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ELECTRICALLY OPERATED MEASURING AND SELECTING DEVICE

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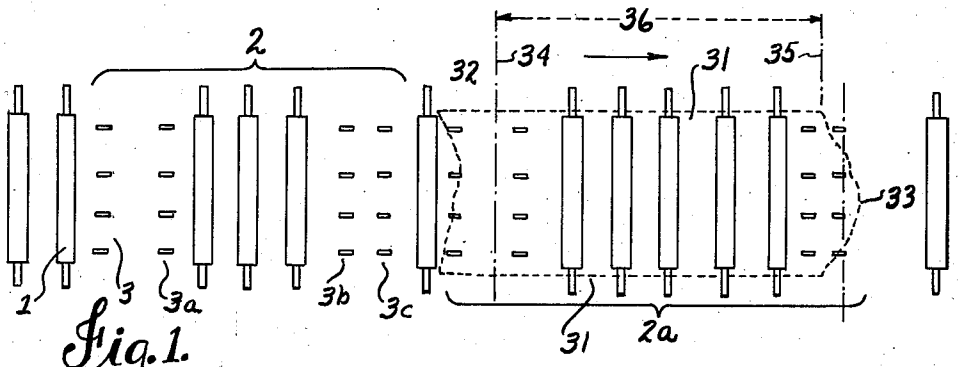


Fig. 1.

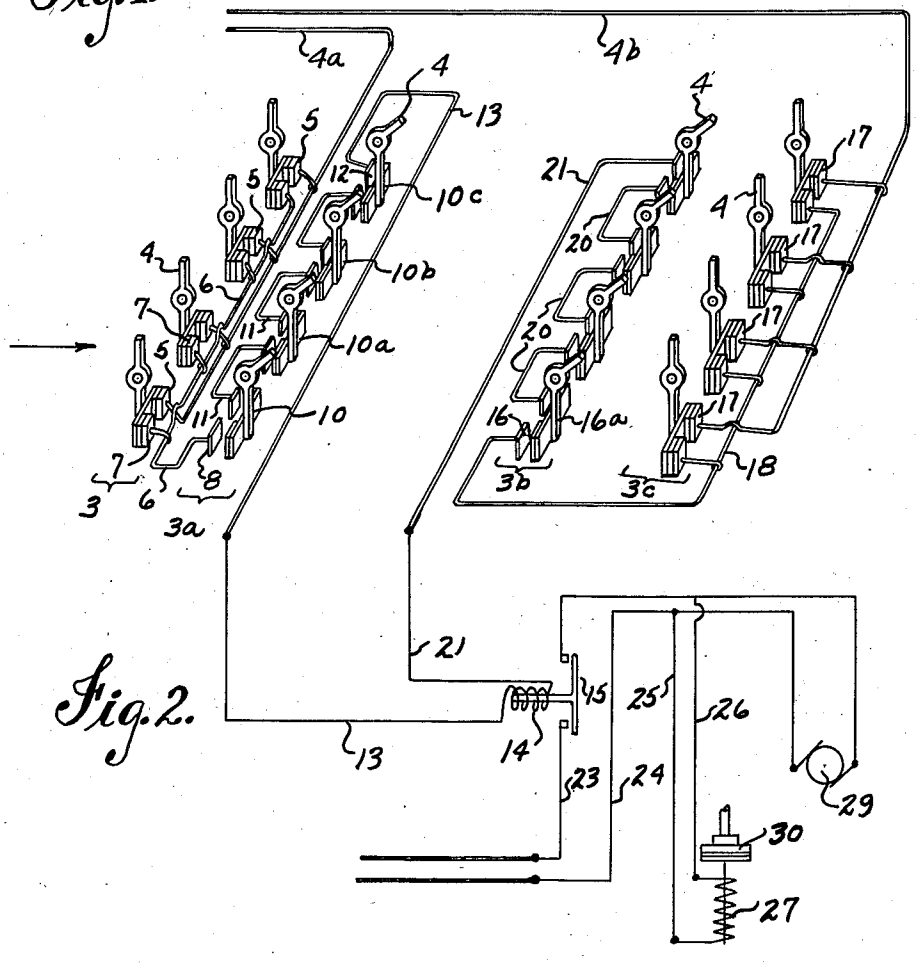


Fig. 2.

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ELECTRICALLY OPERATED MEASURING AND SELECTING DEVICE

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7 Claims. (Cl. 209—82)

My invention relates to electrically operated mechanism for sorting sheets of material by length while they are passing over a conveyor.

In the rolling of sheets of metal, the ends of the sheet frequently "fish-tail"; and in any event there will always be some trim. The amount of irregularity of the ends of the sheets must be taken into account in determining the effective length of squared sheet that can be obtained. The variation in effective length must be determined when sorting the sheets into piles of similar length. Sorting by manual measurement is costly because it will be the slowest operation in line production; furthermore it is frequently desirable to sort sheets by effective length without trimming, as when further rolling is contemplated.

It is an object of my invention to provide an electrical system controlled by switches that will automatically determine the maximum effective length of sheets untrimmed.

A further object is to provide an electrical system that will automatically determine the maximum length of a sheet with squared or irregular edges while the sheet is in transit along a conveyor.

It is a further object to provide an electrical selecting system that can measure the effective length of a squared or irregular edged sheet while in transit along a conveyor and operate a take-off mechanism to remove the sheet after measuring and selection.

These and other objects of my invention which will be more specifically pointed out in the specification or will be clear from what follows, I accomplish by a construction of which I will now describe an exemplary embodiment. Reference is made to the drawing which is part hereof.

In the drawing:

Figure 1 is a plan view of a part of a conveyor with two sets of switches along the conveyor.

Fig. 2 shows the switches in perspective together with a wiring diagram for a certain set of switches.

Broadly, in the practice of my invention I provide an electrical system with switches in series and parallel positioned to be opened or closed by contact with a sheet of material that is in transit along a conveyor. The opening and the closing of the switches will automatically determine the effective length of sheet and also energize take-off mechanism control to remove the sheet at a proper station along the conveyor.

I have shown a roller conveyor 1 with two sets of switches 2 and 2*a* corresponding to and located at two stations where sheets of a certain size will be piled by a take-off and stacking mechanism. The take-off and stacking mechanism is not shown since my present invention is not limited to any certain type of such device. For a disclosure of an operative take-off and stacking device suitable for use with the mechanism of my present invention, reference is made to my co-pending application entitled Automatic pilers, Ser. No. 595,033, filed February 25, 1932, now Patent No. 1,950,192.

The switches, for any station, will be arranged in four rows as indicated by 3, 3*a*, 3*b* and 3*c*. Each of the switches will have a lever 4, which will be pivotally mounted, or other suitable striking means to be actuated by the sheets. The levers will be free to assume a normal position by the action of gravity, or they may be otherwise controlled. They will be located across the conveyor in such a position to allow a sheet to tip them over toward horizontal position.

The first and fourth row of switches 3 and 3*c* will be connected in parallel while the second and third rows 3*a* and 3*b* are connected in series. This may be accomplished as follows:

A main power line 4*a* is connected to the contacts 5, and another line 6 connects to the other contacts 7 of the switches connected in parallel, namely the switches in row 3. The line 6 also extends to a contact 8 of the first one of the switches 10 in row 3*a*. The switches 10, 10*a*, etc. in this row are connected in series by leads 11. A contact 12 on the last switch in the series may be connected to a lead 13 extending to one side of a coil 14 for operating a solenoid switch 15.

The other power line 4*b* connects to the contacts 17 of the row of switches 3*c*. The switches in this row are connected in parallel. Another line 18 connects the other contacts of these switches together and extends to a contact 16 of the first switch 16*a* in the row of switches 3*b*. The switches in this row are connected in series, each switch to the next succeeding, by lines 20. The last switch in this series is connected to the coil 14 by a line 21. Thus all of the switches are connected in the circuit comprising the power leads 4*a* and 4*b* and the coil 14 of the solenoid or relay switch 15. It is convenient to locate the juxtaposed sets of switches in different power leads; but this obviously makes no difference in operation.

The coil 14 operates the switch 15 which closes

a circuit to the motor 29 actuating a take-off and piling mechanism, through lines 23 and 24. Other leads 25 and 26 connect to a coil 27 which is part of a solenoid clutch controlling mechanism 30.

Figure 1 illustrates two stations of a series which may be of any desired length. Each station comprises two rows of the series switches and two rows of the parallel switches, the two rows of the parallel switches disposed at the ends of the grouping aforesaid. The switches in the parallel series are normally closed switches, and the switches in the series groups are normally open switches. Any sheet or other article which actuates all of the switches in any station will pass on over that station through a failure to energize the appropriate take-off mechanism. This is because while the series switches normally open will be closed by such an article, parallel switches normally closed will be opened by such an article. In order for a sheet or other article to actuate take-off mechanism and therefore be removed from the conveyor at any one stage, it will be necessary for such sheet or article so to affect the several rows of switches as to close all of the series switches and to release at least one of the parallel switches in each of the two rows of series or parallel switches.

As a consequence, the two rows of series switches may be regarded as means for measuring the minimum length of a sheet or article, and the two rows of parallel switches as means for measuring the maximum length of a sheet or article. Any sheet or article having a dimension falling between a predetermined maximum or minimum length as aforesaid, will be removed at the particular station; and a sheet or article having a length even shorter than the minimum or longer than the maximum will be passed on over the station.

The stations differ from each other in accordance with the distances between the several rows of switches appropriate to said station. Both the maximum and minimum length measuring means may be adjusted to different values from station to station; but where more than one station is employed for sorting purposes, it will usually be advisable of course so to adjust the several sets of switches that there will be no overlapping of maximum and minimum lengths as between stations.

Adjustability is secured through providing for the selective positioning along the conveyor of means supporting the several switches. Such means have not been shown since they are well within the purview of one skilled in the art to produce without departing from the spirit of my invention. The switches forming the rows or series 3, 3*a*, etc. may separately be mounted upon such a support as a channel iron, which in turn may be slidably positioned along the side rails of the conveyor. The side rails may be calibrated, if desired, to facilitate the adjustment of these members, or the members may be mounted upon threaded shafts or other devices employed whereby their movement and adjustment is facilitated.

The sheets as they come from the roll may have straight sides 31 and irregular ends 32 and 33. It will readily be seen that the effective length of squared sheet will measure between the greatest indentation as indicated by the lines 34 and 35 and the dimension line 36.

This may be explained as follows: I provide corresponding rows of maximum and minimum switches extending across the full width of the sheet or other article. Corresponding switches in corresponding rows will always be the same distance apart. So far as the minimum switches are concerned, in order to actuate the take-off mechanism, a sheet or other article must close all of these switches. So far as the maximum switches are concerned, however, the closing of one switch in both of the rows 3 and 3*c* will complete the circuit. In order to be taken off at any given station, therefore, a sheet or article must present sufficient solid surface to keep all of the series switches closed; but the closing of switches in the parallel rows will be determined by the greatest indentation in the sheet or article. Thus, although the sheet at its forward end may present a convex edge, and although a portion of the switches in row 3*c* may be held depressed by portions of the convexity, another of the switches, as shown in Fig. 1, may remain undepressed and this switch will represent the longest effective length of the sheet as obtained by cutting off the convex portion. Similarly, although the rear of the sheet may be fish-tailed as shown in Fig. 1, that switch in row 3 which is located at the point of furthest depression in the sheet will be first released; and the point of furthest depression of course represents the maximum effective length of the sheet that can be secured by squaring off the fish-tailed portion aforesaid.

Since it is necessary for all of the series switches to be closed in order for the take-off mechanism to function, it will be obvious that should an imperfect sheet or article come along, namely one having such a perforation in it as would permit the release of one of the series switches, the take-off mechanism would not be energized. The number of series switches may, of course, be multiplied as desired; and if it is particularly intended to use my mechanism for the discarding of sheets having discontinuous surfaces then, within the limits of the minimum sheet length at any station, as many rows of the series switches similar to 3*a* and 3*b* may be employed as are thought necessary adequately to cover the area of the sheet.

Primarily in these specifications I have spoken of sheets and particularly metallic sheets, such as sheets of steel and iron. It will be obvious, however, that my mechanism may be employed for the sorting and counting of other articles with respect to a dimension thereof, such as but without limitation, sheets of other materials than metal, lumber, boxes, packages and the like. Consequently I do not intend the term "sheets" to be a limitation upon my invention in the appended claims.

Operation

When a sheet passes over the first row of switches 3 in parallel they will be opened and the circuit broken. If any one of them close the circuit will again be closed. The next row of switches 3*a* in series will close when the sheet comes into contact with their levers and this part of the circuit will be closed to the coil. If any one of these switches were to open the circuit to this side of the coil would be broken even though one of the switches in row 3 was closed.

The next row of switches 3*b* also connected in series will close when a sheet contacts with their levers. Closing these switches completes

the circuit to the other side of the coil 14. When the sheet is over the first three rows of switches, row 3 will be open and rows 3a and 3b will be closed. Just as soon as an indentation along the following edge of the sheet allows one of the switches in row 3 to close current will flow and energize the coil 14. Upon energization of the coil the switch 15 will close and the motor and the solenoid clutch control will coact and cause the take-off mechanism to remove the sheet from the conveyor. There will be a complete unit for each station along the conveyor comprising four rows of switches, clutch control and take-off mechanism.

The method of measuring squared edge sheets will be the same as for the case of measuring sheets with irregular edges.

It will thus be seen that sheets too short to close all of the series switches at one time, i. e. sheets below minimum length, as well as sheets so long as to actuate all of the switches at one time, i. e. sheets above maximum length, will fail to energize the take-off mechanism at the particular stage. If such sheets also fail to energize the take-off mechanisms at succeeding stages, they will be deposited off of the end of the conveyor. It is thus possible in my construction to provide a plurality of stages for various classes of sheets or other articles, the various stages designed to remove sheets between certain fixed lengths and by sending a plurality of sheets or articles through my device, to remove in selected piles all of those sheets or articles of the desired classes, depositing at the end in one pile all of the sheets or articles which do not fall within one of the said classes.

In my exemplary embodiment I have shown switches having levers lying in the path of the sheets or other articles passing over the conveyor. My invention contemplates circuit controlling elements actuated by the articles themselves, but these circuit controlling elements need not be switches in the form shown, but may take the form of any circuit controlling elements consistent with economy and suitability. Thus, but without limitation, electric eyes or other circuit controlling means might be employed in the same way.

Having thus described my invention, what I claim as new and novel and desire to secure by Letters Patent, is set forth in the following:

1. In combination with a conveyor system, means for measuring and selecting sheets or other articles, comprising a system of switches actuated by the passage of said article, said system of switches comprising two rows of parallel connected switches and two rows of series connected switches, said switches all being in the same circuit, said rows of switches being disposed along the conveyor in the order of a parallel connected row, two series connected rows, and a parallel connected row.

2. In combination with a conveyor, means for measuring and selecting sheets or other articles comprising article-actuated electrical switches, a series of said switches connected in series and arranged to measure the minimum length of said article and a series of said switches connected in parallel and arranged to measure the maximum length of said articles, all of said switches arranged to control a single circuit.

3. In an electrical system for measuring and selecting sheets having uneven ends, a plurality of stations representing classifications, means for measuring the largest available rectangular area of said uneven sheets at each station, and take-off means at each station actuated by said measuring means, said measuring means comprising a plurality of electrical circuit controlling members actuated by said sheets, said members arranged in rows transversely to the length of the sheets for measuring maximum and minimum rectangular areas of said sheets and connected with certain rows in series and others in parallel so as to coact in energizing take-off means only when said largest available rectangular area falls between a predetermined maximum and minimum.

4. In an electrical system for measuring and selecting sheets having uneven ends, a conveyor system, a plurality of stations arranged on said conveyor system, each station having take-off mechanism and measuring means adapted to actuate said take-off mechanism, said measuring means at each station adapted, due to their positions along said conveyor, to measure maximum and minimum available rectangular areas of said uneven sheets, said measuring devices at said several stations being set to represent different values.

5. In an electrical system for measuring and selecting sheets having uneven ends according to their largest available rectangular area, a stage, a set of normally open series switches and a set of normally closed parallel switches connected in series with said set of series switches at said stage, said sets being disposed in rows transversely to the direction of travel of the sheet, and means for causing said switches to be actuated by an uneven sheet.

6. In combination with a conveyor system, means for measuring and selecting sheets having uneven edges in accordance with the largest available rectangular area, comprising a system of switches actuated by the passage of said sheets, said system of switches comprising two rows of parallel connected switches and two rows of series connected switches, said switches all being in the same circuit, take-off mechanism, and means for causing said switches to coact in energizing said take-off mechanism.

7. In combination with a conveyor system, means for measuring and selecting uneven edged sheets in accordance with the largest available rectangular area, comprising rows of sheet-actuated circuit controlling devices arranged in rows transversely of said conveyor, all of said circuit controlling elements coacting to control the take-off energizing circuit and so positioned that an article of minimum available rectangular area is required to open normally closed circuit controlling elements.

GEORGE A. REEVE.