B. G. KRAMER.

ENGINE GOVERNOR.

APPLICATION FILED JUNE 20, 1913. RENEWED APR. 17, 1914.

1,127,644. **Patented Feb. 9, 1915.**

2 SHEETS—SHEET 1.

Fig. 2.

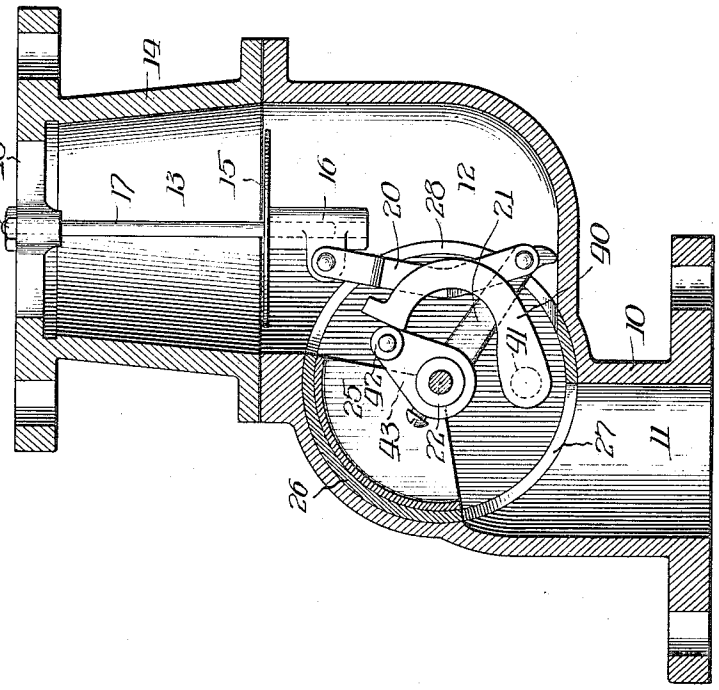
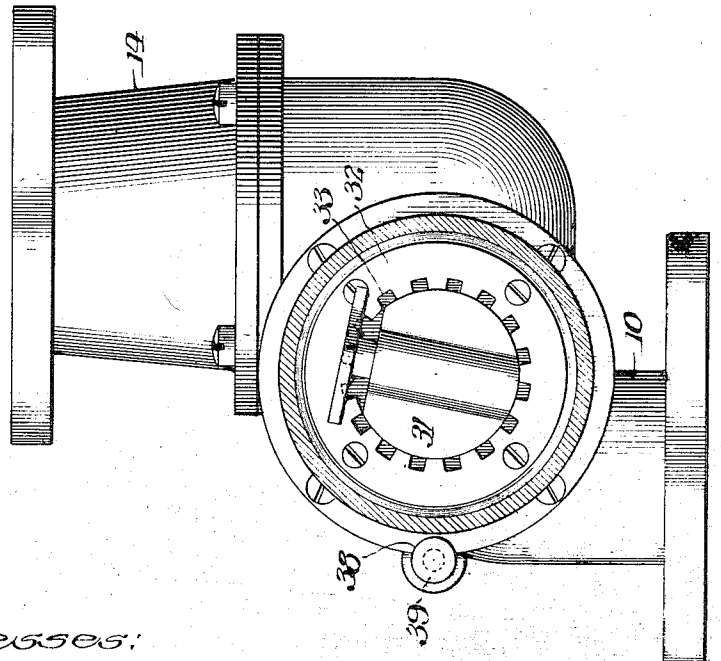


Fig. 1.



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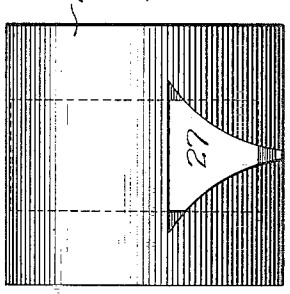
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2 SHEETS—SHEET 2.

Fig 5



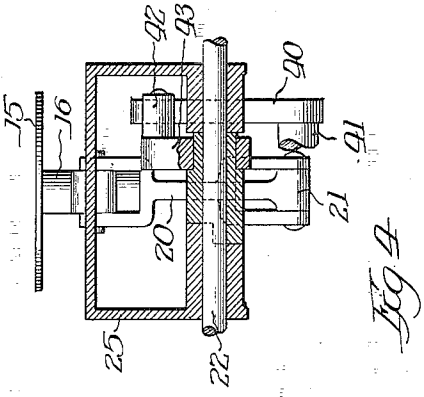
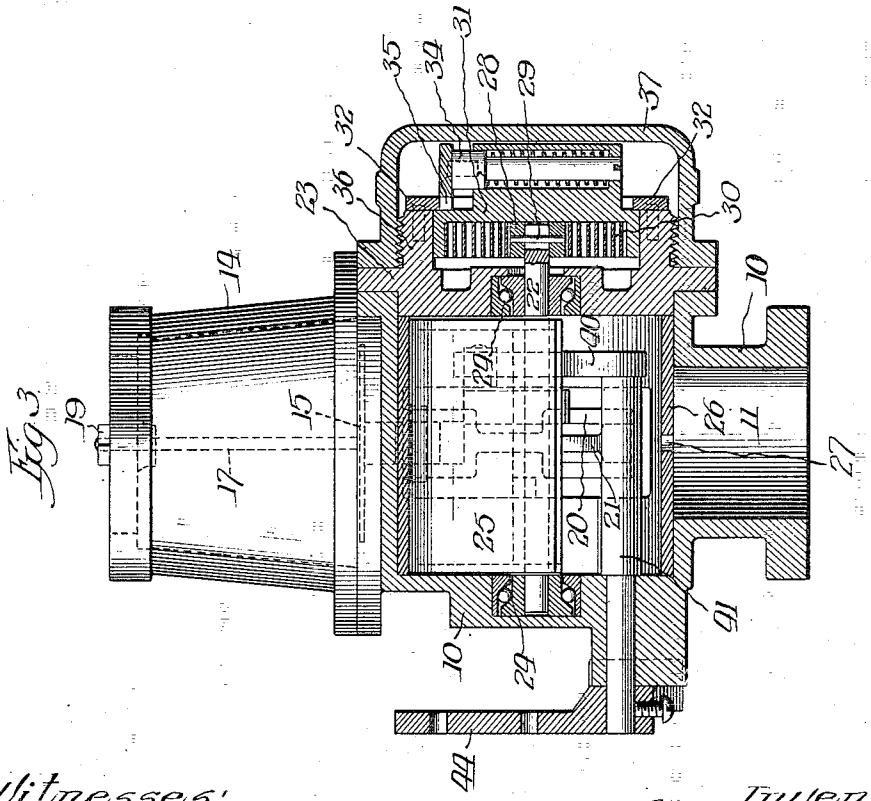


Fig 4

Fig 3



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UNITED STATES PATENT OFFICE.

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ENGINE-GOVERNOR.

1,127,644. Specification of Letters Patent. Patented Feb. 9, 1915.

Application filed June 20, 1913, Serial No. 774,733. Renewed April 17, 1914. Serial No. 832,530.

To all whom it may concern:

Be it known that I, BENJAMIN G. KRAMER, a citizen of the United States, and resident of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Engine-Governors, of which the following is a specification.

My invention relates to governors and has particular reference to a novel governor for use on hydro-carbon engines.

A form of governor somewhat similar in principle to that herein disclosed was first shown and described in my co-pending application, Serial No. 675,208, filed Feb. 3, 1912.

The present invention relates to a modification in the specific construction thereof and broadly claimed therein.

An object in the construction of a governor of this type is to adapt the same for use on commercial trucks, many of which are operated by unskilled and careless drivers, whereby to prevent improper operation in the matter of speed, and further, to prevent racing of the engine at any time.

In both applications the primary governing device is a disk mounted for reciprocation within a flared conduit through which the air or combustion mixture must pass. In both cases the disk is connected to a throttle. In both cases, means are provided for control of the throttle only within the limit permitted by the governing device. In this application the throttle may be positively closed by manual means while in the earlier application the throttle was permitted to close by reducing the tension on a spring. Further, in this application I have claimed a construction wherein the extent of opening or closing of the throttle valve is in proportion to the extent of increase or reduction of the area of the flared conduit by the movable disk.

I am aware that many governors have been suggested with the object in view of securing these advantages, most thereof relying on external parts such as fly balls for securing the governing action. This on a commercial vehicle is an impractical construction for many reasons. Furthermore, I am aware of no means whereby the speed at which the truck may be operated is controlled by the owner without, however, limiting the power which may be utilized at all times. It is quite practicable to place a governor on a stationary engine in such manner that the speed of the engine is constant. However, in the operation of commercial trucks the load varies between the widest possible limits. For instance, in overcoming a steep grade or passing through sand or mud the engine may be taxed to its utmost, whereas, at other times when the engine is running idly the speed should be the lowest possible in order to continue its operation. Furthermore, this governing action should be secured in such manner that even the slightest change in the load will affect the governor instantly. I have discovered that this result is possible only by locating the governing member within the intake manifold, the governing member acting directly on the throttle whereby even the slightest change in the force of the incoming charge is communicated instantly to the throttle and the required adjustment made. All of this should be automatic and preferably entirely out of the control of the operator. I have also discovered, as disclosed in my co-pending application heretofore referred to, that the governing effect is secured to a degree by the employment of a tapered conduit within which a vertically movable disk or plate is mounted, this disk working against a suitable spring and being directly connected to the controlling throttle. By employing a tapered conduit the degree of force applied to the governing plunger is changed somewhat as said plunger moves into the more restricted portion of the conduit. I have found in addition, however, by extended experiments that the orifice controlled by the throttle should likewise be of such shape that the throttle covers or uncovers said opening proportionately to the extent of variation in the cross-sectional area of the conduit within which the governing plunger operates. I have found that the ordinary butterfly throttle does not operate in a highly desirable manner when connected to a plunger located in a tapered conduit for the reason that the extent of opening of the throttle valve is not in proportion to the extent of reduction in the effective area of the conduit within which the governor is located.

By the words "ordinary butterfly throttle", I refer to a device which is not designed to provide for a strictly proportional graduation of opening. If a butterfly valve is constructed to provide an opening propor-

tional to the taper of the conduit within which the disk reciprocates, it will operate successfully.

Therefore one of the principal objects of my invention is to combine with a tapered conduit having a governing disk mounted therein, a throttle valve directly connected to said governing plunger, said throttle valve controlling an opening which shall be graduated in size or effective area of opening in accordance with the degree of reduction of the tapered conduit within which the governing member operates.

A further object is to arrange all such parts completely within one casing, which casing may be secured against unauthorized tampering.

A further object is to so arrange the parts that the throttle-carrying shaft may have ball bearings thus insuring sensitiveness to actuation by the governing member and obviating wear.

My invention will be more readily understood by reference to the accompanying drawings, wherein,

Figure 1 is a side elevation with the outer cap removed; Fig. 2 is a vertical section through the construction shown in Fig. 1; Fig. 3 is a partially vertical section taken at right angles to that of Fig. 2; Fig. 4 is a detail of the throttle control showing the governing disk, and, Fig. 5 is an enlarged face view of the sleeve in which the intake opening is formed.

Referring more particularly to the drawings it will be understood that my governing device is applied in the intake manifold of a hydro-carbon engine, the usual carbureter being secured to the bottom flange of the casing and the flanged manifold secured to the top portion of the casing. In the preferred construction the casing 10, is provided with a vertical conduit 11, this conduit opening into an enlargement 12, in a different plane from that of the conduit 11. The conduit 12 has considerably greater cross sectional area than the conduit 11, the former communicating with a tapered conduit 13, formed in a separable portion 14, of the casing. The space 13 communicates with the engine manifold. It is to be noted that the shape of the space 13 has an important bearing on the operation of my governor. The space is circular in cross section, the cross sectional area becoming less toward the upper portion of the space whereby a tapered conduit is formed. Within this tapered conduit a governing disk 15, is mounted the disk being provided with an apertured hub 16, which coöperates with a pin or rod 17, secured to a cross piece 18, by means of a nut 19. Thus the disk is centered with respect to the conduit but is permitted vertical movement therein under the action of the incoming charge of carbureted air. It will be understood that as the speed of the engine increases, the vacuum above the disk 15 is greater the pressure outside tending to force the disk proper upward within the contracted portion of the conduit 13. The hub 16 is provided with a lug to which a link 20, is secured, this link being connected to a lever 21, which is rigidly secured to a transverse shaft 22. This shaft has a bearing at one end in the casing 10, and at the other end in a removable portion 23, which, when in place, forms a wall of the casing. As shown, the shaft has ball bearings 24, thus insuring an extremely delicate operation. Also secured to the shaft 22, is the throttle valve 25, constructed in the form of a segment, as best shown in Figs. 2, 3 and 4, the outer surface thereof being truly circular, the circle being formed from the center of the shaft 22. This valve operates against a wearing sleeve 26, fitted within the circular opening in the casing and provided with openings 27, 28, therethrough. The opening 27, is controlled by the valve 25, in Fig. 2, the opening being unobstructed by the valve, that is, the valve is fully opened, the disk 15 being in its lowermost position. An important feature in connection with the valve 25, is in the shape of the opening 27, in the sleeve 26. It will be seen that this opening is triangular in outline. The base of the triangle which corresponds to the widest point in the opening is a straight line, whereas the two sides leading from the base to the apex of the triangle are curved or concave. The shape of the opening and hence the extent of uncovering of the intake passage is arranged to correspond to the extent of contraction of the conduit 13. It has been found in practice that by the use of many of the known forms of throttle valves on a sudden acceleration in the speed of the engine the disk is drawn upwardly to an extent whereby the valve is completely closed; that is, the valve opening is not graduated to correspond to the movement of the disk under the vacuum above the disk. By the present construction the throttle opening is closed or opened in the same ratio that the conduit 13 is restricted by the disk 15. Also secured to a projecting end of the shaft 22, by means of a core 28, and a pin 29, is a coiled spring 30, the outer end of the spring being secured to a regulating hand nut, 31, held in place by a ring 32, which ring is provided with notches 33, as best shown in Fig. 1.

Mounted within a transverse recess in the hand nut 31 is a spring-pressed plunger 34, having a projection 35, which coöperates with one of the notches 33, in the ring 32. By this means the hand nut is held in place and the tension of the spring maintained as desired. The spring is arranged whereby its tendency is to open the throttle valve to the position shown in Fig. 2. However, the

suction effect of the engine on the disk 15, overcomes the force of the spring to a certain extent closing the valve and governing the speed of the engine.

It will be seen that by moving the hand nut to right or left the tension of the spring is controlled and therefor the speed at which the engine may operate. It is desirable in the application of this device to trucks or similar commercial vehicles that the speed at which the vehicle may be operated should be controlled by the owner in order to prevent fast driving or the racing of the engine by careless operators. This is accomplished by closing and locking the adjusting means. The portion 23, of the casing is provided with a threaded projecting boss 36, on which a cap 37 is secured. The cap and the casing 23 are provided with registering recesses 38, and after the cap is screwed into place a bolt 39 is seated in the registering recesses and is locked in place. This prevents the rotation of the cap and therefore prevents tampering with the adjustment of the governor.

In order that the engine may be throttled at as low a speed as desired without reference to the governor, I provide a lever 40, secured to a shaft 41, the lever coöperating with an anti-friction roller 42, on an arm 43, securely fastened to the shaft 22. An end of the shaft 41 projects outside of the casing and permits the connection thereto of a throttle lever 44, to which may be connected the usual rods communicating with the steering post of the vehicle. By this means it will be seen that while the operator may throttle the engine to as low a point as desired, he cannot open the throttle beyond the point permitted by the governor and that nevertheless the engine is enabled at all times to deliver its full power inasmuch as whenever the speed of the engine falls below a certain point the throttle will be opened by the action of the spring 35.

The shape of the conduit 13 and the shape of the opening 27 in the sleeve 26 may be varied as desired in order to secure fine or coarse governing action. In the construction shown the governing action will be very delicate, the slightest change in the speed of the engine causing a movement of the valve member and the consequent opening or closing of the intake.

It will be noted also that the entire mechanism is completely inclosed in an air tight manner whereby there is no interference in operation due to the entrance of air other than through the carbureter. This makes possible also the employment of ball bearings with an advantage which is easily understood.

It is obvious that many modifications may be made in the construction shown and such modifications as are within the scope of my claims I consider within the spirit of my invention.

I claim:

1. In an engine governor, the combination of a casing provided with a conduit of varying cross sectional area, a disk mounted in said conduit, a throttle valve, said valve controlling an intake opening, a connection between said disk and said valve, the opening and closing of said intake passage being effected automatically to a degree corresponding to the increase or decrease of the effective area of the conduit surrounding said disk, substantially as described.

2. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a governing disk centered within said conduit and adapted for longitudinal movement with relation thereto, a valve controlling a triangular inlet opening, and a connection between said disk and said valve whereby said intake opening is opened or closed in the ratio of the increase or reduction of effective area in the conduit surrounding said disk, substantially as described.

3. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a governing disk centered within said conduit and adapted for longitudinal movement with relation thereto, a valve controlling a triangular inlet opening, and a positive connection between said disk and said valve whereby said intake opening is opened or closed in the ratio of the increase or reduction of effective area in the conduit surrounding said disk, substantially as described.

4. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a disk centered within said conduit and adapted for longitudinal movement therein, an arcuate valve member mounted for rotation on a shaft within said casing, said valve and disk being interconnected, said valve controlling a V-shaped opening, and means for manually closing said valve, substantially as described.

5. In a governor, a casing providing a conduit of varying cross sectional area, a disk centered within said conduit and adapted for longitudinal movement therein, an arcuate valve mounted for rotation within said casing, said valve controlling a V-shaped opening, a spring operatively connected to said valve, and means for adjusting the tension of said spring, the force of the incoming charge acting on said disk, tending to restrict said V-shaped opening against the tension of said spring, substantially as described.

6. In an engine governor, a casing providing a conduit of varying cross sectional area, a disk centered within said conduit and adapted for longitudinal movement therein,

a valve member mounted for rotation on a shaft within said casing, said valve and disk being inter-connected, said valve controlling a V-shaped opening, means for manually moving said valve to close said V-shaped opening, said valve being operated to uncover said V-shaped opening by other than said manually operable means, substantially as described.

7. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a disk centered within said conduit and adapted for longitudinal movement therein, a valve member mounted for rotation on a shaft within said casing, said valve and disk being inter-connected, said valve controlling a V-shaped inlet space, spring means normally tending to rotate said valve member and uncover said V-shaped space in opposition to the force exerted against said disk, and means for manually operating said valve to cover said opening, substantially as described.

8. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a disk centered within said conduit and adapted for longitudinal movement therein, a valve mounted on a shaft within said casing and adapted to control an intake opening, a spring connected to said valve member, means for adjusting the tension of said spring, a cap for covering said spring adjusting means, and means for locking said cap in position, substantially as described.

9. In an engine governor, the combination of a casing providing a conduit of varying cross sectional area, a disk mounted and adapted for longitudinal movement within said conduit, a throttle valve controlling the travel of fluid through said conduit, means connecting said disk and said throttle valve, the extent of opening of said valve being determined by the position of the disk in the conduit, and positive, manually operable means associated with said throttle and adapted to act only to force said throttle toward its closed position, substantially as described.

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