

Sept. 15, 1942.

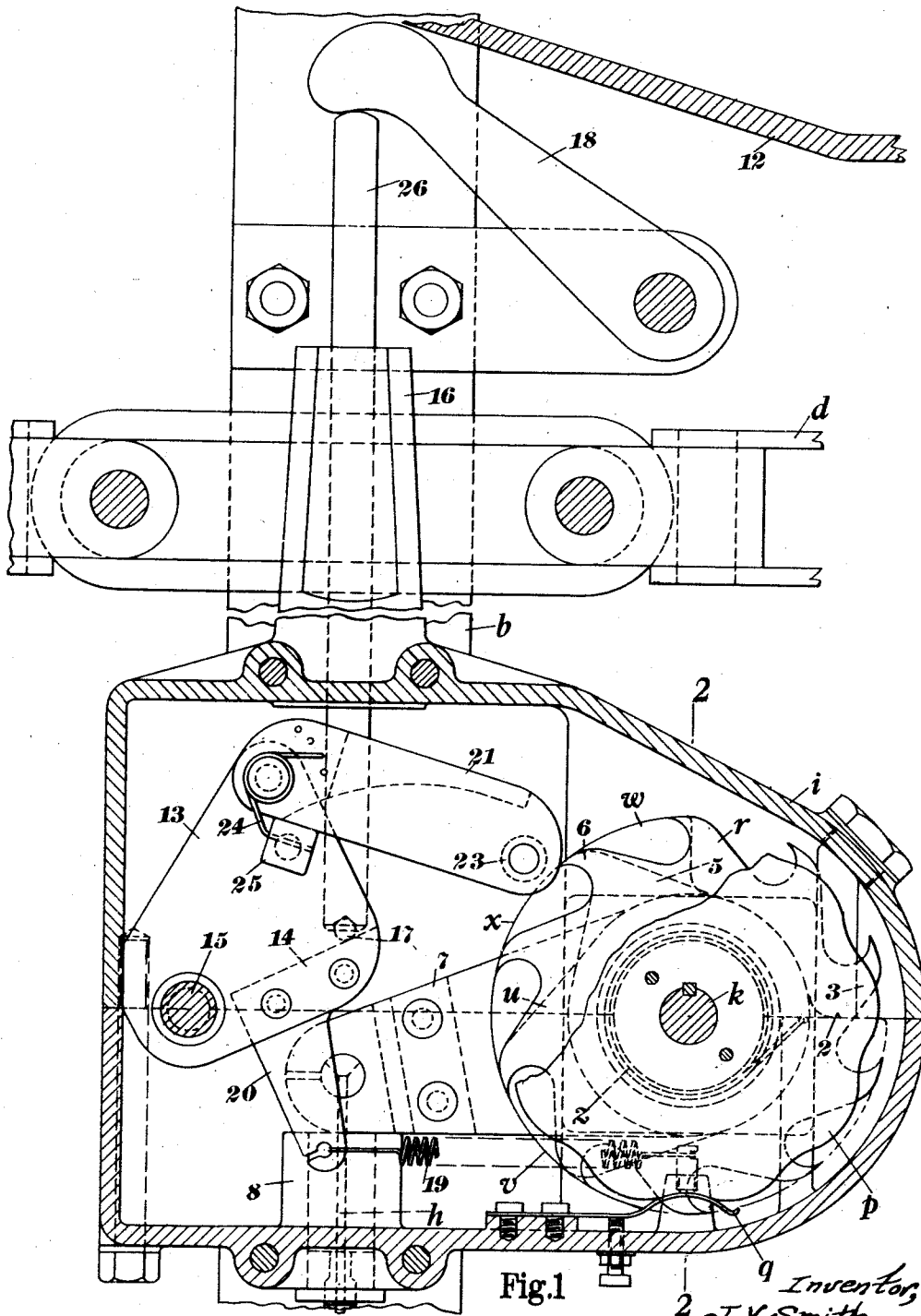
J. V. SMITH

2,296,223

CONVEYER CONTROL DEVICE

Filed June 7, 1940

6 Sheets-Sheet 1 .



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6 Sheets-Sheet 2

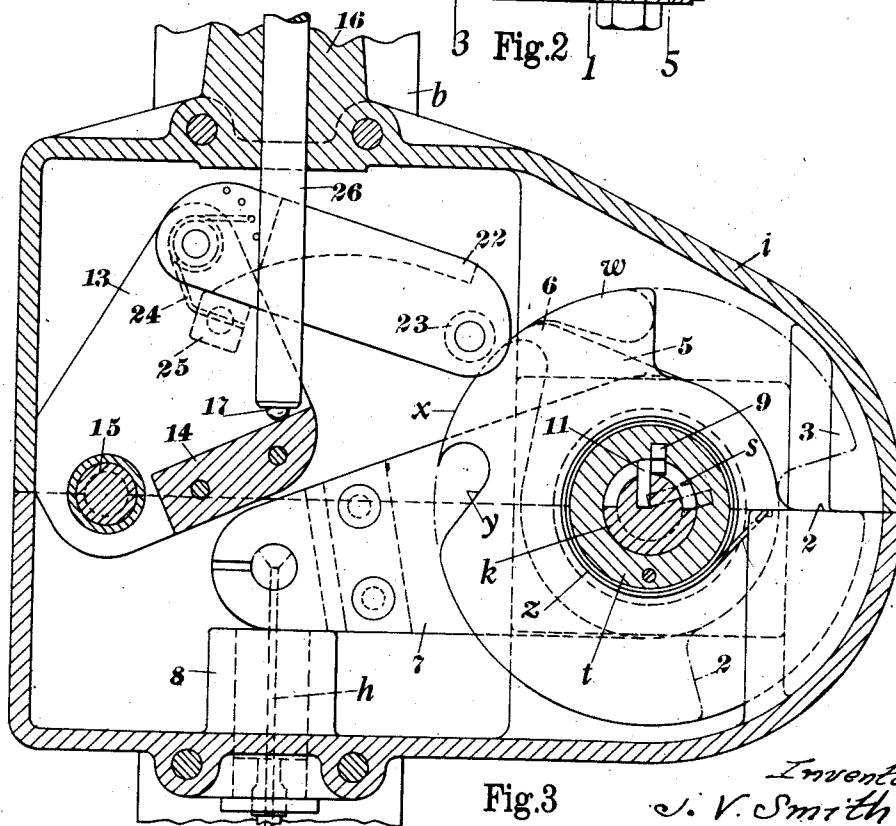
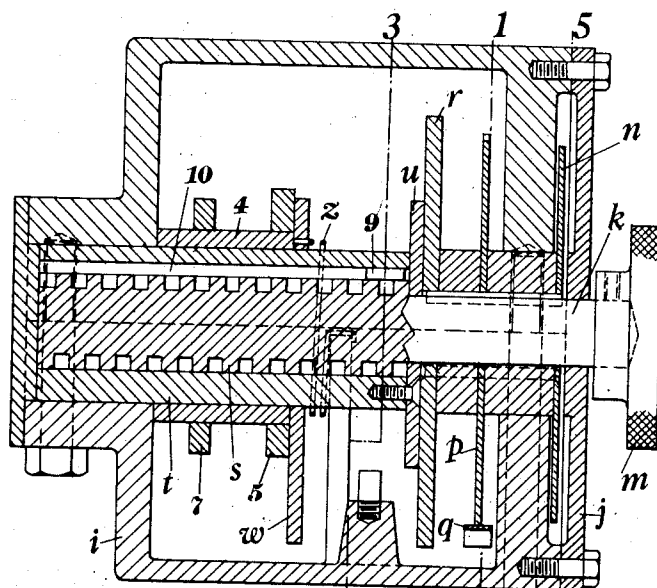


Fig. 3

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6 Sheets-Sheet 3

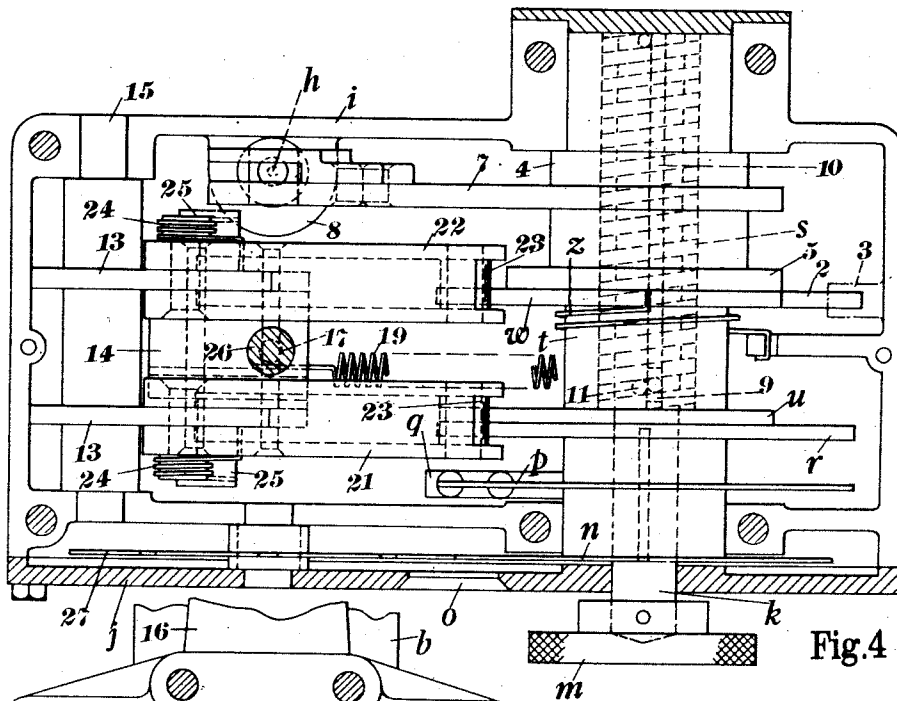


Fig. 4

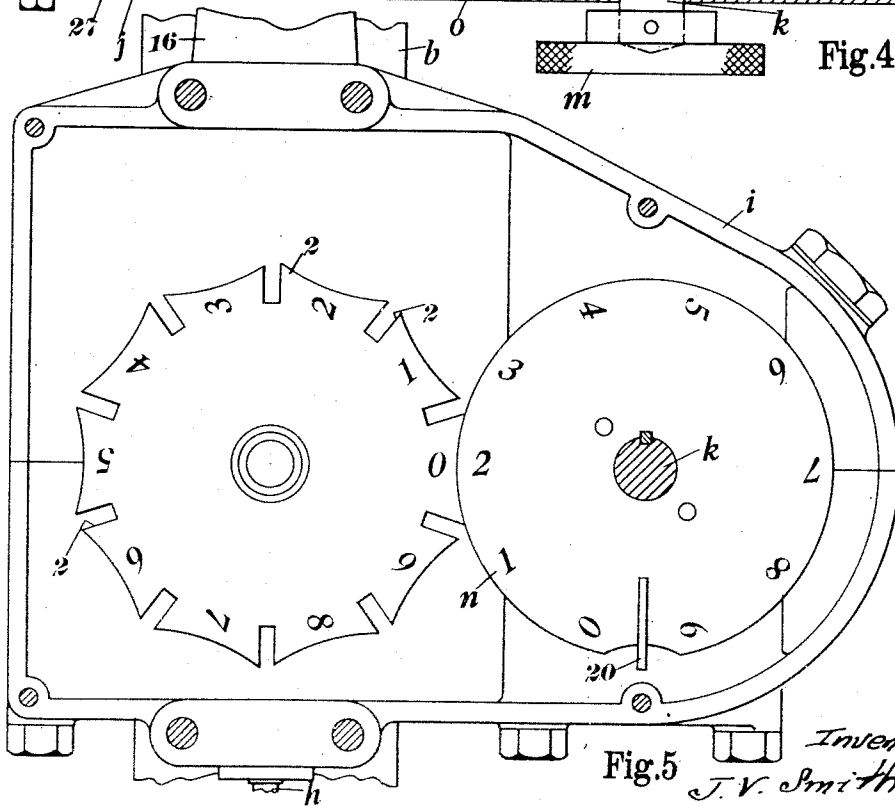


Fig. 5

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6 Sheets-Sheet 4

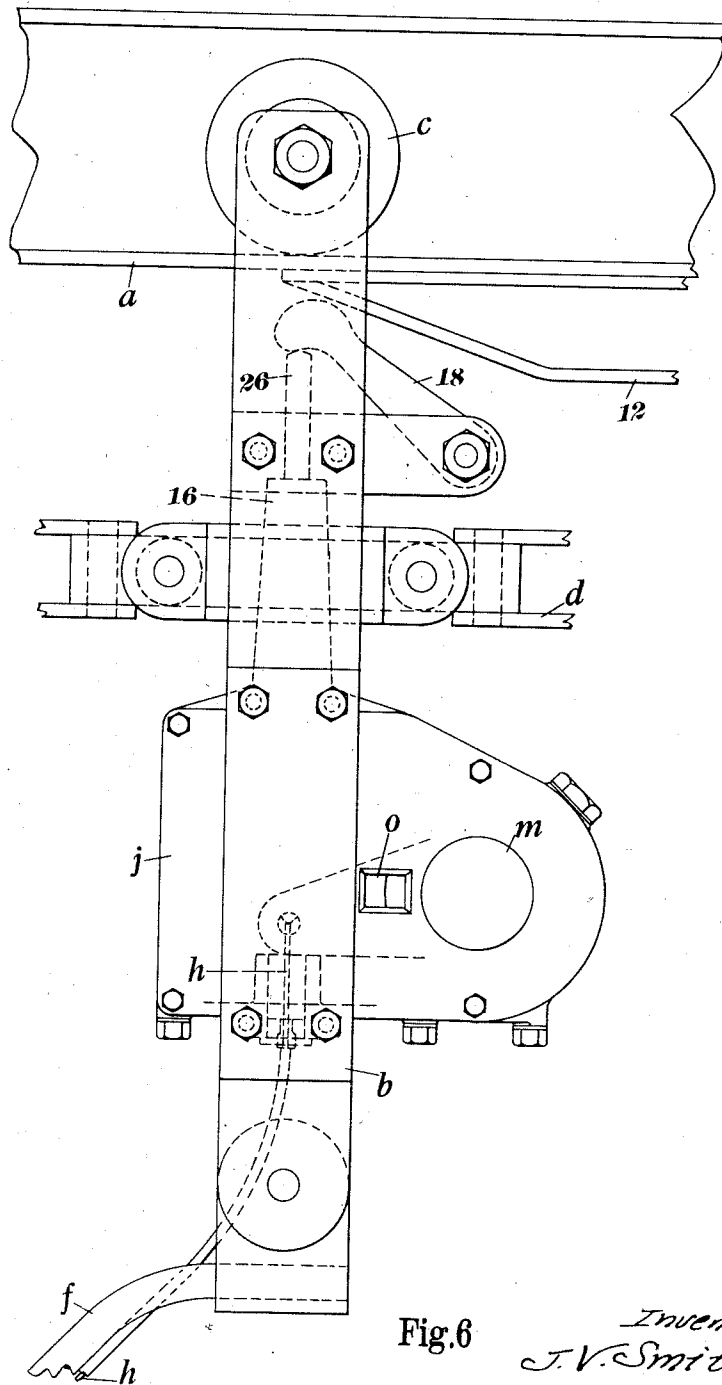


Fig.6

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6 Sheets-Sheet 5

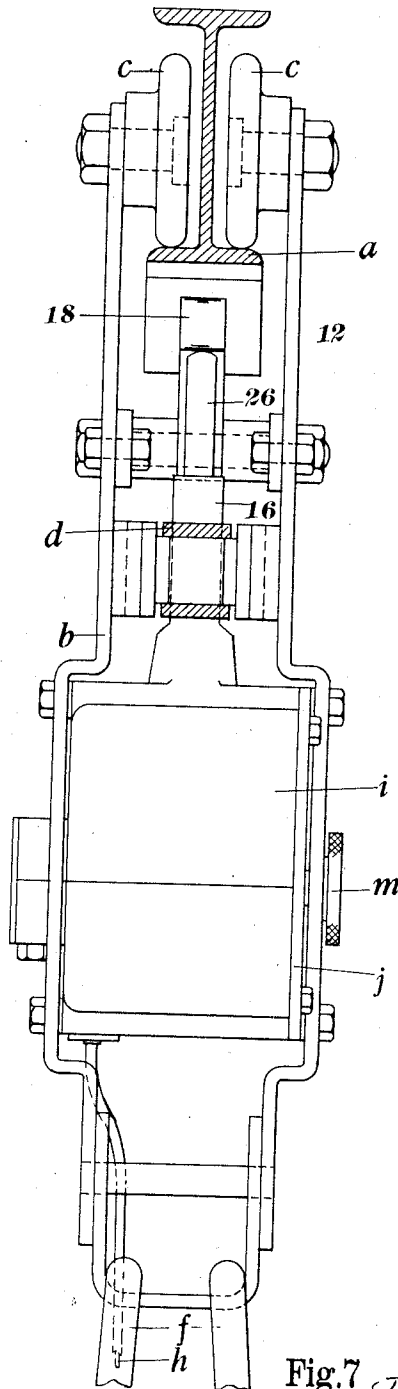


Fig. 7

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CONVEYER CONTROL DEVICE

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6 Sheets-Sheet 6

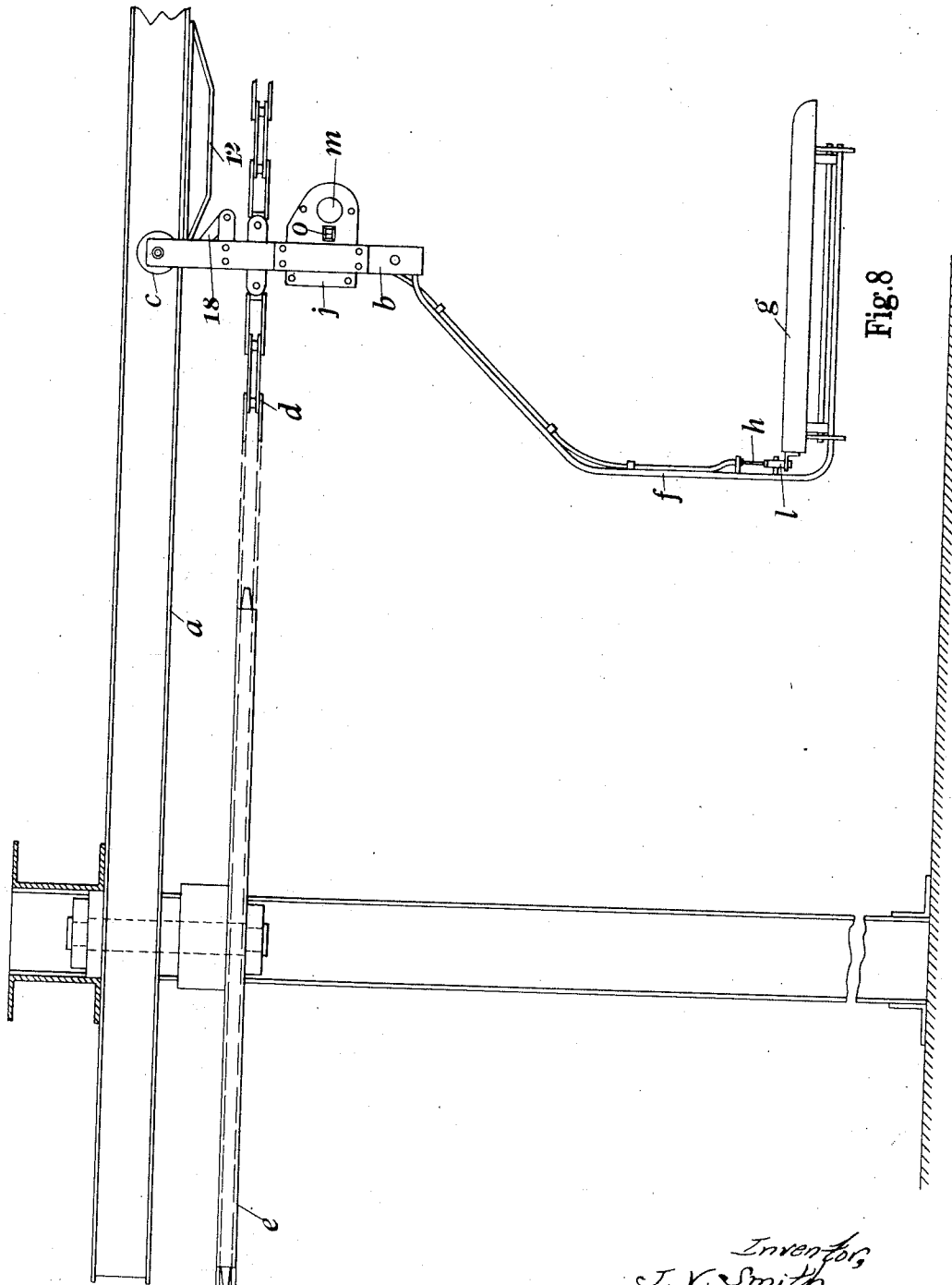


Fig. 8.8

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UNITED STATES PATENT OFFICE

2,296,223

CONVEYER CONTROL DEVICE

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Application June 7, 1940, Serial No. 339,397
In Great Britain June 30, 1939

7 Claims. (Cl. 235—132)

This invention relates to endless chain and like conveyers of the kind having connected thereto tiltable trays by which goods can be transferred from one position to another. It is already known to provide conveyers of the kind specified above with control means for causing any tray to tilt and discharge its load at some position predetermined by the loader or other attendant.

The object of the present invention is to provide improved control means of a simple and convenient form for enabling the discharge to be effected at any predetermined position.

In the accompanying sheets of explanatory drawings:

Figures 1 and 2 are respectively a sectional front elevation and a sectional side elevation of mechanism constructed in accordance with the invention for controlling the discharge movement of a tiltable conveyer tray, Figure 1 being taken on the line 1—1 of Figure 2, and Figure 2 being taken on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 2.

Figure 4 is a part sectional plan of the mechanism shown in Figures 1 to 3.

Figure 5 is a section on the line 5—5 of Figure 2.

Figures 6 and 7 are respectively a front view and a side view of the mechanism shown in Figures 1 to 5, and are drawn to a smaller scale than the latter figures.

Figure 8 illustrates a part of an endless chain conveyer provided with mechanism as shown in Figures 1 to 7, and is drawn to a smaller scale than the latter figures.

Referring more particularly to Figures 6 to 8 of the drawings, *a* indicates a part of an overhead conveyer track from which is suspended a tray carrier *b*. This latter comprises a pair of side members secured together in spaced relationship and depending from opposite sides of the track *a*, the upper ends of these side members being supported on the track by rollers *c*. At a position beneath the track *a* the carrier *b* is anchored to an endless conveyer chain *d* which passes around sprockets as *e*. The lower end of the carrier *b* is adapted for the connection thereto of the adjacent ends of a pair of members *f* which serve to support the tiltable tray *g* at any convenient position beneath the carrier. The tray *g* is movable with its carrier *b* under the action of the conveyer chain *d* in the usual manner, and serves to carry goods from a loading position to any of a plurality of discharge positions. At the

position where it is desired to discharge the contents of the tray, the latter is tilted under the control of a Bowden cable or other suitable means (hereinafter termed a cable and indicated by *h*) which is operable in the manner hereinafter described, and which is carried by one of the tray-supporting members *f*, the end of the cable adjacent to the tray *g* being connected to any convenient and ordinary trip mechanism *l* which holds the tray in its horizontal position.

In carrying the invention into effect as shown, I employ a casing *i* adapted to be mounted between the side members of the tray-carrier *b* at a position adjacent to the underside of the conveyer chain *d*. This casing is preferably made as shown in two (upper and lower) parts, and has an open front side covered by a removable plate *j*.

Mounted within the casing *i* and extending at one end through the front plate *j* is a rotatable spindle *k*. At its outer or front end the spindle *k* carries a knob or finger piece *m* for enabling the spindle to be rotated by the attendant. Secured on the spindle *k* near its front end is a dial *n* in the form of a disc bearing on its front face a plurality of numerals corresponding to the discharge positions of the tray *g*, the dial being situated within the casing *i* immediately behind the front plate *j* so that rotation of the dial with its supporting spindle causes the numerals on the dial to be brought in succession opposite to a window or opening *o* in the front plate of the casing.

To hold the spindle *k* against accidental movement in the position to which it is moved by the attendant any convenient means may be employed. Thus, in the example shown, such means comprise a disc *p* secured on the spindle *k* at a position behind the dial *n*, and a detent in the form of a spring strip *q* secured at one end to the casing *i*, the outer end of the spring strip being adapted to engage recesses in the periphery of the disc as shown clearly in Figure 1.

Also secured on the spindle *k* at a position behind the disc *p* is a ratchet or like toothed wheel *r* which is adapted to be actuated in the manner hereinafter described for returning the spindle to its initial position after the spindle has been actuated by the attendant.

The portion of the spindle *k* at the rear of the toothed wheel *r* is provided with a screw thread *s*, and on this portion of the spindle is freely mounted a rotatable sleeve *t*. On the end of the sleeve *t* adjacent to the toothed wheel *r* is secured a cam *u* having a peripheral portion

v concentric with and of the same radius as the toothed wheel *r*. At a position intermediate its ends the sleeve *t* has secured on it another cam *w* which also has a portion *x* of its periphery concentric with and of the same radius as the toothed wheel *r*, this peripheral portion being formed with a notch *y* corresponding in shape to the space between each pair of adjacent teeth on the wheel. The cam *w* is loaded by a spring *z* which tends to move this cam together with the sleeve *t* and cam *u* in a counterclockwise direction as seen in Figure 3 to an extent determined by contact of a shoulder 2 on the cam with an abutment 3 in the interior of the casing *i*, the spring being arranged around the sleeve *t* and having its ends anchored to the cam *w* and casing respectively.

Freely mounted on the sleeve *t* is another rotatable sleeve 4 to which is secured a radial arm 5 having a claw-like outer end 6 shaped at one side to resemble the notch *y* in the cam *w*, the length of this arm from its outer extremity to the axis of its supporting sleeve being equal to the radius of the peripheral portion *x* of the cam. Also secured on the outer sleeve 4 is a lever 7 which at its outer end is adapted normally to rest on an abutment 8 in the casing *i*, this end of the lever being connected to the adjacent end of the cable *h* which passes through a hole in the casing.

For effecting an operative connection between the spindle *k* and the sleeve *t* I employ any convenient member 9 which engages and can slide along the screw thread *s* of the spindle and a longitudinal groove 10 in the inner periphery of the sleeve. This member 9 is adapted in one position to engage a stop 11 on the spindle *k* so that rotary movement of the spindle in an appropriate direction is accompanied by corresponding movement of the sleeve *t*.

For actuating the ratchet or like toothed wheel *r* to return the spindle *k* after the latter has been rotated by the attendant, and for imparting movement to the tray-tilting lever 7 I employ toggle mechanism which is arranged in the casing *i*, and is operable successively by each of a plurality of ramps or like abutments as 12 on the underside of the conveyer track *a*, one such abutment being provided at each of the positions where it may be desired to discharge the contents of the tray *g*. In the example shown the toggle mechanism is formed in part by a pair of plates 13 mounted in spaced and parallel relationship on a shaft 15, the latter being arranged in the casing *i* at one side of and parallel to the spindle *k*, and the plates being capable of pivotal movement about the axis of the shaft. At the side adjacent to the spindle *k* the plates 13 are interconnected by a transverse member 14 which forms an abutment for the lower end of a vertical plunger 26, the latter having the form of a rod which extends through and is supported by a bearing 16 on the upper side of the casing *i*. Preferably the lower end of the plunger 26 is provided as shown with an anti-friction ball 17 for bearing on the part 14. The plunger 26 and its bearing 16 pass through the adjacent part of the conveyer chain *d* which is arranged beneath the track *a*. Adjacent to the upper end of the plunger 26 there is mounted on the tray-carrier *b* a lever 18 having its free end situated above its pivoted end and in contact with the upper end of the plunger, so that each ramp or like abutment 12 on the underside of the track *a* can impart downward movement to

the plunger through the associated lever during the movement of the tray-carrier along the track. This movement of the plunger 26 causes pivotal movement of the toggle plates 13 against the action of a return spring 19, the latter being connected at one end to a lug 20 on the toggle member 14 and at the other end to the casing *i*. The other part of the toggle mechanism above mentioned is formed by a pair of arms 21, 22 which at one pair of corresponding ends are connected respectively to the upper parts of the two toggle plates 13. The other or outer ends of the toggle arms 21, 22 are adapted to engage and impart angular movements to the toothed wheel *r* and the radial arm 5 when the plunger 26 is depressed and when the cams *u*, *w* are in appropriate positions. These cams *u*, *w* are adapted when in certain positions to prevent actuation of the toothed wheel *r* and radial arm 5 by the corresponding toggle arms 21, 22. Preferably and as shown each of the toggle arms 21, 22 is shaped to provide a pair of spaced sides, and carries a transverse pin 23 at the end remote from the arm pivot, the pin on the arm 21 being adapted to engage the teeth of the wheel *r*, and the pin on the arm 22 being adapted to engage the claw-like outer end 6 of the radial arm 5. The toggle arms 21, 22 normally rest under the action of gravity (with or without the assistance of light springs 24) against stops 25 on the toggle plates 13, the outer ends of the arms being then situated at a slightly lower level than the other ends. Moreover, the spacing of the toggle plates 13 and the arrangement of the toggle arms 21, 22 is such that the outer end of the arm 21 is normally situated adjacent to the teeth of the wheel *r*, and the outer end of the arm 22 is normally situated adjacent to the outer claw-like end 6 of the radial arm 5. Further each of the cams *u*, *w* is arranged so that it is capable of assuming a position in which its peripheral portion *v* or *x* lies in the path of the corresponding toggle pin 23 and thereby renders ineffective the movement of the toggle arm carrying that pin.

When the mechanism above described is in the position shown in the drawings, the slidable member 9 is in contact with the stop 11 on the spindle *k*, and the cam *u* permits engagement of the toggle arm 21 with the toothed wheel *r*, but the part of the peripheral portion *x* of the cam *w* at the upper side of the notch *y* prevents engagement of the other toggle arm 22 with the claw-like outer end 6 of the radial arm 5. If the plunger 26 is now depressed the toggle arm 21 will engage the toothed wheel *r* and move it through a predetermined angular distance in a clockwise direction, and this movement will be communicated to the spindle *k* which, due to the engagement of its stop 11 with the slidable member 9 will carry the inner sleeve *t* with it. During this movement the pin 23 on the toggle arm 22 rides on the peripheral portion *x* of the cam *w* and is thus prevented from engaging the claw-like outer end 6 of the radial arm 5. Movement of the inner sleeve *t* with the spindle *k* causes corresponding movement of the cams *u*, *w*, the notch *y* in the cam *w* being brought into line with the claw-like outer end 6 of the arm 5, and the shoulder 2 on this cam being moved away from its abutment 3. Upon the release of the plunger 26 the latter and the toggle mechanism 13, 21, 22 return to their normal positions as shown under the action of the spring 19, but the parts previously moved by the toggle mechanism

remain in their new positions. If now the plunger 26 is again depressed the toggle arm 21 will engage the toothed wheel *r* and move it through a further angular distance whilst the toggle arm 22 will (by engagement with the notch *y* and claw-like part 6) impart similar movements to the cam *w* and the radial arm 5. This movement of the arm 5 will be communicated through the outer sleeve 4 to the lever 7 which will cause the cable *h* to be actuated and thereby enable the tray *g* to tilt. Moreover, the cam *w* will be brought to the position shown in chain-dotted lines in Figure 3, the movement of this cam causing its shoulder 2 to be moved further away from the abutment 3, and also causing the part of its peripheral portion *x* at the lower side of the notch *y* to assume a position for preventing further actuation of the radial arm 5 by the toggle arm 22 after the radial arm has returned to its normal position as shown. Further, the cam *u* will be brought (by its movement with the cam *w* and sleeve *t*) to a position in which its peripheral portion *v* serves to prevent further actuation of the toothed wheel by the toggle arm 21. Upon the release of the plunger 26, the latter and the toggle mechanism 13, 21, 22 will return to their normal positions under the action of the spring 19. Also the lever 7, the radial arm 5, and their supporting sleeve 4 will return to the positions shown under the action of gravity and/or another spring (not shown), and the tray *g* will return to its horizontal position. The mechanism is now in an ineffective condition and further depression of the plunger 26 will have no effect other than to cause the pins 23 on the toggle arms 21, 22 to ride on the peripheral portions *v*, *x* of the cams *u*, *w*.

With the mechanism above described in its ineffective condition and the tray *g* loaded, the attendant at the loading position may determine the particular position at which the load is required to be automatically discharged. To do this he rotates the spindle *k* in a counter-clockwise direction until the corresponding numeral on the dial *n* is behind the window or opening *o* in the front plate *j* of the casing *i*. If the discharge position is either number one or number two, the rotary movement imparted to the spindle *k* by the attendant is accompanied by corresponding movement of the inner sleeve *t* under the action of the spring *z*, and no sliding movement of the member 9 will take place, the movement of the inner sleeve with the spindle serving to bring the cams *u*, *w* into appropriate positions for enabling the tray *g* to be tilted at the selected position under the control of the plunger 26 as above described. But if the selected discharge position is any other number, say four, the shoulder 2 on the cam *w* will be brought into contact with the abutment 3 before the spindle *k* has been rotated by the attendant to the required extent, and during the continued rotation of the spindle the slidable member 9 will (by its interaction with the screw thread *s* on the spindle) be caused to slide along the groove 10 in the inner sleeve *t*. During the transit of the carrier *b* with its loaded tray *g* along the conveyer track *a*, each successive ramp or like abutment 12 will cause a unit return movement to be given to the spindle *k* through the plunger 26, toggle parts 13, 21 and toothed wheel *r*, and so cause a corresponding return movement to be given to the slidable member 9, until the latter engages the stop 11 on the spindle as shown in the drawings. If, as previously stated, the selected discharge position

is number four, the mechanism will assume the condition shown at discharge position number two, so that the movements imparted to the plunger 26 by the ramps or like abutments 12 at the next two discharge positions will cause the operations previously described to take place for effecting discharge of the contents of the tray *g* at the required position, namely, number four.

The length of the ramp or like abutment 12 at each discharge position is such that it serves to hold the plunger 26 in a depressed condition for a sufficient length of time to ensure complete discharge of the tray contents.

If the number of discharge positions is so large that the numerals corresponding to these positions cannot be accommodated on a single dial, I may use two or more inter-connected dials. Thus, in the example shown, the dial *n* is a "units" dial and has connected to it a rotatable "tens" dial 27, the two dials being arranged side by side in the same plane. The "tens" dial 27 is formed with radial slots 28, and the "units" dial *n* is formed or provided with a radial tooth or projection 29 which at the end of each complete revolution of the "units" dial engages one of the slots in the "tens" dial and moves the latter through one tenth of a revolution, the "tens" dial being held stationary (except when being moved under the action of the said tooth or projection) by the interaction of a concave part of its periphery with the circular periphery of the "units" dial. It will be seen therefore that the two dials *n*, 27 form part of a Geneva mechanism which is operable by the spindle *k*, the numerals on the adjacent parts of the dials being visible through the opening or window *o* in the front plate *j* of the casing *i*.

The invention is not limited to the example above described as subordinate details may be varied to suit requirements.

By this invention the preselection of any of a large number of discharge positions for a conveyer tray can be effected by a device which is simple in character, is of compact form, and is not liable to be rendered ineffective by swinging of the tray carrier.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. Selector mechanism comprising the combination of an actuable member, intermittently operable actuating means, and control means for determining which of a succession of similar movements of said actuating means can serve to impart movement to said member, said control means including a rotatable part which is movable in one direction by an attendant and in the opposite direction by said actuating means, and another part which is slidable under the action of said rotatable part to and from a position in which the two parts can co-operate with each other for enabling said actuating means to impart movement to said member.

2. Selector mechanism comprising the combination of a lever, intermittently operable actuating means for imparting movement to said lever, and control means for determining which of a succession of similar movements of said actuating means can serve to impart movement to said lever, said control means including a screw threaded spindle rotatable by an attendant, a toothed wheel mounted on said spindle and operable by said actuating means to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said

spindle and adapted to be held against rotation, a slidable member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to said sleeve and screw threaded spindle, and a stop on said spindle for engagement by said slidable member.

3. Selector mechanism comprising the combination of a lever, intermittently operable actuating means, and control means for determining which of a succession of similar movements of said actuating means can serve to impart movement to said lever, said control means including a screw threaded spindle rotatable by an attendant, a toothed wheel mounted on said spindle and operable by said actuating means to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said spindle and adapted to be held against rotation, a member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to said sleeve and spindle, a stop on said spindle for engagement by said member, and a cam associated with said sleeve for temporarily preventing actuation of said toothed wheel.

4. Selector mechanism comprising the combination of a lever, intermittently operable actuating means, and control means for determining which of a succession of similar movements of said actuating means can serve to impart movement to said lever, said control means including a screw threaded spindle rotatable by an attendant, a toothed wheel mounted on said spindle and operable by said actuating means to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said spindle and adapted to be held against rotation, a pair of cams carried by said sleeve and adapted temporarily to prevent actuation of said toothed wheel and lever by said actuating means, a second sleeve freely mounted on the first mentioned sleeve and provided with an arm through which motion from said actuating means can be imparted to the said lever when the corresponding cam is in an appropriate position, said second sleeve having said lever provided on it, a member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to the first mentioned sleeve and said spindle, and a stop on said spindle for engagement by said member.

5. Selector mechanism comprising the combination of a lever, toggle mechanism, an intermittently operable plunger for actuating said toggle mechanism, and control means for determining which of a succession of similar movements of said toggle mechanism can serve to impart motion to said lever, said means including a screw threaded spindle rotatable by an attendant, a toothed wheel mounted on said spindle and operable by said toggle mechanism to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said spindle and adapted to be held

against rotation, a slidable member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to said sleeve and screw threaded spindle, and a stop on said spindle for engagement by said slidable member.

6. Selector mechanism comprising the combination of a lever, toggle mechanism, an intermittently operable plunger for actuating said toggle mechanism, and control means for determining which of a succession of similar movements of said toggle mechanism can serve to impart movement to said lever, said control means including a screw threaded spindle rotatable by an attendant, a toothed wheel mounted on said spindle and operable by said toggle mechanism to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said spindle and adapted to be held against rotation, a pair of cams carried by said sleeve and adapted temporarily to prevent actuation of said toothed wheel and lever by said toggle mechanism, a second sleeve freely mounted on the first mentioned sleeve and provided with an arm through which motion from said toggle mechanism can be imparted to said lever when the corresponding cam is in an appropriate position, said second sleeve having said lever provided on it, a member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to the first mentioned sleeve and said spindle, and a stop on said spindle for engagement by said member.

7. Selector mechanism comprising the combination of a lever, intermittently operable actuating means, and control means for determining which of a succession of similar movements of said actuating means can serve to impart movement to said lever, said control means including a screw threaded spindle rotatable by the attendant, a toothed wheel mounted on said spindle and operable by said actuating means to return said spindle after the latter has been rotated in one direction by the attendant, a sleeve mounted on said spindle and adapted to be held against rotation, a cam carried by said sleeve and adapted temporarily to prevent actuation of said toothed wheel by said actuating means, another cam carried by said sleeve and adapted temporarily to prevent actuation of said lever by said actuating means, a loading spring for holding said cams and sleeve against rotation with said spindle, a second sleeve freely mounted on the first mentioned sleeve and provided with an arm through which motion from said actuating means can be imparted to said lever when the corresponding cam is in an appropriate position, said second sleeve having said lever provided on it, a member for effecting a connection between said spindle and sleeve, said member being in engagement with and slidable relatively to the first mentioned sleeve and said spindle, and a stop on said spindle for engagement by said member.

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