Feb. 7, 1956 R. F. SMITH 2,733,619

CAM AND FOLLOWER MECHANISM

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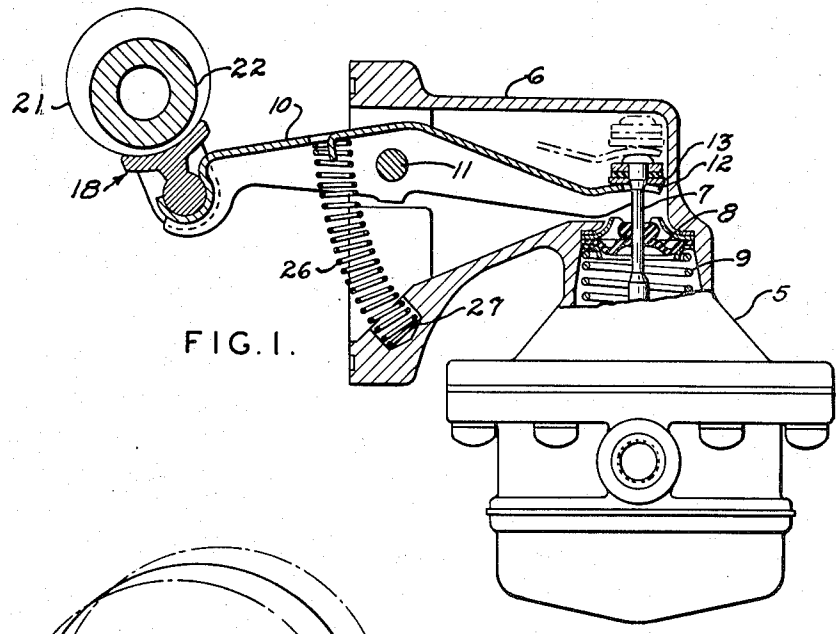


FIG. 1.

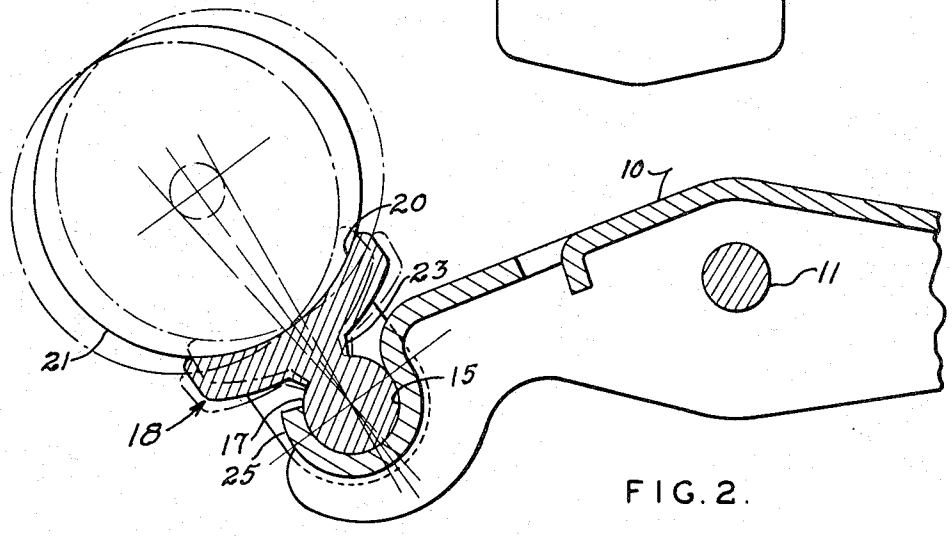


FIG. 2.

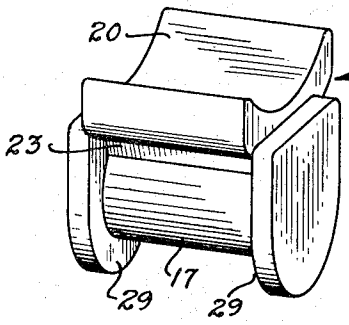


FIG. 3.

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CAM AND FOLLOWER MECHANISM

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4 Claims. (Cl. 74—569)

This invention relates to eccentric and follower mechanisms, and particularly to the type embodying a pivoted shoe between the eccentric and the follower lever.

Conventional fuel pumps of the type used on automotive vehicles are commonly actuated by a lever which has one end resiliently urged into contact with an eccentric on the engine camshaft. In mechanisms in general use the actuating lever has a flat surface which makes a line contact with the face of the eccentric at the point of tangency. Because of the small bearing surface of the lever, the bearing load is highly concentrated and the constant use to which mechanisms of this type are put, result in severe wear on the lever, so that the service life of the lever is relatively short. A mechanism designed to avoid the effects of highly concentrated bearing loads embodying a pivoted shoe with an arcuate contact face is disclosed in an application, Serial No. 236,408, filed July 12, 1951, in the name of James L. Edelen, now Patent No. 2,654,266. It has been found, however, that in his design excessive wear on the journal portion of the pivot pin substantially reduces the life of pivoted shoes therein disclosed.

It is an object of the present invention to provide a novel pivotal mounting for an arcuate follower shoe whereby wear on the pivot may be minimized.

The above object is achieved by providing the pump lever with a transverse cylindrical depression to receive a cylindrical projection on an arcuate cam follower shoe. A projecting lip or other means on one edge of the depression is provided to secure the cylindrical projection in the cylindrical recess, thus providing larger bearing areas and eliminating concentrated bearing loads between the parts.

Additional objects and advantages will appear from the specification when read with the accompanying drawing in which:

Fig. 1 is an elevation view, partially sectionalized, of an automotive fuel pump embodying the invention.

Fig. 2 is an enlarged vertical sectional view of the shoe and lever illustrated in Fig. 1, showing extreme and mean positions of the shoe.

Fig. 3 is a perspective view of the shoe.

The automotive fuel pump illustrated in Fig. 1 is of the well-known Carter type now in wide use and includes a body portion **5**, which contains an operating diaphragm, valves, and vapor dome spaces, all as disclosed in a co-pending application Serial No. 728,979, filed February 17, 1947, in the name of Irven E. Coffey, now Patent No. 2,625,114. Secured to the upper part of body **5** is a right angle lever housing **6** into which projects diaphragm stem **7** through flexible seal **8**. Diaphragm spring **9** constantly urges the diaphragm in the discharge direction, that is, downward. An operating lever **10** of channel cross section is pivoted at **11** to the walls of the lever housing and has a bifurcated end **12** which underlies an abutment washer **13** at the end of stem **7**.

According to the present invention, the outer end of lever **10** is provided with a transverse substantially semi-

cylindrical recess **15** in its upper surface. The purpose of recess **15** is to pivotally receive a cylindrical projection **17** of arcuate cam follower shoe **18**. Shoe **18** is provided with an arcuate contact face **20** of equal radius with eccentric cam **21** mounted on camshaft **22**. The lower surface of the contact shoe proper is connected to cylindrical projection **17** by a short neck portion **23** substantially less in cross-section than the diameter of cylindrical projection **17**. Projection **17** is retained in a recess **15** provided with a half-round socket by a deformable upwardly extending lip portion **25** formed on the outer axial edge of recess **15** and extending beyond a diametral plane of the half-round socket in the recess. Lip **25** is bendable to permit easy insertion and removal of the arcuate shoe and to secure the shoe to the lever. The lip also acts as a stop in cooperation with the adjacent edge of neck **23** to prevent extreme movements of the follower shoe. This is especially useful in installation of the pump, since it eliminates the necessity of manually guiding the follower shoe into engagement with the cam upon installation of the pump. This latter would obviously be necessary if the follower shoe were not restrained in somewhat near its normal operating range of positions. To prevent lateral movement of the shoe in and out of the recess, flanges **29** are formed on both sides of the shoe and engage the side portions of the lever adjacent the ends of recess **15**. Shoe **18** is constantly urged into engagement with cam **21** by means of a coiled spring **26** compressed between the undersurface of the lever and a seat **27** formed in the open mouth of lever housing **6**.

It is evident from Fig. 2 that the very slight angular movement of cylindrical projection **17**, combined with the relatively large contact surface between the cylindrical projection and the semi-cylindrical recess **15**, will result in minimizing the wear on these contact surfaces. The advantage of the large arcuate contact surface **20** of the shoe is similarly evident. In operation, as the cam moves between its right-hand, dead center, and left-hand positions, the shoe merely follows it, wear on the bearing surfaces between the shoe and lever being minimized as described above.

This invention is not limited in its applicability to automotive fuel pumps of the type illustrated and described herein, but is equally adaptable to automotive vacuum booster pumps and other devices embodying eccentric and follower mechanisms.

It will be understood that the form described and illustrated herein is but the preferred embodiment of my invention and that exclusive use is contemplated of all modifications coming within the scope of the appended claims as will occur to those skilled in the art.

I claim:

1. In an eccentric and follower mechanism, a follower element comprising a lever and a shoe, said shoe having an arcuate contact face and an axially aligned cylindrical projection from its undersurface, a relatively slender neck portion joining said shoe and said projection, said lever being formed with a recess providing a semi-cylindrical socket to pivotally receive said cylindrical projection, and a lip projecting from an axial edge of said recess for securing said projection in said recess, said lip and the adjacent edge of said neck portion co-acting to limit pivotal movement of said shoe.

2. In a cam and pivoted lever mechanism, a shoe comprising axially spaced concave and convex bearing members adapted to ride on said cam and lever respectively, said shoe including means extending between said bearing members for connecting said members in spaced relation, said connecting means comprising laterally extending flanges integral with the ends of said concave and convex bearing members.

3. In a cam and pivoted lever mechanism, a shoe comprising axially spaced concave and convex bearing members adapted to ride on said cam and lever, respectively, said shoe including a necked portion between said bearing members for connecting said bearing members in spaced relation, and oppositely arranged flanges integral with the ends of said convex bearing member and said necked portion, and extending to said concave bearing member.

4. In a cam and follower mechanism, the combination of a pivoted pump operating lever actuated by said cam, and a shoe for transmitting the motion of said cam to said pivoted lever, comprising parallel, axially spaced, concave and convex bearing members for engaging said cam and said lever, respectively, means interconnecting said members including a slender neck integral therewith, a means for movably retaining said shoe in said arm for oscillation on said convex bearing member, said means including a recess in said arm with a substantially half-round socket receiving said convex bearing member, a

deformable lip providing an extension of said recess, and spaced, dependent flanges cooperating with said recess and said convex bearing member to retain said shoe in said socket.

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