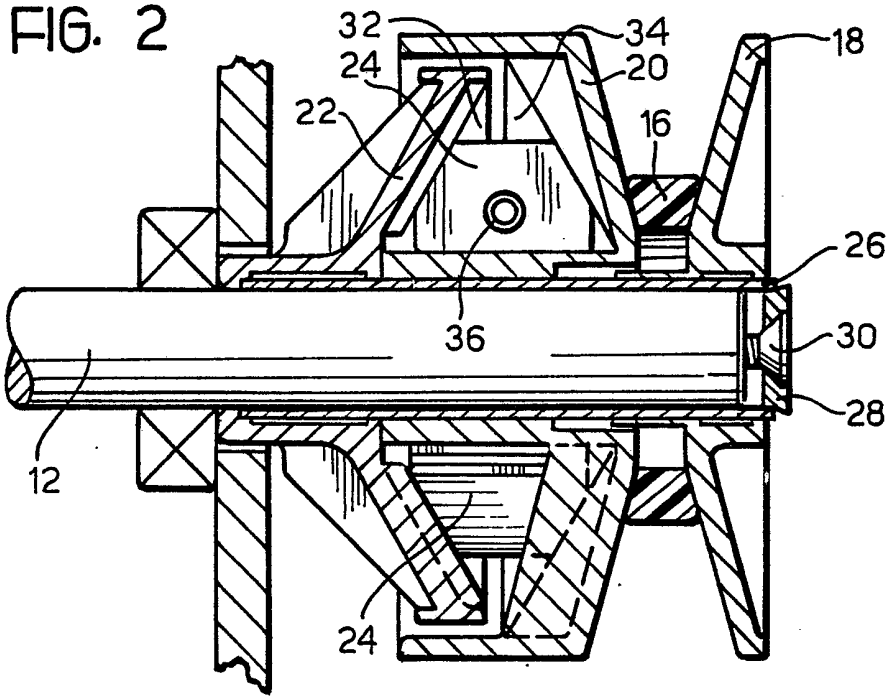

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FIG. 1

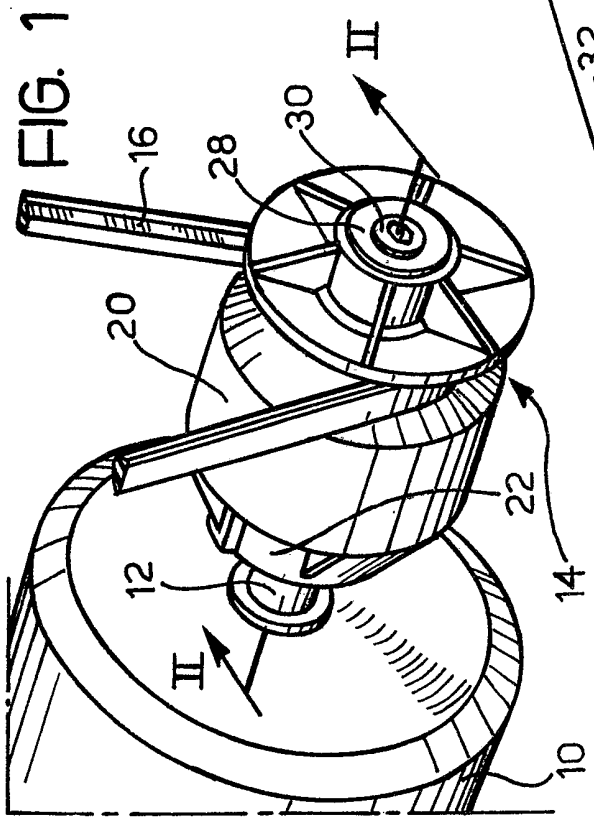
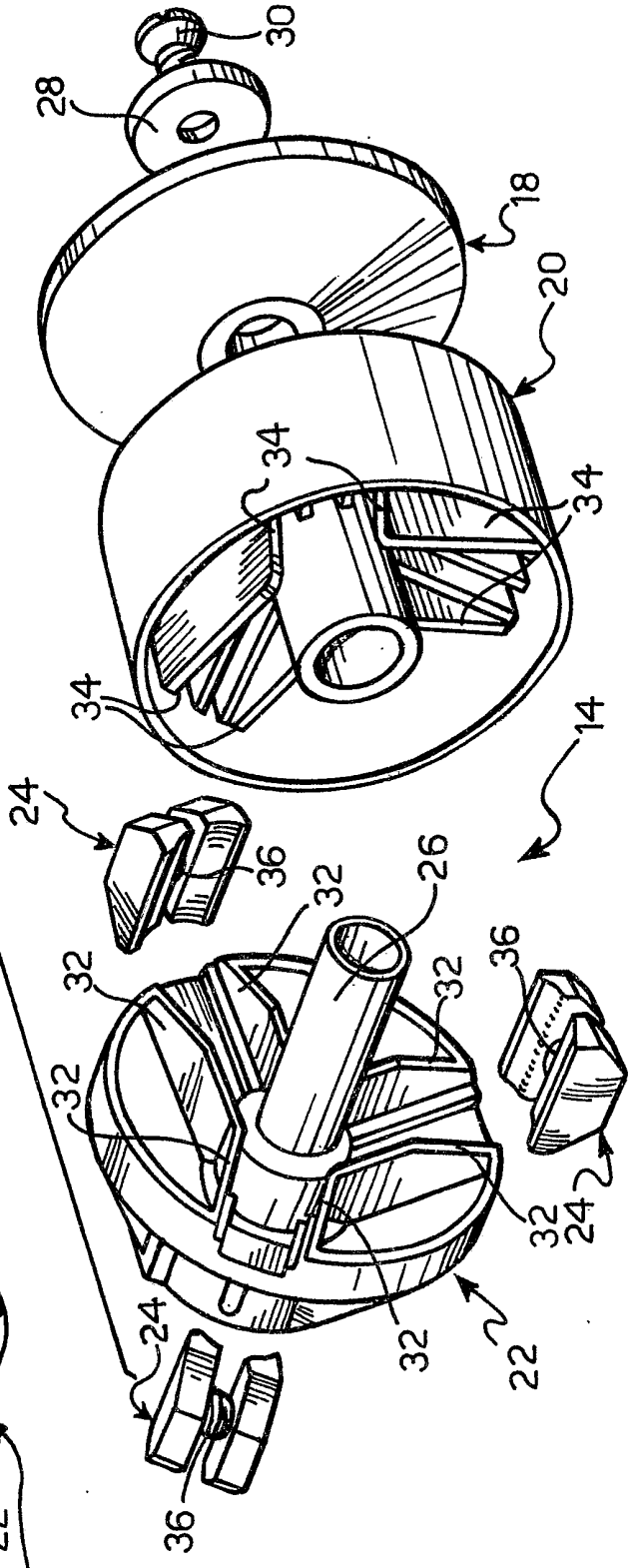

16
28
30
II
20
22
14
12
II
10

FIG. 4


30
28
18
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34
34
34
14
24
36
32
26
32
32
32
36
24
32
32
24
22
36

FIG. 2

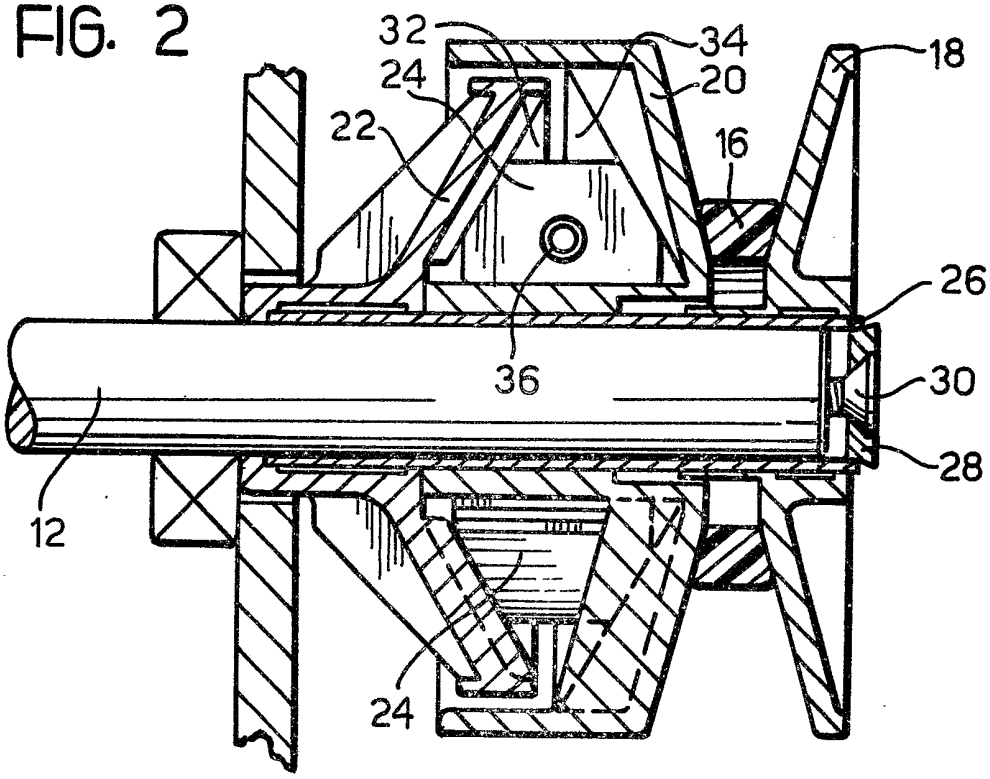
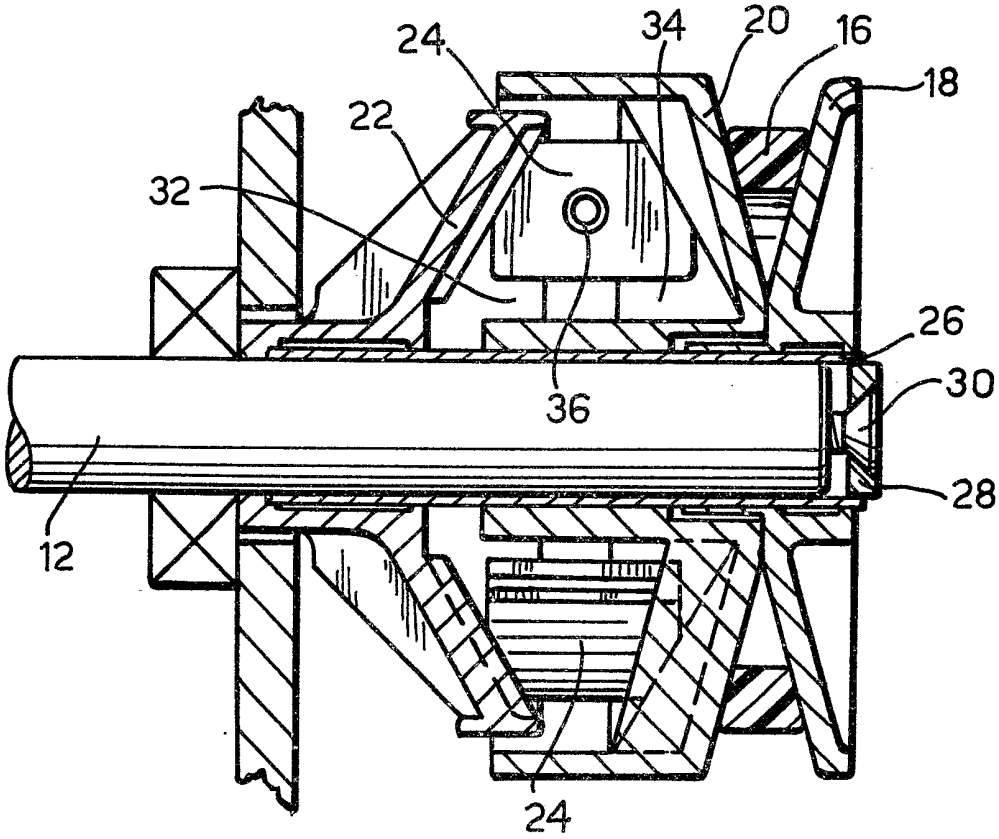

32
34
18
24
20
22
16
26
36
30
28
12
24

FIG. 3


24
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SPECIFICATION
An improved pulley

The present invention relates to centrifugally operated expanding pulleys and concerns in particular, but not exclusively, expanding pulleys for belt drives in washing machines.

The pulley according to the invention is characterised in that it comprises in combination:

— a sleeve constituting a support for the mounting of the pulley;

— a reaction disc rigidly secured at one end of the sleeve;

— a first half-pulley rigidly secured at the other end of the sleeve;

— a second half-pulley sliding on the sleeve between the reaction disc and the first half-pulley, and

— centrifugal weights inserted between the reaction disc and the second half-pulley in such a way that the movement of the centrifugal weights away from the sleeve, which is brought about as a result of the rotation of the pulley, causes the second half-pulley to slide along the sleeve and the wrapping diameter of the pulley to be varied.

The assembly of all the component parts of the pulley on the sleeve is such that the pulley constitutes a self-contained unit which can be easily fitted on a mounting shaft, without there being any necessity for additional operations for adjusting the relative position of said component parts. This not only facilitates the assembly and disassembly of the pulley, with a considerable advantage as regards convenience of use for the user, but also ensures at the same time accurate positioning of the parts, which guarantees constantly the efficient operation of the pulley itself.

Further features and advantages of the invention will be apparent from the following description, given purely by way of non-restrictive example, with reference to the accompanying drawings, in which:

Figure 1 illustrates an expanding pulley according to the invention in its assembled position on the shaft of a motor;

Figure 2 is a view in axial section and on an enlarged scale, along the line II—II in Figure 1, which illustrates the pulley according to the invention in its first operating position;

Figure 3 is a section substantially equivalent to the section in Figure 2, which illustrates the pulley according to the invention in another operating position, and

Figure 4, is an exploded view in perspective of the pulley according to the invention.

In Figure 1 the reference numeral 10 denotes an electric motor of a washing machine, on the shaft 12 of which is installed an expanding pulley designated as a whole by the reference numeral 14. A belt 16 passes around the pulley 14 and imparts rotating movement to a driven pulley (not shown in the drawing) which is fixed on the shaft of a rotating drum (not shown) intended to accommodate the articles to be washed.

The pulley 14 comprises a first half-pulley 18, a second half-pulley 20, a reaction disc 22 and three centrifugal weights 24 which are inserted between the second half-pulley 20 and the reaction disc 22 and which are staggered by an angle of 120° around the common axis of the two half-pulleys 18, 20 and to the reaction disc 22.

The first half-pulley 18 and the reaction disc 22 are rigidly secured at the two ends of a sleeve 26, whereas the second half-pulley 20 is able to slide freely on this sleeve as a result of the movement of the weights 24, in a manner which will be better described in the following.

The connection between the sleeve 26 and the half-pulley 18 or the reaction disc 22 can be effected in various ways, for example by force-fitting or else by embedding at the moulding stage.

Typically, both the half-pulleys 18, 20 and the reaction disc 22 are made of plastics material.

Therefore, it is possible to incorporate the sleeve 26 in the reaction disc 22 during the forming of the disc 22 itself by casting to install the movable half-pulley 20 on the sleeve 26, after having inserted the weights 24 between the disc 22 and the half-pulley 20, and to fit the end of the sleeve 26 opposite to the end connected to the disc 22 into the central bore of the half-pulley 18.

The half-pulley thus obtained constitutes a self-contained unit which can be easily installed on the mounting shaft.

In the example illustrated, the mounting of the pulley 14 on the shaft 12 of the motor 10 is carried out by means of a washer 28 with a conical lateral surface fixed to the shaft 12 by a screw 30.

As shown more clearly in Figure 4, the mutually facing surfaces of the sliding half-pulley 20 and of the reaction disc 22 are each provided with three groups of radial features, respectively designated 32 and 34.

Each pair of features defines a channel-like slot, inside which slides a respective centrifugal weight 24.

Preferably, each of the weights 24 is divided into two symmetrical parts joined by a spring 36 which acts as a repulsion element and ensures that each of the parts of the centrifugal weight 24 is maintained constantly in engagement with one of the side walls of the channel-like guide, inside which the weight 24 itself slides.

The arrangement described is such as to allow an automatic take-up of play in the fitting of the weights 24 inside the respective slide guides and at the same time to prevent the weights 24 themselves from sliding loosely inside these guides, which could substantially increase the noise arising from the pulley 14 during operation.

During the operation of the washing machine, when the electric motor 10 is rotating a low speed, the tension exerted by the belt 16 forces the sliding half-pulley 20 into the position shown in Figure 2. This position corresponds to the minimum wrapping diameter of the belt 16 around the pulley 14, namely to the minimum

value of the transmission ratio between this pulley and the pulley driven by the belt 16.

When the motor 10 is caused to rotate at high speed (for example during a spinning stage), the centrifugal weights 24 overcome the tension exerted by the belt 16 and displace the half-pulley 20 towards the fixed half-pulley 18 until the position shown in Figure 3 is reached. This position corresponds in practice to the maximum wrapping diameter of the belt 16 around the pulley 14, namely to the maximum value of the transmission ratio between this pulley and the pulley driven by the belt 16.

A subsequent decrease in the speed of rotation of the motor 10, with a consequent reduction in the centrifugal force exerted on the weights 24, results in the weights 24 themselves being brought gradually closer again to the sleeve 26 and in the sliding half-pulley 20 being brought closer again to the reaction disc 22 under the action of the restoring force exerted by the belt 16.

Of course, the effect of the present invention also applies to designs which result in similar advantages using the same innovative idea and, in particular, to expanding pulleys in which the arrangement of the centrifugal weights 24 is such that an increase in the speed of rotation of the pulley, rather than causing the sliding half-pulley to be brought nearer to the fixed half-pulley, as in the illustrated example, causes these half-pulleys to be moved apart and the wrapping diameter of the pulley to be reduced.

CLAIMS

1. An expanding pulley comprising a sleeve constituting a support for mounting the pulley, a reaction disc rigidly secured at one end of the sleeve, a first half-pulley rigidly secured at the other end of the sleeve, a second half-pulley sliding on the sleeve between the reaction disc and the first half-pulley, and centrifugal weights inserted between the reaction disc and the second half-pulley in such a way that the movement of the weights themselves away from the sleeve, which is brought about as a result of the rotation of the pulley, causes the second half-pulley to slide along the sleeve and the wrapping diameter of the pulley to be varied.

2. An expanding pulley as claimed in claim 1, wherein the sleeve is connected in non-detechable manner to the reaction disc and to the first half-pulley.

3. An expanding pulley as claimed in claim 2, wherein the sleeve is connected to the reaction disc and/or to the first half-pulley by force-fitting or else by embedding at the moulding stage.

4. A pulley as claimed in claim 1, claim 2 or claim 3 wherein the reaction disc and the second half-pulley are provided on their mutually facing surfaces with corresponding radial guides in which said centrifugal weights are accommodated so as to slide.

5. A pulley as claimed in claim 4, wherein each of the guides which are situated on at least one of said mutually facing surfaces is delimited by radial features disposed in a generally channel-like arrangement, and in that the centrifugal weight accommodated in said guide comprises two parts joined by a resilient repulsion element, whereby each of these parts is urged into a position of sliding engagement with a respective radial feature.

6. A pulley as claimed in any one of the preceding claims, wherein the two half-pulleys and the reaction disc are predominantly made of plastics material.

7. An expanding pulley substantially as herein described with reference to and as shown in the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.