(No Model.)

3 Sheets—Sheet 1.

J. H. DALES.

GOVERNOR.

No. 458,045. Patented Aug. 18, 1891.

Fig. 1

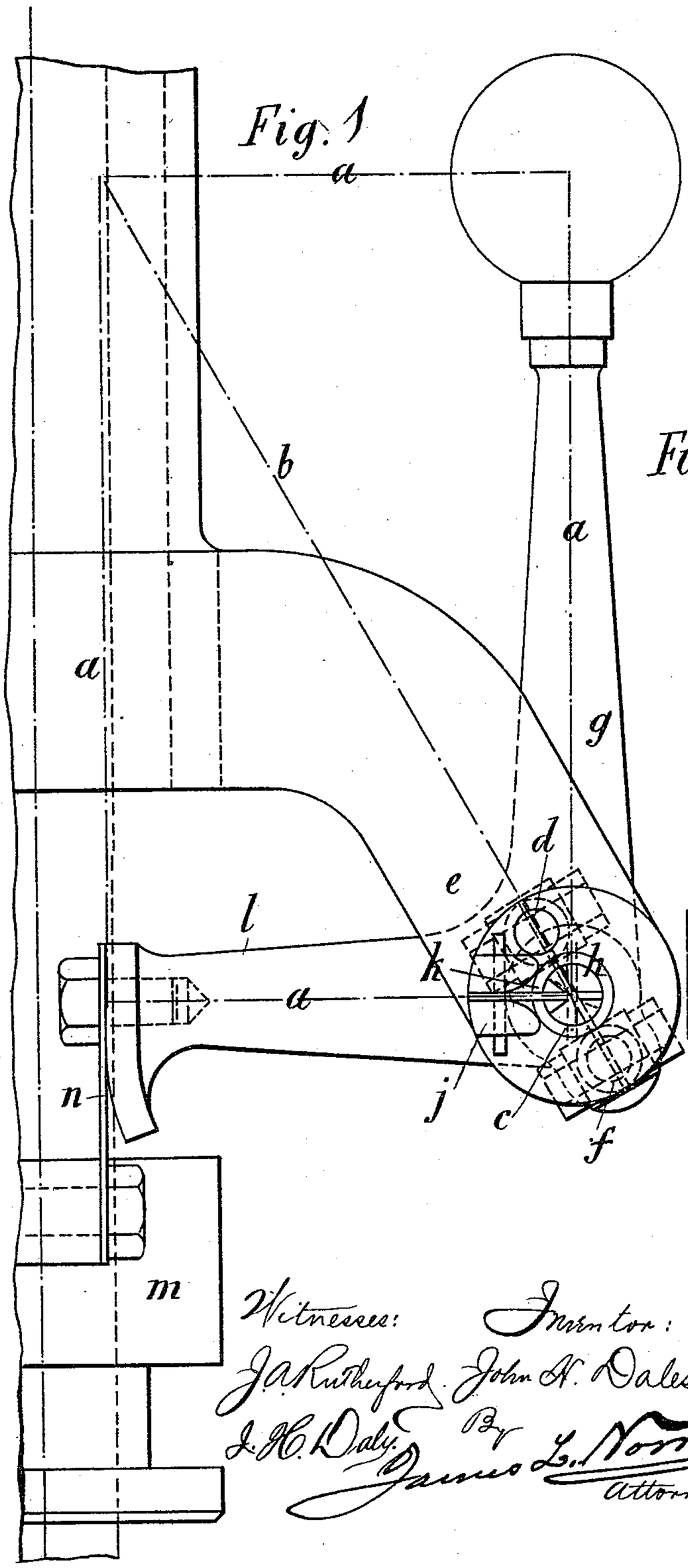
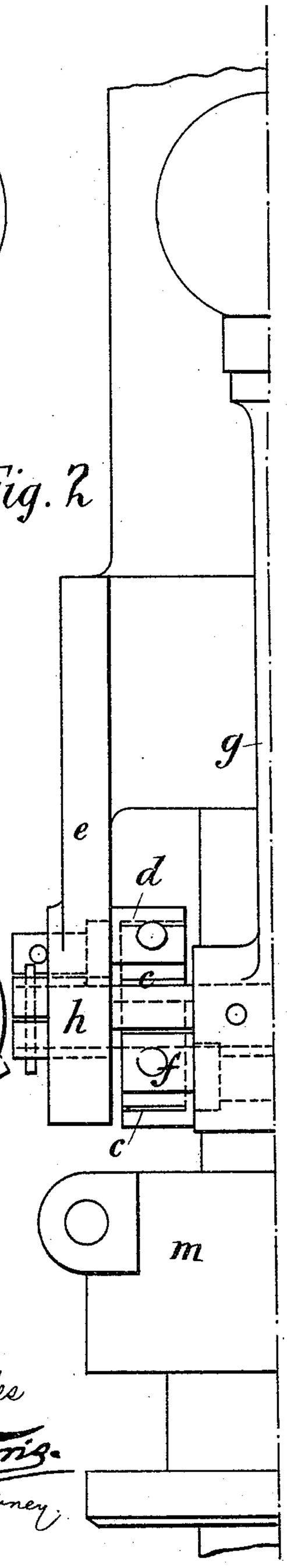


Fig. 2



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(No Model.) 3 Sheets—Sheet 2.

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GOVERNOR.

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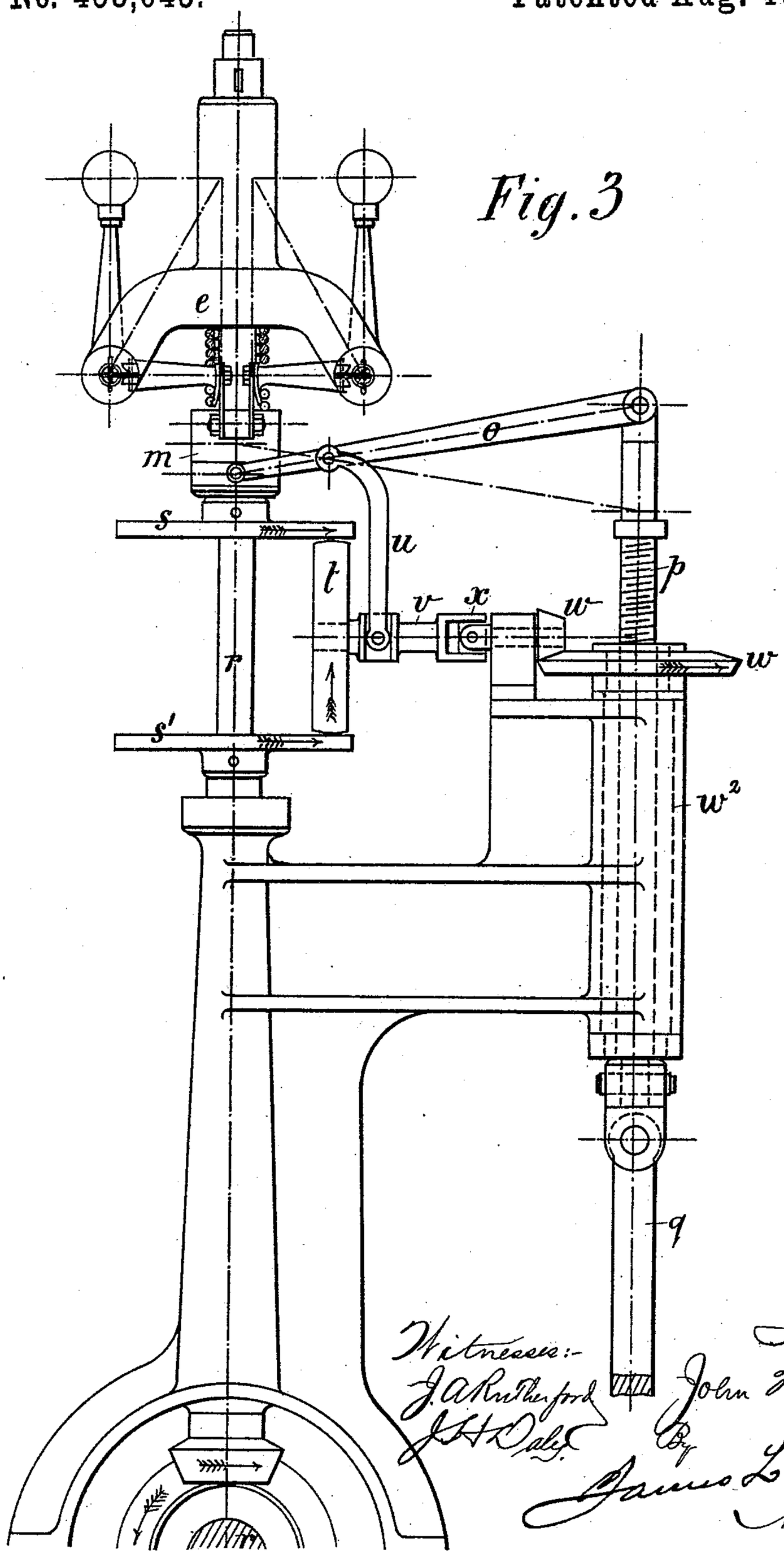
Fig. 3



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(No Model.) 3 Sheets—Sheet 3.

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GOVERNOR.

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Fig. 4.

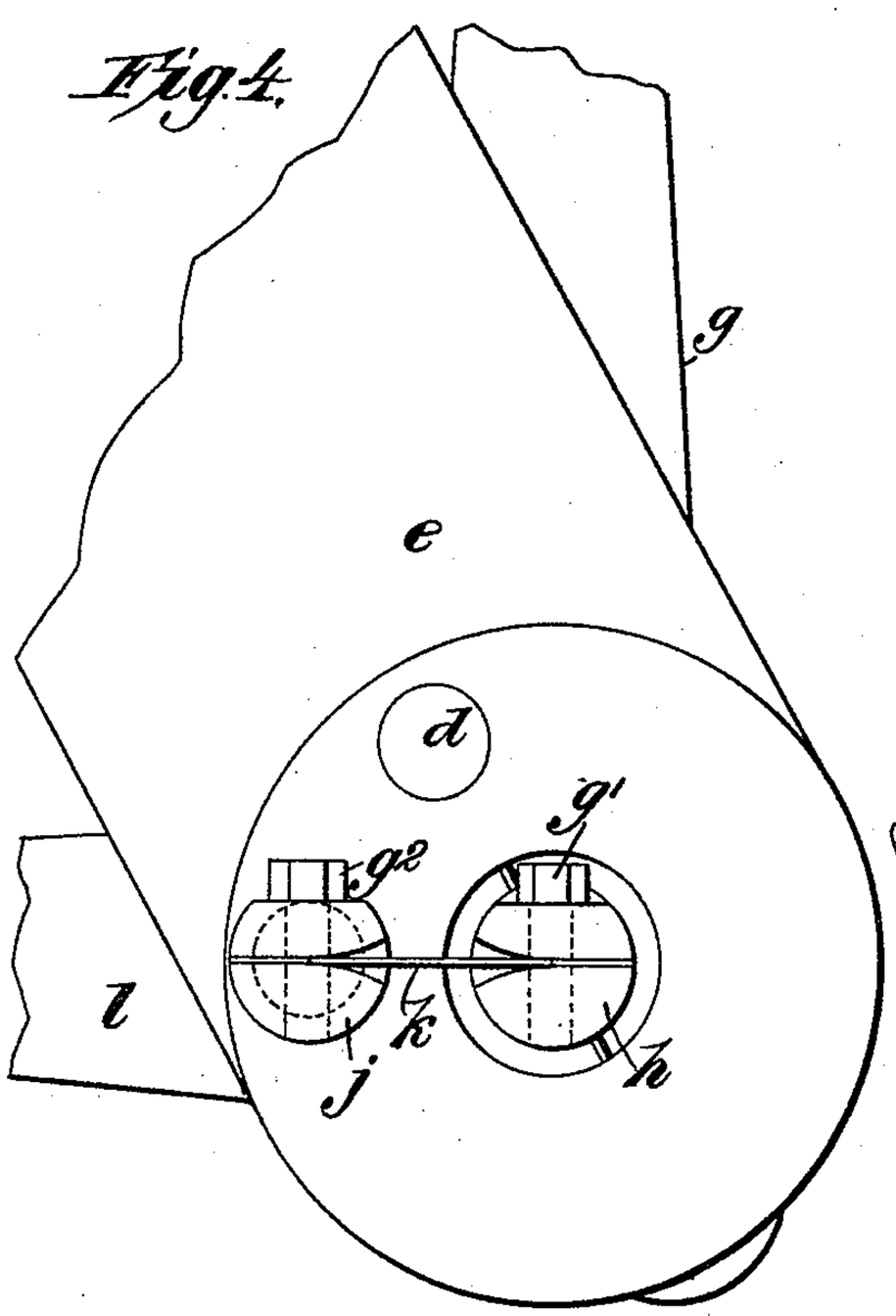


Fig. 5.

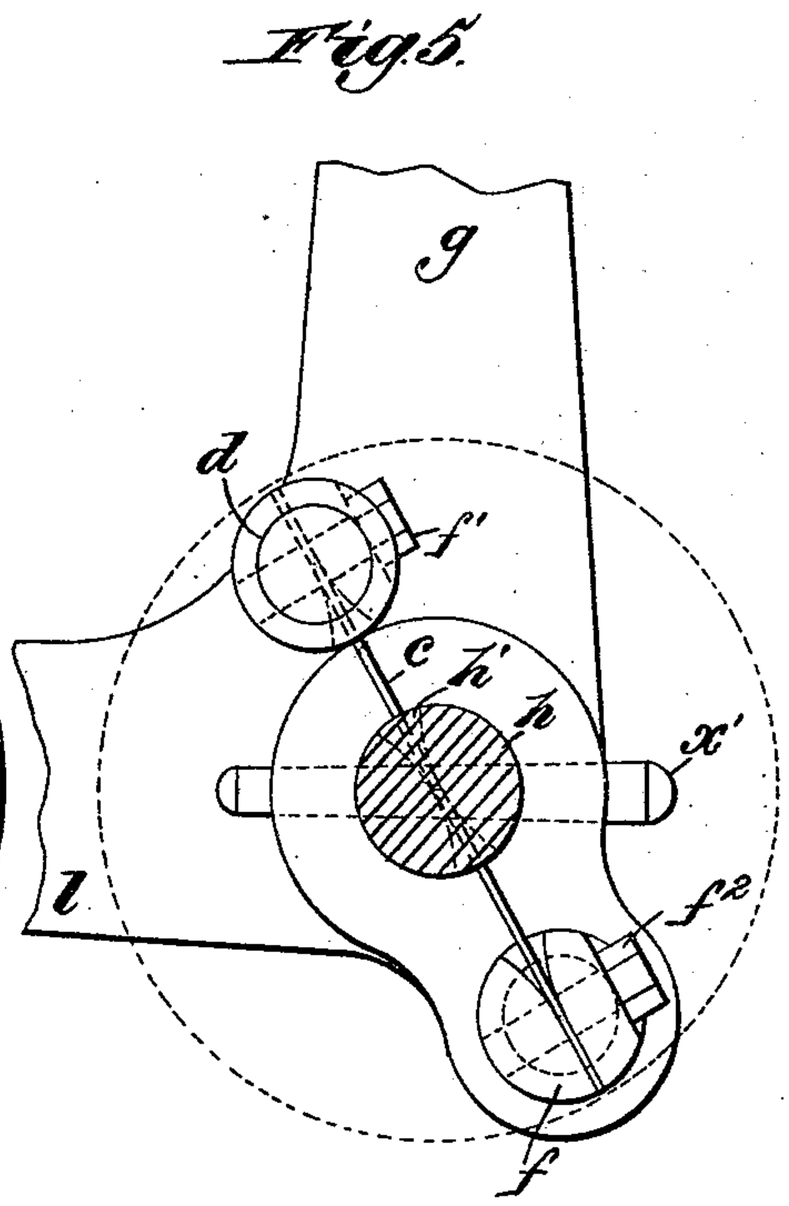
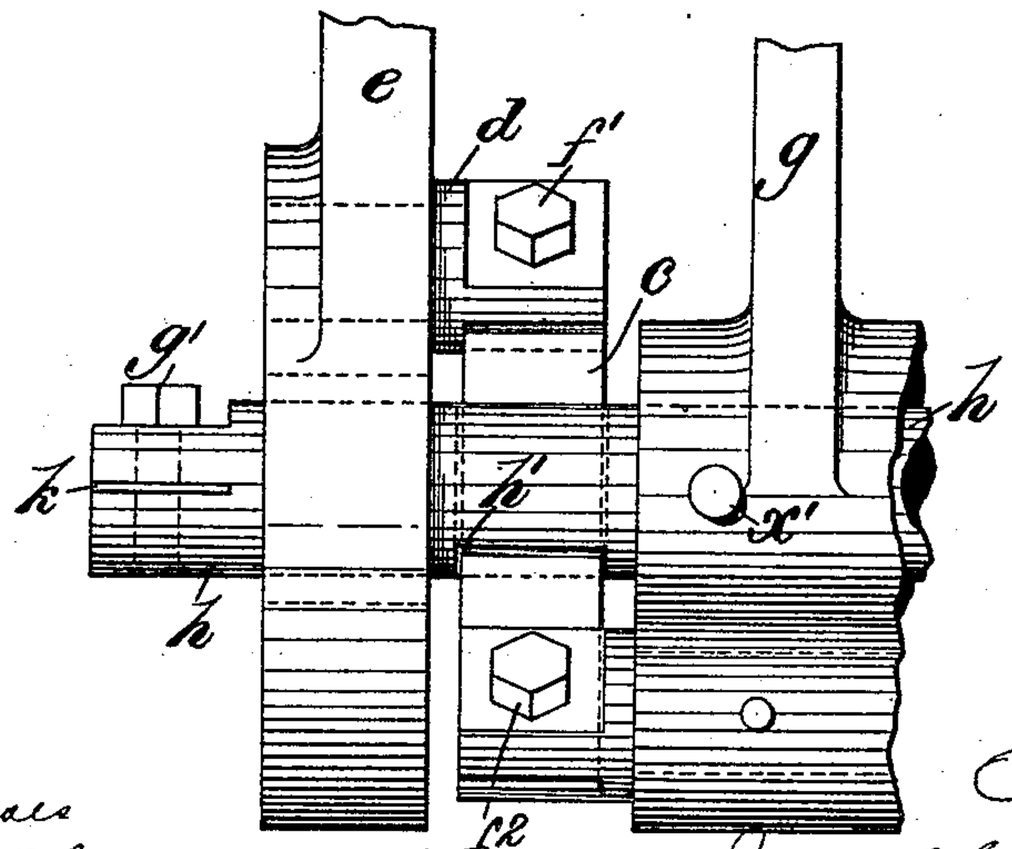


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN HANDSLEY DALES, OF LEEDS, ENGLAND.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 458,045, dated August 18, 1891.

Application filed February 18, 1891. Serial No. 381,839. (No model.) Patented in England February 19, 1890, No. 2,703.

To all whom it may concern:

Be it known that I, JOHN HANDSLEY DALES, a subject of the Queen of Great Britain, residing at Leeds, in the county of York, England, have invented certain new and useful Improvements in Governors for Regulating the Speed of Engines, (for which I have obtained a patent in Great Britain, No. 2,703, dated February 19, 1890,) of which the following is a full, clear, and exact specification.

The object of my invention is to provide a novel and efficient governor for steam-engines which is practically frictionless in its motions, will work through the entire range of its action with little variation in the rate of speed, and is especially suitable for governing or controlling the action of expansion-gears or throttle-valves either direct or through the medium of auxiliary apparatus. To accomplish this object my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a side elevation of a portion of the governor. Fig. 2 is a partial end elevation of the same. Fig. 3 is a side elevation of the governor, showing the mechanism for transmitting motion to the expansion or other valve; and Figs. 4, 5, and 6 are detail views on an enlarged scale to more clearly illustrate the attachment of the stretched springs.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, referring to the drawings, wherein—

The letter *e* indicates a bracket, through which extends the governor spindle or shaft *r*, suitably geared to the engine-shaft *r'* and driven in the direction of the arrow thereupon. To the extremity of each bracket-arm *e* is pivotally connected a bell-crank ball-arm *g*, having its horizontal arm *l* connected with the governor-slide *m*, preferably through the medium of a leaf or flat spring *n*. The pivotal connection between each bell-crank ball-arm *g* and the bracket *e* consists of a shaft or spindle *h*, secured to the ball-arm by means of a pin *x'* and extending through a circular orifice in one arm of the bracket *e*. The bracket-arm *e* is provided with a stud *d*, and the ball-arm *g* is provided with a similar stud *f*, and to the studs are respectively connected by bolts *f' f²* the extremities of a leaf or flat spring *c*, which is stretched between the studs and extends through a slot *h'*, formed in the shaft or spindle *h*. The extremities of the leaf or flat spring *c* are preferably held in such manner as to be capable of a slight longitudinal movement, which can be effected by passing the bolts *f' f²* through slots in the extremities of the spring; but I do not confine myself to this construction. The bracket has also upon each of its arms a stud *j*, and between it and the outer extremity of the shaft or spindle *h* is stretched a subsidiary leaf or flat spring *k*, preferably secured at its extremities, respectively, to the spindle or shaft *h* and the stud *j* through the medium of bolts *g' g²*.

In Fig. 1 the dotted and dashed lines *a a a a* indicate the parallelogram of forces of the centrifugal effort of the arms and balls of the governor and the resistance of the slide and spring, and the line *b* indicates the resultant of these forces.

The orifices in the bracket-arms, through which the shafts or spindles *h* extend, are of a greater diameter than such shafts or spindles, so that the latter do not touch the edges of the orifices in the bracket-arms. By this means the bell-crank ball-arms are solely sustained by the leaf-springs *c* and *k*. The springs are placed under tension by being bent lengthwise when the governor is in operation, and consequently the springs counteract the centrifugal force of the ball-arms.

By employing the subsidiary springs *k* all the springs can be made of comparatively light and flexible metal for the purpose of obtaining correct and nice action of the governor.

The slide *m* is connected to the short arm of a differential lever *o*, having its long arm pivoted to the upper extremity of a screw *p*, and this screw is connected at its lower end to the expansion or other valve connecting-rod *q*.

The governor-spindle *v* is provided with a pair of friction disks or wheels *s s'*, between which is arranged a friction disk or wheel *t*,

capable of being placed in contact with either one of the friction-disks s s' by the action of the differential lever o, for which purpose the latter is connected with the shaft v of the friction disk or wheel t by a link u. The shaft v is connected with a bevel-gear w by a suitable jointed connection x. The screw p engages a nut w^2, which is provided with a bevel-gear w', meshing into the bevel-gear w of the shaft v.

If the shaft r' is driven in the direction of the arrow, Fig. 3, the governor in performing its functions raises or lowers the shaft v, and thus places the friction-wheel t in contact with one or the other of the rotating disks s s' to produce a motion of the screw p in the opposite direction to that of the slide m, whereby the friction-wheel t is moved from contact with one or the other of the friction disks or wheels s s', in consequence of which the motion of the screw p ceases. If the screw p by any reason should overact, it places the friction-wheel t in contact with the opposite disk, which will reverse the operation of the same. It will be obvious that the motion of the screw p will operate the connecting-rod q for the purpose of properly moving the expansion or other valve of the engine.

Having thus described my invention, what I claim is—

1. The combination, in an engine-governor, of the governor-spindle, the bracket having a lateral stud, the slide, the bell-crank ball-arm connected with the slide and provided with a lateral stud and a lateral slotted shaft or spindle, and a leaf or flat spring extending through the slotted part of the shaft or spindle and connected with the stud on the bracket and the stud on the ball-arm, substantially as described.

2. The combination, in an engine-governor, of the governor-head having a bracket-arm, the swinging ball-arm jointed to the bracket, a stretched spring extending across the joint of the ball-arm and connected at one end with the bracket and at the other end with such ball-arm, and a subsidiary spring connected with the joint or pivot of the ball-arm and bearing against a stationary part of the bracket, substantially as described.

3. The combination, in an engine-governor, of the governor-head having a bracket-arm e, the swinging ball-arm a, having a slotted shaft h, journaled in the bracket, a stretched spring extending through the slot of the shaft and having one end attached to the bracket and the other end attached to the ball-arm, and a subsidiary spring k, connected with the shaft and resting upon a fixed part of the bracket, substantially as described.

4. The combination, in an engine-governor, of the governor-head having the bracket e, provided with lugs d j, the ball-arm a, having the lugs f and provided with a slotted shaft h, journaled in the bracket, the stretched spring c, extending through the slotted part of the shaft and having its ends attached, respectively, to a lug on the bracket and the lug on the ball-arm, and a spring k, connected with the shaft and bearing against the other lug on the bracket, substantially as described.

5. The combination, in an engine-governor, of the spindle r, having friction-disks s s' and a slide m, the differential lever o, having the pivoted link u, the shaft v, having the friction-disk t and bevel-gear w, the nut w^2, and the screw p, connected with the differential lever, having the bevel-gear w' and provided with a rod q for connecting with a valve, substantially as described.

6. The combination, in an engine-governor, of the governor-head having a bracket, the swinging ball-arm jointed to the bracket and provided with a spring stretched across its joint, as described, the spindle r, having friction-disks s s' and slide m, the differential lever o, having link u, the shaft v, having friction-disk t, the nut w^2, and the screw p, connected with the differential lever, geared to the said shaft of the friction-disk and having a rod for connecting with a valve, substantially as described.

Dated this 22d day of January, 1891.

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