

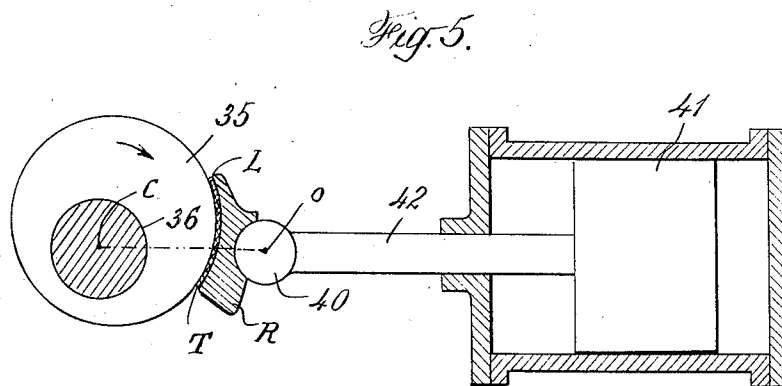
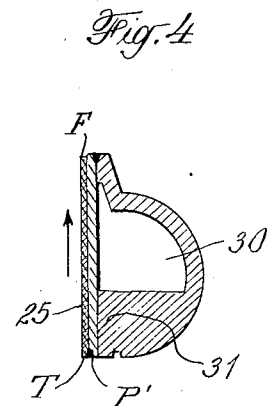
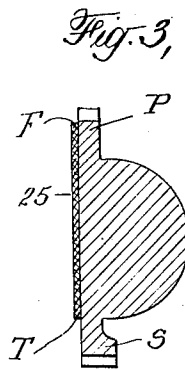
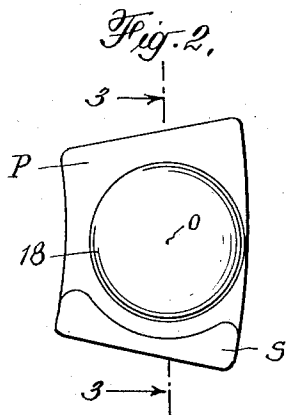
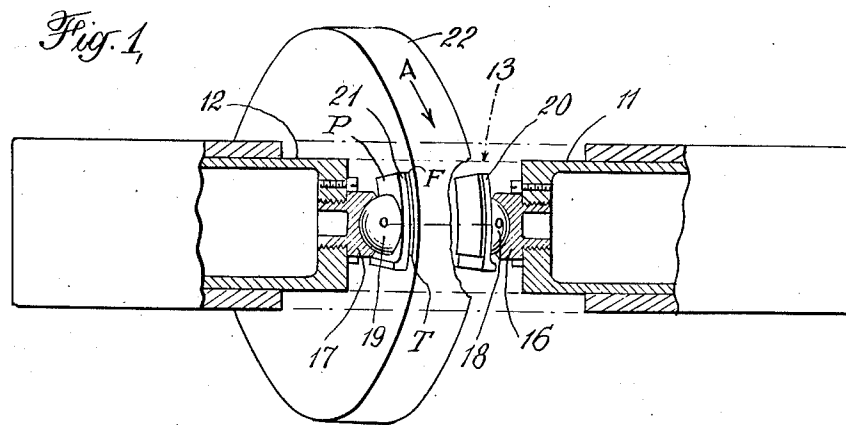
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A. G. M. MICHELL

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CRANKLESS ENGINE

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UNITED STATES PATENT OFFICE

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CRANKLESS ENGINE

Application filed December 13, 1928. Serial No. 325,727.

This invention relates to crankless engines and more particularly to improvements in the construction of pivoted slippers used to transmit motion between two machine or engine parts having respectively a reciprocating and a continuous rotary motion.

The invention although of general application for use between reciprocating and rotary elements, is particularly applicable to the piston slippers of crankless engines of the type disclosed in United States Reissue Patent No. 15,756, granted to Anthony G. M. Michell, February 5, 1924.

A slipper of the type shown in the patent tends by its own inertia, due to its reciprocating movement, to remain in close contact with the continuously rotating element during approximately one-half of the cycle of movement, while in the remaining portion of the cycle it tends from the same cause to move away from the continuously rotating element. It has been found that when running at the extremely high speeds which are practicable in mechanisms of this type, the slipper when thus separated from the rotating element by even very small clearances, may make contact at its edges or corners with the rotating element in an undesirable manner.

This invention has for its salient object to prevent or mitigate such undesirable effects as those mentioned and, further, to provide a slipper so constructed and arranged that the proper contact between the slipper and element engaged thereby will be maintained at all times.

Further objects of the invention will appear from the following specification taken in connection with the drawings, which form a part of this application and in which

Fig. 1 is a top plan view, partly in section and partly broken away, illustrating the invention applied to a pair of slippers coacting with the slant of a crankless engine;

Fig. 2 is a plan view of one of the slippers shown in Fig. 1;

Fig. 3 is a sectional elevation taken substantially on line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a sectional elevation similar to

Fig. 3 but illustrating a slightly different embodiment of the invention; and

Fig. 5 is a sectional elevation illustrating the application of the invention to a reciprocating element coacting with a continuously rotating eccentric.

The invention briefly described consists of a pivoted bearing element having a bearing surface located unsymmetrically with respect to the pivot thereof, the material of the bearing element being so distributed relative to the pivot thereof that the moments of the masses on opposite sides of the pivot will be equalized.

Further details of the invention will appear from the following description.

In the form of the invention illustrated in Fig. 1, the invention is illustrated as applied to reciprocating pistons of a crankless engine. The pistons are shown at 11 and 12 and are connected by a yoke 13, indicated by dot and dash lines, so that they will reciprocate in unison.

The pistons are provided with cups 16 and 17 in which are pivotally mounted spherical bosses 18 and 19 formed on slippers 20 and 21. The slippers 20 and 21 make sliding contact with opposite faces of a slant or inclined disk 22. The structure just described is substantially the same as that disclosed in Reissue Patent No. 15,756, and is more fully illustrated therein. In order to show more clearly the construction of the slipper, a portion of the slant 22 is broken away.

The assumed direction of rotation of the slant 22 which makes contact with the slippers 20 and 21 is indicated by the arrow A in Fig. 1. The working face of each slipper has a thin layer 25 of white metal and this layer or bearing surface is disposed unsymmetrically with reference to the center O of the ball pivot 18 or 19. It will be clear from the illustration that the front or leading edge F of the bearing surface 25 is located a greater distance in front of or in advance of the center O than the rear or trailing edge T with respect to the same point.

Heretofore the outline of the slipper has been made to conform to the unsymmetrical shape of its working face or bearing surface,

and due to this construction the bearing surface or working face of the slipper has not coated properly with the bearing surface of the slant engaged thereby. This lack of coaction was described at the outset of the specification.

In accordance with the invention covered by this application, the plate P of the slipper to which the white metal layer is applied, is extended rearwardly beyond the rearward or trailing edge T of the working surface, so as to equalize the moments of the portions of the slipper on each side of a line O, O joining the centers of the ball pivots 18 and 19. In order to equalize the moments without unduly lengthening the plate P and without extending the trailing edge T to an inconveniently great distance toward the rear, the plate P is thickened, as shown at S, the thickened portion being extended to a greater or less extent around the periphery of the ball 18 or 19, as shown in Fig. 2.

Another construction in which the moments of mass of the slipper on opposite sides of the ball pivots are equalized, is shown in Fig. 4. In this construction the slipper and ball are hollowed out, as shown at 30, but a greater mass 31 of material is disposed at the trailing edge T. This greater mass of material counterbalances the material forming and supporting the bearing or working face 25 adjacent the leading edge F. For convenience of manufacture, the plate P' in Fig. 4 through which the white metal bearing surface 25 is secured, may be formed separate from the slipper and connected thereto in any suitable manner, as by welding.

In Fig. 5 the invention is shown as applied to a rotating eccentric 35 mounted on a shaft 36. In this construction it will be seen that the leading edge L of the bearing surface extends further in a forward direction from the center O of the ball 40 than the trailing edge T of the bearing surface. In order to compensate for the greater mass of material in advance of the center O or in advance of the center line connecting the center O with the center C of the shaft 36, the slipper is provided with a rearwardly extending portion R so designed as to equalize the masses of material on opposite sides of the line O—C. Fig. 5 shows a reciprocating member, such as a piston 41, connected to the ball 40 by a connecting rod 42.

From the foregoing description it will be clear that the primary essential feature of the invention may be broadly defined as residing in a construction of a pivoted slipper connected to a reciprocating element and coacting with a rotating element, whereby the masses or portions of the slipper disposed on opposite sides of the center of the pivot are so arranged as to maintain the proper bear-

ing contact of the working surface of the slipper and rotating element.

Although certain specific embodiments of the invention have been particularly shown and described, it will be understood that the invention is capable of modification and that changes in the construction and in the arrangement of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A pivoted bearing element having a bearing surface located unsymmetrically with respect to the pivot thereof, the material in said element being so distributed relative to the pivot thereof that the moments of the masses of material on opposite sides of said pivot will be equalized.

2. A bearing element having a pivot boss and a bearing surface located unsymmetrically with respect to the center of said boss, the mass of material in said element being so distributed that the moments of the masses of material on opposite sides of the pivot center will be balanced.

3. A pivoted bearing element having a bearing surface located unsymmetrically with respect to the pivot thereof, said element having greater thickness of material on the side of the pivot having a smaller extent of bearing surface.

4. A pivoted bearing element having a bearing surface located unsymmetrically with respect to the pivot thereof, said element having a greater mass of material on the side of the pivot having a smaller extent of bearing surface.

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