J. P. BETHKE AND R. H. STEARNS.

MAGNETIC PULLEY.

APPLICATION FILED JAN. 22, 1920.

1,387,879. Patented Aug. 16, 1921.

Fig. 1.

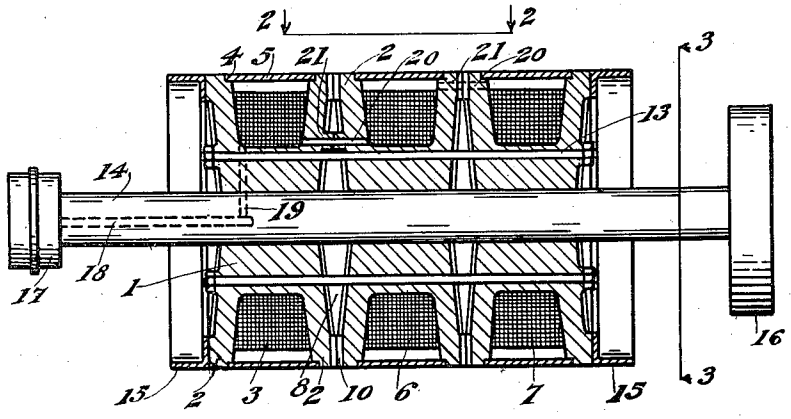


Fig. 2.

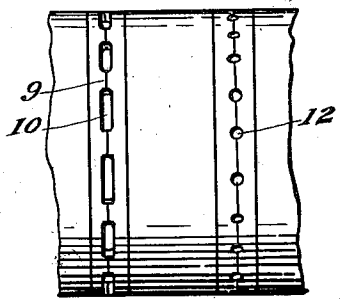
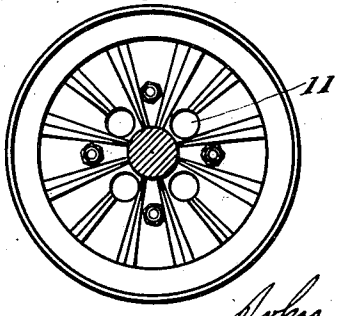


Fig. 3.



Witness

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UNITED STATES PATENT OFFICE.

JOHN P. BETHKE AND ROSWELL H. STEARNS, OF MILWAUKEE, WISCONSIN, ASSIGNORS TO MAGNETIC MANUFACTURING CO., OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN.

MAGNETIC PULLEY.

1,387,879. Specification of Letters Patent. Patented Aug. 16, 1921.

Application filed January 22, 1920. Serial No. 353,345.

To all whom it may concern:

Be it known that we, JOHN P. BETHKE and ROSWELL H. STEARNS, citizens of the United States, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Magnetic Pulleys, of which the following is a specification.

This invention relates to magnetic pulleys.

One of the objects of this invention is to produce a magnetic pulley having a high rate of cooling, or radiation, and having a high flux density.

Other objects are to produce a magnetic pulley in which the interior portions of the pulley are adapted to have air circulate therethrough; in which the various openings are intercommunicating to facilitate the circulation of air: and in which the inner surfaces are fluted, or ribbed, to present a greater radiating surface to the circulating air.

Other objects of this invention are to provide a magnetic pulley in which a high current density may be used, thereby producing a magnetic pulley having increased power and a smaller temperature rise than has heretofore been possible.

This invention is an improvement upon that disclosed in the earlier application of Roswell H. Stearns for magnetic pulleys, filed Dec. 30, 1919, Serial Number 348,442. The subject matter claimed in the above identified application is hereby disclaimed.

In the drawing:

Figure 1 is a longitudinal sectional view through the magnetic pulley.

Fig. 2 is a view looking downwardly upon the pulley in the direction indicated at 2—2, in Fig. 1.

Fig. 3 is a sectional elevation taken upon the line 3—3 of Fig. 1.

The magnetic pulley comprises a plurality of elements each comprising a core 1 and integrally formed pole flanges 2 which together constitute, in effect, a magnetic spool. Upon this spool is wound the exciting coil 3. The opposed portion of the pole flanges 2 are provided with grooves 4 into which fit the corners of a non-magnetic protecting rim 5 which closes the spool and protects the winding from injury. The direction of the current in the coils 3, 6 and 7 of the successive members alternates, that is to say, this current travels in reverse directions in adjacent coils, thereby producing consequent poles between the coils. On the outer faces, or ends, of these magnetic spools, concavities are formed which when two spools are placed together, form an opening 8 of material size. The ends of the spools are also radially fluted so as to form a large radiating surface to facilitate the cooling of the pulleys. The pole pieces 2 are formed upon their outer sides with projecting lugs 9 which are adapted to abut thereby forming openings 10 between the pulleys along their faces or periphery. These openings 10 communicate with the openings 8 and aid in securing proper ventilation and cooling of the pulleys. The pulleys are further provided with openings 11 (Fig. 3) which extend longitudinally of the pulley and serve to connect the openings 8 to further increase the circulation of air.

In place of the above construction, the pole pieces 2 may be provided with flanges which abut when the magnetic spools are in assembled position. These flanges may be subsequently drilled through at 12 which will thereby produce openings equivalent to the openings 10. A further arrangement could be secured by securing each spool separately upon the shaft and at a slight spacing from each succeeding spool whereby air passages will be formed from the outer side between the pulleys.

These magnetic pulleys may be bolted together by through bolts 13 to thereby form a rigid unitary structure, or they may be secured separately upon the shaft 14 by means of keys. The end portions of the pulley are equipped with non-magnetic flanged rings 15 which prevent material from sticking to the outer pole faces and interfering with the operation of the pulley.

The shaft may be driven by means of a pulley 16 at one end thereof. Upon the other end of the shaft slip rings 17 may be provided which are in electrical connection with the exciting coils by means of conductors passing through the conduit 18, 19 formed in the shaft and through one or more of the pulleys. The windings formed on the different pulleys are connected together by means of conductors 20 which

are insulated from the pulleys and pass through abutting projecting lugs 21 formed upon the pulleys.

It will be seen that a magnetic pulley is produced in which ample radiating surface is provided not only at the ends of the pulley but throughout its entire extent so that the heat from the coil is not stored, nor is it passed on to the next coil, or along the body of the pulley. Each coil is supplied with individual heat radiating means. Further, by the increased radiation, an increased current density may be employed and by this increased current density and by the increased area of magnetic path, free from joints, an increased total flux may be secured.

We claim:

1. A magnetic pulley comprising a shaft, a plurality of separate magnetic elements each independently supported from said shaft, said elements being so related that circulation of air therebetween is secured.

2. A magnetic pulley comprising a plurality of magnetic elements, each element comprising a core, pole flanges extending therefrom, each of said elements having concave fluted ends.

3. A magnetic pulley comprising a plurality of separate magnetic elements, each element comprising a core, diverging flanges extending from the ends of the core, thereby forming a magnetic spool with concave ends, the flanges of adjacent elements contacting at separated points around the periphery, whereby air passages are formed from the outside communicating with the spaces formed by adjacent concavities.

4. A magnetic pulley comprising a plurality of separate magnetic spools having concave, fluted ends, said spools being arranged with their axes in alinement, whereby spaces are formed between adjacent spools by the concavities.

5. A magnetic pulley having a plurality of elements arranged in axial alinement, each element comprising a solid magnetic spool having a shallow annular groove formed therein, an exciting winding in said groove, and means for separately cooling each element, whereby a high current density may be employed and a large magnetic flux produced.

6. A magnetic pulley comprising a shaft, a plurality of magnetic spools mounted thereon, said spools having adjacent concave ends and a plurality of openings connecting the concavities, thereby providing free circulation of air about each spool.

In testimony whereof we affix our signatures in the presence of two witnesses.

JOHN P. BETHKE.
ROSWELL H. STEARNS.

Witnesses:
O. C. WEBER,
A. R. WOOLFOLK, Jr.