Oct. 25, 1938. D. S. PARKER 2,134,373

CONVEYER

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FIG. 1

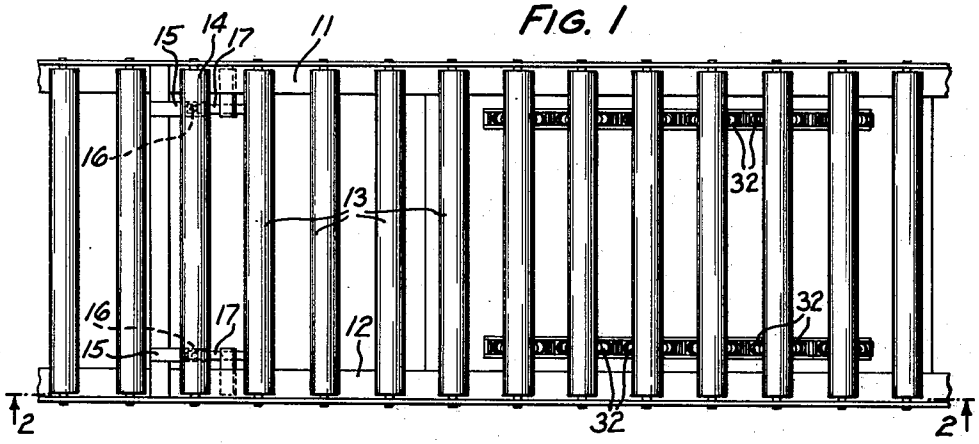


FIG. 2

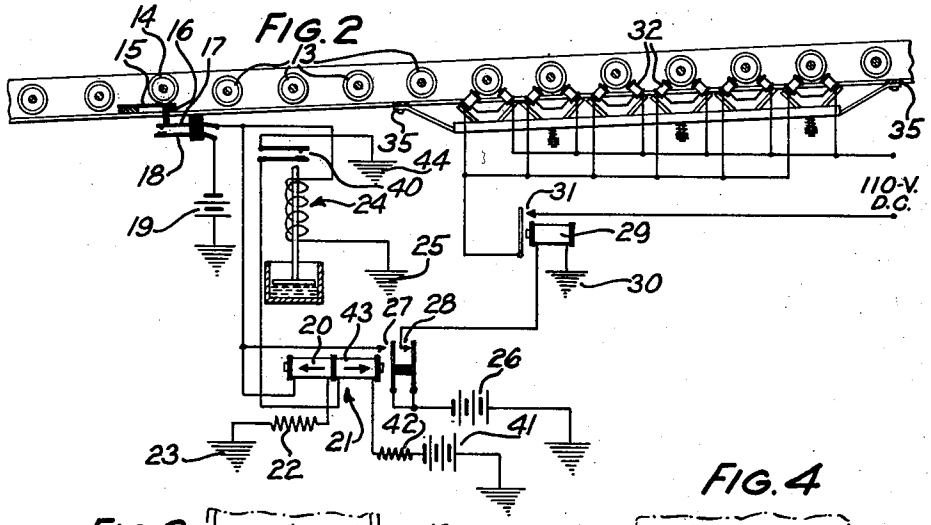


FIG. 3

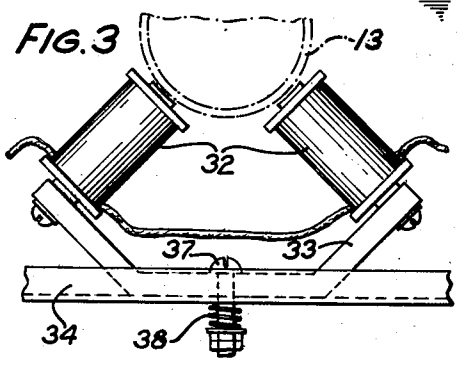
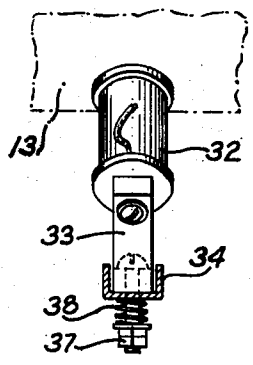


FIG. 4



INVENTOR
D. S. PARKER
BY H. A. Whitehorn
ATTORNEY

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FIG. 5

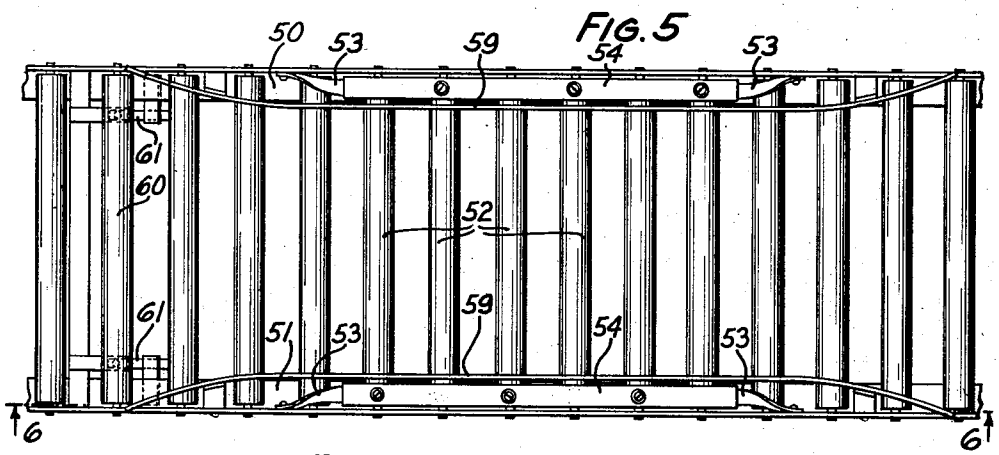


FIG. 6

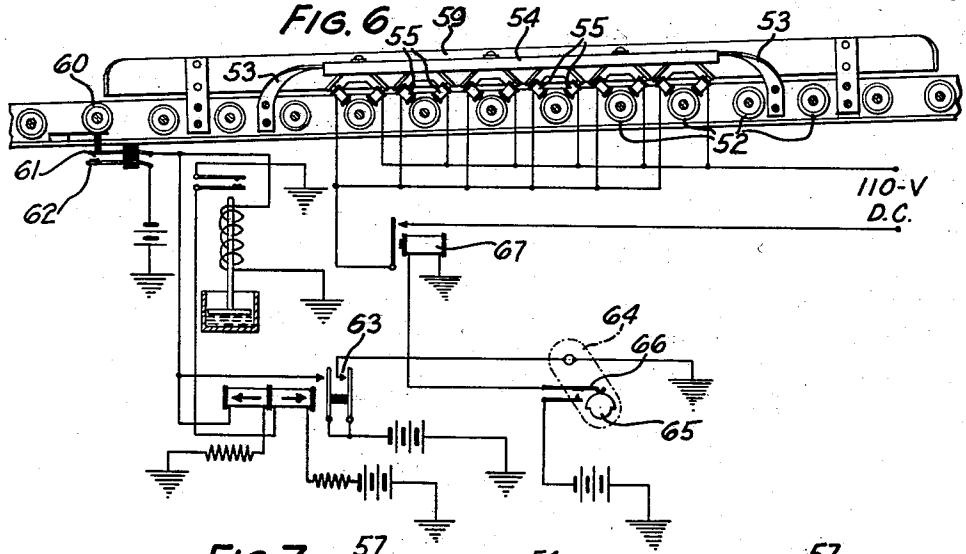
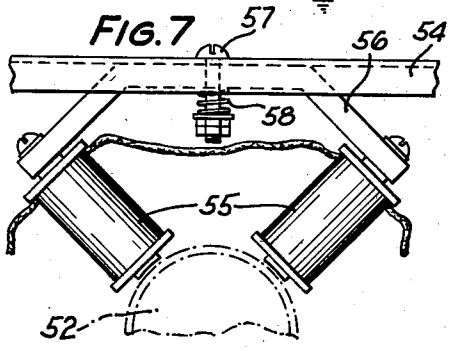


FIG. 7



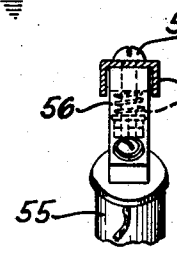


FIG. 8

INVENTOR
D. S. PARKER
BY H. A. Whitehorn
ATTORNEY

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FIG. 9

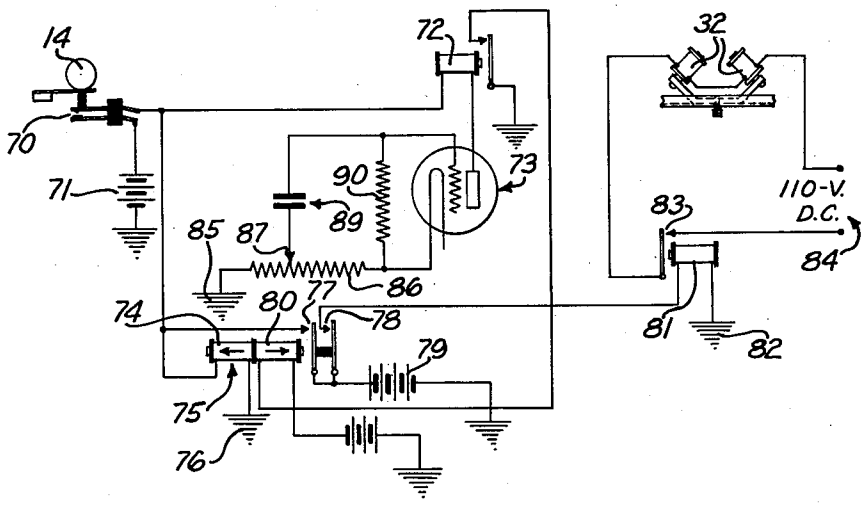
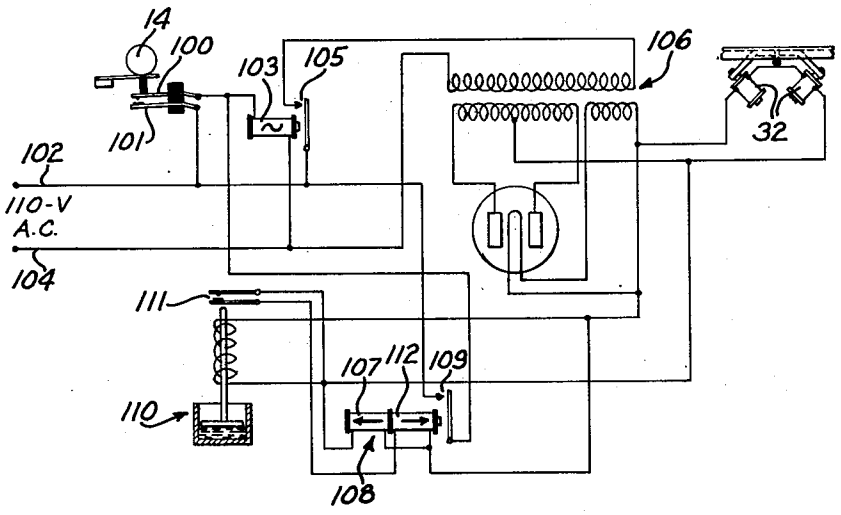


FIG. 10



INVENTOR
D.S. PARKER
BY H.Q. Whitehorn
ATTORNEY

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UNITED STATES PATENT OFFICE

2,134,373

CONVEYER

Douglas S. Parker, Verdun, Quebec, Canada, assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

Application August 26, 1936, Serial No. 97,902

12 Claims. (Cl. 193—35)

This invention relates to conveyers, and more particularly to control mechanism for gravity conveyers.

It is an object of the present invention to provide a more efficient and effective conveyer mechanism.

In accordance with one embodiment of the invention, an anti-friction roller type gravity conveyer is provided with a set of electromagnetically operated brakes for retarding the movement of some of the rollers upon the passage over other rollers of an article being conveyed, to prevent the articles being conveyed from traveling too rapidly and crashing into one another.

A better understanding of the invention will be had by reference to the following detailed specification, when considered in conjunction with the accompanying drawings, wherein—

Fig. 1 is a plan view of an anti-friction roller type of conveyer provided with a decelerating or braking apparatus constituting the subject-matter of the invention;

Fig. 2 is a sectional view taken substantially on the line 2—2 of Fig. 1 in the direction of the arrows and having schematically shown therewith the circuit diagram for controlling the operation of the electromagnets;

Fig. 3 is an enlarged fragmentary side elevational view of the details of the electromagnets and their supporting structure;

Fig. 4 is an end elevational view of the details shown in Fig. 3;

Fig. 5 is a plan view of a conveyer equipped with a braking apparatus in accordance with another embodiment of the invention;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 5 in the direction of the arrows, and including a diagrammatic showing of the control circuit used in this embodiment of the invention;

Fig. 7 is an enlarged side elevational view of part of the details shown in Fig. 6;

Fig. 8 is an end elevational view of the details shown in Fig. 7, and

Figs. 9 and 10 are schematic views showing the diagrammatically alternate embodiment of suitable control circuits.

Referring now to the drawings, wherein like reference numerals indicate the same parts throughout the several views, particular reference at this time being had to Figs. 1, 2, 3 and 4, a conventional type of gravity conveyer composed of a pair of angle irons 11 and 12 supported in any suitable manner and inclined at an angle such that articles placed on anti-friction rollers 13 of a conventional type suspended between the angle irons will move by gravity toward the lower or left end (Fig. 2) of the conveyer. A brake controlling roller 14 similar to the rollers 13 is resiliently mounted upon a pair of springs 15 which normally hold it up out of the plane of the other rollers. Each of the springs 15 has secured thereto, as shown in Fig. 2, a member 16 of insulating material adapted to cooperate with the upper one of a pair of contact springs 17 and 18, and when an article passes over the roller 14 it will be depressed against the energy stored in the spring 15 to close the contacts 17 and 18, thereby to connect grounded battery at 19 to one side of a winding 20 of a release relay 21. The other side of the winding 20 is connected through a suitable resistance 22 to ground at 23. Closure of the contacts 17 and 18 will also connect grounded battery over a branch circuit to the winding of a time delay relay 24 of the dash pot type, the other side of the winding of which is connected to ground at 25. As the winding 20 of the release relay is energized, the relay will operate to connect grounded battery at 26 through a contact 27 of the release relay to the winding 20, thereby to hold the release relay energized. Simultaneously grounded battery at 26 will be connected through contact 28 associated with the release relay 21 to one side of the winding of a power relay 29, the other side of the winding of which is connected to ground at 30. The energization of the power relay 29 will close its contacts 31 to complete a circuit from one side of a 110 volt D. C. line through the winding of a pair of electromagnets 32 in series to the other side of the 110 volt D. C. line.

The electromagnets 32, as shown in Figs. 2, 3 and 4, are mounted upon opposite ends of a U-shaped bracket 33 of magnetic iron and the two magnet coils, together with their cores, and the bracket 33, form a horseshoe type of magnet electromagnetically energized. The brackets 33 are mounted in a channel member 34 strapped to cross members 35 secured to the underside of the angle irons 11 and 12. The brackets 33 are normally held seated in the base of the channel iron 34 by means of a nut and bolt assembly 37 passed through the bracket and base of the channel and having cooperating therewith a compression spring 38. The adjacent roller 13 is made of or contains magnetic material and upon energization of the electromagnets 32, the magnetic pull will overcome the tension of spring 38 and the bracket and electromagnets will move

upwardly to bring the poles of the electromagnets into engagement with the under surface of the roller 13. Since the electromagnets 32 engage the rollers 13, the magnets and their supporting brackets will tend to turn with the rollers, and as a result will be tilted and wedged between the rollers and the channel members 34, thereby applying a braking effect in excess of that which the magnets would apply if they were not mounted in a manner such that they would tilt. The electromagnets as shown in Fig. 1 are mounted adjacent to the opposite ends of adjacent rollers 13.

In the embodiment of the invention just described, an article in passing down the conveyer, will, after passing over the rollers 13 with which the electromagnets 32 are associated, strike the brake controlling roller 14, thereby depressing it and momentarily completing a circuit through the contact springs 17 and 18 controlled by the roller 14. This momentary circuit closure will energize the winding 20 of the release relay 21, which will thereupon attract its armatures to complete circuits through contacts 27 and 28, thereby locking the release relay operated to hold energized the power relay 29, which will in turn close its contacts 31 to supply 110 volt D. C. to the electromagnets 32. The electromagnets 32 will remain energized until the time delay relay has operated fully, at which time it will close its contacts 40 to complete a circuit from grounded battery at 41 through a suitable resistance 42, and a second winding 43 of the relay 21, which opposes the winding 20 of the release relay, and to ground at 44. The current flowing through the winding 43 of the release relay is sufficient to negative the pull of the winding 20, thereby opening the contacts 27 and 28 to break the circuit to the power relay 29, thereby releasing the electromagnets 32.

In accordance with another embodiment of the invention as illustrated in Figs. 5, 6, 7 and 8, a conveyer having a supporting framework comprised of angle irons 50 and 51 similar to the angle irons 11 and 12, supports a plurality of anti-friction rollers 52 in an inclined plane so that an article placed upon the rollers will travel down the conveyer to the left (Figs. 5 and 6) by gravity.

The angle irons 50 and 51 have secured thereto bent brackets or straps 53 which support the channel members 54 in an inverted position above the rollers. Resiliently mounted upon the channel members 54 are a plurality of electromagnets 55 similar to the electromagnets 32. It will be noted, however, that the electromagnets 55 are mounted above the rollers 52, whereas the electromagnets 32 were mounted below the rollers 13, and the resilient support for the electromagnets 55, while similar to the resilient support for the electromagnets 32, tends to hold a bracket 56 of magnetic material, which supports the electromagnets 55, into the channel of the channel member and is in the form of a nut and bolt assembly 57 and a compression spring 58. Upon energization of the electromagnets 55 a magnetic field will be set up between the adjacent pole pieces of the electromagnets 55 which will cooperate with the magnetic material in the roller 52 to draw the bracket and electromagnets downwardly into engagement with the roller 52. When the electromagnets 55 engage the rollers 52, the electromagnets will tend to turn with the rollers and will become wedged between the rollers and the channel 54.

Since the channel 54 is mounted above the rollers a guard plate 59 has been provided adjacent each of the channel members 54, which guard plate is secured to the angle irons 50 and 51 and is bent outwardly to prevent articles from bumping against the channel members 54 or the electromagnets 55.

To the left of the rollers 52 which have electromagnets 55 associated therewith (Figs. 5 and 6) there is provided a depressible brake controlling roller 60 similar to the roller 14 for completing an electrical circuit through a pair of contacts 61 and 62. These contacts, upon their closure, will complete an electrical circuit in the same manner as did the contacts 17 and 18 in the first described embodiment of the invention. The circuits which they control are different in that a contact 63 under control of the release relay will, upon its closure, complete a circuit to a clock motor of conventional type indicated by the numeral 64 and adapted to drive a contact cam 65 for intermittently closing a pair of contacts 66 to complete a circuit to a power relay 67 similar to the power relay 29, thereby to energize the electromagnets 55 intermittently during the time when the time delay relay circuit is completed and before the time delay relay closes its contacts.

In the just described embodiment of the invention, the first article moving down the conveyer and passing over the brake controlling roller 60, will complete an electrical circuit to operate the release relay in the manner described in connection with the first embodiment of the invention, and the release relay, upon energization, will complete a circuit to the clock motor 64. Any articles traveling over the conveyer after the first article will be momentarily stopped by the rollers controlled by the electromagnets 55 when they reach these rollers, and will then be permitted to move down the conveyer when the motor driven cam 65 breaks the circuit at the contact 66. This momentary stopping of the articles will continue until the time delay relay closes its contacts and articles which would otherwise tend to accelerate in their travel down the conveyer would be momentarily stopped until the time delay relay operates to cause the opening of the circuit through contact 63 by energizing the second winding of the release relay, whereupon the next article passing down the conveyer, upon striking the brake controlling roller, will initiate another cycle of braking operations under control of the clock motor 64.

An alternative form of circuit for controlling the electromagnets 32 or 55 is shown in Fig. 9, wherein the brake controlling roller 14, upon being moved downwardly, will close a pair of contacts 70 to connect grounded battery at 71 to one side of the winding of a relay 72, the other side of the winding of which is connected to the plate or anode of a vacuum tube 73. A branch circuit will also become effective at this time to complete a circuit from grounded battery at 71 through the contacts 70 and through a winding 74 of a release relay 75 to ground at 76, thereby energizing the relay 75 and closing its contacts 77 and 78. Closure of contacts 77 will provide a locking circuit for the release relay from grounded battery at 79 through the contacts 77 and winding 74 to ground at 76. This locking circuit will be maintained and grounded battery at 79 will be supplied to the winding of a power relay 81, the other side of the winding of which is connected to ground at 82 until an opposed winding 80 of

the relay 75 is energized. In this manner the power relay 81 will be held energized until contacts 78 are opened. The energization of relay 81 will close its contacts 83 to connect 110 volt D. C. source at 84 through the windings of the electromagnets 32 in series.

One side of the filament of the vacuum tube 73 is connected through a resistance 86 to ground at 85, the grid of the tube is connected through a condenser 89 to an adjustable tap 87 on the resistance 86, and a resistance 90 is connected between the grid and the lead from the filament to the resistance 86. With these circuit conditions, grounded battery at 79 being connected through the winding of relay 72 to the plate of the tube in the manner heretofore described, the plate of the tube will be made positive with respect to the filament and plate current will flow through the resistance 86 to create a potential difference between the filament and the adjustable tap 87 of the resistance 86, the filament being positive with respect to the adjustable tap. This potential difference will be impressed across the condenser 89 and the resistance 90 in series and will cause current to flow through the resistance 90 to the condenser until it has become charged. The current through the resistance 90 at first renders the grid negative with respect to the filament, thereby reducing the plate current to a value too low to operate the relay 72. When the condenser becomes charged the potential of the grid is brought to the same value as the potential of the filament, whereupon the plate current will attain sufficient value to operate the relay 72. The operation of relay 72 will close a circuit to the winding 80 of the relay 75, causing the relay 75 to open its contacts 77 and 78, thereby to release relay 81 and reset the circuit. It will be understood that the length of time elapsing between the closing of the contact 70 and the operation of relay 72 will depend upon the value of the resistances 90 and 86, the capacity of the condenser 89 and the position of the tap 87.

In some instances it may be desirable to operate the braking mechanism of the conveyer with alternating current and in such case a slightly modified circuit is provided wherein the brake controlling roller 14 upon operation by an article passing over it will move a contact spring 100 into engagement with a contact spring 101 connected to one side 102 of a 110 volt alternating current line. The contact spring 100 is connected to one side of the winding of an alternating current relay 103, the other side of the winding of which is connected to the other side 104 of the 110 volt alternating current line. Therefore, when the spring 100 engages the spring 101 the alternating current relay 103 will be energized momentarily to close its contacts 105 which will complete a circuit from the 102 side of the alternating current line through the primary winding of a transformer in a conventional type of rectifier system 106, to the 104 side of the alternating current line. As soon as the alternating current relay 103 is energized the rectifier 106 will become effective to supply 110 volt direct current to the windings of the electro-magnets 32 in series and to a winding 107 of a release relay 108 to operate the release relay and through its contacts 109 complete a locking circuit for the alternating current relay 103 from the 102 side of the alternating current line through contacts 109 and winding of alternating current relay 103 to the 104 side of the alternating current line.

A time delay relay 110 of the dash pot type is also connected to the output side of the rectifier 106 and will start to operate as soon as the rectifier begins to function. This relay will pull up slowly and after a predetermined time will close its contacts 111 to complete a circuit from one side of the output of the rectifier 106 to a winding 112 of the release relay 108 and back to the other side of the output of the rectifier. The winding 112 opposes the winding 107 and when the contacts 111 close the contacts 109 will open to break the locking circuit for the alternating current relay 103 thereby to disconnect the 110 volt alternating current from the rectifier to release the electromagnets 32 and relays 108 and 110.

Although the embodiment of the invention wherein the clock motor controlled intermittent braking of the rollers has been disclosed in conjunction with the arrangement wherein the braking electromagnets are positioned above the rollers, it will be understood that any of the four circuits disclosed or modifications thereof might be used with either of the two arrangements of electromagnets. Furthermore, although the braking is shown in connection with only one set of adjacent rollers, it will be understood that one brake controlling roller could control electromagnetically operated brakes positioned at spaced intervals in a conveyer or that a plurality of brake controlling rollers might be provided for controlling separate groups of rollers having braking electromagnets associated with them. It is usually preferable to arrange the controlling roller in advance of the brake controlled rollers, as shown, or at least in advance of some of them.

In one particular embodiment of the invention it was found satisfactory in a 200 foot conveyer to employ four units each comprising six rollers, three of the units being spaced 10 feet apart and placed above the trip roller while one unit was placed approximately 50 feet below the trip roller. The latter unit checks the speed of any fast moving heavy parcels travelling in a group of three or four which were not checked by the brakes above the trip roller. All of the brake coils are wired in a single circuit each two being in series across a 110 volt direct current line and the whole device consuming 500 watts when operating.

What is claimed is:

1. A gravity conveyer including a plurality of anti-friction rollers, braking means for cooperating with predetermined ones of said rollers, and means operable by an article moving over said conveyer for holding said braking means operated for a predetermined time after the article has moved past said last mentioned means.

2. In a gravity conveyer, spacing mechanism including brakes for retarding the operation of said conveyer at spaced portions thereof, brake controlling means operable momentarily by an article passing over a portion of said conveyer, and means controlled by the brake controlling means for holding the brakes operated for a predetermined time after they are momentarily operated.

3. An automatic retarder for a gravity conveyer comprising a plurality of brake mechanisms, a control circuit for said brake mechanisms, means actuated by an article on the conveyer for initiating the operation of said control circuit, and means in said circuit for holding the brakes operated for a predetermined time after the operation of the circuit has been initiated.

4. An automatic retarder for a gravity conveyer comprising means responsive to the passage

of an article over a predetermined portion of the conveyer for initiating a retarding operation, an electrically controlled brake for retarding operation of portions of the conveyer, and a circuit controlled by the means for initiating retarding operations for causing the brake to operate intermittently a predetermined length of time.

5. An automatic retarder for a gravity conveyer comprising means responsive to the passage of an article over a predetermined portion of the conveyer for initiating a retarding operation, an electrically controlled brake for retarding operation of portions of the conveyer, and a circuit controlled by the means for initiating retarding operations for causing the brake to operate a predetermined number of times during a predetermined interval of time.

6. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined portions thereof, and means for controlling the braking means including contact making means operated by an article passing over the conveyer, a brake operating circuit controlled by said contact making means for operating the braking means, and means for holding said circuit operated after the contact making means is no longer operated by the article.

7. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means including contact making means operated by an article passing a predetermined position on the conveyer, a braking circuit for controlling the braking means and originally energized by said contact making means, and means for holding said braking circuit energized for a predetermined time after the article has passed said predetermined position.

8. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means including contact making means operated by an article passing a predetermined position on the conveyer, a braking circuit for controlling the braking means and originally energized by said contact making means, means for holding said braking circuit energized, and a time delay device for releasing the holding means after a predetermined time.

9. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means, contact making means operated by an article passing a predetermined position on the conveyer, a circuit energized by said contact making means for operating the brake controlling means, means for holding said circuit energized, and means for releasing said holding means after a predetermined time.

10. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means, contact making means operated by an article passing a predetermined position on the conveyer, a circuit energized by said contact making means for operating the brake controlling means, means for holding said circuit energized, and means for releasing said holding means after a predetermined time including a slow acting relay.

11. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means, contact making means operated by an article passing a predetermined position on the conveyer, a circuit energized by said contact making means for operating the brake controlling means, means for holding said circuit energized, and means for releasing said holding means after a predetermined time including a slow acting electrical means the operation of which is initiated by the contact making means.

12. In a retarder for gravity conveyers, braking means for retarding operation of the conveyer at predetermined positions thereof, means for controlling the braking means, contact making means operated by an article passing a predetermined position on the conveyer, a circuit energized by said contact making means for operating the brake controlling means, means for holding said circuit energized, and means for releasing said holding means after a predetermined time including a slow acting electrical means the operation of which is initiated by the contact making means and held operated by the holding means.

DOUGLAS S. PARKER.