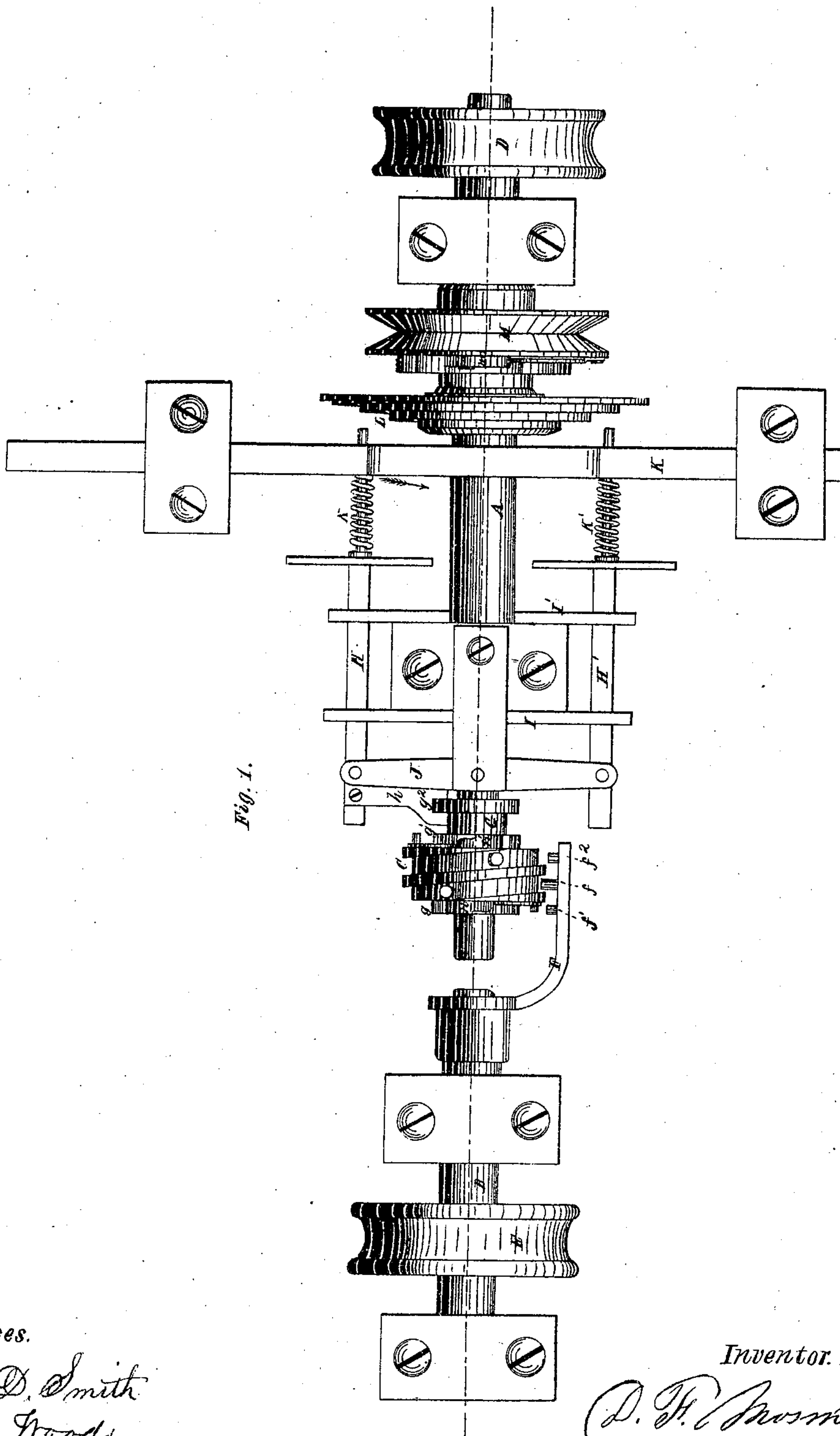


*D. F. Mosman.*  
*Steam-Engine Governor.*  
*Nº 72882*      *Patented Dec. 31, 1867.*



*Fig. 1.*

*Witnesses.*

*Chas. D. Smith*  
*Oliver Wood*

*Inventor.*

*D. F. Mosman*

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## Steam-Engine Governor.

Nº 72882

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*Witnesses.*

Chas. D. Smith  
O. Evans Woods

*Inventor.*

L. F. Mosman



# United States Patent Office.

DANIEL F. MOSMAN, OF CAMBRIDGE, MASSACHUSETTS.

*Letters Patent No. 72,882, dated December 31, 1867; antedated December 19, 1867.*

## IMPROVEMENT IN STEAM-ENGINE GOVERNORS.

*The Schedule referred to in these Letters Patent and making part of the same.*

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, DANIEL F. MOSMAN, of Cambridge, Middlesex county, Massachusetts, have invented a new and useful Improvement in Governors; and I do hereby declare the following to be a full, clear, and exact description of the nature, construction, and operation of the same, reference being had to the accompanying drawings, which are made part of this specification, and in which the same letters indicate corresponding parts in the different figures.

Figure 1 is a plan or top view.

Figure 2 is a longitudinal vertical section.

In this apparatus are two revolving shafts. One is run directly from the engine, at speed derived from its motor, and the other shaft is also run by the engine, but its rate is determined by a pendulum or balance-wheel, and is maintained at a steady rate thereby. These two shafts are connected by a device which is not effectively operative while their motions are in unison, but receives a longitudinal motion on its shaft when the motions are not coincident. This longitudinal motion is made effective, in moving a valve, by devices which will be described hereafter.

For the sake of perspicuity, I shall speak of the two shafts as the engine-shaft A and the governor-shaft B, not but what the motion of each is derived from the engine, but that of the shaft A varies with that of the engine, and that of the governor-shaft B is preserved uniform; a difference between the two being manifested by a longitudinal movement of the scroll-cam C, in one direction or the other, according to whether the motion of the engine-shaft A is faster or slower than that of the governor-shaft B. The motion of the shaft A is by a band connection from the engine to the pulley D, and that of the shaft B is derived from the same source, by a band to the pulley E. The motion of the latter is intended to be fully up to the mark, the pendulum, or equivalent regulator, acting as a detainer, to prevent the motion rising above the rate for which the escapement is adjusted.

To insure that there shall be no lag in the motion of the shaft B, the gearing or band and pulley-connection, by which it is driven, is proportioned to run it, say, one-sixtieth faster than the shaft A, and for this purpose the pulley E is made a friction-pulley, to slip upon its shaft when the driving-devices tend to rotate it more rapidly than the pendulum or other time-keeper is disposed to allow.

Upon the inner end of the shaft B is an arm, F, upon which are three pins,  $f f^1 f^2$ . The middle pin,  $f$ , engages with the spiral slot in the periphery of the scroll-cam C, so that when the shaft A and the said cam run slower than the shaft B, the cam will be drawn in one direction longitudinally, and when the shaft A runs faster than the shaft B, the cam will be drawn in the other direction.

The cam C occupies a groove in the sleeve G, which is attached by a feather to the shaft A, so as to move freely longitudinally thereon, as impelled by the discrepancy in the rates of motion, as has been described, but the sleeve itself has no rotary motion on the shaft A.

The operation of the pins  $f^1 f^2$  will be referred to presently. Their object is to suspend the active connection between the scroll-cam C and the sleeve G, when the former has arrived at the limit of its rotation, the necessity for which will be more distinctly apparent when the mode of transmitting the motion and the limit of motion is described.

The sleeve G consists of the two ratchet-wheels  $g g^1$ , between which is the groove for the scroll-cam C and the collar  $g^2$ , which is engaged by the arm  $h$  of the rocking-frame, which has two plungers,  $H H'$ , which slide in guides  $I I'$ , and are connected by a walking-beam, J, which makes their motion reciprocal.

K is a bar, arranged to slide transversely of the machine, and connected, in any suitable manner, to the valve-rod, so as to govern the area of steam-opening, the water-gate, &c. In the bar K are two spring-pins,  $k k'$ , which are actuated longitudinally in the direction of the helical cam L, the periphery of whose spiral flange, by lateral pressure upon one or the other of the pins  $k k'$ , actuates the bar K.

The helical cam L, and the band-pulley M, by which it is driven, run loosely upon the shaft A, their motions not being dependent thereupon, but being derived from a band from the engine to the pulley M. The cam L is weighted, so that it will run for a considerable time, even if the shaft A cease revolving by the stoppage of the engine, the pawl  $m$ , on the pulley M, clicking upon the teeth of the ratchet  $m'$ , as the cam L runs, without



revolving the pulley M or being revolved by it. This is when, owing to detention, the disposition of the cam L is to outrun the pulley M. When the latter has the greater speed, it drives the cam L, by the engagement of the pawl *m* in the ratchet *m'* of the cam-sleeve.

The spring-pins *k k'* are thrust towards the cam L by the plungers H H', and returned by the force of the spiral springs, which are sleeved upon them. The shaft A being supposed to be running faster than the governed shaft B, the effect will be to drive the plunger H' and the spring-pin *k'* towards the helical cam L, whose spiral flange engages the end of the pin, and moves the bar K in the direction of the arrow, fig. 1. As the cam L continues to revolve, the recession of the face of the cam releases the pin *k'* from contact therewith, unless the relative retrogradation of the shaft B continues the pressure upon the plunger H', so as to maintain the contact of the pin with the flange of the cam.

If the change made in the position of the bar K, by the first contact of the pin with the cam L, be sufficient to close the steam-valve sufficiently to bring the speed of the engine down to the required coincidence of motion with the governor-shaft B, then, as soon as the pin has moved laterally as far as in its longitudinal projection it remains in contact with the cam, it leaves contact therewith, and the shafts being coincident in point of speed, they run in unison, and the mechanism for changing the position of the valves becomes inoperative until a change in the relative motions of the shafts A B again brings the valve-adjusting mechanism into action.

The spiral track upon the scroll-cam C is only about one revolution, and when the pin *f* reaches its limit of motion in either direction, the arm F strikes a pivoted spring-pawl, *n*, or *n'*, as the case may be, and withdraws it from contact with the ratchet-wheels *g* or *g'*, as the case may be, so that the scroll-cam C runs freely on the sleeve G without affecting the longitudinal position of the latter on its shaft A.

The bar K is designed to be attached to the throttle-valve, a variable cut-off, a water-gate of a water-wheel, or in any other analogous position where a steadiness of motion is desired, and where, owing to inequalities in the production of steam, or change in the duty of the engine or water-wheel, fluctuations in the speed are liable to occur.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of two shafts, A B, having independent rotation in the same direction, and a sleeve, G, adapted to receive longitudinal motion, by any inequality in the rotation of the said shafts, substantially as and for the purposes set forth.
2. The combination, with the shafts A B, of the arm F and pin *f*, the scroll-cam C, and sleeve G, constructed and operating substantially as described.
3. I claim the combination of the sleeve G, plungers H H', and pins *k k'* and helical cam L, constructed and operating substantially as described.
4. I claim the helical cam L, in combination with a traversing-rod, K, with an intervening device, such as the spring-pins *k k'* or their equivalents.
5. I claim the helical cam L, in its combination with the pulley M, the pawl and ratchet *m m'*, and the shaft A.
6. I claim the cam C, sleeve G, ratchet-wheels *g g'*, pawls *n n'*, and pins *f<sup>1</sup> f<sup>2</sup>*, on the arm F, operating substantially as described.

D. F. MOSMAN.

Witnesses:

CHAS. D. SMITH,  
O. EVANS WOODS.