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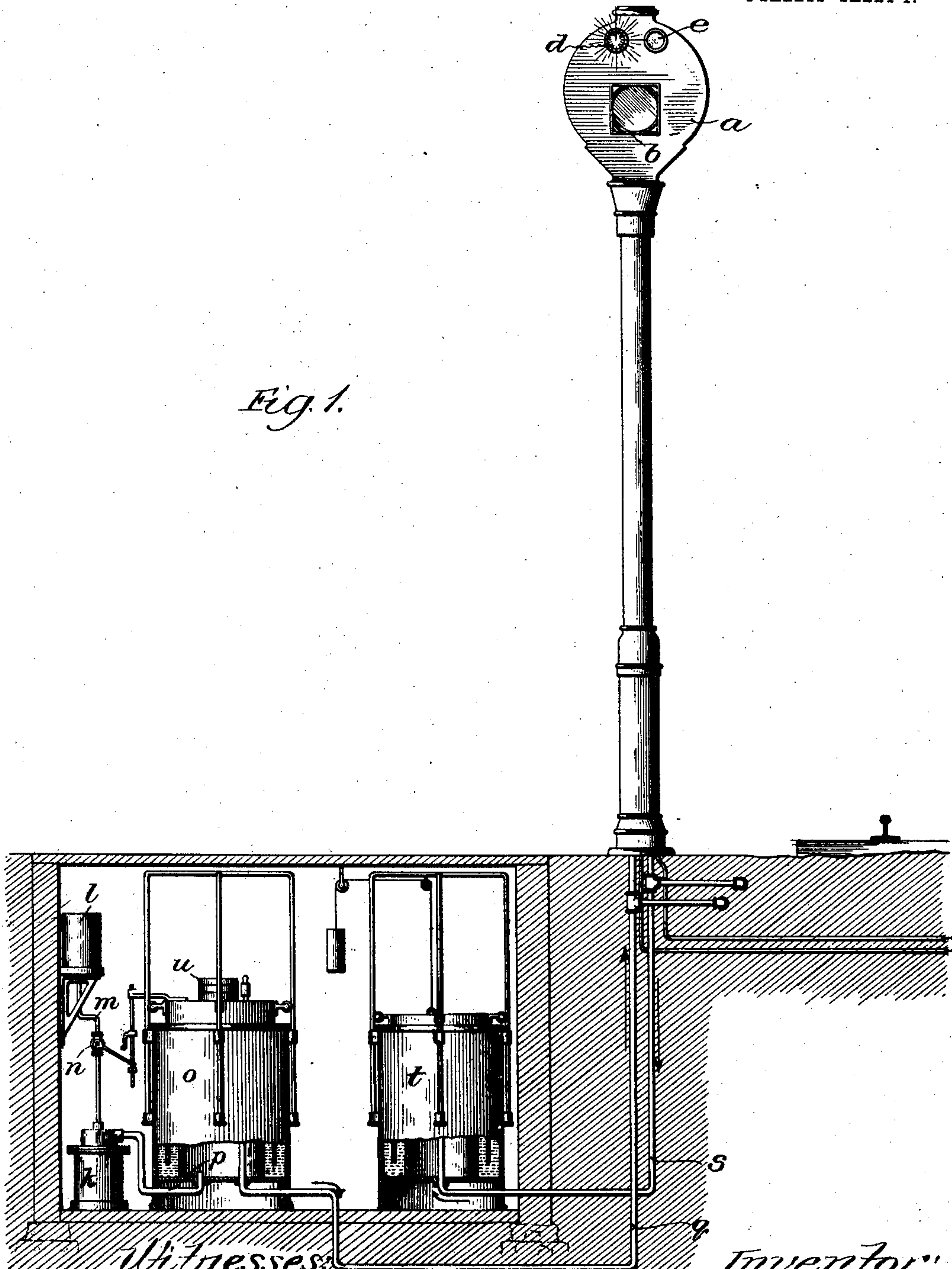
PATENTED AUG. 30, 1904.

E. C. CARTER.
SIGNALING APPARATUS FOR RAILWAYS.

APPLICATION FILED JAN. 11, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



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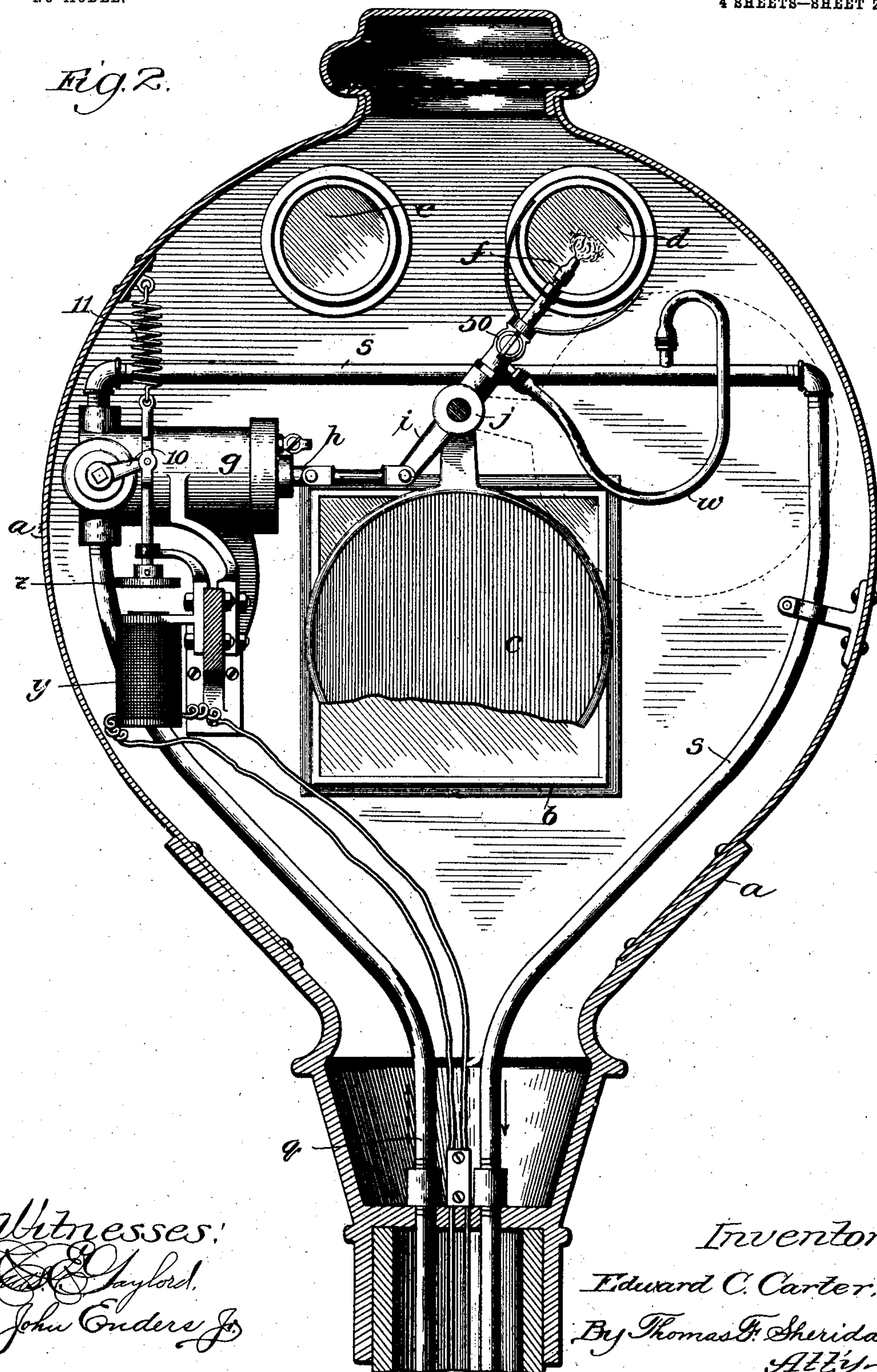
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4 SHEETS—SHEET 2.

Fig. 2.



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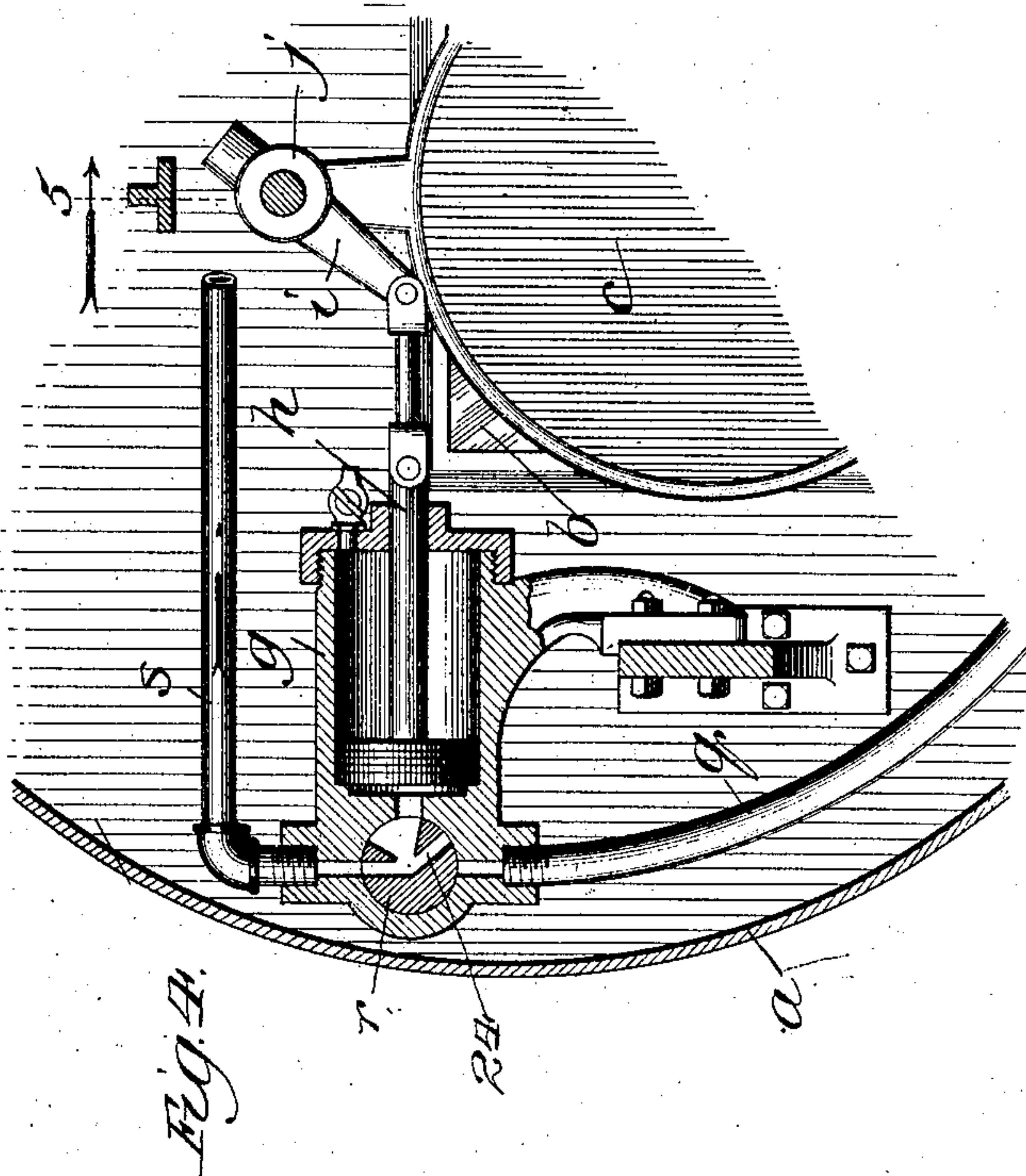
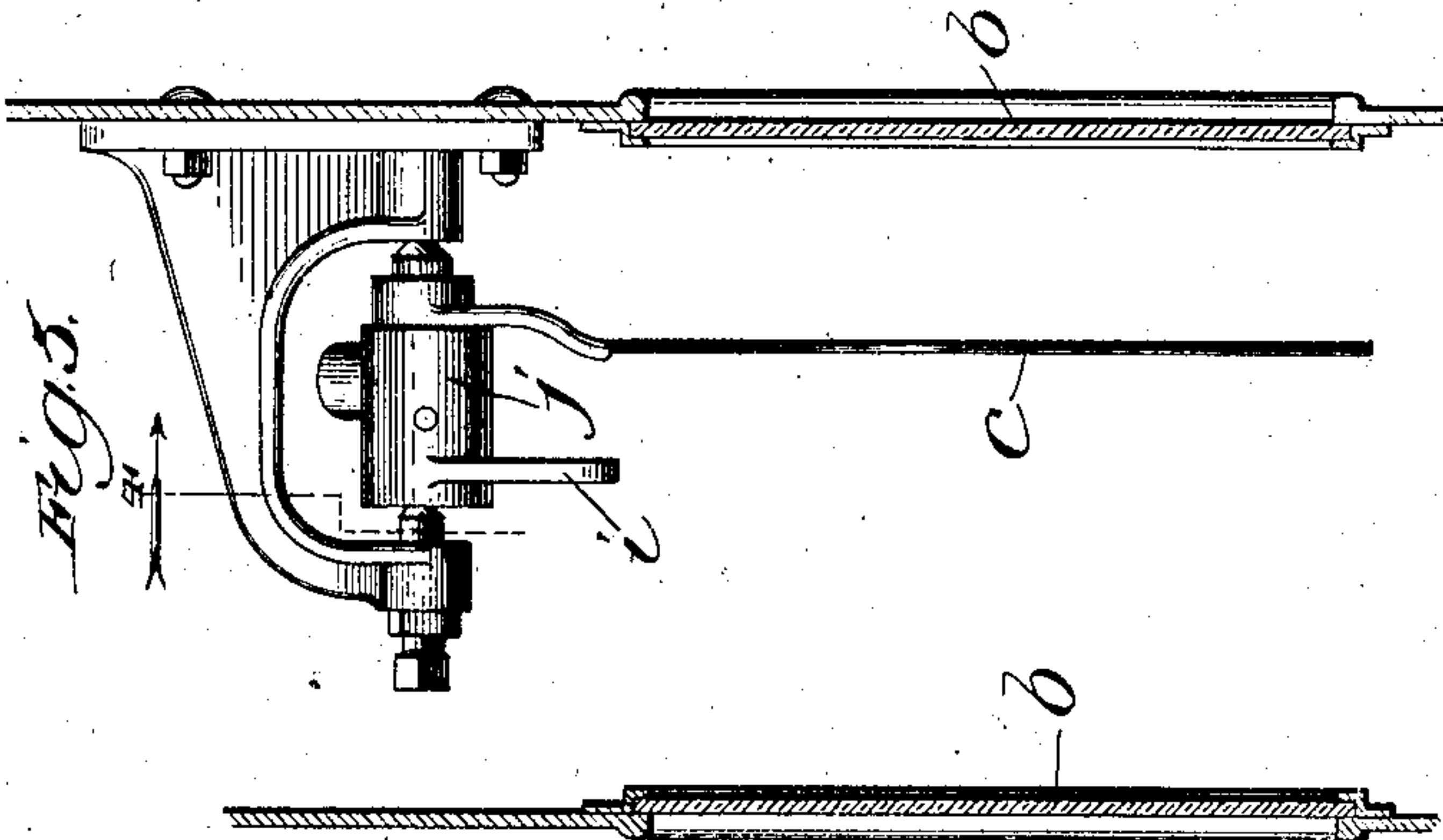
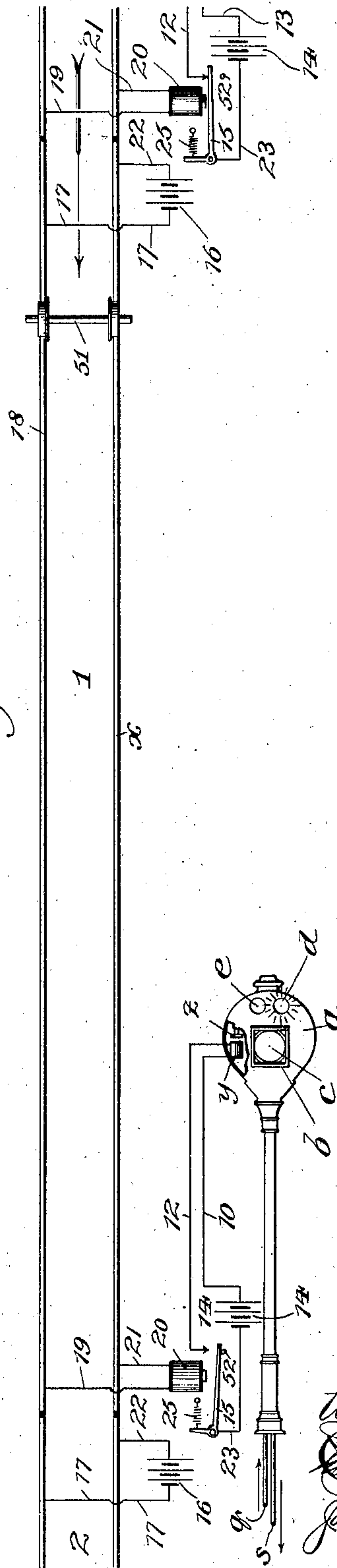
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4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

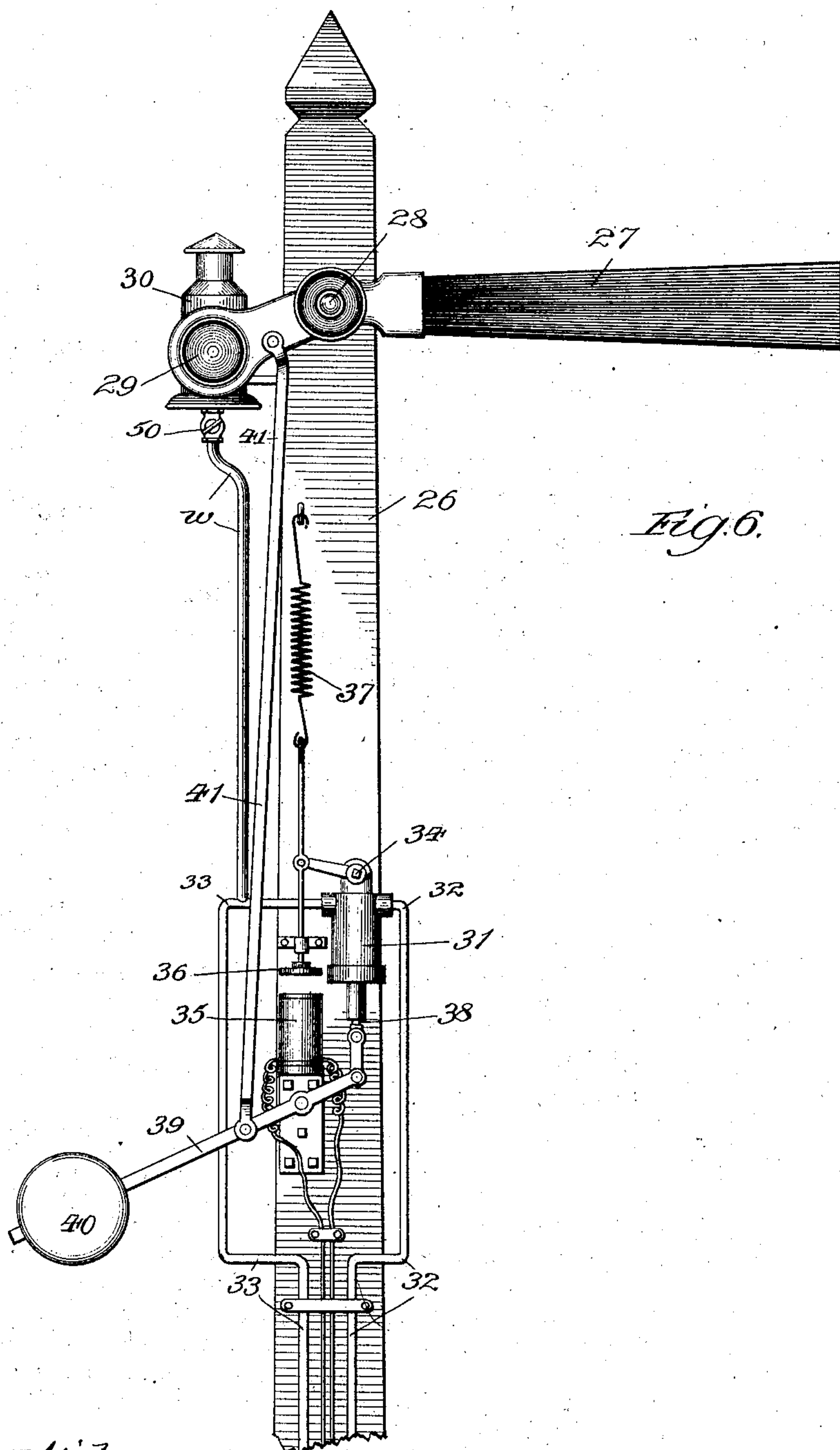


Fig. 6.

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UNITED STATES PATENT OFFICE.

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SIGNALING APPARATUS FOR RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 768,585, dated August 30, 1904.

Application filed January 11, 1902. Serial No. 89,319. (No model.)

To all whom it may concern:

Be it known that I, EDWARD C. CARTER, a citizen of the United States, residing at Evanston, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Signaling Apparatus for Railways, of which the following is a specification.

This invention relates to that class of signaling apparatus known as "block" or "interlocking" signals, in which disk and semaphore signals are used, and particularly to the means by which such disks and blades are actuated.

It relates, further, to the means by which a supply of combustible motive fluid may be generated and furnished automatically to the signaling apparatus for the actuation thereof.

It relates, further and finally, to the means by which the exhausted combustible motive fluid may be further used in connection with the signaling apparatus, all of which will more fully hereinafter appear.

The principal object of the invention is to provide a simple, economical, and efficient signaling apparatus for use in connection with railways with means for automatically generating a motive fluid and operating the signal thereby.

A further object of the invention is to provide a signaling apparatus of the class alluded to with means for generating acetylene gas and delivering it to a point adjacent to the signals for the operation of the same.

Further objects will appear from an examination of the drawings and the following description and claims.

The invention consists principally in a signal apparatus for railways in which there is combined a movable signal, such as a disk or blade, a fluid-pressure cylinder adjacent thereto, the piston of which is connected therewith, a generator for forming acetylene or similar combustible gases connected with the fluid-pressure cylinder, an exhaust-reservoir connected with the fluid-pressure cylinder, and means for admitting and exhausting acetylene or similar gases to and from the fluid-pressure cylinder, so as to control the movements of its piston by the difference of

pressures between the generator and in the exhaust-reservoir.

The invention consists, further, in a signaling apparatus of the class alluded to in which there is combined a movable signal, such as a disk or blade, a fluid-pressure cylinder provided with a movable piston connected with the movable signal, an acetylene-gas generator connected with the fluid-pressure cylinder, an exhaust-reservoir also connected with the fluid-pressure cylinder, whereby the movable piston is actuated by the difference of pressure between the generator and exhaust-reservoir and electrically-actuated mechanisms connected with a railway-track and operated when the circuit between it and such track is made or broken for controlling the admission and exhaust of acetylene gas to and from the fluid-pressure cylinder.

The invention consists, further, in a signaling apparatus of the class alluded to in which there is combined a movable signal, such as a disk or blade, a fluid-pressure cylinder, a movable piston therein connected with the movable signal, an automatic generator for generating acetylene or similar gases, an exhaust-reservoir for such gases, pipe mechanism connecting the generator with the fluid-pressure cylinder, a pipe leading from said cylinder to the exhaust-reservoir, whereby the piston in such cylinder is operated by the difference in pressure between the generator and exhaust-reservoir, a valve for admitting and exhausting fluid-pressure to and from the fluid-pressure cylinder, an electromagneto device connected with the said valve, and an electric circuit embracing such electromagneto device and a railway-track, whereby as such circuit is made or broken the magnet is energized or deenergized and the signaling apparatus operated.

The invention consists, further, in a signaling apparatus of the class described in which there is combined a pivoted signal, such as a disk or blade, a fluid-pressure cylinder, a piston movably mounted therein connected with the movable signal, an automatic generator of acetylene gas, an exhaust-reservoir, pipe mechanism connecting the generator with the

fluid-pressure cylinder, a pipe connecting the fluid-pressure cylinder with the exhaust-reservoir, whereby the piston of such cylinder is operated by the difference of pressure between
 5 the generator and the exhaust-reservoir, electromagnetic devices for controlling the inlet and exhaust of the gas to and from the fluid-pressure cylinder, a circuit embracing the electromagneto devices and the railway-track and
 10 arranged to operate such devices when such circuit is made or broken to operate the parts, a burner for such signal, and a pipe connecting the exhaust-reservoir with such burner, whereby the exhaust may be used for the purpose of furnishing a signal-light.

The invention consists, further and finally, in the features, combinations, and details of construction hereinafter described and claimed.

20 In the accompanying drawings, Figure 1 is an elevation of a signaling apparatus constructed in accordance with these improvements, showing an automatic signaling-disk in one (the danger) position; Fig. 2, an enlarged
 25 sectional elevation of an automatic signaling-disk constructed in accordance with these improvements, showing a movable signal-disk and burner in the first danger position; Fig. 3, a diagrammatic view showing my improvements as they appear when connected with a
 30 railway-track; Fig. 4, an enlarged sectional detail of a portion of the mechanism shown in Fig. 2; Fig. 5, a cross-sectional detail taken on line 5 of Fig. 4; and Fig. 6, an elevation of
 35 a semaphore, showing my improvements as they appear in connection therewith and as used with a one-blade signal.

In illustrating and describing these improvements and showing them as used in connection with automatic signal-disks and semaphore-blades I have only illustrated and described so much that is old, taken in connection with what I consider to be new, as will properly disclose the invention to others and
 45 enable those skilled in the art to practice the same, leaving out of consideration other and well-known elements which if illustrated and described herein would only tend to confusion, prolixity, and ambiguity.

50 In constructing a signal in accordance with these improvements and describing the apparatus in connection with an automatic disk, as shown in Figs. 1 to 5, inclusive, I provide a casing *a* of the desired size, shape, and
 55 strength to hold, support, and protect the operative and other mechanisms, which casing is of the usual form and provided with the usual opening *b*, into and out of line with which a signaling-disk *c* may be swung whenever it is necessary. This casing is also provided with two lens-openings *d* and *e*, fitted with red and green glass representing the danger and safety signals, and into line with
 60 either of which a burner *f* may be brought
 65 at the desired time or times, which burner is

mounted upon an arm on the same hub with the pivoted signal-disk, as shown particularly in Fig. 2, which shows the disk-signal and lamp at the normal or danger position. It is desirable to provide means to operate or
 70 swing this automatic signal-disk, with its burner, into and out of safety position—that is, into danger position and back again into safety position. To accomplish this result, a fluid-pressure cylinder *g* is provided, having
 75 a movable piston slidingly mounted therein and with its rod *h* extending out of one end thereof and arranged to be pivotally connected with an arm *i* on the hub *j*, to which the signal-disk and burner are also attached, so
 80 that as the piston is moved inwardly and outwardly the disk and burner are likewise moved to danger position and safety position. To provide an efficient combustible motive fluid as economically as possible for the op-
 85 eration of this reciprocating piston is one of the principal objects of this invention. The motive fluid should also be a fluid that is capable of being generated to furnish sufficient pressure and at the same time one that can
 90 be used after it has accomplished the operation of the movable signal for purposes connected with the signal. For instance, it is well known that the trimming and keeping of lamps in these signals involves considerable
 95 expense, requiring an outlay of about twenty dollars a year to keep each signal-lamp trimmed, filled, and lighted. It will be seen, therefore, that if a satisfactory combustible motive fluid can be found which can also be
 100 used to provide a light for the signal at night-time, doing away with the trimming operations usually required, on an immense trunk-line the aggregate saving of time, labor, and expense at the end of the year will be considerable. To
 105 accomplish these results, I provide an acetylene-gas generator comprising a carbid-chamber *k*, in which is arranged a quantity of calcium carbid, a water-reservoir *l*, connected therewith by means of a pipe *m* and provided
 110 with a valve *n*, and a preliminary storage-reservoir *o*, connected with the carbid-chamber by means of a pipe *p*, the parts being so arranged that as the casing of the storage-reservoir is raised it operates the valve *n* to
 115 close it and shut off the supply of water; but when the supply of gas in the generating-reservoir falls below a predetermined amount the casing also falls, contacts with and opens the water-valve *n* to furnish a second supply
 120 of water, and thereby generate an additional supply of acetylene gas and restore the required pressure in the reservoir. This generating storage-reservoir is connected, by means of a pipe *q*, with the fluid-pressure cylinder, and by means of a controlling-valve *r* the gas under pressure is admitted into said cylinder or exhausted therefrom through a pipe *s*.

To take care of the exhaust and store it up 130

in such a manner that it may be subsequently used, an exhaust-reservoir *t* is provided, which is connected with the fluid-pressure chamber by means of the pipe *s*, above described. The casing of the generating storage-reservoir should of course be supplied with a desired weight *u* to obtain such pressure as may be required. It will be seen from the foregoing that the difference in pressure between the gas-generating mechanisms and the exhaust-reservoir is such as will permit of the motive fluid operating or actuating the movable piston in one direction, while the counterbalancing of the parts of the signal is arranged to move it in the other direction.

To furnish the light necessary, the exhaust-reservoir is connected with the burner by means of the pipe *s* and a flexible hose or pipe *w*, (see Fig. 2,) so that acetylene gas in the exhaust-reservoir may flow thereto at all times when the regulating-cock 50 is open and may be ignited to form the desired light, thus dispensing with all labor for trimming excepting that required for the initial ignition.

To actuate the controlling-valve *r* the desired time or times, an electromagnet *y* is provided and an armature *z* arranged in position to be controlled thereby. This armature is connected with the controlling-valve by means of the lever-arm 10, while a tension-spring 11 holds the parts in the position shown in Figs. 2 and 4, which permits the weight of the parts to move them into the position shown in Fig. 2.

In Fig. 3 the electric currents, signals, &c., are shown in diagrammatic form. Referring to such diagram, it will be seen that the parts are arranged to normally give the danger-signal when no electric currents are passing through the connections and to give the safety-signal when all the electrical connections are complete in the "block" and not interrupted by the entry of a train thereon; but when a train 51 enters the block 1 the main circuit is short-circuited, so that the current from the main battery flows through wire 17, rail 18, wheels and axles of train 51, rail *x*, and back by wire 22 to battery. This action deenergizes the magnet 20, permitting the armature-lever 15 to be drawn over by the action of its spring 25 against the stop 52, breaking the auxiliary or signal circuit, so that the signal-magnet *y*, as shown in Figs. 2 and 3, is deenergized. This action permits the tension-spring 11 (see Fig. 2) to draw the armature *z* away and at the same time operate the controlling-valve to close the inlet-pipe *q* and open the fluid-pressure cylinder to the exhaust-pipe *s*, (see Fig. 4,) which permits the movable piston to return to its rearmost position and leaves the signal at "danger," as shown. When the train passes from block 1 and a clear track is had, the current flows from the main battery 16 through wire

17, rail 18, wire 19, magnet 20, wire 21, rail *x*, and wire 22 back to battery. This energizes magnet 20 and pulls the armature-lever 15 over toward the core thereof, closing the auxiliary circuit, so that current flows from battery 14 through wire 23, armature 15, wire 12, signal-magnet *y*, and wire 13 back to battery. This action energizes the signal-magnet, so that the armature is drawn toward its core and operates the controlling-valve to close the exhaust and open the inlet to the fluid-pressure-actuatable device—viz., the cylinder—so that its piston is moved outwardly to move the disk away from the opening in the casing, which indicates a clear track.

In Fig. 6 I have shown my improvements as attached to a single-blade signal, the parts being attached to the upper part of a semaphore-post 26. In this connection a single-blade signal 27 is pivoted at 28 to the post, its opposite end having a glass 29 of the desired color arranged to be brought into alignment with a signal-lamp containing an uncolored-glass lens, so that in one position (that shown in the figure) it is in danger position and shows a red light; but when swung downwardly its colored glass 29 is moved away from the front of the lens in the signal-line and the white light of the lamp-lens is shown, all controlled by the operations of the blade. In order to control the signal-blade, a fluid-generator 31 is provided and connected with the reservoir above described by means of an inlet-pipe 32 and with the exhaust-reservoir by a pipe 33. A controlling-valve 34 is also provided, similar in construction and arrangement to that shown and described in connection with Fig. 4 and arranged to be controlled by the same class of electromagnetic devices 35 and 36, held in one position by means of the tension-spring 37, all operating exactly as shown and described in connection with the circuits shown in Fig. 3. The piston 38, projecting out of the fluid-pressure cylinder, is connected with a pivoted weighted lever 39, so that when the fluid-pressure is exhausted from the cylinder the weight 40 operates the parts through the connecting-rod 41 and moves them into the position shown in the figure. When fluid under pressure is admitted through pipe 32, the piston-rod 38 is moved outwardly, so as to swing the free end of the weighted lever 39, with its weight 40, upwardly, thereby moving the signal-blade downwardly, indicating clear track.

I claim—

1. In signals of the class described, the combination of a movable signal, a fluid-pressure-actuatable device connected therewith to operate the same and connected with a source of gas-supply for furnishing a supply of motive-fluid combustible gas under pressure to operate the said device, and a night-signal burner connected with the exhaust of the fluid-pres-

sure-actuatable device, substantially as described.

2. In signals of the class described, the combination of a movable signal, a fluid-pressure-actuatable device connected therewith to operate the same, a gas-generator for supplying a motive-fluid combustible gas to said fluid-pressure-actuatable device, and a night-signal burner connected with the exhaust of the fluid-pressure device, substantially as described.

3. In a signaling apparatus for railways, the combination of a pivoted signal device, a fluid-pressure cylinder, a piston movably mounted therein connected with the pivoted signal, an automatic generator of acetylene gas, an exhaust-reservoir, pipe mechanism leading from the generator to the fluid-pressure cylinder, a second pipe leading from the fluid-pressure cylinder to the exhaust-reservoir, whereby the piston of such cylinder is operated by the difference of pressure between the generator and the exhaust-reservoir, electromagnetic devices controlling the admission and exhaust of gas to and from the cylinder, a circuit embracing such electromagnetic devices and the railway-tracks arranged to operate such devices when such circuit is made or broken, a burner for such signal, and a pipe connecting the exhaust-reservoir with such burner, whereby the exhaust may be used for the purpose of furnishing a night-signal, substantially as described.

4. In signaling apparatus for railways, the combination of a pivoted signaling device, a fluid-pressure cylinder, a movable piston connected with the movable signal, a burner mounted on such movable signal, an automatic generator for generating acetylene or similar gases, an exhaust-reservoir for storing the exhausted acetylene gas, pipe mechanism leading

from the generator to the fluid-pressure cylinder, a pipe leading from the fluid-pressure cylinder to the exhaust-reservoir, whereby the piston is operated by the difference in pressure between the generator and reservoir, a pipe leading from the exhaust-reservoir to the signal-burner, a valve for controlling the admission and exhaust of acetylene gas to and from the fluid-pressure cylinder, an electromagnet for operating such valve, and an electric circuit embracing said magnet so that when such circuit is made or broken the magnet is energized or deenergized and the parts operated, substantially as described.

5. The combination with railway signal apparatus, of a source of illuminating-gas under pressure for operating said apparatus, a signal-lamp, and means for conveying the gas to said lamp after it has been utilized in actuating said apparatus, substantially as described.

6. The combination with railway signal apparatus, of an operating-plunger and cylinder, a source of illuminating-gas under pressure for actuating said plunger, a signal-lamp, and a valve controlling the passage of the gas from the cylinder to the burner of said lamp, substantially as described.

7. The combination with railway signal apparatus, of a source of illuminating-gas under pressure, means for actuating the apparatus by the pressure of said gas, an exhaust-valve for permitting the gas used in operating the apparatus to discharge, a magnet controlling said valve, and a signal-lamp having a burner supplied by the discharged gas, substantially as described.

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