

No. 745,683.

PATENTED DEC. 1, 1903.

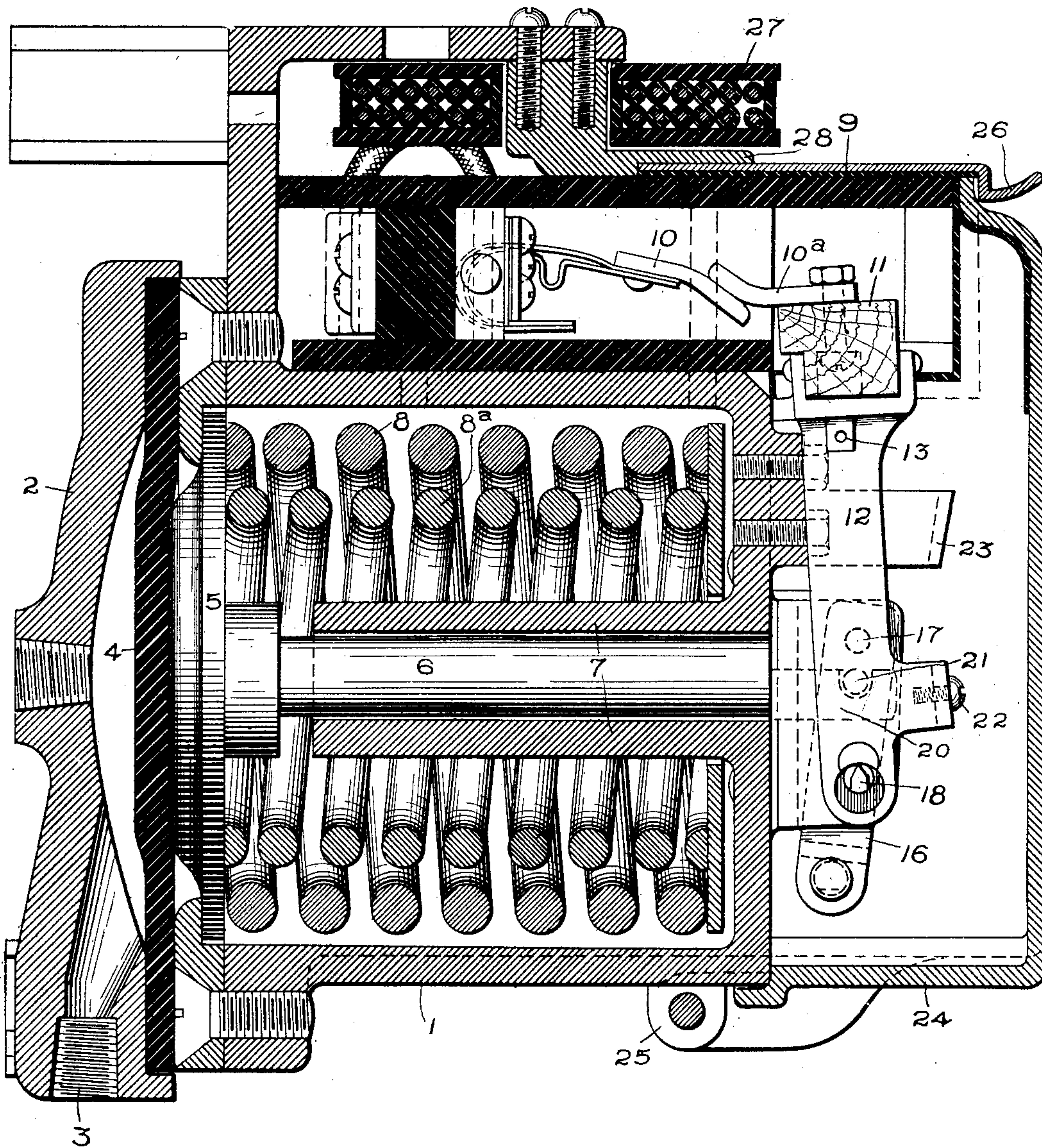
S. B. STEWART, JR.
AIR PUMP GOVERNOR.

APPLICATION FILED JUNE 21, 1901.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

Ewing R. Gurney
Benjamin B. Hall

Inventor.

Samuel B. Stewart Jr.
by *Albert S. Davis*
Atty.

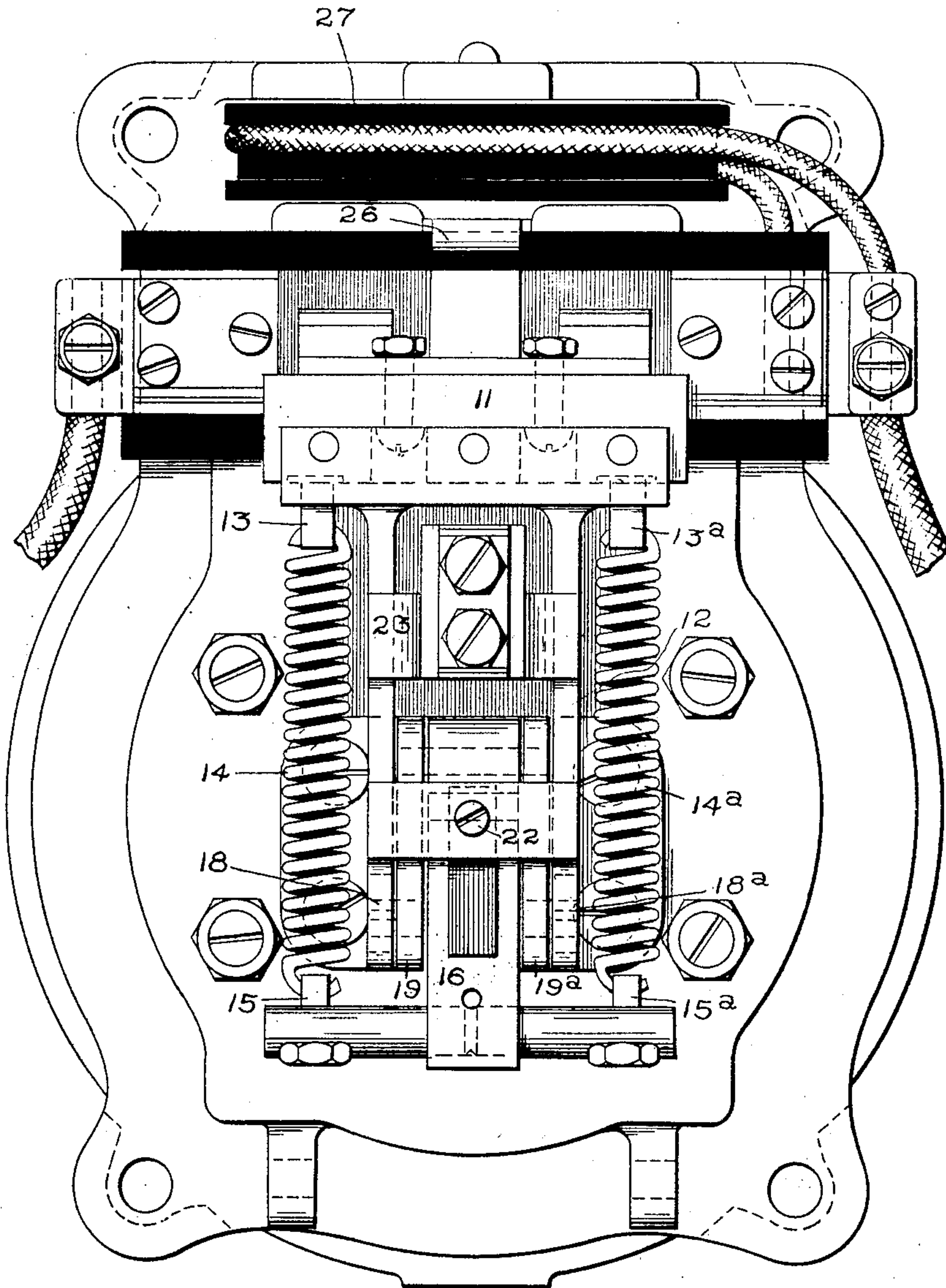
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NO MODEL.

3 SHEETS—SHEET 2.

Fig. 2.



Witnesses.

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NO MODEL.

3 SHEETS—SHEET 3.

Fig. 3.

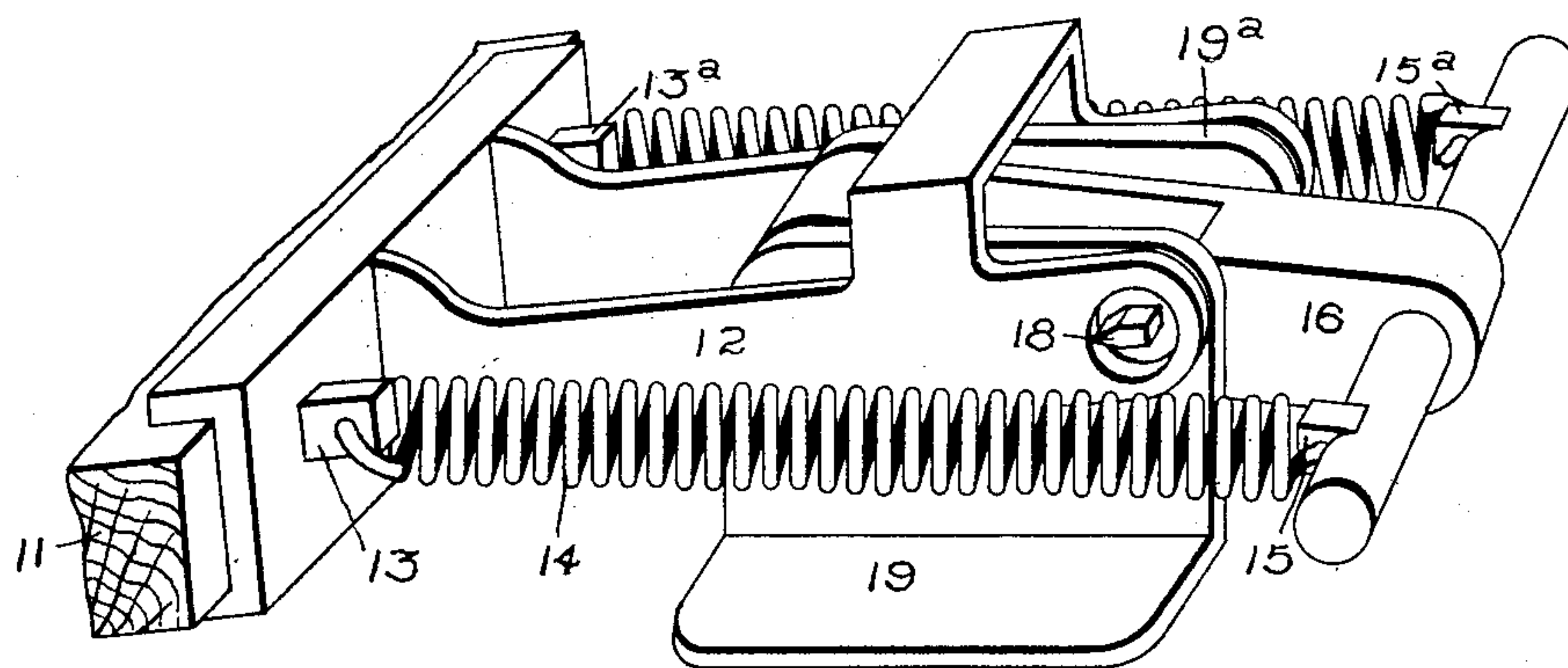


Fig. 5.

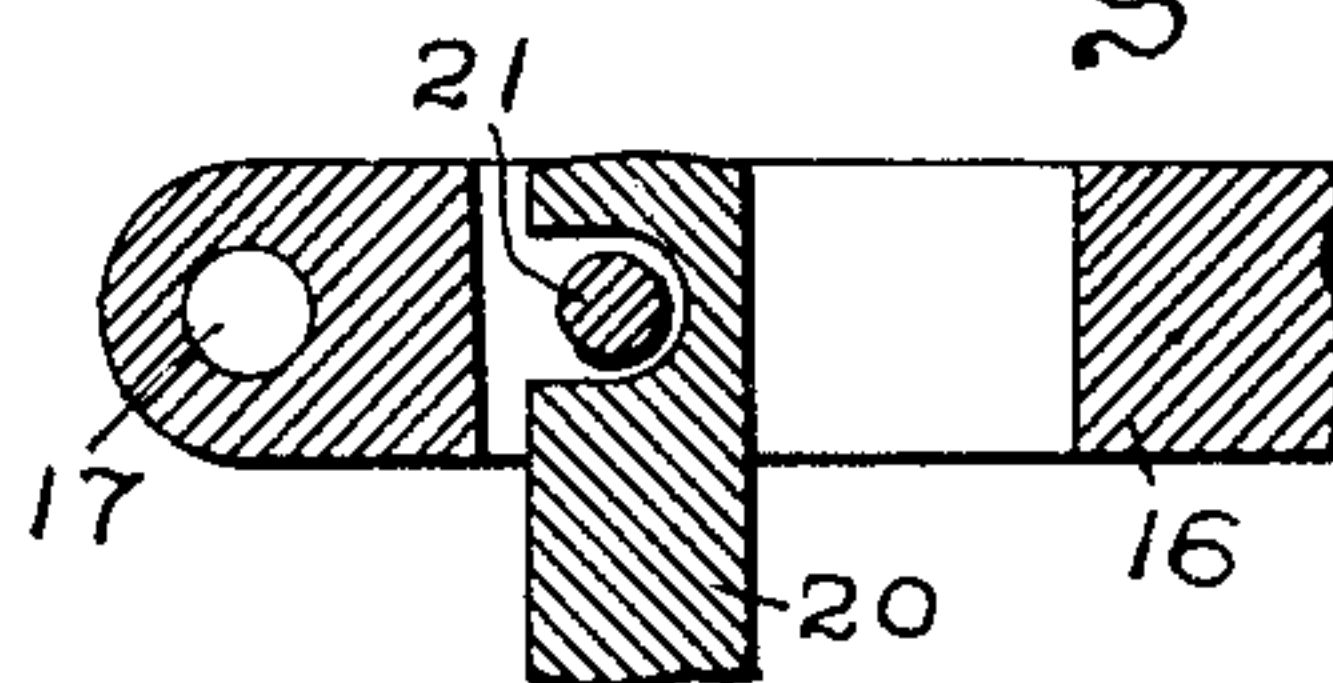
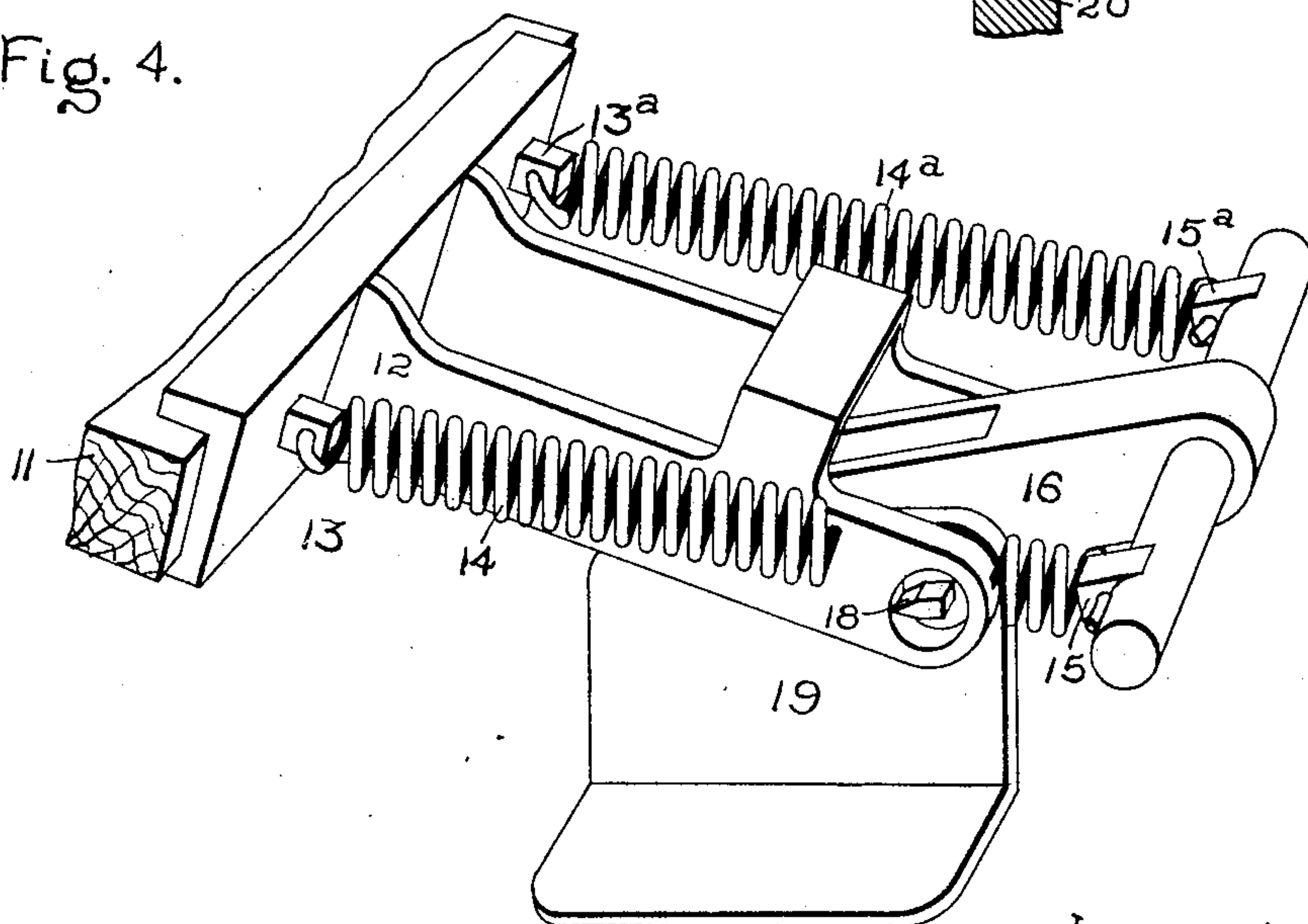


Fig. 4.



Witnesses.

Ewing R. Gurney
Benjamin B. Hill

Inventor.

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UNITED STATES PATENT OFFICE.

SAMUEL B. STEWART, JR., OF SCHENECTADY, NEW YORK, ASSIGNOR TO
GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

AIR-PUMP GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 745,683, dated December 1, 1903.

Application filed June 21, 1901. Serial No. 65,419. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL B. STEWART, Jr., a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Air-Pump Governors, of which the following is a specification.

This invention relates to governors for electric-motor-driven air pumps or compressors, the object being to maintain in an auxiliary reservoir or other holder for compressed air a pressure comparatively uniform and to cut in and out of operation the motor at determinate pressure-limits in the system. It is usual to cut in and out the electric motor which drives the pump after the pressure has fluctuated over a definite operating range, ordinarily fixed at ten pounds. The working range of pressure is ordinarily from eighty to one hundred pounds, the governor being capable of adjustment so that the motor can be cut in when pressure declines to eighty or eighty-five pounds and cut out when it reaches ninety or ninety-five pounds. Various devices have heretofore been designed to control the pressure in this way, sometimes being mechanically actuated by air-pressure at both limits and sometimes being governed by electromagnets cut in by a fluctuation of pressure.

My invention relates to a type in which the circuit-controller which governs the motor-circuit is mechanically actuated by a rise and decline of pressure in the system, the object of the invention being to render the arc at the opening points of contact harmless and to lock the movable parts of the apparatus against derangement by shocks, vibration, or other accidental causes.

In a prior patent issued to me, No. 671,274, I described a governor in which the circuit-controller for the motor was actuated by the fluid-pressure and was latched by a mechanical device in either its off or on position, which device was tripped by a determinate range of movement of a pressure-flexed diaphragm. In my present improvements I simplify the construction, maintaining the same advantages of operation, by having the arm which carries the movable contact-point connected

to a spring which may be carried on opposite sides of the pivotal point of the arm by means controlled by a pressure-flexed diaphragm. By this means the diaphragm may move through the desired range of movement determined by the upper and lower pressure-limits without disturbing the quality of the circuit-contact and at the precisely-proper point will open the circuit with great rapidity, conducing to a rapid extinction of the arc formed between the points of contact. In order to further give a great fineness of definition to this tripping-point, I employ with the diaphragm a spring opposing the air-pressure, composed of two parts, one of which is relatively lighter than the other, so that a too-rapid increase of pressure in the spring as it is moved is not produced.

One of the essential features of my invention consists in storing energy in a freely-movable contact while the pressure is fluctuating, which at a determinate position acts to open the circuit with great rapidity, as contradistinguished from a lock which prevents the movement of the contact until a definite position is reached.

The novel features of the invention will be more particularly hereinafter described, and will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate my invention, Figure 1 is a sectional elevation of an air-pump governor embodying my improvements. Fig. 2 is an end elevation of the same. Figs. 3, 4, and 5 are detail views of the circuit-controller for the driving-motor.

Referring first to Fig. 1, 1 represents a casing secured to a head 2, containing a cavity in communication through a threaded opening 3 with the pipe system, in which fluid-pressure is maintained. Between the head and the casing is clamped a thick flexible rubber diaphragm 4, which bears against a metal plate 5, stem 6 secured to which extends through a reëntrant tube or guide 7, forming part of the casing. Around this guide and bearing against the plate 5 is a double helical spring 8 8', one section of which is formed of thinner material than the other.

On the top of the casing 1 is supported an arc-chute 9, having walls of fiber or other insulating fire-resistant material, in which chute are contacts 10 10^a, which control the circuit of the electric motor governing the air-pressure in the system. One of these contacts is elastically mounted on the rear wall of the chute, as indicated, and the other is carried on a wooden block 11, carried by a movable arm 12. The two contacts may be connected with the motor-circuit in any desired way. To lugs 13 13^a on the upper part of this arm are fastened the ends of two spiral springs 14 14^a, the lower ends of which are fastened to corresponding lugs 15 15^a on an arm carried by pivoted lever 16, the upper end of which is pivoted at 17 to brackets on the end of the casing. The lower end of the arm 12 is pivoted on knife-edges 18 18^a, mounted on the brackets 19 19^a, which support the pivot 17. In the position shown in Fig. 1 the circuit is closed, and the tension of the springs 14 14^a holds it solidly in this position. Attached to the stem 6 of the piston is a notched rod 20, extending through a slot in the lever 16 and loosely engaging a pin 21, extending across the slot. On the outside of the arm 12 is a cross-yoke, in which is mounted a set-screw 22 in alinement with the end of the rod 20. This set-screw is preferably adjusted so that it will not be engaged by the rod 20 until after the lever 16 has been shifted so as to bring the points of attachment of the spring and the center 18 in alinement. A stop 23 is attached to the casing overhanging the arm 12 and adapted to arrest it when the circuit is open. A movable metal cover 24 is provided for the end of the governor, journaled on lugs 25 at the bottom of the casing and cooperating with a spring-catch 26 at the top mounted on the arc-chute. 27 is the coil of a blow-out magnet which develops a magnetic field within the chute 9, one pole of which is extended by the cast-iron casing of the governor and the other end extended over the top of the chute, as indicated at 28, forming about the contact-points when connected a magnetic field which blows the arc-gases laterally out of the chute when the circuit is opened.

Assuming the motor is in operation and the contacts 10 10^a in a closed position, as indicated in Fig. 1, the increasing pressure forces outwardly the diaphragm 4, compressing the springs 8 8^a and forcing outwardly the rod 20, which carries with it the lever 16, to the lower end of which the springs are connected. The circuit is held closed and the arm 12 in the position indicated in the drawings, while an increasing tension is put on the springs by the gradual outward movement of the diaphragm. After the pressure has attained the desired limit the connection-points of the springs are brought into alinement with the pivot 18. The set-screw 22 is adjusted the instant at which the circuit shall be opened, so as to be engaged by the end of the piston in case the contacts should stick or

fuse together, so that the upper lever will be positively pushed away to separate the contacts if the spring should not be powerful enough to do so. The attraction of the springs then rapidly shifts the arm 12, producing a quick opening of the circuit by separating the contact-points 10 10^a, the magnetic field blowing out the arc. The rapid movement of the arm reduces the amount of metal volatilized by the current, and thereby decreases pitting of the engaging faces of contacts 10 10^a. The arm 12 is brought to rest against the stop 23. On a decrease of pressure the reaction of the compressed springs 8 8^a forces to the left the piston and gradually carries the lower end of the arm 16 to a point where the axis of the spring lies to the left of the knife-edge supports, when the circuit will be instantly closed. These relations are clearly indicated in Figs. 3 and 4, 3 showing the relation of the controlling-springs to the pivotal points of the contact-arm when the circuit is closed, and 4 the relation when it is opened. In either of the open or closed positions it will be observed that no jarring can affect the condition of the circuit, as the circuit-controlling arm is held solidly in either position, and during variations of pressure the tension of the spring prevents any accidental shifting of the movable parts. During a movement of the diaphragm in either direction throughout the entire range of movement from the limiting pressures to the pressure at which the circuit-controller is operated tension is being stored in the springs and the line of centers is being gradually shifted, until when the critical pressure is reached an instant change in the circuit is effected.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A governor for electrically-operated air-pumps, comprising a movable switch for opening and closing the motor-circuit, a rock-lever capable of movement to either side of its axis, said lever having its stationary end between the ends of the switch, a spring connecting the free end of the rock-lever with the switch, and means governed by air-pressure stored by the motor for shifting to and fro the rock-lever.

2. A governor for electrically-operated air-pumps, comprising a movable switch for opening and closing the motor-circuit, a magnetic blow-out inclosing the switch-contacts, a strained spring having its axis crossing the switch-axis and one end secured to the switch, and means responsive to variation of air-pressure to shift the other end of the spring across the switch-axis.

3. A governor for an electrically-operated air-pump comprising a pressure-flexed diaphragm, a movable circuit-controller, a controlling-spring operated by the diaphragm and adapted to be shifted off center to operate the controller, and means for engaging

the controller-arm to mechanically force the contacts apart if fused or otherwise locked together.

4. A governor for an electrically-operated
5 air-pump comprising a pressure-flexed diaphragm, a movable circuit-controller, a controlling-spring operated by the diaphragm and adapted to be shifted off center to operate the controller, and an adjustable stop on
10 the controller-arm in operative relation to the diaphragm and adapted to positively separate the contacts.

5. A governor for an electrically-operated
15 air-pump comprising a pressure-operated piston, a movable circuit-controller, a controlling-spring adapted to be shifted off center on determinate change of pressure to operate the circuit-controller, and a stop engaged by the

piston if the spring fails to separate the contacts to positively separate them.

6. A governor for an electrically-operated
20 air-pump comprising a pressure-flexed diaphragm, a lever operated thereby, a circuit-controller operated by said lever after a definite range of movement to effect a snap ac-
25 tion of the controller-contacts, and a spring opposing the air-pressure on the diaphragm composed of two coils of wire differing in thickness.

In witness whereof I have hereunto set my
30 hand this 19th day of June, 1901.

SAMUEL B. STEWART, JR.

Witnesses:

BENJAMIN B. HULL,
FRED RUSS.

DISCLAIMER.

745,683.—*Samuel B. Stewart, Jr.*, Schenectady, N. Y. AIR-PUMP GOVERNOR.

Patent dated December 1, 1903. Disclaimer filed August 3, 1912, by the
assignee, the *General Electric Company*.

Enters this disclaimer—

“To the subject-matter of claims 3 and 5.”

[*Official Gazette, August 13, 1912.*]