Feb. 27, 1940. J. W. CHAMBERLIN ET AL 2,191,607

WASHING MACHINE ROTOR

Filed March 6, 1937 3 Sheets-Sheet 1

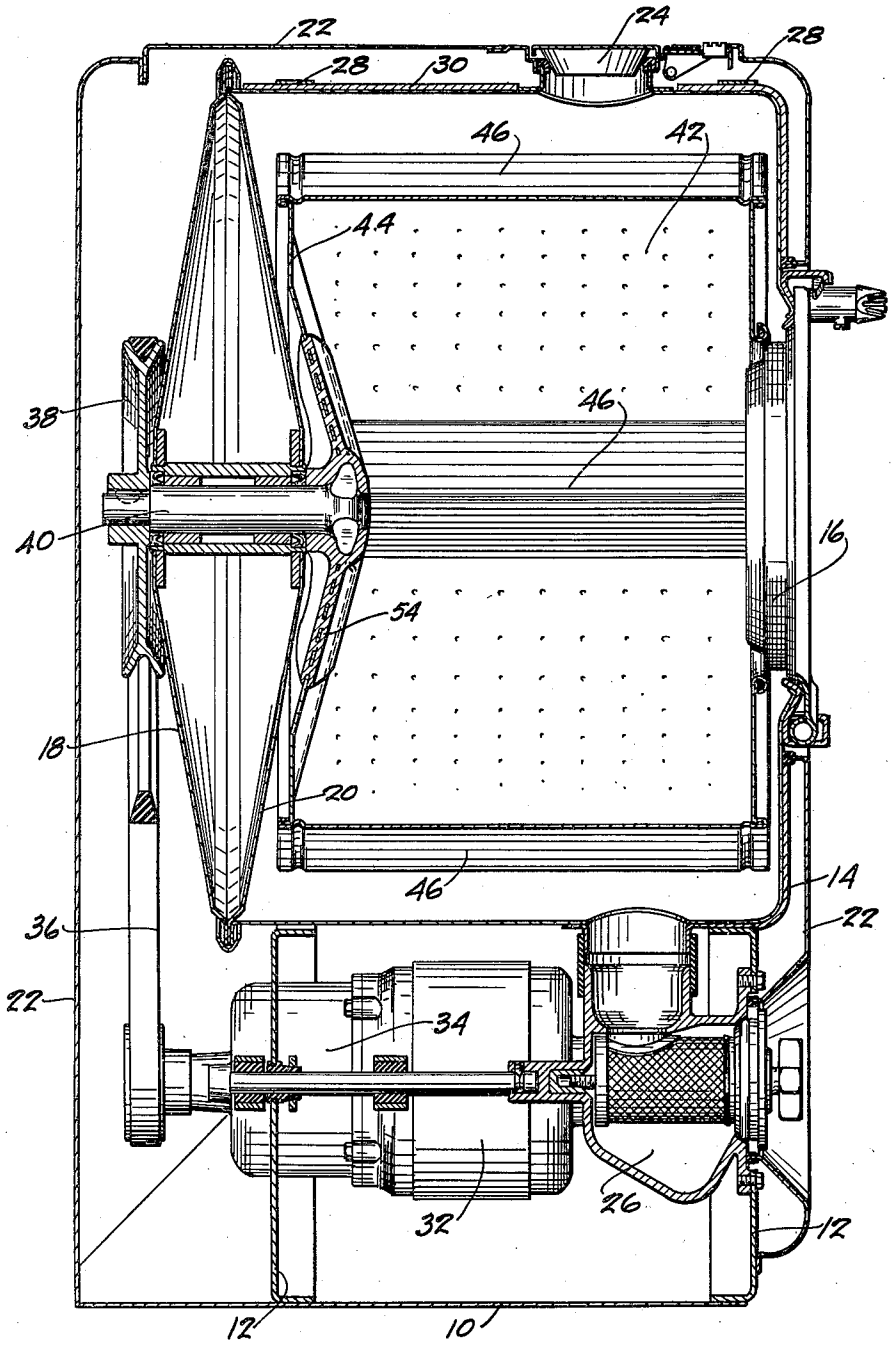

Fig. 1

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Fig. 5

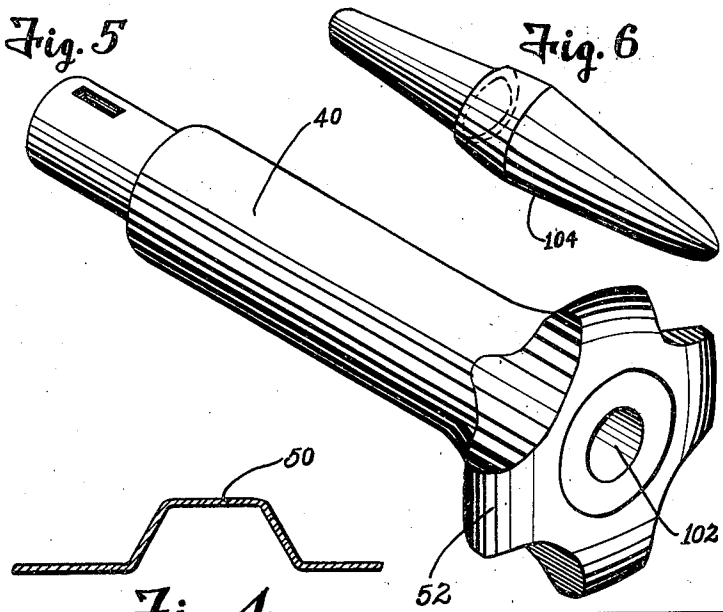


Fig. 6

Fig. 4

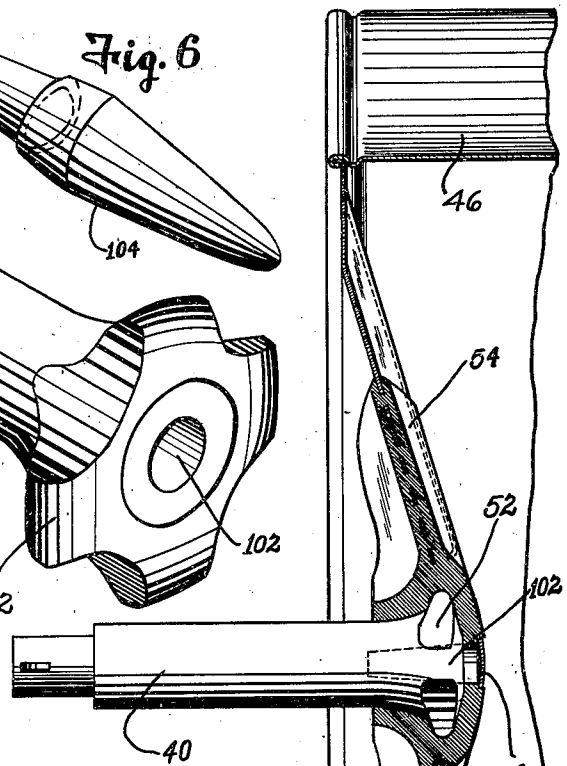


Fig. 2

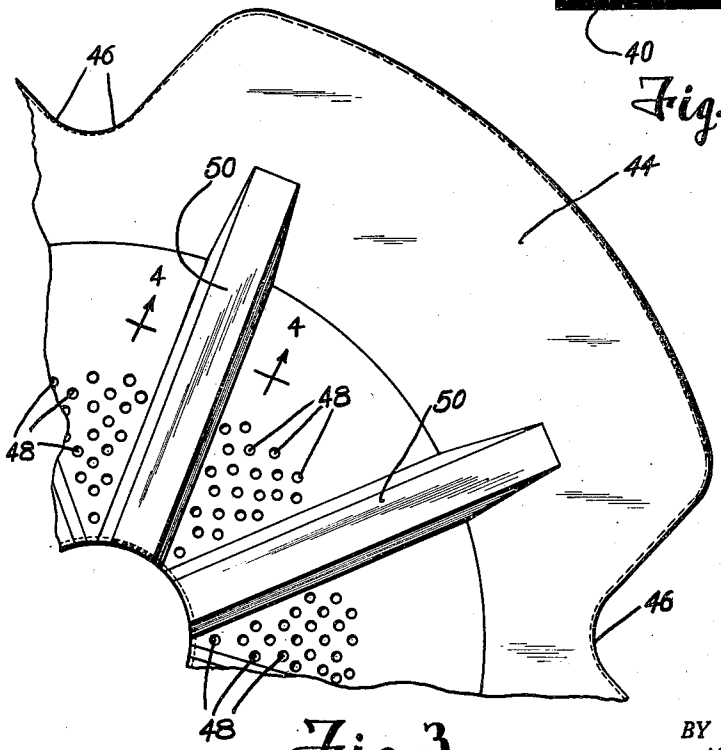
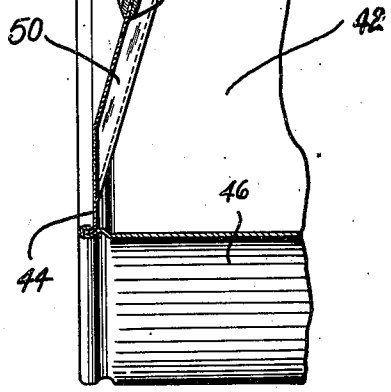


Fig. 3



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WASHING MACHINE ROTOR

Filed March 6, 1937 3 Sheets-Sheet 3

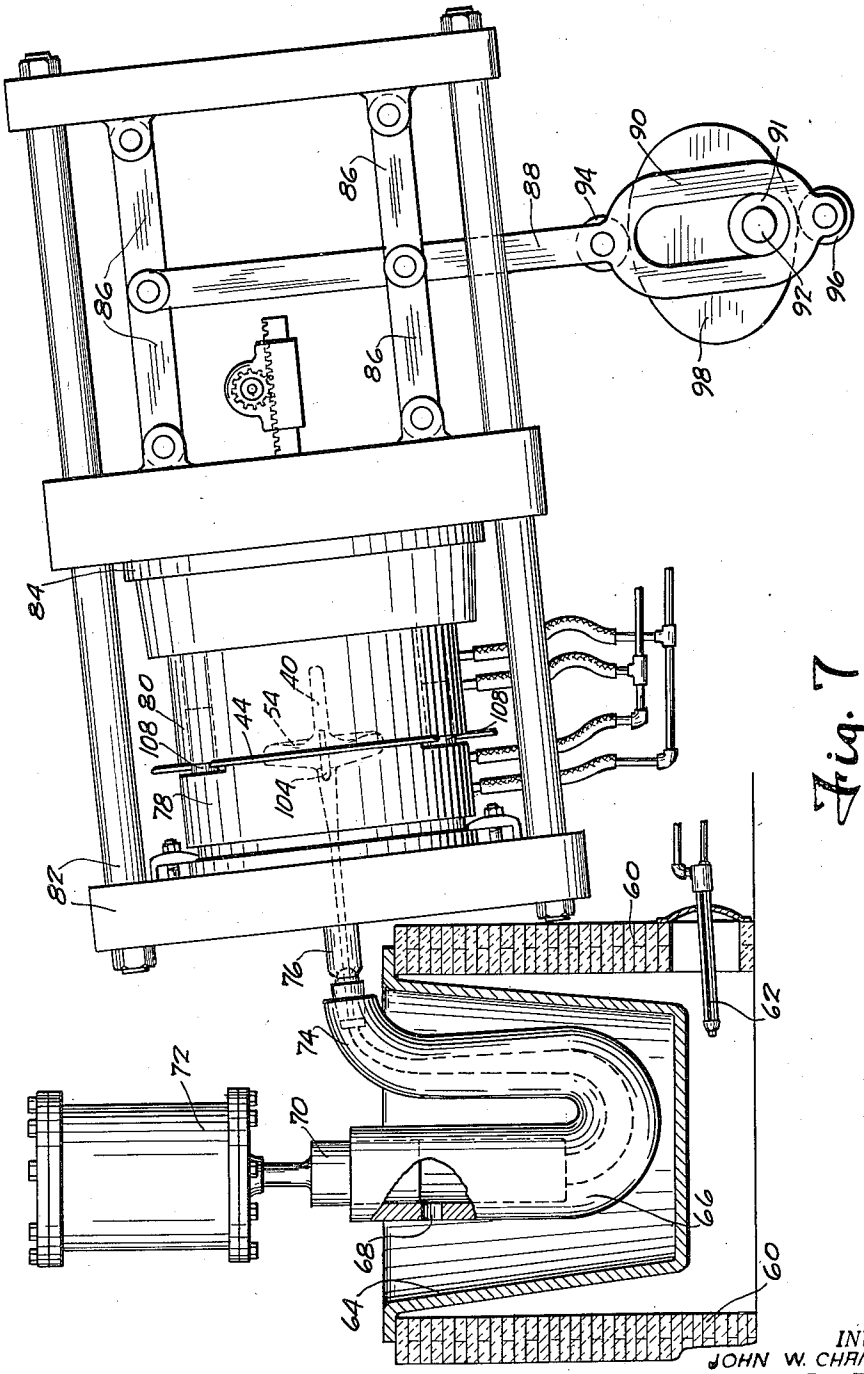

Fig. 7

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2,191,607

UNITED STATES PATENT OFFICE

2,191,607

WASHING MACHINE ROTOR

John W. Chamberlin and Rex Earl Bassett, Jr., South Bend, Ind., assignors to Bendix Home Appliances, Inc., Detroit, Mich., a corporation of Delaware

Application March 6, 1937, Serial No. 129,430

3 Claims. (Cl. 287—20)

This invention relates to the structure and manufacture of rotatably driven units such as the rotors of washing machines, and is illustrated as embodied in the rotatable horizontal clothes drum of an automatic cyclically-operated washing machine.

An object of the invention is to secure accurate alinement of the body and shaft parts of a rotor of this character, which is intended to be driven at a fairly high speed, and where consequently such accurate alinement and balance of the parts is very important.

To this end, we insure the desired accuracy by carefully positioning the head of the rotor, and an attaching portion on the end of its shaft, in a die and then casting metal in the general form of a disk in which is imbedded the central zone of the rotor head and the end of the shaft. The shaft is preferably formed with a non-circular attaching portion on the end which goes in the die and the rotor head may be perforated and may have ribs pressed therein, to insure a strong joint with the body of cast metal.

The above and other objects and features of the invention, including various novel arrangements and desirable constructions of the parts of the rotor, will be apparent from the following description of the washing machine, and the apparatus for making the rotor, shown in the accompanying drawings, in which:

Figure 1 is a vertical section through the washing machine;

Figure 2 is a partial vertical section, on a larger scale, through the head of the washing machine rotor, with its shaft shown in side elevation;

Figure 3 is a partial rear elevation of the rotor body, showing the head before it is attached to the shaft;

Figure 4 is a partial section on the line 4—4 of Figure 3, showing one of the ribs in the rotor head;

Figure 5 is a perspective view of the shaft;

Figure 6 is a partial view of a pin which fits into a recess in the end of the shaft during the die-casting operation; and

Figure 7 is a front elevation of die-casting apparatus used in connecting the shaft and the rotor head.

Figure 1 shows a washing machine having a rotor constructed according to the present invention, the machine being of the automatic type described and claimed in our application Serial No. 129,429, filed concurrently herewith, and being constructed (except as further described below) substantially as described and claimed in application Serial No. 129,412, filed concurrently herewith by Adiel Y. Dodge.

This machine includes a base 10 provided with saddles 12 supporting a horizontal cylindrical tub 14 having an opening in its front provided with a clothes door 16, and having secured to its rim at the rear of the machine two oppositely-dished disks 18 and 20 provided at their centers with alined bearings for the rotor shaft described below. The machine may be inclosed in a casing made up of suitable panels 22, the top one of which is shown provided with a soap door 24.

The tub 14 is provided with a suitable drain 26. The tub 14 may be secured to the saddles 12 in any desired manner, as for example by straps 28. It may be covered with suitable heat and sound insulating material 30. The saddles 12 support a drive unit, shown as including an electric motor 32, rigid with and drivably connected to a two-speed transmission 34 driving, through a belt 36 or the like, a pulley 38 keyed on the rotor shaft 40.

The present invention has more particularly to do with the construction and manufacture of the clothes drum or rotor carried by the shaft 40 and arranged within the tub 14. In the form illustrated, this rotor includes a generally cylindrical perforated horizontal body 42, having a front opening for the insertion of clothes, and having a head 44 extending across its rear side, and formed with baffles 46 (for example four in number, 90° apart) pressed into its periphery.

The central zone portion of the head 44 may be provided with perforations 48, and may have channel-section ribs 50 pressed therein, and the shaft 40 may be forged or otherwise formed with a non-circular attaching portion 52. These constructions are designed to make the strongest possible joint with a generally disk-shaped body 54 of cast metal in which the attaching portion 52 and the ribbed and perforated central zone of the rotor head 44 are imbedded, and which forms the connection between them.

The described joint between the shaft and the rotor body is preferably die-cast in apparatus of the type illustrated in Figure 7. This apparatus includes a suitable furnace 60 heated by a burner 62, or the equivalent, and supporting a container 64 of molten metal, as for example a zinc alloy. The metal is forced into the die by means such as a pump including a cylinder 66 having an inlet port 68, and a piston 70 operated by a compressed-air power unit 72. The cylinder 66 has a discharge spout 74 communicating with an inlet fitting 76 at the die.

The die consists of two parts 78 and 80, the former of which is clamped to one end of a supporting frame 82 and carries the inlet fitting 76. The part 80 of the die is carried by a slide 84 mounted in the frame 82 and moved, to open and close the die, by means such as toggles 86 operated by a link 88 provided with a yoke 90 embracing a roller 91 on a power-driven shaft 92 and having two cam-follower rollers 94 and 96 embracing between them a cam 98 driven by the shaft 92. The die is provided with the usual "knock-out pins", operated by an ejector shown as reciprocated by a power-driven rack and pinion.

The die sections 78 and 80 are formed with their respective parts of the recess for the casting of the metal body 54, in the usual manner, and the die section 80 is provided with a recess receiving the shaft 40. In order to insure even distribution of the metal during casting, the shaft 40 is formed at its end with a recess 102 into which fits one end of a conical spreader pin 104 which extends into the metal inlet in the die section 78. After the joint is formed, and the rotor is removed from the die, the spreader pin 104 is removed, and the recess it forms may be closed by a Welch plug 106 or the like.

The die sections 78 and 80 may have the usual locating pins 108, preferably arranged to come within the outlines of the channels forming the baffles 46.

The joint may be formed between the shaft and the rotor head 44 before the latter is secured to the rotor body, if desired, as shown in Figure 7.

While one particular rotor, and a particular die-casting apparatus, have been described in detail, it is not our intention to limit the scope of the invention by that description, or otherwise than by the terms of the appended claims.

We claim:

1. In a rotor construction, a rotor body having a transverse head formed with a perforated zone around its center, a shaft arranged coaxially with respect to said body and having at one end an attaching portion of non-circular outline arranged substantially at the center of said head, and a generally disk-shaped body of cast metal in which said attaching portion and at least the perforated zone of said head are imbedded, with the cast metal extending through the perforations in said head.

2. In a rotor construction, a rotor body having a transverse head at one end, a shaft arranged coaxially with respect to said body and having at one end an attaching portion arranged substantially at the center of said head, and a generally disk-shaped body of cast metal in which said attaching portion and at least the central portion of said head are imbedded, said head having radially-extending ribs pressed therein and which are imbedded in said body of cast metal.

3. In a rotor construction, a rotor body having a transverse head formed with a perforated zone around its center, a shaft arranged coaxially with respect to said body and having at one end an attaching portion of non-circular outline arranged substantially at the center of said head, and a generally disk-shaped body of cast metal in which said attaching portion and at least the perforated zone of said head are imbedded, with the cast metal extending through the perforations in said head, the perforated zone of said head having radially-extending ribs pressed therein and which are imbedded in said body of cast metal.

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