June 6, 1933. D. E. GAMBLE 1,912,703

DRIVEN PLATE FOR FRICTION CLUTCHES

Filed June 23, 1930

Fig. 1.

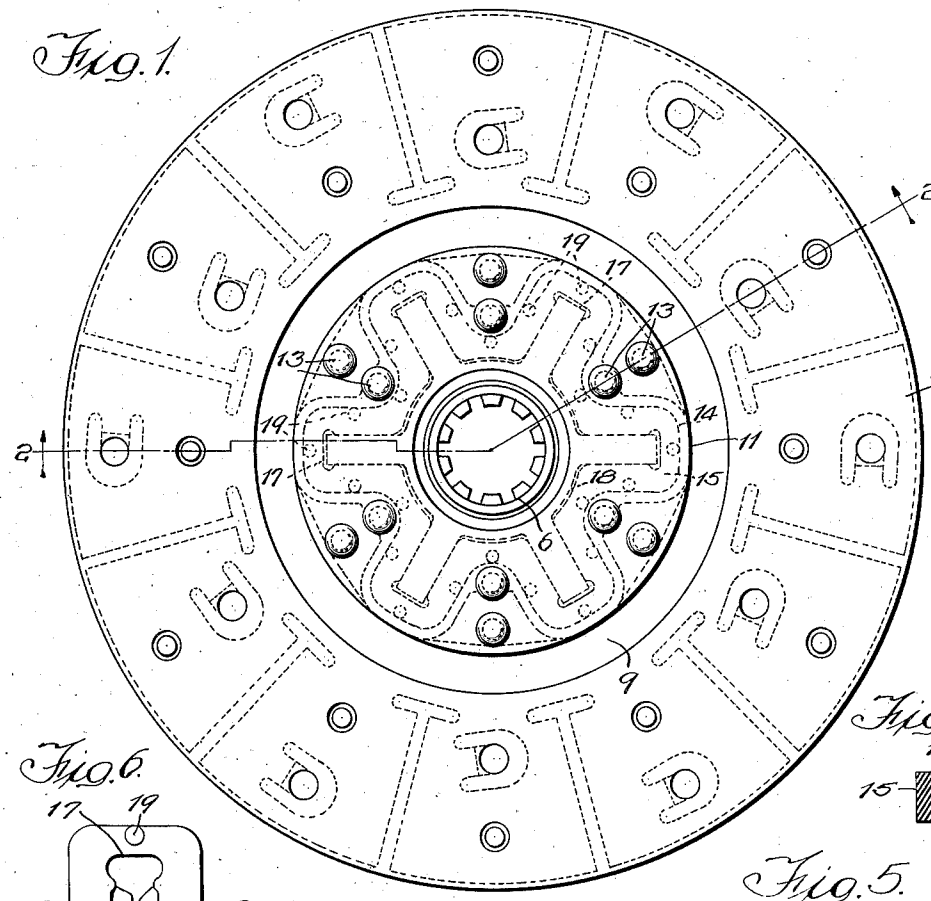


Fig. 4.

Fig. 6.

Fig. 5.

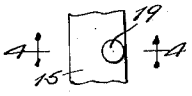
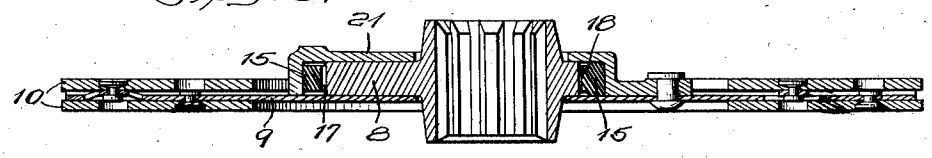


Fig. 2.

Fig. 3.



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Patented June 6, 1933 1,912,703

UNITED STATES PATENT OFFICE

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DRIVEN PLATE FOR FRICTION CLUTCHES

Application filed June 23, 1930. Serial No. 462,952.

This invention relates generally to friction clutches wherein a friction plate driven member is interposed between two parts of a driving member and is adapted to be gripped or clamped by the parts under sufficient pressure to impart motion from the driving member to the driven member; and the invention relates more particularly to that class of driven plates in which a yielding cushion of rubber or other suitable material is interposed between relatively movable parts to absorb noise vibrations from the engine and transmission units and otherwise to improve the operation of the clutch.

The object of the present invention is to control the operative flexibility of the driven plate by reducing the cross-section of the cushion within its chamber to permit the material of the cushion to respond by squeezing or shifting transversely or laterally, as required, to the pressure exerted thereon by the relative movement of the parts of the driven plate between which the cushion is interposed.

The invention also has for its object to retain the cushion in a uniform position in the chamber in which it is located between the relatively movable parts of a driven plate and at the same time to provide such free space as may be required cross-sectionally of the chamber and cushion to enable the material of the cushion to flow laterally as well as longitudinally and thus respond quickly to pressure imparted thereto by the relatively movable parts, thereby improving the efficiency of the driven plate in the compression and also in the expansion movements of the cushion.

Further objects of the invention are to provide free space within the cushion chamber at the sides of the cushion to permit the cushion to compress and to expand quickly in the operation of the clutch; to provide free space about the ends of the hub member spokes, to prevent the spokes from chafing the cushion; and to provide the cushion with ribs to engage the spokes and hold the cushion in its chamber if the fit should happen to vary due to manufacturing limits. Furthermore I can vary both the rate and amount of yield by varying the amount of clearance or free space.

In the accompanying drawing illustrating a selected embodiment of the invention,

Fig. 1 is an elevation of the driven plate.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a similar view showing another embodiment of the invention.

Fig. 4 is an enlarged detail cross-sectional view of the cushion on the line 4—4 of Fig. 5.

Fig. 5 is a plan view of a fragment of the cushion.

Fig. 6 is a detail view.

Referring to the drawing, the driven plate comprises a friction member which is mounted upon a centrally disposed hub member, and a compressible cushion interposed between said members so that movement of the friction member is communicated through the cushion to the hub member whereby noise vibrations of the engine traveling through the friction member are absorbed by the cushion instead of being passed on through the hub member to the transmission, and noise vibrations from units connected with the transmission are also absorbed by the cushion.

The hub member comprises a hub 6 having an integral peripheral flange 7 which is provided with a plurality of radial spokes 8 disposed symmetrically about the hub. The friction member comprises a plate ring 9 which is mounted loosely on the hub at one side of the flange and spokes. Friction facing rings 10 of suitable material are fastened to the plate ring at and adjacent to its periphery and on opposite sides thereof. My present invention may be embodied with any type of plate ring to which it is or may be adapted and it will be understood, therefore, that the invention is not restricted to use with the particular plate ring shown or with a plate ring having any special mounting for the friction facings or with any other particular construction. A backing plate 11 is secured to the plate ring 9

with a spacer 12 interposed therebetween and these parts are secured together by rivets 13 or other means. A chamber 14 is formed having the plate ring and the backing plate for side walls, the hub flange 7 and spokes 8 for its inner wall and the spacer 12 for its outer wall, the chamber forming, in effect, a sinuous compartment between the hub member and the friction member to receive the cushion 15. The cushion may be made of a single strip or of a plurality of strips of rubber or other suitable cushion material and it is seated in the cushion chamber about the spokes and flange of the hub member throughout the sinuous length of the chamber. In driven plates embodying rubber cushions, the practice has heretofore to make the cushion of a cross-section to fit closely in its chamber, but with this construction it has been found that the shift of the cushion material under compression and expansion movements of the hub member and the friction member is mainly lengthwise of the cushion and its chamber and only to a limited extent transversely. While such a driven member is efficient in service the shifting movement of the cushion in compression and in expansion is slower than desired in a friction clutch for automotive vehicles. This is due to the fact that with the cushion closely confined cross-sectionally in the chamber the shift of the cushion material is mainly in a direction lengthwise of the cushion and considerable friction results between the cushion and the walls of the chamber. I have overcome this difficulty by providing free space 16 between the cushion and its side walls which will allow the cushion to expand and contract mainly transversely, instead of longitudinally as heretofore. I prefer to provide free space 17 about the end of each spoke 8 to reduce friction between the ends of the spokes and the cushion, to prevent the ends of the spokes from chafing the cushion and to provide this additional space for expansion of the cushion. I also prefer to provide a slight free space, as a relief to the cushion, between the cushion and the hub at 18 to avoid chafing the cushion. While the cushion may expand and contract longitudinally in a limited degree it will be apparent that the main expansion and contraction of the cushion will be transversely or cross-sectionally, and the friction heretofore produced by the longitudinal shifting of the cushion material under expansion and contraction is correspondingly reduced. This cross-sectional expansion and contraction of the cushion provides a quick adaptation of the cushion to varying requirements upon the driven member in the operation of the clutch and, consequently, provides a quicker acting clutch than heretofore while still retaining the noise and vibration absorption quality of the cushion. The cushion is provided at intervals with studs 19 on its sides to hold it centralized in the chamber. These studs may be formed integral with the body of the cushion and they are oppositely disposed on the sides of the cushion adjacent the outer face thereof. Since the cushion material does not shift longitudinally to any material extent, these studs will not slide on the plate ring 9 and the backing plate 11 but will remain substantially in constant position. The cushion may be provided with transverse side ribs 20, Fig. 6, to hold the cushion in its chamber. The cross-sectional dimensions of the chamber and the cushions may vary some in production manufacture, and the ribs 20 are provided to avoid any loose play of the cushion in the chamber. Under desired conditions the ribs will simply compress and distribute in the cushion when the latter is inserted in the chamber. In Fig. 3 I have shown another form of the invention in which the backing plate and the spacer are made in the form of a one-piece casing 21 which is secured to the plate ring. In other respects this form is the same as that shown in Fig. 2.

The invention provides a quick acting cushion which is maintained in constant position in its chamber between the friction member and the hub member and is permitted by reason of the free space at the sides thereof to expand transversely and quickly without creating any material friction between itself and the walls of the chamber. The cushion material is thus worked throughout its body in a more efficient manner than is the case when the cushion is confined closely and compelled to shift lengthwise, and this reduces friction between the cushion and the walls of the chamber, enables the cushion to respond more quickly to the requirements of clutch operation, keeps the cushion material when made of rubber or rubber composition in better condition, prolongs its life, and preserves the quality of the cushion for absorbing noise vibrations. The spokes 8 are spaced apart, radially disposed, and symmetrically arranged about the hub, and the cushion surrounds the spokes and the parts of the hub flange between the spokes. This provides for a greater area of cushion than heretofore and this improves the efficiency and life of the driven plate.

I have shown the invention in practical forms suitable for commercial use but it may be necessary to change the form, construction and arrangement of parts to adapt the invention to different clutch constructions, or for other purposes, and I reserve the right to make all such changes as fairly

fall within the scope of the following claims:

I claim:

1. A driven plate for friction clutches comprising a hub member and a friction member having a cushion chamber therebetween with opposite side walls, a cushion in said chamber of reduced width as compared with the width of the chamber between said side walls, and means on said cushion member spacing said cushion member from the side walls of said chamber.

2. A driven plate for friction clutches comprising a hub member and a friction member having a sinuous cushion chamber therebetween with opposite side walls, and a continuous cushion in said chamber having its sides spaced from said side walls.

3. A driven plate for friction clutches comprising a hub member and a friction member having a cushion chamber therebetween with opposite side walls, a cushion in said chamber of reduced width as compared with the width of the chamber between said side walls, and studs spaced apart on the sides of the cushion and engaging said side walls.

4. A driven plate for friction clutches comprising a hub member and a friction member having a cushion chamber therebetween with opposite side walls, a cushion in said chamber of reduced width as compared with the width of the chamber between said side walls, and studs spaced apart on the sides of the cushion at the outer edge thereof and engaging said side walls.

5. A driven plate for friction clutches comprising a hub member and a friction member having a cushion chamber therebetween with opposite side walls, a cushion in said chamber of reduced width as compared with the width of the chamber between said side walls, and oppositely disposed studs integral with the body of the cushion and spaced apart on the sides adjacent the outer edge thereof to engage said side walls.

6. A driven plate for friction clutches comprising a spoked hub member, a friction member comprising a plate ring loosely mounted on the hub member, a backing plate and a spacer secured on the plate ring, there being a chamber formed between the plate ring, the backing plate and the spacer about the spokes and intermediate parts of the hub member, and a cushion in said chamber of less cross-sectional area than that of the chamber.

7. A driven plate for friction clutches comprising a hub member having a peripheral flange and a plurality of radially disposed and symmetrically arranged spokes projecting from said flange and spaced apart, a friction member mounted on said hub member and providing therewith a sinuous chamber about the spokes and the intermediate parts of the hub member, and a continuous cushion arranged in said chamber of less cross-sectional area than that of the chamber.

8. A driven plate for friction clutches comprising a spoked hub member and a friction member having a cushion chamber therebetween, and a cushion arranged in said chamber about said spokes, there being a free space between the ends of the spokes and the opposite parts of the cushion.

9. A driven plate for friction clutches comprising a hub member and a friction member having a sinuous cushion chamber therebetween with side walls, and a continuous cushion arranged in said chamber, said cushion having discontinuous engagement with the side walls of the chamber whereby the cushion is centralized in the chamber and is capable of transverse expansion therein.

10. A driven plate for friction clutches comprising a spoked hub member and a friction member having a cushion chamber therebetween and about said spokes, and a cushion arranged in said chamber, there being free spaces between the cushion and the ends of the spokes.

11. A driven plate for friction clutches comprising a spoked hub member and a friction member having a cushion chamber therebetween and about said spokes, and a cushion arranged in said chamber, said cushion having side ribs to engage the wall of the chamber, to space the adjacent portions of the cushion from said side walls.

12. A driven plate for friction clutches comprising a spoked hub member and a friction member having a cushion chamber therebetween and about said spokes, a cushion arranged in said chamber, there being free spaces between the cushion and those parts of the hub member located between the spokes, and means on said cushion to centralize it in said chamber.

13. A driven plate for friction clutches comprising a spoked hub member and a friction member having a cushion chamber therebetween and about said spokes, and a cushion arranged in said chamber, said cushion having transverse ribs disposed thereon to engage the spokes.

DAVID E. GAMBLE.