April 16, 1929. A. E. BILLINGSLEY 1,709,517

SIGNAL APPARATUS ASSOCIATED WITH ELECTRICALLY CONTROLLED MACHINERY

Filed May 4, 1928

Fig. 1.

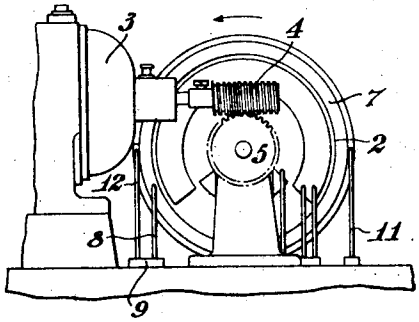


Fig. 2.

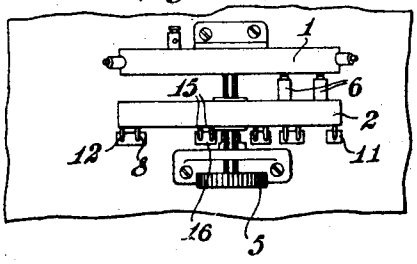
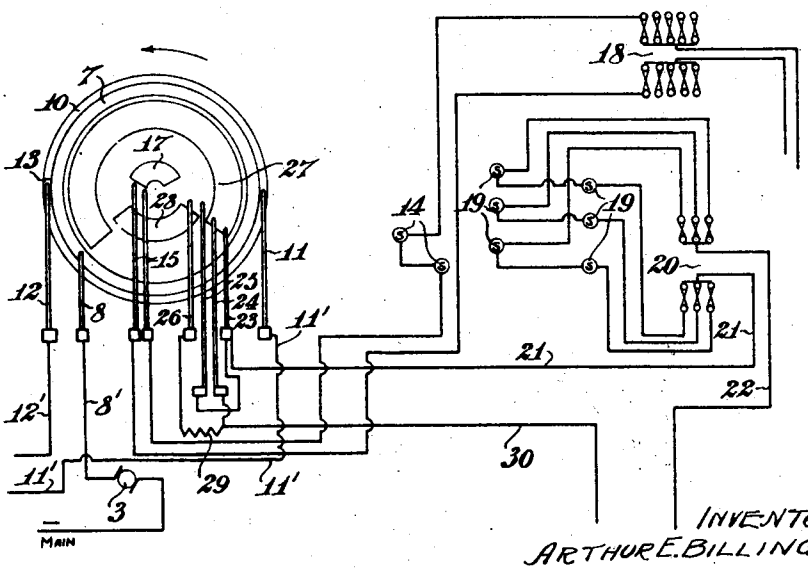


Fig. 3.



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SIGNAL APPARATUS ASSOCIATED WITH ELECTRICALLY-CONTROLLED MACHINERY.

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This invention relates to electrically controlled machinery such as printing and textile machinery arranged to be controlled by electrical means operated by push buttons or the like electrical switch devices, and the object of the invention is to provide means adapted to act automatically before a machine is started or its motion otherwise changed to give warning to the operator or operators attending the machine.

In places where machines are run continuously for extended periods there is danger of accidents if an attendant is not prepared for the starting, stopping or change of operation of a machine, and in order to provide adequate protection it is necessary in some cases to give the attendants such warning when a machine is to be started or stopped or its motion otherwise changed as to preclude as far as practicable the possibility of their being taken by surprise.

According to this invention, this is provided for by means of lamps disposed in or about the machine and connected to a switch or switches operated automatically by the means for controlling the machines in such a manner that the lamps are lighted, dimmed or extinguished prior to the starting or other change of motion of the machine. The lamps provided for this purpose are preferably arranged to supply necessary illumination and may be the lamps ordinarily provided for illuminating purposes, and in such case the lamps may be arranged to be dimmed prior to the starting or other change of motion of the machine. Alternatively, or in addition, red or other auxiliary warning lamps may be provided which are lighted up, prior to the starting or other change of motion of the machine.

A means of carrying the invention into effect will now be described with reference to the accompanying drawings, in which:—

Figure 1 is a view in elevation of a rotary contact device for dimming the lamps or switching them in or out.

Figure 2 is a plan view of the same, the motor 3 and worm 4 being omitted; and,

Figure 3 is a diagram showing the arrangement of the contacts and the electrical connections to the lamps.

The device shown in Figure 1 comprises a fixed disc 1 and a rotary disc 2 mounted coaxially with the fixed disc and adapted to be rotated by an electric motor 3 through the medium of a worm 4 and worm wheel 5. The disc 1 is provided with a number of insulated contacts (not shown), certain of which are adapted to be bridged in certain positions of the disc 2 by means of insulated brushes 6 carried by the disc 2, these contacts on the disc 1 being connected to the electrical means for controlling the machine or machines in such a manner as to allow the latter to be started or stopped when the disc 2 has been moved from one position to another. Apparatus capable of varying the operation of machinery upon the closure of an electric circuit by means such as the brushes 6 is well known and forms no part of the present invention and the arrangement of the contacts on the disc 1 need not therefore be described herein. It is to be understood, however, that these contacts are so arranged and connected that the machine or machines cannot be started without first rotating the disc 2 from the position shown through 180 degrees.

The disc 2 is provided with an insulated conducting ring 7 which makes contact at all times with a stationary brush 8 mounted on an insulating block 9 and with an insulating conducting ring 10 which is electrically connected to the ring 7 and makes contact with a pair of brushes 11, 12 similar to the brush 7 and touching the ring 10 at diametrically opposite points as shown. The ring 10 is broken at 13 by an insulated section so that in the position shown in the drawing the brush 12 is not conductively connected to the brush 7.

The brush 8 is connected by a lead 8^1 to one end of the armature of the motor 3 and the brushes 11 and 12 are connected by leads 11^1 and 12^1 to switches forming part of the electrical means (not shown) for starting and stopping the machinery and so arranged that when a press button or other device for starting the machinery is operated a circuit is closed by way of the brushes 8 and 11 through the armature of the motor 3 whilst when the supply of power to the machinery is cut off prior to stopping the machinery a circuit is closed through the armature of the motor 3 by way of the brushes 8 and 12. When, therefore, the disc 2 being in the position shown in Figure 2, the press button or other device for starting the machinery is operated, current will flow between the brushes 8 and 11 through the rings 7 and 10 and the motor 3 will drive the disc 2 in the direction indicated by the arrow in Figure 3 until the insulated section 13 of the disc 10 moves under the brush 11 whereupon the circuit through the arma-

ture of the motor 3 will be broken and the rotation of the disc 2 will cease. When subsequently the supply of power to the machinery is cut off prior to stopping the machinery, current will flow between the brushes 8 and 12 (the latter being now in contact with the conducting ring 10) and the motor 3 will drive the disc 2 in the same direction as before until the disc is restored to its original position, whereupon the circuit through the armature of the motor 3 will be broken owing to the movement of the insulated section 13 of the ring 10 under the brush 12.

During the movement of the disc 2 which results from the operation of the button for starting the machinery a number of red lamps 14 are lighted by the flow of current between a pair of brushes 15 mounted on an insulating support. These brushes are adapted to make contact with a conducting segment 17 on the disc 2 which is so arranged as shown in Figure 3 that it bridges the brushes 15 during the movement of the disc 2 due to the operation of the button for starting the machinery. The brushes 15 are connected in one of the leads between the lamps 14 and a main fuse board 18 as shown in Figure 3.

The warning given by the red lamps 14 is supplemented by dimming a number of white lamps which are disposed at various points in and about the machinery to provide necessary illumination. This is controlled by contact devices on the disc 2 now to be described.

The white lamps 19 which supply necessary illumination in and about the machinery are connected to a main fuse board 20 supplied by feed conductors 21 and 22. Four fixed brushes 23, 24, 25, 26 are mounted adjacent the disc 2 and co-operate with the conducting segments 27, 28 on the disc 2. These segments are arranged as shown in Figure 3 in such a manner that in the initial or normal position of the disc, the brushes 23 and 24 are connected together by contact with the segment 27 whilst the brushes 25 and 26 are insulated from one another. Upon movement of the disc 2 due to the operation of the press button for starting the machinery as hereinbefore described, the brushes 23 and 24 are disconnected from one another and the brushes 25 and 26 are connected together by the segment 28, this condition continuing until the disc 2 reaches the end of its movement when the segment 28 will have passed beyond the brushes 25 and 26 whilst the segment 27 will have made contact again with the brushes 25 and 26. The brushes 23 and 24 will then remain connected and the brushes 25 and 26 will remain disconnected during the return of the disc 2 to its original position. The brushes 23 to 26 and also the brushes 8, 11, 12 and 13 are so shaped and mounted that they engage the face of the disc 2 at their tips only.

The conductor 21 is connected to each of the brushes 23, 25 and the brush 26 is connected through a resistance 29 to the brush 24 and thence to a conductor 30, the conductors 22 and 30 being connected across the mains.

In operation, when the push button or the like for starting up the machinery is operated, a circuit is closed through the brushes 11 and 8 and the armature of the motor 3 as hereinbefore described and the disc 2 is rotated in the direction of the arrow. This movement of the disc 2 causes the segment 17 to move beneath the brushes 15 thus lighting the red lamps 14. At the same time, the segment 27 moves away from beneath the brushes 23 and 24 whilst the segment 28 makes contact with the brushes 25 and 26 so that the supply circuit of the white lamps 19 is broken between the brushes 23 and 24 and closed through the resistance 29 by way of the brushes 25 and 26. The resistance 29 is thus inserted in the supply circuit and the lamps 19 are dimmed.

The red lamps 14 remain lighted and the lamps 19 remain dimmed until the disc 2 has been rotated through nearly 180 degrees whereupon the segment 17 breaks contact with the brushes 15 thus extinguishing the red lamps 14 whilst the segment 28 breaks contact with the brushes 25, 26 and the segment 27 re-makes contact with the brushes 23, 24, thus restoring the original connections in the supply circuit of the white lamps 19.

When the red lamps 14 have been extinguished and the white lamps 19 restored to full power, the insulated section 13 of the ring 10 moves under the brush 11 with the result that the circuit through the brushes 11 and 8 and the armature of the motor 3 is broken and the rotation of the disc 2 stops. At this point certain of the contacts on the disc 1 are bridged by the brushes 6 on the disc 2 to operate a switch or switches which control the supply of power for driving the machinery as hereinbefore mentioned, so that the machinery is now started up.

The disc 2 remains in its new position as long as the machinery continues to operate, but when the main power supply is cut off, a switch is operated as hereinbefore described to close a circuit through the brushes 12 and 8 and the armature of the motor 3. The disc 2 is therefore rotated in the same direction as before until it returns to its original position in which the insulated section 13 of the ring 10 moves under the brush 12 thus breaking the circuit through the brushes 12 and 8 and the armature of the motor 3 so that the action of the disc 2 ceases.

With the apparatus above described, the lamps 14 and 19 are unaffected when the disc 2 returns to its original position after the supply of power to the machinery is cut off, so that no warning is given when the machinery is to be stopped. If it is desired to give a warning when the machinery is to be stopped, however, the disc 2 may be provided with an