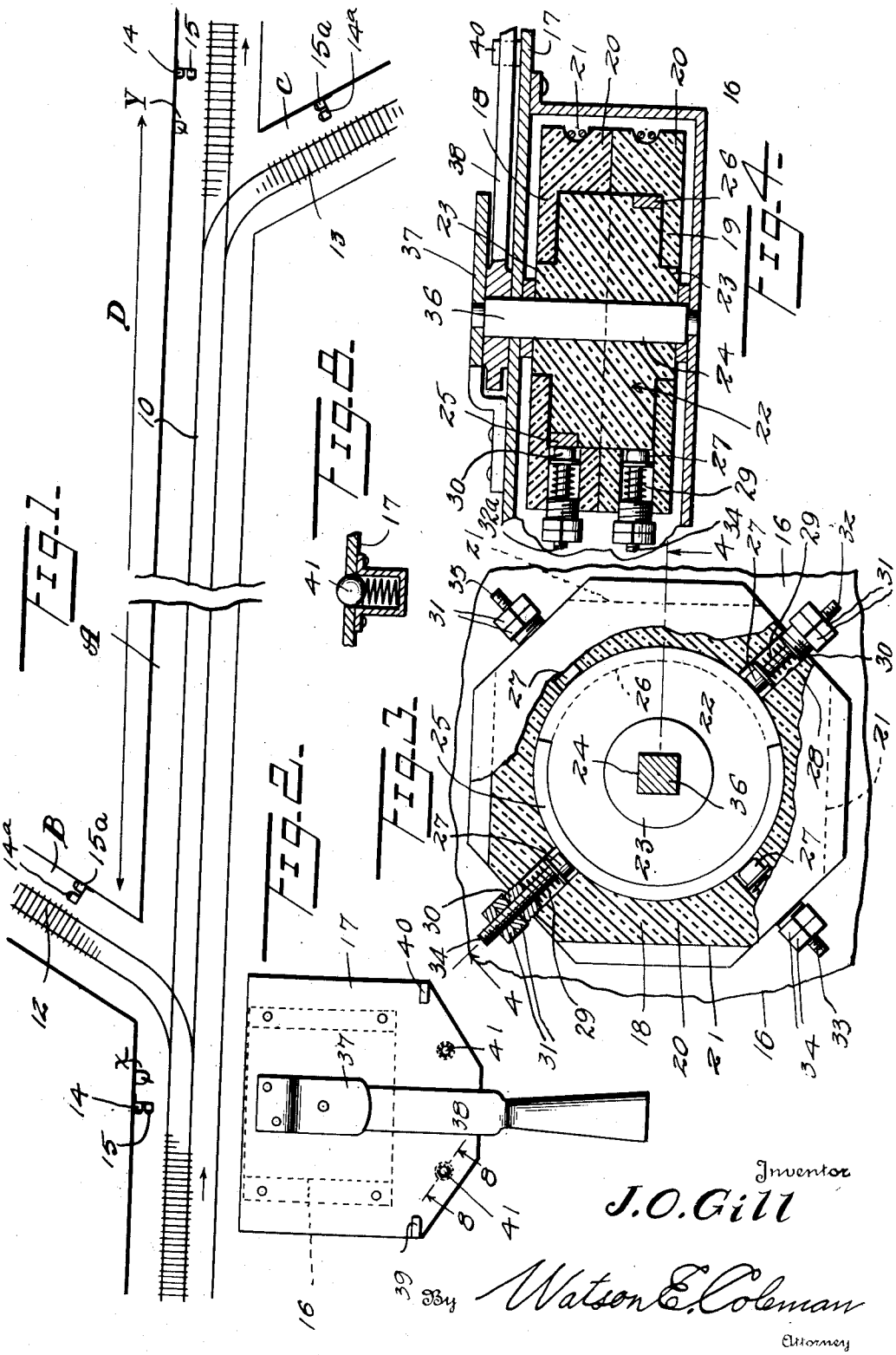
April 16, 1940. J. O. GILL 2,197,692

SWITCH FOR BLOCK SIGNAL SYSTEMS

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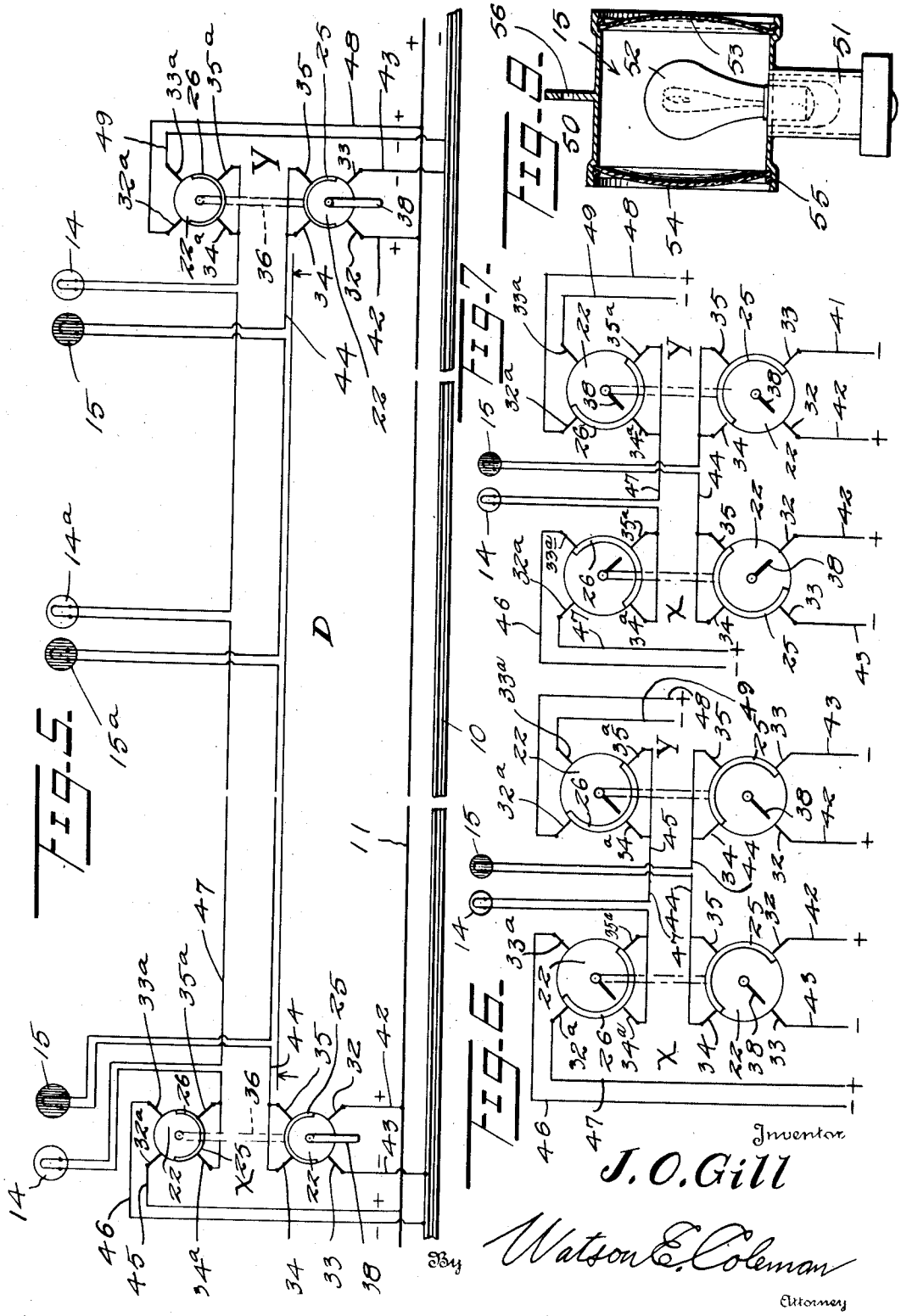


Inventor
J. O. Gill
By Watson E. Coleman
Attorney

April 16, 1940. J. O. GILL 2,197,692

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Patented Apr. 16, 1940 2,197,692

UNITED STATES PATENT OFFICE

2,197,692

SWITCH FOR BLOCK SIGNAL SYSTEMS

John O. Gill, Barnesboro, Pa.

Application April 22, 1937, Serial No. 138,444

1 Claim. (Cl. 200—8)

This invention relates to block signal systems designed for use in mines though not necessarily limited to such use, and relates particularly to an improved switch for controlling such systems.

A principal object of the invention is to provide a very simple switch for the purpose described, one at each end of a block, and which will control the lamps at the opposite ends of the block and also control lamps in the entries opening onto the main track or tunnel.

A further object of the invention is to provide an improved multiple circuit controlling switch which is designed primarily for and may be used in locations where the atmosphere is filled with moisture, gases or dust, and which is so designed that such air-laden substances cannot work into the switch structure to interfere with the operation of the same through contact between or deposit on engaging current carrying metallic parts and thus interfere with the operation of the switch. The switch construction is also of such character as to obviate the possibility of sparking with the resultant dangers when the switch structure is used in mines or other situations where highly inflammable gases are found.

My invention is illustrated in the accompanying drawings wherein:

Figure 1 is a diagrammatic plan view of a mine tunnel with entries.

Figure 2 is an end view of the switch box and handle.

Figure 3 is a fragmentary transverse sectional view through the switch.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a diagram of the block, the switches controlling the block and the signal lamps controlled by the switches.

Figure 6 is a diagrammatic view showing one position of the switches.

Figure 7 is a diagrammatic view showing the switches in reversed position,

Figure 8 is a fragmentary sectional view through one of the switch lever detents and the supporting plate.

Figure 9 is a longitudinal section through one of the lamps.

Referring first to Figure 1, which shows in plan view a portion of a mine as illustrative of one application of my invention, A designates a main tunned or main railway line, and B and C entries or headings opening into the main tunnel or way. The "block" or section of track to be protected is designated D, it being understood that I have only illustrated one "block" but that the same protection may be applied to each successive block of a series. Shown as extending through the main passageway A is a track 10 with a corresponding trolley wire 11, as shown in Figure 5. The trolley wire carries positive current while the rails are negative and constitute return conductors. Tracks 12 and 13 extend from the entries or headings onto the main track 10.

Disposed at each end of the block B are two lamps 14 and 15. Corresponding lamps 14^a and 15^a are disposed in the headings and are connected in series with the lamps 14 and 14^a and 15, respectively. The lamps 14 display a clear signal, that is, a white or amber-colored signal in both directions. The lamps 15 are "danger" lamps and on one side when energized, display a red light and on the opposite face a green light or cautionary signal. The red faces of the lamps 15 are directed away from the block D towards adjacent blocks while the green faces or lenses of the lamps are directed toward the middle of block D. The red faces of the lamps 15^a are directed away from the main line and into the entries and the green or cautionary faces of these lamps 15^a are directed toward the main line.

These lamps are controlled by two identical switches at opposite ends of the block, these switches being designated X and Y in order to distinguish them. When a car is about to enter the block, the adjacent switch is thrown which causes both danger lamps to be energized and also the danger lamps in the sidings or entries, so that at both ends of the block red signals are directed outward to prevent any car from entering the block while cautionary signals are directed inward or along the block. It will be obvious that when the danger lamps in the main block are energized, the danger lamps in the entries are simultaneously energized by the throwing of the first named switch. When a car leaves the block, the adjacent switch at that end of the block is thrown reversely to its previous position which "clears" all the signal lamps both on the main line and in the entries.

The switches designated X and Y in the diagrammatic view, Figure 5, are identically the same in structure and a description of one will suffice for the other.

The switch is enclosed within a casing formed of a section 16 and a plate 17 which is larger in area than the casing section 16 and extends beyond it on three sides. Disposed within the casing is the housing of the switch proper, comprising two approximately annular but many-

sided elements of non-conductive material and designated 18 and 19. Each element has a central shaft opening and a marginal flange 20 which is grooved on certain of its edge faces, as at 21. The two sections are coupled to each other in any suitable manner and when brought together define a chamber within which is disposed a rotatable approximately cylindrical block 22 of insulating material having the outwardly projecting hubs 23 at opposite ends and having a central shaft aperture 24. Embedded in the periphery of the block 22 at one end is a metallic segment 25 and embedded in the other end of this rotatable block is a metallic contact segment 26. Each segment is approximately 210° in angular length and the segments are disposed in diametrically opposite relation. It will be seen, therefore, that one segment at its ends extends beyond the ends of the other opposed segment though, of course, neither of these segments are in contact or electrical engagement with each other.

Each of the blocks 18 and 19 is preferably eight-sided and extending through the four faces of the block 18 are radial passages 28 each containing at its inner end the contact button 27 forced inward by a spring 29 surrounding and electrically engaged with a screw passing through a bushing 30, the screw carrying the binding nuts 31. These screws are numbered 32, 33, 34 and 35. Each of these screws has threaded engagement with the bushing 29 and is connected to a conductor by the binding nuts 34. I shall hereafter refer to these screws as contacts as they, through the corresponding springs and contact buttons, electrically engage the segment 25. There are four of these contacts disposed on a level with and coacting with the segment 25 and there are four contacts or screws 32^a, 33^a, 34^a and 35^a coacting with segment 26. Each housing block 19 is grooved at 21, as before stated, to receive the wires going to the several contact screws. These wires may be carried out of the switch box 16 either through the side of the box or through the top of the switch box, as desired.

Attached to the shaft 36 which passes through the opening 24, and operating between the face of plate 17 and a bracket 37, is a handle 38 which operates between two stops 39 and 40 and limits the throw of the handle to an angular movement of approximately 70°. Also carried on the plate 17 are the two handle latches 41 or spring detents which hold the handle against accidental movement after being set but permit ready intentional movement of the handle.

As shown in Figure 5, the eight contact screws 32, 32, 34 and 35 and 32^a, 33^a, 34^a and 35^a of switch X are connected up with the lamps 14 and 15 (and 14^a and 15^a) and with the like contacts of switch Y, as follows: From contact 32 a conductor 42 leads from the trolley wire 11 and takes current therefrom. From contact 33 a wire 43 leads to the rail 10. From both contacts 34 and 35 a conductor 44 leads serially through all the danger lamps 15 and 15^a of the block to like contacts 34 and 35 of the switch Y. The contacts 32 and 33 of the switch Y are also connected one to the trolley wire and the other to the rail by conductors 42 and 43 respectively.

The contacts 32^a and 33^a of switch X are also electrically connected to the rail and trolley wire, respectively, by conductors 45 and 46, while both of the contacts 34^a and 35^a are connected to a conductor 47 passing serially through the white lamps and 14^a of the block and connected to the corresponding contacts 34^a and 35^a of the switch Y. The contacts 32^a and 33^a of this switch Y are connected by conductors 48 and 49 to the trolley wire and rail, respectively.

Referring again to Figure 5, when a car enters the block D from the right, the operator (if the switch is manually operable) turns the switch Y in a clockwise direction by shifting the handle against the stop 39 in Figure 2. This shifts the segments 25 and 26 to the position shown in Figure 6, and if the switch X has also been left with the handle shifted over to the stop 39 (as shown in Figure 6), then all of the red lamps or danger lamps will be energized, displaying a red signal in opposite directions from the block and a cautionary signal directed from each end of the block towards the middle thereof. The danger lamps 15 and 15^a will also be energized in the entries and directed to the approaches thereof.

Now when the car is about to leave the left hand end of the block, the handle of switch X is shifted to the right into engagement with the stop 40, as shown in Figure 7, reversing the switch X and connecting the white lamps 14 and 14^a in circuit with the trolley wire and rail, as will be later more specifically described.

If another car comes into the block from either end (of course, after the first car has passed out of the black) and the handle of the adjacent switch is shifted over from where it was left by the preceding car, the red lamps will be switched on and the white lights or lamps will be switched off.

Thus the movement of either switch handle in a direction from its previous position will cause a reversal of the switch and a reversal of the signal lights, and this will apply to all the lamps in circuit with the respective segments of the two switches.

The detailed action of the switches is as follows: It is premised that the switches X and Y are never in a neutral position, that is, the handle of the switch is always either shifted to a position against one or the other of the stops 39 or 40. Referring now to Figure 6, it is assumed that initially the handle of the switch X has been shifted to the left and is in that position and that initially the handle of switch Y is turned toward the right and that the lamps display, therefore a "clear" signal. Now when a car enters the block from the right, for instance, the handle of switch Y is shifted to the left, into the position shown in Figure 6. In this position of the two switches a circuit is completed through the red lamps as follows: from the trolley wire to wire 42 of switch X to segment 25, thence to contact 35, thence by wire 44 through the red lights to contacts 34 and 35 of switch Y, then by segment 25 to contact 33, thence to the negative wire 41 to the rail.

Now when the car is about to leave the left hand end of the block, the switch handle of switch X is shifted into engagement with the stop 40, or toward the right as shown in Figure 7. This reverses the position of the segments in the switch X, the segments of switch Y remaining in the same position in which they were left. Under these circumstances, the circuit through the red lights is broken and the circuit through the white lights is completed as follows: from wire 48 which connects with the trolley wire current passes to contact 32^a, thence to the segment 26 of switch Y, thence to one or both of the contacts 34^a and 35^a, thence to the wire 47

through the white lights 14 and 14a, thence to contacts 34a and 35a of switch X, thence to the segment 26 thereof, thence to the contact 33a, and thence by wire 46 to the rail, thus completing the circuit through the white lights. The circuit through the red lights is broken.

Upon the approach of a car from the left toward the block, the switch X is reversed from the position shown in Figure 7 and this will automatically cut off the white lights and automatically energize the red lights.

In Figures 6 and 7, I have illustrated one pair of lights 14 and 15 and in Figure 5 I have illustrated three pairs of these lights, but it is to be understood that as many clear lamps and as many red lamps may be used as necessary to control passage through the block and from the side entries.

It will also be understood that in Figures 5, 6 and 7, I have illustrated the switch diagrammatically as if there were two rotatable members 22, each carrying a segment 25 or 26 whereas in actual practice, as shown in Figure 4, there is only one rotatable member 22 carrying the two segments.

It will also be understood that in Figures 6 and 7, while I have illustrated a handle in connection with that portion of the switch carrying the contact 26, yet this is purely illustrative and to make the position of the switch clearer, and that as a matter of fact, both segments are operated from a single handle 38.

While I have described the switches as being operated by hand, it is obvious that these switches might be shifted automatically by means on the car itself or by the trolley pole itself.

It will be seen that the switch mechanism which I have devised for this purpose is extremely simple and the switch mechanism and the circuits themselves are not liable to get out of order.

Thus it will be seen that by shifting either one of the switches X and Y from its previous position as left by a car leaving the block, one set of lamps will be de-energized and the other energized or, in other words, if the clear lamps are on in the block, then upon a car entering either end, the adjacent switch is shifted from its previous position and will cause the illumination of the danger lamps or red lamps which will remain on until the car reaches the other end of the block and the adjacent switch is shifted, which will cause the red lamps to be cut out and the white lamps to be illuminated. Of course, it is to be understood that while I have referred to the clear lamps as white and the danger lamps as red, other colors may be used.

In Figure 9 I have illustrated one of my double-ended signal lamps (as for instance lamp 15). This includes an open-ended casing 50 having a base 51 in which the lamp 52 is inserted and through which it is connected up to the source of current in the usual manner. At one end of the casing is disposed the red lens 53 and at the other end the green lens 54. These lenses are held in place by spring rings or wires 55. The casing is shown as provided with a web 56 whereby it may be attached to an overhead beam or other support. The lamps 14 are constructed in the same manner as lamps 15 but have preferably a white lens at one end and an amber lens at the other.

The object of having the danger signal lamps display a green light on one side and a red light on the other is so that the green lamps may warn a motorman that he is running out of the block and must change the switch to white or clear. Also when a motorman is running onto a block after he has turned the switch, he can look back and check the light and know that he is safe. In case two cars approach one at each end of the block at the same instant and both switches are turned at the same instant, the lights will remain the same color, thus it is necessary to have differently colored lenses so as to warn these two parties so that one can stop and let the other have the block.

What is claimed is:

A multiple circuit controlling switch, comprising a casing body of insulation material having a circular chamber therein, opposite walls of the chamber having alined circular openings, a circular body fitting in said chamber and having a diameter and thickness substantially conforming to the diameter and width of the chamber whereby the body contacts at its sides and periphery with the walls of the chamber, said body having axial hubs each fitting in a side wall opening, a pair of spaced metallic contact strips each countersunk in and extending throughout at least half the circumference of the periphery of the circular body, said strips being in offset planes and extending around opposite halves of the body periphery, two sets each of four contacts carried by the casing and extending therethrough and exposed in the chamber, each set of contacts being in the plane of one of said metallic strips, the contacts of each set being equi-distantly spaced around the circular body and adapted to engage the periphery thereof and a metallic strip, and means connected to the body to effect turning of the same in the chamber and on said hubs.

JOHN O. GILL.