L. W. BAKER.

AUTOMATIC AIR GOVERNOR.

APPLICATION FILED SEPT. 17, 1908.

930,120.

Patented Aug. 3, 1909.

3 SHEETS—SHEET 1.

FIG. 1

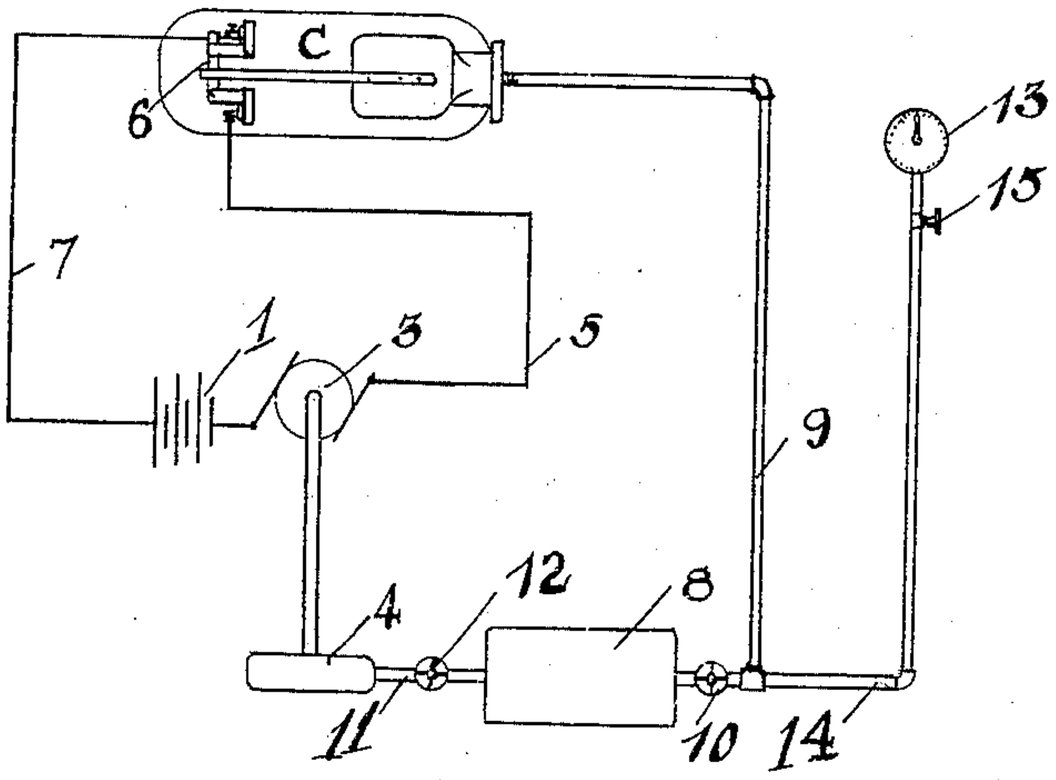


FIG. 3

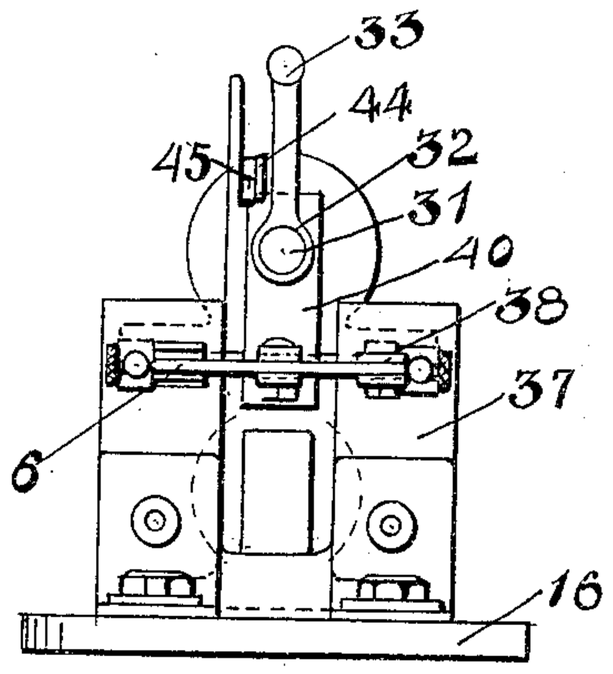
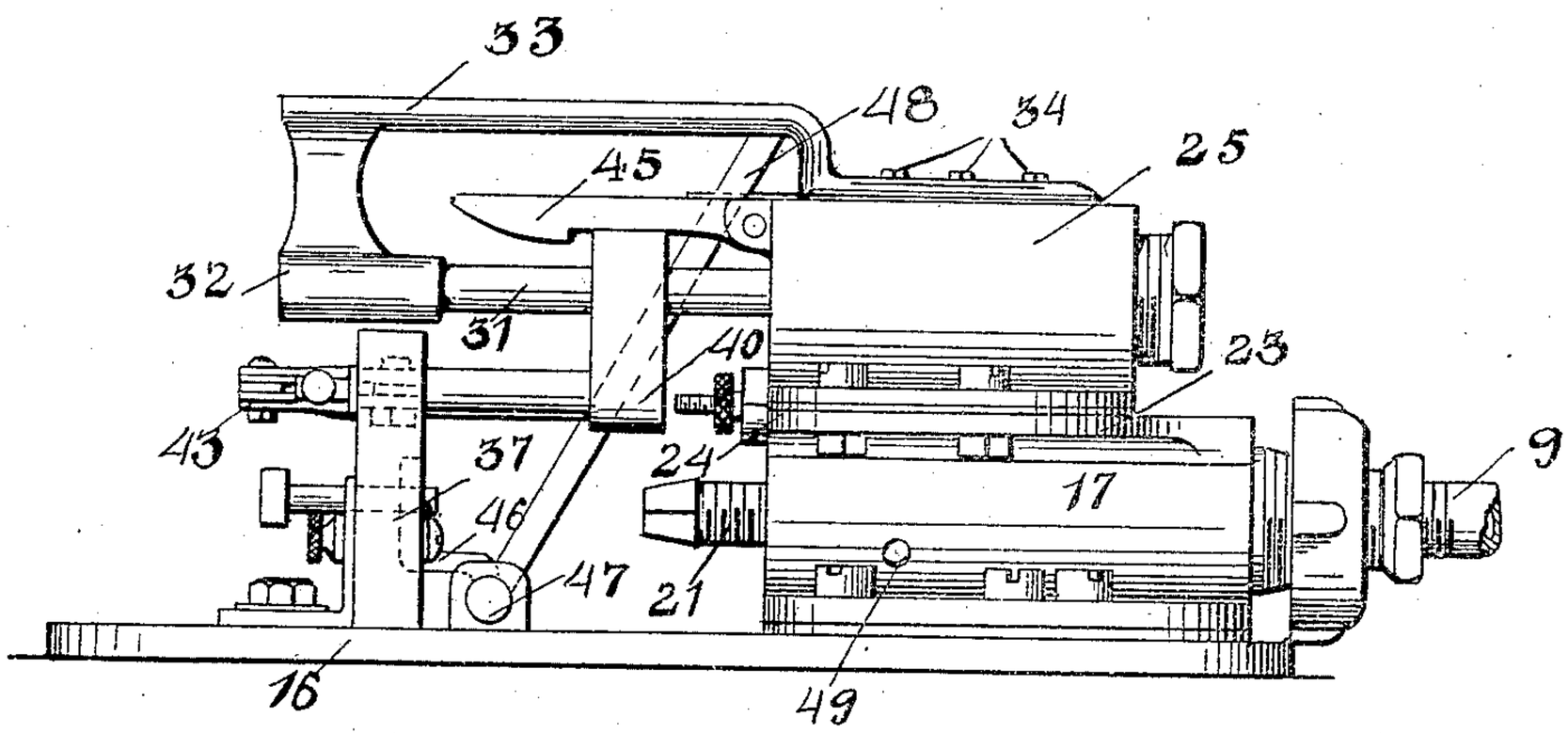


FIG. 2



Witnesses
E. Crocker
C. H. Griesbauer.

Inventor
Lewter. W. Baker.
By H. B. Wilson & Co
Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS. WASHINGTON, D. C.

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3 SHEETS—SHEET 2.

FIG. 4

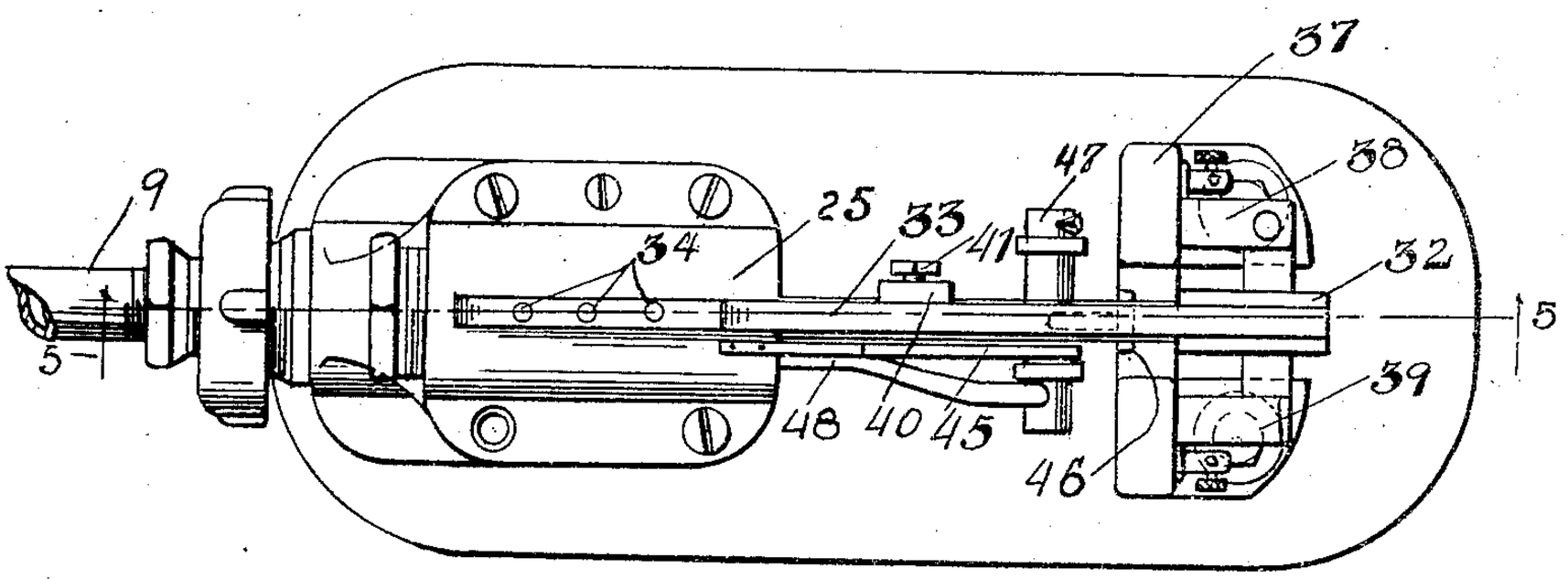
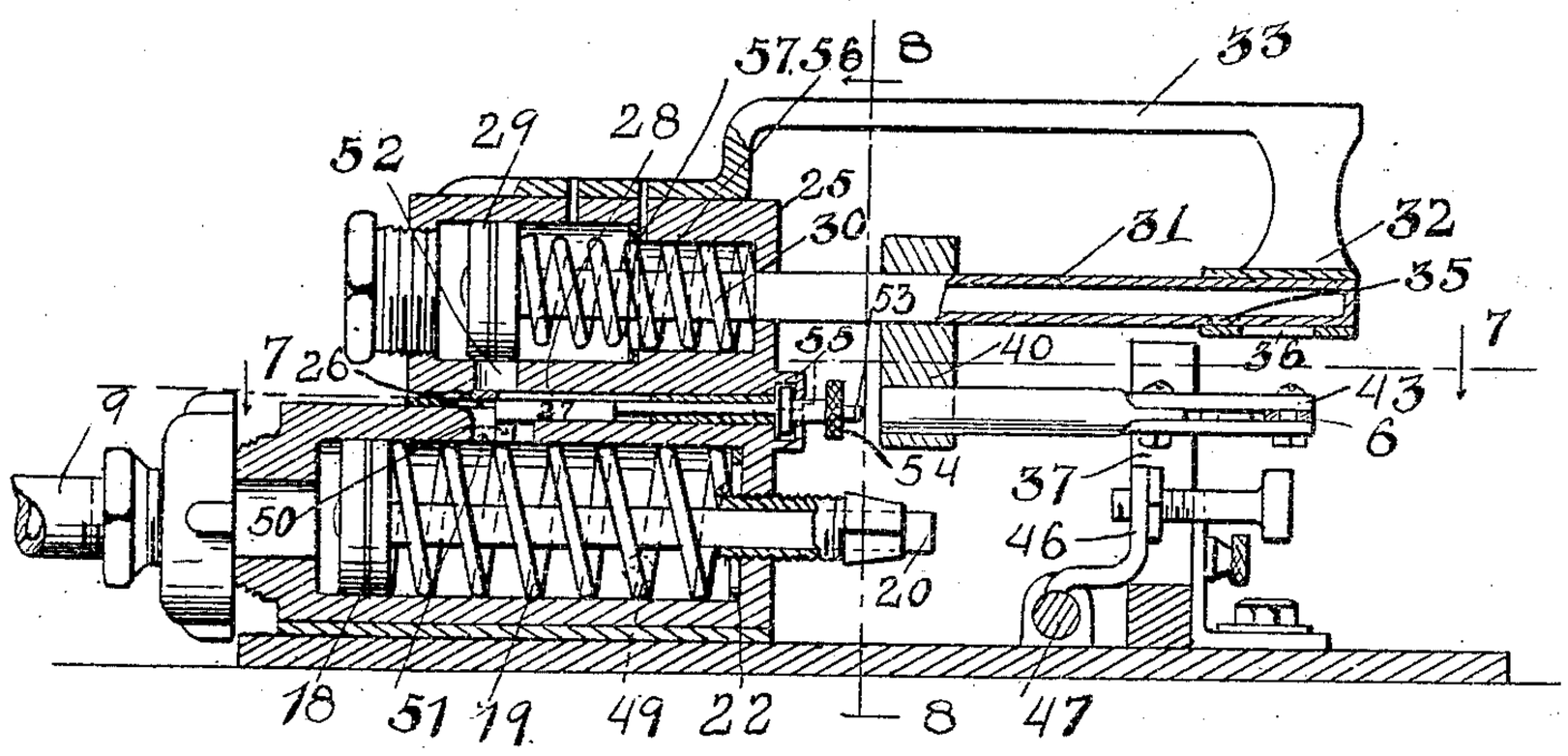


FIG. 5



Witnesses
E. Locker.
C. H. Griesbauer.

Inventor
Lewter W. Baker.
By Wilkinson & Co
Attorneys

L. W. BAKER.

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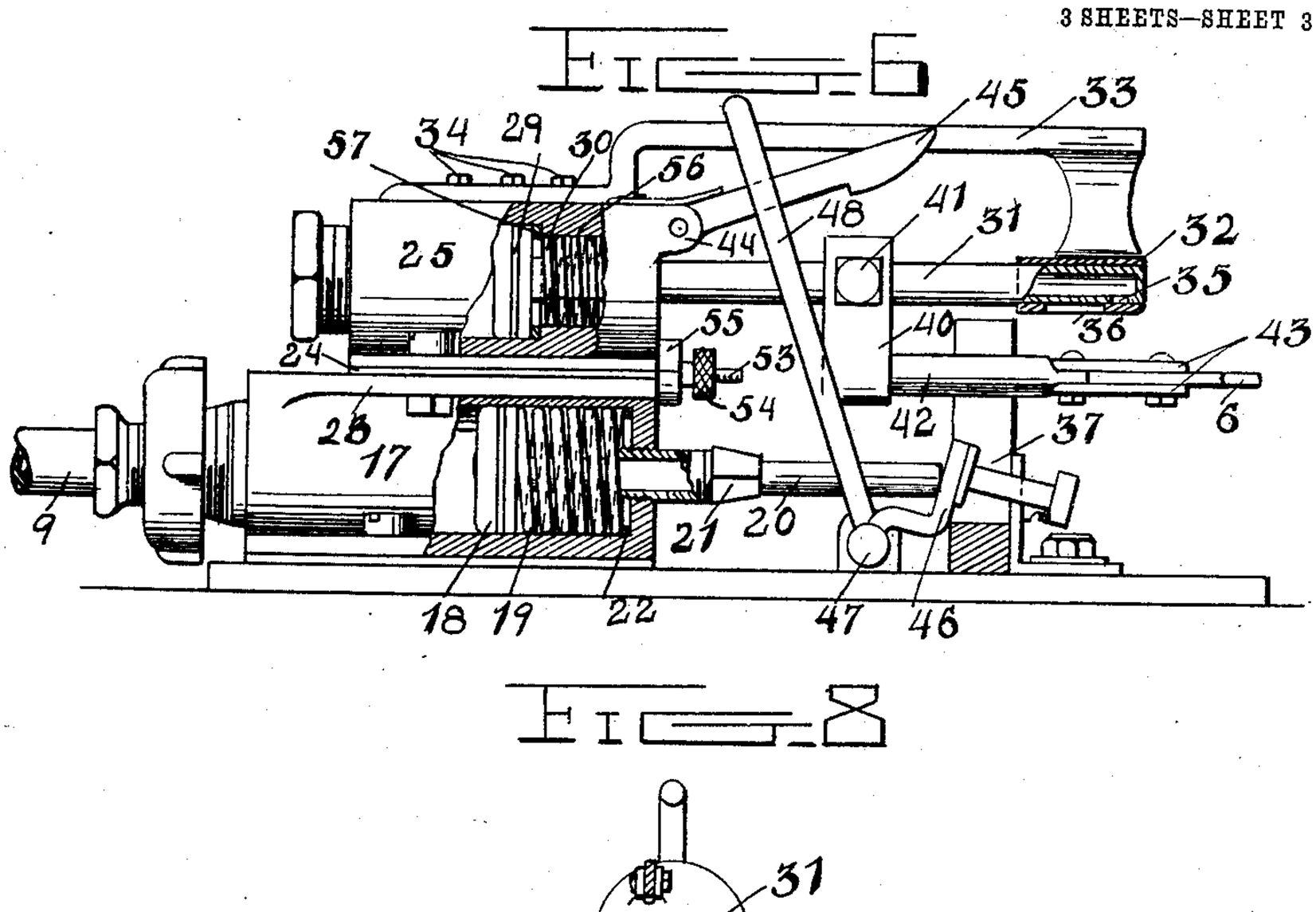
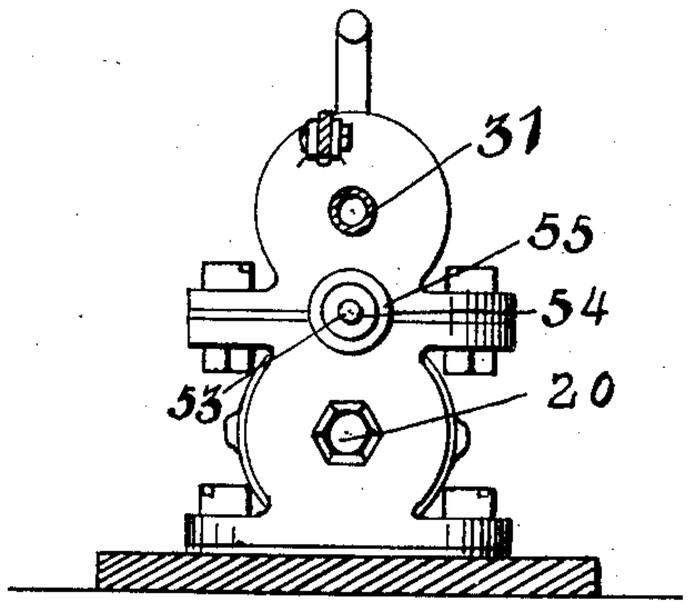
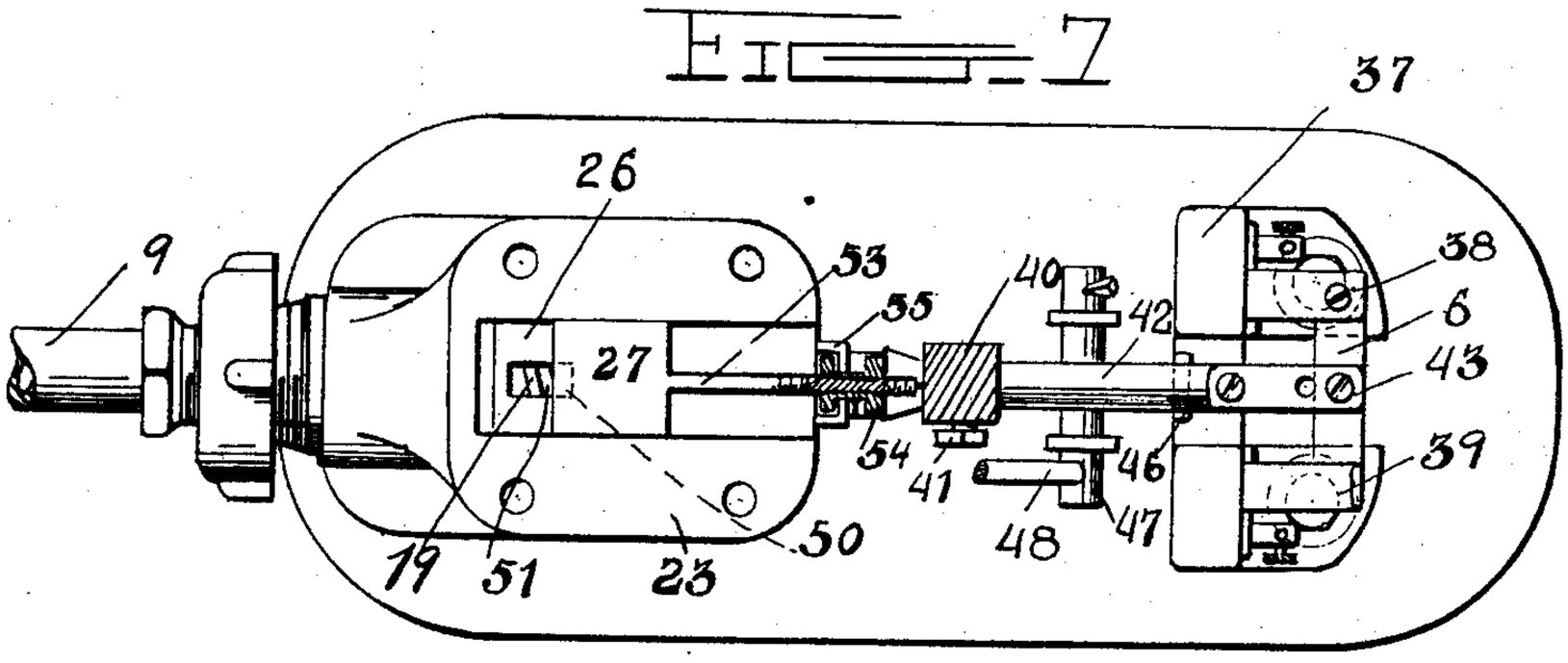
3 SHEETS—SHEET 3.







Witnesses
E. Locker
C. H. Griesbauer.

Inventor
Lewter W. Baker.
By H. B. Wilson & Co
Attorneys

UNITED STATES PATENT OFFICE.

LEWTER W. BAKER, OF WILMINGTON, NORTH CAROLINA, ASSIGNOR OF ONE-HALF TO JOHN F. KEYES, OF WILMINGTON, NORTH CAROLINA.

AUTOMATIC AIR-GOVERNOR.

No. 930,120. Specification of Letters Patent. Patented Aug. 3, 1909.

Application filed September 17, 1908. Serial No. 453,504.

To all whom it may concern:

Be it known that I, LEWTER W. BAKER, a citizen of the United States, residing at Wilmington, in the county of New Hanover and State of North Carolina, have invented certain new and useful Improvements in Automatic Air-Governors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to automatic controlling devices for air brake systems and particularly to that class of systems which are used upon trolley cars and the like, although the same may be used in connection with locomotive systems.

The object of the invention is to provide a cheap and efficient device of this character which will occupy small space, withstand excessive pressures, and at the same time, automatically control the supply of fluid to the tank or reservoir.

A further object of the invention is the provision of means for adjusting the tension or pressures at which the device operates and to also adjust the exhaust of the device so that it may operate upon a decrease of pressure from one pound down to thirty or forty pounds.

A still further object of the invention is the provision of means for disrupting the arc at the switch contacts of the motor.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a diagrammatic view; Fig. 2 is a side elevation; Fig. 3 is an end elevation; Fig. 4 is a top plan view; Fig. 5, a vertical longitudinal sectional view in normal position; Fig. 6, a similar view with the controller and switch in the alternative or operated position; Fig. 7 is a horizontal section on the line 7—7 of Fig. 5, and, Fig. 8 is a vertical transverse section on the line 8—8 of Fig. 5.

Referring more especially to the drawings and particularly to Fig. 1, 1 represents a suitable source of energy such as a battery, which is connected upon one side by a wire to the motor 3 which may be of any suitable type for alternating or direct current, and of any suitable horse-power which may be deemed desirable for the proper operation of the pump 4. The remainder of the circuit constitutes a feed wire 5 which leads to the switch 6 and a return wire 7 connected to the opposite side of the battery.

The controlling device is represented generally by the letter C and is fed with compressed air from the main tank 8 by a pipe 9. This pipe is provided with a check valve 10, as is usual, and the feed pipe 11 from the pump is also provided with a similar check valve 12. To conventionally illustrate the general plan of such structures, I have illustrated a pressure gage 13 connected to the pipe 9 by a pipe 14, and having the pressure therein controlled to the gage by a valve 15.

The controller C is mounted upon a suitable base 16, which is preferably secured to some suitable support upon the car either in the position shown or in an inverted position, as may be deemed desirable. Secured to the base 16 is the main cylinder 17 which is connected to the supply pipe 9 from the reservoir 8. This cylinder has mounted for reciprocation within its body a piston head 18 which is normally held against the rear end of the cylinder by a spiral spring 19, surrounding the piston rod or projector 20. In order to adjust this spring, I provide a threaded plug 21 seated in the forward end of the cylinder and having at its forward end a washer or disk 22 adapted to bear against the spring. If the spring in the cylinder is constructed so as to resist a pressure of forty pounds, the spring may be further tensioned by use of the plug 21 so as to increase its resisting capacity for varying pressures up to one hundred or more pounds.

The upper part of the cylinder is flattened out into a receiving flange 23 on either side

of the cylinder so as to receive the packing 24, which lies between the main and the auxiliary cylinder 25. The upper part of the cylinder is preferably recessed as at 26 so as to receive the sliding guide 27, which is also thick enough to enter a similar recess 28 formed in the bottom of the auxiliary cylinder. This auxiliary cylinder is also provided with a piston head 29 which is normally held against the rear end thereof by a spiral spring 30, surrounding the piston rod 31, which extends some distance beyond the end of the cylinder and has its end arranged in an apertured sleeve 32 which is supported by a horizontal rod 33 carried upon the top of the main cylinder and secured thereto by screws or bolts 34.

The outer end of the piston rod 31 is closed and a suitable opening 35 is made adjacent its end which is covered when the piston head is in normal position by the inner part of the sleeve and, when in operated position, by the outer portion of the sleeve, the aperture 36 of the sleeve being formed intermediate its ends for a purpose which will be hereinafter described. Extending upwardly from the base on either side thereof are insulated posts or pillars 37, which support the contact terminals 38 and 39 of the switch 6. These terminals have suitable binding posts connected thereto as shown which serve to hold the line wires 5 and 7 and are of any approved type.

The switch lever is connected to the piston rod 31 in the following manner. An adjustable collar 40 is secured to the piston rod 31 intermediate the sleeve 32 and the auxiliary cylinder 25 by a set screw 41. This collar depends from the piston rod and has a forwardly projecting arm 42 which has pivoted to it the links 43 of insulating material, so as to connect the arm with the switch blade 6. These links have preferably a number of holes formed in them so as to make the adjustment complete and are made of insulating material to avoid any short circuiting of the current from the battery or source of energy.

In operation, the auxiliary piston, at a certain pre-determined time which will be explained hereinafter, receives an equal amount of pressure with the main piston and as this would be gradually applied as the main piston moves forward under increased air supply from the reservoir, the piston rod 31 would move forward gradually and uncover the opening 35 therein, so as to permit the exhaust of the air. If the air were supplied rapidly enough to both pistons, it would continue to exhaust through the opening 35 and the action of the machine would amount to practically nothing. It will be seen therefore that the piston rod 31 has to be held inactive until the full pressure at which the device is to be released is present behind both pistons. At this time, the piston rod 31 must be released so as to be rapidly forced forward and cut off its exhaust through the port 35 after a rapid blast therefrom upon the switch 6. For this purpose I provide a pair of ears 44 between which is pivoted a spring-pressed catch 45 adapted to take over the forward edge of the collar 40 and normally hold the piston rod 31 with its port 35 covered by the inner end of the sleeve 32. In order to trip this catch at the proper moment, I arrange an adjustable detent 46 which is secured to a pivoting shaft 47 in line with the piston rod 20 so as to be engaged thereby after a predetermined travel of the piston. This shaft has also secured to it a tripping lever 48 which is normally held beneath the catch and is actuated to throw the catch out of engagement with the collar 40 when the piston engages the detent 46.

The main cylinder is provided with an exhaust port 49 which is located beyond the extreme movement of the piston 18 so as not to be permitted to take off any pressure from the main cylinder while the main piston is moving forward or in its stationary position.

The slide 27 which is mounted in the recess 26 and the recess 28 is provided at its forward end with a downwardly extending lug 50 which is rounded to fit the piston 18 and is adapted to seat closely within the outlet port 51 formed in the cylinder 17. This outlet port communicates with a similar outlet port 52 located in the auxiliary cylinder 25 so that after a predetermined movement of the piston 18, pressure is admitted to the auxiliary cylinder from the main cylinder. In order to hold the slide adjustably mounted in the recess I provide a suitable stem 53 which is threaded at its outer end to be engaged by an adjusting nut 54 having a collar 55 arranged thereon which seats in a socket formed by the semi-cylindrical halves carried by the auxiliary and main cylinders, respectively. By this means the size of the port hole is determined so that the time of starting the pump can be determined to suit the circumstances.

In operation, the device is adapted to work as follows, the main piston, being supposedly at its rear end under no pressure, and the switch 6 being closed. The motor 3 is now started thus rotating the pump and forcing air into the reservoir 8 which as soon as filled commences to exert pressure against the piston 18. If the adjustment of the setting plug 21 is such that an average pressure of sixty pounds to the square inch is required to trip the device, the piston 18 gradually moves forward under the increasing pressure from the reservoir until the port 51 is uncovered to the port 52 at which time the piston 29 will receive the full quota

of pressure in the main cylinder. The compressed air still continues to flow from the reservoir 8 into the main cylinder until the requisite amount of sixty pounds per square inch is behind the piston 18, at which time, the piston rod or plunger 20 will engage the tripping detent 46 so as to operate the tripping lever 48 to disengage the catch 45 from the collar 40 on the piston rod 31. As soon as this is done, the piston 29 with its accompanying piston rod flies outwardly with rapid movement and opens the port 35 to the aperture formed between the outer and inner ends of the sleeve 32. Part of the compressed air within the cylinder will then exhaust through the tube 31 to blow out the arc formed at the switch contacts as these are separated by the action of the arm 42 and links 43. It will now be noticed that the port 35 is closed by the outer end of the sleeve 32 and that no exhaust can escape from the auxiliary cylinder and, as the port 49 is considerably beyond the travel of the main piston 18, no exhaust can find exit at this point. If the slide 27 is adjusted so that the auxiliary piston will exhaust after a decrease of 20 pounds in pressure, when such decrease is obtained by use of the compressed air in braking, the piston 18 will have traveled so that its forward side is past the forward edge of the port 51. It will then be seen that the compressed air in the auxiliary cylinder may exhaust over the forward side of the piston to the port 49 and release the piston which is rapidly returned to normal position by the action of the spring 30, thus again causing the port 35 in the pistod-rod 31 to pass the opening between the forward and rear ends of the sleeve 32 and thereby causing a secondary blast of air to be directed against the switch contacts when the circuit is being made. As the piston-rod 31 travels to its normal position, the catch 45 again engages the collar 40 and the device is locked in position again until the requisite amount of pressure (sixty pounds) is obtained, at which time, the operation will be repeated. In order to prevent any exhaust in the auxiliary piston when at its outward stationary position, I provide a shoulder 56 against which a suitable packing washer 57 is arranged so as to receive the impact of the piston when violently forced forward, and to hold the compressed air behind the piston so that there will be no leak around the piston rod 31. It must be understood that the sleeve is ground perfectly to fit the piston rod 31 so that no leakage is apparent when the port 35 is in either one of its positions.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

I claim as my invention:—

1. In a device of the class described, the combination with a suitable source of pressure, of a main cylinder, adapted to receive pressure from said source, an auxiliary cylinder adapted to receive pressure from said main cylinder, pistons in said cylinders, a connection between said cylinders opened to the source of pressure by the piston in the main cylinder at an intermediate point of its movement, a latching device for controlling the movement of the auxiliary piston, a tripping device operated by the main piston for controlling said latching device, and means operated by the auxiliary piston for controlling the source of pressure to the main cylinder.

2. In a device of the class described, the combination with a source of pressure, of a main cylinder, a piston therein, an auxiliary cylinder, said piston and the main cylinder adapted to control the pressure to the auxiliary cylinder, a piston in the auxiliary cylinder, means for latching said piston, means operated by the piston in the main cylinder for tripping said latching mechanism at a predetermined time, and adjustable means carried by the piston in the auxliiary cylinder for controlling the source of pressure to the main cylinder.

3. In a device of the class described, the combination with a suitable source of pressure, of a main cylinder adapted to receive pressure from said source, an auxiliary cylinder, pistons in said cylinders, means operated by the piston in the main cylinder for controlling the movement of the piston in the auxiliary cylinder, said pistons being operated by pressure in the cylinders, of means to return them to normal position when the pressure thereon has been relieved, an exhaust in the main cylinder for relief of the pressure in the auxiliary cylinder and means operated by the piston in the auxiliary cylinder for controlling the source of pressure.

4. A controlling device for air systems comprising, in combination with, a source of pressure, main and auxiliary cylinders, pistons therein, means operated by one of the pistons for controlling the source of pressure, an exhaust in the main cylinder for relieving the pressure in the auxiliary cylinder, and a slidable valve between the cylinders to regulate the time of said exhaust.

5. In a device of the class described, a source of pressure, a main cylinder connected thereto, an auxiliary cylinder, a connection between the main and auxiliary cylinders, means in the main cylinder for opening the

connection to the source, a piston in the auxiliary cylinder, means for locking the piston against movement, means operated by the connection opening, means to release said locking means, and means operated by the piston for controlling the source of pressure.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LEWTER W. BAKER.

Witnesses:
E. EDMONSTON, JR.,
E. CROCKER.