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GOVERNOR FOR DYNAMOS.

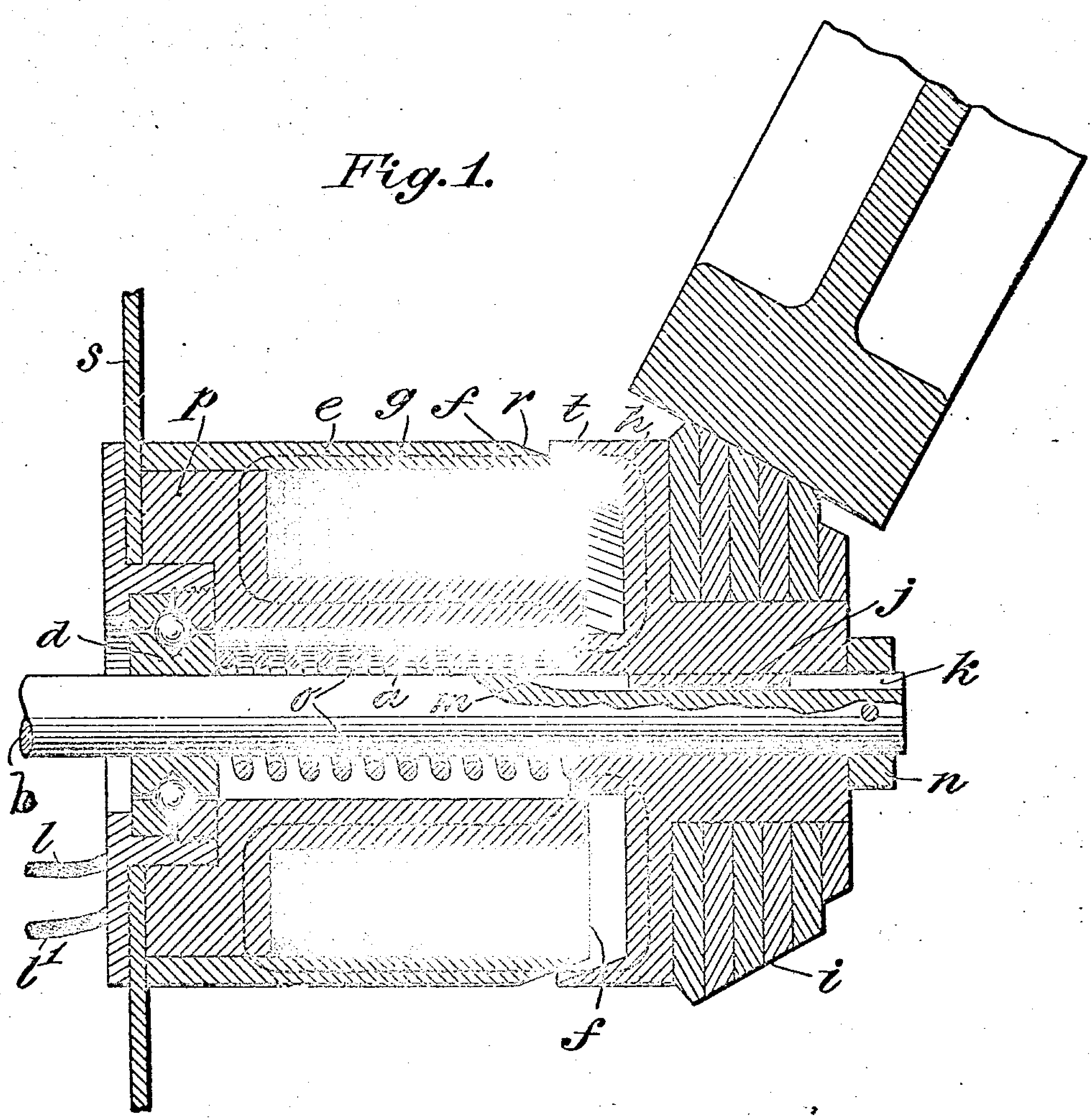
APPLICATION FILED DEC. 11, 1907.

899,088.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

Fig.1.



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2 SHEETS—SHEET 2.

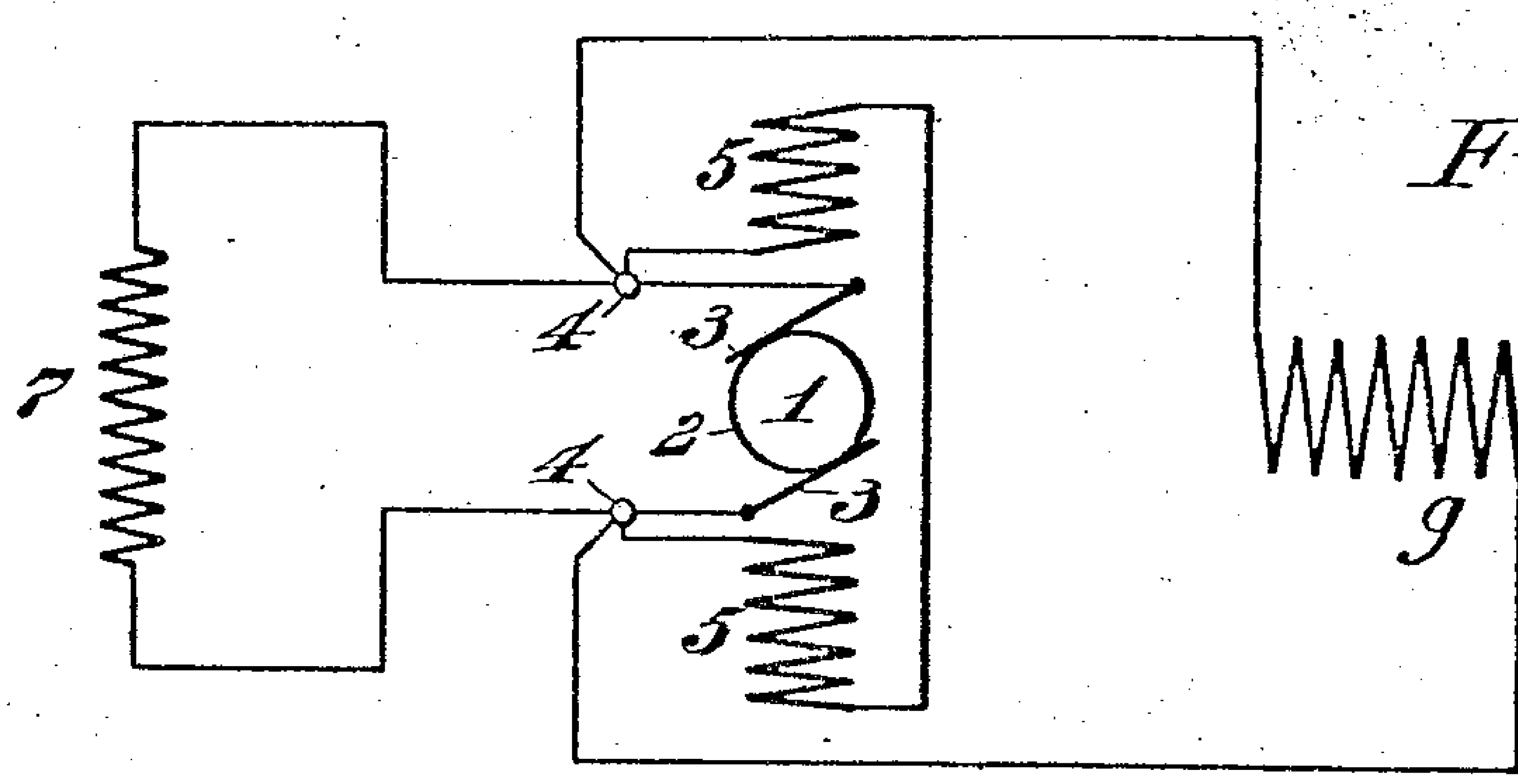

Fig. 2.

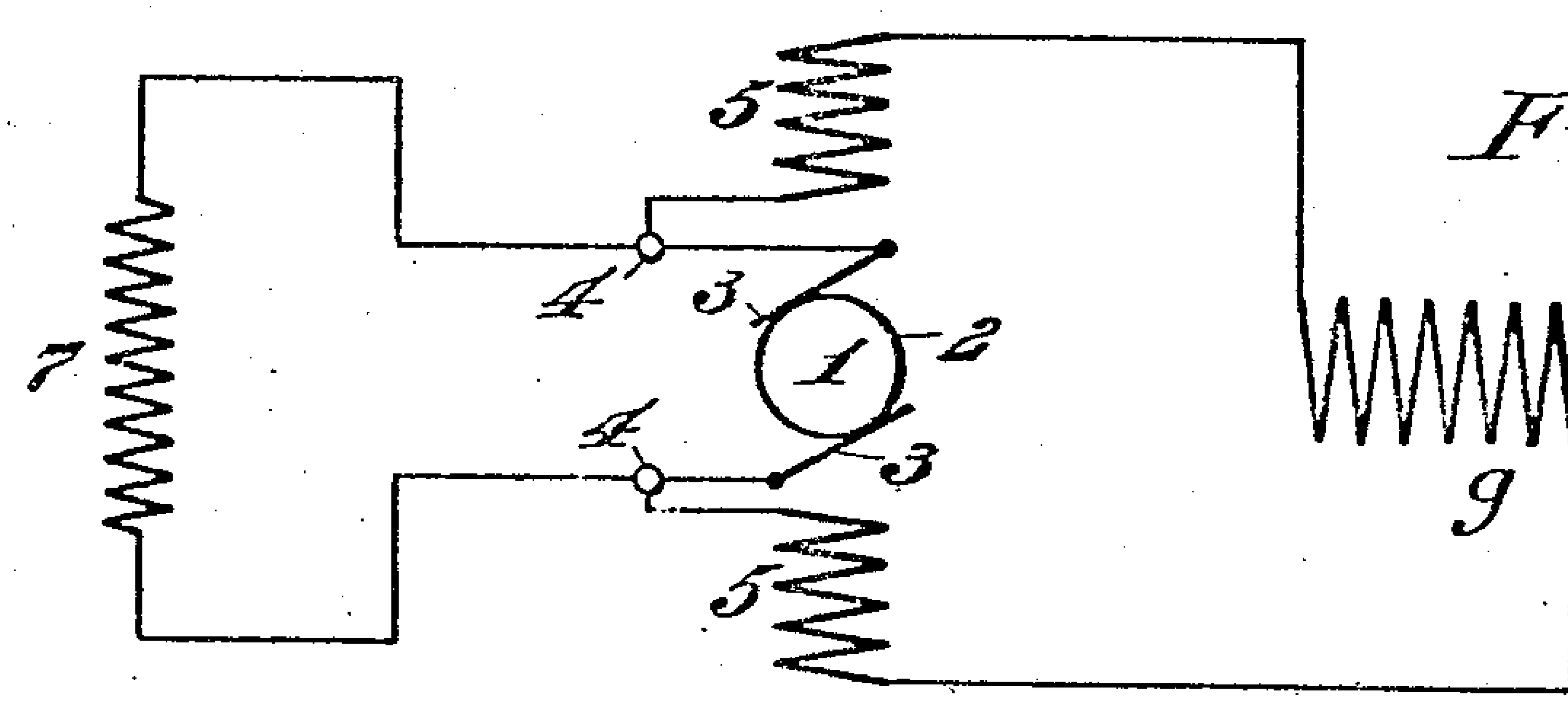

Fig. 3.

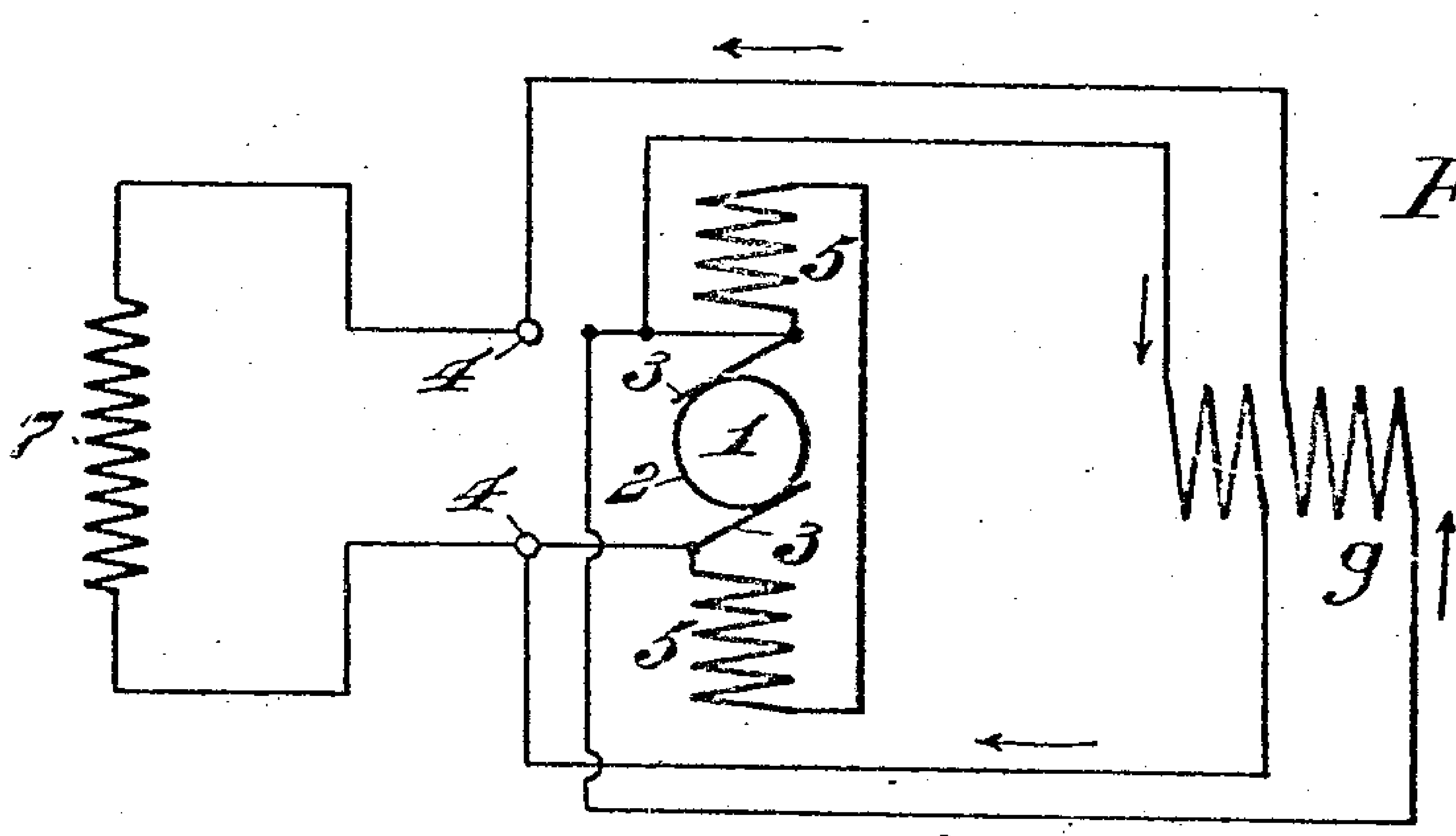

Fig. 4.

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GOVERNOR FOR DYNAMOS.

No. 899,088. Specification of Letters Patent. Patented Sept. 22, 1908.

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To all whom it may concern:

Be it known that I, CHARLES L. WEICHELT, a citizen of the United States, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Governors for Dynamos, of which the following is a specification.

My invention relates to improvements in devices for governing the speed of a dynamo, and more particularly to improvements in devices for governing the speed of that form of dynamo which is frictionally driven by the fly wheel of an internal combustion engine and the current generated by which is employed to explode the charges in the cylinders of said engine.

To obtain the best results the armature of the dynamo should revolve at practically a constant speed. In most internal combustion engines the speed of the fly wheel, owing to opening or closing of the throttle of the engine, to advancing or retarding the spark, or for some other reason, varies and the speed of a dynamo frictionally driven from the wheel will, unless provided with some form of governing device, also vary. The governing device usually employed is some form of well known centrifugal governor which is attached in some way to the dynamo, but the action of this device is such that the armature is driven more or less intermittently.

The purpose of my invention is to furnish a governing device for a frictionally driven dynamo which will maintain a constant speed of the armature entirely irrespective of variations in the speed of the driving means. Another object is to do away with the moving balls or weighted arms of the usual form of centrifugal governor, which, being usually unprotected, not unfrequently cause accidents to the operator or other person by becoming entangled with their clothing.

In the accompanying drawings forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views:—Figure 1, is a view partly in side elevation and partly in longitudinal central sectional elevation of my improved governing device. Figs. 2, 3 and 4 diagrammatic views of different forms of magnet winding which I may employ in my invention.

Referring to Fig. 1, *a* is a hollow steel core through which passes the extended shaft *b* of the armature, which is not shown. *p* is an angular flange, forming part of core *a*, upon which is mounted a steel shell *e* the forward end of which is beveled as shown at *r*. Opposite the flange *p* is a ring *f* of some non-magnetic material, as brass or fiber. Surrounding the core *a* and between the flange *p* and the ring *f* is the magnetizing coil *g*. The lead wires *l*—*l'* to convey the necessary current from the dynamo to the magnet winding are passed through the flange *p*. *d* is a bearing, shown as a ball bearing, securely fastened to the inner end of the hollow core *a*.

The magnet is secured to the frame of the dynamo and is held central and in alinement with the armature by the bearing *d* and the shaft *b*. Upon the extended armature shaft *b* is mounted loosely the flanged steel hub *h* to which is securely fastened the beveled friction pulley *i*. The hub *h* is provided with a key or feather which engages a keyway *k* in shaft *b*. The flanged portion *t* of hub *h* serves to complete the magnetic circuit of magnet *g* and, in fact, is the armature of this magnet. The inner end of this portion *t* of the hub *h* is beveled to mate with the beveled front end of the shell *e* and these beveled surfaces act together to reduce the air gap between the magnet and armature and at the same time permit a relatively long movement of the armature upon the shaft *b*, in other words this construction permits a considerable movement of the armature without danger of its getting out of the field of attraction of the magnet.

m is a rearward extension of the hub *h* which enters the bore of the core *a*, it is made of somewhat less diameter than the bore so that it may revolve freely therein.

o is a spring placed in the bore of core *a* and surrounding shaft *b*, one of its ends bears against the bearing *d*, which is secured to shaft *b*, and its other end against the extension *m* of the hub *h*. This spring normally forces the hub, pulley or armature outwards, a collar *n*, fastened to shaft *b*, limiting its movement in this direction.

The magnetic circuit of the magnet is indicated by dotted lines in Fig. 1.

The spring *o* normally forces the hub *h* outwards and holds the pulley *i* against the driving wheel. At normal speed the magnet *g* is not sufficiently energized to pull against spring *o* but any increase of speed of the pulley *i* is immediately transmitted to the ar-

mature shaft *b*, to which this pulley is fastened, and the voltage of the dynamo is raised to a predetermined point energizing magnet *g* sufficiently to cause it to draw the hub or armature *h* towards it and compress the spring *o*, this will result in reducing the contact pressure between the pulley *i* and the driving wheel and permit the pulley to slip. The greater the speed of the driving wheel the greater will be the slip of the pulley *i* and, conversely, the less the speed of this wheel the less the slip of the pulley.

It will be noted that the pulley *i* is never entirely out of contact with the driving wheel but is so arranged that it is held more or less tightly against this wheel as dictated by the action of spring *o* and magnet *g* hence the contact movement of the shaft *b* is constant and not intermittent.

If for any reason the dynamo should fail to generate its proper voltage at a known speed the controlling device would allow the speed to rise or fall until the proper voltage is generated. The air gap between the magnet and the armature may be varied for adjustment, increasing the air gap increases the speed of the dynamo, decreasing it decreases the speed.

There is no mechanical connection between the controlling magnet *g* and the armature *h* and pulley *i*, the longitudinal movements of the latter are controlled entirely by the former and the spring *o*. The device is very sensitive and responds instantly to any change of electro motive force generated by the dynamo.

In Figs. 2, 3 and 4 diagrammatic arrangements of the dynamo and different forms of windings of my magnet are shown. In Fig. 2 a parallel connection is shown. The leads of magnet are connected across the brushes of the dynamo so that the full voltage of the dynamo acts upon the magnet winding. In this, and the following figures, 1 represents the armature, 2 the commutator, 3 the brushes of the dynamo, 4 the terminals, 5 the field coils, *g* the controller magnet, 7 the line wires.

In Fig. 3, the magnet *g* is shown connected in series with the field coils. The connection shown in this figure and in Fig. 2 are used when the current taken from the dynamo does not have very much variation.

When there is a great variation in the current from the dynamo a differential winding, as shown in Fig. 4, is preferred. In this case the magnet *g* has two windings, one, a shunt winding, connected as shown in Fig. 2 and another a series winding wound to oppose the first, or shunt, winding and connected in series with the outside circuits. When there is no current flowing through the series winding the full strength of the shunt winding will act upon the spring thereby reducing the tension between the driving and driven wheel, as soon, however, as the current starts to flow through the series winding part of the lines of force in the shunt will be neutralized thereby weakening the pull of the magnet and increasing the contact between the driving and driven wheel.

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

1. In a speed governing device of the character described, in combination, a dynamo, an armature and shaft, a driven pulley, a hub or armature slidingly carried by said shaft and carrying said pulley, a spring for controlling the movement of said hub or armature in one direction, an electro-magnet for controlling the movement of said hub or armature in the other direction, and connections leading from the field coils of said dynamo to the winding of said electro-magnet.

2. In a speed governing device of the character described, in combination, a dynamo and its shaft, a stationary controlling electro-magnet surrounding the armature shaft of said dynamo and subject to the changes of electro-motive force generated by said dynamo, an armature mounted slidingly upon the armature shaft of said dynamo, a friction pulley carried by said sliding armature, and a spring for forcing said armature and pulley away from said magnet.

3. In combination, a dynamo, an armature and its shaft, a stationary electro-magnet, carried by the frame of the dynamo, the core of which is hollow and which surrounds said armature shaft, an armature for said magnet mounted slidingly upon said shaft, a friction pulley carried by said magnet armature, a spring within said hollow magnet core operating to force said magnet armature and pulley outward, and connections between the field coils of said dynamo and the winding of said electro-magnet.

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