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W. K. RANKIN & T. F. KELLY.
ELECTRIC AND PNEUMATIC GOVERNOR.
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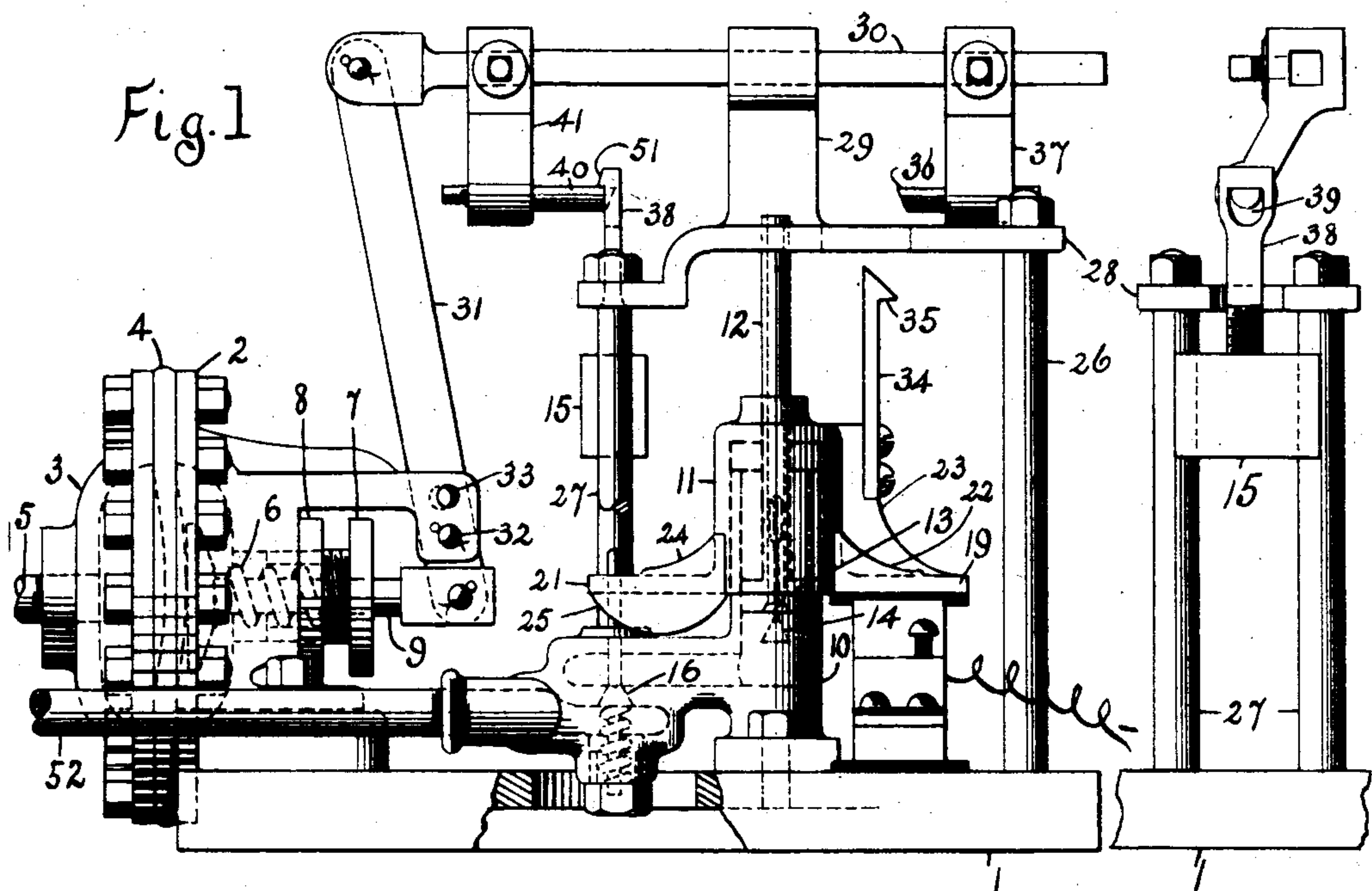


Fig. 2

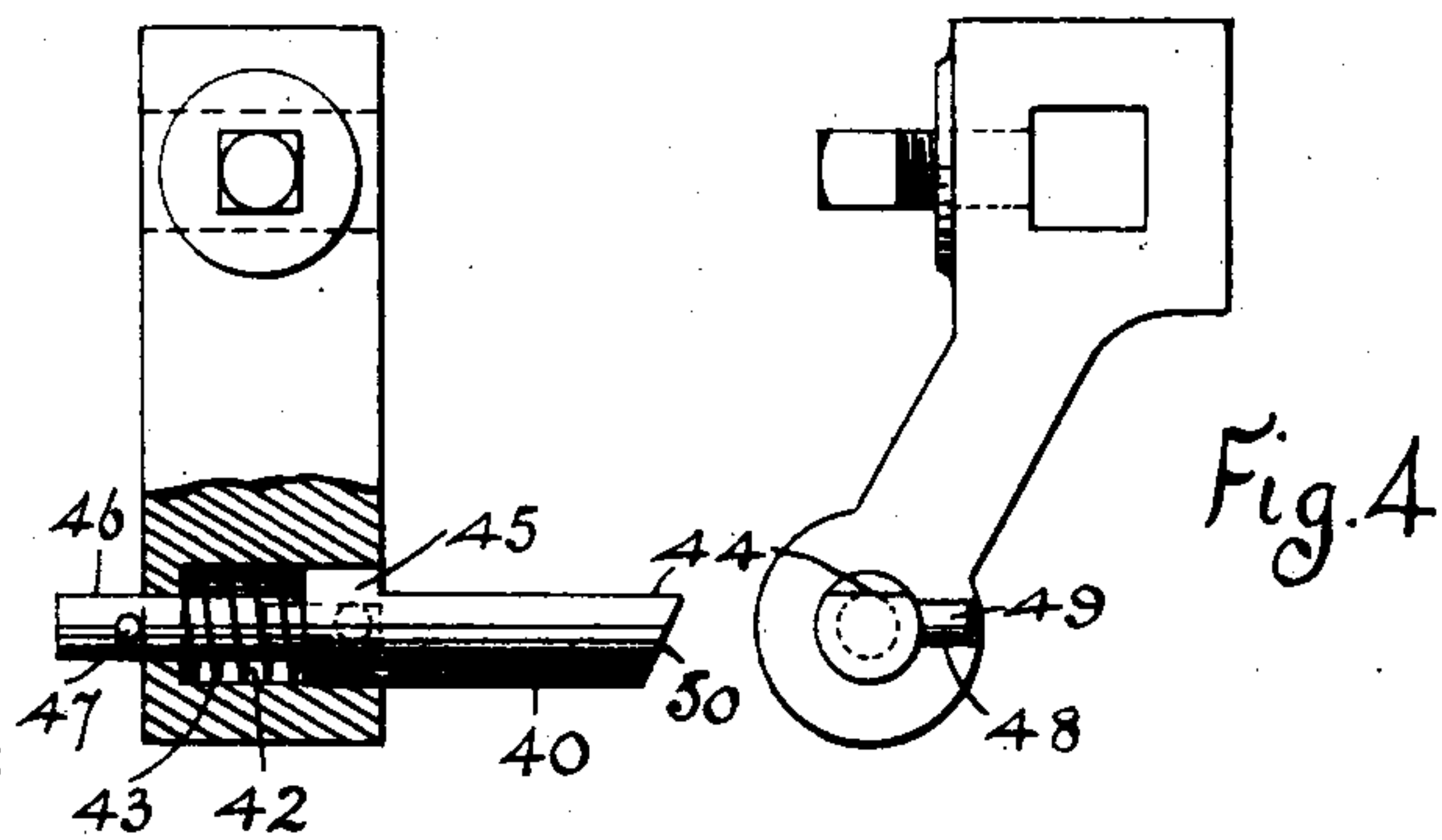


Fig. 3

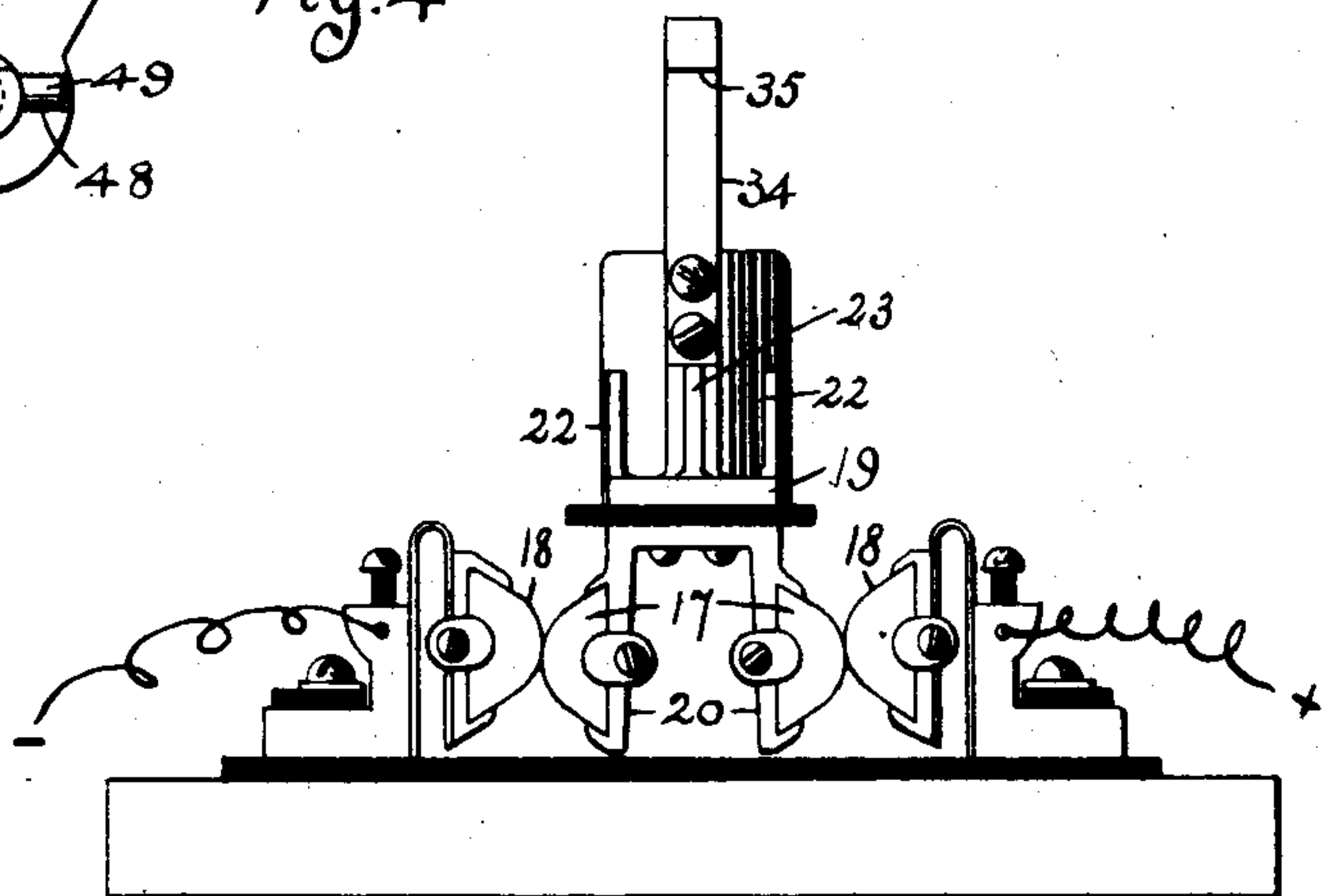


Fig. 5

Witnesses.
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UNITED STATES PATENT OFFICE.

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ELECTRIC AND PNEUMATIC GOVERNOR.

No. 871,360.

Specification of Letters Patent.

Patented Nov. 19, 1907.

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To all whom it may concern:

Be it known that we, WILLIAM K. RANKIN and THOMAS F. KELLY, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric and Pneumatic Governors, of which the following is a specification.

This invention has for its object the improvement of the electric-pneumatic governor for which an application was filed January 22, 1906, number 297,147 and allowed October 5, 1906.

The improvements herein shown and described are for the purpose of simplifying the construction by eliminating many parts which proved to be unreliable, and subject to derangements which seriously impaired the value of the machine. The new elements presented in the present machine are of a substantial construction which render the machine thoroughly reliable and more sensitive as to changes of maximum to minimum and minimum to maximum pressures, so that now a constant pressure is controlled by this machine.

The improvements are illustrated in the accompanying drawing where like parts are indicated by like reference characters throughout the views, in which

Figure 1 is a side elevation; Fig. 2 is an elevation view of the weight and its suspension; Fig. 3 is an enlarged side view, with a part in section of the weight suspension arm and its catch; Fig. 4 is an end view of Fig. 3; Fig. 5 is an elevation view of the carbons, the elevating cylinder and its suspension.

As in the previous invention a bed plate 1 supports a stand 2 with a cover 3 inclosing a diaphragm 4 actuated in one direction by pneumatic pressure which enters by pipe 5, and oppositely by spring 6 whose tension is regulated by follower 7 secured by lock nut 8, and a stem 9 passing through the follower has one end connected to the diaphragm. Also secured upon the bed plate there is a fixed cylinder 10 and surrounding, freely movable, guided and mounted thereon is a lifting or elevating cylinder 11. Attached to cylinder 11 is a hollow piston rod 12 carrying a piston 13 which is closely fitted within cylinder 10 and provided with a valve 14 controlling the passage through rod 12, which is

closed by the pressure passing valve 16, thereby presenting a solid surface against the pressure. There is also a weight 15 to force down valve 16 to admit pneumatic pressure under piston 13, and also movable carbons 17 and fixed carbons 18, similar to the previous machine. The movable and elevating cylinder 11 freely fits the outside of fixed cylinder 10 and has an integral foot 19 to which carbons 17 are attached by a bracket 20 and an integral foot 21 for lifting weight 15. Integral brackets 22, 23, 24, 25 rigidly support feet 19, 21 thus forming a cylinder which is neat, simple and strong and not liable to derangement, and as it is an aluminium casting offers but slight resistance to the lifting pressure under piston 13, which is essential for positive and sensitive action when changes of pneumatic pressure take place.

Upward from base plate 1 are columns 26 and weight guide columns 27 supporting plate 28 and guide 29 for rectangular section rod 30, which is coupled to lever 31 which at its opposite end is attached to stem 9, the lever having a fulcrum 32 for high pressures and 33 for low pressures. Cylinder 11 has a rigid suspension 34 which passes through an opening in plate 28 when the cylinder moves up, and a hook 35 engages a horizontally operative catch 36 resiliently supported in arm 37 which is adjustably supported on rod 30. Weight 15 has a rigid suspension 38 with an eye 39 for the free passing of a horizontally operative catch 40, supported in arm 41 which is adjustably secured to rod 30. In Figs. 3, 4 the construction of arm 41 and its attachments are shown on an enlarged scale. A pocket 42 is formed in the arm and a coiled spring 43 is placed therein, the catch 40 is flattened at its upper part 44, back of which at 45 it is of circular section, fitting in pocket 42 and abutting spring 43, and an extension 46 of less diameter passes through the spring and the far side of arm 41 has a limit pin 47. Arm 41 has a slot 48 and a pin 49 movable in the slot keeps flat face 44 always up, the spring permits the automatic adjustment of the catch to insure its engagement with suspension 38, while the beveled end 50 of the catch and the oppositely beveled hook 51 of suspension 38 insure their engagement to suspend weight 15. Catch 40 is made quite long so as to pass through

eye 39 for a distance sufficient to enable the adjustment of arm 41 for a great range of accumulated pneumatic pressure and to prevent any contact of arm 41 with suspension 38, which contact, if made, would limit the movement of spring 6, which must be free for movement within the limits it is adjusted by follower 7 against diaphragm 4. Arm 37 has a catch 36 of the same construction as catch 40, already described, except it projects a less distance from its supporting arm.

As illustrated, cylinder 11 is down and carbons 17, 18 have formed the circuit from + to - to operate the motor-compressor (not shown) to accumulate the allowed maximum pneumatic pressure, which by means of pipe 5 deflects diaphragm 4 and moves its connected parts, stem 9, lever 31, rod 30, arm 41 and catch 40 to release suspension 38 and weight 15, the released weight descends, by gravity opens valve 16 to admit pressure through pipe 52 to cylinder 10 which closes valve 14 and forces up piston 13, cylinder 11, and carbons 17, breaking the circuit to the motor-compressor; as the cylinder 11 and its attachments move up suspension 34 is caught by catch 36 and held suspended until by decreased pressure the diaphragm and its attached parts again operate to release cylinder 11 and carbons 17 for their descent by gravity to form the electrical circuit; and thus, automatically and alternately the governor controls minimum and maximum pneumatic pressure.

We claim.

1. In an electric and pneumatic governor, the combination with a fluid pressure diaphragm and a fixed cylinder, of a movable cylinder having an integral foot and movable carbons attached thereto, a suspension member for the cylinder and carbons and a

resilient catch, horizontally operative to automatically engage the suspension member.

2. In an electric and pneumatic governor, the combination with a fluid pressure diaphragm, a weight, having a suspension member with an eye and a fixed cylinder, of a movable cylinder, having an integral lifting foot for the weight, and a horizontally operative catch with resilient means and whereby the catch automatically enters the eye when the weight is elevated.

3. In an electric and pneumatic governor, the combination with a fluid pressure diaphragm and a fixed vertical cylinder, of a movable cylinder composed of aluminium, inclosing the fixed cylinder and vertically guided, thereby the movable cylinder having a rigid means of support, an integral foot carrying carbons and an integral foot adapted to elevate a weight.

4. In an electric and pneumatic governor, horizontally operative and resiliently yielding catches, flattened tops therefor, and means to insure the flat top to always be uppermost.

5. In an electric and pneumatic governor, the combination with a fluid pressure diaphragm, a fixed and a movable cylinder and a weight, of horizontally operative resilient catches supported in arms movable by the diaphragm, and means whereby the catches engage and support the movable cylinder and the weight, substantially as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:

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