

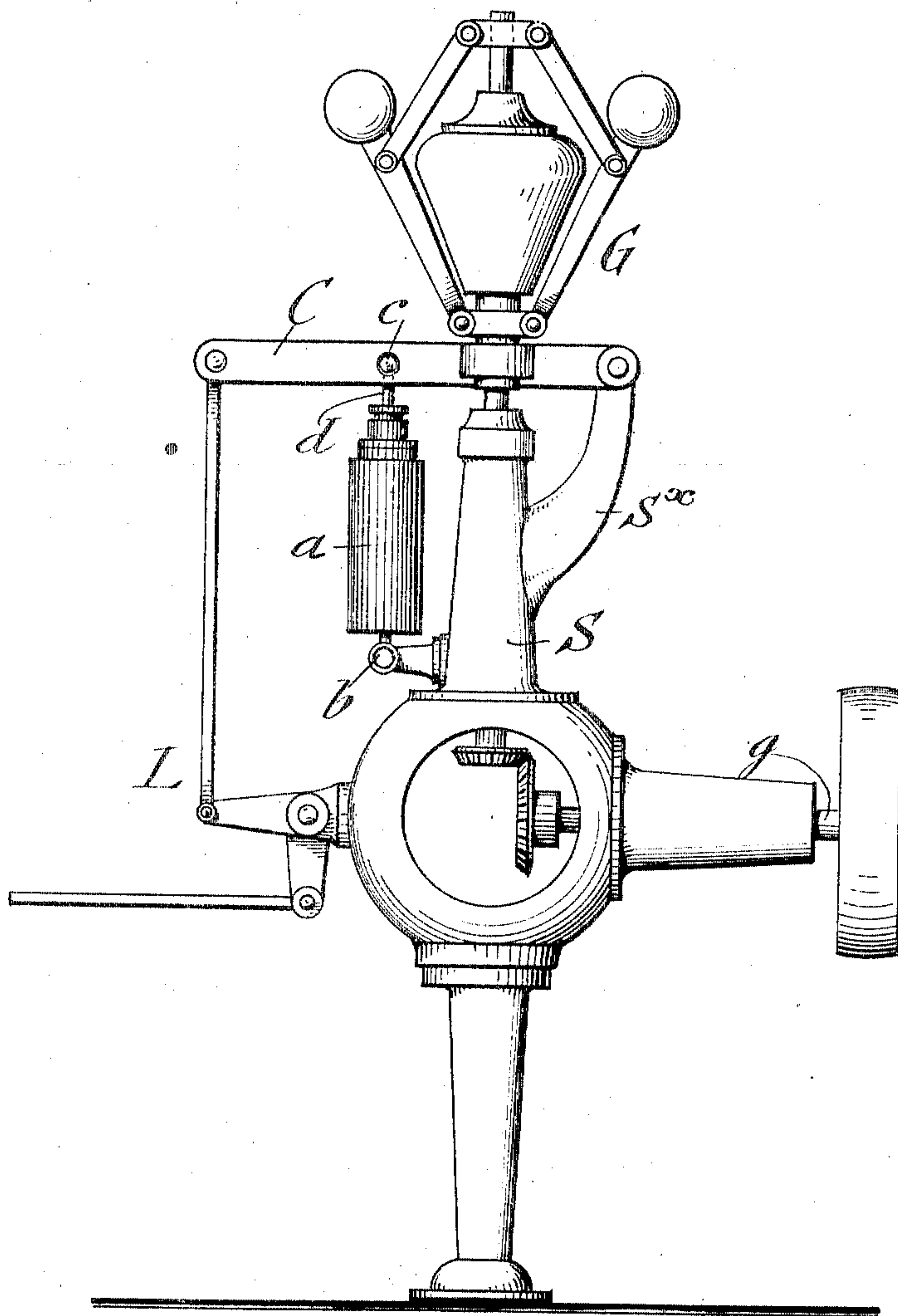
No. 821,359.

PATENTED MAY 22, 1906.

M. HAEBERLEIN.  
OIL BRAKE FOR SPEED GOVERNORS.  
APPLICATION FILED SEPT. 20, 1905.

2 SHEETS—SHEET 1.

*Fig: 1.*



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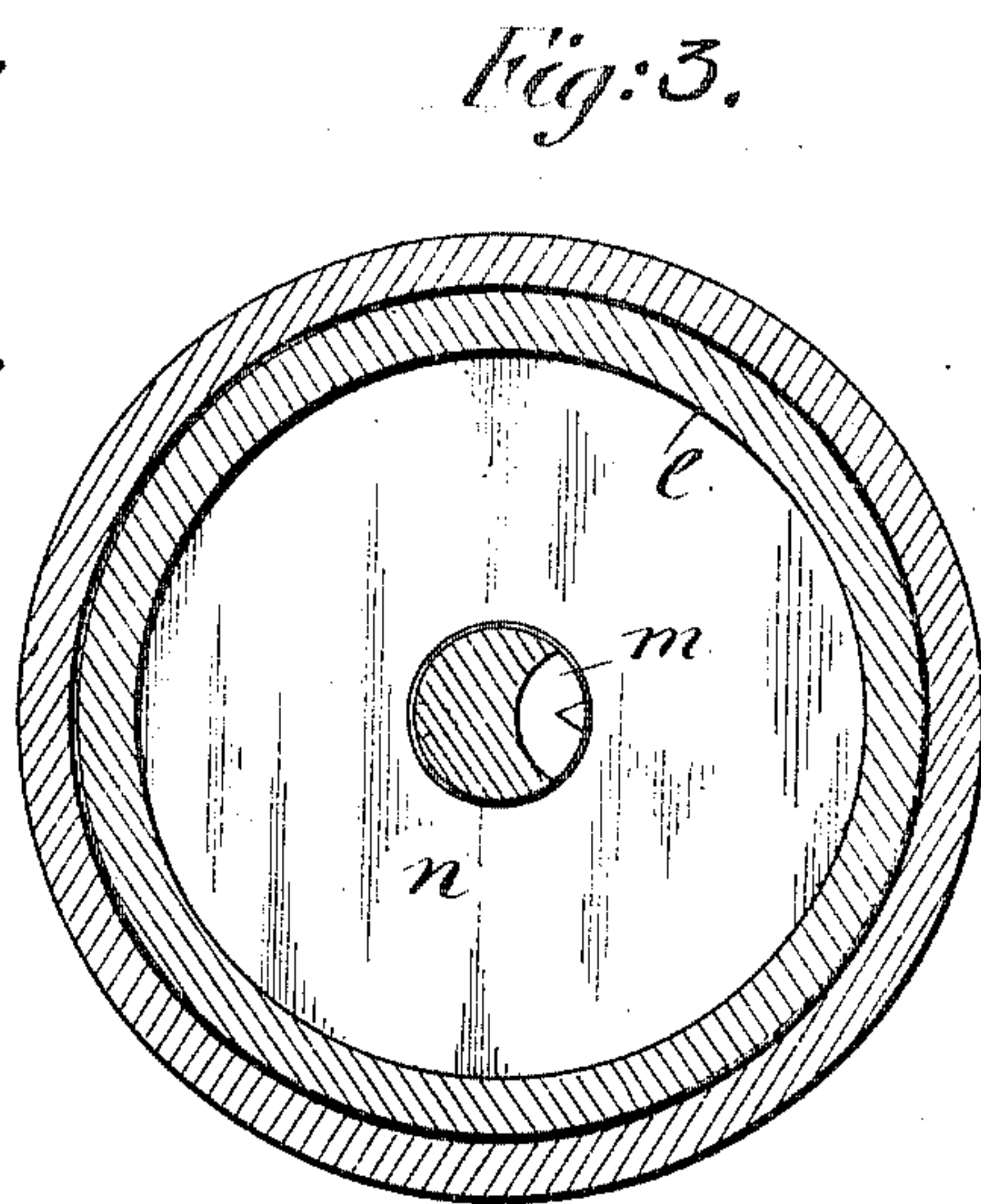
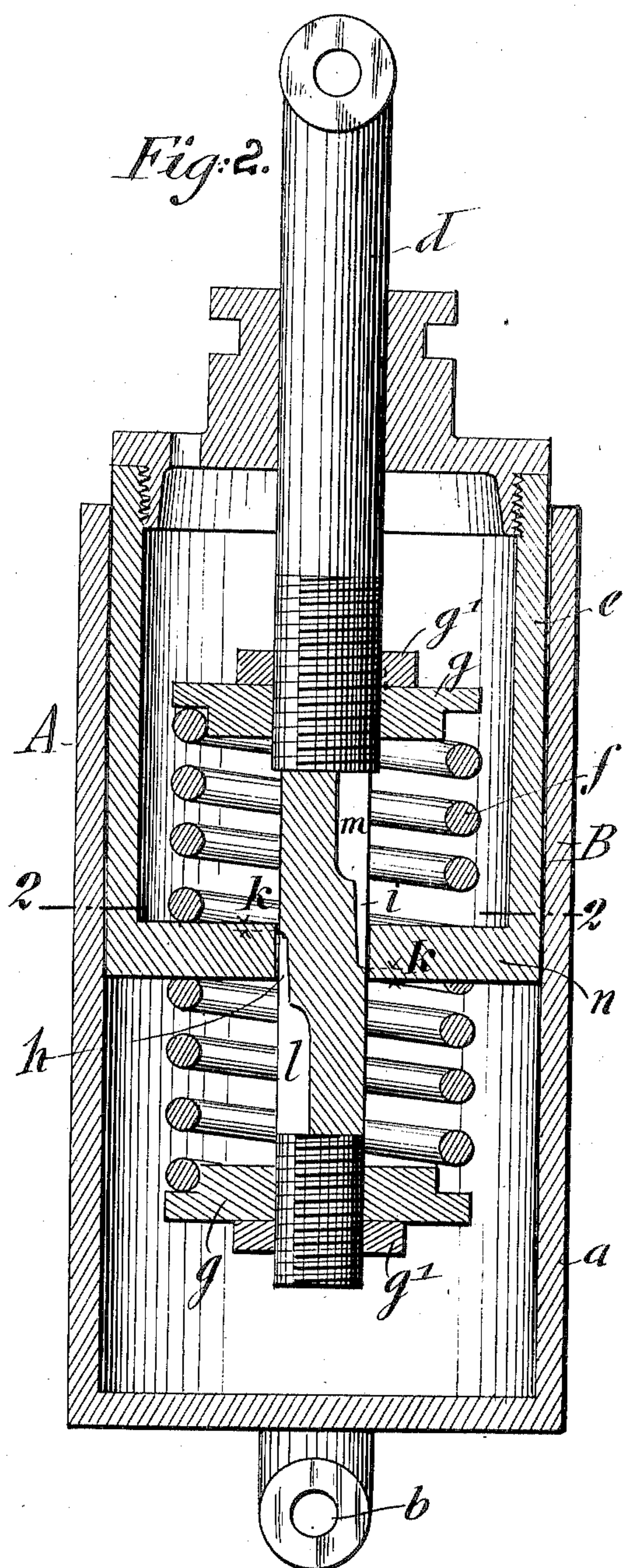
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2 SHEETS—SHEET 2.



Witnesses

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# UNITED STATES PATENT OFFICE.

MAX HAEBERLEIN, OF NIAGARA FALLS, NEW YORK.

## OIL-BRAKE FOR SPEED-GOVERNORS.

No. 821,359.

Specification of Letters Patent.

Patented May 22, 1906.

Application filed September 20, 1905. Serial No. 279,309.

*To all whom it may concern:*

Be it known that I, MAX HAEBERLEIN, a citizen of the Empire of Germany, residing in Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Oil-Brakes for Speed-Governors, of which the following is a specification.

With the directly and indirectly acting speed-governors for motors oil-brakes are frequently used which are intended to influence the regulating operation of the governors in such a manner that the difference of speed between motors running without load and motors running with full load is either equal to zero or reduced to a very small extent. Such oil-brakes are known, and various constructions of the same are in use. These oil-brakes, however, have the disadvantage that they cannot entirely prevent at a uniform load the oscillation of the regulating motion of the governor, for the reason that the two entirely oil-filled spaces of the oil-brake are always connected with each other by an equalizing-opening of constant size. A good regulation can only be obtained when in the normal position of the governor this equalizing-opening is entirely closed and only opened when the motion of the governor is to be regulated. The object of this invention is to obviate the disadvantage referred to and to improve the oil-brakes for speed-governors of motor-engines in such a manner that a more effective regulation is obtained; and the invention consists of an oil-brake comprising a cylinder, a piston in said cylinder, a piston-rod connected with the governor and guided in the piston, and a regulating device, which serves to close entirely the connection between the oil-spaces in piston and cylinder at the relatively median position of the brake-piston, but establishes the connection more or less with variations in the speed of the governor, according to the extent of the regulation, so as to prevent with small differences of speed an equalization of pressure in the oil-spaces, while the same takes place slower or quicker with larger variations of speed of the governor.

The invention consists, further, of the details of construction of the oil-brake, which will be fully described hereinafter and then pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation of a governor mechanism in which the improved oil-brake is included.

Fig. 2 is a vertical central section of the oil-brake, the same being detached; and Fig. 3 is a section on line 2 2, Fig. 2.

Similar letters of reference indicate corresponding parts in the different figures of the drawings.

Referring to the drawings, Figure 1 shows a governor mechanism including an upright centrifugal governor G, rotated by the shaft *g* through a suitable transmission mechanism. A lever C, pivoted at one end to an arm *S*<sup>x</sup>, extending from the standard S, on which the governor G is mounted, is attached immediately to the sleeve of said governor and at the other end to a lever mechanism L, connected by any suitable means to the regulating mechanism (not shown) of the motor-engine. Secured at *b* to a bracket on the standard S is the cylinder *a* of the improved oil-brake, the piston-rod *d* of which is connected at *c* with the governor-lever C. In the brake-cylinder *a* is fitted a piston *e*, through the bottom of which the piston-rod *d* is passed, the piston-rod being accurately fitted into the central opening in said bottom. At each side of the bottom of the piston *e* is arranged a pressure-spring *f*, the springs being held in position between the bottom and screw-nuts *g g*, that are held by means of jam-nuts *g'* on the threaded portions of the piston-rod *d*, the tension of said springs being so adjusted by the screw-nuts *g g* that they have always a tendency to force the piston *e* into a median position with respect to the piston-rod *d*. Both pressure-springs *f f* act on the piston in the same manner as a single pull and pressure spring, which when the piston is in its median position is not in tension. The springs *f f* possess sufficient stiffness so as to impart to the governor the required degree of stability. In the median position of the piston *e* on the piston-rod *d* the pressure of the springs is neutralized; but with every shifting of piston and piston-rod toward each other they exert a resistance on the piston which is gradually increased from zero.

In the piston-rod *d* are arranged two longitudinal grooves *h* and *i*. The groove *h* is enlarged toward the lower end, so that it is always in connection with the lower oil-space, while its upper end does not reach up to the upper edge of the piston bottom, but is slightly covered by the same for the thickness *k*. The groove *i* is arranged in a similar manner in regard to the upper oil-space. In the median position of the piston *e* the



ends of both grooves are covered by the bottom of the piston, so that no connection is formed in this position between the upper and lower oil-spaces in the piston and cylinder.

5 The operation of the improved oil-brake is as follows: With a constant velocity of the speed-governor both piston and piston-rod will assume the median position. (Shown in Fig. 2.) With small changes in the velocity of the governor and correspondingly smaller movements of the piston-rod than the covering thicknesses  $k$  the grooves  $h$  and  $i$  remain closed. A slipping of the brake-piston can therefore not take place, and consequently the entire tension of the springs  $f$  is exerted on the same. With increased variations of speed and a correspondingly larger shifting motion of the piston-rod  $d$  the springs  $f$  are set to greater tension, so that one of the grooves, either  $h$  or  $i$ , is opened and called into action. Owing to the difference in pressure in the two oil-spaces, an equilibrium of pressure takes place instantly by means of the communicating groove until the piston has followed the pressure of the spring set to tension and has again been placed into its median position.

The form and cross-section of the grooves can be changed. Generally speaking, it is preferable to permit the grooves to terminate in a point, so that the shifting of the brake-piston becomes slower the more it approaches its median position. At the opposite ends the grooves can either be provided with a uniform narrow cross-section or with a gradually-enlarged cross-section. In some cases the narrow portions of the grooves  $h$  and  $i$  may be made comparatively short and then suddenly enlarged into grooves or cavities  $l$  and  $m$ , having a very large cross-section. In this case the shifting of the piston-rod produces, first, the slow following of the piston, which is succeeded by a quick motion of the piston as soon as one of the large grooves or cavities  $l$  or  $m$  is in a position to permit the passage of the oil.

The oil-brake can also be provided with other spring constructions for carrying out the same inventive idea. In place of the grooves  $h$   $i$  and the enlargements  $l$   $m$  other means, such as a rotary slide or valve constructions, can be employed.

The oil-brake may be connected either directly with the sleeve of the governor or with any other suitable part of the governor mechanism. 55

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

1. An oil-brake for directly and indirectly acting speed-governors for motors, which consists of a brake-cylinder, a piston in the same, a piston-rod connected with the governor and guided in the piston, and a regulating device which serves to close entirely the connection between the two oil-spaces in piston and cylinder at the relatively median position of the brake-piston, but opens the same, more or less, with variations in the speed of the governor, according to the extent of the regulation, so as to prevent with small differences of speed an equalization of pressure, while the same takes place slower or quicker with larger variations of speed of the governor. 60 65 70 75

2. An oil-brake for the speed-governors of motor-engines, consisting of a brake-cylinder, a piston in said cylinder, a piston-rod connected with the governor and guided in the bottom of the piston, said piston-rod being provided with longitudinal grooves terminating within the edges of the piston bottom, and pressure-springs acting on opposite sides of the piston bottom. 80

3. An oil-brake for the speed-governors of motor-engines, consisting of a brake-cylinder, a piston in said cylinder, a piston-rod connected with the speed-governor and guided in a central opening of the piston bottom, said piston-rod being provided with longitudinal grooves extending in opposite direction and terminating at one end between the edges of said bottom and having enlarged portions or cavities at their opposite ends, and pressure-springs acting on opposite sides of the bottom of the piston. 85 90 95

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

MAX HAEBERLEIN.

Witnesses:

H. C. FUCHT,  
ARTHUR KILLIAN.