

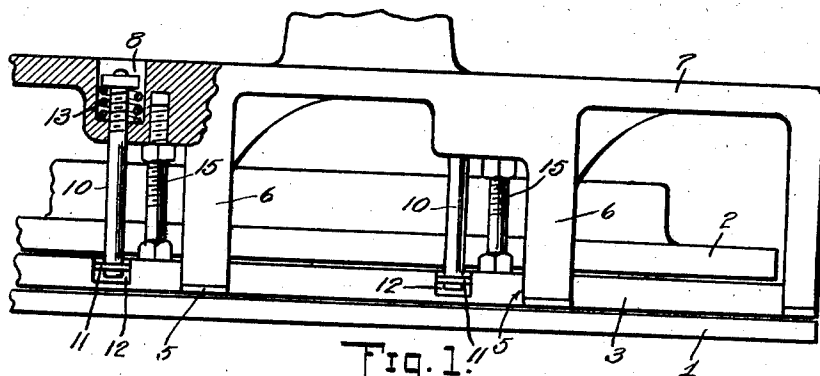
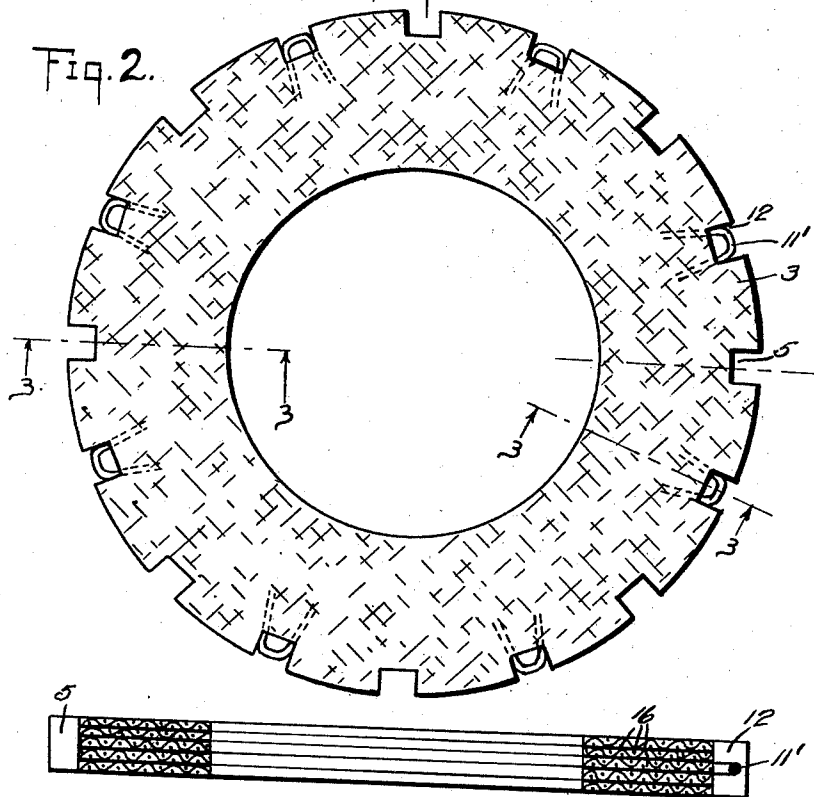
Feb. 20, 1940.

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2,190,767

FRICTION DISK FOR MULTIPLE DISK BRAKES

Original Filed March 12, 1934 3 Sheets-Sheet 1



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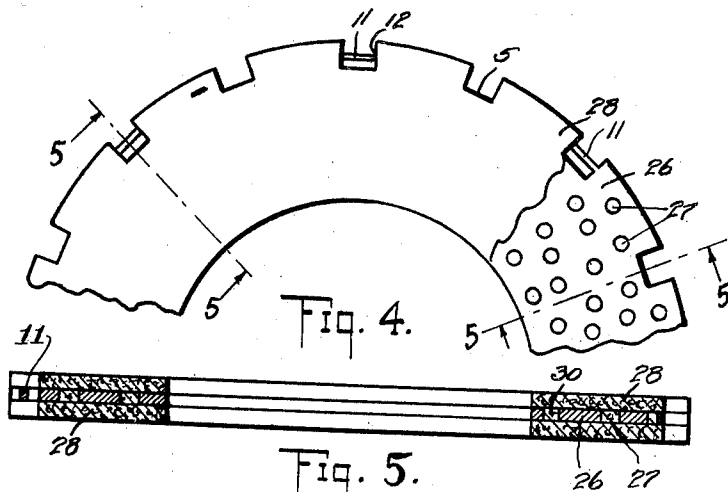
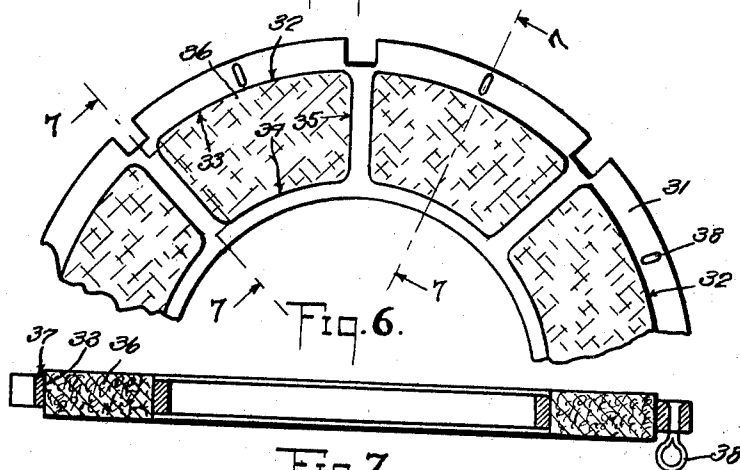
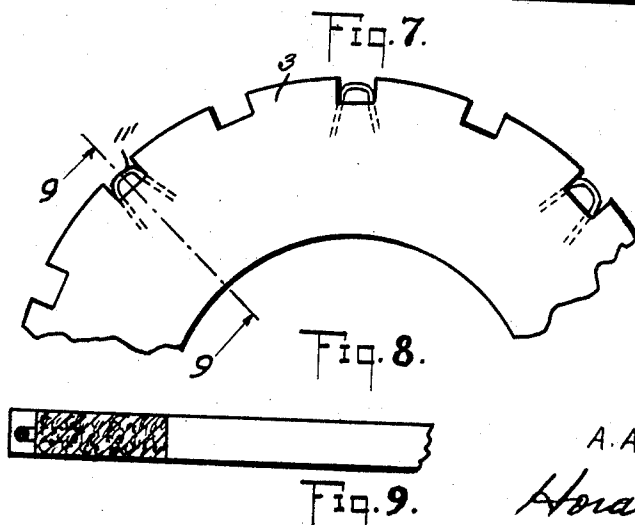
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FRICTION DISK FOR MULTIPLE DISK BRAKES

Original Filed March 12, 1934 3 Sheets-Sheet 2



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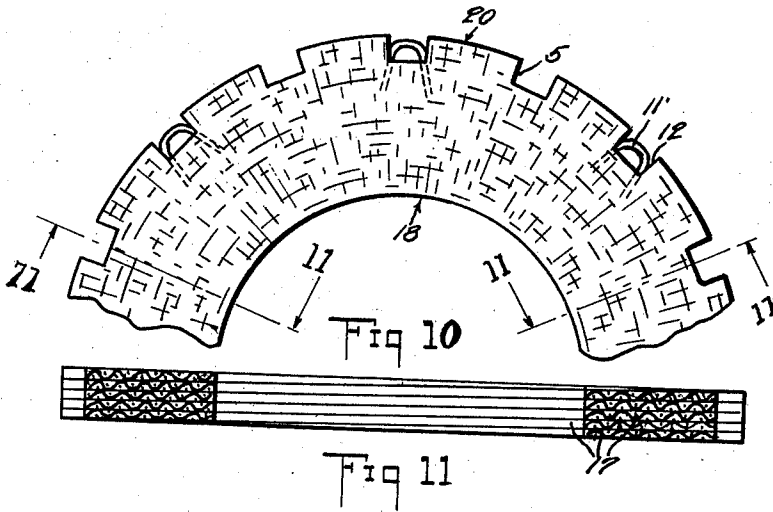
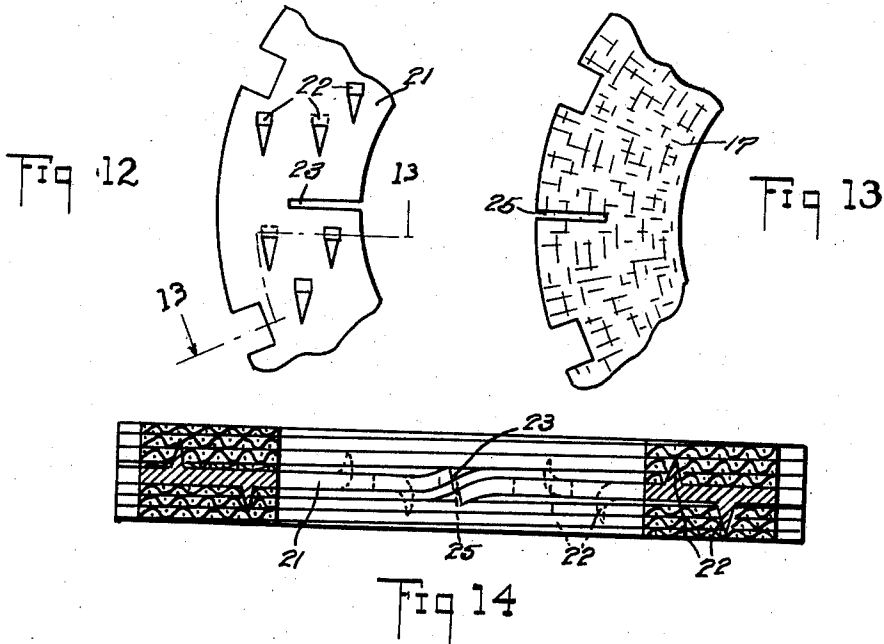
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FRICTION DISK FOR MULTIPLE DISK BRAKES

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UNITED STATES PATENT OFFICE

2,190,767

FRICTION DISK FOR MULTIPLE DISK
BRAKES

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Refiled for abandoned application Serial No.
715,130, March 12, 1934. This application
August 18, 1938, Serial No. 225,623

6 Claims. (Cl. 188-218)

This invention relates to improvements in friction disks for vehicle brakes of the multiple disk type exemplified in my joint application on Brakes, filed in the Patent Office on August 18, 1938, Serial No. 225,624. The subject matter of this application was embodied in my previous application for patent, Serial No. 715,130, filed March 12, 1934, which became abandoned May 13, 1936.

The present invention has for its object the provision of a friction disk for multiple disk brakes as a distinct and independent article of manufacture involving novel features and characteristics in form, structure and composition especially and advantageously adapting the disks to perform the functions peculiar to the friction element of brakes of the class described.

A further object of the invention is to provide a friction disk element of flat annular configuration whose perimeter is formed with substantially rectangular notches to slidably receive key-arms extended from a rotatable part rigid with the wheel and whereby the braking forces applied on the lateral faces of the disk may be efficiently and effectively transmitted to the wheel.

Still further objects of the invention are directed to the structure and composition of the friction disk and their adaptation to the purposes intended, all such objects and advantages being readily apparent in the course of the detailed description to follow.

The accompanying drawings illustrate by way of example representative forms of my invention, in which:

Figure 1 is a fragmentary view in side elevation, partly in section, of a multiple disk brake apparatus, showing an application of my improved friction disk thereto.

Fig. 2 is a plan view of a friction disk embodying my invention.

Fig. 3 is a view in cross section on line 3-3 of Fig. 2.

Fig. 4 is a partial plan view, broken away in parts, of a friction disk similar in form but modified in structure to that shown in Fig. 2.

Fig. 5 is a view in cross section on line 5-5 of Fig. 4.

Fig. 6 is a fragmentary plan view of a further modification of the invention.

Fig. 7 is a view in cross section on line 7-7 of Fig. 6.

Fig. 8 is a fragmentary plan view of another embodiment of the disk.

Fig. 9 is a view in cross section on line 9-9 of Fig. 8.

Fig. 10 is a fragmentary plan view of a modified structure of the disk.

Fig. 11 is a view in cross section on line 11-11 of Fig. 10.

Fig. 12 is a fragmentary plan view of a detached metal element utilized in a still further modification of the invention.

Fig. 13 is a fragmentary plan view, detached, of a portion of the fabric-composition element of the modification shown in Fig. 12.

Fig. 14 is a view in cross section of the combined structure whose elements are illustrated in Figs. 12 and 13.

Referring to said views, wherein similar characters of reference denote similar parts in the several views, and particularly to Fig. 1 illustrating sufficiently for the purposes of showing the application of the friction disk an operative multiple disk brake of the type set forth in said companion application and analogous structures, the reference numeral 1 indicates a non-rotatable plate-member of circular form rigidly secured to the axle-housing, not shown, of an automobile. 2 designates a pressure-plate mounted upon a central hub of the plate-member, meshing spiral screw-threads being formed on the member and plate whereby the pressure-plate may be actuated by the operator of the car in a rotary direction to move axially towards the plate-member and engage a friction disk 3 therebetween. Said disk is formed with slots 5 in its outer perimeter in which key-arms 6 of the outer housing member 7 are slidably received. The housing member is rigidly connected to the wheel and the braking forces applied to the disk are transmitted through the key-arms to the member 7 and the wheel.

The member 7 is formed with a plurality of spaced pockets 8 through which extend short rods 10 engaging with hooked portions at their opposite ends with pins 11 positioned in recesses 12 of the disk. Coil springs 13 in said pockets exert tension upon the rods to draw the disk away from the plate-member when the pressure-plate is withdrawn. Adjacent the rods 10 stop-screws 15 are adjustably secured in the member 7 and extend at their inner ends to serve as stops to limit the outward movement of the disk in response to the pull of the rods 10 and thus the disk is maintained in separated relation from the plates 1 and 2 when the brake is inoperative.

In Figs. 2 and 3 is shown an embodiment of a braking disk of my invention consisting of an

annular body 3 comprised of a plurality of layers 16 of suitable brake-lining material preferably impregnated with a binding material of plastic qualities having a high fusing point. Said material is desirably of relatively open-mesh fabric composed of strands of asbestos with metal wire twisted thereabout. A sufficient number of these layers are superimposed and pressed into a compact disk in the presence of heat and results in a dense and rigid structure having immense strength to withstand the braking strains imposed thereon together with the durability and tenacity required in a braking disk of this type.

Either before or subsequent to the molding of said fabric layers into disk form slots 5 are formed in the periphery of the layers or disk. These slots are symmetrically arranged about the disk and are desirably rectangular in form though the lateral edges may be disposed to approach radial directions if the key-arms 6 are correspondingly formed, the slots being formed to receive the key-arms as closely as is consistent with slidability thereon.

Recesses 12 may be likewise formed in the disk in an analogous manner and may extend entirely through the disk as shown in said views or may extend inwardly from one side through several of the plies of fabric only, as seen in Fig. 1. In Fig. 1 the pins 11 have their ends embedded in the disk material and extend straight across the respective recesses, and in Figs. 2 and 3 take the form of staples 11' or pins that are bent at their ends to extend inwardly of the disk-body.

In Figs. 10 and 11 I illustrate a modified form of the invention similar in most respects to the foregoing example but characterized by being formed of a continuous spirally woven strip 17 of brake-lining material. The composition of the fabric may remain the same as before, that is, composed of strands of twisted asbestos and wire, but the warp-threads are extended radially of a circle approximately of the same diameter as the finished disk and the woof threads extend circularly, the width of the woven strip being substantially that of the body of the disk from the central opening 18 to the outer perimeter 20. When thus laid in a continuous band of material impregnated with an analogous or identical binding material and subjected in a mold to heat and pressure a remarkably strong and durable disk is obtained having no perceptible joints or cleavage between layers.

In Figs. 12, 13 and 14 a further modified form is presented wherein a spirally laid strip 17 of brake-lining material is employed and is combined advantageously with a metal backing-plate 21. In its simpler form the spirally wound strips are arranged in the manner described and then are mounted upon each of the opposite faces of a plate 21 and are further secured thereon in an effective manner by studs 22 extending outwardly from the opposite sides of the plate and into the fabric material, said studs being either applied or extended through the plate as rivets or, as shown, may be integral with the plate and struck out therefrom.

In the form shown, however, a continuous strip of fabric is employed passing from one side of the plate to the other. The plate is formed with a slot 23 extending from the inner perimeter of the plate radially to approximately one-half of the width of the plate. The fabric strip is formed with an opposing incision 25 at its mid-length and extending from its outer perimeter to approximately one-half the width of the strip.

The incision 25 of the strip is then brought to coincide with the slot 23 of the plate and when interfitted the strip will lie symmetrically with respect to the plate, the opposite ends of the strip lying on the opposite sides of the plate. The strip is then coiled on both sides of the plate in the manner shown in Fig. 14 and is continuous and intact with the exception of the incision 25.

In Figs. 4 to 9, inclusive, still further modified forms of my invention are disclosed with relation to the structure and composition of the friction-receiving surfaces, while the configuration of the disks are substantially the same in all instances as well as in those previously described. In Figs. 8 and 9 the disk is preferably formed of a homogeneous structure and may be molded of plastic materials or formed therefrom. Likewise metal or various types of wood or vegetable fibers may be prepared in this form.

In Figs. 4 and 5 a core or backing-plate 26 is provided having apertures 27 therethrough. Plastic friction material 28 is applied upon its opposite sides and under heat and pressure connecting keys or rivets 30 will be forced through such apertures to unite and bond the two friction surfaces together and to the plate. In this form of the invention slots 12 are formed in the plate 26 leaving integral bars thereacross serving the purposes of the pins 11.

In Figs. 6 and 7 a skeleton frame 31 is formed of cast metal of the exterior dimensions and form of the typical disk. Openings 32 are formed therein of any desired contour but preferably as shown having concentric inner and outer sides 33 and 34, and lateral sides 35 directed radially of the disk. Insert pieces or blocks 36 are provided for said openings of approximately exact size to enter therein and of thickness to protrude beyond the planes of the disk-sides 37. Said blocks may be fixed within said openings but preferably are merely pressed therein and allowed to find their natural position through frictional contact of their outer surfaces with the plate braking members 1 and 2 of the brake. In this embodiment eyes 38 are rigidly secured in the outer face of the frame with which the rods 10 are engageable in a manner analogous to the pins 11 to withdraw the disk from the plate-member 1 when the pressure-plate 2 is retracted.

Having described my invention, what I claim, is:

1. As an article of manufacture, a friction disk of the class described, comprising an annular body having opposite parallel plane surfaces, a plurality of spaced transverse slots formed in the outer periphery of the disk, a plurality of recesses formed in the disk intermediate said slots, and pin connections embedded in said disk and extending within said recesses.

2. As an article of manufacture, a friction disk of the class described, consisting of an annulus composed of spirally wound continuous coils of fabric impregnated with a plastic binding material, and compressed to form an integral body having parallel plane lateral surfaces.

3. A friction disk formed in accordance with claim 5, wherein a metal backing plate is introduced in the midthickness of the disk.

4. As an article of manufacture, a friction disk of the class described, consisting of a metal annular backing-plate having a radially directed slot formed therein, and a continuous strip of spirally woven fabric impregnated with a plastic binding material and having an incision in its midlength oppositely corresponding to the slot

in said plate, said strip being coiled upon opposite sides of said plate with said incision and said slot interfitting and compressed to obtain opposite parallel plane surfaces.

5 5. An article of commerce, a friction disk of the class described, comprising an annular body having opposite parallel plane surfaces, a plurality of spaced transverse slots formed in the outer periphery of the disk, and pin-connections

embedded in said disk and extending within certain of said slots.

6. An article of manufacture, a friction disk for disk brakes, comprising a metal plate, friction material secured to the opposite sides of said plate, a plurality of slots formed in the periphery of said plate, and pin-connecting means extending into said slots. 5

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