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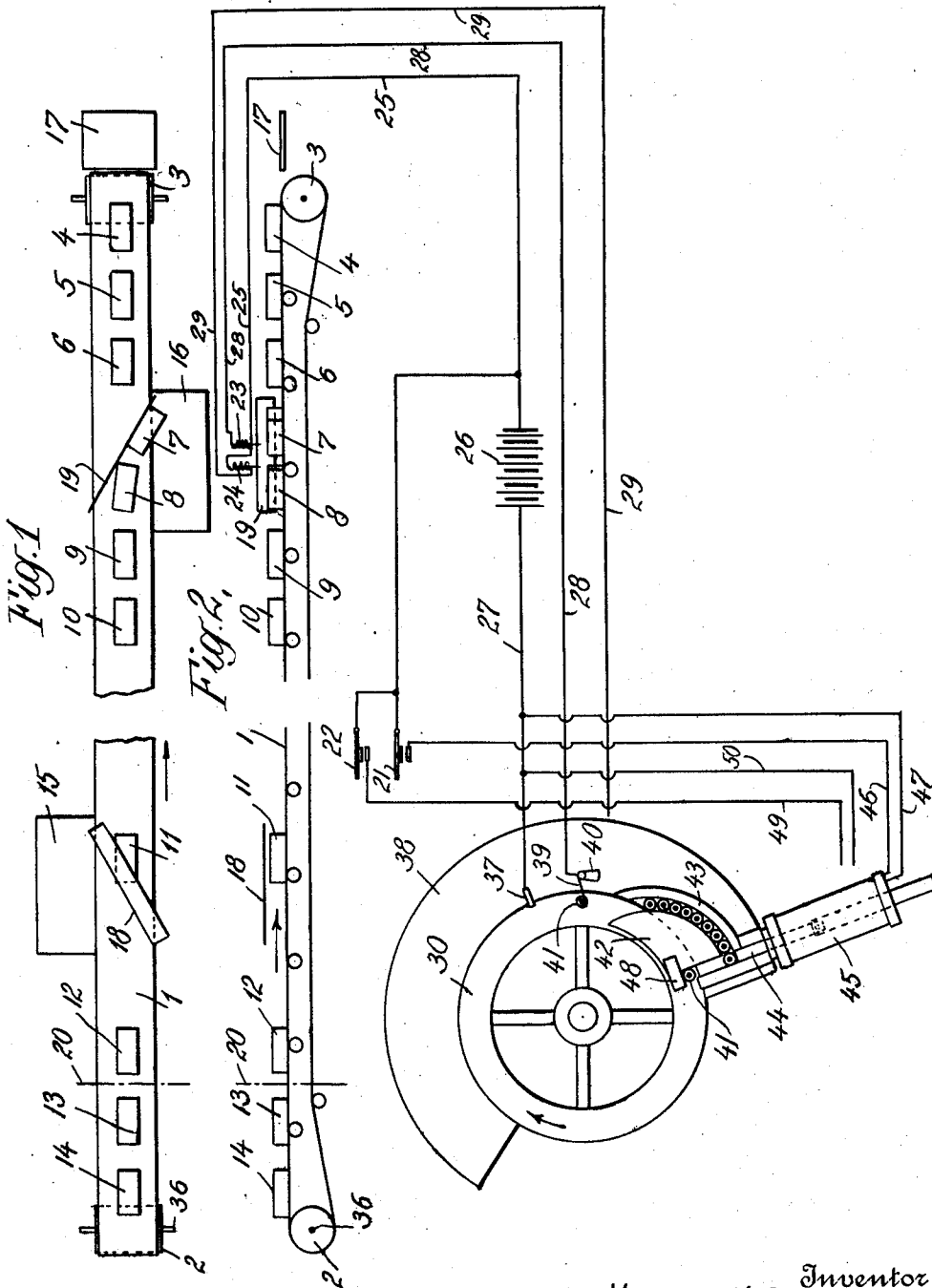
1,528,227

H. W. SPOONER

CONVEYER SYSTEM

Filed May 17, 1921.

3 Sheets-Sheet 1



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Mar. 3, 1925.

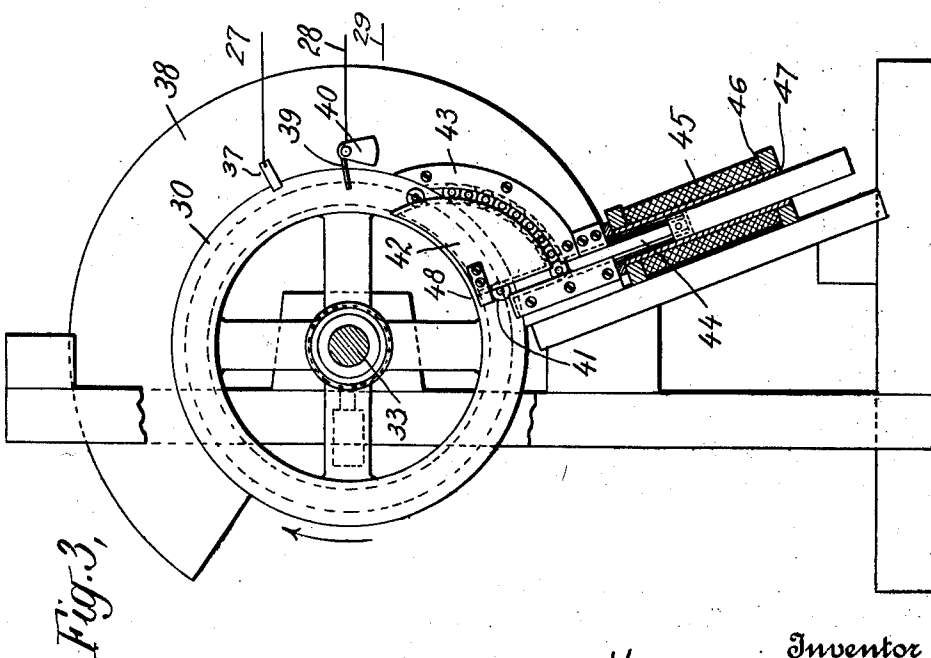
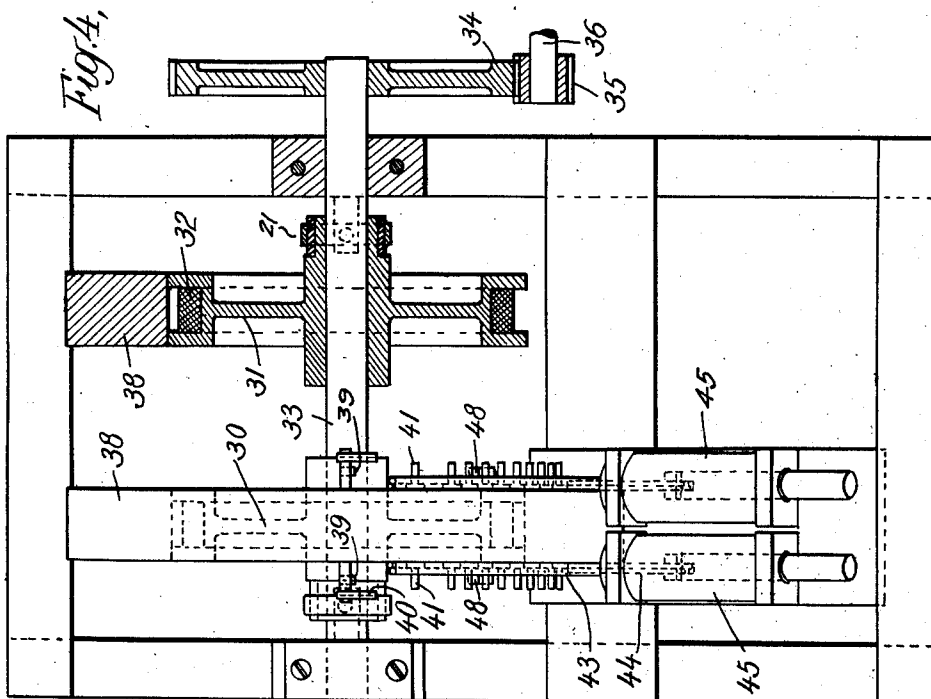
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CONVEYER SYSTEM

Filed May 17, 1921

3 Sheets-Sheet 2



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CONVEYER SYSTEM

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3 Sheets-Sheet 3

Fig. 5,

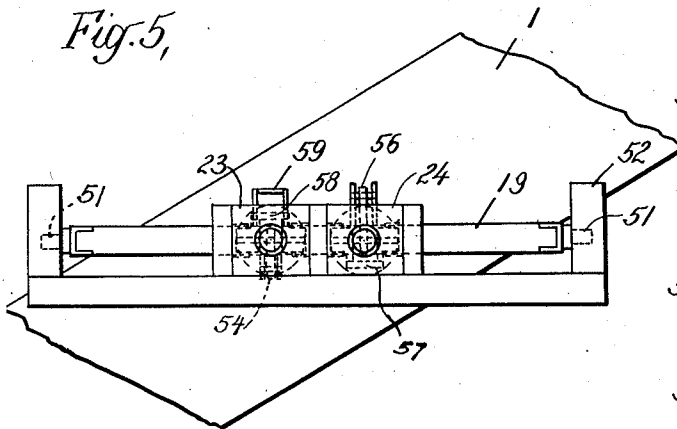


Fig. 8,

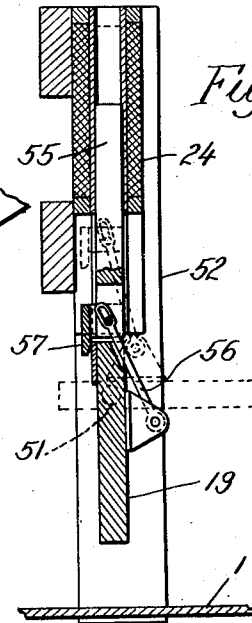


Fig. 6,

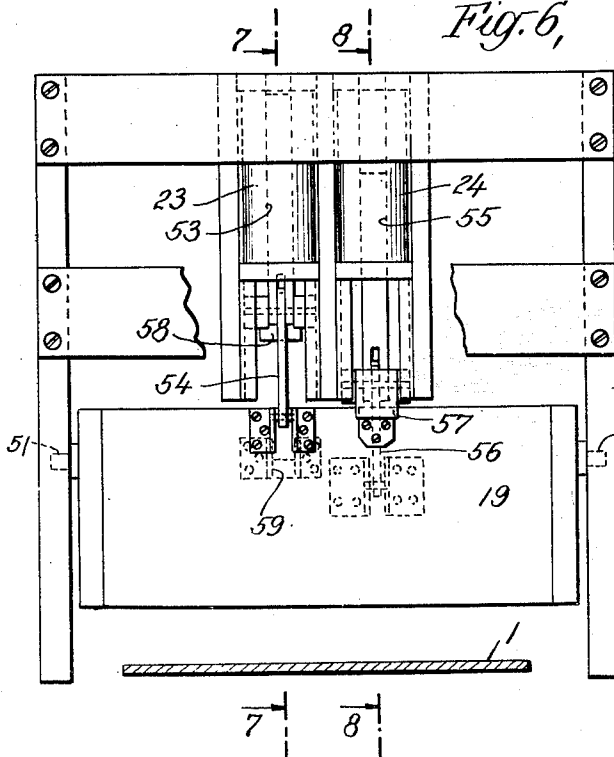
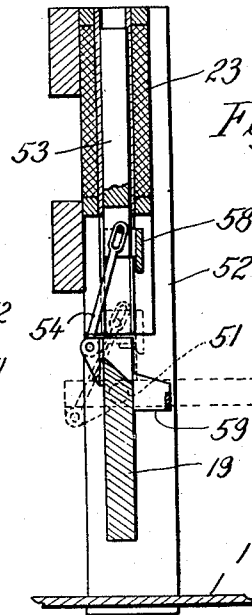


Fig. 7,



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UNITED STATES PATENT OFFICE.

HENRY W. SPOONER, OF BROOKLYN, NEW YORK.

CONVEYER SYSTEM.

Application filed May 17, 1921. Serial No. 470,441.

To all whom it may concern:

Be it known that I, HENRY W. SPOONER, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Conveyer Systems, of which the following is a specification.

My invention aims to provide an improved conveyer system by which the articles carried are easily distributed and removed at certain stations.

The accompanying drawings illustrate an embodiment of my invention.

Fig. 1 is a diagrammatic plan of the conveyer;

Fig. 2 is a diagrammatic side elevation thereof including the timing or controlling mechanism;

Fig. 3 is a side elevation of one of the timing devices;

Fig. 4 is a view of one of the timing devices in elevation and of part of another in section;

Fig. 5 is an enlarged plan of a deflector or removing device;

Fig. 6 is a front elevation thereof;

Figs. 7 and 8 are sections of the same on the correspondingly numbered lines of Fig. 6.

Referring first to the diagrams, Figs. 1 and 2, the conveyer is illustrated as a belt 1 traveling in the direction of the arrow and carried on end rollers 2 and 3. Packages or other articles 4 to 14 are placed in turn on the belt at its left hand end and to be taken off at different stations indicated respectively at 15, 16 and 17 arranged below the belt; the first two at the sides and the latter at the end. The articles to be taken off at stations 15 and 16 are deflected from the line of travel of the belt by removing devices or deflectors 18 and 19 respectively. Those which are not taken off at one of these points pass over the end of the belt to station 17. The system may be equipped with any desired number of stations, only three being shown for convenience.

The deflectors 18 and 19 are arranged to be moved out of the path of the articles to permit them to pass to the last station, or one or the other of the deflectors 18 and 19 is shifted to operative position just in ad-

vance of the article or series of articles which is to be removed at the corresponding station.

The operation of the deflectors is controlled through a timing device set at or near the starting point of the conveyer, say to register with the position on the conveyer indicated by the dotted line 20, which may be marked in any suitable way on the apparatus. For each of the deflectors there is a pair of push buttons or switches 21, 22. The switch 21 is closed when an article to be removed at station 16 arrives at the line 20. Suppose, for example, the article 7, when it arrived at the line 20 was found by the operator to be of the class described for station 16, and that the switch 21 had been closed at that time. The deflector 19 would be inoperative until the article 7 arrived at a point just in advance of the deflector, whereupon the latter would be shifted to operative position and would remove the article 7 and drop it at station 16. If the succeeding articles 8, 9 and 10 were to be taken off at the same station they would each have passed the line 20 without action by the operator and they would each in turn be deflected at station 16. If number 10 is the last of this lot, then when it passed the line 20 the operator would close the switch 22 and after the article 10 had been deflected the deflector 19 would be moved to the inoperative position and subsequent articles would pass to the end of the conveyer and to station 17. Articles 4, 5 and 6, for example, will pass to the station 17 in this way. The deflector 19 being withdrawn article 11 will also pass. The classification of article 12 has already been determined and articles 13 and 14 will be classified as they arrive at the line 20.

The operation of the deflector is effected by means of solenoids 23 and 24, each of these being connected by a wire 25 passing to a battery 26 or other source of current connected by a wire 27 to the timing device hereinafter described.

The other end of the solenoid coil 23 is connected by a wire 28 to a switch on the timing device adapted to be closed at a certain interval after the timing device has been set in operation. Similarly the oppo-

site end of the solenoid coil 24 passes by a wire 29 to another timing device, which, after being set in operation and being run for a certain interval of time will cause the withdrawal of the deflector.

The timing devices are illustrated in enlarged view on Figs. 3 and 4. A pair of wheels 30 and 31 serve the deflectors 19 and 18 respectively. They are of cast iron or other magnetic material with a rim which is magnetized either permanently or by means of a coil 32 set in a groove in the periphery. These wheels are on a shaft 33 which is driven from a gear 34 driven by a pinion 35 on the shaft 36 which (Fig. 4) is also driven from the conveyer. Thus the timing wheels 30 and 31 are synchronized with the conveyer. Each of the wheels, 30 and 31, is adapted to carry switch-operating devices which close a circuit through the corresponding deflector solenoid just as the article to be deflected arrives at the deflector. For the deflector 19 the switch-operating devices of the wheel 30 will be set in operative position at a point on its circumference which requires that the wheel turn through a distance corresponding to the distance from the starting line 20 to the deflector 19 before closing the circuit of the latter. For the deflector 18 the circuit closing devices will be set in operative position at a point farther advanced around the timing wheel so as to require a correspondingly shorter time before it closes the circuit for this deflector; or the switch which closes the circuit may be located nearer the point at which the switch-operating device is fixed in operative position on the rim of the wheel.

The wheel 30, for example, rotates in the direction of the arrow. The wire 27 is connected with the wheel through a brush 37. Mounted on a stationary segment 38 which surrounds a part of the wheel there is a switch arm 39 pivotally supported and held in an approximately horizontal position by the weight 40, the pivotal support being connected to the wire 28. The switch arm 39 projects alongside the face of the wheel. When the arm 39 is struck by a contact member 41 on the face of the wheel the wire 28 is electrically connected to the wheel which in turn is electrically connected to the wire 27, so that the circuit is closed through the solenoid 23 which turns the deflector 19 to operative position. The contact member 41 is one of a number of buttons or pins of magnetic material which are used in turn, being held on the side of the wheel by magnetic attraction until they are forcibly removed therefrom. After the button passes the switch 39 which yields to permit such passage, it strikes a cam 42 which forces it out beyond the wheel and into a slot formed between the cam and an

outer guide 43. The buttons pass down the slot, the lower one resting on the end of a plunger 44 of the solenoid 45, the opposite ends of the coil of which are connected by wires 46 and 47 to the terminals of the switch 21 (through the battery 26). When this switch is closed the plunger 44 of the solenoid is advanced and pushes the lowest button on to the side face of the wheel, its movement being stopped by a shoulder 48. It immediately commences to move around with the wheel and will arrive at the switch 39 in the same length of time that it takes an article on the conveyer to travel from the starting line 20 to the deflector 19.

On the opposite side of the wheel 30 the wire 29 is connected to a switch similar to that shown at 39 and there is a reservoir of contact buttons and a solenoid and plunger similar to those shown in Fig. 3 and placed at the same angular distance from the switch which connects the line 29 with the wheel; this solenoid being connected by wires 49 and 50 to the terminals of the hand switch 22 (through the battery 26). When this switch is closed a button 41 is set on the wheel and in due time closes the circuit through the wire 29 and the solenoid 24 which moves the deflector 19 to inoperative position.

The deflectors may be of various designs arranged to swing on a horizontal or vertical axis or to slide into and out of position. In Fig. 5 I have shown a deflector which operates with ease and certainty and which is locked in either position to which it may be thrown, until the operator unlocks it through the timing device. In this deflector, Figs. 5 to 8, the blade or deflector proper 19 is supported on trunnions 51 above its center so that when released it will tend to swing down quickly, the trunnions being carried in a frame 52 set obliquely to the conveyer. The solenoids 23 and 24 are mounted on this frame. The core 53 of the former is connected by a pin and slot with a link 54 which is connected at its lower end with a bracket on the edge of the blade which is to be uppermost in the operative position of the blade. The core 55 of the solenoid 24 is similarly connected by a link 56 with the lower part of the blade, on the face opposite the connection to the link 54. Now when the solenoid 23 is energized its core will pull the blade to the upright position as shown in full lines, Fig. 7. The solenoid 24 being inoperative at the same time, its core 55 will drop and, by the play of the pin in the slot, it will carry a lock 57 against the face of the blade. See Fig. 8. In this position the blade cannot move. When the blade is to be turned to the inoperative position the solenoid 24 is energized, the core 55 rises, first removing the lock 57 and then swinging the blade up to

the horizontal position. To hold it locked in this position, the core 53 is provided with a lock 58 which drops behind a stop 59 mounted on the upper face of the blade for this purpose.

Various means may be provided for setting the timing device to operate after the desired interval; and these setting devices may be actuated either by hand as described or by various automatic means cooperating with the articles as they are conveyed past the starting point.

It will be seen that my improved apparatus can be worked by a single operator without confusion or loss of time in waiting for the articles to reach their discharging stations. The contact members on the timing wheel represent in a sense the articles on a belt. That is to say, the contact members become operative and start their movement when the corresponding articles arrive at the starting line. And the difference between the travel of the first button (which at the end of its travel renders a certain deflector operative) and the second button (which renders it inoperative) corresponds to a certain length of the belt carrying any number of articles in succession. If we assume that the switches 39 on opposite sides of the timing wheel are in register with each other and that the opposite solenoids 45 are likewise in register; then the arc of the timing wheel between the first switch-operating button 41 and the next button 41 on the opposite side will represent the length of belt which has passed the starting line in the interval between the bringing of these two buttons 41 to their operative positions. Thus the switch-operating buttons correspond to the first and last articles on a given belt, and the arc of the timing wheel between said buttons corresponds to the length of the belt carrying said articles and any number of articles between the first and last.

The conveyor is indicated as a single straight belt. But the invention may be applied to a great variety of conveyers other than belts, and to conveyers comprising a plurality of units and also to conveyers which carry the articles not only in a straight line but also in curved or broken lines. The controlling and deflecting mechanisms are not dependent on the type of conveyor, except to the extent that the controlling mechanism must be synchronized with the movement of the articles on the conveyor.

Obviously a great variety of equivalents is possible for the contact members 41 which are shifted onto and off the face of the timing wheel. Any other form of devices may be used which are set in operative position to control the electric circuit after a given period of time and any means for setting them in such operative positions and for

rendering them inoperative after they have acted on the electric circuit and until they are again set.

Also instead of the timing wheel shown belts and various other devices may be used traveling at a rate proportional to that of the conveyor.

Though I have described with great particularity of detail an embodiment of my invention yet it is not to be understood therefrom that the invention is restricted to the particular embodiment disclosed. Various modifications thereof in detail and in the arrangement of the parts may be made by those skilled in the art without departure from the invention as defined in the following claims.

What I claim is—

1. The combination with a conveyor of devices for removing articles therefrom at selected points, and means operable in advance for varying the order in which said removing devices operate and the interval of time for which they remain in operative position.

2. The combination with a conveyor of a plurality of removing devices normally held in inoperative position and selective means for moving said devices to operative position and varying the period of time for which said removing devices remain in operative position.

3. The combination with a conveyor of a plurality of deflectors for removing articles from the conveyor at different points in its travel, a timing device located at a point remote from the discharge points and means coacting with said timing device for controlling said deflectors whereby the order of operation of said deflectors and the interval of time for which they remain in operative position can be varied at will.

4. The combination with a conveyor of a deflector and a manually operable delayed control device arranged to be variably set in advance to control the period of time for which said deflector remains in position to remove articles from the conveyor.

5. The combination with a conveyor, a deflector, separate solenoids for moving said deflector into and out of operative position and manually variable timing means for controlling the interval between the operations of said solenoids.

6. The combination with a conveyor, a device for removing articles therefrom, a timing device which is driven at a rate commensurate with that of the conveyor, separate means for moving said first named device into and out of operative position, and means coacting with said timing device adapted to determine the interval between the movements of the last named means.

7. The combination with a conveyor, a device for removing articles therefrom, and a

timing device adapted to be set in advance to control the removing device whereby it can cause said device to remain in operative position for varying time intervals to serve varying lengths of the conveyor.

8. The combination with a conveyor of a device for removing articles therefrom at a certain point in its travel including a pivoted deflector, separate electric devices for swinging said deflector to and from operative position and separate locks actuated by said electric devices and arranged to directly engage said deflector to positively hold it in either position to which it is swung by said devices.

9. The combination with a conveyor of a device for removing articles therefrom, a timing device which travels at a rate commensurate with that of the conveyor and means for causing said removing device to move from its normal inoperative position to its discharging position, at the end of an interval determined by said timing device, and means for returning said removing device to its normal inoperative position after the lapse of an interval of time determined by said timing device.

10. The combination with a conveyor of a device for removing articles therefrom, a magnetic timing device which travels at a rate commensurate with that of the conveyor and separate electrical means for moving said removing device into and out of operative position, separate devices adapted to be applied to said timing device to control the said electrical means and setting mechanism for applying said separate devices to said timing device.

11. The combination with a conveyor of a device for removing articles therefrom, a timing device, driven in synchronism with the conveyor, electrical means for actuating said removing device and means co-acting with the timing device adapted to be set in operative position and to control said electrical means to cause the operation of said removing device at the end of an interval determined by the timing device, and means for rendering said removing device inoperative after an interval determined by said timing device so that any desired length of the conveyor may be cleared of articles by said removing device at a desired station.

12. The combination with a conveyor of a device for removing articles therefrom and a mechanism including a timing device for rendering said removing device operative at the beginning and inoperative at the end of an interval selected by an operator corresponding to a determined travel of the articles conveyed by said conveyor so that a given article carried by a selected length of the conveyor can be discharged at will at a desired station.

13. The combination with a conveyor of

means for removing articles therefrom and means for registering on a remote controlling device on a reduced scale the length of a desired portion of said conveyor and for causing said removing device to remain in its discharging position during the interval of time that said portion of the conveyor is passing the removing device.

14. The combination with a conveyor and a removing device of a variable timing means for controlling the time at which the removing device is moved to operative position and also the length of time that said removing device is held in its operative position.

15. The combination with a conveyor and a removing device of a variable timing means for controlling the time at which the removing device is moved to operative position and also the length of time that said removing device is held in its operative position, said timing means including a member driven in synchronism with the conveyor, a plurality of contactors adapted to be applied thereto and means for applying said contactors to said member in a selected spaced relationship.

16. The combination with a conveyor and a deflector located above the conveyor and adapted to be lowered into position to remove articles therefrom, of a variable device for controlling the time at which said deflector is lowered and also the period for which it remains in its lowered position, said device comprising a magnetic time wheel driven in synchronism with the conveyor, contactors adapted to be applied in different positions on said time wheel and switches co-acting with said contactors and electro-magnetic means controlled by said switches for operating said deflector.

17. A timing device for controlling the interval of a given operation comprising a member driven at a governed rate, contactors adapted to be held thereon by magnetic attraction, means for applying said contactors to said member and means for removing said contactors from said member after they have acted in connection therewith.

18. A timing device for controlling the interval of a given operation comprising a magnetic wheel driven at a governed rate, contactors, magazines and means for feeding said contactors from said magazines to the opposite faces of said wheel and means for removing the contactors after they have acted in connection therewith.

19. A timing device comprising a magnetic wheel, magazines on opposite sides of said wheel, contactors in said magazines and means for transferring contactors from each of said magazines to said wheel.

20. The combination with a conveyor of a deflector for removing articles therefrom, electro-magnetic means for actuating said

deflector, and a device for controlling the time at which said electro-magnetic means operate, comprising a member driven at a rate commensurate with that of the conveyor, separate contactors adapted to be applied in a selected spaced relationship to said member so as to determine the interval between the operations of said electro-magnetic means.

21. The combination with a conveyor of a deflector for removing articles therefrom, electro-magnetic means for actuating said deflector, and a timing device for controlling the operation of said deflector comprising a magnetic wheel driven in synchronism with said conveyor, magazines in juxtaposition to said wheel and carrying a supply of contactors, means for transferring said contactors to said wheel at will in spaced relationship and means arranged to co-act with said contactors to actuate said deflector.

22. A timing device comprising a rotating member, means for magnetically holding contactors thereon and means to overcome the magnetic hold on said contactors.

23. A timing device comprising a rotating magnetic member, contactors adapted to be held thereon by magnetic attraction and mechanical means to overcome the magnetic hold on said contactors.

24. A timing device including a rotating magnetic member, means for applying contactors to said magnetic member, a circuit-

closing device in the path traversed by said contactors and means for removing the contactors from said rotating magnetic member.

25. A timing device including a rotating magnetic member, means for driving said member at a determined rate, stationary means for applying a circuit-closing device at any desired point on said magnetic member, a switch in the path of said circuit-closing device and means for removing said circuit-closing device from said magnetic member.

26. A timing device including a rotating magnetic member, means for driving said member at a determined rate, stationary means for applying a circuit-closing device at any desired point on said magnetic member, a switch in the path of said circuit-closing device, means for varying the position of said switch and means for removing said circuit-closing device from said magnetic member.

27. A timing device including a rotating magnetic member with multiple faces, means for applying contactors to each face of said member, means for rotating the magnetic member at a predetermined rate, said contactors being adapted to be spaced with relation to one another so as to represent various periods of time.

In witness whereof, I have hereunto signed my name.

HENRY W. SPOONER.