May 20, 1941. G. J. SNYDER ET AL 2,243,056

PANEL FEED MECHANISM

Filed March 8, 1939 7 Sheets-Sheet 1

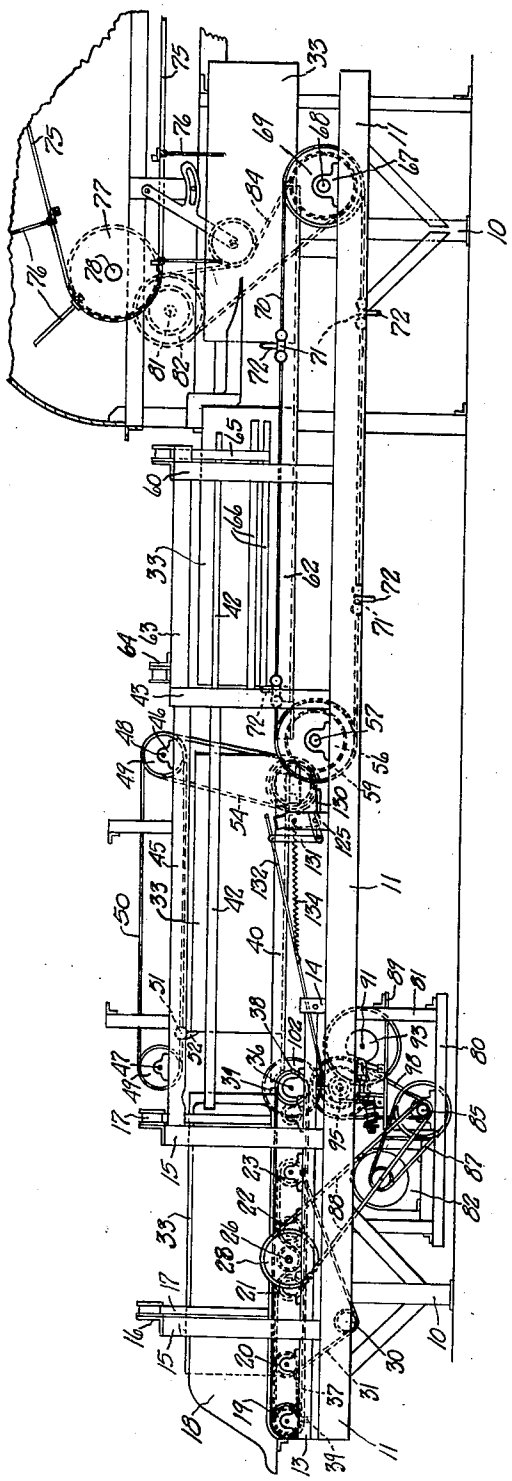


FIG. 1.

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PANEL FEED MECHANISM

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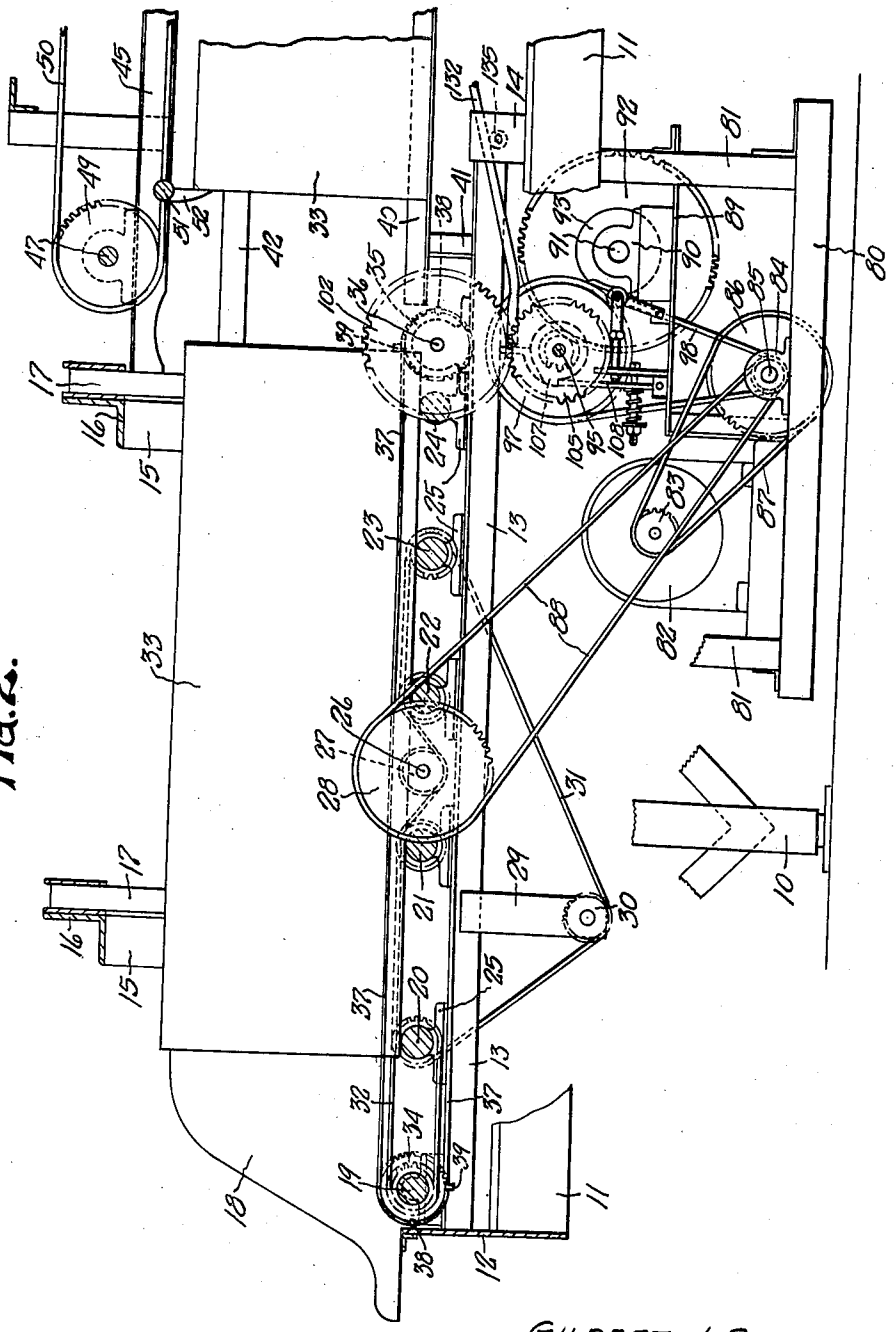


FIG. 2.

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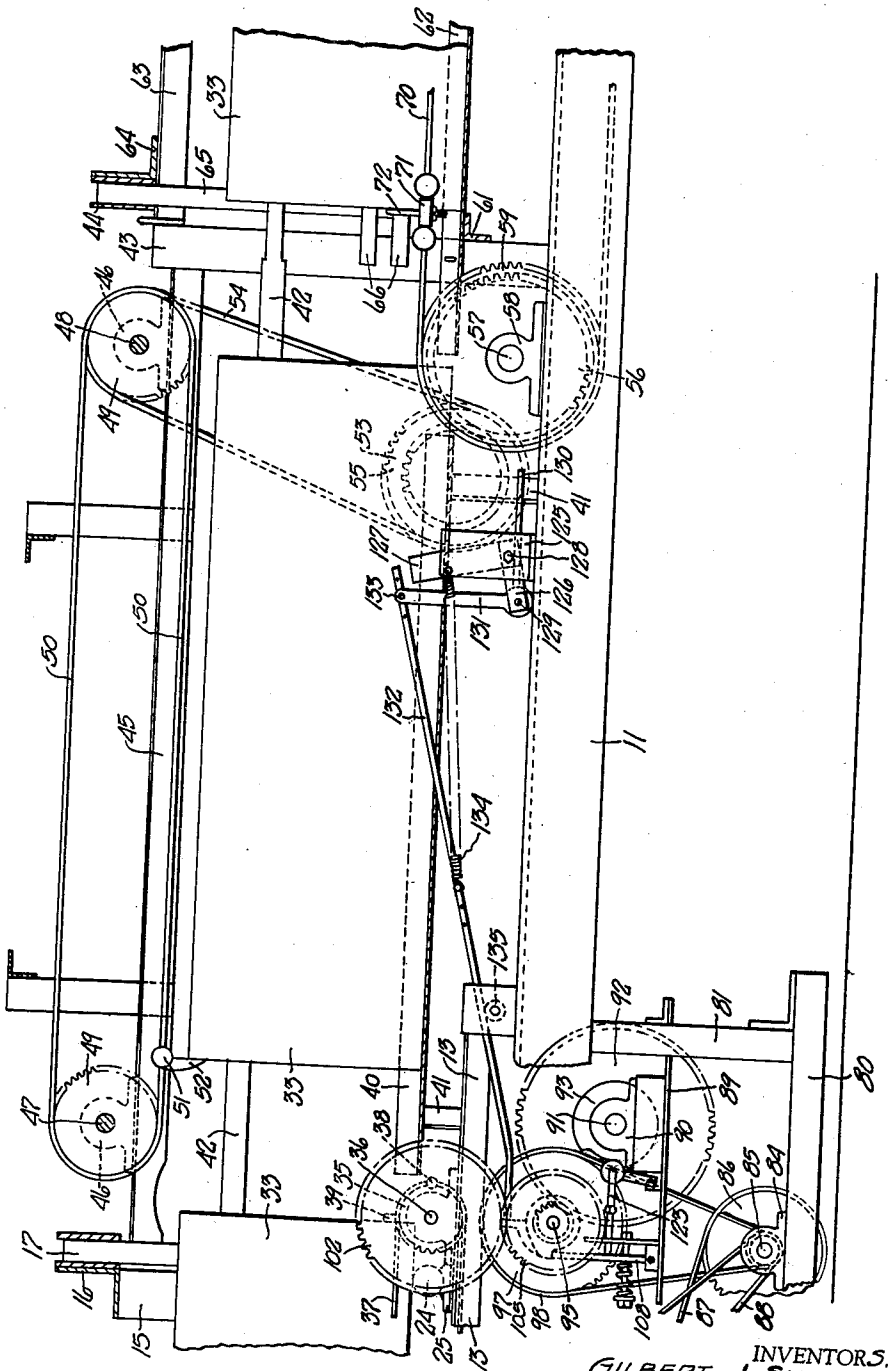
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May 20, 1941. G. J. SNYDER ET AL 2,243,056

PANEL FEED MECHANISM

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FIG. 3.



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PANEL FEED MECHANISM

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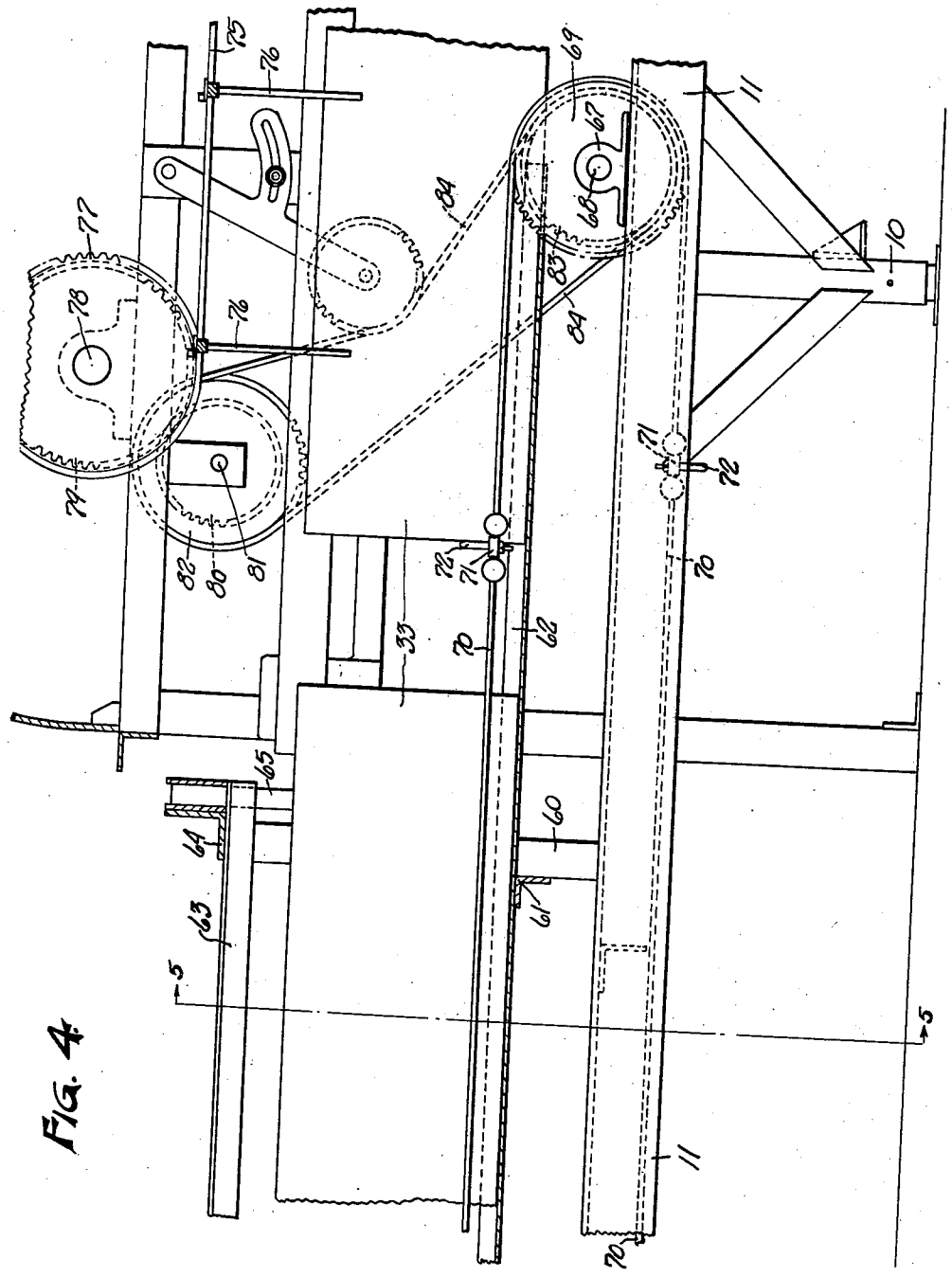


FIG. 4

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May 20, 1941. G. J. SNYDER ET AL 2,243,056

PANEL FEED MECHANISM

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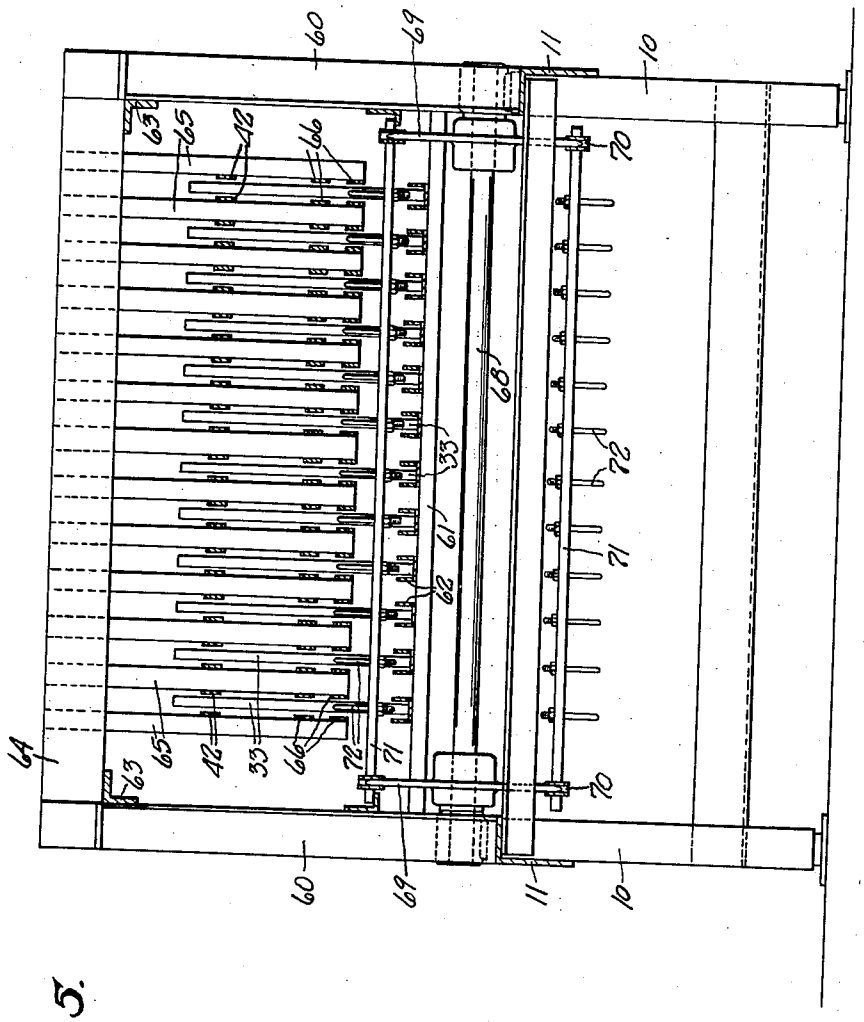


FIG 5.

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May 20, 1941. G. J. SNYDER ET AL 2,243,056

PANEL FEED MECHANISM

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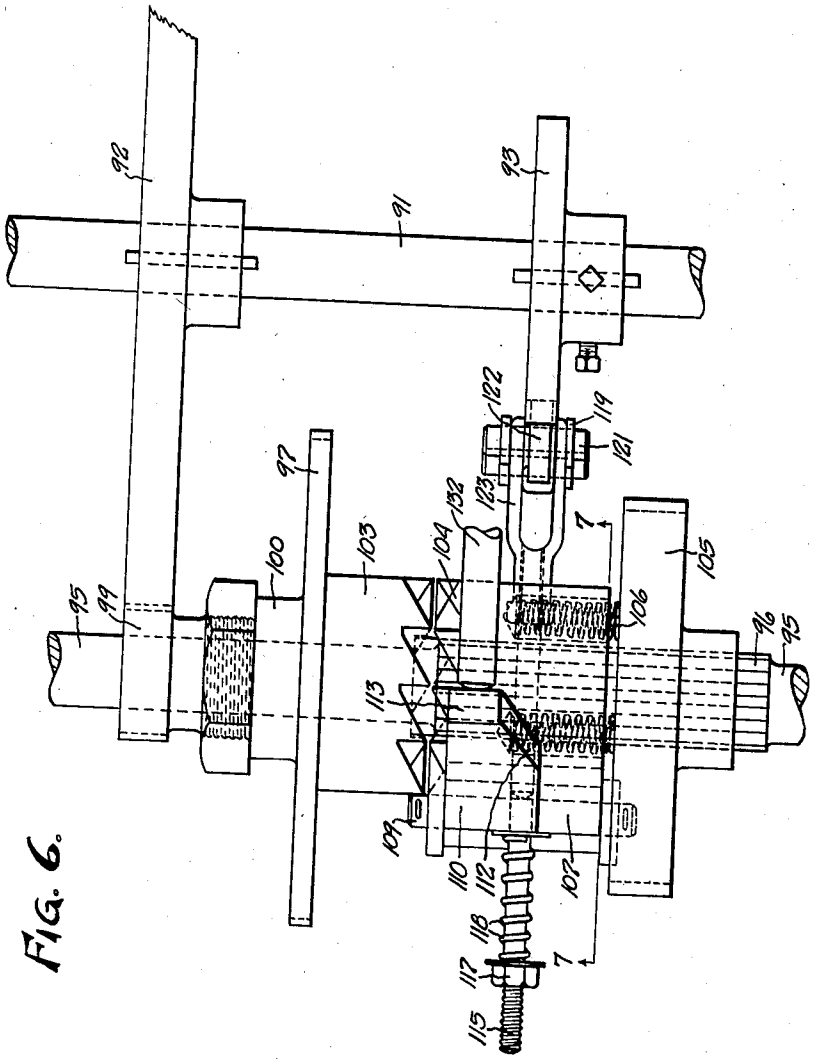


FIG. 6.

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May 20, 1941. G. J. SNYDER ET AL 2,243,056

PANEL FEED MECHANISM

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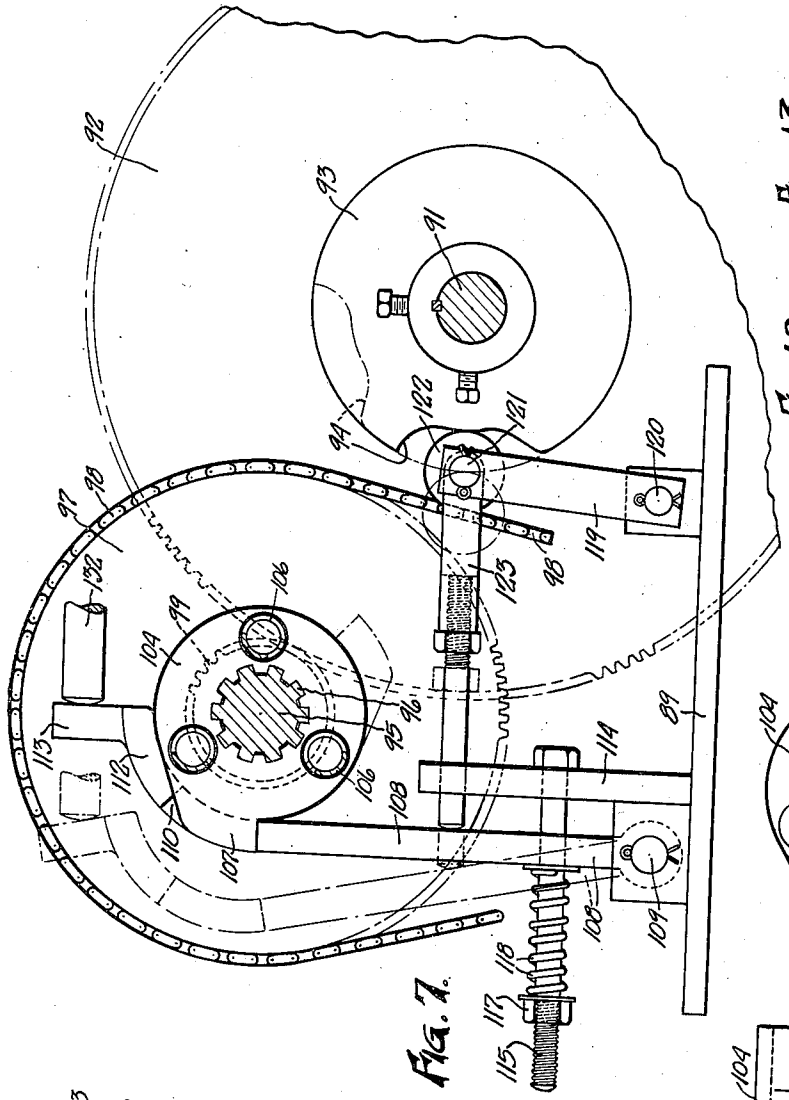


FIG. 7.

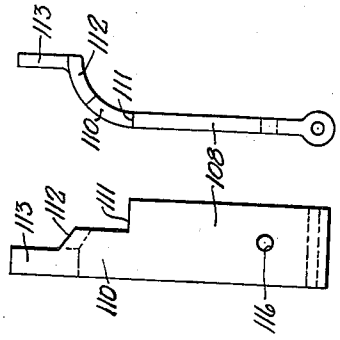


FIG. 8.

FIG. 9.

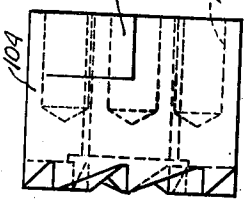


FIG. 10.

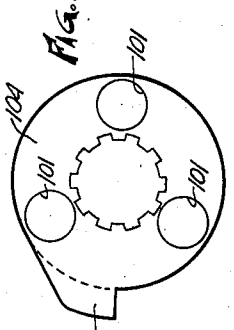


FIG. 11.

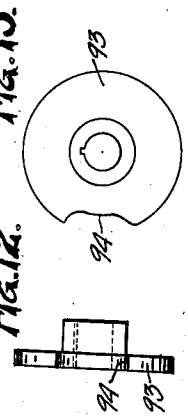


FIG. 12.

FIG. 13.

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Patented May 20, 1941 2,243,056

UNITED STATES PATENT OFFICE

2,243,056

PANEL FEED MECHANISM

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Application March 8, 1939, Serial No. 260,555

23 Claims. (Cl. 198—105)

The primary object of the invention is to advance groups of similar panels from a starting position to a point of delivery juxtaposed to the apparatus to be fed, with the panels in each group in desired relation to each other.

A further object is to provide a device of this character with novel means for timing delivery of a panel thereby.

A further object is to provide a device of this character with a plurality of independent propellers including a propeller driven in timed relation to the apparatus to be fed thereby, and an initial intermittently operated propeller having control means associated with said first named propeller.

A further object is to provide a device of this character with a novel clutch mechanism for controlling an intermittently operating propeller.

A further object is to provide a device of this character to which panels may be individually and successively supplied in laterally spaced relation, with means for initially advancing the individual panels to an intermediate position, and other means thereafter moving said panels simultaneously in a group arranged in desired relation to each other.

Other objects will be apparent from the description and appended claims.

In the drawings:

Fig. 1 is a side elevation of the device with parts shown in section.

Fig. 2 is an enlarged longitudinal vertical sectional view of the supply end of the device.

Fig. 3 is an enlarged longitudinal vertical sectional view of the intermediate part of the device.

Fig. 4 is an enlarged longitudinal vertical sectional view of the delivery end of the device.

Fig. 5 is an enlarged vertical transverse sectional view of the device taken on line 5—5 of Fig. 4, but illustrating the panels and their propellers in elevation.

Fig. 6 is an enlarged fragmentary plan view of the clutch mechanism.

Fig. 7 is an enlarged fragmentary vertical sectional view of the clutch mechanism taken on line 7—7 of Fig. 6.

Fig. 8 is a side elevation of a cam lever of the clutch mechanism.

Fig. 9 is an edge elevation of said cam lever.

Fig. 10 is a side elevation of one of the clutch elements.

Fig. 11 is a face view of said clutch element.

Fig. 12 is a side view of the control cam for the clutch.

Fig. 13 is a face view of said control cam.

Referring to the drawings, which illustrate the preferred embodiment of the invention, the numeral 10 designates supports for an elongated horizontal frame including rails 11. At the supply end of the device, best illustrated in Figs. 1 and 2, rails 11 are interconnected by cross piece 12 projecting vertically thereabove. A second pair of horizontal rails 13, each secured at one end to cross piece 12 and at its opposite end to a support 14, are positioned at the sides of the frame above rails 11. A plurality of uprights 15 are mounted by rails 11, said rails being connected in pairs by transverse bars 16. Spacers 17 depend from bars 16 and support a plurality of longitudinal vertical guide panels 18 each secured to cross piece 12 at its forward end.

A plurality of transverse rollers 19, 20, 21, 22, 23 and 24, having their ends journaled in bearings 25 mounted on upper rails 13, are arranged in spaced relation. Each of rollers 19, 20, 21, 22 and 23 has a gear associated therewith. Intermediate the rollers 21 and 22 is mounted a drive shaft 26 mounting a gear 27 complementary to the roller gears, and a driving gear 28. An arm 29 depends from rail 13 and mounts a shaft journaling an idler gear 30. A chain 31 passes over gears 20 and 21, thence under gear 27, thence over gears 22 and 23, and thence around idler gear 30. A chain 32 drives roller 19 from roller 20. It will thus be seen that each of rollers 19, 20, 21, 22 and 23 are positively driven at equal speed and in the same direction; while roller 24 is an idler. The panels 33 fed to the device in vertical position between guides 18 rest upon said rollers and are initially advanced in the device thereby.

A plurality of idler gears 34 are loosely journaled on the opposite ends of the shaft of roller 19, one between each guide 18. A plurality of complementary gears 35 are fixed on a shaft 36 journaled in suitable supports on rails 13 rearwardly of idler roller 24. Chains 37 run over gears 34 and 35 and between said guides. Each chain carries two opposed pushers 38 and two opposed strikers 39, said parts being arranged in pairs each constituting a striker and a pusher. The driving mechanism for the chains 31 and 37 will be described hereinafter.

The intermediate portion of the device is best illustrated in Figs. 1 and 3. A plurality of elongated, horizontal, longitudinally extending channels 40, mounted on supports 41 carried by rails 13 and 11, are arranged to support the panels 33 as they pass through the intermediate portion of the device. The bases of said channels are positioned slightly below the plane in which the

rollers 19 to 24 support the lower edge of the panel. A plurality of longitudinally extending guide bars 42 supported at their forward ends by guide bars 18 and positioned in spaced relation above channels 40, serve to hold panels 33 in vertical position while supported on channels 40. Uprights 43 are carried by rails 11 in rearwardly spaced relation to channels 40, and are interconnected by cross members 44. Longitudinal frame members 45 extend between uprights 43 and 15 above the panel and mount suitable bearings 46 which journal transverse shafts 47 and 48 each mounting a pair of gears 49 adjacent its ends. Over each set of gears 49—49 runs a chain 50, said chains being connected by a cross bar 51 which carries a plurality of spaced pusher elements 52 adapted for edge contact with the panels 33. The forward end of channel 40, and shaft 47 are both positioned slightly rearwardly of shaft 36. Shaft 48 mounts a third gear between which and a gear 53 runs a drive chain 54. A spur gear 55 is concentric with and has a fixed connection with gear 53. Gear 55 meshes with a gear 56 fixed on a shaft 57 journaled in bearings 58 mounted on rails 11. A pair of gears 59 are fixed on shaft 57 adjacent opposite ends thereof.

The delivery end of the device is best illustrated in Figs. 1, 4 and 5. Uprights 60 are mounted on rails 11, and cross bars 61 connect said uprights. Similar cross bars also interconnect uprights 43. A plurality of channels 62 are supported by cross bars 61 and extend longitudinally and horizontally in alignment with channels 40 but at a slightly lower elevation, the forward ends of chamber 62 terminating above shaft 57 and being spaced therefrom substantially less than the diameter of gears 59. Longitudinal bars 63 connect the upper ends of uprights 43 and 60 and mount upper cross bars 64 from which depend a plurality of rigid arms 65 between which panels 33 pass. Arms 65 support guides 42, and also longitudinal guides 66 for the panels. Channels 62 project substantially beyond upright 60, and in vertical alignment therewith the rails 11 carry bearings 67 for a shaft 68. Shaft 68 carries a pair of gears 69 complementary to and aligned with gears 59, and over each aligned set of said gears 59, 69 runs a chain 70. Chains 70 are interconnected by a plurality of equi-spaced transverse bars 71 carrying panel pusher elements 72, the spacing between bars 71 being equal to the length of a panel 33 plus the spacing between panels.

As herein illustrated, the machine to which the panels are to be fed employs a chain conveyor 75 with depending panel clamps or carriers 76. This machine is so positioned that it projects above the delivery end of the instant apparatus, with the forward sprocket gear 77 for conveyor 75 positioned above channels 62 and forwardly of shaft 68. The shaft 78 of gear 77 mounts a spur gear 79 with which a spur gear 80 on shaft 81 meshes. A sprocket gear 82 fixed on shaft 81, and a sprocket gear 83 on shaft 68 are interconnected by a chain 84, whereby chain 70 and chain 50 of the feed mechanism are driven in timed relation to conveyor 75 and carriers 76 of the machine which the instant device feeds.

The mechanism for driving and controlling the initial stage of the device is best illustrated in Figs. 2, 3, 6 and 7. A platform 80 is suspended beneath the frame by supports 81 depending from the frame. A drive motor 82 is mounted on the platform and has a sprocket gear 83 mounted on its arbor. Bearings 84 are mounted on the platform and journal shaft 85. A sprocket gear 86 is fixed on said shaft and is driven by a chain 87 trained thereover and around gear 83. A pair of sprocket pinions are also fixed on shaft 85, one of which has a chain 88 trained thereover and around gear 28.

A support 89 is carried by one of the supports 81 and the platform 80 in spaced relation above the latter. On support 89 are mounted bearings 90 journaling a shaft 91 fixedly mounting a large spur gear 92 and a disc 93 having an indented peripheral portion 94 constituting a cam face.

Above shaft 85, a shaft 95 is journaled between rails 11, said shaft being splined at 96 for a portion of its length. Shaft 95 has a large gear 97 loose thereon and driven by a chain 98 trained around one of the sprocket pinions on shaft 85. A pinion 99 is keyed on shaft 95 and meshes with gear 92 on shaft 91. A collar 100 spaces pinion 99 from gear 97. One toothed part 103 of a clutch is carried by gear 97, said part 103 being cylindrical and having its teeth formed on its end. The toothed end of part 103 terminates adjacent one end of spline 96 of shaft 95.

Splined portion 96 of shaft 95 has slidably mounted thereon a cylindrical clutch part 104 having teeth complementary to and adapted to mesh with part 103. A gear 105 is fixed on the splined portion of the shaft and forms an abutment for one end of each of a plurality of coil springs 106 seating in recesses 101 in part 104 and normally serving to urge said part into meshing engagement with clutch part 103. Clutch part 104 has a peripheral projection 107 adjacent one end thereof. Gear 105 meshes with a gear 102 keyed to shaft 36 to drive sprockets 35 and chains 37.

A cam lever 108 is pivoted at 109 on support 89 and extends upwardly therefrom and includes a reduced curved portion 110 adapted for engagement with clutch part 104. The reduced width of curved part 110 provides a shoulder 111 at the lower end thereof and normally horizontally aligned with the axis of shaft 95, whereby the projection of part 104 may bear thereon. The end of curved part 110 of lever 108 is tapered at 112. Lever 108 terminates in an off-set end 113 parallel thereto and projecting from said curved part 110. An upright 114 on support 89 carries a horizontal bolt 115 passing freely through an aperture 116 in lever 108, and mounting a nut 117 serving as an abutment for a coil spring 118 pressing against said lever 108 to normally urge the same against clutch part 104.

An arm 119 is pivoted at 120 on support 89 and mounts a pin 121 which journals a roller 122. A pusher arm assembly 123 is pivoted at one end to pin 121, passes freely through suitable guide opening in upright 114 and bears against lever 108. The pusher arm assembly is longitudinally adjustable whereby it positions roller 122 in peripheral engagement with cam disc 93.

The control for the above described mechanism is best illustrated in Fig. 3 and comprises a support 125 mounted on one rail 11 adjacent shaft 57. On this support is mounted an L-shaped member having a lower leg 126 and an upwardly extending leg 127. Said L-shaped member is adjustably mounted on support 125 at 128. A bellcrank is pivoted at 129 adjacent the outer end of said lower leg 126. The lower part 130 normally extends substantially horizontally in the direction of shaft 57 and terminates in the path of movement of propellers 71, 72 on chains 70. The other part 131 of said bellcrank pro-

jects upwardly and pivots one end of an elongated rod 132 at 133. Rod 132 extends forwardly downwardly to terminate in end abutment with ear 113 of lever 108. A coil spring 134 extends between support 125 and an intermediate portion of rod 132 and serves to hold the free end of the rod against a guide 135 and to hold the bellcrank in normal position.

The operation of the initial stage of the apparatus is as follows: Motor 82 operates at constant speed and drives shaft 85 therewith through pinion 83, gear 86 and chain 87. Chain 88 running from a pinion keyed on shaft 85 to gear 26 on shaft 26, serves to drive the latter at constant speed. Chain 31 driven by pinion 27 on shaft 26, and passing around drive pinions on rollers 20, 21, 22 and 23, and around idler 30, serves to rotate said rollers at constant speed. Chain 32 between pinions on rollers 19 and 20 drives roller 19. Thus as panels 33 are fed to the device between guides 18, they are propelled by said rollers to a position in engagement with stops 39 on chains 37 which are operated only intermittently, whereby the forward progress of panels 33 is arrested as illustrated in Fig. 2. This permits panels 33 to be individually fed to the apparatus and at the same time be arranged in transversely aligned series or groups before discharge.

Chain 98 runs between another pinion on shaft 85 and sprocket gear 97 which rotates freely on splined shaft 95 at approximately the same speed as shaft 26 and the rollers. The clutch parts 103 and 104 are normally held separated by lever 108 as illustrated in Figs. 6 and 7, and consequently the speed increasing drive 105, 102 between shaft 95 and drive shaft 36 for sprocket gears 35 controlling operation of pushers 38 and strikers 39 on chains 37 is normally inoperative. This speed increasing drive is intermittently operated by engagement of propellers 71, 72 on chains 70 with bellcrank arm 130 thereby tilting bellcrank arm 130 upwardly and arm 131 forwardly. Bellcrank arm 131 urges rod 132 forwardly and pushes against ear 113 to pivot lever 108 clear of clutch projection 107. Upon disengagement of lever 108 from part 107 of the clutch part 104, springs 106 urge said part 104 into mesh with clutch part 103 to rotate shaft 95, gears 105 and 102 and their associated parts. Likewise pinion 99 thereupon rotates to drive gear 92 meshing therewith and cam disc 93, at a reduced speed. Rotation of cam disc 93 urges rod assembly 123 to the left in Fig. 7 as the roller 122 rides out of cam indent 94. The rod 132 under control of propellers 71, 72, holds lever 108 in disengaged position with respect to the clutch until rod assembly 123 is shifted as above by cam disc 93. Thereafter, and after return of rod 132 to normal position, lever 108 is held disengaged to permit clutch engagement until the slowly moving cam 93 completes its revolution. The parts are so proportioned that during the interval required for said cam revolution the rotation of shaft 95, gear 105, gear 102, shaft 36 and sprockets 35 will move chains 37 just one-half of their travel, thereby transposing the positions of the two sets of pushers 38 and strikers 39 on said chains. By this operation of chains 37, the forwardly positioned pushers 38 will rapidly move into engagement with the panels 33 at the left in Fig. 2, and push the same to approximate position of the panel at the right in Fig. 2, resting entirely on the channels 40 on which the panels stop until the next propeller 51, 52 on chains 50 engages the panels to continue their movement.

When the roller 122 rides into indent 94 of cam disc 93, lever 108 is released to permit spring 119 to return the same to normal position. The projection 107 of clutch part 104 consequently engages tapered face 112 on its next succeeding revolution, thereby shifting part 104 for disengagement from part 103; and thereafter part 107 engages shoulder 111 to stop shaft 95 and the parts driven thereby in precise desired position. In consequence, one set of strikers 39 on chains 37 always assumes the same inoperative position, so that a succeeding group of panels 33 fed to the device will be propelled by rollers 19—23 to the same position as that from which the preceding group has just been discharged.

The intermediate propeller chains 50 are operated in timed relation with delivery propeller chains 70 by means of drive chain 54 and gears 53, 55, 56 and 59; and chains 70 are in turn operated in timed relation to the apparatus to which the panels are to be fed through chain 34 and gears 62, 80 and 79. Hence the propulsion of the panels 33 along channels 40 and 62 is synchronized with the movement of slab conveyor 75 and its carriers 76 to feed and discharge said panels in precise desired timed relation for pick-up by carriers 76 and for proper desired spacing between the panel groups as discharged to conform with the spacing of said carriers.

It will be seen from the above that the apparatus advances panels which are individually fed thereto to a positioning or grouping point, thence quickly delivers them in grouped relation to a pick-up point, and thence propels them at predetermined speed and in predetermined spaced relation to a discharge point. Hence it enables the use of apparatus wherein panels are arranged side by side for processing, thus enabling processing of large quantities of panels; all without requiring more than one operator to feed the panels to such side-by-side position.

We claim:

1. Panel feed mechanism comprising a frame, a plurality of transverse rollers journaled in said frame, means for continuously rotating said rollers, a plurality of guides for positioning panels vertically on said rollers, a normally inoperative propeller juxtaposed to said rollers and having striker means carried thereby for stopping advance of said panels by said rollers at a predetermined point, and means for intermittently operating said propeller a predetermined extent to discharge said panels from said rollers.

2. The combination defined in claim 1, and stationary supports on said frame for receiving panels from said rollers, continuously operated propeller means juxtaposed to said supports, and means intermittently operated by said last named propeller means for controlling the operating means for said first propeller.

3. Panel feed mechanism comprising continuously operating means for advancing vertically positioned panels in substantially parallel relation to a predetermined grouping position, means for stopping said panels at said grouping position, intermittently operating means for advancing said grouped panels to a second position in unison, said stop means being carried by said intermittently operating means, and a continuously operating propeller for advancing said grouped panels from said second position.

4. The construction defined in claim 3, wherein said first named advancing means comprises

a series of continuously rotating rollers supporting said panels, and said stopping means and second named advancing means are both controlled by an intermittently operating member.

5. Panel feed mechanism comprising a frame, a plurality of longitudinal panel guide means on said frame for positioning panels vertically, a series of transverse continuously operated rollers on said frame, stationary panel supporting means on said frame extending longitudinally from a position adjacent said rollers, means for stopping panels on said rollers at a predetermined point, intermittently operated means for releasing said stopping means and for advancing said panels to said supporting means, and a propeller for sliding said panels along said supporting means.

6. The combination with a panel processing machine having a continuously operating conveyor mounting a carrier for suspending a plurality of panels, of a panel feed mechanism comprising a frame, a plurality of continuously rotating rollers journaled at the front of said frame, stationary panel supporting means extending from a point adjacent said rollers to a position beneath said conveyor, means for stopping advance of said panels on said rollers at a predetermined position, means operating intermittently to release said stopping means and advance said panels to said stationary panel supporting means, propeller means above said supporting means for initially advancing said panels on said supporting means, and propeller means for engaging the lower ends of said panels for propelling the same to the discharge end of said supporting means.

7. The combination defined in claim 6, wherein said two propeller means are driven by the conveyor of the panel processing machine.

8. The combination defined in claim 6, wherein said two propeller means are driven by the conveyor of the panel processing machine, and said intermittently operating means is controlled by one of said propeller means.

9. The combination defined in claim 6, and a plurality of longitudinal guides carried by said frame for supporting said panels in predetermined spaced, longitudinal, vertical position.

10. Panel feed mechanism comprising a frame, a series of continuously operating rollers journaled on said frame, a support on said frame extending longitudinally from the inner roller, continuously operating means for shifting a panel on said support, a propeller juxtaposed to said rollers and including a pair of spaced panel engaging members, one of said members serving to stop advance of said panel by said rollers at a predetermined position, and the other to propel said panel to said support, and means controlled by said continuously operating means for intermittently operating said propeller a predetermined extent to shift said panel from said rollers to said support and return said stop member to said predetermined position.

11. The construction defined in claim 10, wherein said control means comprises a spring pressed control clutch, shiftable means for normally disengaging said clutch, and means controlled by said continuously operating means for intermittently shifting said clutch disengaging means to inoperative position.

12. The construction defined in claim 10, wherein said control means comprises a spring pressed clutch, a cam member normally disengaging said clutch, means controlled by said continuously operating means for intermittently disengaging said cam member from said clutch, and means controlled by said clutch for holding said cam member in inoperative position for a predetermined time interval.

13. Panel feed mechanism comprising an intermittently operated panel propeller and a continuously operated panel propeller, and means for operating said first propeller including a continuously operating motor, a drive connection between said motor and first propeller including a spring pressed clutch, shiftable means normally disengaging said clutch, means controlled by the continuously operated panel propeller for intermittently shifting said clutch disengaging means to inoperative position, and means controlled by said clutch for positioning said clutch disengaging means in inoperative position for a predetermined time interval.

14. Panel feed mechanism comprising an intermittently operated panel propeller, a continuously operated panel propeller, a motor, a driving connection between said motor and first propeller including a normally disengaged clutch, means controlled by said continuously operated propeller for engaging said clutch, and means controlled by said clutch for holding said clutch engaged for a predetermined time interval upon each engagement thereof.

15. Panel feed mechanism comprising a normally stationary panel propeller, means for actuating said propeller including a continuously operating driving member and a spring pressed clutch having a projection on one part, a pivoted lever having a cam face, said lever being spring pressed toward said clutch for engagement of said projection with said cam face to disengage said clutch parts, means for shifting said lever to inoperative position against the action of said spring, a continuously operating propeller for propelling panels delivered to a predetermined position by said first propeller, said last named propeller intermittently operating the means for shifting said lever and a cam having a reduced speed driving connection with said clutch and a part between said cam and lever for holding the latter in inoperative position until the cam completes a predetermined movement.

16. Panel feed mechanism comprising a frame, a plurality of transverse rollers journaled in said frame, means for continuously rotating at least one of said rollers, a normally inoperative endless propeller extending around said rollers, striker means carried by said propeller for stopping advance of panels by said rollers at a predetermined point, and means for intermittently operating said propeller a predetermined extent to discharge said panels from said rollers.

17. Panel feed mechanism as defined in claim 16, wherein said propeller operates at a higher speed than the circumferential speed of the driven rollers.

18. Panel feed mechanism as defined in claim 16, and a second striker member on said propeller positioned adjacent the rear edge of the panel when the panel engages said first striker, said propeller operating one-half of its length upon each actuation thereof.

19. Panel feed mechanism as defined in claim 16, wherein said propeller carries a plurality of sets of spaced strikers, one set being positioned adjacent the trailing edge of said panel when the leading edge of the panel engages the rearmost striker of another set, one striker of each set constituting a stop and the other a pusher,

said propeller shifting the distance by which said sets are spaced upon each actuation thereof.

20. Panel feed mechanism as defined in claim 16, and means for positioning said panel vertically on said rollers.

21. Panel feed mechanism comprising a frame, a normally inoperative endless member having an actuating run extending longitudinally of said frame, means for intermittently actuating said member, a plurality of transverse rollers journaled in said frame adjacent the actuating run of said endless member, means for rotating at least one roller, panel engaging means carried by said endless member and normally positioned adjacent the end of said actuating run to stop advance of a panel by said rollers, and panel engaging means carried by said endless member adjacent the other end of said actuating run and actuable to propel said panel from said rollers upon actuation of said endless member.

22. Panel feed mechanism comprising a frame, an endless member, means journaled at opposite ends of said frame for training said endless member longitudinally of said frame, a plurality of spaced transverse rollers journaled in said frame intermediate said first means and between the longitudinal runs of said endless member, means for rotating at least one of said rollers, a panel-engaging member carried by said endless member and normally positioned adjacent one end of the upper run thereof to constitute a stop for a panel supported on said rollers, and means for intermittently actuating said endless member for a predetermined extent.

23. Panel feed mechanism as defined in claim 22, and a second panel-engaging member carried by said endless member and normally positioned below the plane on which said rollers support a panel and adjacent the feed end of the mechanism.

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