

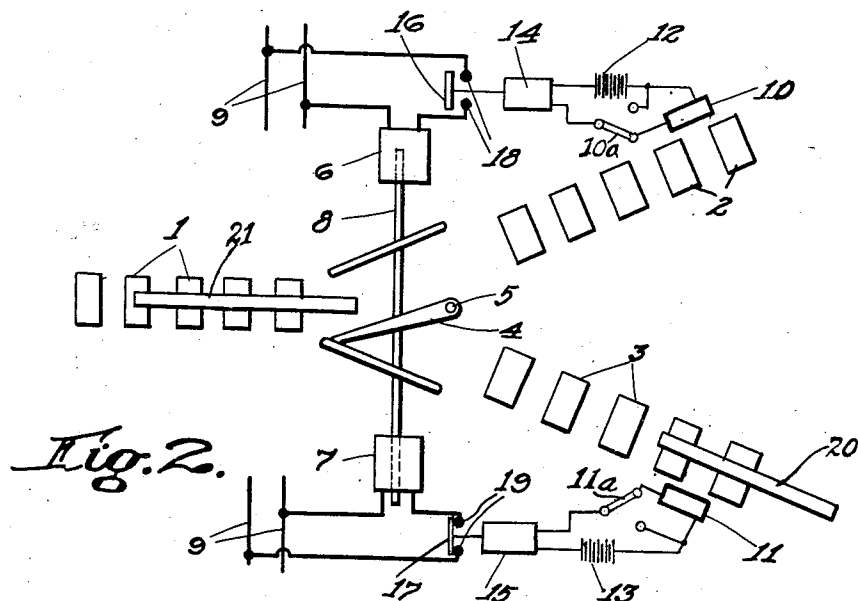
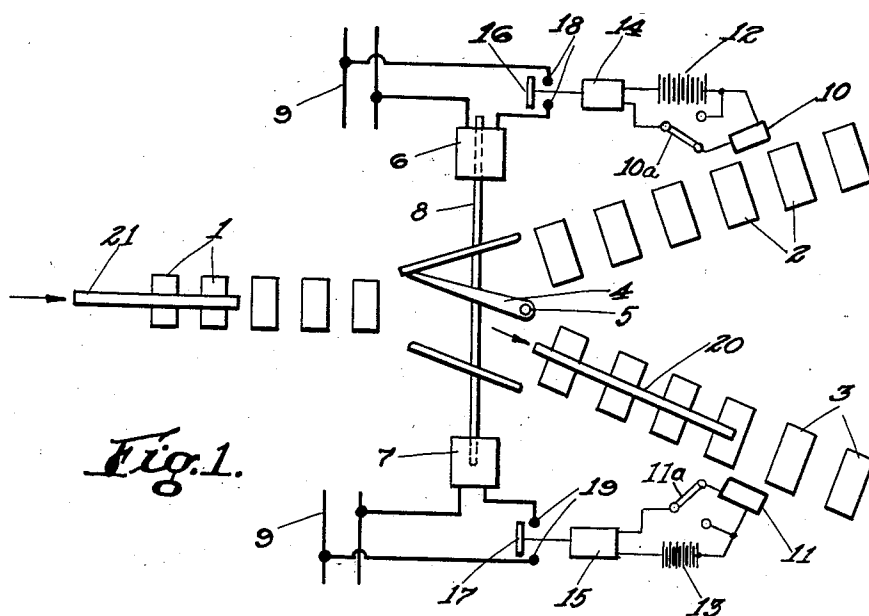
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AUTOMATIC DIRECTION CONTROLLING MECHANISM

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AUTOMATIC DIRECTION-CONTROLLING MECHANISM.

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My invention relates to an automatically operated mechanism responsive to radiant energy, and adapted to be used for instance, for controlling the direction of movement of hot material, as delivered by a rolling mill. My improved mechanism is also adapted for the operation of switching devices, as used in rod mills and the like to direct the moving material first to one and then to the other, of a pair of receiving devices.

While mechanism has been heretofore employed to automatically direct the movement of material from a rolling mill into different paths, such mechanism has been dependent upon the functioning of trigger devices placed in the path of movement of the material so as to be actually struck thereby, and thus exercise a mechanical or electrical control over a direction controlling or switching member. According to the present invention I propose to utilize the radiant energy of the heated material itself in order to automatically operate a direction controlling member, or switch, my mechanism being characterized by its extreme simplicity and substantial absence of mechanical parts. The above and other advantageous features of my invention will hereinafter more fully appear, reference being had to the accompanying drawings, in which—

Fig. 1 is a diagrammatic view of a direction controlling mechanism embodying my invention.

Fig. 2 is a view similar to Fig. 1, showing the parts of the mechanism in different positions.

Like reference characters refer to like parts in the different figures.

Referring to Fig. 1, my invention is shown for example, in connection with a series of runout rolls 1, which are adapted to deliver pieces of material from a rolling mill to diverging series of rolls 2 and 3. The rolls 2 and 3 are adapted to convey the material to suitable receiving devices, such as cooling beds, not shown, and a switch member 4, pivoted at 5, is disposed between the rolls 1 and the rolls 2 and 3, so that the position of this switch member 4 determines the direction in which the material from the rolls 1 will

travel, i. e. either on the rolls 2 or on the rolls 3.

The switch 4 is adapted to be turned about its pivot 5 by means of solenoids 6 and 7 acting on opposite ends of a plunger 8 connected to the switch member 4 at a point intermediate its ends. Energization of the solenoid 6 causes the switch member 4 to be turned about its pivot 5 into the position shown in Fig. 1, while energization of the solenoid 7 is adapted to move the switch 4 to the position shown in Fig. 2. The solenoids 6 and 7 are adapted to be energized from any suitable source of power, indicated by the supply mains 9, and my invention contemplates the automatic control of the energization of the solenoids 6 and 7 by means of the radiant energy of the heated material, whose movement it is desired to control.

In carrying out my invention, photo electric cells 10 and 11 are disposed closely adjacent to the diverging series of rolls 2 and 3, respectively, so that when the hot material is run out on either of the series of rolls 2 and 3, the cells 10 and 11 will be subjected to the radiant energy emanating from the heated material. By the term photo electric cell, I mean a device, such as a selenium cell, providing a light responsive element, the electrical resistance of which varies inversely with the degree of illumination to which the cell is subjected. It is known that the "dark" resistance of such a cell may range from 25,000 to 100,000 ohms; whereas when the same cell is illuminated its resistance will range from 2,000 to 5,000 ohms; consequently, when a constant voltage is impressed on such a cell, the current passing through the cell will vary inversely with the degree of illumination of the cell.

In carrying out my invention one terminal of each cell 10 and 11 is connected to a low voltage source of electrical energy, indicated by the batteries 12 and 13, while the other terminals of the cells 10 and 11 are connected to the energizing coils 14 and 15 respectively, of relays. The relays provide movable contact members 16 and 17 which are adapted to bridge pairs of spaced stationary contacts 18, 18 and 19, 19 located in the cir-

cuits of the solenoids 6 and 7, respectively, upon energization of the coil 14 or the coil 15, as the case may be.

When the cells 10 or 11 are in a dark, or unilluminated, condition the cell resistance is so high that not enough current can pass through the corresponding relay coils 14 and 15 to cause closing of the relays and energization of the corresponding solenoids 6 and 7. The cells 10 and 11 are shown in a dark or high resistance condition in Fig. 1, in which the switch 4 is shown in position to direct a piece of material 20 coming from the rolls 1 onto the series of rolls 3. A second piece of material 21 is shown as advancing over the rolls 1 an appreciable distance behind the first piece of material 20, and the manner in which the first piece of material 20 automatically causes the delivery of the second piece 20 to the series of rolls 2 will now be described.

As the advancing end of the hot piece of material 20 comes abreast of the cell 11, the latter is subjected to an increase of illumination which has the immediate effect of greatly reducing the electrical resistance of the cell 11. Therefore, by the time that an appreciable portion of the piece 20 has passed the cell 11, the resistance thereof is so greatly decreased that enough current from the constant voltage source 13 will pass through the cell 11 to fully energize the relay coil 15. When this occurs, the spaced contacts 19, 19 are bridged by the movable relay contact 17, thereby completing the energizing circuit of the solenoid 7. The solenoid 7 thereupon acts upon the plunger 8 to move the switch 4 from the position of Fig. 1 to the position of Fig. 2.

Consequently, when the succeeding piece of material 21 reaches the end of the rolls 1, its advancing end will be directed by the switch 4 to the series of rolls 2. During this time, the solenoid 7 remains energized to hold the switch member 4 in the position of Fig. 2, but by the time the advancing end of the piece 21 reaches the rolls 2 the tail of the piece 20 will have passed the cell 11. This has the effect of reducing the resistance of this cell 11 to such an extent that the relay coil 15 will be deenergized and the contacts 19 will be opened. The switch plunger 8 is then no longer subjected to the pull of the solenoid 7, so that when the advancing end of the second piece 21 comes abreast of the cell 10, the decreased resistance of this cell will result in the energization of the solenoid 6 to cause the switch member 4 to be moved from the position of Fig. 2 back to the position of Fig. 1.

Obviously the above described delivery of successive pieces of material first to the rolls 2 and then to the rolls 3 will continue alternately as long as the circuit connections remain as shown in the drawings. Should it be desired, however, to cause the material to

pass continuously to either the rolls 2 or the rolls 3, it is only necessary to open the circuit of either cell 10 or 11 or to short circuit either cell 10 or 11, by means of the knife switches 10^a and 11^a, whereupon the switch member 4 will always be held in one position, by either one of the solenoids 6 or 7.

From the foregoing it is also apparent that my improved direction controlling mechanism can be caused to function with practically any desired disposition of the controlling light responsive cells. That is, the cells 10 and 11 may be placed at different distances from the switch 4, depending upon the length of the pieces of material, as well as the spacing between the rear end of one piece and the front end of the next succeeding piece. The controlling factor is that one cell must be illuminated by the passage of a piece of material before the next succeeding piece reaches the switch 4; so long as this condition is met the mechanism will function as described, and may be employed for controlling the direction of movement of any kind of material which is hot enough to give off radiant energy.

I claim:

1. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of said material to automatically operate a device for controlling the direction of travel of said material.

2. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of said material to automatically operate a device for directing said material first into one path of travel and then into another.

3. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of said material to automatically operate a direction controlling device so as to direct successive pieces of said material into different paths.

4. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of said material on a light responsive device to operate means for automatically causing successive pieces of said material to alternate between different paths of travel.

5. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of said material on light responsive devices which control means for determining the direction of travel of successive pieces of said material.

6. In the handling of moving pieces of hot material, the improvement which consists in utilizing the effect of the radiant energy of one of said pieces on a light responsive device

to operate means for determining the direction of travel of a succeeding piece.

7. In a rolling mill, the combination with direction controlling means for the hot product of said mill, of means for utilizing the radiant energy of said product to actuate said direction controlling means.

8. In a rolling mill, the combination with direction controlling means for the hot product of said mill, of means for utilizing the radiant energy of said product to actuate said means so as to cause successive pieces of said product to travel in different paths.

9. In a rolling mill, the combination with direction controlling means for the hot product of said mill, of mechanism responsive to radiant energy, and means for utilizing the influence of the hot product on said radiant-energy-responsive mechanism to actuate the said direction controlling means.

10. In a mechanism for controlling the direction of travel of moving pieces of hot material, direction controlling means, and a device responsive to radiant energy given off by the moving material for actuating said direction controlling means.

11. In a mechanism for controlling the direction of travel of moving pieces of hot material, direction controlling means, a device responsive to variations in radiant energy, and means for utilizing the effect of the radiant-energy-responsive means to cause operation of the direction controlling means.

12. In a mechanism for controlling the direction of travel of moving pieces of hot material, direction controlling means, a device responsive to variations in radiant energy so disposed as to be influenced by the radiant energy given off by the moving material, and means for utilizing the effect of the passage of said material on said radiant-energy-responsive device to cause said direction con-

trolling means to direct successive pieces of material into different paths.

13. In a mechanism for controlling the direction of travel of moving pieces of hot material, a direction controlling means, a light responsive cell so disposed as to be influenced by the radiant energy given off by the moving material, and means for utilizing the effect of the radiant energy of said material on said light responsive cell to actuate said direction controlling means.

14. In a mechanism for controlling the direction of travel of moving pieces of hot material, a direction controlling device, electromagnetic means for operating said direction controlling device, a light responsive device whose electrical resistance varies in accordance with its degree of illumination, and means for utilizing the variations in the electrical resistance of said device, due to the influence of the radiant energy emanating from the moving material thereon, to actuate said direction controlling means.

15. A conveyor over which articles may be passed including a direction controlling means the operation of which is characterized by the utilization of the radiant energy emanating from hot articles moving on said conveyor to automatically control the direction of movement of said articles on said conveyor by said direction controlling means.

16. The combination with a conveyor for hot material, of means for deflecting pieces of material passing over said conveyor into one or another of a plurality of different paths, electrically operated means for actuating said deflecting means to different positions, and means controlled by the radiant energy of each piece passing over said conveyor for controlling said actuating means.

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