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PATENTED MAY 2, 1905.

T. B. JEFFERY.  
GAS ENGINE GOVERNOR.

APPLICATION FILED DEC. 14, 1903. RENEWED APR. 3, 1905.

Fig. 1.

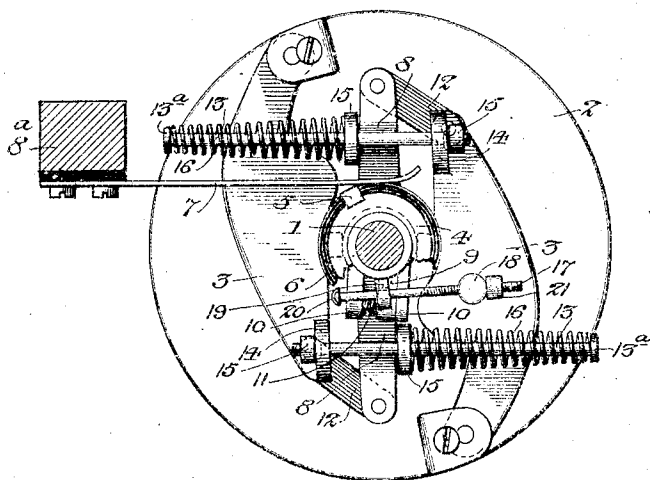
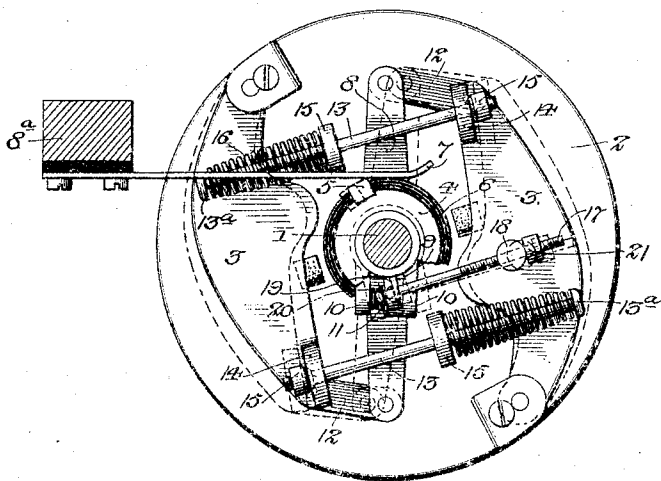


Fig. 2.



Witnesses:-

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# UNITED STATES PATENT OFFICE.

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## GAS-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 789,028, dated May 2, 1905.

Application filed December 14, 1903. Renewed April 3, 1905. Serial No. 253,663.

*To all whom it may concern:*

Be it known that I, THOMAS B. JEFFERY, a citizen of the United States, residing at Kenosha, in the county of Kenosha and State of Wisconsin, have invented new and useful Improvements in Gas-Engine Governors, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved governor for an electric igniter to govern the time of sparking in an explosive-motor conformably to the speed of the motor for the particular purpose of preventing the motor from "running away" by the continued advance of the time of sparking as the speed increased and to cause such increase of speed after a predetermined point to no longer advance the time of sparking, but to retard or interrupt it.

It consists in the features of construction set out in the claims.

In the drawings, Figure 1 is a plan view of a governing device for an explosive-motor embodying my invention, the parts being shown at the position of rest. Fig. 2 is a similar view showing in full line the parts in the position corresponding to the highest speed for which the device is adjusted and in dotted line said parts at the position to which they would be moved if the speed should be increased beyond the maximum for which adjustment is made.

1 represents any shaft whose period of rotation corresponds to the cycle of the engine's action. 2 is a disk secured to said shaft and rotating therewith, having pivoted to it at diametrically opposite and equidistant points the centrifugal elements 3 3.

4 is a sleeve mounted on the shaft 1. This sleeve carries with it in its rotation one of the contact-pieces 5, which is preferably guarded by an insulating-collar 6, at whose periphery said contact-piece is exposed for contact with the other circuit-closing element 7, which rests upon the insulating-collar 6 in its rotation, being supported by any fixed part, as the post 8<sup>a</sup>.

On the shaft 1 at the inner end of the sleeve

4 there is mounted for rotation about the shaft 50 with the sleeve a bar 8, which has a lug 9, engaged between two lugs 10 10 on the sleeve, so as to be rotated with the sleeve, but with a slight range of movement relative to the sleeve in so far as the distance between the 55 lugs 10 10 is greater than the thickness of the lug 9, a spring 11 being provided, holding the lug 9 against one of the lugs 10—that is, at one limit of its range of movement relatively to the sleeve. It will be seen that the bar 60 8 constitutes substantially two oppositely-projecting lever-arms of the sleeve, having slight range of yielding movement relatively thereto. The opposite ends of said bar or lever-arms are connected by links 12 12 with 65 the centrifugal elements 3 3, respectively, at points remote from their respective pivotal attachments to the disk 2. Check-rods 13 13, extending through lugs 14 14 on the centrifugal elements and through lugs 15 15, projecting from the disk, are positively stopped 70 outside one of said lugs by nuts screwed onto the ends of said check-rods, and outside the other lug in each case by a spring 16, coiled on the rod and stopped at the end 75 thereof by a head 13<sup>a</sup>. The springs on these check-rods, it will be seen, tend to hold the centrifugal elements in toward the center and to yieldingly resist their centrifugal movement. Such movement, to the extent to which it occurs, tends to rock the sleeve 4 about the shaft 1 in the direction of the rotation of the shaft, thus advancing the contact-piece 5 and causing the sparking to occur earlier in the rotation as the speed increases. This, it will be 85 understood, is designed and necessary for the purpose of making the sparking-point at starting and at slow speed occur safely late in the cycle of the engine's action, so that it shall not be in danger of occurring before the piston has commenced its outgoing movement, which the explosion caused by the sparking will continue, since if it occurred at an earlier point before any momentum had been acquired the result would be a reverse action 95 upon the occurrence of explosion, and as speed is gained and the momentum becomes sufficient to insure against reversion by an earlier

ignition such earlier ignition is desirable for the purpose of economy to get the most motive force from the explosion in accordance with well-understood principles. The result of this method of governing as applied to automobile-vehicles is to cause the speed to become accelerated automatically after starting, the speed of the motor being governed by other means to regulate the speed of the vehicle as desired. When the vehicle is at rest and the motor is disengaged from the running-gear, its own motion being continued for the purpose of maintaining the proper conditions for starting promptly and being for the time being abandoned by the operator, the tendency of the motor controlled only by the centrifugal governor constructed as thus far described would be to continue the acceleration of speed without limit, or, in common parlance, to "run away," to the detriment of the mechanism. To prevent such action and cause the motor to limit its own speed automatically at a certain point is the purpose of the yielding connection between the sleeve and the cross-bar or lever-arm 8. This yielding connection is made available for the purpose by providing a link 17, extending through a lug 18 on one of the centrifugal elements 3 and through a lug 19 on the sleeve 4, said link being stopped by its head 20 at one end and an adjustable nut 21 at the other end outside said lugs, respectively, so that when the centrifugal element to which it is thus connected has moved a certain distance out from the shaft the link being drawn to its full range through the lugs comes into operation by stopping against said lugs, and the further movement of the centrifugal elements causes said links to rock the sleeve 4 about the shaft in the reverse direction from that in which the connection of the centrifugal elements with the cross-bar 8 tends to rock it, and the connection of the cross-bar 8 with the sleeve for rocking it in advancing direction being a yielding one—that is, involving the spring 11—and the connection by means of the link 17 being positive when the stops on said links have reached the lugs, respectively, the movement caused by said link prevails over the movement which the centrifugal elements tend to cause through the medium of the cross-bar, and the advancing action of the contact element 5, which the outward movement of the centrifugal elements produces up to that point, ceases by retrograde movement caused by the link 17. In operation of course as soon as the slightest retrograde movement is caused the retarding of the sparking tends to slow up the engine and the centrifugal elements tend to return toward the center, so that, in fact, there will never occur any more than an initial retrograde movement caused by the link 17, and the range of play of the cross-bar 8 with respect to the sleeve 4, which is restricted by

the spring 11, need be but very slight, as shown.

I claim—

1. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; an element rocking on the shaft connected to such centrifugal element for such rocking movement; a contact-piece-carrying element pivotally mounted and carried by said rocking element in the rocking movement of the latter, and means operating after a limited extent of such rocking movement for turning the contact-piece-carrying element about its pivotal support.

2. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; an element rocking on the shaft connected to such centrifugal element for such rocking movement; an element carrying a contact-piece yieldingly connected with said rocking element for movement therewith, and a check device preventing the rocking movement of said contact-piece-carrying element beyond a predetermined point.

3. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; an element rocking on the shaft connected to said centrifugal devices for such rocking movement; a contact-piece-carrying element yieldingly connected with said rocking device; an abutment carried by the shaft, and means extending from said contact-piece-carrying element in position for encounter by said abutment at a predetermined point in such rocking movement.

4. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by said shaft; an element rocking on said shaft and connections from said centrifugal element for rocking it; a contact-piece-carrying element mounted pivotally with respect to said rocking element; a spring reacting between the contact-piece-carrying element and the rocking element; a stop limiting the action of the spring, and means limiting the movement of the contact-piece-carrying element relative to the shaft.

5. A gas-engine governor comprising, in combination with a shaft rotated in uniform time relation to the complete cycle of the engine's action, a centrifugal element carried by the shaft; an element rocking on the shaft and connected with said centrifugal element for such rocking movement; a contact-piece-carrying element pivotally mounted and yieldingly connected with said rocking device; an

abutment carried by the shaft, and means extending from said contact-piece-carrying element in position for encounter with said abutment in the said rocking movement.

5 6. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; an element rocking on the shaft connected to such  
10 centrifugal element for such rocking movement; a contact-piece-carrying element mounted loose about the shaft and connected with the rocking element, and means operating after limited movement of the latter for  
15 turning the contact-piece-carrying element about the shaft.

7. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; a device rocking on the shaft and connected with  
20 said centrifugal devices for such rocking movement; a contact-piece-carrying element pivotally related and yieldingly connected with said rocking device; an abutment on the  
25 centrifugal element and a connection extending from the contact-piece-carrying element in position for encounter with said abutment in said rocking movement and the outward  
30 movement of the centrifugal element.

8. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; an element rocking on the shaft and connected to  
35 such centrifugal element for such rocking movement; a contact-piece-carrying element also rocking on the shaft; yielding connection between said rocking element and said contact-piece-carrying element; an abutment carried  
40 by the centrifugal element, and connection from said contact-piece-carrying element extending in position for encounter with said abutment at a predetermined point in said  
45 rocking movement.

9. A gas-engine governor comprising a shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; a device  
50 rocking on the shaft and connected with said centrifugal element for such rocking movement; a contact-piece-carrying element also rocking on the shaft and yieldingly connected

with said first-mentioned rocking device for transmission therefrom of said rocking move- 55  
ment; said contact-piece-carrying element having a lever-arm, and connections from said lever-arm extending back with respect to the direction of rotation to the centrifugal element, said connections being adapted to allow  
60 limited range of separation or play between said lever-arm and such centrifugal element, and means for adjusting said connection to vary the limit of such separation.

10. A gas-engine governor comprising a 65  
shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; a device rocking on the shaft and connected to said centrifugal element for such rocking movement; 70  
a contact-piece-carrying element also mounted on the shaft and yieldingly connected to said rocking device for transmission therefrom of the rocking movement; a link extending from said contact-piece-carrying element back with respect to the direction of rotation for connection with the centrifugal element, and means for adjusting the operative  
75 length of said link.

11. A gas-engine governor comprising a 80  
shaft rotated in uniform time relation to the complete cycle of the engine's action; a centrifugal element carried by the shaft; a device rocking on the shaft and connected with said centrifugal element for such rocking move- 85  
ment; a contact-piece-carrying element mounted on the shaft and yieldingly connected with said rocking device for transmission of such rocking movement; a lug projecting from the contact-piece-carrying element; a lug on the centrifugal element which  
90 with respect to the direction of rotation of the shaft is rearward from the first-mentioned lug; a link extending loosely through both lugs and stopped thereagainst, one of the stops being a nut adjustable on the link for varying  
95 the distance between the stops and thereby the operative length of such link.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at 100  
Chicago, Illinois, this 3d day of December, 1903.

THOS. B. JEFFERY.

In presence of—

CHAS. S. BURTON,  
FRED. G. FISCHER.