May 5, 1942. G. J. SNYDER 2,281,725

PANEL FEED MECHANISM

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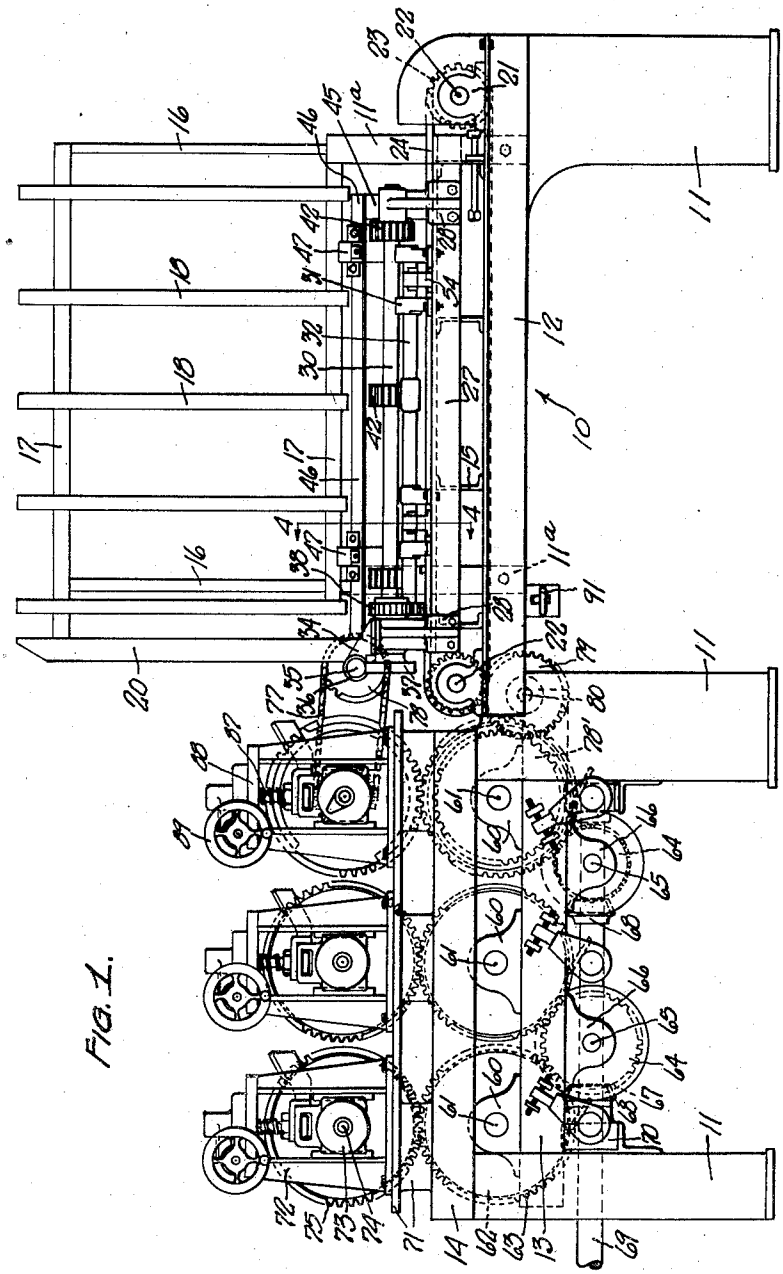


FIG. 1.

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FIG. 2.

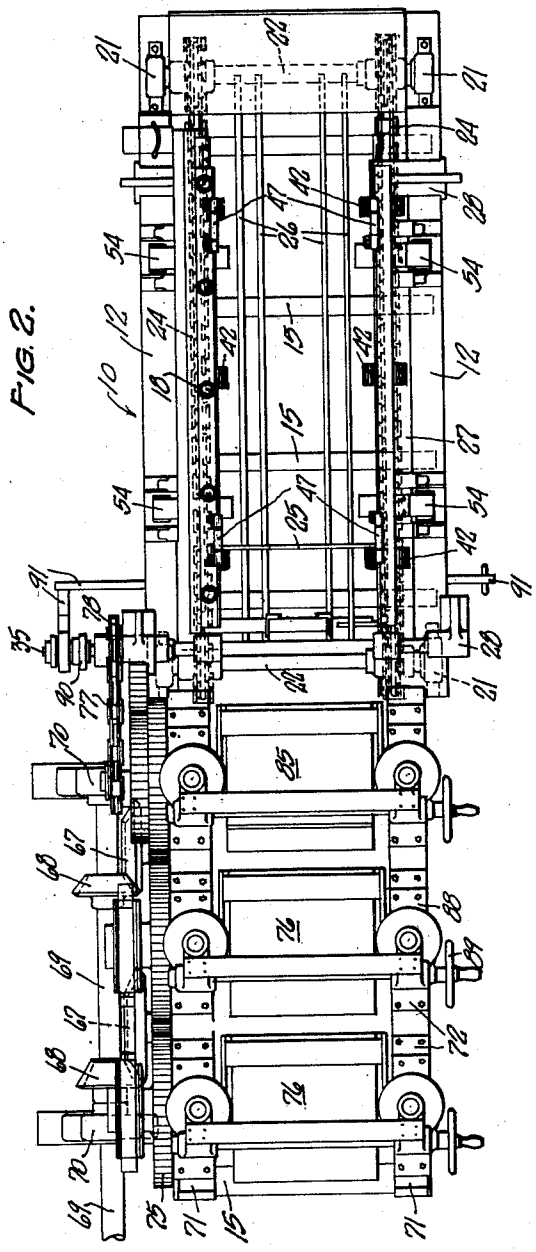
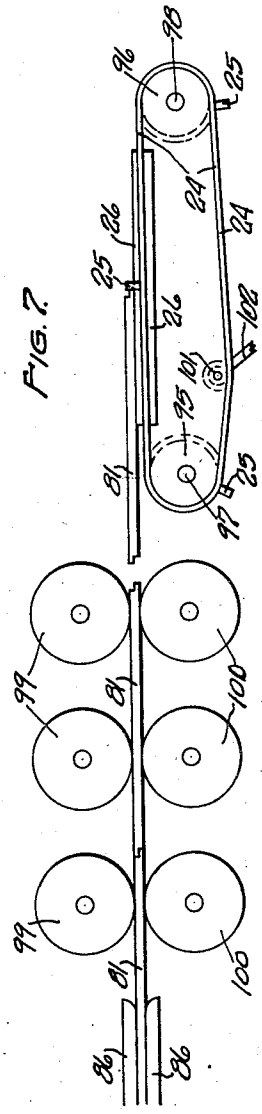


FIG. 7.



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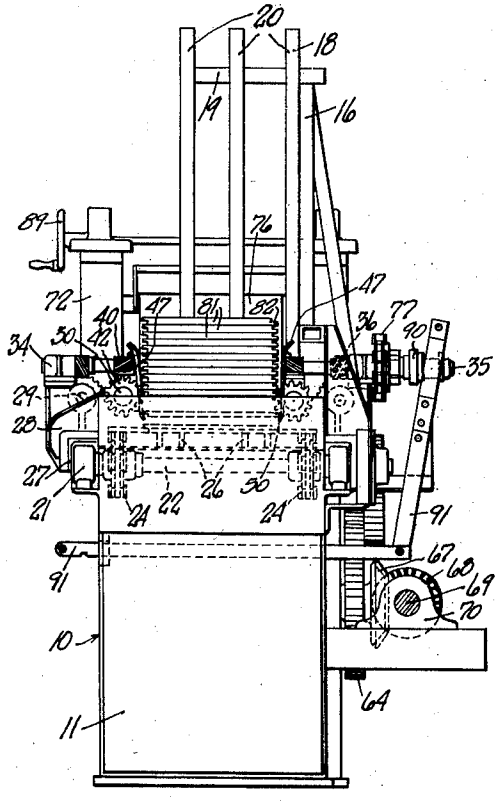
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PANEL FEED MECHANISM

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FIG. 3.



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PANEL FEED MECHANISM

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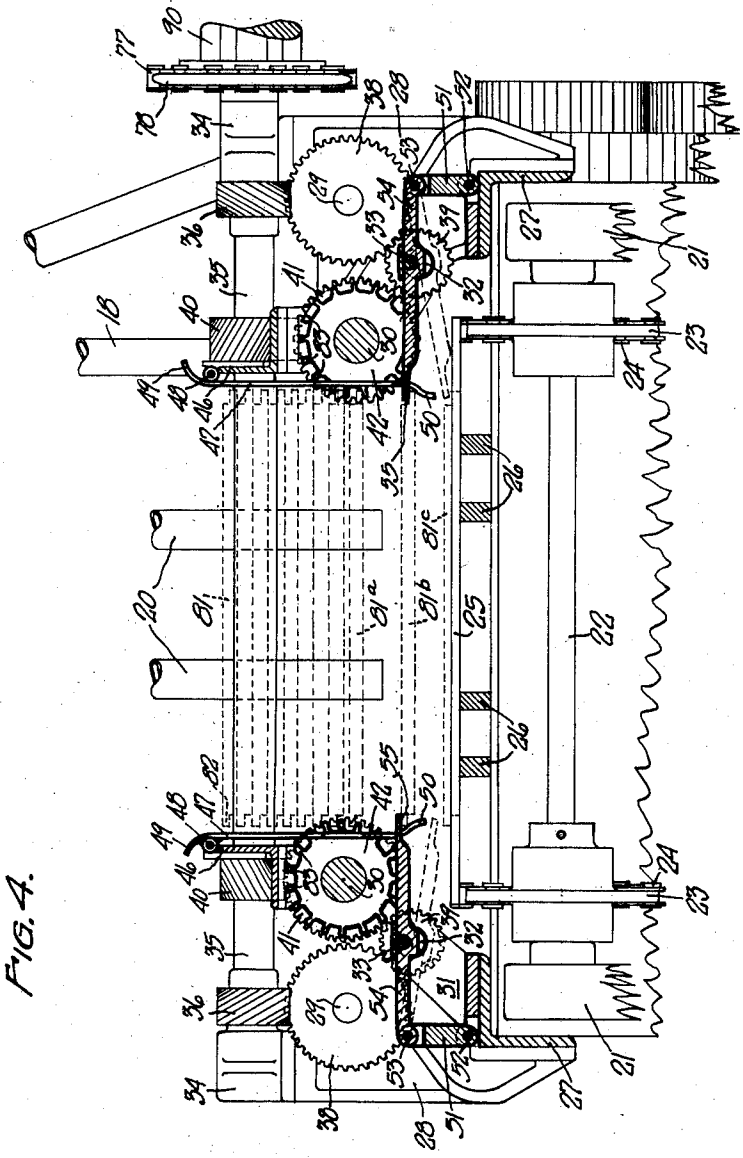


FIG. 4.

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PANEL FEED MECHANISM

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FIG. 5.

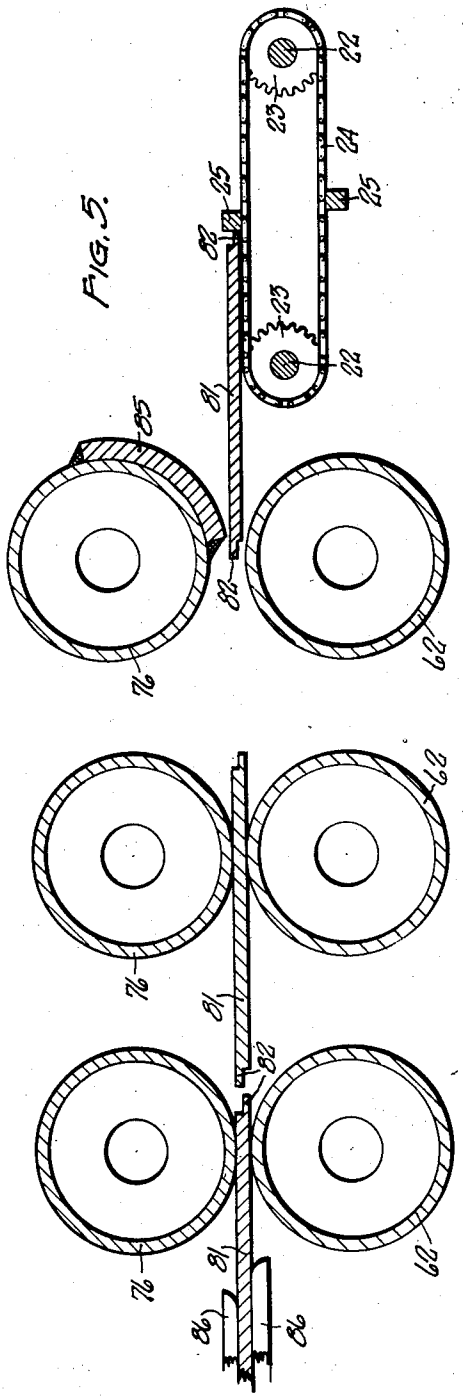
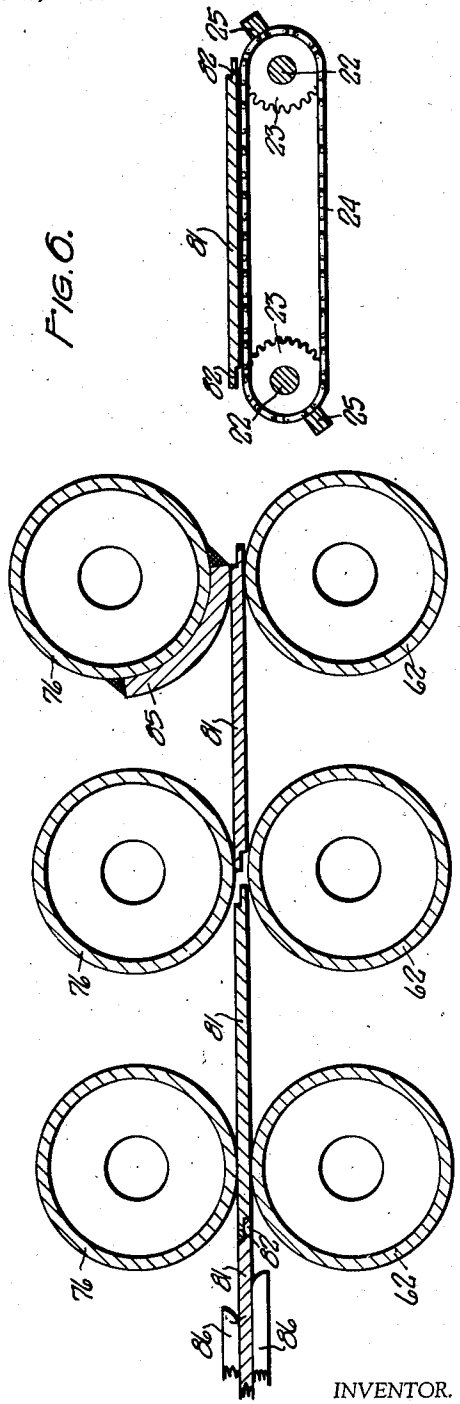


FIG. 6.



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UNITED STATES PATENT OFFICE

2,281,725

PANEL FEED MECHANISM

Gilbert J. Snyder, South Bend, Ind., assignor to Mastic Asphalt Corporation, South Bend, Ind., a corporation of Indiana

Application October 2, 1939, Serial No. 297,422

5 Claims. (Cl. 198—110)

This invention relates to improvements in panel feed mechanism, and more particularly to mechanism by which panels of material may be fed in desired sequence and desired relation to apparatus for treating them. One example of such material is insulation board which is treated and processed for the purpose of manufacturing building covering material therefrom. Referring specifically to the latter example, it is customary to provide machinery for coating and waterproofing the panels and impressing designs upon the same. In quantity production it becomes desirable to provide mechanism for feeding the units to such a machine automatically to reduce the number of attendants necessary for the operation of processing machinery, to facilitate handling of panels at greater speed than is possible manually, and to insure automatically a proper relation to each other of panels fed to the machine in continuous operation.

Therefore, it is the primary object of this invention to provide panel feeding mechanism answering the above qualifications.

A further object is to provide a device of this character having supporting means adapted to receive a stack of panels and to successively feed the lowermost panel of the stack to panel treating machinery.

A further object is to provide a device of this character having means for successively removing a panel from a stack and shifting the same to a delivery point, wherein speed-up means are provided in the shifting means to secure edge-abutment of the panels at said delivery point.

A further object of this invention is to provide a device of this character having novel means for withdrawing a panel from the bottom of a stack.

A further object is to provide a device of this character including a conveyor section having a speed-up means associated therewith intermediate its length, for the purpose of shifting panels, fed thereto at intervals, into abutting relation as they reach the discharge end of the conveyor.

A further object is to provide a device of this character having means for supporting a stack of panels, means for separating the lowermost panel from the panel next above, means below the stack for conveying panels therefrom, and means operating in timed relation to the separating means for discharging the panels successively to the conveying means.

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

In the drawings:

Fig. 1 is a side elevation of the device.

Fig. 2 is a top plan view of the device.

Fig. 3 is an end elevation of the device as viewed from the right in Fig. 1.

Fig. 4 is a vertical transverse fragmentary sectional view of the device taken on line 4—4 of Fig. 1.

Fig. 5 is a diagrammatic view of a portion of the device in one position.

Fig. 6 is a diagrammatic view similar to Fig. 5 and illustrating the parts in a different position.

Fig. 7 is a diagrammatic view of a modified embodiment of the portion of the device shown in Figs. 5 and 6.

Referring to the drawings, which illustrate the preferred embodiment of the invention, and wherein similar parts bear the same reference numerals throughout; the numeral 10 designates the frame of the machine, which includes a plurality of legs 11 supporting horizontal frame parts 12, 13 and 14 which are suitably interconnected by cross-pieces 15 to provide a rigid frame structure. At one end of the frame, a plurality of uprights 11A are carried by frame parts 12 and extend vertically thereabove at one side only of the frame. Uprights 11A support a suitable stacking arrangement including uprights 16 interconnected by horizontal bars 17 which in turn support vertical guide bars 18. At one end of the stacking arrangement just described is provided an end unit for the stacking arrangement comprising transverse horizontal frame units 19 carrying suitable vertical guides 20.

Below the stacking guides just described is arranged a panel conveyor of any suitable construction which is positioned in spaced relation below the lower stacking element 17. As here illustrated, each of the frame elements 12 carries a suitable bearing 21 at each end thereof, and these bearings journal shafts 22 extending transversely of the frame. A plurality of sprockets 23 are mounted upon each shaft 22 in spaced relation, and a conveyor chain 24 is trained around each set of aligned sprockets 23 to extend longitudinally of the frame at the right hand end portion thereof as viewed in Fig. 1. Chains 24 are interconnected by one or more transversely extending propeller bars 25. Where a number of bars 25 are provided, they are arranged in equi-spaced relation. Cross bars 15 also support longitudinally extending guide bars or panel supporting bars 26 extending longitu-

dinally of the frame intermediate the sprockets 23 with their upper edges positioned slightly below the level of the upper runs of conveyor chains 24 so that propeller bars 25 may pass thereover.

At the opposite sides of the frame the cross bars 15 support longitudinal frame members 27. Bars 27 carry suitable brackets 28 adjacent their opposite ends. Each of the left hand brackets 28 (Fig. 1) journals a stub shaft 29. Shafts 30, extending longitudinally of the frame at opposite sides thereof, have opposed ends journaled in brackets 28 in spaced relation to shafts 29. Bars 27 also carry brackets 31 serving to journal the ends of a longitudinally extending shaft 32 at each side of the frame and below and parallel to shafts 29 and 30. Shafts 32 each include a plurality of offset crank or cam portions 33.

Adjacent the left hand end of the stacking device (Fig. 1), brackets 34 are mounted on brackets 28 and journals a shaft 35 extending transversely of the frame. Shaft 35 mounts a worm gear 36 adjacent each end thereof, which gears 36 each mesh with a worm gear 37 mounted on a shaft 29. Each shaft 29 also mounts a gear 38 adapted to mesh with a gear 39 carried by each shaft 32, whereby the shafts 29 and 32 are driven in timed relation by means of shaft 35 and the intermediate gear connections therebetween. Shaft 35 also carries worm gears 40 adjacent opposite ends thereof each adapted to mesh with a worm gear 41 carried by one of the shafts 30. In spaced relation along its length, each of the shafts 30 carries a plurality of toothed members 42 for purposes to be hereinafter set forth.

A plurality of uprights 45 are suitably carried by each frame member 27 adjacent opposite ends thereof and support at each side of the frame a longitudinally extending horizontal bar 46 positioned above the level of the upper portions of members 42. Each of the bars 46 carries one or more spring retainers 47 pivoted thereto at its upper end at 48. Retainers 47 extend vertically with their upper ends 49 bent outwardly and their lower ends 50 bent inwardly. The retainers 47 at opposite sides of the frame are spaced apart a distance slightly greater than the spacing between the members 42 on opposite shafts 30, and their lowermost ends 50 are spaced apart a distance slightly less than the spacing between opposite members 42.

Each of the frame members 27 has links 51 pivoted thereto at 52 and extending upwardly therefrom. To the upper end of each link is pivoted at 53 an arm 54 which extends substantially horizontally inwardly with respect to the frame. Intermediate its ends each arm 54 is journaled on a crank offset 33 of shaft 32. The inner ends 55 of arms 54 are preferably of reduced thickness and extend inwardly of and adjacent to the lower ends 50 of retainers 47.

Referring now to the construction illustrated at the left hand side portion of Fig. 1, the frame members 13 mount a plurality of bearings 60 journaling transverse shafts 61 which mount drums or rollers 62. Each shaft 61 also mounts one or more gears 63 each of which meshes with one of a plurality of gears 64 carried by shafts 65 journaled in bearings 66 also carried by members 13. Shafts 65 journal bevel gears 67 which mesh with bevel gears 68 mounted on a drive shaft 69 journaled in bearings 70. Drive shaft 69 preferably constitutes a drive shaft common with and extending from the processing mechanism to which the instant feed mechanism supplies the panels.

A superstructure 71 is mounted on each frame member 14 and carries suitable vertical guideways 72 for adjustably mounting bearings 73 for transverse shafts 74 each positioned parallel to and directly above one of the lower shafts 61. Each shaft 74 carries a drive gear 75 meshing with a gear 63 on shaft 61, whereby each vertically aligned set of shafts 61, 74 is driven in positive timed relation. Each shaft 74 carries a drum or roller 76. The shaft 74 nearest shaft 35 carries a sprocket over which runs a chain 77 extending to a sprocket 78 mounted on shaft 35. The shaft 61 below the last named shaft 74 mounts a gear 78 which meshes with a gear 79 mounted on a shaft 80 suitably journaled in the frame 10 below the left shaft 22 as viewed in Fig. 1, and gear 79 in turn meshes with a suitable gear on said shaft 22 to drive the conveyor chains 24.

The operation of the device is as follows: A plurality of panels 81 are stacked at the feed end of the machine in proper relation and position governed by the stacking mechanism 16—20. Each of these panels 81 is preferably of the form best illustrated in Figs. 5 and 6, being provided at their opposite side edges with oppositely disposed reduced thickness or shiplap flanges 82. The lowermost panel of the stack is supported by the toothed members 42 at opposite sides of the frame. The teeth of member 42 are spaced apart slightly more than the thickness of the panels and the individual teeth are of a transverse dimension or thickness preferably slightly less than the dimension by which the flanges 82 of the panels 81 are offset. For example assuming that the panels to be handled are formed from insulation board one-half inch in thickness each having shiplap flanges 82 one-quarter inch in thickness, the teeth of members 42 will be spaced apart slightly more than one-half inch, and the thickness of each tooth will be slightly less than one-quarter inch.

Referring now to Fig. 4 particularly, it will be seen that the stack of panels 81 passes freely between the upper ends of retainers 47, and the full weight of the stack bears upon the teeth 83 of members 42. As the members 42 are slowly rotated by virtue of their worm drive connection with shaft 35 by means of worm gear 40 and associated gearing, each of the teeth 83 of the members 42, as they reach innermost position, will enter between the shiplap flanges 82 of adjacent stacked panels 81 and successively support the weight of the stack, and at the same time lower the stack. In this operation, the lowermost panel 81A will be separated from those above and permitted to drop to position 81B, at which it is supported by the lower ends 50 of retainers 47. The arms 54 are operated by the cranks 33 on shafts 32 in an eccentric movement combining vertical and horizontal components. Specifically, assuming the position illustrated in full lines in Fig. 4 as a starting point, as the shafts 32 rotate, the arms 54 will be moved inwardly and downwardly, thereby pressing upon the panel in position 81B downwardly against the action of the spring retainers 47, and cause the panel 81B to be pushed clear of retainer ends 50, whereby it may fall upon supports 26 just in advance of one of the propeller bars 25. On their return movement from panel-releasing position illustrated in dotted lines in Fig. 4, the arms 54 are moved outwardly and upwardly clear

of the edges of the next succeeding panel 81 which will by that time have been released by members 42 and caught by ends 50 of retainers 47. The arms 54 are driven through the meshing gears 39, 38 and the worm gear train including gear 36 mounted on shaft 35. Thus it will be seen that the common drive shaft 35 for the cranks 33 and members 42 serves to synchronize the operation of the parts for separating, releasing, and finally discharging the panels from the panel stack to the bars 26 on which the panel is shifted away from the stack by propeller bars 25 on chains 24. The chains 24 are driven in timed relation to members 42 and arms 54 by virtue of the fact that the shaft 69 is the common prime mover for all and a positive gear drive is provided from shaft 69 to each of said parts. Obviously the timing is such that a panel 81B will not be released until the preceding panel 81c on bars 26 has been propelled away from the stack. In consequence, the panels 81 are fed to the conveyor arrangement at the left hand side of the machine, as viewed in Fig. 1, in spaced relation.

Referring now to the operation of the conveyor mechanism shown at the left in Fig. 1, and best illustrated in Figs. 5 and 6, it will be seen that the guide bars 26 below the panel stack are substantially horizontally aligned with the passage between the rollers 62, 76 to permit the propeller bars 25 to push the panels 81 between the said rollers. The first set of rolls illustrated at the right in Figs. 5 and 6 rotates at a peripheral speed greater than the speed at which the chain 24 travels. To accomplish this speed ratio, said upper roll 76 is provided with a shoe 85 extending partly therearound and so arranged that its leading end engages the leading end of panel 81 as the panel is moved into its sphere of influence by propeller 25. The shoe 85 preferably comprises an arcuate plate welded or otherwise fixedly secured to the outer periphery of said roller, whereby the radius of its outer surface is greater than that of roller 76. This increased radius serves to provide increased peripheral speed, and consequently, as soon as the panel 81 comes into contact with shoe 85, its speed is substantially increased. Shoe 85 is of such length that its trailing end will disengage panel 81 just before said panel engages the intermediate set of rollers. By the time the leading edge of panel 81 reaches the intermediate set of rollers it will be substantially in engagement with the trailing edge of the next preceding panel. The intermediate rollers 62, 76 rotate at slightly lower circumferential speed than the above mentioned set first contacting the panels and serve to feed the panels to the set of rollers 62, 76 at the left which constitute a set of bulldozer rollers. These bulldozer rollers serve to propel and push the panels to and along the stationary guide members 86 of the processing machine (not shown). Guides 86 serve to hold the panels 81 in proper position, both vertically and laterally of the processing machine, while being pushed thereon by the bulldozer rollers. Preferably the bulldozer rollers constitute the sole means for propelling the panels through the first part of the processing machine, and therefore, as each panel 81 comes under the influence of said rollers, it is pushed into firm abutting engagement with the edge of the preceding panel 81, so that the progress of the panels between guides 86 is achieved by the pushing action of the bulldozer rollers transmitted from each of the abutting panels to the one next in advance thereof.

Fig. 6 clearly illustrates the manner in which a panel 81, coming into the influence of the bulldozer rollers, is brought into said edge abutment with the preceding panel. It will be understood, of course, that each of the sets of rollers 62, 76 has a firm frictional engagement with the panels 81 with the exception, of course, that in the first set of rollers the frictional engagement is effected between lower rollers 62 and the surface of shoe 85. For the purpose of achieving this frictional engagement, the bearings 73 slidable in guides 72 and journaling the roller shafts 74 mounting the upper rollers 76 are suitably spring pressed, as by springs 87 which extend between the bearings 73 and a crosspiece 88 on the upper end of each guide 72. Suitable adjusting means, actuated by hand wheels 89, are provided for the purpose of adjusting the clearance between the rollers 62, 76 to accommodate panels of different thickness. A suitable clutch 90 may be mounted on shaft 35 for operation by lever mechanism 91, whereby the drive connection between sprocket 78 and shaft 35 may be selectively connected or disconnected. It will be seen that it is possible to disengage the clutch to stop the operation of toothed members 42 and arms 54 without interfering with the continued operation of propeller chain 24, and of the rollers 62, 76. Hence the device may be conditioned for stopping by first stopping the feed from the stack a sufficient time in advance of stopping the remainder to permit all panels in the machine to pass therefrom before the entire machine is stopped. In other words, this arrangement permits the machine to be entirely cleared of panels and hence conditioned for ready adjustment and repair without interference from panels positioned at intermediate points of the machine when the same is stopped.

The advantages of the machine are primarily its automatic gravity feed which eliminates the necessity of an operator to place the panels in proper position in reference to a processing machine, and possibility of feeding of the panels at higher speed than would be possible manually, all without inaccuracies of position or the like. In actual practice it has been found that a machine of this character may be operated at a speed which is such that one man will be kept busy supplying panels in groups to the stack, which obviously entails a speed of feeding much higher than would be possible if panels were to be manually fed one by one to a processing machine in proper aligned and abutting relation.

The Fig. 7 modified embodiment constitutes an alternative mechanism which may be employed for the purpose of conveying the panels from beneath the stack to the processing mechanism. In this embodiment the panels 81 fall from the stack to the guide supports 26 to be engaged by one of a series of transverse propeller bars 25 carried by a set of chains 24 as in the preferred form. The chains 24 are trained around sprockets 95 and 96 mounted on shafts 97 and 98 respectively. Shaft 98 is an idler shaft and sprockets 96 are mounted thereon concentrically thereof. Shaft 97 is the driving shaft and sprockets 95 are fixedly mounted thereon eccentrically thereof. The circumferential dimension of sprocket 95 is exactly equal to the spacings between the propeller bars 25 on the chain 24, so that the sprockets 95 each make exactly one complete revolution while the chains 24 travel

distance equal to the spacing of bars 25. A plurality of sets of upper drive rolls 99 and lower drive rolls 100 are arranged to receive and propel the panels 81 delivered from propeller mechanism 24, 25, 26 and to be directed to the guides 86 at the feed end of the processing machine. Each of the rollers 99 and 100 rotates at the same speed and has a frictional driving engagement with the panels 81.

The operation of this modified construction is as follows: When a panel 81 is fed into delivery position on support 26, one of the propeller bars 25 will thereafter engage the same and push it forwardly. As the propeller bar 25 approaches the last portion of its panel-propelling movement, sprockets 95 will reach a rotatable position whereby the circumferential portion thereof spaced furthest from their rotative centers will assume an outward position and will tighten the chain 24 against the action of a suitable idler sprocket 101 mounted on a spring pressed arm 102. In other words, as a panel 81 approaches the first set of rollers 99—100 the chains will engage the portions of the sprockets whose teeth are spaced farthest from the center, so that their peripheral speed at the portions driving the chains will be increased, and the speed of the chains 24 and propeller bars 25 will likewise be increased. Thus, the action or movement of the propeller bars 25 upon engaging a panel will first be slow, while the chains are traveling over the portions of the sprockets spaced closest to its shaft 97, and will thereafter increase until it reaches position to be engaged by rollers 99 and 100. This movement serves to close the gap between adjacent panels before they reach the rollers 99 and 100, and hence eliminates the necessity for providing any one or more sets of said rollers with increased peripheral speeds as in the embodiment first described.

I claim:

1. Panel feed mechanism comprising means for conveying horizontally positioned panels in a substantially horizontal path, means for positioning panels on said conveying means in spaced relation, said conveying means including an endless member trained around an eccentrically journaled drive member whereby the linear speed of said endless member varies in predetermined relation during each revolution of said drive member.

2. Panel feed mechanism comprising means for conveying horizontally positioned panels in a substantially horizontal path, means for positioning panels on said conveyor in spaced relation, said conveying means including a panel support, an endless member shiftable adjacent said support and carrying a plurality of equi-spaced panel-engaging members, and driving and driven rotatable members around which said endless member is trained, said driving member being journaled off-center and having a circumferential dimension equal to the spacing of said panel-engaging members on said endless member.

3. Panel feed mechanism comprising means for conveying horizontally positioned panels in a substantially horizontal path, means for positioning panels on said conveyor in spaced relation, said conveying means including a panel support, an endless member shiftable adjacent said support and carrying a plurality of equi-spaced panel-engaging members, and driving and driven members around which said endless member is trained, said driving member being journaled off-center and having a circumferential dimension equal to the spacing of said panel engaging members on said endless member, and means for tensioning said endless member.

4. Panel feed mechanism comprising a horizontal panel support, an eccentrically journaled drive member adjacent the discharge end of said support, a driven member journaled adjacent the opposite end of said support, an endless member trained around said driving and driven members, and equi-spaced panel engaging members on said endless member spaced apart a distance equal to the circumference of said driving member and arranged whereby one thereof is adjacent the discharge end of said support when the peripheral portion of said driving member spaced farthest from the journal axis of said member engages said endless member.

5. Panel feed mechanism comprising a horizontal panel support, a rotatable drive member mounted eccentrically relative to a fixed axis of rotation adjacent the discharge end of said support, a driven member journaled about a stationary axis adjacent the opposite end of said support, an endless member trained around said drive and driven members and carrying spaced panel engaging elements, and means for tensioning the run of said endless member traveling from said drive member to said driven member.

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