J. L. HALL.

SIGNALING SYSTEM.

APPLICATION FILED APR. 4, 1910.

1,071,046. Patented Aug. 26, 1913.

Fig. 2.

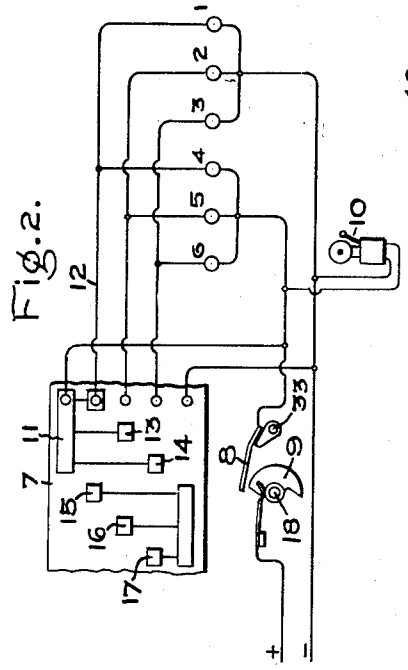
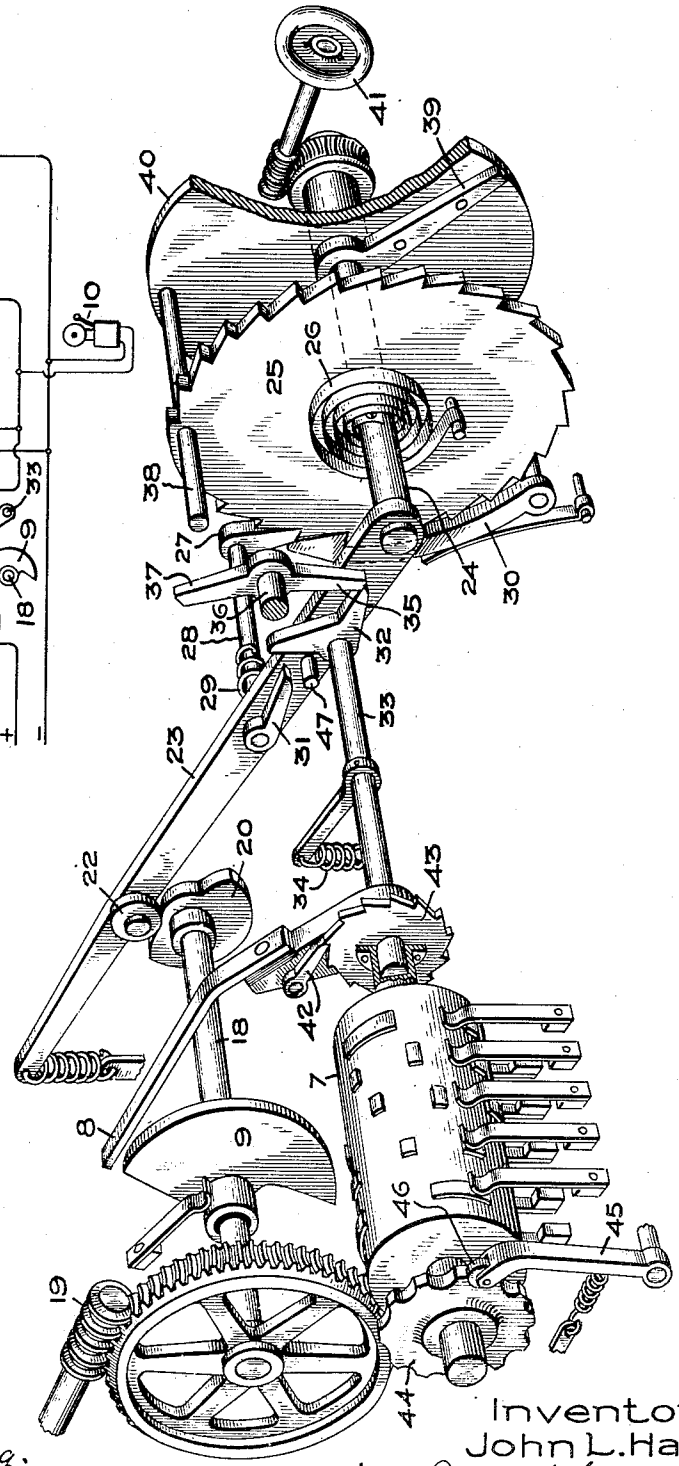


Fig. 1.



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Inventor:
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His Attorney.

# UNITED STATES PATENT OFFICE.

JOHN L. HALL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## SIGNALING SYSTEM.

1,071,046. Specification of Letters Patent. Patented Aug. 26, 1913.

Application filed April 4, 1910. Serial No. 553,183.

*To all whom it may concern:*

Be it known that I, JOHN L. HALL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Signaling Systems, of which the following is a specification.

This invention relates to signaling systems and has for its object the provision of improved means whereby indications may be transmitted at predetermined intervals, the length of which may be varied in a simple and efficient manner.

My invention relates more specifically to signaling systems for use on shipboard in signaling to the fire-room the times for firing the various furnaces. In my previous Patents Nos. 946,431 and 918,848, I have disclosed systems for accomplishing this result. In the present case, I have devised a new system which is better adapted for certain uses than my earlier ones. In carrying out my invention, I accomplish almost entirely by mechanical means that which is done in my previous systems electrically. The indicating lamps are controlled by a drum which always rotates in the same direction so that the lights will be lighted consecutively at predetermined intervals apart. A step-by-step mechanism driven by a constantly rotating shaft controls the operation of the drum, the latter being actuated after a predetermined number of steps have been made by the step-by-step mechanism. I also provide means for adjusting the number of steps which are taken before the drum is moved, thereby furnishing a variable time element by means of a simple and durable structure.

In the accompanying drawing in which I have shown my invention embodied in concrete form for purposes of illustration, Figure 1 represents a perspective view of the entire operating mechanism, all the bearings and framework being removed for purpose of clearness; and Fig. 2 represents a diagram of the circuit connections.

Referring first to Fig. 2, the numerals 1, 2, 3, 4, 5, and 6 represent the indicators which are shown for purposes of illustration as electric lamps. It is obvious that the particular arrangement of these lamps and the particular type of indicator may be varied without departing from the spirit of my invention. The circuits of these lamps are controlled by means of a drum controller 7 which is operated in a manner hereinafter described. The contacts on this drum are so arranged that the lamps will be lighted consecutively as the drum rotates, there being the same interval of time between the lighting of the successive lamps. The circuit through these lamps is closed at intervals independently of the controller drum by means of the contact 8 and cam 9. I also connect a bell 10 across the line, as shown, so that whenever the circuit is closed at the cam 9 the bell will ring so as to call attention to the fact that one of the lamps is lighted. When the circuit is closed at the cam 9 with the drum in the position shown in Fig. 2, the circuit is completed through lamp 1 as follows: from the positive main through the cam 9 and contact 8 to contact 11, thence to conductor 12, lamp 1 to the negative main. At the same time the bell 10 is connected across the line. When the drum is moved to the next position, the lamp 2 will be lighted, the circuit being through the contacts 11 and 13 on the drum. Similarly, when the drum is moved another step, lamps 3 will be lighted, the circuit being through contacts 11 and 14. In the same way lamps 4, 5, and 6 will be lighted through the contacts 15, 16, and 17 respectively on the drum. By continuously rotating the drum and intermittently closing the circuit at the cam 9, the lamps will be lighted, one after another, at equal intervals of time and the bell will ring each time a lamp is lighted.

The mechanism for carrying out the various movements necessary in the operation of my device consists of a shaft 18 which is continuously rotated by means of the worm 19. The shaft is provided at one end with a cam 20 and at its middle portion with the contact segment 9 which is likewise in the form of a cam insulated from the shaft. The shaft 18 is arranged to operate a step-by-step mechanism by the engagement of the cam 20 with a roller 22 on an arm 23 pivoted to the shaft 24. A ratchet disk 25 is likewise mounted to rotate on the shaft 24 and is pressed by means of a spring 26 in a clockwise direction. The reciprocating movement of the arm 23 moves the ratchet wheel 25 step by step against the tension of the spring. This is accomplished by

means of a pawl 27 on a rod 28 mounted in the arm 23 the spring 29 normally forcing the pawl 27 into engagement with the teeth of the ratchet wheel. As the arm 23 moves up and down, the pawl 27 moves the ratchet wheel in the well-known manner and the wheel is held each time in its new position by the pawl 30. For throwing the pawls 27 and 30 out of engagement so as to release the ratchet wheel, I provide the following mechanism: Trip finger 31 is secured to the end of the shaft 28 in such a position as to be engaged by a bell crank hammer 32 on the shaft 33. The hammer 32 is spring pressed by means of the spring 34 toward the finger 31 so that if released it will move the finger to throw the pawl 27 which in turn throws pawl 30 out of engagement with the ratchet wheel. The hammer 32 is held by means of a trigger 35 pivoted at 36. The free end of this trigger, 37, is arranged to be engaged by a rod 38 mounted in the ratchet disk. The arrangement is such that when the disk is moved far enough for the rod 38 to engage the end 37 of the trigger, the hammer 32 will strike the finger and the pawls will be thrown out, thereby permitting the ratchet wheel to return in response to the tension of the spring 26. The return of the ratchet wheel is limited by a stop 39 on the dial plate 40, this stop being arranged in the path of the rod 38 which is extended for this purpose as shown. The position of this stop 39 may be adjusted by means of the hand wheel 41 which turns the dial plate in one direction or the other and thereby moves the stop. By moving this stop, the time interval between the successive trips of the ratchet wheel is varied, since the number of steps taken by the ratchet mechanism is either increased or decreased.

The controlling drum 7 is operated by means of a ratchet mechanism, the pawl of which, 42, is mounted on the contact arm 8 secured to the shaft 33. The ratchet wheel 43 is secured to the drum so that as the shaft 33 is reciprocated back and forth it rotates the drum 7. On the opposite end of the drum from the ratchet mechanism is provided a mechanism for centering the contacts, consisting of a notched wheel 44 engaged by a spring pressed pivoted arm 45 having a roller 46 for engaging the notches.

Reverting now to the step-by-step mechanism, it will be seen that when the trigger 35 releases the hammer 32, the spring 34 forces it down against the stop pin 47. This turns the shaft 33 and thereby rotates the contact 8 into engagement with the cam 9. This closes the circuit through the indicating lamps and the circuit is held closed during a partial revolution of the shaft 18. When the contact 8 reaches the end of the cam 9 it drops down and the pawl 42 engages another tooth of the ratchet wheel 43. As soon as this is done, the arm 23 is again raised by the cam 20 and the pin 47 engaging the hammer 32 rotates the shaft 33, and thereby the drum 7, one step. The hammer 32 is then caught up by the trigger 35 and the arm 23 may now move back and forth without shifting the drum 7.

The mode of operation of my device will now be explained in connection with a system for indicating the firing of furnaces on shipboard. Assuming that there are six furnaces to be fired, one of the indicating lamps will be arranged at each of the furnaces so as to give a clear visual indication. Suppose that the engineer desires that the furnace be fired at fifteen minute intervals. This would mean that the first furnace No. 1 is fired, and then fifteen minutes later furnace No. 2 is fired, and so on going back to furnace No. 1 at the end of ninety minutes. By turning the hand wheel 41, the dial 40 may be turned to the fifteen minute interval, thereby adjusting the stop 39 to the proper position to give such an interval. The ratchet wheel is now rotated step-by-step by means of a constantly rotating shaft 18 until the pawls are released and the disk returns until it is held by the stop 39. As this is done, the circuit of lamp No. 1 is closed at cam 9 and the alarm bell 10 rings. The mechanism now continues to operate until the shaft 38 engages the free end 37 of the trigger 35 and again releases the mechanism to close the circuit and move the controlling drum so as to light the lamp at furnace No. 2. This successive lighting of the lamps will continue as long as the shaft 18 continues to rotate. When it is desired to change the interval, the dial may be shifted by means of the hand wheel as before stated.

It will be seen that I have provided a signaling system in which all electromagnetic mechanism is eliminated, all operations being performed positively by automatic mechanical movements. It should be understood, of course, that the particular structure and arrangement of parts therein described is for purposes of illustration merely, since various modifications thereof will suggest themselves to those skilled in the art without departing from the spirit of my invention, the scope of which is set forth in the annexed claims.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. In a signaling system, the combination with a series of electric indicators, a continuously operated step by step mechanism, a controlling member rotated always in the same direction to successively energize said indicators, ratchet mechanism operated at predetermined intervals by said step by step mechanism to move the controlling member,

and an auxiliary switch for closing a circuit through said indicators closed by said ratchet mechanism.

2. In a signaling system, the combination with a series of electric indicators, a controlling member therefor, actuating means for said controlling member, an element biased to rotate in one direction, means for moving said element against its bias, a switch in circuit with the controlling member, and means whereby said element is released at a predetermined point to permit the element to return and effect the operation of said actuating means and said switch.

3. In a signaling system, the combination with a continuously rotating element, and a step by step mechanism driven thereby, of a series of electric indicators, a controlling member therefor, an auxiliary switch in circuit with said controlling member, and a ratchet mechanism for closing said switch and likewise rotating said controlling member a step after the step by step mechanism has taken a predetermined number of steps.

4. In a signaling system, the combination with a continuously rotating element, a step by step mechanism driven thereby against a bias, a series of electric indicators, a controlling member therefor, an auxiliary circuit closing switch, ratchet mechanism for rotating said controlling member, and means whereby said step by step mechanism is released at a predetermined point to permit it to return and operate the ratchet mechanism and close the switch.

5. In a signaling system, the combination with a time element mechanism and means for driving the same, of a series of electric indicators, a controlling member for said indicators, a switch in circuit with said controller biased to closed position, a latch for holding said switch in open position, operating mechanism for said controlling member held in inoperative position by said latch, and means whereby said latch is tripped after a predetermined movement of the time element mechanism whereby the switch is closed and the controlling member operated.

6. In a signaling system, the combination with a continuously rotating element, a step by step mechanism driven thereby, a series of electric indicators, a controlling member therefor, a switch in circuit with said controlling member biased to closed position, a latch for holding the same in open position, ratchet mechanism driven by the rotating element for operating said controlling member held in inoperative condition by said latch, and means whereby said step by step mechanism is released at a predetermined point and the latch tripped whereby the ratchet mechanism becomes operative and the switch is closed.

7. In a signaling system, the combination with ratchet mechanism driven step by step against a spring tension, a series of electric indicators, a controlling member therefor, actuating means for said controlling member, an auxiliary circuit closer, and means whereby said ratchet mechanism is released at a predetermined point to effect the operation of said actuating means and said circuit closer.

8. In a signaling system, the combination with a ratchet mechanism driven step by step against a spring tension, a series of electric indicators, a controlling member therefor, always rotatable in the same direction to successively energize said indicators, ratchet mechanism operated at predetermined intervals by said step by step mechanism to move the controlling member, a switch in series with said controller, and means whereby said switch is closed and opened at similar intervals after the shifting of the controller.

In witness whereof, I have hereunto set my hand this first day of April, 1910.

JOHN L. HALL.

Witnesses:
BENJAMIN B. HULL,
HELEN ORFORD.