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BY A. P. C.

A. RYBA

ELECTROMAGNETIC MULTIPLE-DISC CLUTCH

Filed Dec. 9, 1939

Serial No.
308,479

2 Sheets-Sheet 1

Fig. 1

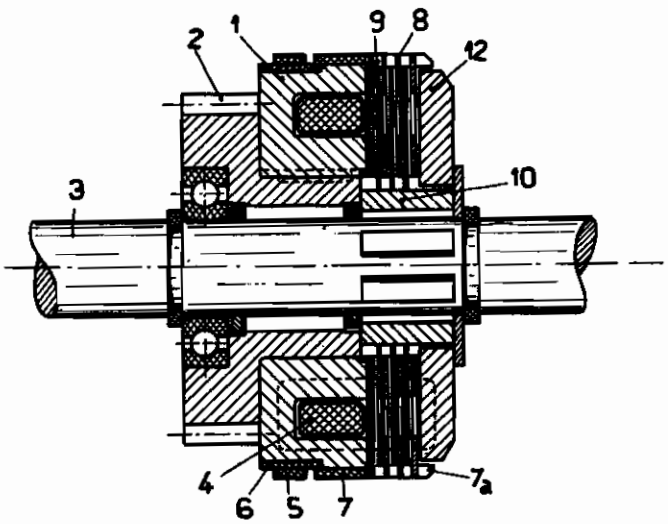
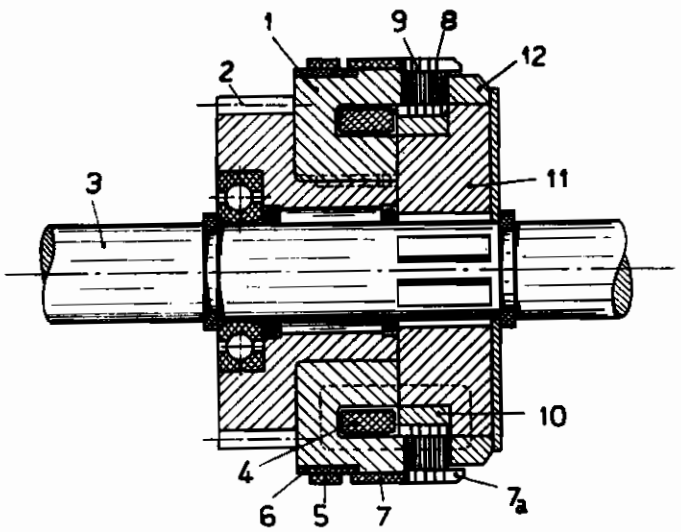


Fig. 2



Inventor;
A. Ryba

by Glascock Downing & Seibold
Attys.

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Fig. 3

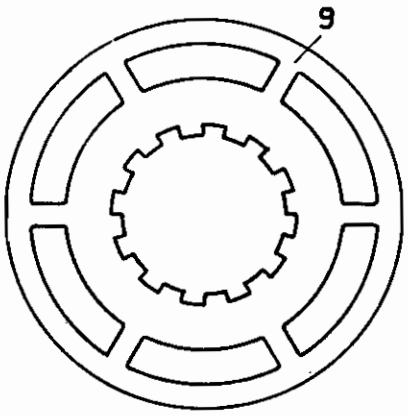


Fig. 4

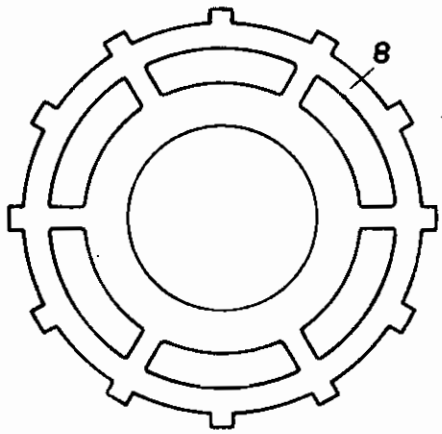


Fig. 5

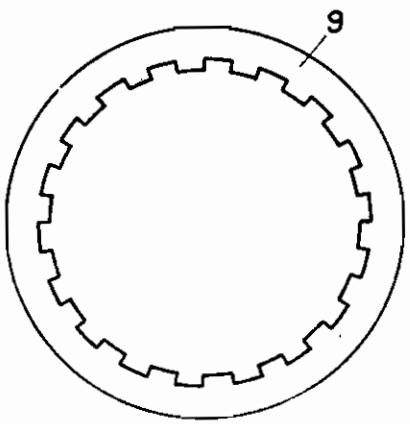
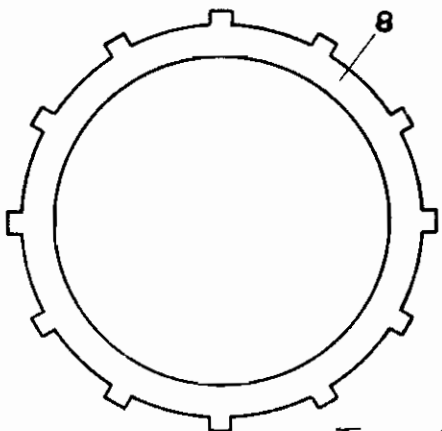


Fig. 6



Inventor;
A. Ryba
By: Mascock Downing & Seebold
Attys.

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ALIEN PROPERTY CUSTODIAN

ELECTROMAGNETIC MULTIPLE-DISC CLUTCH

Anton Ryba, Bolzano, Italy; vested in the Alien Property Custodian

Application filed December 9, 1939

The present invention relates to electromagnetic multiple-disc clutches particularly adapted for use in the gearing of motor vehicles.

Clutches of this kind hitherto were not adapted to fulfil practical requirements owing to too small specific efficiency, too small durability and annoying remanence phenomena,.

The object of my invention which is a continuation in part of my copending U. S. Application Ser. No. 176,339 filed November 24, 1937 for "Electromagnetic multiple-disc clutches" is to provide an electromagnetic multiple-disc clutch which obviates the above mentioned deficiencies. To this purpose my clutch is provided with discs consisting of ferromagnetic material tempered to about 40 degrees Rockwell, said discs being so thin that on a magnetic force acting upon them they elastically yield and mutually are shifted to perfectly bear against each other. I have found that on cutting out the current such thin and tempered discs mutually disengage without any remanence action and that such discs, moreover, have the required resistance to wear to render the clutch usable to the highest degree for all practical purposes.

Discs made as explained above may be used in clutches in which the magnetic flux once only traverses the set of discs in an axial direction as well as in clutches in which the magnetic flux traverses the discs twice in an axial direction. In the latter case the discs in the annular zone of the exciting coil are provided with a number of perforations.

Ferromagnetic materials suitable for the manufacture of the clutch discs are well known. For instance I have found that kinds of steel having about O, 7% carbon, O, 25% silicon, O, 5% manganese and some thousandths of sulphur and phosphorus are extremely suitable.

To direct the magnetic flux mainly in an axial direction through the discs a notched sleeve of non-magnetisable material is provided into which engage the inner discs.

To reduce as far as possible the losses due to idle running of clutches running in oil, the use of well known means is recommended, for instance deforming the discs by means of hollow presses, corrugating or simply bending or inserting of resilient members.

In the accompanying drawings some constructions of clutches according to the invention are shown by way of example.

In these drawings:

Fig. 1 is a longitudinal section through a clutch in which the magnetic flux twice traverses the set of discs,

Fig. 2 shows a longitudinal section through a clutch in which the magnetic flux only once traverses the set of discs,

Fig. 3 is a view of an inner disc of the clutch according to Fig. 1.

Fig. 4 is a view of an outer disc of the clutch illustrated in Fig. 1,

Fig. 5 is a view of an inner disc of the clutch shown in Fig. 2, and

Fig. 6 is a view of an outer disc of the clutch illustrated in Fig. 2.

As may been seen from the drawings, the electromagnet 1 is connected to a gear wheel 2 which is rotatably mounted upon the shaft 3. In the concentrical annular space of the electromagnet 1 an exciting coil 4 is inserted the terminals of which are connected to mass on the one hand and to a slip-ring 5 on the other hand. The latter is pressed upon the electromagnet 1 and an insulating layer 6 being interposed between the ring 5 and the electromagnet 1. Also fixed upon the electromagnet 1 is a ring 7 which is provided with projections or dogs 7a cooperating with the outer discs 8. The inner discs 9 engage into a notched sleeve 10 consisting of a preferably non-magnetisable material. This sleeve in the construction shown in Fig. 1 is directly connected to the shaft 3, whereas said sleeve in the construction shown in Fig. 2 is fixed to a ferromagnetic sleeve 11. The latter is connected to the shaft 3 and at a point of contact with the armature 12 its outer diameter is as large as that of the non-magnetic sleeve 10. The armature 12 serves as return path for the magnetic flux. The discs shown in Figs. 3 and 4 belong to the clutch illustrated in Fig. 1 and in the annular zone of the exciting coil are provided with a row of perforations. The discs shown in Figs. 5 and 6 belong to the clutch illustrated in Fig. 2 and are formed as simple narrow rings.

If current traverses the coil 4 a magnetic field is produced in the sense of the dotted line which traverses the discs and causes the thin tempered discs to perfectly bear against each other, whereby the two members of the clutch are connected together by friction. On cutting out the current the remanence is opposed by the multiple subdivision of the set of discs, the low thickness of the discs as well as the elastic reaction of the discs.

ANTON RYBA.