

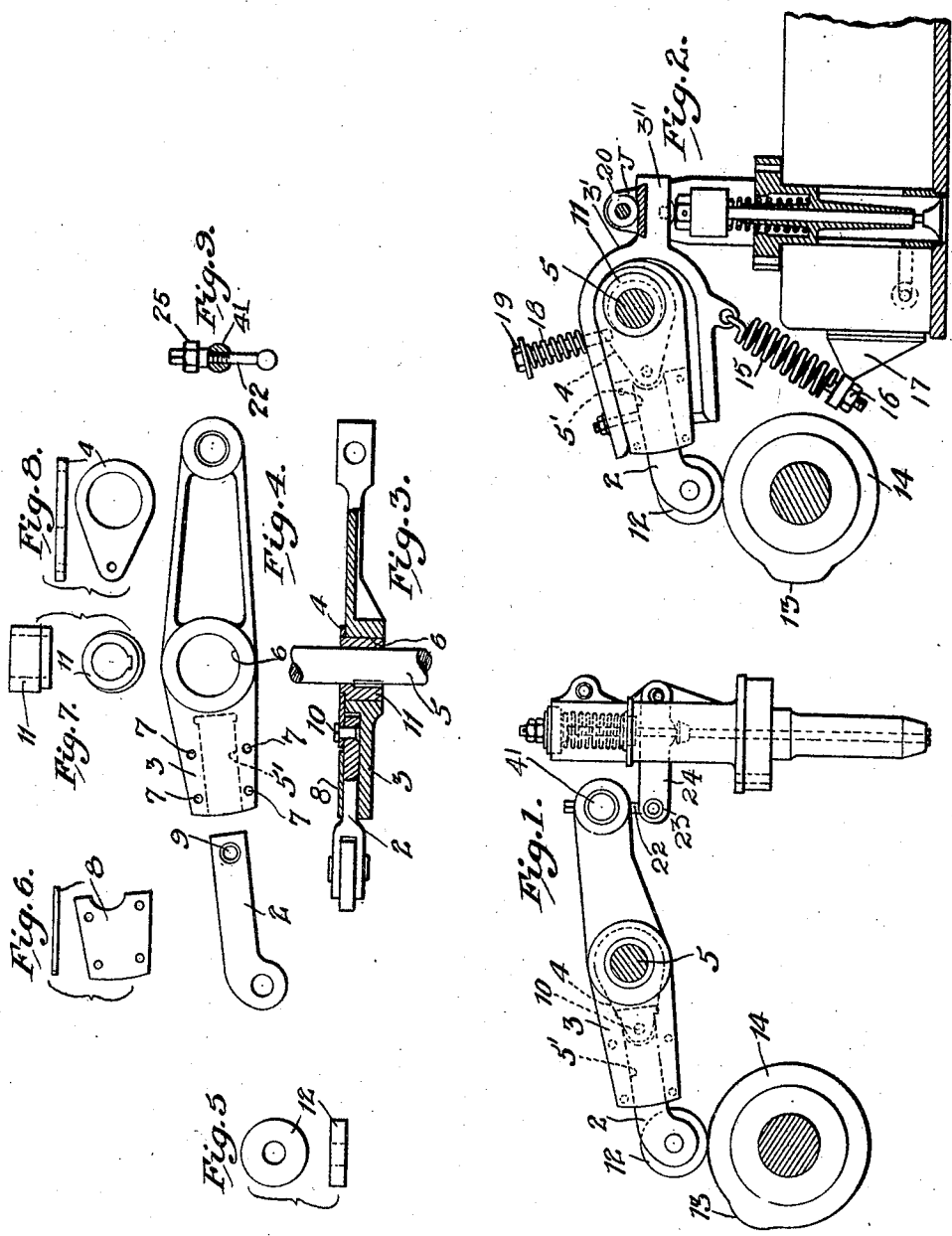
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CAM LEVER TIMING BLOCK WITH CONNECTIONS

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CAM-LEVER TIMING BLOCK WITH CONNECTIONS.

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To all whom it may concern:

Be it known that I, AXEL A. ASPLUND, a citizen of the United States, residing at Auburn, in the county of Cayuga and State of New York, have invented certain new and useful Improvements in Cam-Lever Timing Blocks with Connections; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to internal combustion engines, and while particularly adapted to what is known as the Diesel type of internal combustion engines, is not limited thereto. The invention specifically relates to cam lever timing blocks.

An object of this invention is to provide a means for compensating for the action of the usual eccentric used on the modern Diesel engine, which eccentric is provided for lifting the cam engaging members or timing rollers from the cams during the reversal movement; that is to say during a movement of the rollers relative to the cams or the cams relative to the rollers in changing the cams in a reversing operation. In the modern Diesel engine it is usually the custom to provide a plurality of cams upon the cam shaft, the cams being in duplicate in juxtaposition and the duplicate cams being operative of the same valve. These duplicate cams are mounted on the same shaft at a relative angularity to each other so that by the shifting of one of these cams under the roller the timing is accomplished to open the valve for a forward movement and by the shifting of the other cam under the roller the valve is opened for a rearward movement. In order to accomplish this shifting of the cams it is customary to provide on the cam lever or rocker shaft which is adjacent to the cam shaft, an eccentric which by the turning of the cam lever shaft lifts the timer rollers from the cams prior to this shifting operation. The movement of this eccentric on the cam lever shaft varies the position of the roller relative to its normal engagement with the cam, and since the engine is still running during this reversing operation and before the roller is entirely lifted from the cam, it disarranges the predetermined timing frequently causing serious trouble. It

is an object of this invention to provide a means for compensating for the movement of the cam lever by this eccentric in directions other than those desired for the lifting of the cam and to keep the cam roller at the same distance from the center of the cam shaft during this lifting operation.

With these and other objects in view the invention consists in the construction, the combination, the detail and arrangements of parts as hereinafter more fully described and claimed.

In the drawings Figure 1 is a side elevation of a cam lever of this improved design attached to a fuel valve.

Figure 2 is a side elevation of a cam lever of this design attached to a starting valve.

Figure 3 is a section through the cam lever shown in Figure 1 showing the timing block partly in plan and partly in section.

Figures 4, 5, 6, 7 and 8 are details of the parts shown in Figure 3.

Fig. 9 is a detail of an adjustable device connecting the cam lever with the fuel valve operating lever.

In detail this invention consists in a slide comprising the timing block 2 and its mount in cam lever 3 and connecting link in the form of a strap 4 pivoted concentrically with respect to cam lever shaft 5. This application is one of a set of seven independent applications filed simultaneously, the valve illustrated in Figure 1 and connecting means to the cam lever and also the specific form of cam lever and valve connection and the valve illustrated in Figure 2 being covered in separate applications, copending with the one herein. As illustrated more in detail in Figure 4, cam lever 3 is provided with a longitudinal guiding surface in the nature of a groove or slot 5' to receive timing block 2, the cam lever also being provided with a bore 6 and tapped holes 7 in which cap screws are inserted in mounting a retaining plate 8 for retaining said timing block 2 in said slot 5' and permitting it to slide longitudinally therein. Timing block 2 is provided with a hole 9 for receiving a stud 10, which stud 10 provides pivotal connection between timing block 2 and strap 4. Strap 4 is mounted concentric relative to shaft 5 and timing lever 3 is mounted eccentric relative to shaft 5, both being mounted upon

a collar 11 shown in side and end elevation in Figure 7. That is to say strap 4 is mounted on the smaller bearing surface in said collar 11, which is concentric to its bore, and lever 3 is mounted upon the longer surface, which is eccentric relative to its bore, its bore being such as to fit upon shaft 5 and being affixed thereto by a key. The turning of shaft 5 will cause the cam lever 3 to have a movement about an axis eccentric with respect to the axis of shaft 5, but by reason of the sliding of block 2 in lever 3 due to the fact that strap 4 connected with block 2, is pivoted concentric with respect to said shaft 5; the roller 12 mounted in block 2 will always have its center the same distance from the center of shaft 5 irrespective of the movement of lever 3 about said axis that is eccentric relative to shaft 5. Obviously if the compensating means herein specified were not provided and said shaft 5 were rotated in a clockwise direction (as viewed in Figure 1) through an arc of 90° from a downward position of the eccentric as shown in Figure 7, the center of the roller 12 would move to the left substantially the normal throw of the eccentric and this would cause the raised portion 13 of the cam 14 if it were rotating in a clockwise direction to preengage roller 12 relative to its normal engagement to a considerable extent, as, for instance, if the throw of the cam were throughout a half circle an inch and one quarter there would be a substantial variation of five eighths of an inch of this roller from the vertical line in 90° and quite a considerable fraction of this variation prior to the full lifting of the said roller from the said cam. This would cause trouble especially with the fuel valve, which is normally set to open a tiny fraction of time before upper limit of piston movement is reached and which, by reason of this eccentricity, would be opened a relatively large fraction of time before the upper limit of piston movement and might occasion the rupturing of the crank shaft or other breakage or straining of the engine by reason of a premature combustion. Whereas, in the improved means described relative change of position is very slight, being only equal to the fraction of the radius outward from the chord of the small arc described by the angular movement of said cam roller. More specifically referring to the method of accomplishing this improved result, it will be observed that timer block 2 which slides freely in slot 5' can have no movement relative to lever 3 except a radial movement with respect to axis of said lever, and by reason of the fact that block 2 is held from radial movement relative to shaft 5 by strap 4, the varying movements of said lever 3 with respect to said

shaft 5 cause a relative sliding movement between block 2 and lever 3 and cause the center of roller 12 mounted on block 2 to substantially describe an arc about the axis of shaft 5 having a constant radius.

Applicant has herein illustrated the application of his improved compensating device to two types of valve levers. In Figure 1 a fuel valve is illustrated in which the eccentrically operated part 3 of the lever is shown pivoted as at 41 to a stud 22 which is in turn pivoted at 23 to a lever 24 adapted to engage and operate the valve stem. In Fig. 2 applicant shows the present invention applied to a starting air and pressure relief valve in which the eccentric operated part of the lever 3' is shown flexed by spring 15 secured by nut 16 to a bracket 17 and also flexed with regard to the non-eccentric part of the lever by means of spring 18 and stud 19. In this type of valve lever it will be noted that the rear end 3'' of lever 3' is left free and provided on its upper face with a wedge-shaped slide J which is adapted to be drawn under roller 20 by the forward transverse motion imparted by eccentric 11 operating to depress the valve stem during this stage of the operation to relieve the pressure in the cylinders as more fully set forth in my pending application Serial No. 359,415.

Another advantage of this timer block construction herein disclosed is that by the removal of stud 10 the timer block 2 can be quickly withdrawn thus admitting of a downward movement of lever 3 without engaging the cam and thus enabling the quick removal of the valves in the engine, which heretofore has been extremely difficult with a single member comprising the cam lever since it was obstructed from downward movement by the cams necessitating the removal of parts difficult to remove in order to obtain access to the valves.

Claims:

1. In a timer, having a cam lever shaft with an eccentric for lifting a cam lever mounted thereon, a timer block slidable in one end of said cam lever, and a link connecting said timer block with the lever shaft to retain the timer block at a constant radial distance therefrom.

2. In combination, a cam lever shaft, a cam lever eccentrically mounted on the lever shaft, a timer block slidable in the cam lever, and a link concentrically mounted on the lever shaft and connected with the timer block.

3. In mechanism of the class described, the combination of a revoluble cam, an angularly adjustable shaft having an eccentric, a lever journaled on said eccentric, a block slidably mounted with respect to the lever, said block carrying a cam engaging member, and means for holding the cam

engaging member in substantially the same angular relation with respect to the axis of the cam in all adjustments of said eccentric.

4. In mechanism of the class described, 5 the combination of a cam, an angularly adjustable shaft carrying an eccentric, a lever journaled on said eccentric, a link pivoted concentrically with respect to the said shaft, a timer block connected to said link, a timer 10 member on said timer block adapted to engage said cam, said timer block being slidably mounted on said lever.

5. In mechanism of the class described, 15 the combination of a cam, an angularly adjustable shaft, an eccentric on said shaft, a lever journaled on said eccentric, said lever having a longitudinal groove, a timer block slidably mounted in the groove in said lever, a timer member carried by said block, a link 20 pivoted to said block and concentrically pivoted with respect to said shaft.

6. In mechanism of the class described, a timing cam, a timing lever adapted to be 25 rocked by said cam, an adjustable fulcrum for the lever adapted to free the lever from engagement with the cam, a contact member movably mounted on said lever, and means for maintaining the contact member in sub-

stantially the same timing relation with respect to the cam throughout adjustments 30 of the fulcrum.

7. The combination with a cam, a lever carrying a cam engaging member, and a pivotal bearing for the lever, of means for 35 varying the center of the pivotal bearing and means for maintaining a constant relation between the cam and the cam engaging member.

8. A cam lever, having a transverse bore for mounting the same, a sleeve rotatable 40 in said bore, a bearing shaft eccentrically mounted and secured in said sleeve, said sleeve provided with a seat concentric with said shaft, a slide on said lever, said slide 45 carrying a contact member at one end and having a bore adapted to seat on said concentric seat on the sleeve.

9. The combination of a lever, a slide on said lever carrying a contact member and 50 means for pivotally mounting said lever and slide on a common pivot member, said lever being mounted eccentrically and said slide being mounted concentrically of said pivot member.

In testimony whereof I affix my signature.
AXEL AUGUST ASPLUND.