(No Model.) 2 Sheets—Sheet 1.

L. RUSHWORTH & I. M. LIVSEY.

SPEED GOVERNOR.

No. 494,894. Patented Apr. 4, 1893.

Fig. 1.

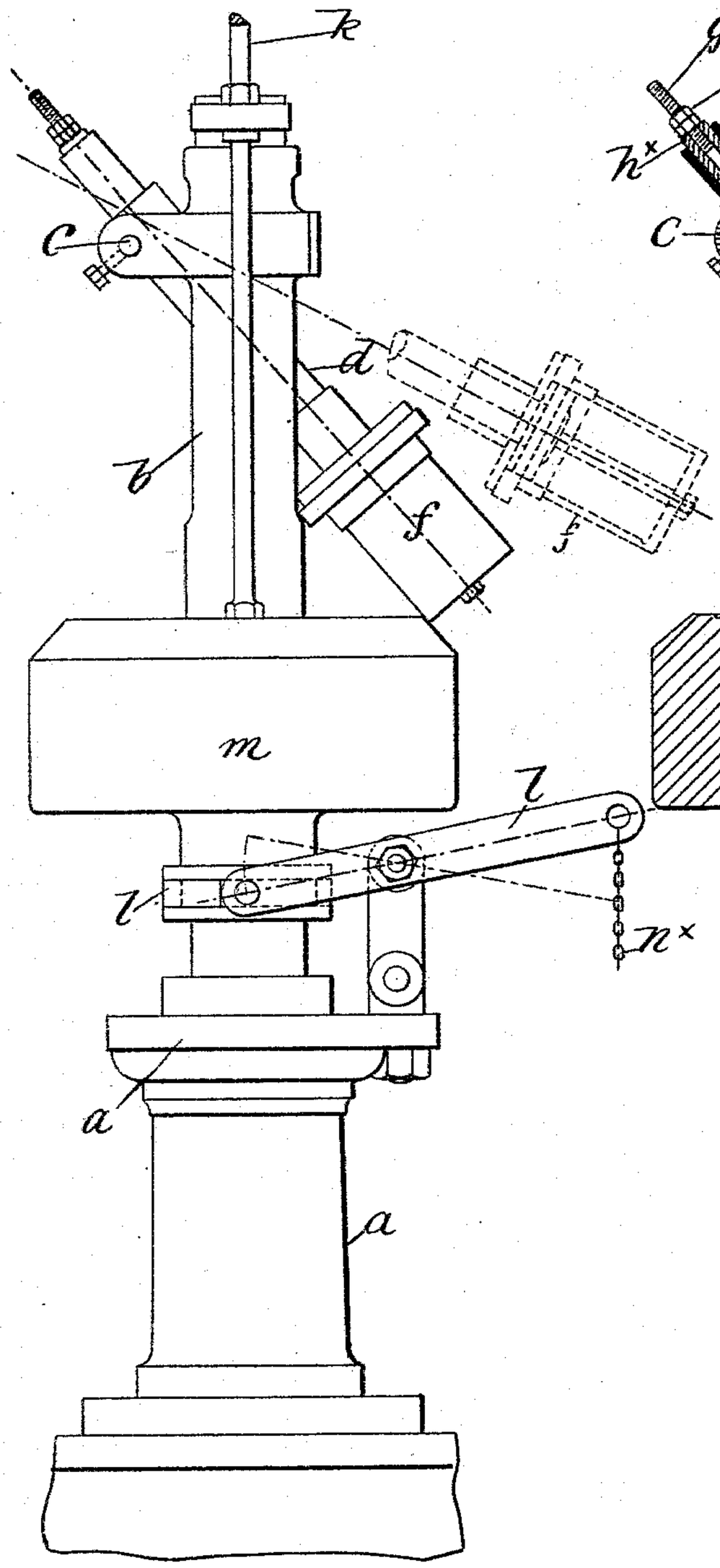
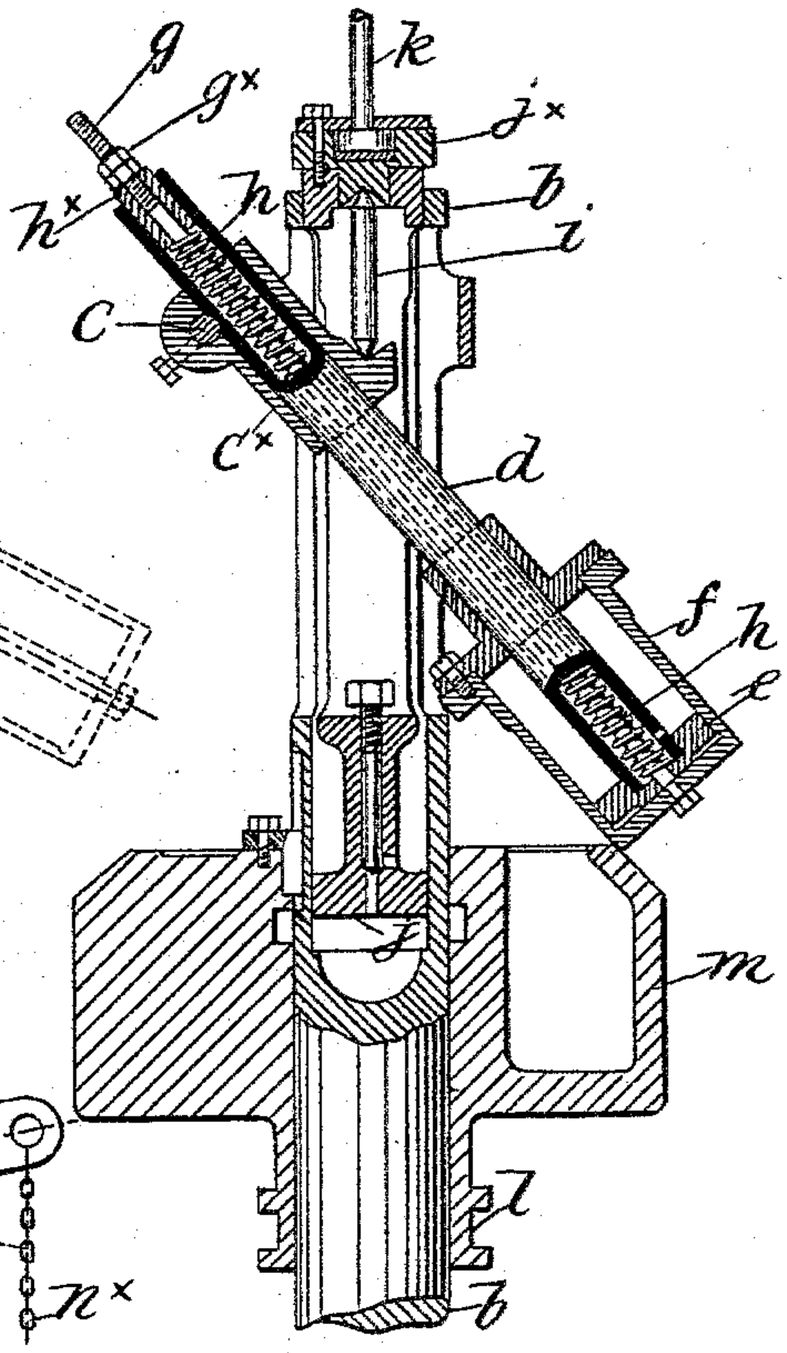


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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SPEED GOVERNOR.

No. 494,894. Patented Apr. 4, 1893.

Fig. 3

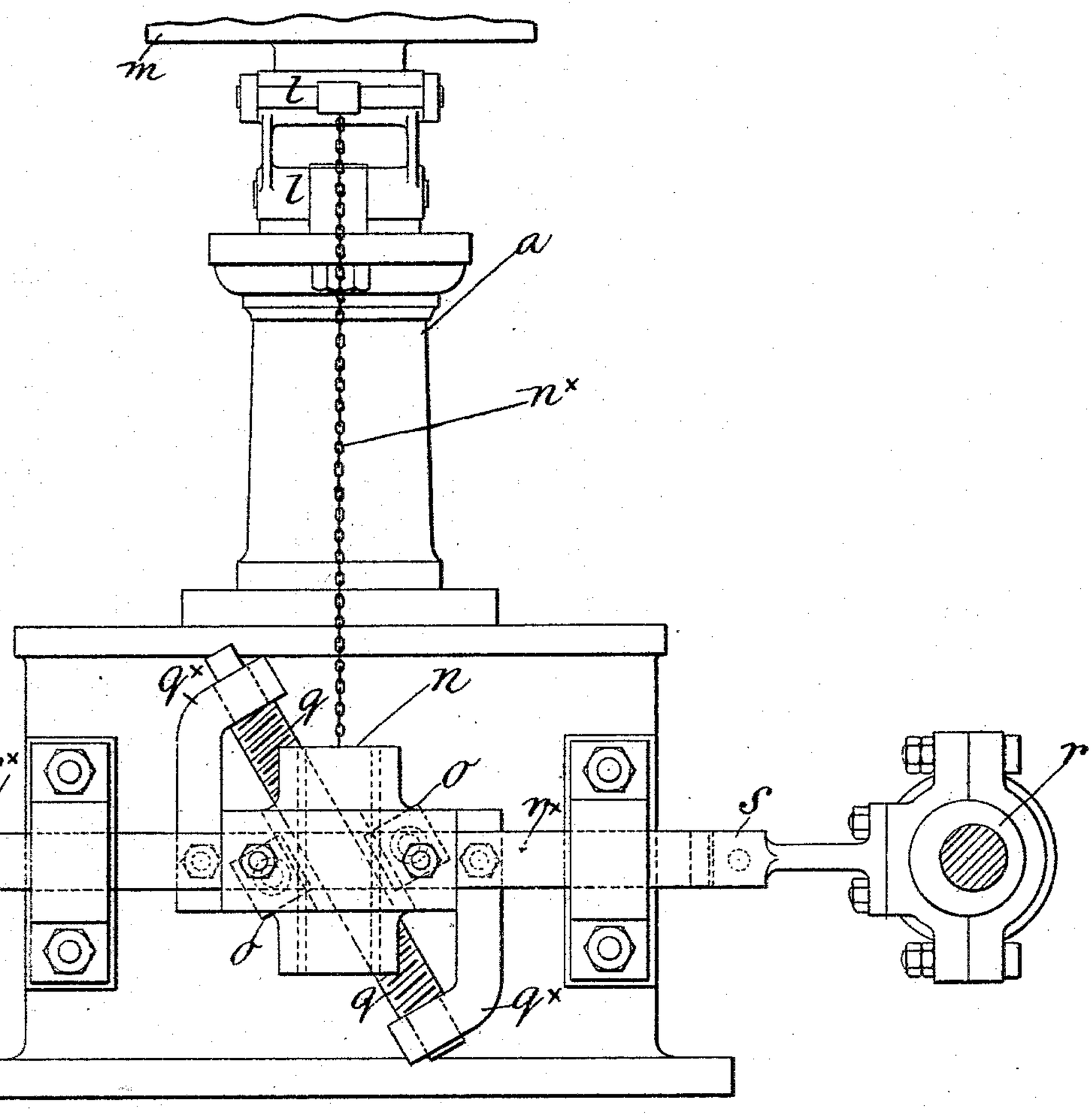
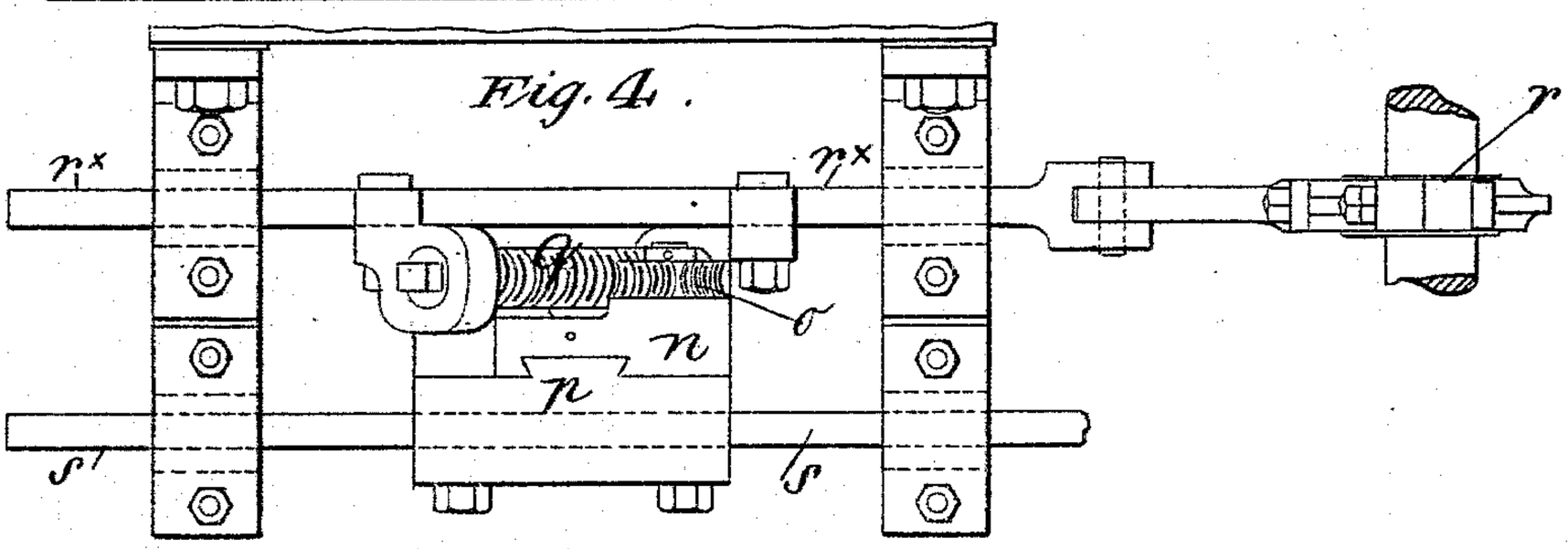


Fig. 4.



Witnesses.
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Inventors.
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UNITED STATES PATENT OFFICE.

LUKE RUSHWORTH, OF DROYLSDEN, AND ISAAC MOORHOUSE LIVSEY, OF ASHTON-UNDER-LYNE, ENGLAND.

SPEED-GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 494,894, dated April 4, 1893.

Application filed October 21, 1891. Serial No. 409,459. (No model.) Patented in England November 28, 1890, No. 19,392.

To all whom it may concern:

Be it known that we, LUKE RUSHWORTH, of Droylsden, and ISAAC MOORHOUSE LIVSEY, of Ashton-under-Lyne, both in the county of Lancaster, Kingdom of Great Britain, subjects of the Queen of Great Britain, have invented new and useful Improved Means for Governing or Regulating the Speed of Steam or other Motive-Power Engines, (for which we have obtained provisional protection in Great Britain, No. 19,392, dated November 28, 1890,) of which the following is a specification.

Our invention for governing or regulating the speed of steam or other motive power engines consists principally in employing, in lieu of the ordinary governor arms, an oscillating arm or pendulum which by reason of the centrifugal force, not only rises and falls but also lengthens and shortens and thus greatly increases the sensitiveness of the governor. We attain this object by the means illustrated in the accompanying two sheets of drawings, in which—

Figure 1, Sheet I, is an elevation and Fig. 2, a sectional elevation of the governor. Fig. 3, Sheet II, is an elevation and Fig. 4, a plan of the governor stand, with the connection to the inclined toothed plate, bar, or spindle and the compound slide with its catches.

Similar letters refer to similar parts throughout the several views.

Referring to Figs. 1 and 2, Sheet I, *a* is the top portion of the governor pillar. The main spindle *b*, which is caused to revolve in the usual manner, is partly a tube, and has a fulcrum *c* situated outside its center of rotation, to which fulcrum *c* is attached, preferably by means of a collar $c^{\times}$, a tubular pendulum *d* extending across the center of rotation. This tubular pendulum *d*, has a piston *e* attached thereto at or near its lower extremity, on which is arranged to slide a ball or cylinder *f* which incloses the piston *e*. This sliding ball or cylinder *f* is secured to one or more rods *g* and is under the influence of a spiral spring or springs *h*, placed on the rod or rods *g*, the lower end of which spiral spring *h* bears against the piston *e* and the upper end against a bush $h^{\times}$ and rendered adjustable on the rod *g* by means of nuts $g^{\times}$, for the purpose of regulating the movements of the ball or cylinder *f*. The latter is filled with liquid of the consistency required, and is controlled thereby in the passing of the liquid from one side to the other side of the piston *e* thus giving an automatically lengthening and shortening pendulum, as the altering conditions of load on the engine may require. The tubular pendulum *d*, at or near the center of rotation, through the medium of the collar $c^{\times}$ and the pivot bar *i*, forms a connection with a dash pot piston *j* situated and working inside the lower end of the main tubular spindle *b*. Through and by this connection, either from the upper end *k* at $j^{\times}$ of the dash pot piston connection, or from the collar and lever attachment *l* formed on the lower end of the counterpoise weight *m*, which slides on the main tubular spindle *b* and is connected thereto by means of the cross head $i^{\times}$ and rods $b^{\times}$, the motions and variations of the pendulum are transmitted to a slide *n* by means of the chain $n^{\times}$, as shown in Figs. 3 and 4, Sheet II. The slide *n* is furnished with toothed catches *o*, *o*, and adapted to move vertically on another slide *p* fixed to a bar or rod *s*, which is rendered laterally movable and connected to the throttle valve or cut off gear of the engine. In front of the slide *n* is arranged to reciprocate laterally, preferably by an eccentric *r*, a rod or bar $r^{\times}$ furnished with arms $q^{\times}$ carrying a diagonal toothed spindle *q* positioned between the catches *o*, *o*. If the engine runs at a normal speed, the catches *o*, *o*, of the slide *n* allow the diagonal spindle *q* to laterally reciprocate without coming into contact with them. On an excess of speed taking place, the slide *n* is lowered, through the medium of the governor, toward the lower end of the diagonal spindle *q* and brings one of its catches *o* into contact with the spindle *q*, which moves the slide *n* and the latter the slide *p* simultaneously in a lateral direction and thereby causes the bar or rod *s* to operate the throttle valve or valve gear of the engine and cut off steam as may be required. On a decrease of speed taking place, the slide *n* is raised toward the upper end of the spindle *q* and thus comes into contact with the other of the catches *o*, *o*, which moves the slides *n* and *p*

in a reverse direction and causes bar or rod *s* to operate the throttle valve or gear and admit steam as may be required.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In means for governing or regulating the speed of steam or other motive power engines, the tubular pendulum with a ball or cylinder which automatically lengthens and shortens, and is turned or regulated by means of a screw adjustment in combination with a rod and spring and controlled in its movements by a liquid contained in the ball or cylinder.

2. In means for governing or regulating the speed of steam or other motive power engines, the slide *n* adapted to be lowered and raised by the governor on a laterally movable slide *p* connected to the throttle valve or valve gear of the engine, which slide *n* has catches *o*, *o* in combination with a toothed diagonal spindle *q* adapted to reciprocate laterally between the said catches and take the slides *n* and *p* with it laterally on the slide *n* being lowered or raised by the action of the governor, substantially as and for the purpose set forth.

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Witnesses:
ALFRED BOSSHARDT,
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