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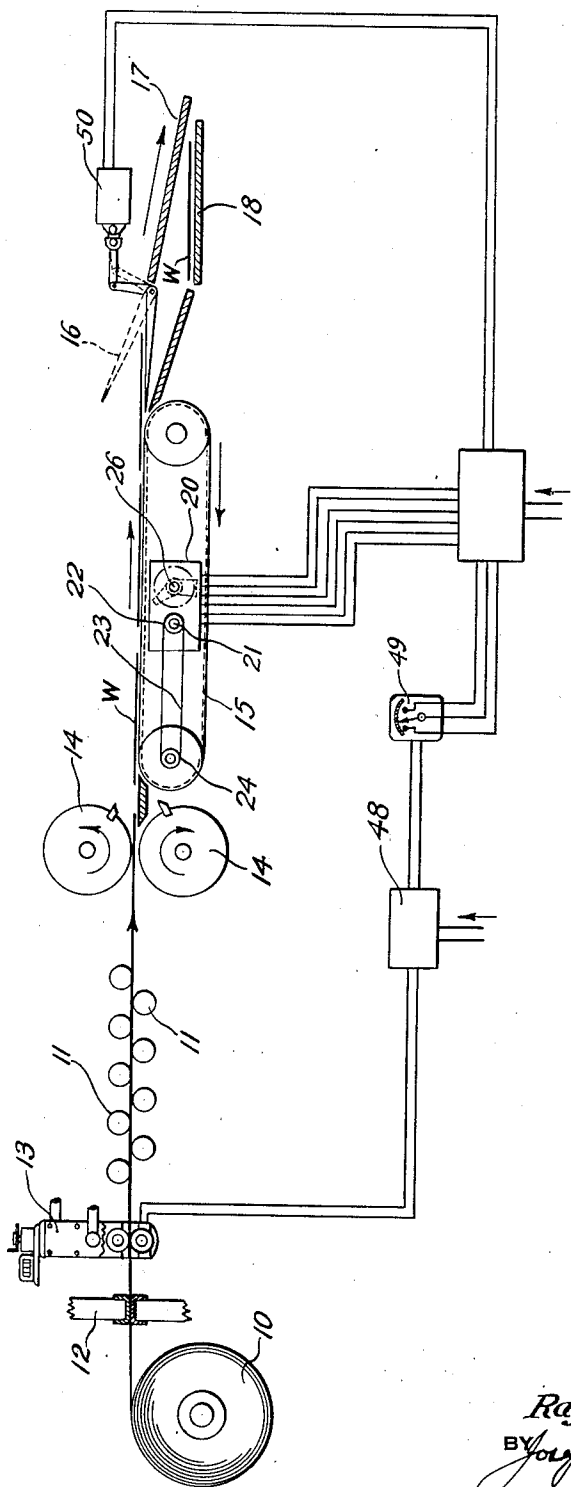
R. S. FOX
SORTING DEVICE

2,293,500

Filed March 11, 1940

3 Sheets-Sheet 1

Fig. 1



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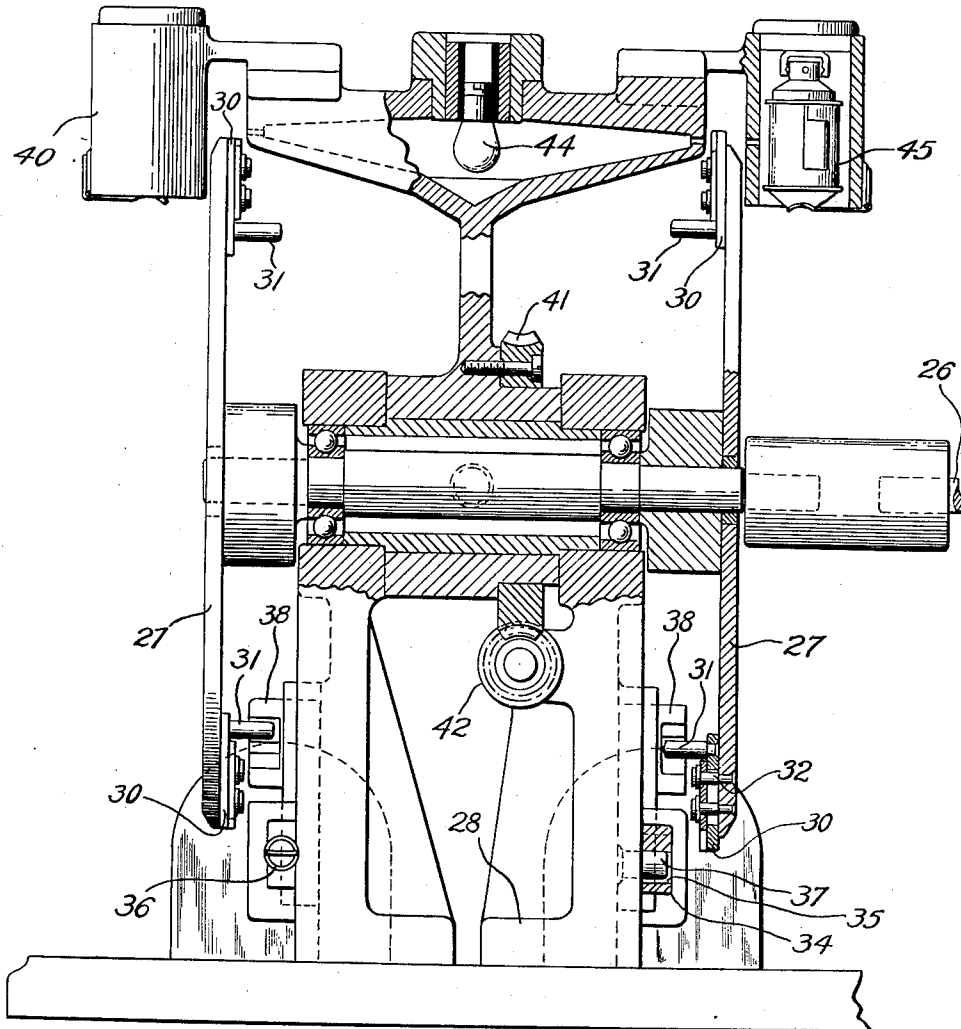
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Fig. 2



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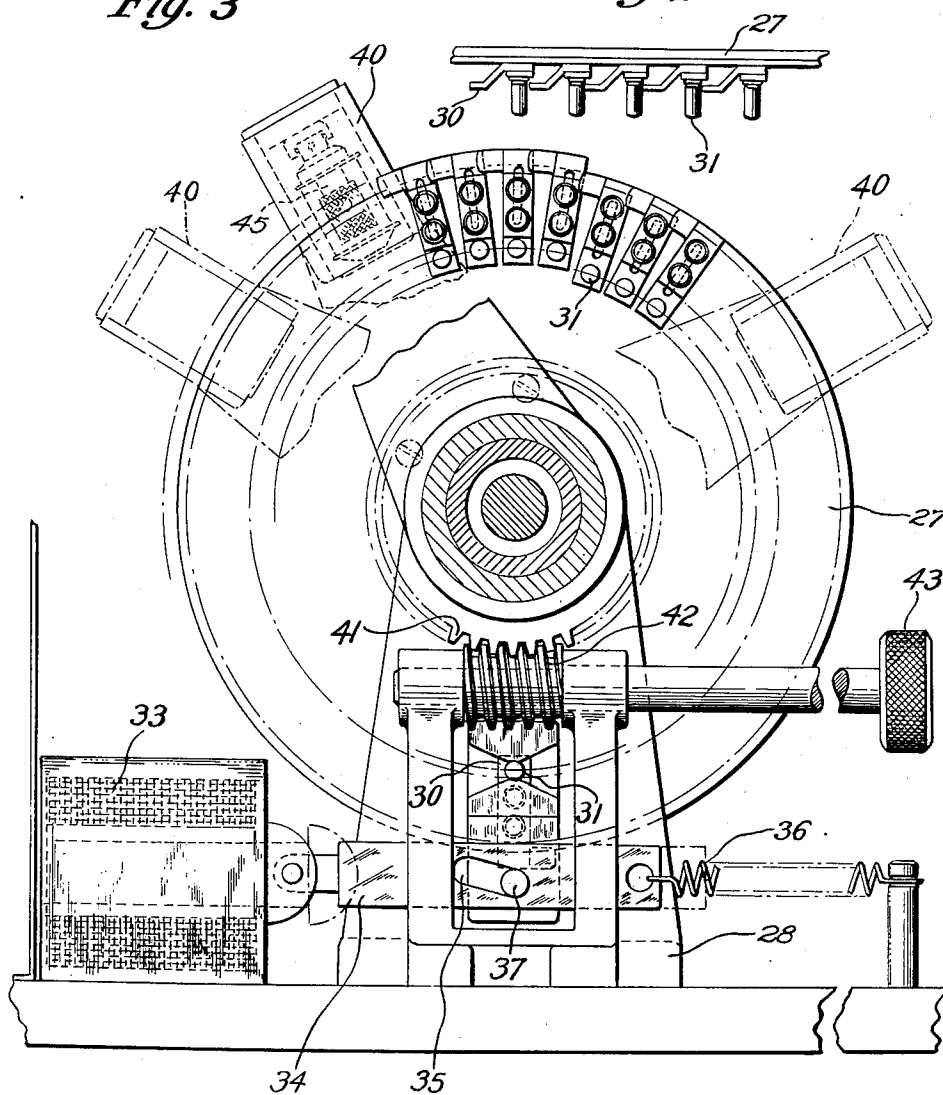
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3 Sheets-Sheet 3

Fig. 3

Fig. 4



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2,293,500

SORTING DEVICE

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Application March 11, 1940, Serial No. 323,327

5 Claims. (Cl. 209—72)

This invention relates to sorting devices and particularly to a size sorting or classifying device which will operate to separate articles of slightly different thickness or other dimension into several groups.

A primary object of the invention is to enable a measuring or gaging device to operate upon a length of strip material, or upon a plurality of similar articles, as the materials or articles pass along a conveyor, and, at the end of the conveyor, the articles are diverted into separate chutes or passages in accordance with variations in the dimension that previously has been measured. As the distance between the measuring or gaging device and the classifying or sorting mechanism may be substantial and may vary materially in different installations, it is essential that mechanism be provided cooperating with and operating in timed relation with the movement of the conveyor to indicate the classification required by each individual article as it passes the gaging or measuring position. Then after that particular article has reached the sorting or classifying mechanism another mechanism may be operated to open the proper chute by moving a gate or other member in accordance with the indication previously established by the gaging device.

In the operation of cutting long strips of sheet metal into short lengths the sorting mechanism is necessarily at a substantial distance from the gaging mechanism which may operate upon the material before it has been cut. It is therefore impossible to directly control and operate the sorting mechanism by or simultaneously with the gaging means. This is for the reason that the distance between the gage and the sorting mechanism exceeds the length of the articles being sorted and the sorting mechanism would therefore operate upon one article while the gage would be in contact with a different article separated from the article being classified by several other articles.

A primary object of the invention therefore is to actuate a setting member by means of the gaging mechanism as each article or as a portion of the material passes the gage and to advance each individual setting member in timed relation to the movement of the articles toward the classifying position so that when the particular article reaches the sorting mechanism its setting member will have reached a position to control the proper operation of the sorting device.

A feature of construction that enables the

above object to be accomplished is that a wheel carrying a number of setting members is slowly and continuously rotated in timed relation to the conveyor on which the articles being classified are advanced to the sorting mechanism, the gage acting upon and moving a setting member at one rotative position of the disc or wheel and the setting member acting upon the sorting mechanism after the setting member has been rotated with the wheel to a different position.

With the above and other objects in view, the invention may include the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings.

In the accompanying drawings annexed hereto and forming a part of this specification, I have shown the invention embodied in mechanism which may be driven by the conveyor carrying the articles being classified and which by photo-electric means may actuate the sorting device after a predetermined distance traveled by the conveyor, but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Figure 1 is a diagrammatic view of an embodiment of the invention installed to classify sheets of rolled metal after they have been cut into predetermined lengths from an elongated strip.

Fig. 2 is a front elevation, partly in section, of the device comprising the principal part of the present invention, the enclosure therefor being omitted.

Fig. 3 is a side elevation of the parts shown in Fig. 2, and

Fig. 4 is a detail plan view of the setting members shown in Figs. 2 and 3.

In the above mentioned drawings there has been shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

Briefly and in its preferred aspect the invention may include the following principal parts: First, a conveyor for the material or articles being gaged and classified, there being a gage associated with the conveyor at one end so that the material or articles after being gaged as they pass along the conveyor may be diverted into one

of several chutes or passages for the sheets of different thickness; second, a rotating disc or wheel supported in fixed position and coupled to and rotating in timed relation with the conveyor for the articles; third, a movable or actuating member controlled by the gage and mounted adjacent the disc to radially position setting members adjacent the periphery of the disc; fourth, photo-electric means for controlling the operation of a movable gate or other classifying or sorting member; fifth, a source of light adapted to strike the photo-electric cell when successive setting members are in one position but being intercepted when the setting members are in the other or outer of their radial positions; and sixth, means to position the photo-electric means relative to the actuator for the setting means so that predetermined different intervals of time will elapse between a setting member being positioned by the gage operated member and the setting member reaching its light intercepting position.

Referring more in detail to the figures of the drawings, and first to the diagram shown in Fig. 1, the general assembly of a classifying mechanism for metal sheets is shown. A strip of metal W wound on a coil 10 is fed to a row of straightening rolls 11 past wiping members 12 and through the work engaging rollers of a gage 13. The gage shown in this figure is of the electro-induction type and variations in thickness vary the output voltage in a circuit presently to be more fully described. As the type of gage forms no part of the present invention it is not thought that any description thereof will be necessary. Preferably a gage of the type shown in the patent to Terry et al. 2,115,351 granted April 26, 1938, may be used.

After passing the straightening rolls the strip W is separated into sheets of any desired length by the rotating shears 14. From the shears 14 the separated sheets then pass on to a traveling table or conveyor 15 and at the opposite end of this conveyor are guided by operation of a movable gate 16 to selective delivery chutes, two of which, 17 and 18, are indicated in the drawings.

Adjacent the conveyor 15 I provide a base or stand 20 on which is rotatably mounted a preferably horizontally driven shaft 21 adapted to be directly coupled to the conveyor 15 carrying the articles being classified and driven in timed relation thereto. For this purpose the shaft 21 may have a pulley 22 thereon over which passes a belt 23. Belt 23 is driven from a pulley 24 which preferably and as shown is directly connected to the conveyor driving mechanism. Shaft 21 through a speed reduction unit (not shown) rotates a shaft 26 at a greatly reduced speed but in timed relation to the rotation of pulleys 22 and 24 and the speed of traverse of the conveyor 15. On shaft 26 are mounted discs or wheels 27, there preferably being two of these wheels, one on each side of the base 28. These discs are or may be identical so that only one will be described.

Slidably mounted within these wheels 27 and preferably closely positioned one to the other are radially movable setting members 30, these members being in the form of small plates having a slot therein. At the inner end of each of these plates 30 is an outstanding pin 31 and to frictionally retain the plates in place rivets 32 may be provided passing through the slots within the plates 38 and permanently fastened to the wheel. Each plate 30 has a lateral offset portion as in-

dicated in Fig. 4 so that adjacent plates overlap for a part of their length.

On the base 28 adjacent each disc 27 and at one side thereof is a solenoid indicated generally by 33 and adapted to be actuated by the gaging device 13 in a manner presently to be described. Preferably two of these solenoids 33 are provided, one for each disc 27 and each solenoid has coupled thereto a bar 34 provided with an oblique slot 35. As will be seen in Fig. 3, the solenoid 33 has been energized and its armature retracted. This movement has forced the bar 34 as far as possible toward the left. When this solenoid 33 is deenergized a spring 36 serves to return the bar 34 toward the right. Movement of this bar 34 from one position to the other by means of a pin 37 on an actuating member 38 which engages the slot 35 within the bar 34 moves the actuating member 38 for the plates 30 vertically up or down.

This actuating member 38 is provided with a recess or slot tapered from opposite ends to a dimension permitting the pins 31 outstanding from the setting members 30 to pass freely but closely therethrough. With the bar 34 in the position indicated in Fig. 3 in full lines the setting members 30 will be held or moved to their radial outward position as the member 38 is forced to its lowermost position. With the bar 34 in its right-hand position the setting member 30 will be moved to its radial inner position. As successive articles W pass gage 13 each article which is either over or under size will energize the solenoid 33 which will move the bar 34 toward the left as shown in Fig. 2 and will thus serve to move a setting member 30 in its outer radial position. It will be understood that the two discs or wheels 27 may be provided with separate solenoids 33 each operating its own classifying gate 18 but one of which is shown in the diagram, Fig. 1.

Preferably upon the same axis as the shaft 26 carrying the wheels 27 there is mounted an arm 40 which may be swung in either direction about the axis of the shaft 26 as a center. To facilitate this angular adjustment of the arm 40 the arm is provided with a worm wheel 41 keyed directly to the arm 40 and having its teeth engaging a work wheel 42 mounted for rotation in a portion of the base 28. By means of a hand wheel 43 on the shaft carrying the worm 42 the arm 40 may be moved to any angular or oblique position as indicated in Fig. 3.

At the outer part of this arm 40 and centrally disposed thereof is a light bulb 44 connected to a suitable source of current to give it sufficient luminosity to actuate photo-electric cells 45 also mounted upon this arm at the ends of lateral extensions thereof. As will be seen in Fig. 2, the arm 40 is provided with openings so that light from the bulb 44 may pass through these openings and directly impinge upon the photo-electric cells 45, these openings in the arm 40 being on either side of the discs 27 which, during rotation, pass these openings. With the setting members 30 in their retracted or inner positions, the light is free to pass from the bulb 44 to a photo-electric cell 45. This is shown at the left-hand side of Fig. 2. However, with a setting member 30 moved to its outer position the light from the bulb 40 is intercepted and therefore the photo-electric cell 45 is not illuminated and is inactive while the setting member is passing the openings for the light in the arm 40.

The sorting device or classifying device actuated by the photo-electric cell 45 may be of any standard type and as there are two photo-electric cells 45 and two discs 27 each having a series of setting members 30 for this classifying means, one photo-electric cell 45 can be set to separate all of the articles W that may be oversize or above a predetermined limiting dimension and the other photo-electric cell may be set to divert those which are undersize or below a predetermined limiting dimension. Each photo-electric cell 45 has its own solenoid which is operated by the gaging device 13 and one solenoid may be actuated when the gage 13 indicates an oversize and the other actuated when the gage indicates an undersize. As each article W, therefore, passes the gaging station, one of the setting members 30 passing through the recess in the actuated member 38 at that time on each of the discs will be positioned according as the article is to be classified as over- or undersize. As the article W continues to pass along the conveyor 15 toward the classifying mechanism, the setting member 30 on its disc 27 will be slowly rotated until when the article W which has been gaged passes the classifying station adjacent gage 16, its setting member 30 will be in position to intercept the light passing from the light source 44 on the arm to a cell 45. As the arm 40 can be adjusted to any oblique position the distance traveled by the conveyor 15 to present a setting member 30 in position to actuate the classifying device 16 may be widely varied.

In operation the gage 13 is set for the required dimensions and its induction coils are coupled electrically to a source of current as at 48 and to a relay 49. Within the compartment 48 may be located the power pack, rectifier, etc. through which the relay 49 is controlled. The relay 49 closes alternate contacts, one when the article being gaged is oversize and the other when the article is undersize. Through circuits connecting the relay 49 and the solenoids 33 means, preferably in the form of solenoids 50 controlling the movements of gates 16 (but one of which is shown), are actuated to control the distribution of articles W to the chutes such as 17 and 18.

What I claim is:

1. A controlling device for sorting mechanisms comprising in combination, a body member, a disc mounted for rotation thereon, a plurality of spaced members mounted for limited radial movement thereon, lateral projections on said members, a slide in the path of movement of said projections having a cam shaped recess in one side thereof, an electro-magnetically operated actuator for said slide whereby in one position of said slide said members are successively moved to an outer position, and in the opposite position of said slide said members are moved to an inner position, a light source on said body member, and a photo-electric cell adjacent thereto, whereby said members in one position will intercept light passing from said source to said cell, and circuits controlled by said cell to actuate a movable gate.

2. A controlling device for sorting mechanisms comprising in combination, a body member, a disc mounted for rotation thereon, a plurality of spaced members mounted for limited radial

movement thereon, lateral projections on said members, a slide in the path of movement of said projections having cam shaped surfaces in one side thereof, an electro-magnet to actuate said slide whereby in one position of said slide said cam surfaces move said members successively to an outer position, and in the opposite position of said slide said cam surfaces move said members to an inner position, a light source on said body member, and a photo-electric cell adjacent thereto, whereby said members in one position will intercept light passing from said source to said cell, and circuits controlled by said cell to actuate a movable gate.

3. A controlling device for sorting mechanisms comprising in combination, a body member, a disc mounted for rotation thereon, a plurality of spaced members mounted for limited radial movement thereon, lateral projections on said members, a slide in the path of movement of said projections having a cam shaped recess in one side thereof, an electro-magnetically operated actuator having cam connections to said slide whereby in one position of said actuator and slide said members are successively moved to one limited radial position as they pass said recess, and in the opposite position of said slide said members are moved to another radial position, a light source on said body member, and a photo-electric cell adjacent thereto, whereby said members in one position will intercept light passing from said source to said cell, and circuits controlled by said cell to actuate a movable gate.

4. A controlling device for sorting mechanisms comprising in combination, a body member, a disc mounted for rotation thereon, a plurality of spaced members mounted for limited radial movement thereon, lateral projections on said members, a slide in the path of movement of said projections having a cam shaped recess in one side thereof, a slide actuator, an electro-magnet to operate said actuator whereby in one position of said actuator and slide said members are successively moved to one limited radial position and in the opposite position of said slide said members are moved to another radial position, a gage opening and closing a circuit to said magnet, a light source on said body member, a photo-electric cell adjacent thereto, whereby said members in one position will intercept light passing from said source to said cell, and circuits controlled by said cell to actuate a classification gate.

5. A controlling device for sorting mechanisms comprising in combination, a body member, a disc mounted for rotation thereon, a plurality of spaced members mounted for limited radial movement thereon, lateral projections on said members, a slide in the path of movement of said projections having a cam shaped recess in one side thereof, an actuator for said slide whereby in one position of said slide said members are successively moved to one limited radial position and in the opposite position of said slide said members are moved to another radial position, a gage controlling movements of said actuator, a light source on said body member, a photo-electric cell adjacent thereto, whereby said members in one position will intercept light passing from said source to said cell, and circuits controlled by said cell to actuate a classification gate.

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