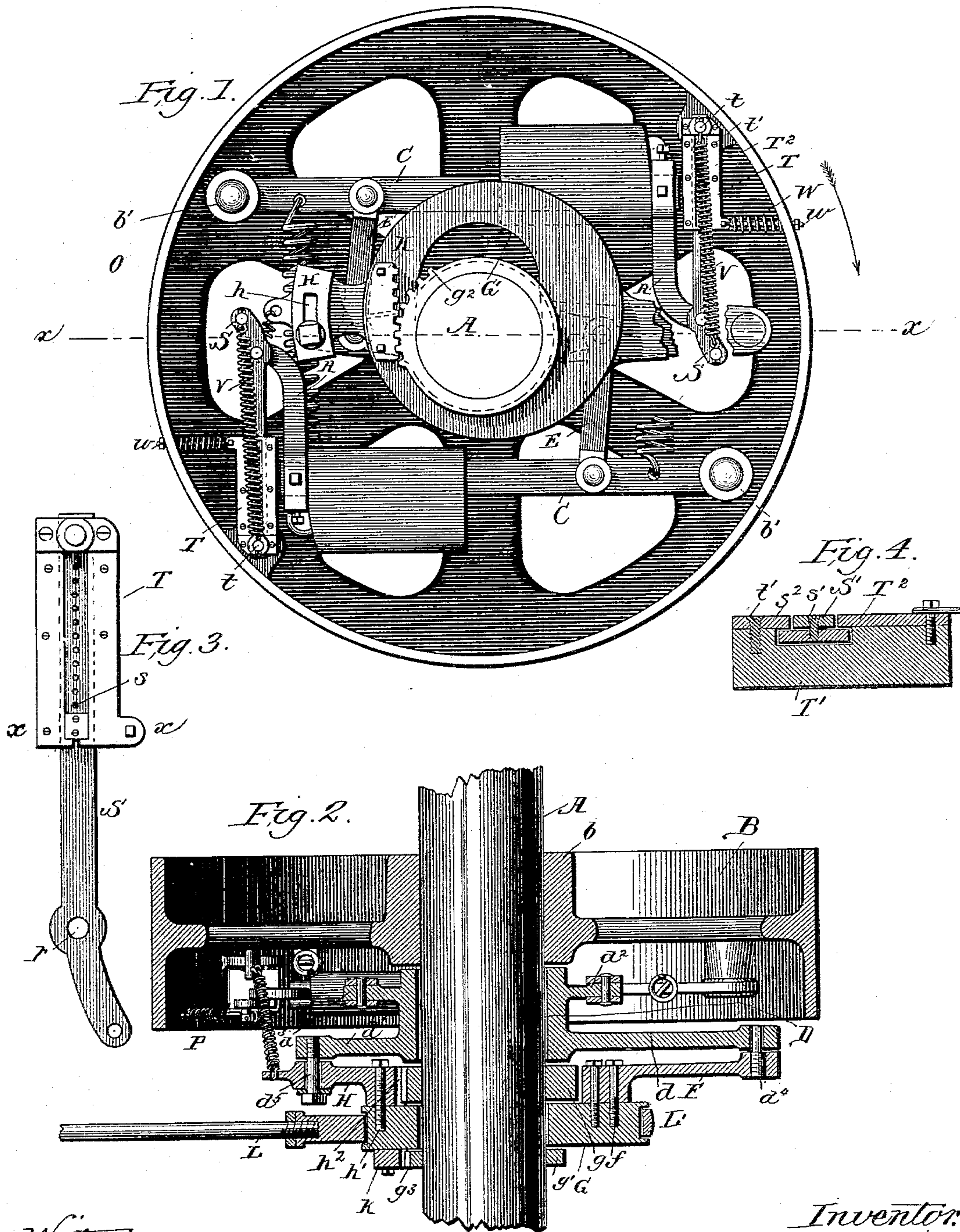


(No Model.)

C. SCHMID.  
STEAM ENGINE GOVERNOR.

No. 384,286.

Patented June 12, 1888.



Witnesses,  
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# UNITED STATES PATENT OFFICE.

CHARLES SCHMID, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
GEORGE FARNSWORTH, OF SAME PLACE.

## STEAM-ENGINE GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 384,286, dated June 12, 1888.

Application filed September 23, 1886. Serial No. 214,316. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES SCHMID, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Engine Governors, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention has relation to the improvement of that class of steam-engine governors wherein the throw of the eccentric and the consequent movement of the valve are controlled by means of weighted arms or levers pivotally connected to the side of a governor wheel or disk keyed to the main shaft of the engine.

In this class of apparatus it has been heretofore customary to provide the governor wheel or disk with weighted levers suitably connected to an eccentric having an elongated slot which permitted its position upon the main shaft to be shifted from time to time, according to the variations in the movement of the weighted arms or levers. An example of this type of mechanism is illustrated in Letters Patent No. 207,607, granted to D. O'B. Ladd and George Farnsworth, September 3, 1878.

The object of my present invention is to improve the construction of the governor mechanism illustrated in said patent, and governors of like character, in order that the movement of the weighted arms or levers may exert a more uniform action in shifting the position of the eccentric upon the main shaft, so that all "jerking" of such levers and the consequent irregular or spasmodic movement of the valve may be avoided.

To this end my invention consists in the improved means for insuring a more even and positive action of the weighted arms, hereinafter described, illustrated in the accompanying drawings, and particularly defined in the claims at the end of this specification.

Figure 1 is a view in side elevation of my improved governor. Fig. 2 is a view in central cross-section on line  $x x$  of Fig. 1. Fig. 3 is an enlarged detail view of the sliding bar and its bearing. Fig. 4 is an enlarged detail view in cross-section on line  $x x$  of Fig. 3.

A designates the main shaft of the engine, upon which is rigidly fastened the hub  $b$  of the main governor wheel or disk B, and to the side of this main wheel or disk are pivotally connected, as shown at  $b'$ , the weighted arms or levers C, the movement of which serves to vary the position of the eccentric upon the main shaft, as will hereinafter appear.

Adjoining the hub  $b$  of the governor-wheel and loosely held upon the main shaft is the long collar D, from which collar and formed integral therewith project the two long arms  $d$  and  $d'$  and the shorter arms,  $d^2$  and  $d^3$ . The weighted arms or levers C are connected to the shorter arms,  $d^2$  and  $d^3$ , of the collar D by means of the pivoted links E and E', so that as the weighted arms are moved in an outward direction by their centrifugal force during the rotation of the governor-wheel the links E and E' will serve to impart a partial rotation to the collar D.

From the sides of the arms  $d$  and  $d'$  of the collar D project the bolts or pins  $d^4$  and  $d^5$ , the pin  $d^4$  serving as a journal for the end of the arm F, that is bolted, as at  $f$ , to the inner side of the eccentric G, which is held upon the main shaft between the collars  $g$  and  $g'$ , firmly keyed thereto. The bolt or pin  $d^5$ , that projects laterally from the arm  $d'$  of the collar D, enters a slot,  $h$ , that is formed in the expanded end portion of the arm H, that is bolted, as shown at  $h'$ , to the inner side of the eccentric. A portion of the periphery of each of the collars  $g$  and  $g'$  is provided, respectively, with a segmental cog-gear,  $g^2$  and  $g^3$ , the gear  $g^2$  meshing with the rack-bar  $h^2$  upon the inner end of the arm H, while the gear  $g^3$  engages with the rack-bar K, that is bolted, as shown, to the outer side of the eccentric. The eccentric G is provided, as shown in Fig. 1, with the elongated slot or bearing G', so that the position of this eccentric upon the main shaft may be varied in order to control the extent of movement of the eccentric-arm L, that projects from the periphery of the eccentric-strap L'.

To the weighted arms or levers C, near their rear ends, are connected the strong coiled springs O, which serve to impart an inward or centripetal movement to the weighted arms in order to cause them to promptly re-



spond to any decrease of the load of the engine or of the steam-pressure, and, as will be seen, the opposite ends of these coiled springs O are connected, as at *o*, to a pin projecting

5 from the side of the governor wheel or disk B. From the foregoing construction, to which I make no claim of invention, it will be seen that when motion is imparted to the main shaft the weighted arms or levers C will be  
10 thrown by the centrifugal force in an outward direction, and as these arms are thus thrown outwardly they impart a movement to the pivot-links E and E', which in turn cause a partial rotation of the collar D and the arms  
15  $d^2$  and  $d^3$ , to which they are connected. This partial rotation of the collar D causes the arms  $d$  and  $d'$  thereof to move in like direction the bars F and H, and as these bars F and H are rigidly connected to the eccentric G the  
20 movement of the bars F and H tends to shift the eccentric to a more nearly central position and consequently to shorten the extent of throw of the eccentric-rod L. When the load upon the engine is lessened or the pressure of  
25 steam is reduced, the force of the springs O will tend to impart a centripetal movement to the weighted arms C and draw these arms nearer the main shaft, and, if desired, a smaller coiled spring, P, connected to the stud *p* on  
30 the side of the governor-wheel and the outer end of the arm H, may be employed to aid in controlling the movement of the parts.

As the mechanism thus far defined is of well-known construction, the operation need  
35 not be more specifically detailed.

A difficulty met with in the use of the mechanism above described, particularly when employed in connection with the form of slide-valve illustrated in Letters Patent granted to  
40 me and to George Farnsworth, as my assignee, August 10, 1886, was due to the fact that no provision was made for preventing the too sudden inward movement or centripetal movement of the weighted arms and consequent  
45 spasmodic or jerky action of the valve. In other words, the governor did not properly respond to the variations in the load of the engine or of the steam-pressure, because too much or too sudden freedom of movement was  
50 permitted to the weighted arms.

I shall now proceed to describe the means by which I have overcome the before-mentioned difficulty and have insured a more positive, steady, and uniform action of the governor  
55 mechanism.

To the outer ends of the weighted arms C are bolted the dependent arms or bars R, to the lower ends of which are pivoted, as at *r*, the upright bars S, that slide within the boxes  
60 or bearings T, that are pivotally connected by the pin *t* to an inwardly-projecting lug upon the rim of the governor-wheel. The pivot boxes or bearings T are preferably formed, as shown in Fig. 1, of the grooved bars T' and  
65 the face-plates T<sup>2</sup>, bolted thereto, as at *t'*, and the upper portions of the sliding bars S are pref-

erably provided with perforations *s*, adapted to receive the pins *s'*, by means of which a stop-plate or guard, S', that limits the downward  
70 movement of the sliding bars, may be fixed at any desired position thereon. To the outer end of the pin *t* of each pivoted bearing or box T will be connected the coiled traction-spring V, the opposite end of this spring being con-  
75 nected to the lower end of the sliding bar S. From this construction it will be seen that when the weighted arms or levers C are moved by centrifugal force in outward direction the dependent bars R will be lifted and the sliding  
80 bars S will be moved upwardly through the boxes or bearings T and through a suitable slot cut in the rim of the governor-wheel. At the same time the spring V will be more or less collapsed, and this action will continue until  
85 there is a decrease in the load of the engine or of the steam-pressure, when the weighted arms or levers C will be drawn inwardly, or toward the main shaft. As these weighted arms or levers are thus drawn inwardly by centripetal  
90 force and by the action of the springs O, their inward movement will be resisted by the springs V as the sliding bars S are forced downward within the bearings or boxes T; hence it  
95 will be seen that the springs V prevent any sudden collapsing of the weighted arms or levers and any consequent irregular movement of the eccentric.

If desired, there may be employed a supplemental compression-spring, W, that is sustained upon the rod *w*, connected to the box  
100 T and the rim of the governor-wheel, which spring will tend to bear against the box and insure its more steady movement as the bar S slides through it.

In addition to the advantage incident to the  
105 use of the springs V, the sliding bars S, held as they are within the boxes or bearings T, guard the weighted arms against any lateral movement or shaking, and, without interfering with the proper movement thereof, tend  
110 to make this movement much more positive and regular.

By providing the adjustable strap-plates or guards S', which, as will be seen, strike against the bottoms of the boxes or bearings T, I am  
115 enabled to restrict the extent of inward movement of the weighted arms, and hence to control the degree to which these arms shall be allowed to shift the eccentric in order to give a longer throw to the eccentric. In other  
120 words, by thus limiting the inward movement of the weighted arms I am enabled to prevent these arm from shifting the eccentric to such an extent as to unnecessarily open the steam-ports of the engine.  
125

It will be readily understood that the details of construction above set out may be varied without departing from the spirit of my invention, and that certain features of the invention may be employed apart from the  
130 others.

Having thus described my invention, what I



claim as new, and desire to secure by Letters Patent, is—

1. In a governor for valve-gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main shaft, of two springs, V, connected both with said weighted arms and with the main wheel, whereby said springs will exert force at all times against the inward movement of said weighted arms, substantially as described.

2. In a governor for valve-gears, the combination, with the main governor-wheel and its arms suitably connected with the eccentric for shifting the same on the main shaft, of bars R, connected to the weighted arms, and springs V, connected with said bars and with the main wheel, said springs exerting force against the inward movement of the weighted arms, substantially as described.

3. In a governor for valve-gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main shaft, of adjustable guards suitably connected with said weighted arms for determining the extent of their inward movement, substantially as described.

4. In a governor for valve gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main

shaft, of bars R, the sliding bars S, and suitable bearings for said sliding bars, substantially as described.

5. In a governor for valve-gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main shaft, of bars R, the sliding bars S, pivoted to said bars, the pivoted bearings T for the sliding bars, and the springs V, substantially as described.

6. In a governor for valve gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main shaft, of the bars R, the slide-bars S, the bearings T for said sliding bars, and suitable mechanism for adjusting the movement of said sliding bars within the bearings, substantially as described.

7. In a governor for valve gears, the combination, with the main governor-wheel and its weighted arms suitably connected with the eccentric for shifting the same on the main shaft, of the dependent bars R, the sliding bars S, the pivoted bearings T, and the supplemental spring W, substantially as described.

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Witnesses:

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