

Nov. 11, 1952

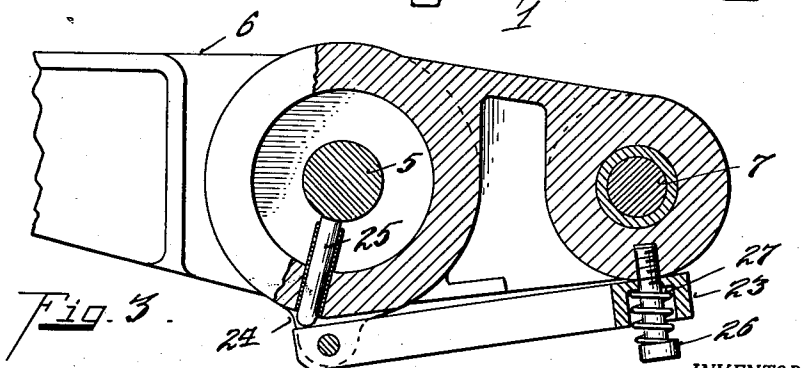
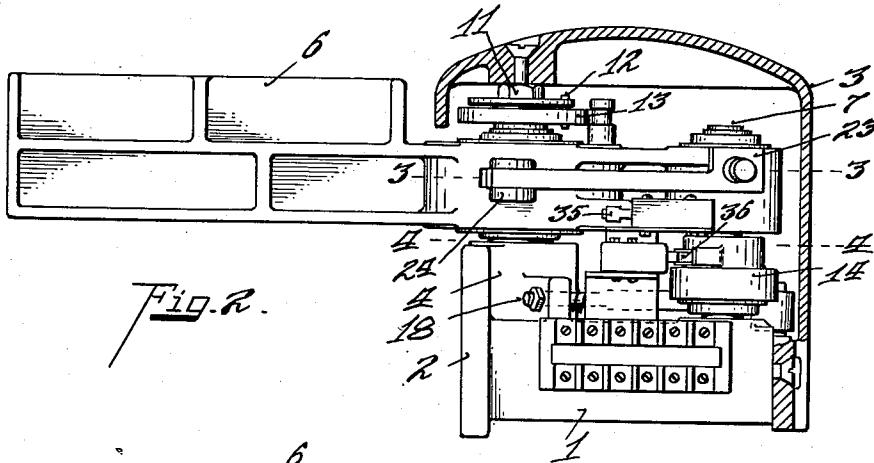
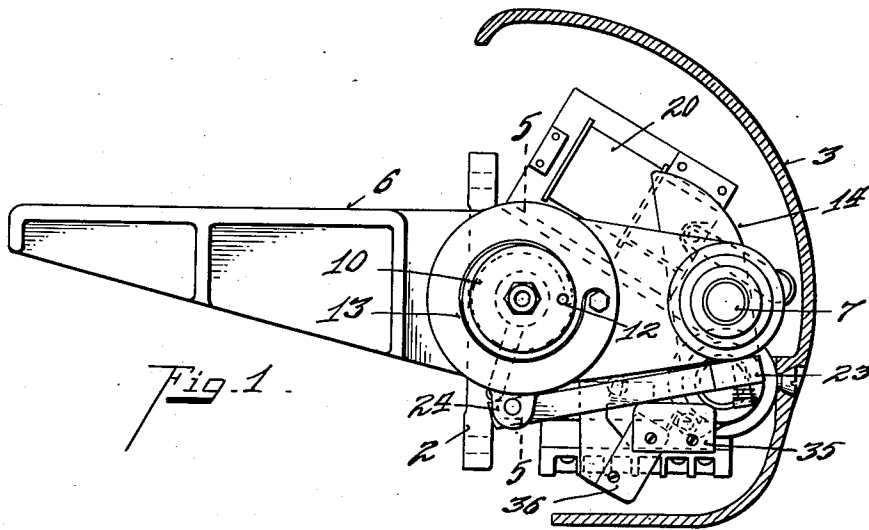
N. M. SULLIVAN

2,617,516

CONVEYER TRAFFIC CONTROL MECHANISM

Filed Oct. 14, 1948

4 Sheets-Sheet 1



INVENTOR.
Norman M. Sullivan
BY
Oliver B. Hain
Atty.

Nov. 11, 1952

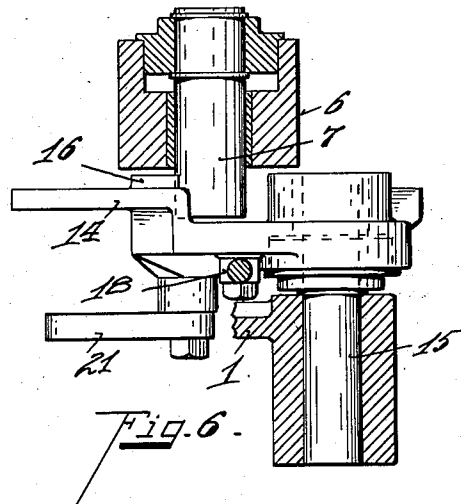
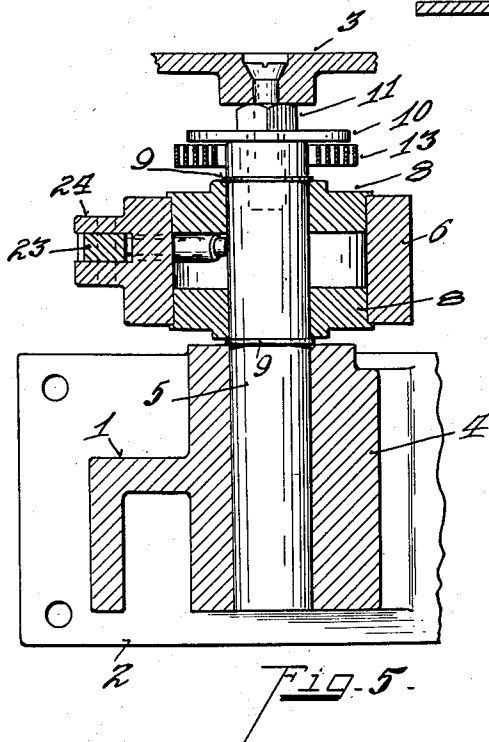
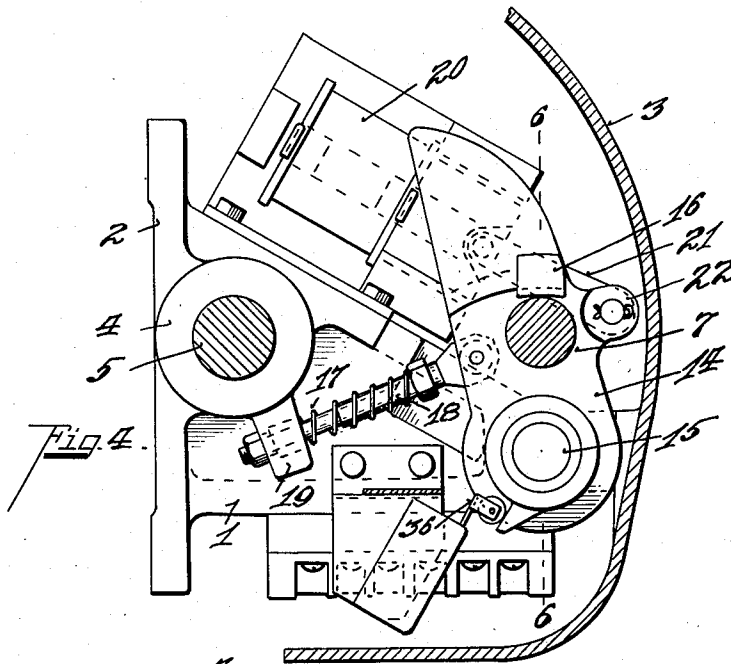
N. M. SULLIVAN

2,617,516

CONVEYER TRAFFIC CONTROL MECHANISM

Filed Oct. 14, 1948

4 Sheets-Sheet 2



INVENTOR.
Norman M. Sullivan
BY
Oliver B. Haines
Att.

Nov. 11, 1952

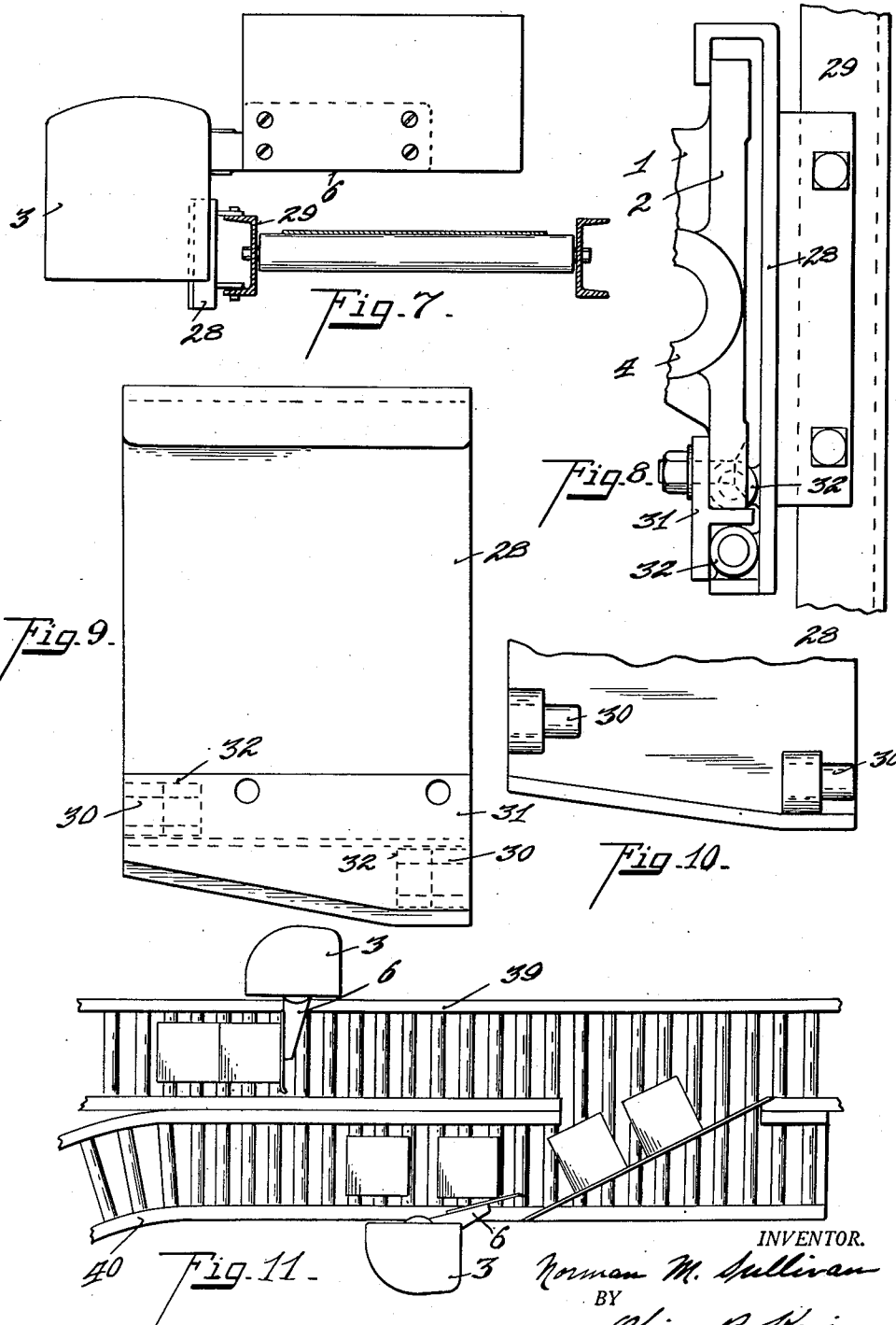
N. M. SULLIVAN

2,617,516

CONVEYER TRAFFIC CONTROL MECHANISM

Filed Oct. 14, 1948

4 Sheets-Sheet 3



Nov. 11, 1952

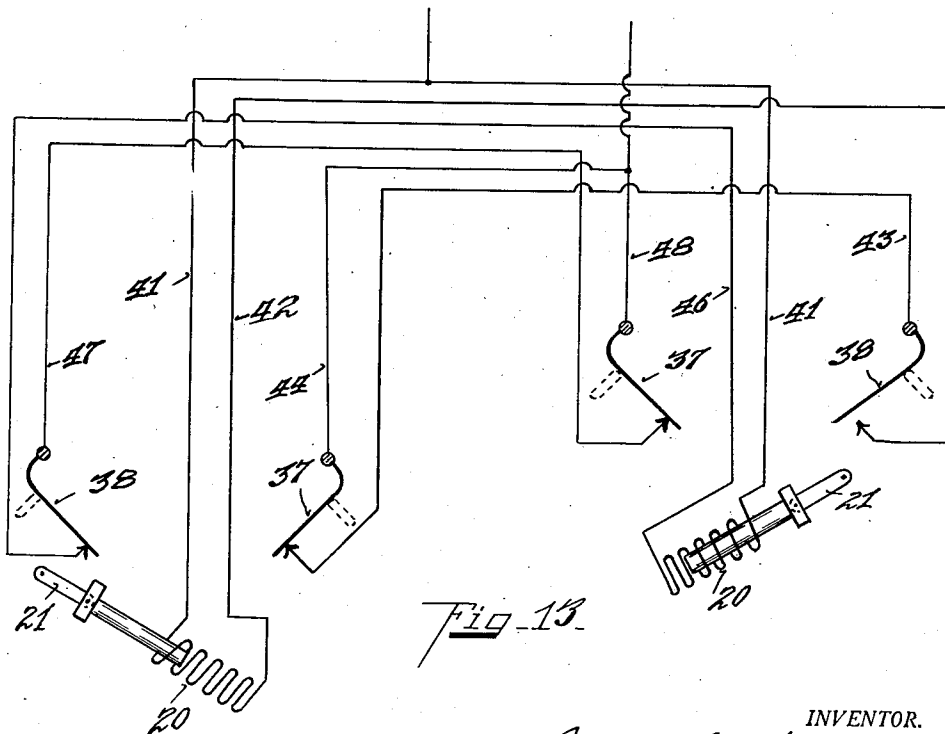
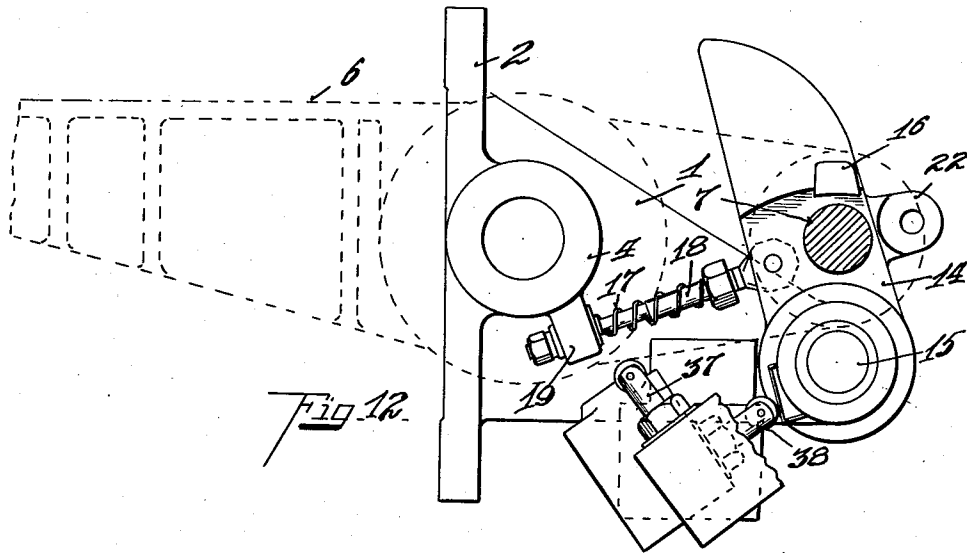
N. M. SULLIVAN

2,617,516

CONVEYER TRAFFIC CONTROL MECHANISM

Filed Oct. 14, 1948

4 Sheets-Sheet 4



INVENTOR.
Norman M. Sullivan
BY
Chas. B. Haines
att.

UNITED STATES PATENT OFFICE

2,617,516

CONVEYER TRAFFIC CONTROL MECHANISM

Norman M. Sullivan, Cincinnati, Ohio, assignor
to The Alvey-Ferguson Company, Cincinnati,
Ohio, a corporation of Ohio

Application October 14, 1948, Serial No. 54,492

1 Claim. (Cl. 198—21)

1

This invention relates to an automatic traffic control unit for conveyor systems for arresting the conveyance of articles at or in proximity to a junction or merger of several conveyor lines, as a main line and a branch line, primarily governed by the articles in transit on the conveyors, whereby the first in its approach to the junction or at a determined distance therefrom on one line precedently controls restraint or interruption to the translation of an article approaching the junction zone on the other line to avoid collision.

Each line respectively has a swinging traffic controlling gate, normally extending cross-wise of the conveyor to be intercepted by an article conveyed and swing the gate in relief of or non-interfering to the continued travel of the article, unless locked against movement controlled by a relative gate advancedly intercepted and moved by an article on a second conveyor.

The gate unit, however, is of a character and construction to adapt it without change in structure for diversified service in the article transit control for conveyors in which it is not dependent upon the functioning of a relative gate on a second or other lines and adapted to be normally locked and selectively unlocked, from a remote point as by an operator.

The gate normally may be latched and is unlatched electrically instead of using the force of a transmitted article as is prevailingly practiced. The gate has a slight freedom of movement which can be effected by an article or package of small size and weight before being restrained by the latching mechanism, sufficient for an electric circuit control for the latching mechanism for unlatching, unless the circuit is otherwise interrupted, as by the open position of a second gate. The latching mechanism is of a character for movement to a gate unlatching position by a relatively small force and when a relatively large force is imposed thereon by the gate, which allows controlling of the articles or packages irrespective of the size and weight.

An object of the invention is to provide a traffic control device for conveyor systems, constituting a simple and compact unit readily applicable to the conveyor forming and embodying a pivoted gate to extend crosswise of the conveyor at a selected point, to be intercepted by an article transported to either arrest the advance thereof and when moved by the article to electrically control the locking of a gate of a second unit of the same or another conveyor to arrest traffic.

Another object is to provide a conveyor traffic

2

control device having a gate extended to be engaged by the articles transported by the conveyor and be moved thereby for the control of an electric circuit for the locking of a gate of a second control device and which without change in the mechanical structure of the unit can be electrically controlled from a remote point by an operator, or timing control.

Another object is to provide a lock for a conveyor traffic controlling gate non-impeding to the swing of the gate to its normal position when released by an article conveyed.

Another object is to provide a latch for a conveyor traffic controlling gate moved and sustained in a gate unlatching position by electrically actuated means, as a solenoid, which when deenergized permits the latch to automatically move to its gate latching position and free to be moved by the gate to permit the gate to automatically move to its normal or locking position when released by an article transported by the conveyor. This permits both gate and latch to swing freely and not require undue spring pressure to return both to a normal position and permits automatic control by extremely light weight articles conveyed than is possible with strictly mechanical units. This also permits arresting of a greater number of articles as the latch can be released from its gate locking position when under heavy strain imposed thereon by the articles arrested.

Various other features and advantages of the invention are more fully set forth in and apparent from the following description of the preferred embodiment, as illustrated by the drawings accompanied herewith and forming a part of this specification, in which:

Figure 1 is a top plan view of the conveyor traffic control device with its casing or cover shown in section and the gate arm, which normally extends crosswise of a conveyor, latched to arrest the advance of an article transported by the conveyor when brought into contact therewith.

Figure 2 is a side elevation thereof.

Figure 3 is an enlarged section of the gate arm taken on line 3, 3, Figure 2.

Figure 4 is an enlarged section taken on line 4, 4, Figure 2.

Figure 5 is an enlarged section taken on line 5, 5, Figure 1.

Figure 6 is a section taken on line 6, 6, Figure 4.

Figure 7 is a cross section of a belt conveyor with a traffic control device in side elevation, fixed to a hinge bracket mounted upon the outer side of a rail of the conveyor and the gate arm

3

having a plate fixed to its face side to increase its area and reach.

Figure 8 is an enlarged top plan view of the hinge bracket mounted upon a side rail of a conveyor for hingedly sustaining the traffic control device and provide for a light oscillatory or vibratory motion thereof for impact dampening portability.

Figure 9 is a plan view of the hinge bracket.

Figure 10 is a plan view of a section of the hinge end of base portion of the bracket.

Figure 11 is a plan view of a section of two adjoining conveyors with the terminal of one merging with the other and diagrammatically disclosing a traffic control device respectively for each, relatively located.

Figure 12 is a view similar to Figure 4 of the gate latch arm, with the gate arm shown in dotted lines and a modified form of electric circuit control switches respectively operated by the gate and latch arm.

Figure 13 is a plan view of an electric wiring diagram.

Conveyor traffic controlling devices as heretofore employed at the merging of two lines are generally provided with interconnecting mechanical means operable by the transported articles on the lines for blocking the movement of the articles on either one of the lines. The movement of one gate restrains the movement of another gate through interengaging means, which counteracts the freedom of movement of the gates when both are subjected to the pressures of moving articles resulting in simultaneously blocking of the articles on both lines. Also when a gate is stalled in moving to an open position it is possible to divert the articles from the conveyor and usually to the damage thereof. The interrelated cooperation, aside from the interference encountered in operation, adds complications in many instances in making installations on account of the relative location of the gates and relative position and types of conveyors merged, as parallel or at an angle to one another and relatively differing as gravity, live roller or belt types.

With the present improvement each gate and its latching means constitutes a separate and independent unit, eliminating any mechanical interlock of the gates or means alternately engageable therewith which necessitates definite relative location of the gates for the several lines. Each gate can be located on either right or left side of the conveyor, whichever is the most appropriate location and at the most efficient distance from the junction or merging point of the lines. This is of material advantage, particularly when the conveyors are of relatively different types, one a power driven and the other gravity, the same type at different speeds or in merging parallel conveyors, in which the one deflected requires further travel of the articles and must be favored by placing the gate closer to the junction point.

One gate, for example, for the main line can serve for several branch lines as merging therewith respectively at opposite sides thereof. Each gate as herein exemplified has its own gate latch, electrically actuated and its electric circuit controlled by its own gate and the latch of another unit. It can also be controlled from a dispatching point, as the electric control can be independent of any movement of a gate or latch. The unlatching of the gate is accomplished electrically, so that the gates can be arranged to

4

swing very freely and do not require too heavy a spring or tension for returning the gate automatically to a neutral or active position. This permits the handling of much lighter container packaged articles than possible with strictly mechanical units. The same feature also permits holding back or blocking a greater number of containers or articles as the latch can be released at any pressure that may be imposed thereon by the gate. As long as a gate is in an open position and not permitted to swing to its normal or closed position, the articles on such line will pass on and those on a second line will be held until a sufficient break in the spacing of the articles occurs and should two articles arrive at the gate on their respective lines at exactly the same instant, one is arranged to give preference to the other.

Referring to the drawings, 1 indicates the base of the unit having a lateral flange 2 at one end thereof for mounting the base to a rail or bracket fixed to a rail of a conveyor and to extend the base preferably in a horizontal plane therefrom. The base has a cover 3, removably fixed thereto providing an enclosure for the elements of the unit mounted upon and sustained by the base.

The base 1 at its laterally flanged end has a boss 4 integral therewith and extending from opposite face sides thereof, having a bore axially therethrough to supportingly receive a gate pivoting shaft or stud 5, which extends from the upper end of the boss to journal a gate 6 as a lever. One arm of the gate or lever is arranged to normally extend cross-wise of and above a conveyor for which it serves, to be engaged by the articles transported upon or by the conveyor to either block transit of the articles upon reaching the gate, when the gate is latched or to be shifted by the transported article to an open position for its continued and interrupted travel. The opposite arm or end of the gate or lever carries a stud 7 depending therefrom for cooperation with a latch to withhold the swing of the gate by the pressure of a moving article thereby blocking its transit.

The gate has a pair of bearings 8, 8, respectively seated therein at relative opposite sides thereof, axially traversed by the gate journaling shaft 5. The gate is confined against lateral or transverse movement upon the shaft by a pair of retainer rings 9, 9, each annularly recessed into the shaft 5, the lower of which is in bearing contact with the upper end of the boss 4 of the base.

The upper end of the gate shaft 5 has a disk 10 fixed thereon by a screw 11, axially threaded into the upper end of the shaft 5. The disk 10 has a pin 12 projecting from the lower side for anchoring one end of a flat band spirally coiled spring 13 thereto. The disk also serves as a guard for the spring. The opposite end of the spring is anchored by a bolt to the upper side of the gate. As shown in Figure 2, the shaft 5 also serves as a support for the cover or casing 3 and to which the head portion is secured.

The gate is latched in its closed or normal position when extending crosswise of the conveyor line by a latch arm 14, at one end pivotally mounted upon a stud 15, traversing and fixed to a boss formed on the base 1. The latch arm 14 is shaped to provide a recess within its upper side for the reception of the stud 7, depending from the latching arm of the gate 6 and to offset the forward end of the latch arm which lon-

gitudinally has its outer edge of arc shape to be engaged by the stud 7 of the gate to shift the latch arm to avoid any interference to the gate in its return stroke. The latch arm 14 toward its outer edge has a lug 16 extending perpendicular therefrom from its outer edge and provided with a concaved front face which extends slightly in relief from the relative wall forming the recess in the upper side of the latch arm for normally bearing against or blocking the stud 7 to withhold gate swing in a gate opening direction. The concave surface of the lug 16 therefore possesses but a line contact with the latching stud depending from the gate and as the latching stud is free to rotate in its bearing in the gate, the latch arm can readily and easily be shifted by slight pressure to release the gate even when the gate is subjected to a heavy pressure by the articles conveyed and blocked thereby.

As the latch arm normally may be maintained in either a latching or non-latching position and is moved to its non-latching position by an electrically controlled solenoid, the curved edge of the latch arm can always be engaged on a return stroke of the gate lock stud 7 of shift the latch arm in the event of its release prior to a return stroke of the gate to its normal position cross-wise of the conveyor or normally is permitted to occupy its latching position.

The gate unlatching movement of the latch arm, being electrically controlled, it normally may be in either a latched or unlatched position whichever is most favorable for particular operating conditions as the gate can always return to its closed or normal position when released by the article or articles conveyed. As long as the articles arrive in proximity to one another to prevent the gate to swing to its normal position they cannot be withheld and only when the spacing is sufficient to allow full return of the gate. As the unlatching is done electrically it is possible to arrange the gate to swing very freely and thereby does not require too heavy a spring pressure for returning the gate. This permits the handling of much lighter weight articles than is possible with a strictly mechanical unit. Also a greater number of articles can be withheld or blocked as the latch arm can be moved to its unlatching position when subjected to excessive pressure.

The latch arm is moved and held to its gate latching position by a spring 17 about a link 18. The link 18 at one end is pivotally connected to the lower side of the latch arm 14 and its opposite end slidably traverses an ear 19 radially extending from the boss 4 of the base 1 upon which the gate is fulcrumed. The link limits the return stroke of the latch arm and is adjustable for a determinate setting of the lug 16 of the latch arm relatively to stud 7 of the gate when the gate is in its closed position.

The latch arm is moved to its unlatching position by a pull type of solenoid 20 of conventional form mounted upon a relative side of the base 1, and at an angle to the latch arm. The solenoid has its plunger in coupling connection with the latch arm by a link 21, at one end pivotally connected to the solenoid plunger and its opposite end pivotally connected to an ear 22 extending laterally from the lower side of the latch arm. When the solenoid is energized, the plunger is moved inwardly thereof swinging the latch arm in a direction to unlatch the gate.

In an electrically controlled system as herein exemplified as a selected method of operation, the

solenoid is normally deenergized to maintain the latch arm in its gate latching position and as the latch arm of one unit controls the electric circuit for the solenoid of a second unit, both gates must be in the closed position before the solenoid of either unit can be energized, so that one gate is always locked while the second gate is open.

As shown in Figures 1, 2 and 3 the gate, longitudinally, along one side thereof, as the rear side, carries an inertia brake lever 23, pivotally mounted at one end to and intermediate of a pair of ears 24, extending laterally from the pivot hub of the gate. The lever 23 at its pivoted end extends slightly beyond its fulcrum and bears against a rounded end of a rod 25 slidably diametrically within the hub of the gate to bring its opposite end in thrust bearing engagement with the gate shaft 5. The opposite end of the brake lever 23 is loosely mounted upon the gate by a bolt 26, which carries a spring 27, partially recessed into and in bearing engagement with the lever, whereby any sudden rebound movement of the gate will cause the spring tensioned end of the brake lever to depart from its bearing contact with gate. The brake lever 23 under such action will impart pressure upon the rod 25 increasing its frictional bind against the periphery of the gate fulcrum shaft, resistant to the swing of the gate. This prevents any undue forward rebound or false momentum of the gate, which as the gate actuates an electric circuit controlling switch would be interfering to an electric control of its latching arm. The brake mechanism, however, may be dispensed with by hingedly mounting the unit as herein exemplified.

Referring to Figures 7 to 10 inclusive the base of the unit instead of being rigidly secured as to the side of a conveyor or rail thereof, is hingedly mounted at one end upon a plate 28, which as shown in Figures 7 and 8, is fixed to a channel beam form of rail 29 for a side of a roller belt type of conveyor and extend in parallelism therewith and outer side thereof. The plate 28 at its outer side and at one end has a pair of hinge elements 30, fixed thereon or integral therewith and in an offset or staggered relation for pivotally mounting a bracket 31 thereon. The bracket 31 is preferably of T-form in cross-section with the central longitudinal flange thereof positioned intermediate of the hinge elements 30 and provided with a pair of hinge elements 32, one respectively at each of the opposite sides of the flange for a hinge connection with the hinge elements 30. The bracket 31 is rigidly secured or bolted to the outer side of the base 1 of the unit with the hinge connection forward of the gate. The base 1 is vertically disposed, with the gate extending horizontally above and cross-wise of the conveyor and laterally of the conveyor rail 29. The opposite end of the base 1 is confined within a channel 34 formed at the relative end of the plate 28 to limit the swing of the base. The offsetting of the hinges allows for a slight pivotal action of the unit—which frictionally retards the movement in one direction thereby reduces and neutralizes its swinging force. This accommodates for a slight bouncing or vibrating action of the unit to the relief of the gate, and which serves in substitution of the inertia brake lever 23 carried by the gate, as heretofore described.

The arrangement permits a swinging action of the device as a unit and avoids independent rebound of the gate, which may be disturbing in its subsidiary use for an electric circuit control, as for a solenoid actuating its latch arm, which also controls an electric circuit in connection with a

second unit, as for automatically controlling the flow of articles on two conveyor lines in which one merges with the other. The articles on the line arriving first at its gate continue in travel while those on a second line are withheld until the gate of the first line has been cleared to permit it to swing back to its normal or neutral position, which it must occupy before the gate latching arm of a relative second unit can be moved to its unlatching position. The offset pivot hinge mounting of the base 4 allows the complete unit to move forward and slightly upward on impact of the returning gate and automatically return to starting position when the force of impact has been dissipated. The hinge also is increasing resistive to the swing of the unit and thereby tends to serve as a friction brake, and owing to the limited swing of the unit the parts cannot be bound.

For a preferred method of automatic control of a pair of units both gate and latch arm of each unit respectively actuate an electric circuit controlling switch. The switch structure may be of various conventional types commercially available, and as to detail of construction are separate and apart from the present invention. For example in Figures 1 and 2, the electric switches 35, 36 each designated as a single pole, double throw, and may be used as a normally "open" or normally "closed" switch and therefore in construction are the duplicate of one another. Each switch has a spring tensioned pivoted lever with a roller at its outer or free end and for the gate, the roller bears against a side of the gate arm which carries the gate latching stud 7. The second switch 36 is actuated by a lug extending from the hub of the latch arm 14. The switch lever in each instance actuates a plunger which in turn actuates a flexible strip metal conductor, as a single pole, with its free end moving between a pair of oppositely disposed and suitably spaced stationary terminals for alternate service, depending upon which is in connection with an electric circuit line, for either open or closed circuit control. In a second type, as illustrated in Figure 12, the electric switches 37 and 38 relatively corresponding to switches 35—36, have the plunger provided with a roller for a more direct engagement with the gate or actuator.

As outlined by the wiring diagram Figure 13, a pair of units for automatic control of the flow or travel of articles on two conveyor lines, one merging with the other, for example as diagrammed in Figure 11, the gate actuated switch of each unit is termed a normally closed, held open to break the electric circuit to its latch arm actuating solenoid when the gate is in its closed position. The latch arm 14, as it normally is in its gate latching position, its solenoid must be energized to move the latch arm to its gate unlatching position. The electric switch actuated by the latch arm normally is in a closed position and as it is in series circuit connection with the gate actuated electric switch of a second or other unit, the gate must be moved for its switch actuation before the solenoid for actuating its latch arm can be energized. Under such condition the gate of each unit when in its closed position has its gate latching stud 7, spaced slightly from the lug 16 of the latch arm 14, as illustrated in Figure 12. The spacing in practice is approximately one-eighth of an inch. This permits the gate actuated electric switch to move from a normally open to a closed position while the latch arm is in its normal or closed position.

The diagram of a wiring plan as illustrated in

Figure 13, is merely schematic, as in practice mechanical and electrically interlocked relays may be included and which would more directly control an electric circuit to the solenoid, respectively for each latch arm to energize the solenoid at a higher current than that employed for the gate and latch swing controlling circuit and also to give one gate preference over another in the event the gates of relative units be simultaneously contacted and moved by articles transported on the several lines. A latch actuating solenoid of one line, as a main line may be normally maintained energized so that the gate is constantly unlatched unless deenergized by an electric circuit control of a second unit or manually controlled from a dispatching point. As any system of electric control is separate and apart hereof, the method included herewith will suffice for an understanding of an operation of a unit.

Referring to Figure 13, representative of a wiring diagram for a pair of units as exemplified in Figure 11, in which the gate for the main conveyor line 39, is latched in its normal position blocking the articles against transit, while the unit for the second conveyor line 40 merging with the line 39, has its gate held in an open position by the articles which are being transferred from the line 40 into the line 39. Thus for the wiring diagram, the electric switches 37 and 38 and solenoid 20, at the left constitute a part of the unit for the main line 39 and those at the right for the second conveyor line 40 merging with the main line.

The gate actuated switch 37 for the main line unit is closed as the gate is under pressure of the articles blocked, it having been moved sufficiently to bring its latching lug 7 into contact with the latch 14. As the latch actuated switch 38 of the second line is in series circuit connection with the gate actuated electric switch 37 of the main line unit the electric circuit is broken as the latch 14 of the second conveyor line 40 is in a gate unlatching position. The solenoid 20, respectively for each unit has one pole in direct circuit connection to an electric supply source by a wire 41, while its opposite pole as for the first or main line unit is in series circuit connection with the latch actuated switch 38 of a second unit by a wire 42, thence by a wire 43 connects said electric switch with the gate actuated electric switch 37 of the first unit and by a wire 44 to the opposite pole of the electric supply source. As the latch actuated switch 38 of the second unit is in an open position the circuit for the solenoid of the first unit cannot be completed. Correspondingly opposite pole of the solenoid of the second unit connects by a wire 46 in series circuit connection with the latch actuated switch 38 of the first unit, thence by a wire 47 with the gate actuated electric switch 37 of the second unit and therefrom by a wire 48 to the electric current supply, and as the latch actuated switch of the first unit is closed the circuit is completed to the solenoid of the second unit, and remains so until its gate returns to its normal position.

In an instance as shown in Fig. 11, in which the gate 6 for the second conveyor line 40 is held open by the traversing articles and which follows for the wiring diagram Fig. 13, the latch actuated switch 38 for the conveyor line 40 is in an open position, thereby breaking the electric circuit for the solenoid 20 of the main line 39, so that the latch for the main line 39 remains in its closed position locking the gate against opening although it was moved slightly by the

pressure of the articles thereagainst, sufficient to permit its gate actuated switch to be moved to an electric circuit closing position, but alone is ineffective to complete the circuit for the solenoid of the main line 39. As a gate switch 37 of one line and a latch switch 38 of a second line are in series electric circuit connection both must be closed before the solenoid which they control can be energized. With the gates of both lines in a normally closed position the control circuits for both lines are neutral, so that the latches of both lines are in a position each to hold their respective gate in a closed position. As shown in Fig. 13 with both gates being under pressure of the transmitted articles, both gate actuated electric switches 37 are in a closed position and as the gate for the conveyor line 40 was advancedly moved in a gate opening position it initially completed the electric circuit for its solenoid and moved its latch to a non-gate locking position, and retained such position until its gate moved to a closed position which opened the gate actuated switch 37 of the conveyor line 40 neutralizing its solenoid of the line 39 would be instantly energized.

The latch being moved to its gate unlatching position by a solenoid when energized, operating a plunger in coupling connection with the latch can normally be maintained in either an active or inactive condition, depending solely upon the method of electric current control for energizing or deenergizing the solenoid and is non-interfering to the return movement of the gate. In the control of the electric current for the solenoid by the gate, the gate must return to its normal position to deenergize the solenoid. However should the circuit for the solenoid be controlled independent of a unit, as from a dispatching point, the solenoid can be deenergized prior to the return of the gate, which however does not impede or interfere therewith, as the return pres-

sure of the gate is sufficient to move the latch through its stud engagement with the cam edge of the latch. The latch in its gate latching position being in anti-friction engagement with the gate and moving in an arc can be moved under the most severe pressure brought thereagainst by the load bearing against the gate.

It is recognized that the electric means for actuating the latch may possess rotative or oscillatory motion in substitution of reciprocatory motion.

Having described my invention, I claim:

A conveyor traffic control unit, comprising a pivotally supported gate for normally extending over a conveyor to intercept an article transported upon the conveyor and thereby moved in relief when unlocked and withhold traverse of the article when locked, a pivotally supported latch arm normally in engagement with the gate to withhold gate movement, a stud journaled on said gate for engagement with the latch arm, the surface engaged by the stud being of arcuate form having a radius with its pivotal axis, thereby to avoid stall of its gate unlatching stroke under heavy pressure imposed upon the gate while blocking transit of an article and means for moving the latch arm in a gate unlocking stroke.

NORMAN M. SULLIVAN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,281,580	Johnson	Oct. 15, 1918
1,924,556	Jennings et al.	Aug. 29, 1933
2,047,406	Copping	July 14, 1936
2,304,447	Feusier	Dec. 8, 1942
2,371,419	Bergmann	Mar. 13, 1945