Aug. 11, 1942. H. WÄLTI 2,292,728

CAM MECHANISM

Filed Dec. 27, 1939

Fig. 1

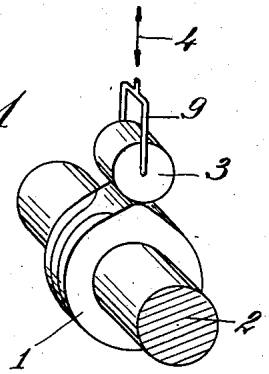


Fig. 2,

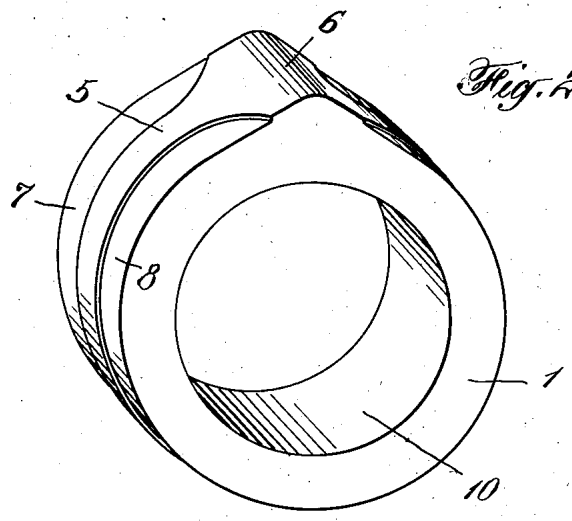
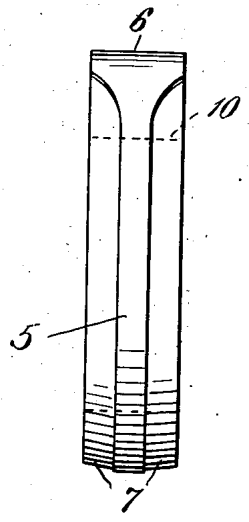


Fig. 3,



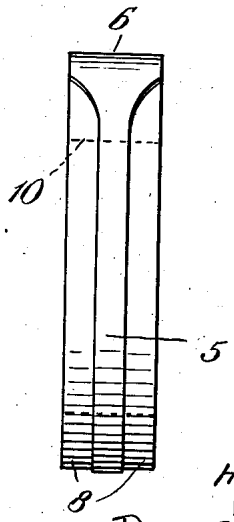


Fig. 4.

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CAM MECHANISM

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3 Claims. (Cl. 74—567)

This invention relates to cam mechanisms and in particular to those intended for operating fuel pumps and other parts of internal combustion engines.

The object of the invention is to provide a cam mechanism which will be more efficient in operation and in which the cam is less liable to wear than those at present in use.

Hitherto the rolling or bearing surfaces of the two cooperating parts of the cam mechanism, e. g., the cam itself and of the roller or its equivalent, have been of the same width over their whole circumferential peripheries. In some cases the rollers have been narrower than the cams and the cams have been narrower than the rollers, the determining factor, assuming that the roller engages the cam without any slip, being the linear pressure or the specific load per unit area as calculated in accordance with the theory of elasticity.

In very highly loaded cam mechanisms, for instance those intended for operating fuel pumps, it has been found that the operating surface tends in certain circumstances to become worn in spite of the fact that the surfaces both of the cam and of the roller have been accurately machined and uniformly hardened. This wear readily occurs when starting, i. e., at low load and with cold and viscous oil when tests show that the rollers slip to a considerable extent relatively to the cam. For instance it has been found that a roller turned through an angle of only 150°, when it should theoretically have a turn through 800° and that it is this slip which causes the wear since wear invariably occurs at those places where, through high stressing of the roller, the latter is rotated through less than the theoretical angle.

According to this invention this drawback is avoided by the width of the track or roller-engaging surface of the base circle of the cam being less than that of the cam nose or projection. Change-over from the narrow track of the base circle to the full width of the cam nose or projection is designed in accordance with the load curve of the cam, and the inoperative or non-bearing surfaces on both sides of the narrow portion of the track may form the surfaces of a cone or of a cylinder. Preferably the cam roller is of especially light construction with respect to its moment of inertia about its axis of rotation.

In the accompanying drawing which shows somewhat diagrammatically one construction of cam mechanism according to the present invention,

Figure 1 is a perspective view showing a cam and its roller,

Figure 2 shows in perspective a cam on an enlarged scale,

Figure 3 is an edge view showing a cam with conical non-bearing surfaces, and

Figure 4 is a similar view of a cam having a cylindrical non-bearing surface on either side of the narrow roller-engaging track.

In Figures 1 and 2 the cam 1, which is adapted to be fixed to its driving shaft 2, cooperates with a roller 3 which is in operative connection with the plunger of a pump, not shown, and is reciprocated in the direction of the arrow 4 when the cam 1 is rotated by the shaft 2.

As more clearly shown in Figure 2, the track or rolling surface of the base circle 5 of the cam is narrow in comparison with the projecting portion or cam nose 6, the non-bearing surfaces on either side of the narrow track 5 being either conical, as shown at 7 in Figure 3, or cylindrical as shown at 8 in Figure 4. In Figure 2 the cam is shown detached from its shaft which fits into the bore 10.

The merging or change-over from the narrow track portion 5 to the full width projecting portion 6 is designed to suit the load curve of the cam and preferably the roller 3 is of light construction with relation to its moment of inertia about its axis of rotation.

By means of the present invention the increased specific surface pressure is obtained by making the heavily loaded bearing surface of the cam nose 6 of the full width of the cam whilst the base circle, which is only lightly loaded, and also the part between the cam nose and the base circle are reduced in width.

Preferably the width of the track on the base circle of the cam will be chosen less than ⅔ of the width of the cam itself. Already with base circle roller-engaging surfaces, whose width is only somewhat less than ⅔ of the width of the cam, the oil film between the roller and the track is so crushed that a damaging of the track in consequence of the acceleration when the cam begins to be raised is no longer to be feared.

I claim:

1. A cam mechanism which comprises a roller and a cam, a base surface and a nose surface on the cam for engaging the roller, the roller surface being at least as wide as the nose surface, the base surface being substantially narrower than the nose surface and proportioned in width on a basis of

the load on the nose surface in relation to the load on the base surface, whereby the specific surface pressure is such that the slippage between the roller and the cam surfaces is practically eliminated.

2. A cam according to claim 1 in which the base surface is less than two-thirds the width of the nose surface.

3. A cam mechanism comprising a roller, a cam in operative engagement with the roller, the rolling surface of the base circle of the cam being substantially narrower than the rolling surface of the cam nose and the cylindrical surface of the roller being substantially as wide as the rolling surface of the cam nose, the width of the said cam surfaces being such that with the normal working pressure between the said surfaces and the roller the oil film is crushed preventing slippage between the surfaces and the roller.

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