No. 842,828. PATENTED JAN. 29, 1907.

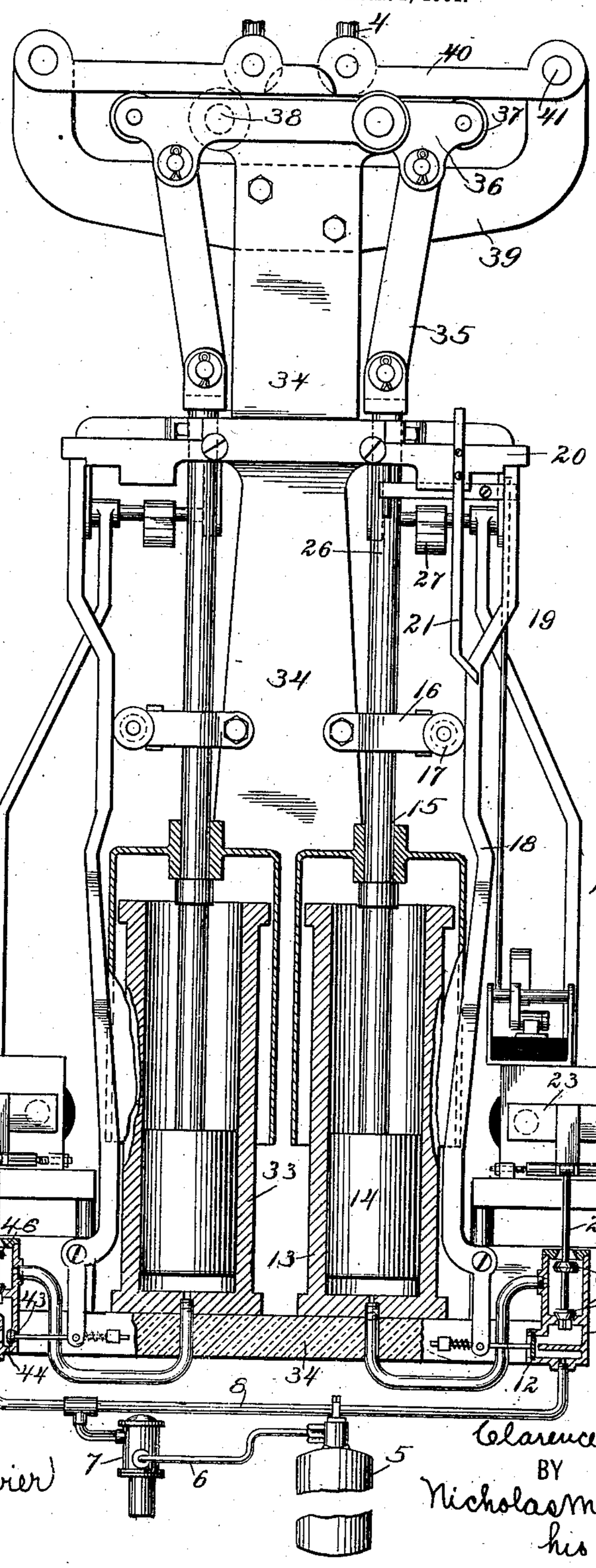
C. W. COLEMAN.

RAILWAY SIGNAL.

APPLICATION FILED MAR. 1, 1904.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

Francis McBarron

Emily G. Gravier

INVENTOR

Clarence W. Coleman

BY

Nicholas M. Goodlett Jr.

his ATTORNEY

No. 842,828. PATENTED JAN. 29, 1907.

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2 SHEETS—SHEET 2.

Fig. 2.

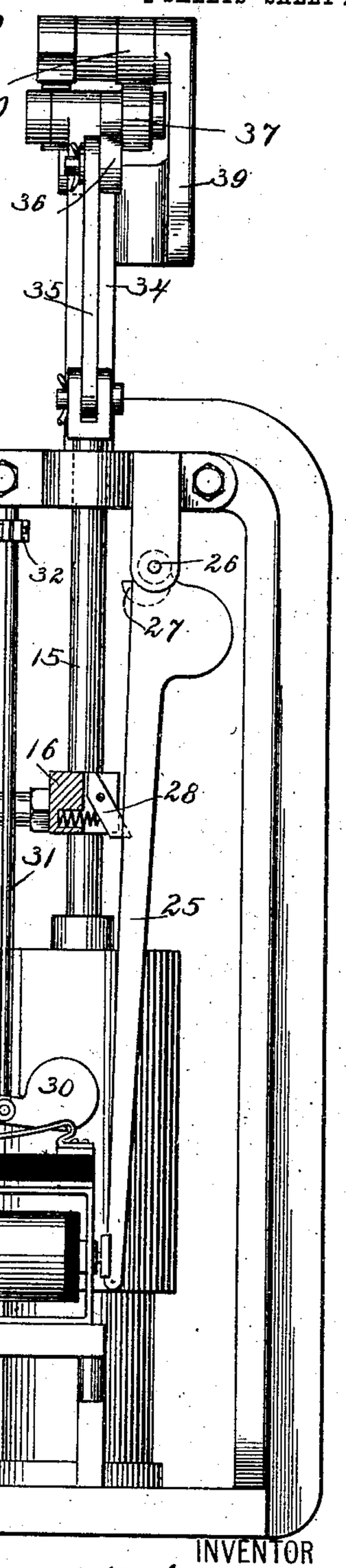
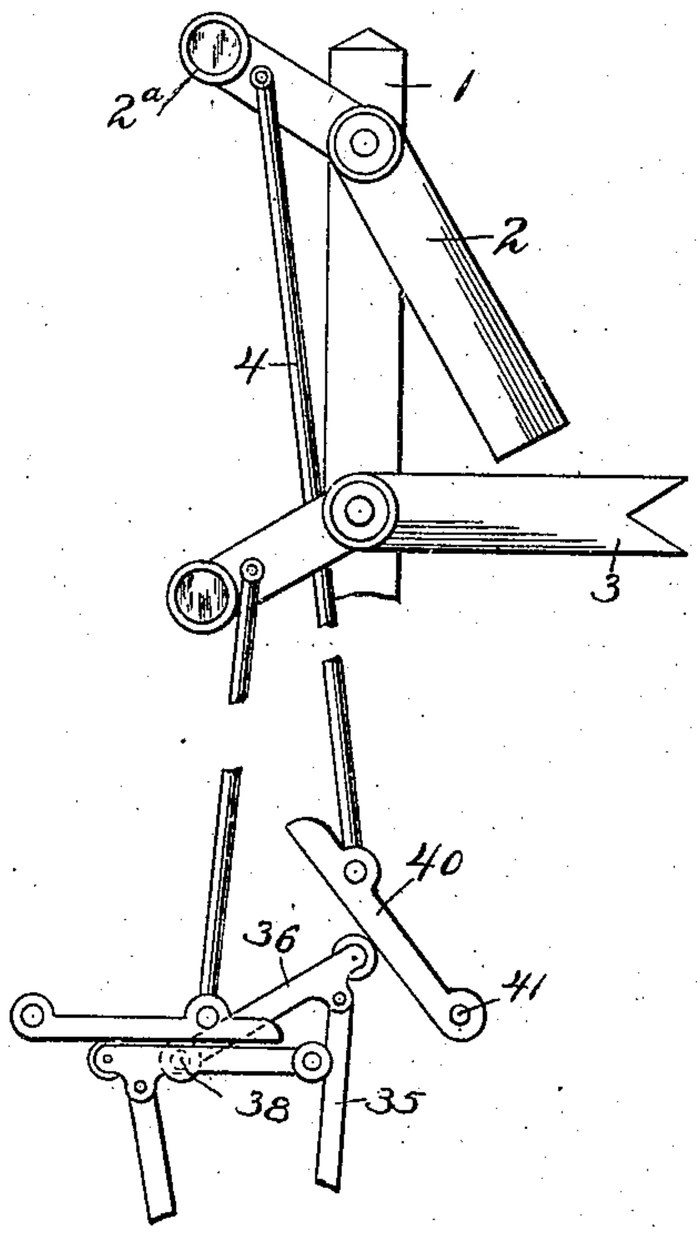


Fig. 3.



WITNESSES:

Paul Baum

Emily G. Gravier

INVENTOR

Clarence W. Coleman

BY

Nicholas M. Goodlett Jr.

his ATTORNEY

UNITED STATES PATENT OFFICE.

CLARENCE W. COLEMAN, OF WESTFIELD, NEW JERSEY, ASSIGNOR TO THE HALL SIGNAL COMPANY, A CORPORATION OF MAINE.

RAILWAY-SIGNAL.

No. 842,828. Specification of Letters Patent. Patented Jan. 29, 1907.

Original application filed April 4, 1902, Serial No. 101,327. Divided and this application filed March 1, 1904. Serial No. 196,088.

To all whom it may concern:

Be it known that I, CLARENCE W. COLEMAN, a citizen of the United States, and a resident of Westfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Railway Signal Apparatus, of which the following is a specification.

This invention relates to signal apparatus, especially such as is adapted for use on railways.

The invention seeks to provide means interposed between the motor and the signal for increasing the efficiency or effectiveness of the motor. These means preferably consist of a connection—such as a system of levers—which operates to increase the mechanical leverage. This connection may be applied in a variety of ways and may be embodied in various forms. It may be employed in connection with a motor whose power remains constant or diminishes or increases. In either case the connection intermediate the signal and motor will operate to increase the efficiency or effectiveness of the motor. Moreover, the load of the signal may remain constant or it may increase or decrease.

This application is a division of a former application, filed by this applicant April 4, 1902, Serial No. 101,327.

In the accompanying drawings the invention is shown in one of its various embodiments, the motor being operated by liquefied gas.

Figure 1 is a front elevation of a home and distant signal apparatus partly in section and parts omitted, the signals being at "danger." Fig. 2 is a side elevation of the apparatus shown in Fig. 1 looking from right to left and partly in section. Fig. 3 is a front elevation of home and distant signals, the motors being omitted.

Referring now more specifically to the particular embodiments of the invention shown in the drawings, 1 is the signal-post, on which is pivoted the home signal 2 and distant signal 3.

2[a] is the usual weighted spectacle of the signal 2, and 4 is the signal-rod for signal 2. The signal 3 has a similar weighted spectacle and signal-rod. Instead of employing these spectacles for counterweighting the signal other counterweighting devices may be employed.

5 is a tank containing liquefied gas connected by pipe 6 with automatic reducing-valve 7, which is connected by a pipe 8 with valve-casing 9, which contains the supply and exhaust valves 10 and 11 and also the cut-off valve 12. The valve-chamber 9 is connected with a piston-chamber 13, in which works the piston 14 and piston-rod 15.

16 is a block fixed on piston-rod 15 and having an arm 17, which works up and down against lever 18, which lever has an offset 19 and is arranged to be engaged by a pivoted catch 20, carrying an arm 21.

The supply and exhaust valves are carried on a stem 22, operated by an armature 23 of magnet 24.

25 is an arm having an armature coöperating with magnet 24 and carried on the rock-shaft 26, on which is secured the catch 27, designed to engage the pivoted spring-dog 28, carried on the block 16.

29 is a circuit-closer controlled by the lever 30, which is operated by the rod 31. This rod carries a stop 32. When piston-rod 15 has almost completed its upward movement to put the signal to "safety," block 16 strikes stop 32, thereby lifting rod 31 and closing circuit-closer 29. This circuit-closer controls the operation of the distant signal 3.

33 is the piston-chamber for the distant signal 3, supplied with gas from pipe 8 and provided with devices similar to those described with reference to the home signal, except that the valves are differently arranged and the arm, such as 21, is omitted.

In the valve-chamber 42, 43 and 46 are exhaust-valves.

44 is the cut-off valve arranged on the same stem with valve 43.

45 is the inlet-valve on the same stem with valve 46.

Valves 43 and 44 work together, the one opening when the other closes. Valves 44 and 46 are normally open and valves 43 and 45 are normally closed. When the signal goes to "safety," valve 44 closes and valve 43 opens. When signal 2 is released from "safety," exhaust-valve 46 is opened to permit the air in piston-chamber 33 to escape.

The magnets, such as 24, are designed to be operated in the usual manner, preferably by means of track-circuits. In the present embodiment of the invention the signals are arranged to stand normally at "danger,"

although, of course, they may be arranged to stand normally at "safety." When magnet 24 is energized, the exhaust-valve 11 is closed and the supply-valve 10 is opened, admitting gas to the piston-chamber 13, whereupon the piston rises to put the signal to "safety." After the piston has made a predetermined movement and before the signal has reached "safety" arm 17 strikes arm 21, lifting latch 20 from engagement with lever 19, whereupon this lever moves to the left to close the cut-off valve 12. The gas within the cylinder 13 continues to expand and continues the upward movement of the piston until dog 28 engages catch 27. When magnet 24 was energized, arm 25 was held against the magnet, so that when the signal reaches "safety" it is held against return movement by the catch 27. When the magnet 24 is deënergized, arm 25 is released and exhaust-valve 11 is opened, so that the signal returns to danger position.

It will be seen that the catch 27, with associated devices, constitutes a retaining device which prevents return movement of the signal or which positively holds the signal at "safety."

The piston-cylinders 13 and 33 are mounted on the frame 34.

35 is a link pivotally connected at one end to the piston-rod 15 and at its other end to a lever 36, whose free end carries a roller 37 and whose opposite end is pivoted at 38 to the frame 34.

39 is a yoke bolted to the frame 34.

40 is a lever having one end pivoted at 41 to the yoke 39 and its other end pivotally connected to the signal-rod 4.

When the signal 2 is at "danger," the levers 36 and 40 occupy the position as shown in Fig. 1, these levers being at this time in substantially a horizontal position with the roller 37 contacting with the under side of lever 40 near its middle. As the piston rises to put the signal to "safety" the lever 36 is inclined upward, lifting the lever 40 to an inclined position, as shown in Fig. 3. In this movement the roller 37, which bears against lever 40, moves gradually outward from the pivoted end of lever 40, so that the leverage of the piston on the signal increases as the movement of the signal to "safety" proceeds. It will also be seen that this leverage will increase at a predetermined part of the upward stroke of the piston—namely, throughout the latter part of the upward stroke. The leverage changes very little until a predetermined part of the stroke is reached, and then changes quite rapidly. In the lever system illustrated a slight upward movement of the piston may be effected without changing the leverage appreciably, but a continued upward movement increases the leverage quite rapidly. The system shown is unlike a toggle combination working between its extreme positions, in which the leverage varies from zero to infinity. On the contrary, in my system illustrated the leverage varies from a predetermined ratio to infinity.

Where a fluid-pressure employed to operate the signal is capable of doing work by its own expansion within the piston-chamber, it is feasible to cut off the supply of fluid-pressure before the signal has completed its movement to "safety," relying upon the expansive power of the gas to complete its movement. This is the arrangement shown with reference to the home signal 2. In such case a device consisting of levers 36 and 40 will have an especial utility because it increases the leverage of the piston on the signal. These levers 36 and 40 constitute a device for increasing the efficiency or effectiveness of the motor.

The distant signal 3 is provided with a connection similar to that just described intermediate the signal and the motor. It will not be necessary to specifically describe the motor and other devices associated with the distant signal 3, except to say that the cut-off valve for the distant signal is not closed until the signal has about completed its movement, so that the expansive power is not relied upon to complete the movement of the signal. In an ordinary semaphore-signal the load on the motor in shifting the signal to safety position increases materially as the blade nears the vertical position, so that the device for increasing the leverage on the signal at this time accomplishes an important result. It thus enables a motor operated with constant power to operate with an increased efficiency to correspond to the increased load when the signal nears vertical position.

The motor or prime mover for the signal may be electrical, mechanical, fluid-pressure, or other character.

I claim—

1. The combination with a pivoted semaphore-signal comprising a spectacle and a blade, of a prime mover, and connections intermediate the prime mover and the semaphore-signal for increasing the efficiency of the prime mover in its movement of the semaphore-signal on its pivot.

2. The combination with a pivoted semaphore-signal comprising a spectacle and a blade unsymmetrical in their relative arrangement, of a prime mover, and connections intermediate the prime mover and the semaphore-signal for increasing the leverage or power of the prime mover with the increase in load of the spectacle.

3. The combination with a pivoted semaphore-signal comprising a spectacle and a blade unsymmetrical in their relative arrangement, of a prime mover operable with a minimum constant power, and connections intermediate the prime mover and the sema-

phore-signal for increasing the leverage or power of the prime mover with the increase in load of the spectacle.

4. The combination with a pivoted semaphore-signal comprising a spectacle and a blade, of a prime mover, and a jointed connection intermediate the prime mover and the semaphore-signal for increasing the leverage or power of the prime mover with the increase in load of the spectacle.

5. In a signal apparatus, the combination of a signal; a motor; and a connection intermediate the signal and the motor for increasing the efficiency or effectiveness of the motor.

6. In a signal apparatus, the combination of a signal; a motor for moving the signal, the load of the signal on the motor increasing as the signal changes position; and means between the motor and signal for increasing the efficiency or effectiveness of the motor.

7. In a signal apparatus, the combination of a signal; a motor; and a jointed connection intermediate the signal and motor for increasing the efficiency or effectiveness of the motor.

8. In a signal apparatus, the combination of a signal; a fluid-pressure motor; and a connection intermediate the signal and motor for increasing the efficiency or effectiveness of the motor.

9. In a signal apparatus, the combination of a signal; a fluid-pressure motor for moving the signal, the load of the signal on the motor increasing as the signal changes position; and means between the motor and signal for increasing the efficiency or effectiveness of the motor.

10. In a signal apparatus, the combination of a signal; a motor; and a system of levers intermediate the signal and motor for increasing the efficiency or effectiveness of the motor.

11. In a signal apparatus, the combination of a signal; a motor operating by means of an expansible fluid; means for cutting off the supply of fluid-pressure to the motor before the signal has completed its movement from one position to another, whereby the expansive power of the fluid in the motor may be utilized to complete the movement of the signal; and a connection intermediate the signal and motor for increasing the efficiency or effectiveness of the motor.

12. In a fluid-pressure signal apparatus, the combination of a signal; a supply source for an expansible fluid; a fluid-pressure-applying-chamber in operative connection with said supply and in controllable communication with said supply source; means for cutting off the supply of said fluid to the pressure-applying chamber before the signal has completed its movement from one position to another, whereby the expansive power of the fluid in said chamber may be utilized to complete the movement of the signal; and a device for increasing mechanical leverage interposed in the connection between the signal and the pressure-applying chamber.

13. In a gas-pressure signal apparatus, the combination of a signal; a tank for liquefied gas; a gas-pressure-applying chamber in operative connection with said signal and in communication with said tank, whereby gas may be supplied from said tank to said gas-pressure-applying chamber to move the signal to another position of indication; supply and exhaust valves for said chamber; means for cutting off the supply of gas to said chamber before the signal has completed its movement under gas-pressure, whereby the expansive power of the gas in said chamber may be utilized to complete the movement of the signal; and a device for increasing mechanical leverage interposed in the connection between the signal and the pressure-applying chamber.

14. In a gas-pressure signal apparatus, the combination of a signal; a tank for liquefied gas; a gas-pressure-applying chamber in operative connection with said signal and in communication with said tank, whereby gas may be supplied from said tank to said gas-pressure-applying chamber to move the signal to another position of indication; supply and exhaust valves for said chamber; means for cutting off the supply of gas to said chamber before the signal has completed its movement under gas-pressure, whereby the expansive power of the gas in said chamber may be utilized to complete the movement of the signal; a device for increasing mechanical leverage in the connection between the gas-pressure-applying chamber and the signal; a retaining device to prevent return movement of the signal; and electric means for operating said supply and exhaust valves and said retaining device.

15. In a gas-pressure signal apparatus, the combination of a signal; a tank for liquefied gas; a gas-pressure-applying chamber in operative connection with said signal and in communication with said tank, whereby gas may be supplied from said tank to said gas-pressure-applying chamber to move the signal to another position of indication; supply and exhaust valves for said chamber; means for cutting off the supply of gas to said chamber before the signal has completed its movement under gas-pressure; means in the connection between the gas-pressure-applying chamber and the signal for gradually increasing mechanical leverage to compensate for the decrease in pressure of working gases during expansion, whereby the expansive power of the gas in said chamber may be utilized to complete the movement of the signal.

16. In a signal apparatus, the combination of a signal; a prime mover; and levers

36 and 40 in the connection between the prime mover and the signal for increasing mechanical leverage.

17. In a signal apparatus, the combination of a movable signal; a gas-motor for moving said signal; and means intermediate said signal and said gas-motor for increasing the mechanical leverage of said motor.

18. In a signal apparatus, the combination of a movable signal; a motor for moving said signal; an independent source of stored power for said motor; and means intermediate said signal and said motor for increasing the mechanical leverage of said motor.

19. In a signal apparatus, the combination of a movable signal; a motor for moving said signal; an adjacent independent source of stored power for said motor; and means intermediate said signal and said motor for increasing the mechanical leverage of said motor.

20. In a signal apparatus, the combination of a movable signal; a gas-motor for moving said signal; an independent tank of compressed gas for operating said gas-motor; and means intermediate said signal and said gas-motor for increasing the mechanical leverage of said motor

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE W. COLEMAN.

Witnesses:
NICHOLAS M. GOODLETT, Jr.,
E. G. WHITAKER.