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C. N. WALSH & W. N. RUMELY.

ENGINE GOVERNOR.

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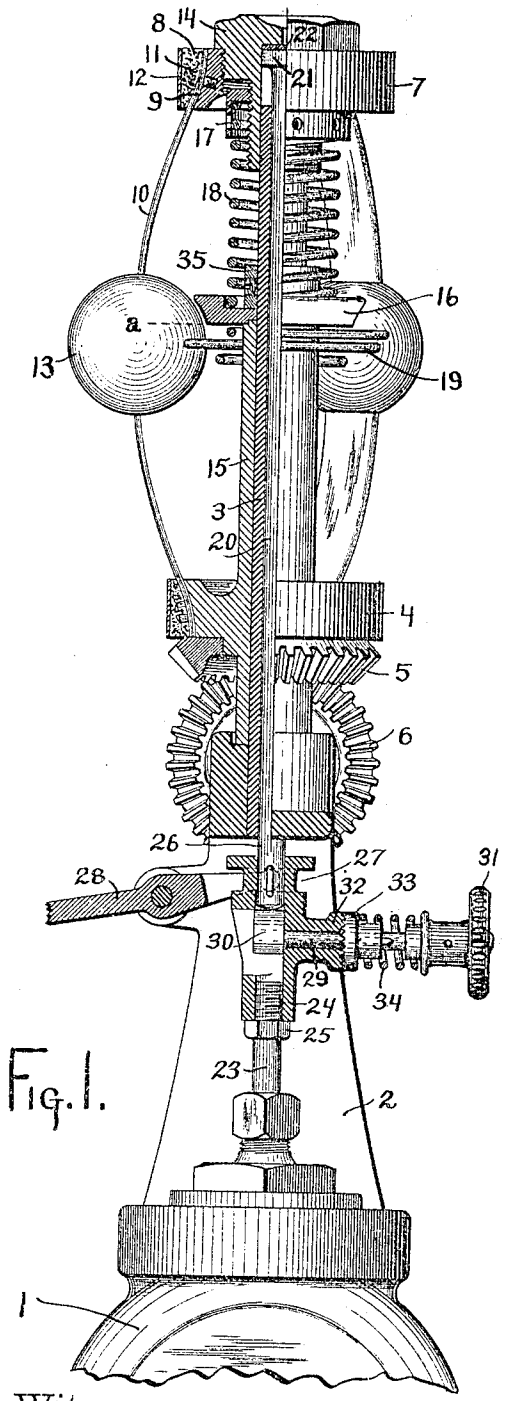

Fig. 1.

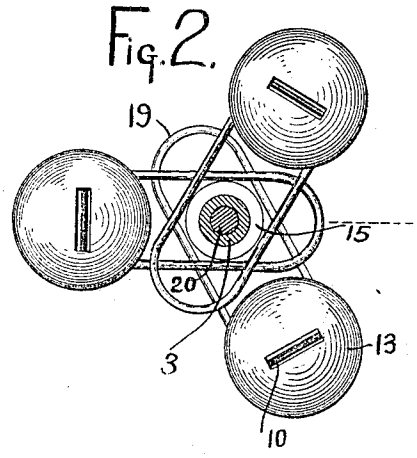

Fig. 2.

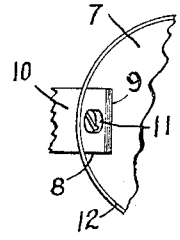

Fig. 3.

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UNITED STATES PATENT OFFICE.

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ENGINE-GOVERNOR.

No. 818,718. Specification of Letters Patent. Patented April 24, 1906.

Application filed October 14, 1905. Serial No. 282,723.

To all whom it may concern:

Be it known that we, CHARLES N. WALSH and WILLIAM N. RUMELY, citizens of the United States, residing at Laporte, Laporte county, Indiana, (post-office address Laporte, Indiana,) have invented certain new and useful Improvements in Engine-Governors, of which the following is a specification.

This invention, pertaining to improvements in engine-governors of the flexible spring type, will be readily understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a vertical half-section of a governor exemplifying our improvements; Fig. 2, a horizontal section of the same, and Fig. 3 a plan of the head with the filling omitted.

In the drawings, 1 indicates the valve-body; 2, the so-called "harp" mounted thereon; 3, the fixed hollow stud rising therefrom; 4, the whirl mounted to turn on the base of the stud; 5, the bevel-gear secured to the whirl; 6, the bevel-gear for transmitting motion to the whirl from the pulley-shaft; 7, the head, arranged for rotation on the upper end of the stud; 8, peripheral notches in the whirl and head in number corresponding with the number of governor-balls provided, three in the example; 9, the inner walls of these notches, the same presenting contours in the form of outwardly-presenting concave circular curves; 10, the springs, being metallic ribbons or blades, preferably laminated, having their upper ends seated in the notches of the head and their lower ends seated in the notches of the whirl; 11, screws passing through the ends of the springs and into the inner walls of the notches and serving to draw the ends of the springs into substantial conformation with the contour of those walls; 12, bands encircling the whirl and head and closing the outer portions of the notches; 13, the governor-balls secured to intermediate portions of the springs; 14, a plug screwed downwardly into the head 7, the lower portion of this plug being counterbored to turn and slide upon the upper end of the stud 3 and the lower portion of the plug being of reduced diameter and exteriorly threaded; 15, a sleeve adapted to rotate upon the stud and extending from the whirl upwardly to a point preferably somewhat above the general plane of revolution of the center of the governor-balls, the illustration showing this sleeve as being integrally formed with the whirl, which is a preferred construction; 16, a flange seated upon the upper end of the sleeve and turning with it and the whirl; 17, a nut adjustable upon the threaded lower portion of the plug 14, the greatest diameter of this nut being not in excess of that of the hole through the head in which the plug is screwed; 18, a helical spring compressed between collar 16 and nut 17; 19, the guard-loops projecting inwardly from the governor-balls and surrounding the sleeve and adapted to limit the outward movement of the balls; 20, the governor-rod sliding within the axial bore of the stud 3; 21, a head upon the upper end of this rod above the top of the stud and within the bore of plug 14; 22, anti-friction-washers disposed within the bore of the plug between the roof of the bore and the top of the head on the rod; 23, the valve-stem, projecting upwardly from the valve-body; 24, a housing adjustably screwed upon the upper end of the valve-stem; 25, a lock-nut for making secure the screwed juncture of the valve-stem with the housing; 26, the lower end of the valve-rod 20, the same being splined into the upper portion of the housing 24, so as to slide vertically relative thereto; 27, a notch or groove in the housing; 28, the counterbalancing-lever for supporting the valve-rod and the load parts connected with it; 29, a spindle journaled in the housing at right angles to the axis of the governor-rod and valve-stem; 30, an eccentric on the inner end of the spindle in the plane of the axis of the governor-rod, the foot of the governor-rod resting upon this eccentric; 31, a handle on the outer end of the spindle; 32, a serrated outer face for the spindle bearing in the housing; 33, a collar splined on the spindle and having a serrated face intermembering with the face 32; 34, a helical spring compressed between collar 33 and the handle on the spindle and tending to press the serrated members into engagement, and 35 a collar secured upon stud 3 above collar 16 and serving to prevent the rising of the parts rotating upon the lower portion of the stud.

The descent of the governor-head as brought about by the outward movement of the balls depresses the governor-rod and valve-stem, the return movement or upward tendency of these parts being brought about by the counterbalance-lever 28, as usual. The relation of the valve to the governor-head is adjusted by lengthening and shortening

the connection between them, and in our construction this is accomplished in an obvious manner by means of the eccentric. When the swell of the eccentric is upward, then the connection has its greatest length, and when the swell of the eccentric is downward then the connection has its least length. The serrated collar and spring arrangement permits the eccentric to be angularly adjusted by means of the handle 31 and bring about a substantial locking of the parts after adjustment.

As the balls move outwardly their motion is limited and damage prevented by the engagement of the guard-loops with sleeve 15, and as this sleeve turns with the rotating system no frictional resistance to the rotation is brought about by the stopping system; similarly as to collar 16, which may, if desired, serve as an inward limit to the movement of the balls.

Spring 18 furnishes most or much of the centripetal force of the governor and constitutes the main agent, giving it stability in action. In our construction this spring neither interferes with nor is interfered with by the guard-loop system. The tension on this spring is adjusted by means of nut 17. The unscrewing of plug 14 permits the ready withdrawal of spring 18 and the governor-rod.

In producing the notches 8 they are preferably cut by means of a milling-cutter of about two inches or more radius. When the end of a spring is laid in a notch, it bridges the concavity of the wall, and when the screw 11, which preferably has a convex under surface for its head, is forced home it draws the spring snugly down into the concavity of the wall of the notch. The effect of this upon the spring having consideration for the attachment at opposite ends of the spring is to give the portion of the spring between the whirl and governor-head a peculiar reversed curvature of such character that in the action of the governor the springs are not subjected to the usual damaging concentrated strains. After the springs are secured to the whirl and governor-head and before or after the bands 12 are put in place the outer portions of the notches are preferably filled solidly with some comparatively soft metal, as lead, whereby considerable relief is given to the attaching-screws, and inward pressure is brought upon the entire outer surfaces of the springs opposite the concave walls of the notches.

The eccentric provides for a certain range of adjustment in the relationship of the governor-head to the valve-stem, and the screwed connection between the valve-stem and the housing provides for an additional range of adjustment.

We claim as our invention—

1. In a governor, the combination, substantially as set forth, of a valve-stem, a rod in line therewith and arranged to be reciprocated by the governor mechanism, a housing secured to the valve-stem and having the foot of the rod arranged to slide in it, an eccentric mounted in the housing and having the foot of the rod resting upon its periphery, and means for turning and locking the eccentric.

2. In a governor, the combination, substantially as set forth, of a valve-stem, a rod in line therewith and arranged to be reciprocated by the governor mechanism, a housing adjustably screwed to the valve-stem and having the foot of the rod arranged to slide in it, an eccentric mounted in the housing and having the foot of the rod resting upon its periphery, and means for turning and locking the eccentric.

3. In a governor, the combination, substantially as set forth, of a valve-stem, a rod in line therewith and arranged to be reciprocated by the governor mechanism, a housing secured to the valve-stem and having the foot of the rod arranged to slide in it, an eccentric mounted in the housing and having the foot of the rod resting upon its periphery, a spindle journaled in the housing and carrying the eccentric, a handle on the spindle, intermembering serrated members carried by the housing and spindle, and a spring holding said serrated members yieldingly in engagement.

4. In a governor, the combination, substantially as set forth, of a fixed stud, a governor-head rotatable and slidable at the top thereof, balls connected with the governor-head, a member with an upwardly-presenting surface mounted on the stud below the governor-head, a plug screwed downwardly into the governor-head, and a helical spring compressed between said upwardly-presenting member and a downwardly-presenting surface carried by said plug.

5. In a governor, the combination, substantially as set forth, of a fixed stud, a governor-head rotatable and slidable at the top thereof and having a threaded bore extending through it, balls connected with the governor-head, a member with an upwardly-presenting surface mounted on the stud below the governor-head, a plug screwed downwardly into the governor-head, an adjusting-nut screwed upon the lower portion of the plug, and a helical spring compressed between said upwardly-presenting member and said nut.

6. In a governor, the combination, substantially as set forth, of a fixed stud, a governor-head rotatable and slidable at the top thereof and having a threaded bore extending through it, balls connected with the governor-head, a member with an upwardly-presenting surface mounted on the stud below the governor-head, a plug screwed down-

wardly into the governor-head, an adjusting-nut screwed upon the lower portion of the plug, and a helical spring compressed between said upwardly-presenting member and said nut, the bore of the governor-head having a diameter in excess of that of said nut or spring.

7. In a governor, the combination, substantially as set forth, of a fixed stud, a governor-head rotatable and slidable at the top thereof, balls connected with the governor-head, a whirl mounted to turn on the stud and having connection with the balls, a sleeve projecting upwardly from the whirl and carrying a collar, a plug screwed downwardly into the governor-head, a helical spring compressed between said collar and a downwardly-presenting surface carried by said plug, and guard-loops carried by the balls and inclosing the sleeve below said collar.

8. In a governor, the combination, substantially as set forth, of a fixed stud, a governor-head rotatable and slidable at the top thereof, balls connected with the governor-head, a whirl mounted to turn on the stud and having connection with the balls, a sleeve projecting upwardly from the whirl and carrying a collar, a plug screwed downwardly into the governor-head, a helical spring compressed between said collar and a downwardly-presenting surface carried by said plug, and guard-loops carried by the balls and inclosing the sleeve below said collar, said collar being disposed in the general plane of revolution of the balls and having a diameter suited to limit the inward movement of the balls.

9. In a governor, the combination, substantially as set forth, of a rotary disk, a notch in the periphery thereof having an inner wall with a concave contour, a spring-blade having its end seated in said notch against said wall, and means for forcibly curving the end of the spring into contact with the concave surface of said wall.

10. In a governor, the combination, substantially as set forth, of a rotary disk, a notch in the periphery thereof having an inner wall with a concave contour, a spring-blade having its end seated in said notch against said wall, and a screw engaging the end of the spring and the disk and serving to forcibly curve the spring against the wall of the notch.

11. In a governor, the combination, substantially as set forth, of a rotary disk, a notch in the periphery thereof having an inner wall with a concave contour, a spring-blade having its end seated in said notch against said wall, a screw engaging the end of the spring and the disk and serving to forcibly curve the spring against the wall of the notch, and a filling within the notch against the outer face of the end of the spring.

12. In a governor, the combination, substantially as set forth, of a rotary disk, a notch in the periphery thereof having an inner wall with a concave contour, a spring-blade having its end seated in said notch against said wall, a screw engaging the end of the spring and the disk and serving to forcibly curve the spring against the wall of the notch, a filling within the notch against the outer face of the end of the spring, and a band encircling the disk exterior to the filling.

13. In a governor, the combination, substantially as set forth, of a fixed stud, a whirl mounted to turn thereon, a governor-head mounted to turn and reciprocate upon said stud, a support to prevent the whirl moving axially on the stud in a direction away from the governor-head, balls connected with the whirl and governor-head, a fixed first collar carried by the stud above the whirl and preventing the movement of the whirl axially upon the stud in a direction toward the governor-head, and a second collar carried by and rotating with the whirl between the first collar and the whirl, and a spring compressed between the second collar and the governor-head.

14. In a governor, the combination, substantially as set forth, of a fixed stud, a whirl mounted to turn thereon, a governor-head mounted to turn and reciprocate upon said stud, a support to prevent the whirl moving axially on the stud in a direction away from the governor-head, balls connected with the whirl and governor-head, a fixed first collar carried by the stud above the whirl and preventing the movement of the whirl axially upon the stud in a direction toward the governor-head, and a second collar carried by and rotating with the whirl between the first collar and the whirl, a spring compressed between the second collar and the governor-head, and an adjusting-nut carried by the governor-head and engaging said spring.

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