March 31, 1942. W. H. McLAUGHLIN ET AL 2,278,087

MEANS FOR ACTUATING ELECTRICALLY CONTROLLED MECHANISMS

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FIG. 1.

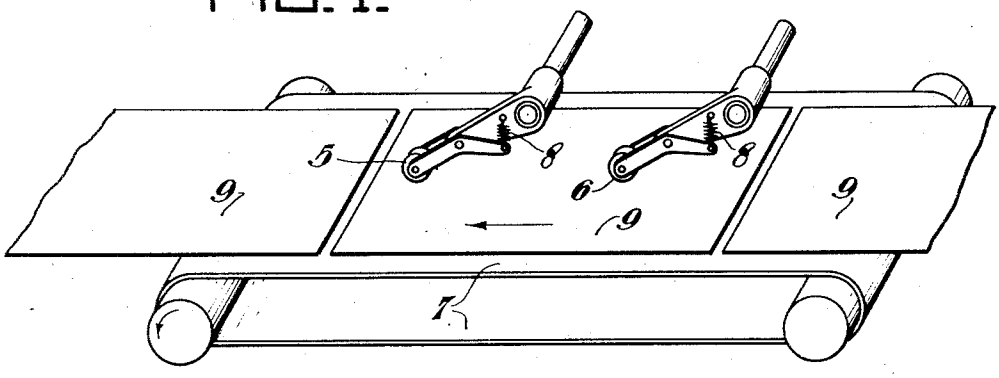


FIG. 2.

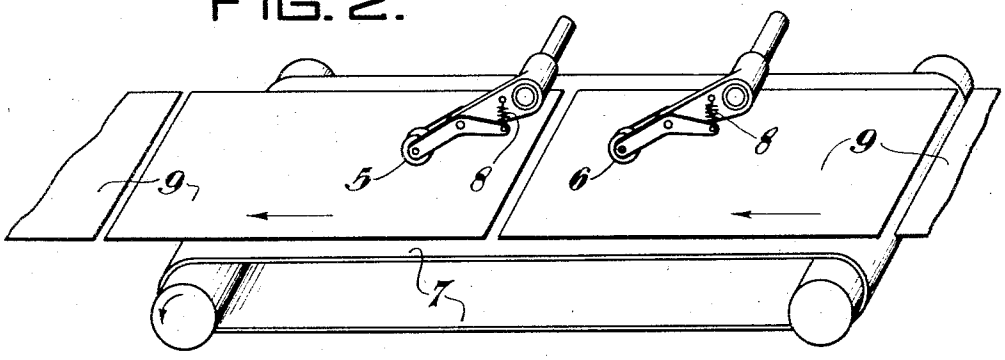
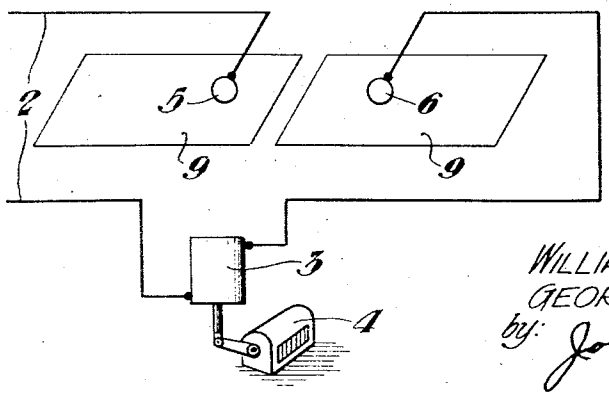


FIG. 3.



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MEANS FOR ACTUATING ELECTRICALLY CONTROLLED MECHANISMS

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3 Claims. (Cl. 235—98)

This invention relates to a method and means for automatically actuating electrically controlled mechanisms, and particularly to such an improved method and means which is especially adaptable for actuating electrical means for counting metallic sheets and the like.

In certain cases, for example, where articles are fed continuously and successively into a machine for perfoming a certain operation on each of them, it is desirable to provide means controlled by the articles as they pass thereinto and through the machine for actuating intermittently mechanisms, such as relays, counters, etc., to perform the particular operation thereon. Such a means is particularly adaptable for counting articles such as metallic sheets and the like as the sheets pass continuously along a conveyer. Various types of machines, electrical and photoelectrical devices have been suggested and used for this purpose. While such electrically controlled devices or counting apparatus are usually satisfactorily actuated by articles or sheets spaced a relatively large distance apart on a rapidly moving conveyer, they are not satisfactorily actuated by articles or sheets that travel successively along the conveyer in close proximity to each other, in that, the space between the articles or sheets is small and insufficient to permit the mechanical, electrical or optical device to function through a complete cycle. That is, in the case of electrical means, it does not allow sufficient time for the same to completely energize and deenergize before the next article or sheet passes therealong.

In the present invention, there is provided a means for actuating electrically controlled mechanisms, such as counters, which are actuated by each of the sheets or articles as they pass successively therealong which will properly function no matter how closely or how far apart the articles or sheets are spaced from each other.

Accordingly, it is one of the objects of the present invention to provide an improved method and automatic means for actuating electrically controlled mechanisms which is simple and inexpensive in its construction and, at the same time, efficient and accurate in its use.

It is another object of the invention to provide an improved method and automatic means for actuating electrically controlled mechanism in which the length of time to energize and deenergize any given electrical device can be predetermined and the actuating means adjusted accordingly.

It is a further object of the invention to provide an improved automatic means for actuating an electrically controlled mechanism which is actuated by a series of metallic articles or sheets as they pass successively along a conveyer wherein the metallic articles or sheets act as a conductor and close the electric circuit therethrough to actuate the electrically controlled mechanisms.

It is still a further object of the present invention to provide an improved method and means for actuating electrically controlled counters for counting metallic articles, such as metallic sheets as they pass along a conveyer which is automatically actuated by the articles or sheets as they pass therealong.

Various other objects and advantages of this invention will become more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawing, there is shown, for the purpose of illustration and description, one embodiment which our invention may assume in practice.

In the drawing:

Figure 1 is a perspective view of the improved means for actuating electrically controlled mechanisms showing both the contacting members in one position in contact with the same metallic sheet to close the circuit therethrough;

Figure 2 is a similar view showing both the contacting members in another position in contact with successive metallic sheets thereby permitting the circuit to be open, and

Figure 3 shows the electrical diagram.

The present invention is shown for the purpose of illustration incorporated with a conveyer for counting metallic sheets, but it will be understood that it may be used for actuating any electrically controlled mechanism, such as a relay and the like.

According to the present invention, there is provided an electrical circuit 2 connected to a suitable source of potential and in which there is positioned an electrically controlled device 3 such as a contactor, solenoid, relay switch or the like, as shown in Figure 3 of the drawing, which is adapted to actuate the counter 4.

There is also arranged in the circuit 2, a pair of article or sheet contacting members with one positioned forwardly of the other and being spaced apart a predetermined distance. In the present instance, the contacting members are preferably metallic rollers 5 and 6 suitably arranged above the conveyer belt 7 but it will be

understood that contacting members may be brushes or any other suitable electrical conductors, and there is preferably provided therewith means such as springs 8 for normally forcing the rollers 5 and 6 downwardly toward the conveyer belt 7 against the metallic sheets 9 which are moved successively along thereby.

It will thus be seen that the contacting members, that is, the rollers 5 and 6, and the electrically controlled device 3 are all arranged in series with each other and the only break in the circuit is the space between the rollers. As the metallic sheets 9 pass along the conveyer, it will be seen that when any one of them comes in contact with both the rollers 5 and 6, as shown in Figure 1, the circuit is completed from the potential source through roller 5, through the metallic sheet 9 in the contact with both the rollers 5 and 6, and through roller 6 thereby energizing the electrical device 3. Thus the current will flow as above described as long as both the rollers 5 and 6 are in contact with any one metallic sheet.

After the sheet advances to a point where the rear end thereof has passed by the contacting roller 6 and out of contact therewith, as shown in Figure 2 of the drawing, the circuit is broken and open until the forward end of the next successive sheet which has passed the rearwardly positioned contacting roller 6, and is contacting the same, advances to a point where the most forward contacting roller 5 contacts the sheet when the circuit will again be completed as heretofore described. That is to say, the circuit will be open during the time the space between the sheets passes between the contacting rollers 5 and 6 and closed during the time any one of the sheets is in contact with both of the contacting rollers. It will be seen that the distance between the rear end of one sheet and the forward end of the next succeeding sheet may be extremely small, or very large as the length of time the electrical device 3 is deenergized is governed by the distance the contacting rollers 5 and 6 are spaced apart and the speed of the conveyer, or rate of travel of the sheets and not by the distance the sheets are spaced apart, and the length of time the device is energized is governed by the length of the sheets.

To more fully understand the present invention, the following example is being submitted. For instance, if the speed of the conveyer is 60 inches per second and the metallic sheets to be counted passing therealong are 18 inches in length and the gap or space between the successive sheets is 1/64 or 0.0156 of an inch, the length of time for any sheet to pass any given point would be the length of the sheet, 18 inches, divided by the speed of the conveyer, 60 inches per second, which is equal to 0.3 of a second. Therefore, it will be seen that the length of time for the gap or space between the sheets to pass any given point would be the distance the sheets are spaced apart, 0.0156 of an inch, divided by the speed of the conveyer, 60 inches per second, which equals 0.00026 of a second. It has been found in such a case that if it is attempted to use the gap between the sheets as a functioning agent to actuate an electrical circuit, the time allowed, namely 0.00026 of a second, would not be sufficient to completely energize or deenergize the circuit and thus the purpose of the same would be defeated.

For the purpose of illustration, it will be assumed that it is desirable to have the effect of a considerable increase in the length of time between the time the rear end of one sheet and the forward end of the next successive sheet passes any given point, for example, a 10 inch spacing between the sheets so that if the electrical device is energized, it would be able to completely deenergize to complete the cycle before being again energized. In such a case, the contacting roller 5 would then be located approximately 10 inches from the roller 6 in the direction of travel of the sheets along the conveyer. It now becomes apparent that the gap between the 18 inch sheets will travel the 10 inch distance between rollers 6 and 5 before the sheet establishes contact between both rollers and closes the electrical circuit. The device 3 will now be energized for the period of time required for the remaining 8 inch portion of the moving sheet to pass under roller 6. The circuit would then be completed or closed through the device energizing the same for 0.133 of a second, or, for the duration of time required for the remaining 8 inches of the sheet to pass under the roller 6, that is, 8 inches, divided by the speed of the conveyer, 60 inches per second, and the circuit would be broken or open, and the electrical device deenergized for 0.167 of a second, that is, the distance the sheets are spaced apart, 10 inches, divided by the speed of the conveyer 60 inches per second.

Thus, in the practice of the present invention, it will be seen that the effective time between the rear end of one sheet and the forward end of the next succeeding sheet is increased from 0.00026 of a second to 0.167 of a second, or, in other words, the effective spacing between the rear end of one sheet and the forward end of the next sheet is increased from 1/64 of an inch to 10 inches. It will also be seen that the circuit is completed for 0.133 of a second and broken for 0.167 of a second, thereby allowing the electrical device sufficient time to follow the electrical impulses through a complete energization and deenergization cycle. It will be understood that the above values, that is, the conveyer speed, the length of sheets, and the distance of the spacing apart thereof have been arbitrarily selected merely for the purpose of illustration and that each can be varied as described to suit the conditions to any particular application to which the present invention is to be applied.

As a result of our invention, it will be seen that there is provided a method and means for actuating the electrically controlled mechanisms in which there is established a distinct division of "on" and "off" impulses in the electrical circuit which can be easily and conveniently regulated as desired as to length of duration.

While we have shown and described one specific embodiment of our invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of our invention, as defined in the appended claims.

We claim:

1. Means for counting metallic sheets and the like including, in combination, a conveyer, a counting device, electrical means for actuating said counting device, a pair of spaced apart contacting members arranged one in front of the other and with which the sheets are adapted to contact as they pass successively therealong, a circuit including said electrical means, said contacting members and a sheet when bridging said contacting members, each of said sheets closing

the circuit therethrough as they pass successively in contact with both of said contacting members thereby conditioning the circuit so that the circuit is completed through the contacting members and each of the sheets successively as they pass therealong thereby intermittently actuating said electrical means in said circuit which in turn actuates said counting device to count the sheets.

2. Apparatus of the class described for actuating an electrically controlled mechanism including, in combination, means for conveying a series of metallic sheets successively along from one point to another, a pair of contacting members arranged one in front of the other along said conveying means and with which the metallic sheets are adapted to contact as they pass successively therealong, a circuit including said electrically controlled mechanism, said contacting members and a sheet when bridging said contacting members, each of said sheets closing the circuit therethrough as they pass successively in contact with both of said contacting members thereby conditioning the circuit so that the circuit is completed through the contacting members and each of the sheets successively as they pass therealong thereby intermittently actuating said electrically controlled mechanism, said contacting members being spaced a predetermined distance apart so as to allow the electrically controlled mechanism sufficient time to follow the electrical impulses through a complete energization and deenergization cycle between the passage of each sheet therealong with said distance determined by the rate of travel of the sheets and the length of the sheets.

3. In combination with a conveyer for conveying metallic sheets and the like, means for counting the sheets as they pass along the conveyer, including a pair of spaced-apart metallic contacting rollers with one arranged beyond the other along the conveyer which the metallic sheets are adapted to contact as they pass successively therealong, means for supporting said rollers, means for forcing said rollers against the sheets, an electric circuit including said rollers, a solenoid and a sheet when bridging said rollers, a counting device which is adapted to be actuated by said solenoid, each of said sheets closing said circuit as they pass successively in contact with both of said rollers thereby conditioning the circuit so that the circuit is completed through the rollers and the sheet whereby said solenoid and counter are intermittently actuated by the sheets as they pass along, said contacting rollers being spaced a predetermined distance apart so as to allow the solenoid sufficient time to follow the electrical impulses through a complete energization and deenergization cycle between the passage of each sheet therealong with said distance determined by the rate of travel of the sheets and the length of said sheets.

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