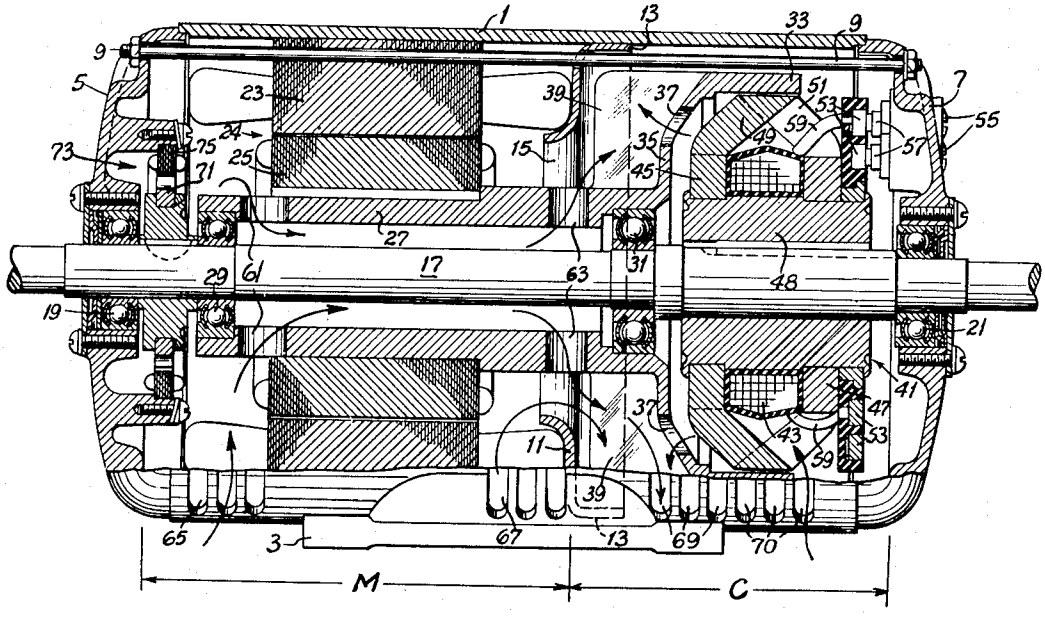
Nov. 8, 1955 R. L. JAESCHKE 2,723,356

CONTROLLED MOTOR-DRIVE UNIT

Original Filed Feb. 9, 1953



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United States Patent Office

2,723,356

Patented Nov. 8, 1955

2,723,356

CONTROLLED MOTOR-DRIVE UNIT

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Original application February 9, 1953, Serial No. 335,920, now Patent No. 2,702,872, dated February 22, 1955. Divided and this application January 18, 1954, Serial No. 404,494

4 Claims. (Cl. 310—59)

This invention relates to controlled motor-drive units, and with regard to certain more specific features, to such a unit incorporating an adjustably controlled magnetic coupling, being an improvement upon the electrical control apparatus shown in Anthony Winther U. S. Reissue Patent 22,432, dated February 1, 1944.

This application is a division of my copending application Serial No. 335,920, filed February 9, 1953, for Controlled Motor-Drive Unit, eventuated as Patent 2,702,872, dated February 22, 1955.

Among the several objects of the invention may be noted the provision of a low-cost electrically controlled motor-drive unit particularly applicable (though not limited to) fractional horsepower ratings such as from approximately ¼ to 1½ hp. which, due to an improved cooling arrangement for its motor and coupling components, is more compact in size and reliable in performance with a lower temperature rise than heretofore. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter descrbed, the scope of the invention being indicated in the following claims.

In the accompanying drawing, in which several of various possible embodiments of the invention are illustrated, the single figure is an axial section through physical apparatus embodying the invention.

Referring now more particularly to the drawing, there is shown a motor-coupling unit consisting of a sleeve 1 mounted upon a base 3. Attached to the sleeve 1 are end bell enclosures 5 and 7, held in place by draw bolts, one of which is indicated at numeral 9. The internal cylindric chamber formed by the parts 1, 5 and 7 is divided by means of a round septum 11 which incorporates a flange 13 for fastening it to the inside of the sleeve 1. The septum is formed with a throat 15. Thus is formed a motor compartment M and a coupling compartment C. A shaft 17 is mounted upon bearings 19 and 21 in the end bells 5 and 7, respectively. The sleeve 1 in motor compartment M supports the stator 23 of a motor 24. This motor may be single or polyphase and of the capacitor-start-capacitor-run or capacitor-start-induction-run types, depending upon the particular application desired.

The rotor 25 of the motor 24 is keyed to hollow quill 27, the latter being carried upon bearings 29 and 31 on the shaft 17. Bearing 29 is in the motor compartment M and bearing 31 is in the coupling compartment C. In the coupling compartment the quill 27 carries a magnetizable (iron) inductor drum 33. This drum, with its connection 35 to the quill, forms a cup in the base of which are located air-circulating openings 37. Between the connection 35 and the quill 27 are impeller ribs 39, which form combined fan impeller blades and heat-radiating fins. These fins are closely adjacent to the septum 11, through the throat 15 of which passes the quill 27. The base of the cup (in which are the openings 37) and the septum 11 (in which is the opening 15)

form lateral enclosure walls around the impeller constituted by the ribs 39.

Keyed to the shaft 17 in the coupling compartment C is a magnetizable (iron) field member 41 made generally according to the construction shown in my U. S. Patent 2,606,948, dated August 12, 1952. This field member has an annular field coil 43 flanked by pole spiders 45 and 47 located on a hub 48. The spiders have interdigitated pole-forming teeth 49 and 51. Collector rings 53, served by outside connections 55 through brushes 57, serve to excite the coil 43 through leads 59. Brushes 57 are mounted in the end bell 7. Upon exciting the coil 43, a toroidal flux field passes through the members 45, 47, 48, 49, 51 and 33. Upon rotation of the drum 33 relative to the poles 49 and 51, eddy currents will be generated in the drum which form a reactive magnetic field with respect to that emanating from the poles 49 and 51, thus tending to drive the field member 41 with some rotary slip, which is in an inverse relationship to the field strength as determined by the ampere turns of coil 43. Since the motor 24 drives the quill, which is responsible for rotation of the drum 33, the field member 41 and hence the shaft 17 will be driven with slip, at an angular velocity depending upon the load on the shaft 17 and the excitation of coil 43. The driving action is accompanied by heating of the drum 33 induced by the eddy currents therein.

In order (1) efficiently to dissipate the drum heat, (2) to reduce the temperature rise of the motor 24, and (3) to cool the bearings 29 and 31, I provide sets of openings 61 and 63 in the quill 27, and two groups of air inlets 65 and 67 in the motor compartment M and a set of air outlets 69 in the coupling compartment C. By means of the centrifugally operating impeller blades 39, fresh air is drawn through the inlets 65 and 67. The cool air which enters at 65 passes through the quill and out its opening 63. The motor stator and field assembly 23, 25 acts as a diaphragm enforcing this flow of air through the quill 27, thus abstracting heat from the core of the machine, which is usually difficult to accomplish. The cool air which enters at 67 passes through the throat 15. All of this air ultimately passes out of the outlets 69, and some will be drawn into inlets 70 to circulate around the inductor drum 33, around the poles 49 and 51 and through the openings 37, finally to escape from said outlets 69. The direction of air flow is suggested by the arrows. The cooling thus effected is such that substantial savings may be made in the sizes of the parts for a given temperature rise, which renders the unit compact. As referred to in the appended claims, openings 65 are first inlet openings adjacent the first (left) end of the casing 1, 5, 7; openings 70 are second air inlet openings adjacent the second (right) end of the casing; openings 69 are third and intermediate outlet openings in the casing; and openings 67 are additional inlet openings between the motor members 23, 25 and the septum 15.

The end bells 5 and 7 are nonmagnetic (aluminum, for example) to prevent completion of any magnetic circuit through either of the bearings 19 or 21. This considerably extends their lives. Also, carried on the left end of shaft 17 (between the end bell 5 and the left end of quill 27) is the magnetic polar field member 71 of an A. C. generator 73. The stator 75 of this generator 73 is bolted to the end bell 5. The bearings 19, 21, 29 and 31 are of the type which are lubricated and sealed for life, so that they are incapable of allowing passage therethrough of any air.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above con-

structions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A motor-coupling unit comprising a casing, a rotary shaft mounted in the casing, a relatively rotary quill mounted on the shaft, a motor field member mounted on the quill toward a first end of the casing and a motor stator member within the casing surrounding said motor field member, a coupling field member mounted on the shaft and located toward the other and second end of the casing, an inductor cup carried by the quill, the base of the cup forming separating means in the casing between the said two field members and having openings connecting its inside and outside, the coupling field member on the shaft being contained inside the cup, an air impeller connected with the outside of the cup base adjacent the openings therein, said quill having air-circulating openings on opposite sides of the motor field member, said casing having a first inlet on the side of the motor field member adjacent the first end of the casing and a second air inlet opening adjacent its second end supplying air to the inside of the cup, the casing having a third and intermediate outlet opening opposite said impellers, whereby air driven by the impellers through the intermediate outlet opening is supplied by the first air inlet opening to flow through the quill by way of openings therein and also through the gap between the motor field and stator members, and whereby air is supplied by the second air inlet opening for flow into the cup and over said coupling field member and through said openings in the cup base to said outlet.

2. A motor-coupling unit made according to claim 1, including an additional air inlet opening in the casing between the motor members and the impeller.

3. A motor-coupling unit made according to claim 1, including a septum in the casing located between said motor members and said impeller, said septum forming an opening around the quill, said cup base and septum forming lateral enclosure means around the impeller.

4. A motor-coupling unit made according to claim 3, including additional inlet openings in the casing between the motor members and the septum.

References Cited in the file of this patent

UNITED STATES PATENTS

2,411,781	Fell	Nov. 26, 1946
2,630,466	Landis	Mar. 3, 1953