June 14, 1938. W. R. ISAKSON 2,120,612

CAMSHAFT GOVERNOR

Filed April 3, 1936 3 Sheets-Sheet 1

Fig. 1.

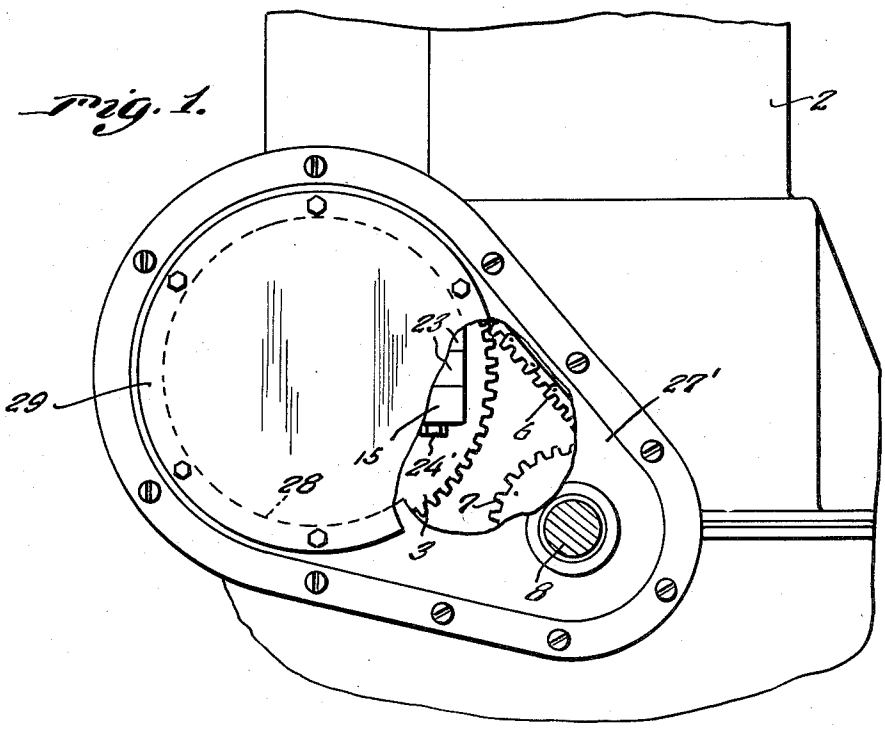


Fig. 4.

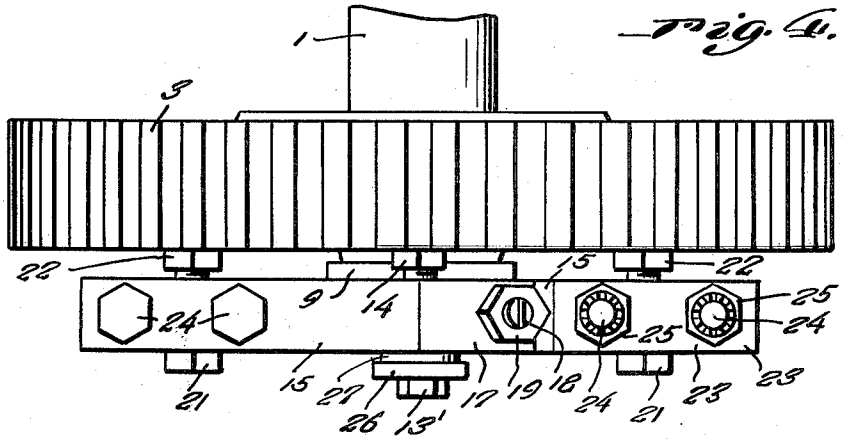
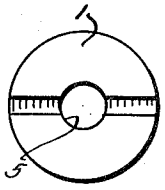


Fig. 7.



Inventor

W. R. Isakson

By Clarence O'Brien and Hyman Berman Attorneys

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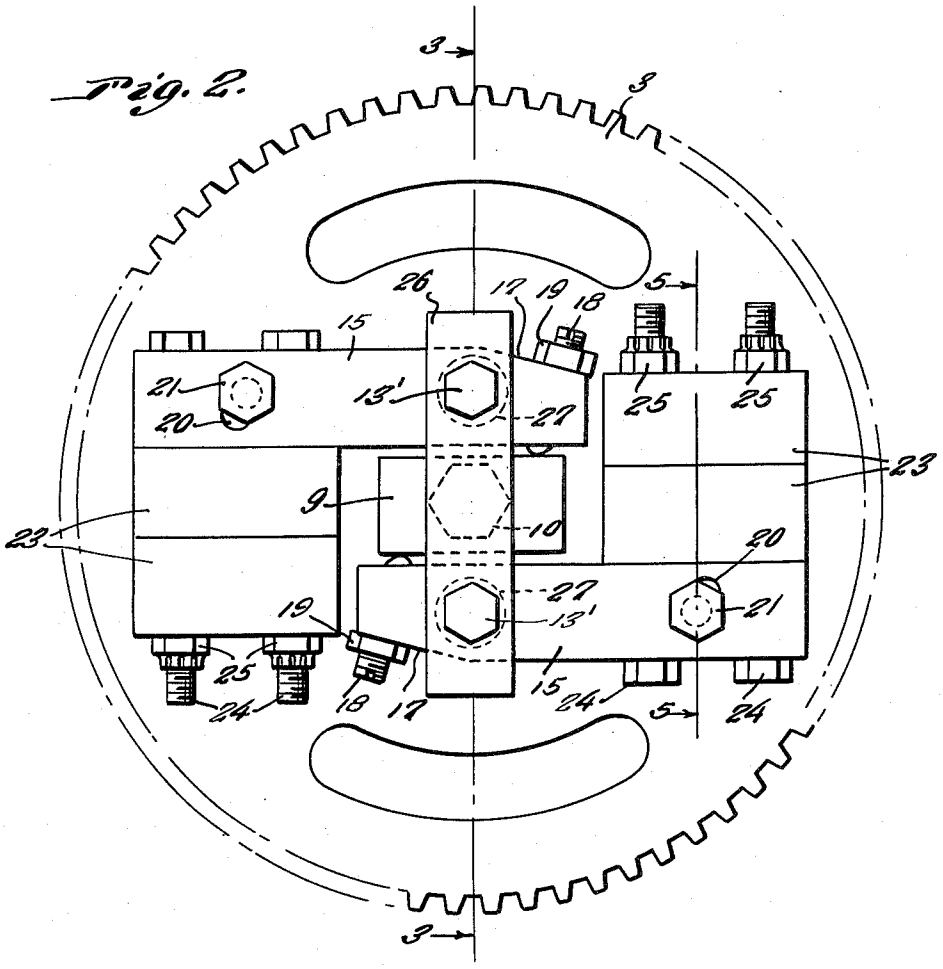
CAMSHAFT GOVERNOR

Filed April 3, 1936 3 Sheets-Sheet 2

Fig. 2.



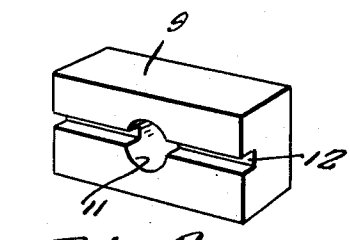
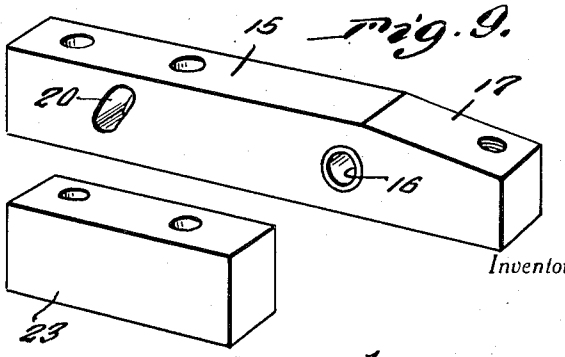


Fig. 8.

Fig. 9.



Inventor

W. R. Isakson

By Clarence O'Brien and Hyman Berman Attorneys

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CAMSHAFT GOVERNOR

Filed April 3, 1936 3 Sheets-Sheet 3

Fig. 3.

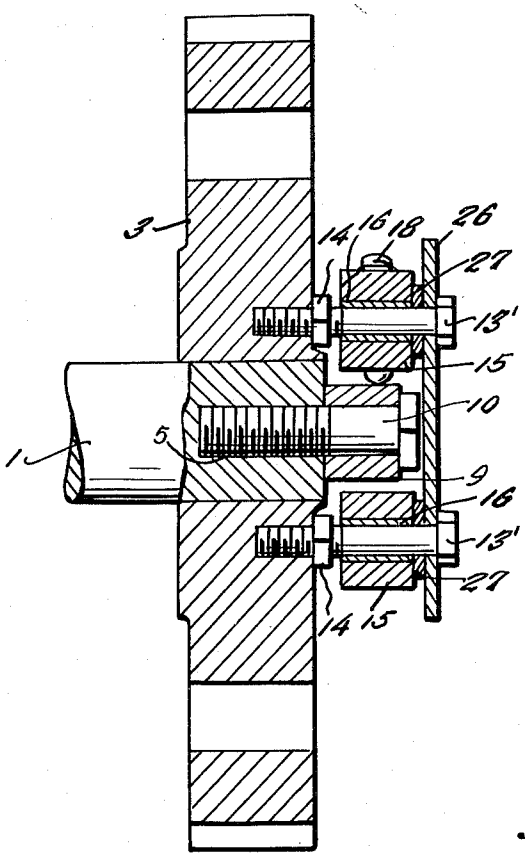


Fig. 5.

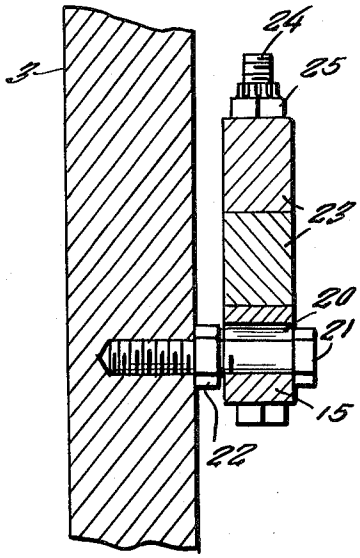


Fig. 10.

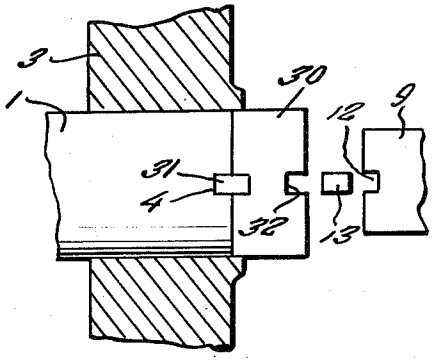
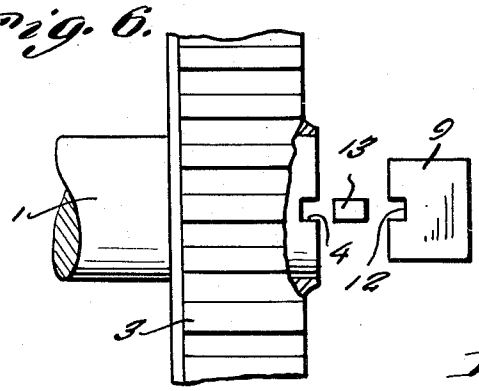


Fig. 6.



Inventor

W. R. Isakson

By Clarence A. O'Brien and Hyman Berman Attorneys

Patented June 14, 1938 2,120,612

UNITED STATES PATENT OFFICE

2,120,612

CAMSHAFT GOVERNOR

Walter R. Isakson, Hobart, Ind.

Application April 3, 1936, Serial No. 72,653

2 Claims. (Cl. 64—25)

The present invention relates to new and useful improvements in governors for the cam shafts of internal combustion engines and has for its primary object to provide, in a manner as hereinafter set forth, means operable by centrifugal force for automatically advancing the cam shaft as the speed of the engine increases.

Other objects of the invention are to provide a mechanism of the aforementioned character which will be comparatively simple in construction, strong, durable, highly efficient and reliable in use, compact, light in weight and which may be manufactured and installed at low cost.

All of the foregoing and still further objects and advantages of the invention will become apparent from a study of the following specification, taken in connection with the accompanying drawings wherein like characters of reference designate corresponding parts throughout the several views, and wherein:—

Figure 1 is a view in front elevation of the invention, a portion of the casing broken away, the crankshaft of the engine being shown in cross-section.

Figure 2 is a view in front elevation of the invention with the casing omitted.

Figure 3 is a vertical sectional view, taken substantially on the line 3—3 of Figure 2.

Figure 4 is a top plan view.

Figure 5 is a detail view in vertical section, taken substantially on the line 5—5 of Figure 2.

Figure 6 is a detail view in side elevation of an end portion of the cam shaft, the polygonal head which is mounted thereon, the key for locking said head to said cam shaft, the elements being shown separated, a portion of the cam shaft gear also being shown and broken away in section.

Figure 7 is a view in end elevation of the cam shaft.

Figure 8 is a detail view in perspective of the polygonal head which is fixed on the end of the cam shaft.

Figure 9 is a perspective view of one of the levers and one of the weights mounted thereon, the elements being shown separated.

Figure 10 is a view in side elevation of an arrangement which is used for mounting the speed responsive mechanism on cam shafts which are already in use, a portion of the cam shaft gear being shown in vertical section.

Referring now to the drawings in detail, it will be seen that the reference numeral 1 designates the cam shaft of an internal combustion engine 2. Journalled on the forward end portion of the cam shaft 1 is a gear 3. It will be noted that the forward end of the cam shaft 1 projects beyond the gear 3 and formed therein is a diametrically extending groove 4. Formed centrally in the forward end of the cam shaft 1 is a threaded socket 5. An endless chain 6 drives the cam shaft gear 3 in the usual manner from a gear 7 on the engine crank shaft 8.

The reference numeral 9 designates an elongated head which is secured on the forward end of the cam shaft 1 by a cap screw 10. The head 9 has formed therein a centrally located opening 11 for the passage of the cap screw 10, said cap screw being threadedly engaged in the socket 5 of the cam shaft 1. The head 9 has formed in its inner face a longitudinal groove 12 for the reception of locking keys 13 on opposite sides of the cap screw 10, which keys are also engaged in the groove 4 of the cam shaft 1. It will be noted that the socket 5 intersects the groove 4 and the opening 11 intersects the groove 12.

Pivot screws 13' are threadedly mounted in the gear 3 on opposite sides of the elongated head 9 and secured by locknuts 14. Journalled adjacent their inner ends on the pivots 13' are levers 15 which, as best seen in Figure 3 of the drawings are provided with removable bushings 16, The levers 15 include bevelled inner end portions 17 through which adjustable contact screws 18 are threaded for engagement with the head 9. The screws 18 are secured in adjusted position by lock nuts 19. The outer end portions of the levers 15 have formed therein slots 20 which accommodate cap screws 21 which are threadedly mounted in the cam shaft gear 3. Lock nuts 22 (see Figure 5) are provided for the screws 21. It may be well to here state that the screws 21 constitute stops for limiting the swinging movement of the levers 15. Mounted on the outer end portions of the levers 15 are weights 23 which are secured in position by bolts 24 and nuts 25.

Reference numeral 26 designates a brace which extends between the pivot screws 13' of the levers 15, said brace being mounted on said screws between the heads thereof and said levers 15. Washers 27 are interposed between the brace 26 and the levers 15.

The operation of the invention is substantially as follows:

With the speed responsive mechanism in the position shown in Figure 2 of the drawings, the cam shaft 1 of the engine is in its normal position with respect to the engine valves, timer, etc. The elements remain in this position while the engine is idling or running at comparatively slow

speed. However, when the engine is speeded up the levers 15 with the weights 23 thereon are swung outwardly by centrifugal force on the pivots 13' in a manner to advance the cam shaft 1 in angular relation relative to the gear 3 through the medium of the head 9 with which the contact screws 18 on the inner ends of the levers 15 are engaged. Of course, as the speed of the engine decreases, the cam shaft 1, under the influence of the usual valve springs of the engine, returns to normal position relative to the gear 3. The brace 26 supports the pivot screws 13' at their outer ends against outward strain exerted thereon by the weighted levers 15. Through the medium of the screws 18 the levers 15 may be conveniently equalized, also, the actuation of the cam shaft 1 by said levers may be regulated as desired.

The reference numeral 27' designates a casing for the gears 3 and 7, the endless chain 6, the speed responsive elements on said gear 3, etc. The casing 27' has a circular opening 28 formed therein which accommodates the speed responsive elements on the gear 3 and through the medium of which access to said elements may be conveniently had. A removable cover 29 is provided for the opening 28, said cover constituting an extension for the casing 27' which accommodates the speed responsive elements. A suitable gasket (not shown) is to be provided between the removable cover 29 and the casing 27'.

The arrangement illustrated in Figure 10 of the drawings is for adapting the invention to engines which are already in use. In this embodiment an extension 30 is provided on the forward end of the cam shaft 1 which, it will be noted, is necessitated by the fact that said cam shaft does not project forwardly beyond the gear 3. Keys 31 lock the extension 30 to the cam shaft 1 for rotation therewith. The head 9 is mounted on the outer end of the extension 30, the keys 13 being engaged in a groove 32 which is provided therefor in the outer end of said extension. The extension 30 is provided with a centrally located opening (not shown) for the passage of the cap screw 10 which secures the elements 9, 13, 30, and 31, in assembled position on the cam shaft 1. If desired, the keys 13 and 31 may be welded in position.

It is believed that the many advantages of a cam shaft governor constructed in accordance with the present invention will be readily understood and although preferred embodiments of the device are as illustrated and described, it is to be understood that changes in the details of construction and in the combination and arrangement of parts may be resorted to which will fall within the scope of the invention as claimed.

What is claimed is:—

1. A cam shaft, a gear journalled on said cam shaft, an elongated head fixed on the cam shaft, pivots projecting from the gear on opposite sides of said head, levers journalled, at an intermediate point, on said pivots, a brace connecting the outer end portions of said pivots, contact screws adjustably mounted in one end portion of the levers and engaged with opposite sides of the head on opposite sides of the axis of said head, weights mounted on the other end portions of the levers for actuating said levers by centrifugal force and for advancing the cam shaft angularly relative to the gears, and means mounted on the gear for limiting the swinging movement of said levers.

2. A cam shaft, a gear journalled on said cam shaft, an elongated head fixed on the cam shaft, pivots projecting from the gear on opposite sides of said head, levers journalled, at an intermediate point, on said pivots, a brace connecting the outer end portions of said pivots, contact screws adjustably mounted in one end portion of the levers and engaged with opposite sides of the head on opposite sides of the axis of said head, weights mounted on the other end portions of the levers for actuating said levers by centrifugal force and for advancing the cam shaft angularly relative to the gears, and means mounted on the gear for limiting the swinging movement of said levers, said means including bolts threaded into the gear, the levers having slots in said other end portions thereof in which said bolts are engaged.

WALTER R. ISAKSON.