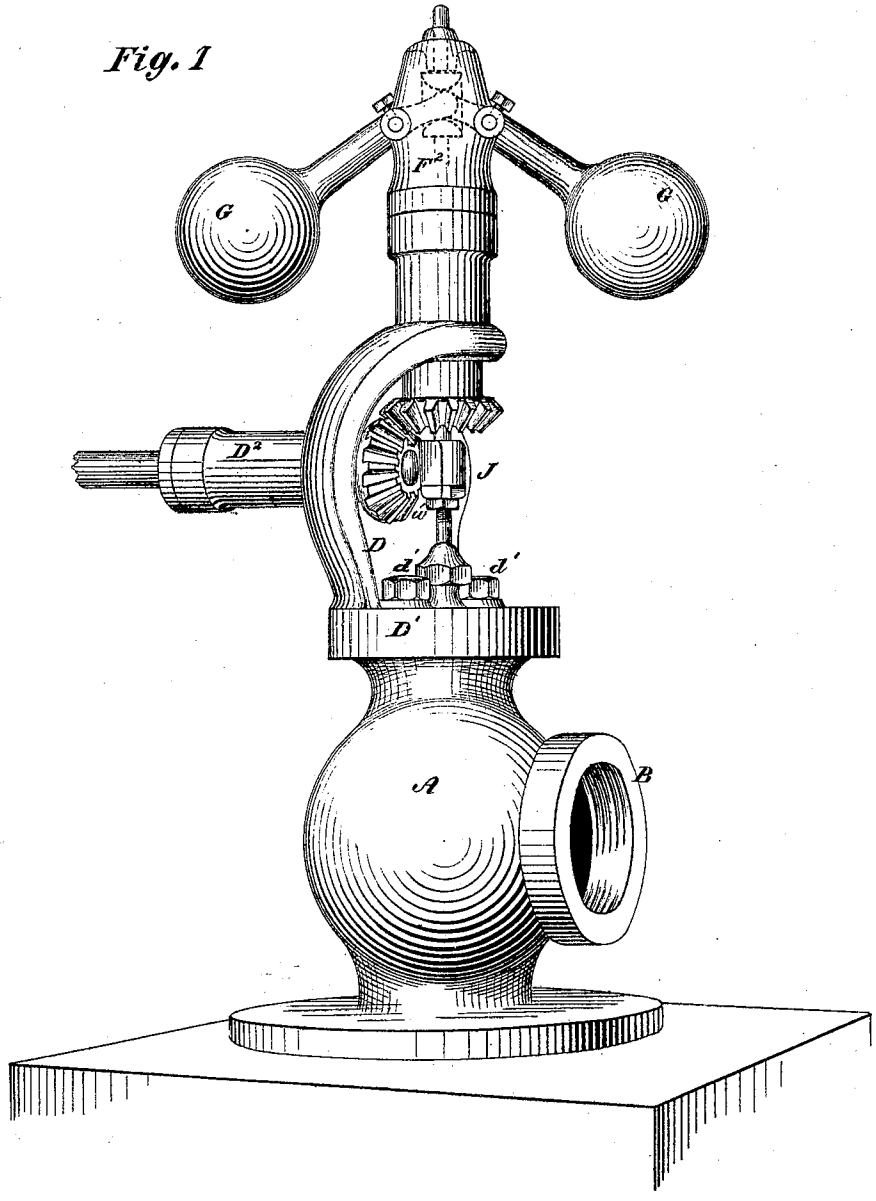
2 Sheets--Sheet 1.

W. B. LE VAN.

Improvement in Governors.

No. 129,040. Patented July 16, 1872.

Fig. 1



Witnesses:-

W. H. Rowe.

Baltis De Long

W. B. De Van

by his Atty

Wm. D. Baldwin

2 Sheets--Sheet 2.

W. B. LE VAN.

Improvement in Governors.

No. 129,040. Patented July 16, 1872.

Fig. 2

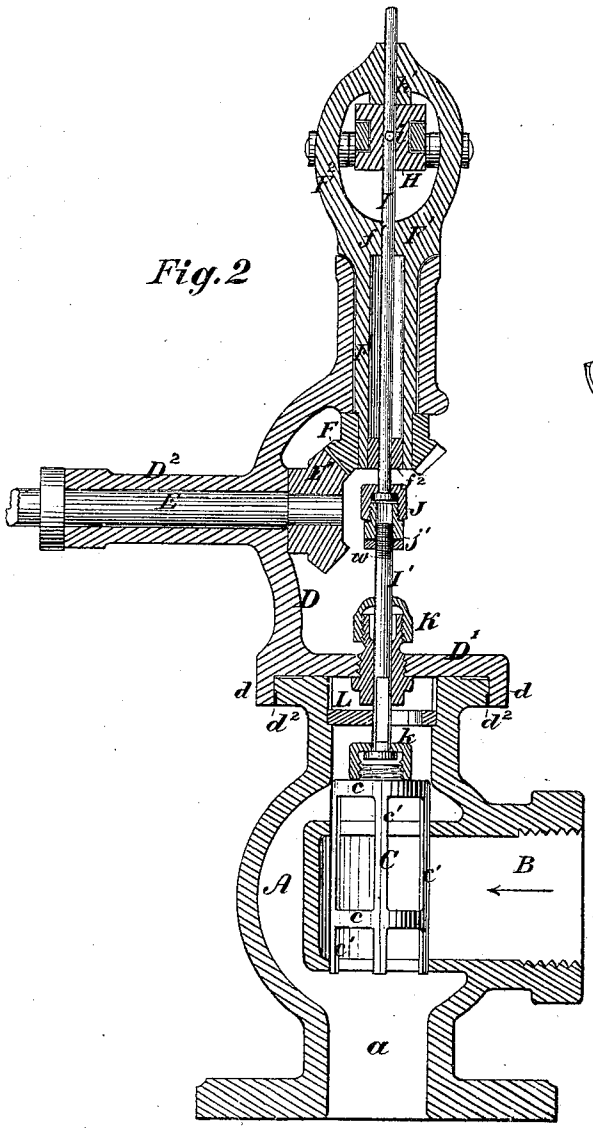


Fig. 3

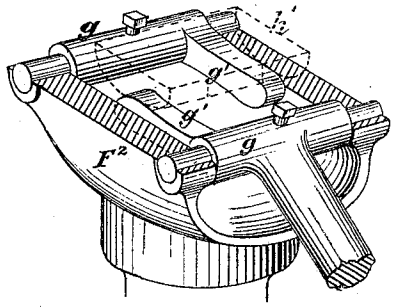
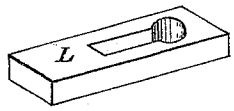


Fig. 4



Witnesses:—

W. H. Rowe,

Baltis & Long.

W. B. Le Van

by his Atty

Wm. B. Baldwin

UNITED STATES PATENT OFFICE.

W. BARNET LE VAN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN GOVERNORS.

Specification forming part of Letters Patent No. 129,040, dated July 16, 1872.

To all whom it may concern:

Be it known that I, W. BARNET LE VAN, of No. 3607 Baring street, Philadelphia, Pennsylvania, have invented certain new and useful Improvements in Engine-Governors, of which the following is a specification:

My invention relates to an improved apparatus for regulating engines in order to secure uniform speed and steadiness of movement. Many attempts heretofore have been made to attain this result, but with varying success; all the modes adopted, however, so far as known to me, being liable to objections developed by experiment, familiar to engineers, and, therefore, unnecessary to recapitulate here. The objects of my invention are to combine, in an engine-governor, the qualities of simplicity of design, cheapness of construction, efficiency in operation, and facility of connecting and disconnecting the several parts for erection, removal, replacement, or repairs. The improvements by which these results are attained are hereinafter particularly specified.

The accompanying drawing shows all my improvements as embodied in one apparatus; some of them, however, obviously, may be used without the others.

Figure 1 represents a view in perspective of so much of a steam-engine governor as is necessary to illustrate the improvements hereinafter claimed; Fig. 2, a vertical section thereof; Fig. 3, a sectional perspective view through the journal of the ball-arms on an enlarged scale; and Fig. 4, a view in perspective of the valve-rod locking-plate detached.

A valve-chest, A, is, by preference, made globular in form, with flanged ends, and is secured upon the engine in the usual way. An inlet-pipe, B, projects into this chest, and is perforated vertically to receive a cylindrical lantern or cage shaped valve, C, which moves axially endwise therein. An outlet, *a*, to the engine, is arranged directly below this valve. The valve C consists of parallel disks *c*, connected by straight bars *c'*. These disks are placed at a distance apart equal to the bore of the inlet-pipe across which they work; consequently, when in their seats, the pipe is closed and the steam shut off. As the valve opens the escaping steam presses outward upon the lower surfaces of both disks, escaping at both sides of the pipe, and thus tends to keep the valve open, and enables it to lift with much ease. By this mode of construction I avoid the necessity of a separate counter-balance for the valve, which has been used where a cage-valve heretofore has been employed. As the valve-chest and inlet-pipe are cast in one piece, and as the valve-seat and outlet are in the same axial line, these openings can all be truly bored out by a single operation, thus largely reducing the cost of fitting up the parts. The straight-barred lantern-valve is cheaper to construct, and less liable to derangement, than one with spiral bars. A standard, D, supports the main portion of the mechanism. The foot D^1 of this standard is constructed with a vertical flange, *d*, which overlaps and fits snugly upon the chest A, to the flanged top of which it is secured by suitable bolts d^1, Fig. 1. This cup-shaped flange not only adds strength, but serves to conceal the joint between the chest and standard, thus giving the instrument a neat appearance, but also serves to lock the two parts together, besides acting as a guide to insure the accurate adjustment of the parts, which is important to the proper working of the governor, for reasons hereinafter explained. I am, moreover, by this construction, enabled to insert packing d^2, when desired, between the flange and valve-chest and to calk it tightly without straining the bolts. A lighter construction of the foot is also permissible where this form of flange is used than would be safe without it. The body of the standard is made in a segment or concavo-convex form, with its convex side outward. A long pipe-box bearing, D^2, projects from the center of this segment and receives a driving-shaft, E, connected with the engine in the usual way. The upper portion of the standard projects over the center of the governor to sustain the revolving arms and their appurtenant mechanism. This form of standard combines elegance, strength, and lightness, and enables the moving parts of the mechanism readily to be adjusted, removed, or replaced, as hereinafter more fully explained. A miter-pinion, E^1, on the shaft E, drives a corresponding gear, F, on a spindle, F^1, revolving in a bearing in the standard D. This spindle is made tubular for the passage of the valve-rod, has an enlarged head or yoke, F^2, to receive the ends of the ball-arms and their collar, and has its bearings f^1 curved according to the well-known law of

friction developed by Schiele. (See Fig. 2.) The top of the standard is likewise curved so as to form a counterpart to the bearing portion of the tube. By this adaptation of Schiele's curve or friction-pivot to a governor, the greatest practicable amount of bearing-surface is obtained, the friction is reduced to a minimum, and the two parts always wear coincidently.

The arms of the governor are, by preference, as well as for cheapness of manufacture, cast solid with the balls G. Instead, however, of casting pivots or bearings on the arms, I prefer to cast a tubular bearing, *g*, on each arm, to insert therein a steel rod or pin, and to fasten said pin by a check-screw to lock it upon its arms. The shoulders of the bearings fit snugly between the jaws of the yoke, and are thus prevented from moving laterally and jerking as the speed varies. The steel pin is much more durable than a cast-iron one; its friction is less, and it can easily be removed or replaced, as the arm can be placed in position and the pin then driven in. The pins rock in their bearings in the yoke, thereby being less liable to wear out of line than if the arm rocked on the pin. The fingers *g'* of the ball-arm, instead of being connected directly with the swiveled collar H of the valve-rod, project on one side thereof. This collar is shown in section in Fig. 2, and in dotted lines in Fig. 1. It consists of a block grooved at each side in the peculiar form shown—that is, with a groove flaring each way from the center—to admit a wide range of movement of the ball-arms, is perforated vertically for the passage of the valve-rod I, and is secured thereto by a pin, *i*. As the fingers *g'* act on the side of the block instead of on its front, they can be made to project beyond the pivot of the block, and be allowed to slide endwise in their respective grooves, thus allowing large surface for wear and a wide range of movement to the valve-rod without liability to become disconnected therefrom. The valve-rod I both rotates and moves freely endwise in bearings f^1 f^2 in the revolving yoke F^2. As the ball-arms and swiveled collar are fastened to this rod, it cannot be adjusted vertically to regulate the governor-valve. This difficulty I have obviated by connecting the rod with the valve by means of a swivel nut or box, J, consisting of a cup-shaped nut or box slipped over the pin and held by an enlargement thereon, and of a screw-plug, *j*, inserted therein, these parts being made polygonal to admit of being more readily grasped to screw and unscrew. The lower section I' of the valve-rod screws into this plug, and is secured by a jam-nut, *w*, and passes down through a stuffing-box, K, and is connected with the valve by a swivel-nut, *k*, like the one above described, except that the hole in the swivel-nut is made larger than the rod, so as to allow the valve always to be free to work in case the stem gets bent or out of line. By this mode of construction the upper section I only of the valve-rod rotates, the lower one moving endwise only. In order to prevent any possible rotation of the lower valve-rod its sides within the valve-chest are flattened on two sides, and pass through a slotted bar, L, Fig. 4. This bar fits in locking-grooves in the valve-chest to prevent it from turning, and its slot is enlarged and rounded at one end that the valve-rod may be readily inserted and adjusted, and then locked by passing into the rectangular part of the groove, which prevents it from turning. The rod is thus prevented from being accidentally screwed out of the swivel-box J, while the valve can readily be adjusted up or down by lengthening or shortening the valve-rod by slackening the jam-nut *w* and screwing its lower section into or out of its swivel. The parts are thus readily kept in line; but even should the rods become deflected by wear or torsion, the swivel-nut *k* would compensate such deflection and insure accurate movements of the valve. The lower section of the valve-rod is kept in line by its stuffing-box.

I have demonstrated the practicability, utility, and value of my invention by practical experience.

In operation, the driving-shaft E is rotated from the engine in the usual way, and this rotates the yoke, ball-arms, swiveled collar, and rod I. The valve is opened and closed by the movement of the ball-arms, as is well understood. The block H limits the upward movement of the valve by abutting against a lug, *h'*, on the yoke.

I claim as my invention—

1. The combination, with an engine-governor, of a bowl-shaped standard, having a vertical tubular head and a horizontal tubular bearing, constructed substantially as set forth.

2. The combination of the revolving yoke, the swivel-collar connected to the valve-stem, and the ball-arms pivoted to the yoke and provided with fingers projecting across and between the flanges of the swivel-collar upon opposite sides thereof, these parts being constructed and operating in combination substantially as set forth.

3. The combination of the valve, the swiveled nuts, the jam-nuts, the valve-rod, and the locking-plate, to prevent the rod from turning, these parts being constructed and arranged substantially as set forth.

4. The combination of the valve, the lower valve-rod locked to prevent its turning, the swivel connecting the two sections of the rod, and the upper section revolving with the ball-arms, all these members being constructed and operating in combination, substantially as set forth.

In testimony whereof I have hereunto subscribed my name.

W. BARNET LE VAN.

Witnesses:

JOHN EVERDING,

W. W. DOUGHERTY.