

F. W. WOOD.

TIME CONTROLLED CIRCUIT CONTROLLING MECHANISM.

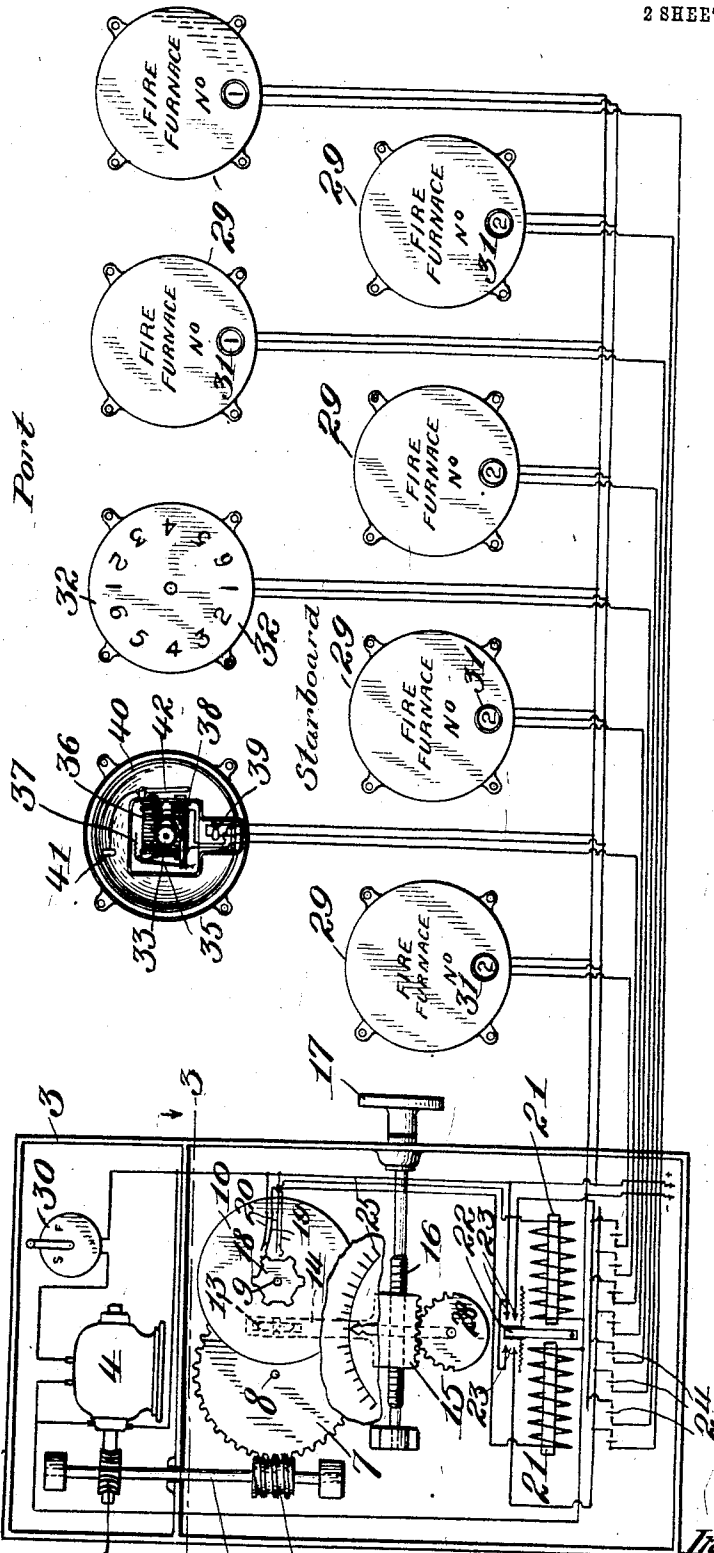
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933,217.

Patented Sept. 7, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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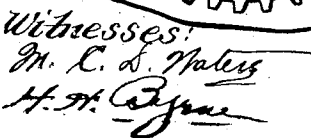
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

FRANK W. WOOD, OF NEWPORT NEWS, VIRGINIA, ASSIGNOR TO CHARLES CORY AND JOHN M. CORY, OF NEW YORK, N. Y., A FIRM.

TIME-CONTROLLED CIRCUIT-CONTROLLING MECHANISM.

933,217.

Specification of Letters Patent.

Patented Sept. 7, 1909.

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To all whom it may concern:

Be it known that I, FRANK W. WOOD, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented new and useful Improvements in Time-Controlled Circuit-Controlling Mechanisms, of which the following is a specification.

The present invention relates to time-controlled circuit-controlling mechanism, and in the particular adaptation herein shown and described, is illustrated in connection with signaling instrumentalities, such signaling instrumentalities being shown herein as indicators for furnace rooms.

It will be understood that my invention has to do broadly, with improved circuit-controlling mechanism, regardless of the adaptation of such mechanism, and the illustrated embodiment of the invention shown in the drawings which accompany and form a part of this specification, and described in detail hereinafter, while it illustrates my invention as applied to indicators for use in connection with batteries of boilers or furnaces, it is to be understood that the invention is by no means limited to this particular adaptation and use; the showing being merely for the purpose of indicating one convenient application and use of my invention.

Referring to the drawings—Figure 1 is a view of the circuit-closing mechanism and its associated parts connected with a plurality of indicating or signaling devices for furnaces; Fig. 2 is an enlarged detail view of a portion of the apparatus shown in Fig. 1, to illustrate the means for securing intermittent and variable operation of the circuit-closing devices; Fig. 3 is a sectional view on line 3—3 of Fig. 1, looking in the direction of the arrow; Fig. 4 is an enlarged detail view of one of the signaling devices which I have shown to illustrate the operation of my circuit-closing mechanism; and Figs. 5 and 6 are detail views of the make and break devices or circuit closers.

Referring to the drawings by numerals, like numbers illustrating like parts in the several views, 2 indicates a driving shaft mounted in suitable bearings, and preferably within an inclosing casing 3 of any suitable design, said driving shaft 2 constituting a driven member and being actuated by any prime motor, as 4, the prime motor in this instance being shown conventionally as

an electric motor. The motor 4 and the driving shaft 2 are operatively coupled in any suitable manner, as by the worm-and-worm-wheel driving connection 5, shown. Mounted upon the said driving shaft 2 is a worm 6, which meshes with the teeth of a gear 7 mounted on a shaft 8 journaled in the casing 3, so as to rotate the said gear 7 and shaft 8; said gear 7 forming a driver or power device to operate the parts presently to be described.

Mounted on the shaft 9, supported in suitable bearings in the casing 3, is a friction disk 10 which lies adjacent and lapped upon the gear wheel 7, the said friction disk 10 being splined to the shaft 9, so as to be movable longitudinally thereon, and being normally forced toward the gear wheel 7, by means of a spiral spring 11 interposed between the disk 10 and a collar 12, mounted on the shaft 9, and running against anti-friction bearings between it and the wall of the casing 3, as clearly shown in Fig. 3 of the drawing.

Interposed between the gear wheel 7 and the disk 10 is a power-transmitting device, namely, the friction roller 13, journaled in an arm 14 carried by a block 15, said block 15 being mounted on a screw-threaded shaft 16 journaled in suitable bearings, so that rotation of the shaft 16, by means of a thumb disk 17, on the outside of the case 3, will cause the block 15 to traverse the shaft 16 in one direction or the other, dependent upon the direction of rotation of said shaft 16, thereby moving the transmitting device or roll 13 on the arm 14 radially of the gear or power device 7 and friction disk 10, so as to permit the relative speeds of the said gear and disk to be changed.

Mounted upon the shaft 9 which carries the friction disk 10, is a tappet disk 18, provided with one or more radial fingers or projections, dependent upon the necessities of the case, the said tappet fingers being so arranged as that they will alternately raise and release one or more spring contact fingers 19, so as to make contact with a second finger or series of fingers 20. The said fingers 19 and 20 form the circuit-closers for any suitable circuits, the circuits in the present instance, being shown as selecting circuits for operating the desired signal circuits for the indicators for the furnaces, and in the embodiment of the invention

shown in Figs. 1, 2 and 5, the circuits and circuit-closers are shown in duplicate and so arranged as to be alternately operated by the fingers of the tappet disk 18, the purpose of this alternately closing of the circuits by the duplicate sets of fingers being more fully brought out hereinafter. In the arrangement shown in Fig. 1, the contact fingers 19 and 20 are connected across the positive and negative leads (see Fig. 1), so that upon closing of the circuit by raising the arm 19 of either of the duplicate sets of circuit closers shown, the circuit will be completed through one or the other of the selecting circuits. Each of the circuits controlled by the make and break fingers 19 and 20 has therein an electro-magnet 21, and these magnets are preferably arranged as shown in Fig. 3, in opposed relation to each other, and with a single spring centered contact or circuit closing and changing arm 22 between them, so that one or the other of said magnets will be energized as the circuit is closed through the circuit closers 19 and 20, through the revolution of the tappet wheel 18. The said circuit closing arm 22 is adapted to bridge the terminals 23 of the signaling circuits by which the signaling devices are rendered active, and in order that any one or any number of a plurality of signaling instrumentalities may be brought into service, they are provided with independent branch circuits which are connected by means of manually controlled plugs or keys 24, with the main circuit, which is controlled by the circuit changing arm 22, magnets 21, and the time-controlled circuit closers or make and break devices 19 and 20, just described.

From the foregoing it will be seen that under ordinary conditions the shaft 2 will be driven by the motor 4 at a constant rate of speed, said shaft in turn rotating the gear wheel 7 at uniform speed, the motion of the gear wheel 7 being transmitted by friction roller 13 to the frictionally driven disk 10. It will be seen, further, that the speed of the disk 10 may be varied within wide limits by simply moving the transmitting roller 13 radially by means of the traveling block 15, and screw shaft 16, so that the relative speed of disk 10 may be changed and this within very minute gradations. Obviously, variation in the speed of travel of the disk 10 will give a corresponding change in the timed intervals of the operation of the circuit closing fingers 19 and 20 by the projections on tappet disk 18, and the impulse given to the electro-magnets 21, and the resultant movement of the circuit closing arm 22, will be increased or diminished accordingly, this resulting in a definite timing of the signaling devices which may be in circuit. It will be observed, further, that this timing mechanism may be made to operate the signal de-

vices at any desired intervals whatever, within the range of the apparatus, and is not limited to variations by certain fixed steps, as in prior devices of this character. This is obvious from the fact that the friction roller 13 may be moved freely to any point whatever, and in each position, causes a corresponding frequency of operation of the signaling device. This arrangement has many points of advantage over that heretofore employed, in which certain definite intervals only, could be obtained, and in which the variation took place, step-by-step. In the present case, the intermissions may be made to vary continuously, from minimum to maximum.

Instead of providing duplicate sets of circuit closers for the selecting circuits, as shown in Fig. 5, I may provide a single spring finger 19^a between two spring contact fingers 20^a, with one of which (the lower one, as shown in Fig. 6) the spring finger 19^a is normally in contact, so as to close the circuit through one of the selecting circuits, and it will be readily understood that as the tappet wheel revolves, the spring finger 19^a will be lifted into contact with the upper spring finger 20^a, closing circuit through this finger and breaking circuit with the lower finger 20^a, so that an alternate closing and opening of the two circuits is secured in the same manner as in the duplicate arrangement, shown in Fig. 5 and described hereinbefore.

As a convenient means of indicating to the operator what position the transmitting disk 13 should be brought to in order to secure the properly timed intervals in the operation of the circuit closing mechanism, I preferably place upon the outer face of the casing 3 a line of time gradations 25, divided into appropriate time intervals, and adjacent these time gradations I place an indicating hand or pointer 26, mounted on a rock shaft 27, which carries a gear segment 28, meshing with a rack on the traversing block 15, so that when the operator rotates the shaft 16 through the thumb disk 17 and swings the indicator 26 to the desired point on the line of timed gradations, the transmitting wheel 13 will be moved to the proper position between the gear 7 and the friction disk 10 to give the desired speed to said disk 10.

In Fig. 1 I have shown a series of signaling devices 29, and although they may be operated in turn, or in any appropriate sequence by the circuit closing mechanism just described, these signaling devices 29 are preferably arranged in two definite groups as in the diagrammatic arrangement shown herein, the upper group constituting indicators for port fire rooms of a ship; while the lower group forms the indicators for the starboard side all the indicators of each group being operated simultaneously. Each

indicator is designed to be placed in a separate compartment or stoke hole, and in each of said compartments are a plurality of furnaces, corresponding with the numbers on the dial of each indicator. In the arrangement herein shown, assuming that all the indicators are in service, the keys 24 having been placed in proper position to close the circuit through their respective indicators, it will be seen that the circuit controlling mechanism will alternately close circuit through the electro-magnets 21 and swing the circuit closing arm 22 first to one side and then to the other. The arm 22, when the right hand side of its swing, bridges contacts 23, and closes the circuit from the positive wire, across said contacts, through the plug switches 24, through each of the corresponding starboard indicators, back to negative wire. When at the left-hand extremity of its swing, it closes a similar circuit through the port indicators. Thus, indicators on the port and starboard sides are alternately selected, and this arrangement I deem of considerable importance for the reason that when boilers and furnaces are in use on both sides of the ship, a very uniform indication for firing is secured, and a minimum number of furnace doors would be opened at one time. It will be obvious that any number of indicators 29 less than the whole, and any arrangement of grouping may be put in service, dependent on the boilers in use, by means of the keys 24, and that the controlling mechanism described will thereafter actuate the signals regularly in the manner described.

In order that the mechanism described may not be entirely dependent for variation in timing upon the variable transmitting connection 13 between the gear 7 and the disk 10, I preferably place in circuit with the motor 4 a rheostat 30, by means of which current to the motor 4 may be controlled and the speed of the motor controlled within certain limits; and obviously, if the speed of the motor 4 be varied, a corresponding variation in the speed of the shaft 2 and its driven parts will be secured, so that variations in timing may be attained without altering the position of the transmitting instrumentality above described.

The indicators 29, while they may be of any suitable type, either visual or audible, or both, are herein shown as comprising a box or inclosure of suitable design having a sight opening 31 in its face, and within said inclosing case is mounted a rotatable disk 32 carrying suitable characters on its face to indicate the particular furnace to be fired, these characters being so arranged that they will travel past the sight openings 31 in the face of the casing. In order to give the proper intermittent rotation to the said disks 32, I provide the electro-magnetic operating

devices shown in Fig. 4, in which 33 indicates a ratchet wheel mounted on the shaft which carries the indicating disk 32, said ratchet wheel being given a step-by-step movement by a ratchet thrust-rod 34, secured at one end to a pivoted armature 35 hung from a support adjacent the poles of an electro-magnet 36, which magnet is included in circuit with the circuit closing mechanism hereinbefore described, and, as will be apparent, is periodically energized as the circuit is closed through the circuit closing mechanism set forth. Normally the armature 35 is held in retracted position by means of the spring 37, but upon energization of the magnet 36 through the time controlled circuit closing mechanism, the armature 35 will be drawn to the poles of the magnet, the ratchet thrust-rod 34 will advance the ratchet-wheel 33, and the disk 32 will be rotated to bring the proper indicating character before the sight opening 31, a stop pawl 38 being preferably provided and actuated by movement of the thrust-rod 34 to engage the ratchet 33 at the proper point in its angular movement and prevent over-throwing of the indicating disk.

I preferably inclose within the indicator case and adjacent the sight opening 31, a lamp 39, which is included in the main circuit, so that the lamp 39 will show plainly through the sight opening 31, indicating the character on the disk 32. Furthermore, in order to give an audible signal, and thereby more surely direct the attention of the stoker to a particular indicator, I provide a gong 40 within the indicator case, which gong is sounded by means of a clapper 41 pivotally mounted, and carrying an armature 42, which hangs adjacent the end of the electro-magnet 36 opposite the armature 35, so that when the said electro-magnet 36 is energized the clapper armature 42 will be quickly pulled to the poles of the magnet 36, strike the gong 40, and give an audible signal.

While I have shown and described a particular embodiment of my invention, and that the best now known to me, since this showing is merely illustrative and not restrictive of the invention, I do not limit myself to the details of construction shown and described, except in so far as I am limited by the prior art to which this invention belongs.

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

1. In a time controlled signaling system, the combination with an electrically controlled indicator, constructed to display successive intelligences, of a transmitter governing said indicator, such transmitter comprising a circuit-closer and uniformly rotating means for periodically actuating the same at regularly recurring intervals, a driv-

ing motor and rotating means between the motor and the said actuating means for causing the said actuating means to operate the circuit closer at any interval whatever, within the range of the apparatus.

2. In a time controlled signaling system, the combination with an electrically controlled indicator, constructed to display successive intelligences, of a transmitter governing said indicator, and comprising a circuit closer and means for periodically actuating the same at regularly recurring intervals, such actuating means consisting of a continuously rotating member, means for driving such member uninterruptedly, and means for varying at will, and by any amount whatever within the range of the apparatus, the speed at which such member is driven.

3. In a time controlled signaling system, the combination with an electrically controlled indicator, constructed to display successive intelligences, of a transmitter governing said indicator, such transmitter comprising a circuit closer and means for periodically actuating the same at regularly recurring intervals, said means including a driving member, means for causing the same to rotate at constant speed, a driven member in operative relation with said circuit closer, and a power transmitting device between the driving and driven members whereby continuous rotation is imparted to the latter, and means for shifting said power transmitting device so as to vary at will and by any amount whatever within the range of the apparatus, the speed of rotation of said driven member.

4. In a time controlled signaling system, the combination with an electrically controlled indicator, constructed to display successive intelligences, of a transmitter governing said indicator, such transmitter comprising a circuit closer and means for periodically actuating the same at regularly recurring intervals, said means including a constant speed motor, a driving member connected thereto, a driven member operatively associated with said circuit closer, a rotary friction element engaging both said driving and driven members and serving to impart a continuous rotation to the latter, and means for shifting said friction element whereby the relative speeds of said members may be varied as desired.

5. In a time controlled signaling system, an electrically controlled indicator constructed to display successive intelligences, a circuit closer which, when actuated, serves to operate said indicator and cause it to display the next successive signal, continuously rotating means for periodically actuating said circuit closer at regularly recurring intervals, means for continuously driving said actuating means between the driving and

actuating means, and means for causing said actuating means to operate the circuit closer at any interval whatever within the range of the apparatus.

6. Time-controlled circuit-closing mechanism comprising a circuit closer, a driven part to periodically actuate said circuit closer at regularly recurring intervals, a driving part, a rotary power transmitting device between said driven and driving part, means for shifting said transmitting device as desired to vary the speed of said driven part by any amount whatever within the range of the apparatus, and a pointer movable with said transmitting device over a scale to indicate the interval corresponding with the speed selected.

7. In a time controlled signaling system, the combination with a plurality of electrically controlled indicators, of a transmitter governing said indicators, said transmitter comprising a plurality of circuit closers, one for each indicator, and means for periodically and successively actuating said circuit closers at regularly recurring intervals, such actuating means comprising a rotating driven member, means for continuously driving said driven members, and means for varying the speed of such driven member by any amount whatever, within the range of the apparatus.

8. In a time-controlled signaling system, the combination with a plurality of electrically controlled indicators, each constructed to display successive intelligences, of a transmitter governing all of said indicators, said transmitter comprising a plurality of circuit closers, one for each indicator, and means for periodically and successively actuating said circuit closers at regularly recurring intervals, such actuating means comprising a single continuously rotating member in operative relation with all of said circuit closers, a driving member, means for operating the same at constant speed, a power transmitting device between said driving and actuating member, and means for shifting said power transmitting device so as to vary the speed of said actuating member by any amount whatever within the range of the apparatus.

9. In a time controlled signaling system, the combination of an indicating means at a suitable point for displaying the signals desired, means for operating the indicating means from a distant point, and means for controlling the time interval between successive signals, comprising a continuously rotating driving member, a continuously rotating driven member in operative relation to the aforesaid operating means, and a single member for varying the time interval between the successive signals by any amount whatever within the range of the apparatus.

10. In a time controlled signaling system,

the combination of indicating means at a suitable point for displaying the signals desired, means for operating the indicating means from a distant point, and means for
5 controlling the time interval between successive signals, comprising a continuously rotating driving member, a continuously rotating driven member in operative relation to the aforesaid operating means, and a single
10 means for obtaining a continuous variation of the speed of the driven member between designed limits.

11. In a system for the transmission of successive signals, the combination of a device for receiving and a device for transmitting the signals, the said transmitting device comprising a continuously rotating driving element, a continuously rotating driven element for actuating the receiving device and
15 a unitary gearing connection between said driving and driven elements for obtaining a continuous variation of speed, and connections between the transmitting and receiving devices in operative relation to the continuously rotating driven member whereby the
20 time interval between the transmission of the successive signals is controlled.

12. A transmitter for use in a time controlled signaling system comprising a circuit
25 closer, a driving element, a driven element for actuating the circuit closer, a casing inclosing the said elements, a shaft journaled

in the casing, an arm screw threaded on said shaft and carrying at its one end a gear engaging said driving and driven elements, 35 means for turning the shaft to move the gear to vary the speed of the driven element, a second shaft journaled in said casing at right angles to the first, gearing between the first and second shafts, and an indicating
40 pointer on the second shaft.

13. A transmitter for use in a time controlled signaling system comprising a circuit closer, a driving element, a driven element for actuating the circuit closer, a casing
45 inclosing the said elements, a shaft journaled in the casing, an arm screw threaded on said shaft and carrying at its one end a gear engaging said driving and driven elements, said arm being provided with a rack
50 at its other end, means for turning the shaft to vary the speed of the driven element, a second shaft journaled in the casing at right angles to the first, a pinion on said second shaft meshing with the afore-mentioned
55 rack, and an indicating pointer on said second shaft.

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

FRANK W. WOOD.

Witnesses:

J. E. WARREN,
E. W. HOUSE.