PUBLISHED
MAY 11, 1943.
BY A. P. C.

M. HASIMOTO
METHOD OF MANUFACTURING CLUTCH DISCS FOR AIRPLANES
Filed Sept. 28, 1940

Serial No.
358,825

Fig. 1

Fig. 2

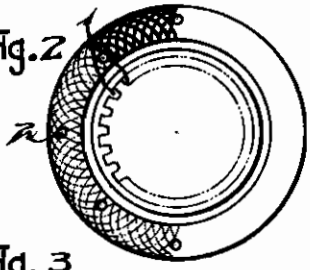

Fig. 3

Fig. 4

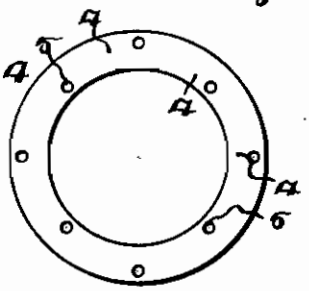

Fig. 5

Fig. 6

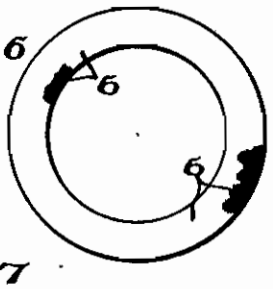

Fig. 7

Fig. 9

Fig. 10

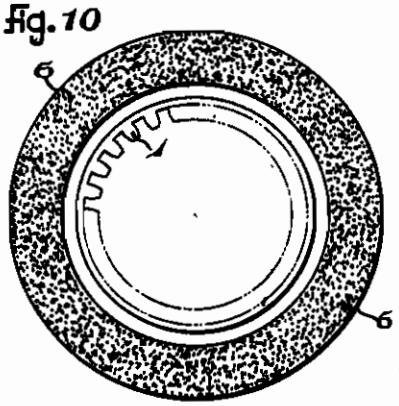

Fig. 8

Inventor

MASAYOSI HASIMOTO,

By Antonio Michaelson
Attorney

Published May 11, 1943

Serial No. 358,825

ALIEN PROPERTY CUSTODIAN

METHOD OF MANUFACTURING CLUTCH DISCS FOR AIRPLANES

Masayosi Hasimoto, Azabu-ku, Tokyo, Japan;
vested in the Alien Property Custodian

Application filed September 28, 1940

This invention relates upon the method of manufacturing clutch discs for airplanes. The advantage of this invention is to get the method of manufacturing the clutch disc which is constructed as follows: First corrode both surfaces of a stell clutch plate with a certain chemical and then drill holes through it. Next, coat it with phthalic hydride resin. Between the friction plate made of the asbestos cloth which is impregnated with phenolic resin having caustic soda as its catalyser and the clutch plate coated with phthalic phdride resin, insert an adhesive layer consisting of a sheet of asbestos paper which is impregnated with phenolic resin having ammonia as its catalyser. The friction plate, the asbestos paper, and the clutch plate are then tightly bound together by means of a piece of asbestos string, and heated and compressed in a mould of suitable shape so as to have the friction plate adhered firmly on the clutch plate.

The main object of this invention is to get the method of manufacturing the clutch disc suitable for use in clutching on or off the shaft of an engine which is rotating at an extremely high speed, within oil or in a very small space such as in airplanes.

The accompanying drawings show an example of applications of this invention:

Fig. 1 shows the front view of the cross-section of a part of the clutch plate.

Fig. 2 shows the plane view of the same.

Fig. 3 shows the front view of the longitudinal cross-section of the adhesive layer.

Fig. 4 shows the plane view of the same.

Fig. 5 shows the front view of the longitudinal cross-section of the friction plate.

Fig. 6 shows the plane view of the same.

Fig. 7 shows the front view of the cross-section of the clutch disc as assembled.

Fig. 8 shows the front view of the longitudinal cross-section of a part of the clutch disc constructed in accordance with this invention.

Fig. 9 shows the front view of the cross-section of a part of the completed clutch disc constructed in accordance with this invention.

Fig. 10 shows the plane view of the same.

The most advantage of this invention is to get the method of manufacturing the clutch disc for use in airplanes which is capable of being used for heavy load, at high speed, and within a very small space.

One example of applications of this invention is shown in the accompanying diagrams:

First, both surfaces and sides of the steel clutch plate **3** are corroded with a certain chemical and holes **2** are drilled through it. Second, the adhesive layer **4** is obtained by impregnated a sheet of soft asbestos paper with phenolic resin having ammonia as its catalyser and holes **5** are drilled through it. Third, the friction plate **6** is obtained by impregnating and drying a circular asbestos cloth of uniform cross-section with phenolic resin having caustic soda as its catalyser. Fourth, phthalic hydride resin is coated on the corroded parts of the clutch plate **3** on its both surfaces, and the adhesive layer **4** and the friction plate **6** are placed on each surface of the clutch plate. The clutch plate **3**, the adhesive layer **4**, and the friction plate **6** are then bound tightly together by means of a piece of asbestos string through holes **2** and **5**. Fifth, the clutch disc thus assembled is placed in a mould of proper shape and heated at a temperature of 180 degrees centigrade and compressed at a pressure of 5 tons per square inch for 2 minutes so as to adhere the friction plates **6** on the clutch plate. Finally the surface of the friction plates on both sides of the clutch plate are ground smooth by means of a grinder in order to obtain a finished product of clutch discs.

The phenolic resin having caustic soda as its catalyser possesses a proper degree of hardness but lacks adhesiveness, while the phenolic resin having ammonia as its catalyser possesses a high degree of adhesiveness but lacks adhesiveness against metal since the oil impregnates into it when heated within oil, though no variation is noticed in resin oil. The phthalic hydride resin possesses adhesiveness and the degree of adhesiveness does not change when heated within oil since the oil does not impregnate into the resin.

Because of the above-mentioned construction, we can expect that the clutch disc manufactured in accordance with this invention has a suitable value of coefficient of friction when used for airplanes and in a room at a temperature of 200 degrees centigrade or its vicinity, or within oil, it withstands for heavy load at high speed; therefore, there is no fear of the friction plate coming apart from the clutch plate.

MASAYOSI HASIMOTO.