W. GADKE.

GOVERNOR.

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1,362,689. **Patented Dec. 21, 1920.**

Fig. 1.

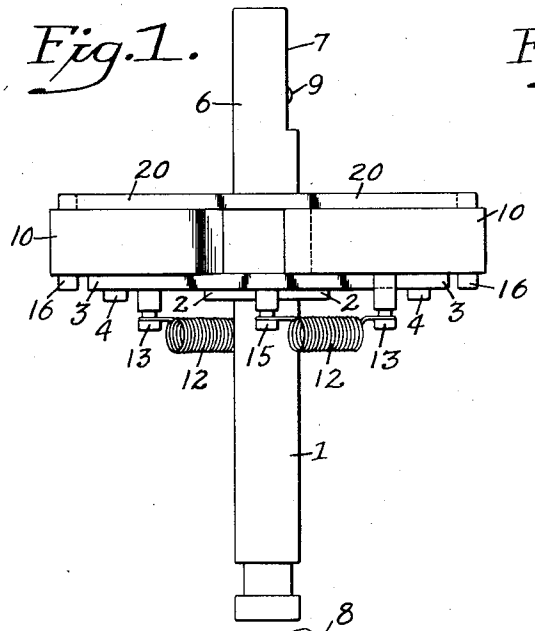


Fig. 4.

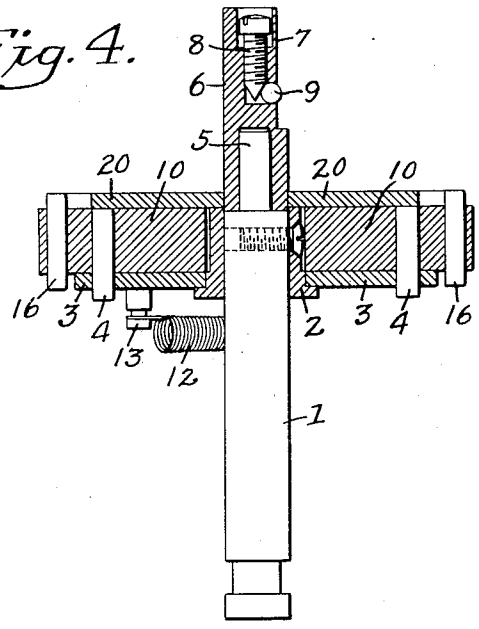


Fig. 3.

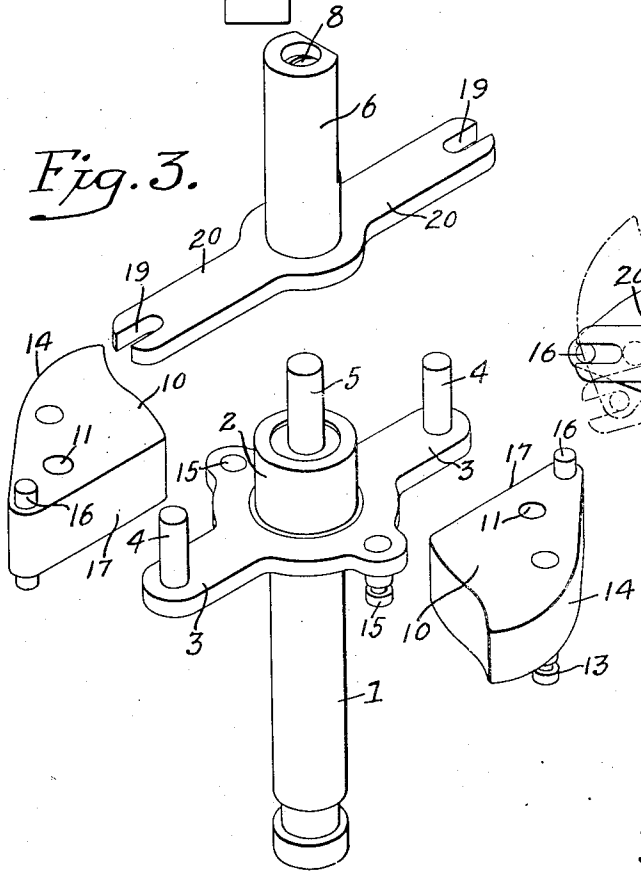
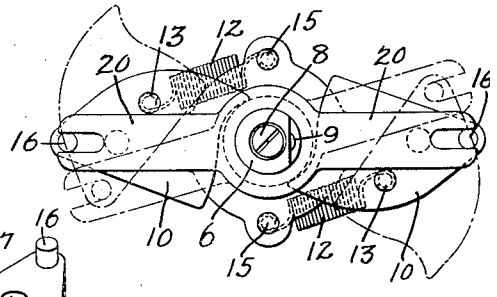


Fig. 2.



Inventor:-
William Gadke
by his Attorneys.
Howson & Howson

UNITED STATES PATENT OFFICE.

WILLIAM GADKE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO NORMAN MELLOR, OF PHILADELPHIA, PENNSYLVANIA.

GOVERNOR.

1,362,689. Specification of Letters Patent. Patented Dec. 21, 1920.

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To all whom it may concern:

Be it known that I, WILLIAM GADKE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Governors, of which the following is a specification.

One object of this invention is to provide a device for regulating the timer or spark producing device of an internal combustion engine so that the sparks will be formed in its cylinders at the most efficient or other predetermined point in the cycle of operation of the parts of said engine, it being further desired that the governor shall be steady in action, shall be relatively simple, and shall operate without fluttering.

A further object of the invention is to provide a governor of the above noted type with weights of novel form and so mounted that they shall act to give the steadiness and invariability of operation requisite for the best results, the construction being such that automatic adjustment of the timer under the action of the weights shall not occur until the governor shaft is turned at a predetermined rate.

These objects and other advantageous ends I secure as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figures 1 and 2 are respectively a side elevation and a plan of a governor constructed according to my invention, the latter figure showing in dotted lines the positions occupied by the weights when the speed of the driven shaft is relatively high;

Fig. 3 is a detached perspective view of certain of the parts of the governor; and

Fig. 4 is a central vertical section of the device.

In the above drawings 1 represents a portion of a shaft driven from the shaft of the engine whose timing device is to be governed or automatically adjusted. As is shown in Fig. 4 this has mounted on its upper end a collar 2 carrying a pair of oppositely projecting arms 3, adjacent the extremities of which are fixed two spindles or pins 4 extending at right angles to the plane of said arms. The upper extremity 5 of the shaft 1 is of reduced diameter and is designed to fit into a similarly formed cavity in the end of a shaft 6 upon which is mounted the toothed timer member or ratchet whose position is to be adjusted relatively to the movable contact of the timer. For the attachment of this toothed member or ratchet the spindle 6 preferably has one side flattened as indicated at 7 and has a centrally extending threaded cavity in its end for the reception of a screw 8. This cavity has a portion at right angles to the line of the screw in which is mounted a hard metal ball 9, it being noted that the end of the screw 8 is conical and that the outer edges of the cavity in which the ball rests are overhung so as to prevent its falling out. The diameter of the ball is such that when the screw 8 is turned into its cavity, the conical end thereof engages the ball 9 and projects it beyond the plane of the flat surface 7.

Mounted on each of the spindles or pins 4 is a relatively heavy weight, the greater portion of whose mass is located between its pin and the center line of the shaft 1, although its center of gravity lies at a greater or less distance to one side of a straight line extending between these two elements. While the weights 10 are not necessarily of a definite geometrical section, they may be described as having approximately the form of a triangular prism, one of whose sides is plane, while the adjacent side is somewhat convexly curved. The third side which is most distant from the hole 11 for the reception of the pin 4, has the outline of a reverse curve, one portion of which is similar to the external surface of the collar 2. As a consequence, when these weights are in their innermost positions, the relatively acute corner formed by the junction of the third side and the convex side 14, extends around the collar 2 so as to limit the movement of the weights on their pivots in one direction.

For drawing the weights into or toward their innermost positions each of them has operative upon it a coiled spring 12 connected between a post 13 projecting from its bottom face adjacent the central part of the convex side 14, and a second post 15 projecting downwardly from the arm structure 3—3. It is noted however that these springs are of such length or adjustment that they do not retard the outward swinging of the weights on their pivots for about the first 15 to 20 degrees of their angular movement. Each of the weights has projecting upwardly from its top plane face a pin or post 16 placed adjacent the acute edge formed by the junction of the convex

side 14 and the plane side 17 and designed to operate in a radially placed groove or recess 19 in an arm structure 20—20 fixed to the lower end of the second shaft 6. This second arm structure normally lies with its center line substantially parallel with the center line of the arm structure 3—3.

When however, under conditions of use the driving shaft 1 is rotated, the weights 10 at once swing outwardly away from the center line, turning on their pivots 4 through an angle of about 15 to 30 degrees. Obviously this movement of the weights swings the posts 16 through corresponding arcs and causes them, through the arms 20, to turn the second shaft 6 together with the timer member attached thereto, thus advancing to a definite extent the time at which sparks are formed. As the speed of the driving shaft is increased, there is no further substantial outward swinging of the weights until such speed passes a predetermined point, beyond which the weights again turn on their pivots until finally their posts strike the bottoms of the recesses 19 of the arm structure 20—20, when further movement is impossible. Obviously this outward movement of the weights is accompanied by a corresponding turning of the shaft 6 on the extension 5 and a corresponding angular advance of the timer member carried by it. Any decrease in the speed of the driven member is accompanied by a movement of the large ends of the weights 10 toward the collar 2 and a corresponding angular retrogression of the shaft 6 and the parts attached thereto.

By means of the device above described I am enabled to so govern the time of engagement of the contacts of an ignition system that the sparks are formed in the engine cylinders at precisely the times in the engine cycle desired, regardless of the speed at which the engine is operated. That is to say, the device automatically compensates for or overcomes the results of the lag in the ignition system which would ordinarily require hand adjustment of one of the timer members, in order to allow of a variation of speed, the sparks being caused to occur at those times in the cycle of the engine necessary to produce the highest efficiency of operation or requisite to give any other desirable results.

I claim:—

1. The combination of a shaft; arms fixed thereto; substantially triangular prismatic weights pivoted to said arms and each formed to approximately fit into the space between its pivot and the shaft; springs tending to draw the weights to positions in which their main portions lie between the line of the shaft and their pivots; and a member mounted to be actuated by said weights when they turn on their pivots.

2. The combination of two substantially coaxial shafts; two sets of oppositely extending arms respectively fixed to said shafts; two weights mounted between said sets of arms and pivoted to the arms of one set; means connecting said weights to the arms of the second set at points farther from the shaft than the pivots of the weights; and springs operative on the weights to oppose their movement away from the line of the shafts.

3. The combination of two substantially coaxial shafts; two sets of oppositely extending arms respectively fixed to said shafts; pivot pins projecting from the arms of one set in lines parallel with the shafts; weights rotatably mounted on one set of pivot pins and having projections respectively operative in slots in the arms of the second set; with springs acting to oppose swinging of the weights and mounted to be inoperative until the weights have turned through a predetermined angle.

4. The combination of two substantially coaxial shafts; sets of arms respectively fixed to said shafts; weights of substantially triangular prismatic form operative between said arms; pivots connecting said weights respectively to the arms of one set; springs tending to draw the weights into position with their main portions between their respective pivots and the center line of the shafts; each of said weights having a projection positioned to engage one of the shafts to limit its movement in one direction.

5. The combination of two substantially coaxial shafts; two sets of oppositely extending arms respectively fixed to said shaft; pivot pins on the arms of one of said sets; substantially flat weights of substantially triangular section mounted on said pins and each having an edge projected to engage one of the shafts to limit its movement in one direction; pins slidably connecting the weights with the arms of the second set respectively; and springs opposing outward swinging of the weights.

WILLIAM GADKE.