

Nov. 18, 1958

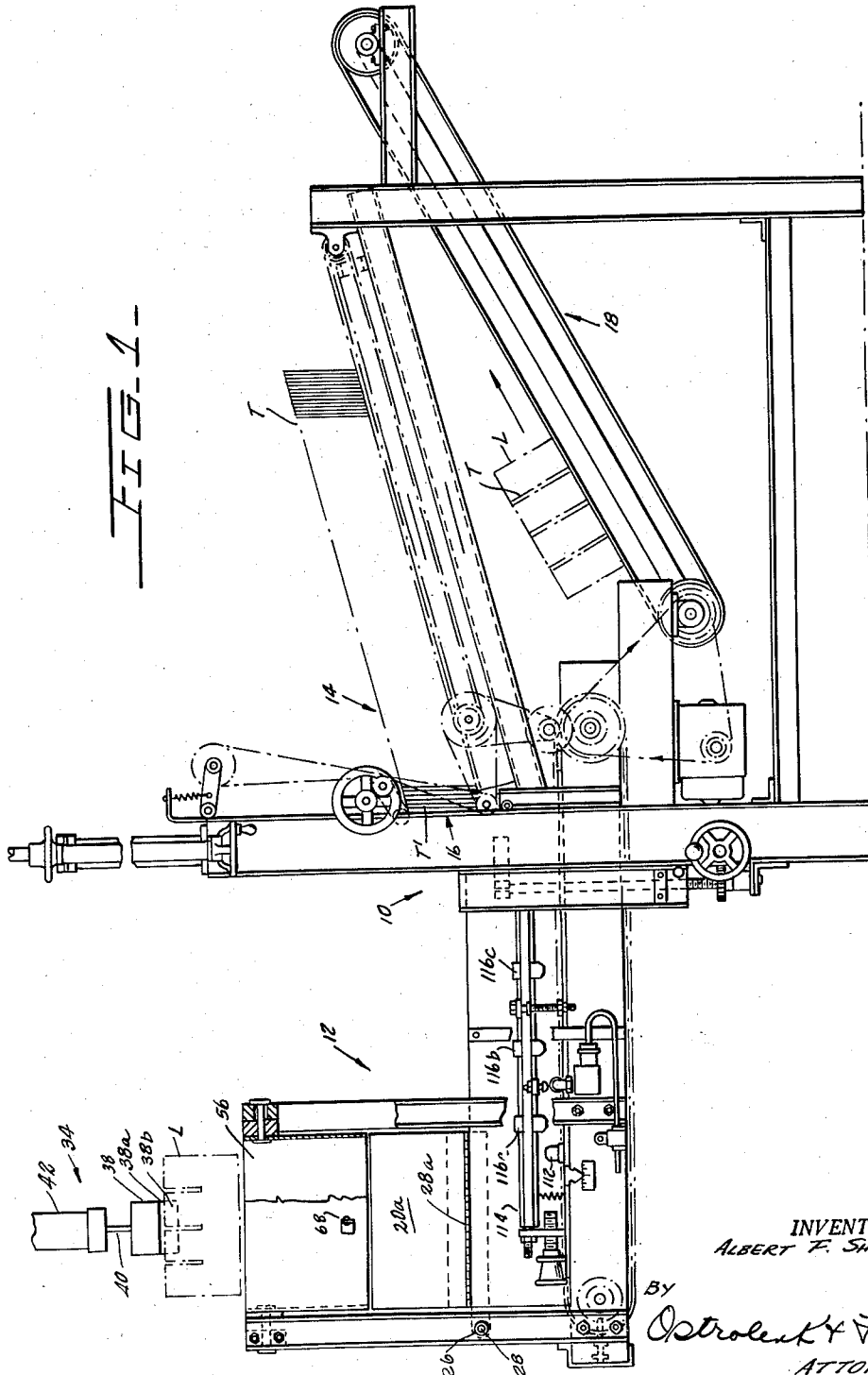
A. F. SHIELDS

2,860,554

PARTITION ASSEMBLY MACHINE

Filed April 16, 1953

3 Sheets-Sheet 1



INVENTOR.  
ALBERT F. SHIELDS

By  
*Ostrolenk & Faber*  
ATTORNEYS

Nov. 18, 1958

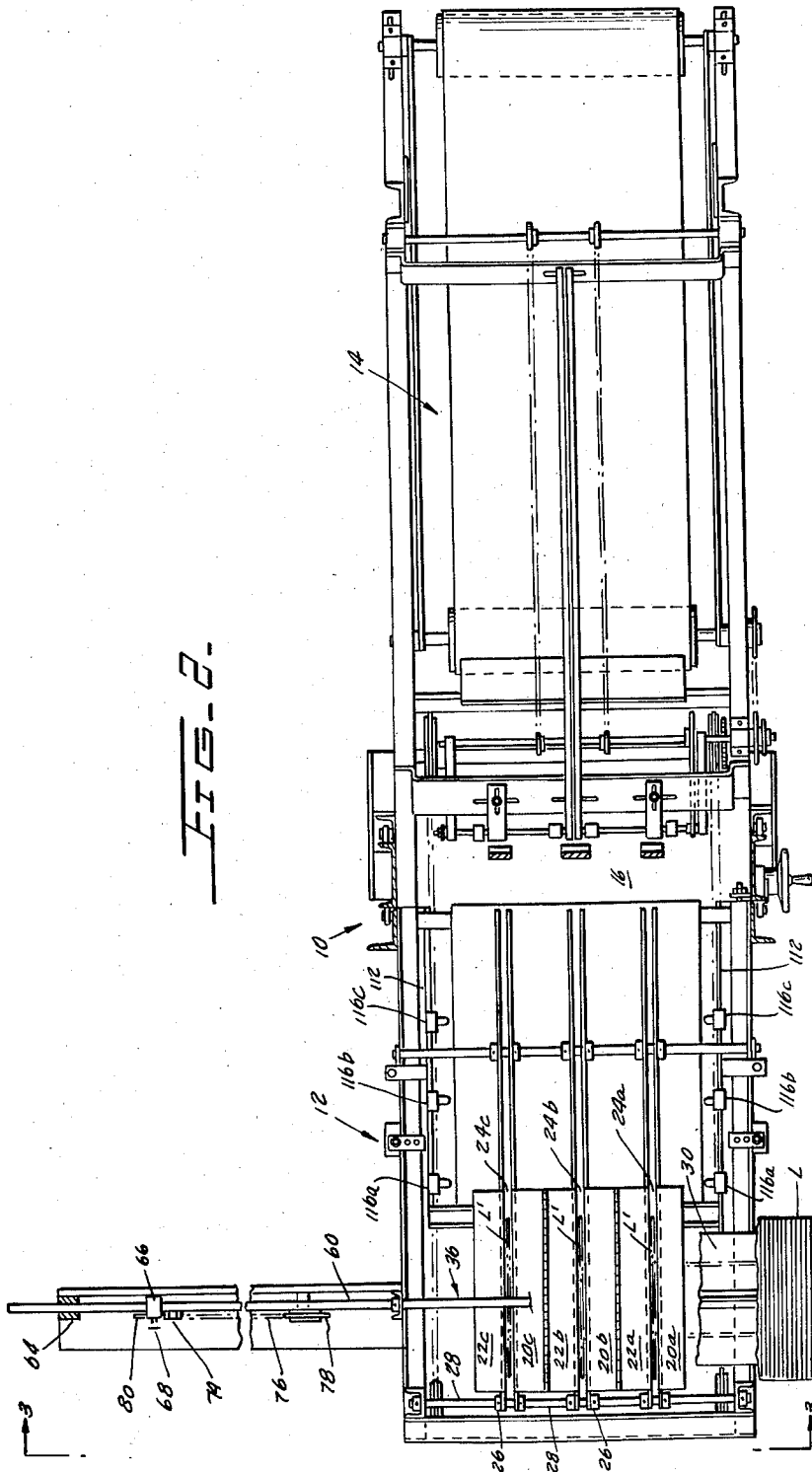
A. F. SHIELDS

2,860,554

PARTITION ASSEMBLY MACHINE

Filed April 16, 1953

3 Sheets-Sheet 2



INVENTOR  
ALBERT F. SHIELDS

BY *Carlson & Faber*  
ATTORNEYS

Nov. 18, 1958

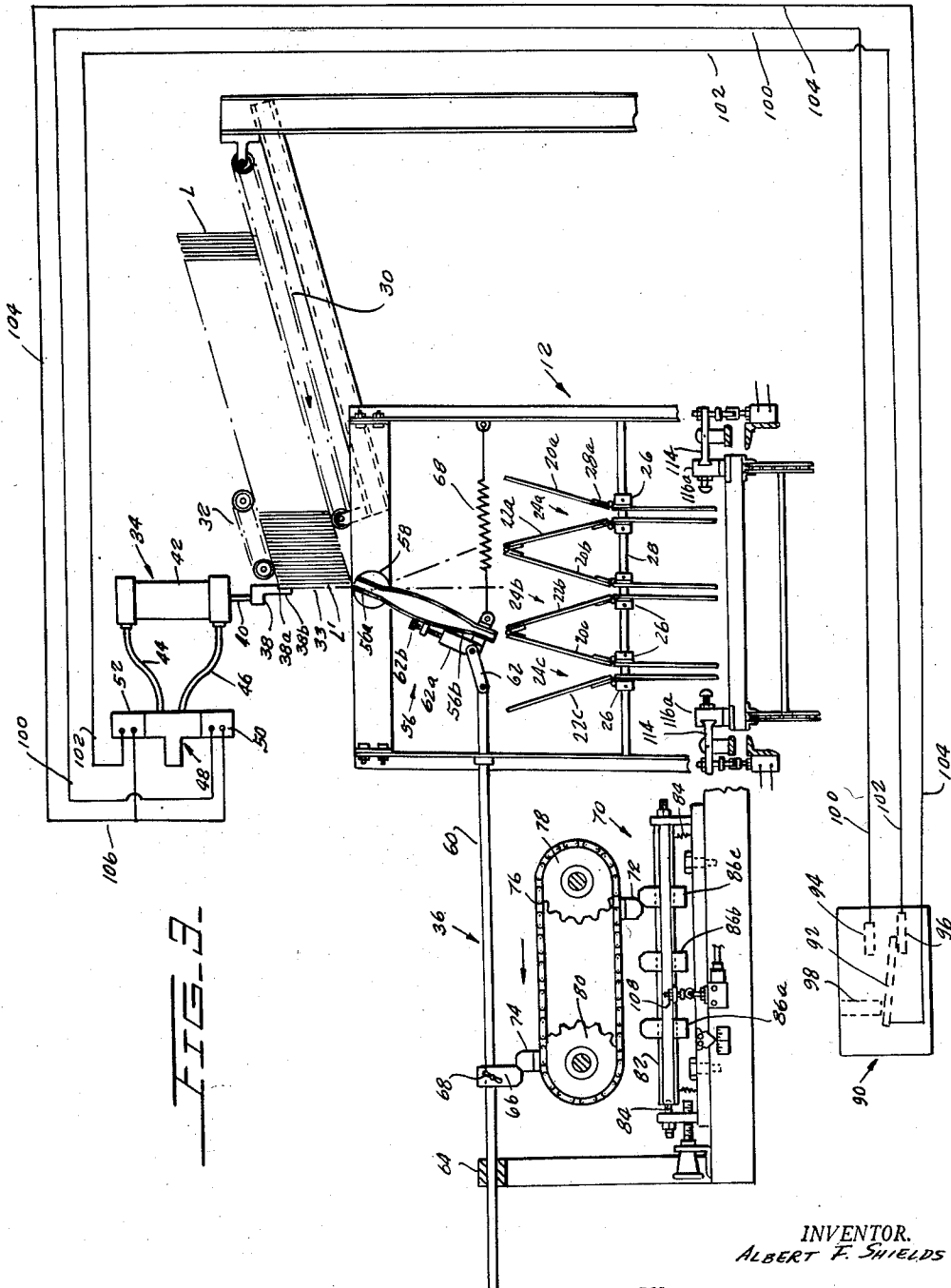
A. F. SHIELDS

2,860,554

PARTITION ASSEMBLY MACHINE

Filed April 16, 1953

3 Sheets-Sheet 3



1

2,860,554

## PARTITION ASSEMBLY MACHINE

Albert F. Shields, Forest Hills, N. Y., assignor to S. & S. Corrugated Paper Machinery Co., Inc., Brooklyn, N. Y., a corporation of New York

Application April 16, 1953, Serial No. 349,164

5 Claims. (Cl. 93—37)

The present invention relates to partition assembling machines; in particular to mechanisms for automatically feeding a longitudinally movable set of partitions along predetermined parallel feed paths to an assembly station at which successive partitions arranged transverse to the feed path are moved into engagement with the longitudinally movable partitions to form an interlocked criss-crossed cellular assembly.

In prior application Serial No. 181,259 filed August 24, 1950, which issued as Patent No. 2,754,731, and assigned to the assignee of the present invention, there is disclosed a partition assembling device arranged to interengage a longitudinally displaceable set of parallel panels or partitions, with a second set of parallel panels or partitions extending in planes transverse to the first set of panels and intermittently fed across the parallel feed paths in a predetermined feed or assembly plane. The respective sets of panels have intermeshable notches or slots in the edges directed toward each other.

Accordingly, when the longitudinally fed set of panels is advanced to bring successive groups of its notches into the feed plane of the transverse panels, the latter may be intermeshed in criss-cross and interlocked relation. The insertion of the successive ones of the transverse panels is coordinated to advancing of the longitudinally displaceable set of panels to assure proper assembly.

Although in the aforementioned application there is provided automatic mechanisms for successive delivery of the longitudinal and transverse panels to the assembly station in proper timed relation, no provision is made for successively and automatically loading sets of panels along the predetermined parallel feed paths for subsequent longitudinal advancement to the assembly station. In point of fact, it was heretofore necessary for an operator to manually place the new set of blanks along the parallel feed paths at a loading station, after the automatic mechanisms have removed the previously inserted set of blanks from the loading station. This manual operation is not only tedious and time consuming but is often a bottle-neck in high speed operation for partition assembly devices.

Accordingly, it is an object of the present invention to provide automatic mechanisms obviating at least the aforementioned difficulties. In particular, it is within the contemplation of the present invention to provide novel automatic devices for delivery of successive sets of blanks to a partition assembling machine of the type in which the sets of blanks are longitudinally displaced along parallel feed paths to an assembly station.

The above and still further objects and features of the present invention will become apparent upon reference to the following detailed description of an illustrative embodiment when taken in conjunction with the drawings wherein:

Figure 1 is a side elevational view with parts broken

2

away, sectioned, and phantom, showing a novel partition assembly machine embodying features of the present invention.

Figure 2 is essentially a top plan view of the machine.

Figure 3 is an elevational view taken substantially along the line 3—3 of Figure 2 and looking in the direction of the arrows.

Referring now specifically to the drawings, there is shown a partition assembly device, generally of the type disclosed and claimed in my aforementioned application. Briefly, the machine includes an assembly station 10, a first loading station 12 for delivering a set of parallel longitudinally displaceable panels to the assembly or work station 10, a second work station 14 for delivering successive transverse panels to the assembly or work station 10 along a feed plane 16, and an unloading station 18 for removing the cellular assembly from the work station 10. The present invention resides in the mechanisms for loading and delivering the longitudinally displaceable panels to the work station 10 and the coordination of these automatic mechanisms to the general system of the aforementioned application.

Specifically, the loading station 12 which periodically delivers plural side-by-side longitudinally displaceable panels to the assembly station 10 includes generally vertical cooperating partition plates 20a, 22a, 20b, 22b, 20c, 22c referred to collectively, hereafter as 20, 22 arranged to define side-by-side feed paths 24a, 24b, 24c referred to hereinafter as 24 for the respective panels.

As seen best in Figure 3, the respective plates 20, 22 are supported on collars 26 slidably mounted for lateral adjustment on an appropriate cross-bar 28. The collars are provided with set screws or lock nut arrangements to secure the vertical plates 20, 22 in predetermined adjusted positions. Each set of plates 20, 22 defines a guideway or feed path 24 with a flared mouth and includes pairs of superposed sections connected together by appropriate hinges 28a to permit successive sections to be brought to the formation shown in Figure 3. Since in the illustrative machine provision must be made to deliver three parallel side-by-side panels to the work station 10, there are shown six side-by-side hinged two part plates supported on the cross-bar or shaft 28. It is to be further noted that the sections of the respective plates are appropriately fastened to maintain them in predetermined adjusted positions as by collars 26 or the like.

The longitudinally displaceable blanks are supported in a stack, generally designed by the letter L, above the parallel feed paths 24a, 24b, 24c by means of lower and upper conveyors or delivery mechanisms 30, 32. Both delivery mechanisms 30, 32 are in the form of conveyor belts supported on appropriate pulleys and connected to a drive source. It is to be observed from the direction of the arrows in Figure 3 that the lower conveyor belt 30 moves generally in a counterclockwise direction, while the upper conveyor belt 32 moves generally in a clockwise direction, thereby causing the delivery of successive leading blanks L' of the stack L toward the transfer or loading plane, illustrated by the broken lines and designated by the numeral 33.

The successive leading blanks L' are downwardly displaced along the transfer plane 33 and channeled to appropriate ones of the longitudinal feed paths 24a, 24b, 24c by means of a longitudinal feed and pusher mechanism 34 suitably coordinated to a funneling and guiding mechanism 36. The longitudinal feed pusher 34, includes a vertical feed plate 38 having a horizontal ledge 38a slightly less than the width of successive blanks L' and a vertical ledge 38b movable in the transfer or

loading plane 33. Accordingly, upon vertical and downward displacement of the vertical plate or pusher 38, the leading blank L' is engaged by the narrow horizontal ledge 38a as well as the vertical abutment 38b to cause a downward displacement of only the leading blank L'.

Intermittent delivery of the leading blanks L' along the loading plane 33 by means of the vertical pusher 38 is accomplished through a pneumatic operating system including a piston rod 40 receivable within a piston cylinder 42 having admission pipes 44, 46, respectively, connected to the upper and lower ends of the piston cylinder and on opposite sides of the cylinder head (not shown). Delivery of the fluid medium is accomplished via the pipes admission 44, 46 and the three-way solenoid operated control valve mechanism 48 having solenoids 50, 52. The control valve 48 is arranged such that upon operation of the solenoid 52 the compressed fluid is channeled via intake pipe 44 to the top of the cylinder 42, thereby driving the piston downwardly and causing corresponding downward movement of the pusher 38.

During delivery of the compression fluid to the upper end of the cylinder 42, the pipe 46 serves to return the fluid ahead of the piston to atmosphere and in this sense serves as an exhaust. Converse operation is brought about by energization of the solenoid 50 during which periods the compressed fluid is introduced via the pipe 46 into the lower end of the cylinder 42, the conduit 44 serving to return the fluid to atmosphere. As the piston moves upwardly, the pusher 38 is upwardly displaced into the starting position illustrated in Figure 3.

Suitable mechanisms may be provided for adjusting the stroke of the piston 42 and to laterally constrain the blanks L' being delivered to the loading plane M by the lower and upper conveyor belts 30, 32. For the present purposes, it will suffice to point out that the solenoid controlled pusher mechanism 34 is effective to displace successive leading blanks L' along the transfer plane 33 for subsequent delivery to the generally vertically extending parallel feed paths 24a, 24b, 24c.

The transfer mechanism 36 includes a transfer chute or funnel 56 which is pivoted adjacent its upper end on the rockable head 58 for swinging movement about a pivotal axis parallel to the feed paths. The input end 56a of the feed chute or funnel is arranged along the loading plane M while the output end 56b of the chute may be brought into unloading positions over successive ones of the parallel feed paths or channels 24a, 24b and 24c. In the illustrative embodiment, swinging movement of the feed chute in a clockwise direction successively brings the output end 56b over the feed paths from right to left.

The feed chute or transfer funnel 56 is periodically swung from right to left in Figure 3 by an operating rod 60 connected thereto by a pivoted linkage 62 and supported for displacement along an axis transverse to the feed paths by appropriate bearings 64. Member 62a slidably attached to funnel 56 is adjustable by bolt 62b to vary the stroke of the funnel 56. The operating rod 60 adjustably supports an appropriate depending abutment member 66 which may be fixed in a predetermined longitudinal position along the rod 60 by a set screw 68 or the like.

Operatively connected to the feed chute 56 is a spring 68 serving to normally maintain the feed chute 56 over the delivery path 24a. The spring 68 is biased in response to displacement of the operating rod 60 to the left in Figure 3 and upon release of the rod 60 returns the chute 56 to the initial position with the output end 56b over the path 24a.

The chute 56 of the transfer mechanism 36 is displaced during the appropriate time in the operating cycle of the partition assembling machine and coordinated to successive operations of the pusher mechanism 34 by means of a timing and operating mechanism 70 having operating dogs 72, 74. The dogs 72, 74 are mounted on a chain 75

conveyor 76 supported on appropriate sprockets 78, 80 connected to the main drive of the partition assembling machine, as will be subsequently described, to move the dogs 72, 74 in a general counterclockwise direction.

Arranged below the chain supported dogs 72, 74 and coordinated therewith is a switch operating plate 82 pivoted about the axis 84 for rocking movement. The switch operated plate 82 is biased into its generally horizontal position by compression springs 84 and is periodically rocked out of the position by engagement of the dogs 72, 74 with the contact members 86a, 86b, 86c.

The rocking movement of the plate 82 against the tension exerted by the springs 84 is brought about by engagement of the dogs 72, 74 with successive ones of the stationary contact members 86a, 86b, 86c. In this connection it is to be noted that the contact members are spaced apart in accordance with the spacing of the center planes of the respective feed paths 24a, 24b, 24c.

In order to coordinate the downward displacement of the respective leading blanks L' as the chute 56 is brought into transfer positions relative to the respective feed paths 24a, 24b, 24c a switch 90 is provided which is operated upon rocking of the plate 82 due to engagement between the respective dogs 72, 74 and the contact members 86a, 86b, 86c. The switch 90 includes a movable contact 92 displaceable between fixed or stationary contacts 94, 96 and normally biased into conductive connection with the fixed contact 94.

Interconnected between the stationary contact 94 and the solenoid 50 of the hydraulically operated and electrically controlled pusher mechanism 34 is a conductive wire 100. A similar connection 102 is provided between the stationary contact 96 and the upper solenoid 52. The movable contact 92 is connected via lead 104 to one side of a suitable source of potential, the other side of the source of potential being connected to the common lead 106 for the solenoids 50, 52.

Accordingly, upon contact of the movable contact 92 with the stationary contact 96 the energization circuit for the upper solenoid 52 is completed whereupon the pusher mechanism is effective to displace a leading blank L' downwardly into the chute 56. Since the movable contact 92, shown in the operated position under control of the external switch operator 98, is normally biased into contact with the stationary contact 94, the pusher mechanism will always be restored into the inoperative position illustrated in Figure 3. The external switch operator 98 is connected via appropriate linkages 108 to the rocking plate 82 and controlled thereby to periodically move the contact 92 into engagement with the stationary contact 96 as the respective members 86a, 86b, 86c are depressed by contact with the conveyor carried dogs 72, 74.

In the position illustrated in Figure 3, the dog 72 is about to engage the contact member 86c for depressing the contact plate 82 which then completes the operating circuit for the upper solenoid 52 to cause a blank to be delivered into the chute 56. At this precise instant, the dog 74 suitably adjusted relative to the dog 72 is in its operative position relative to the abutment members 66 to maintain the lower or delivery end 56b of the chute 56 directly over the feed path 24c. Accordingly, upon energization of the solenoid through further clockwise movement of the dog 72, the leading blank supported in the transfer plane 33 will be delivered to the feed path 24c.

Upon further rotation of the dogs 72, 74 in the generally clockwise direction, the dog 74 will be freed from the abutment 66 whereupon the spring 68 will restore the chute to the initial position over the feed path 24a. Continued rotation of the conveyor chain 76 will then bring the dog 74 into position to engage the first contact member 86a. Until the dog 74 is effective to complete the solenoid circuit 52 by depressing the contact member 86a, the dog 72 is inoperative. Thereupon the dog 72 will begin to displace the chute 56 to a delivery position rela-

5

tive to the feed path 24b. When the chute arrives at the appropriate position over the delivery path 24b, the dog 74 will be in position to depress the contact member 86b, thereby effectuating delivery of a blank to the feed path 24b.

From the foregoing it can be seen that while one of the operating dogs is effective to position the chute 56 relative to the delivery paths, the other operating dog periodically causes a blank to advance into the chute 56 for guided delivery to the appropriate feed path. The period during which a set of panels to be longitudinally displaced along the feed path is loaded is, of course, coordinated into the general operation of the partition assembling machine. In order to have a complete and thorough understanding of this coordination, a relatively brief description of a partitioning machine will be set forth. However, it is to be expressly understood that the partitioning machine is subject to a latitude of variation commensurate in scope with the teachings of the aforementioned application.

As best seen in Figure 1, the transverse partitions are supported in stacked formation, designated by the letter T, for delivery to the assembly plane 16 at the work or assembly station 10. For the purposes of delivering the successive blanks of the stack T to the assembly plane, there is provided appropriate upper and lower conveyor chains, shown diagrammatically but similar to the conveyor belts 30, 32 employed in conjunction with the blanks L. The leading transverse blank T' is advanced downwardly along the assembly plane 16 by means of pusher mechanisms similar to that described in conjunction with the longitudinal blanks L. The pusher mechanisms for the transverse blanks may be operated by solenoid control valve arrangements similar to the valve 48 having the solenoids 50, 52. Operation of the pusher mechanisms for the transverse blanks T occurs when the longitudinally displaceable set of blanks L movable along the feed paths 24a, 24b, 24c have an appropriate set of notches disposed along the assembly plane 16.

In order to advance the longitudinally displaceable set of blanks along the parallel feed paths, there is provided a pusher bar 112 which is engageable with the trailing edges of the longitudinally displaceable set of blanks L and normally traverses the feed paths 24a, 24b, 24c. Co-operating with an extension of the pusher bar 112 as described in the aforementioned co-pending application there is provided a rockable switch plate 114. This rockable switch plate 114 likewise carries contact members 116a, 116b, 116c which are spaced apart in accordance with the distance between the respective groups of aligned slots on the longitudinally displaceable blanks. Rocking movement of the switch plate 114 under control of the pusher bar 112 engaging the respective contact members 116a, 116b, 116c causes the energization circuit for the pusher mechanism of the transverse panels T to be operated, thereby displacing a leading transverse panel downwardly along the assembly plane 16 for intermesh in the appropriate notches of the set of longitudinal blanks being advanced by the pusher bar.

A typical cycle of operation of the loading and transfer mechanisms for the longitudinal blanks L and for the subsequent assembly of the longitudinal and transverse panels will now be described.

After a set of longitudinal panels supported along the feed paths 24a, 24b, 24c have been removed by the reciprocating pusher bar 114 from the loading station 10, the appropriately timed and displaced dogs 72, 74 come into operation to successively position the feed chute 56 over the feed paths 24a, 24b, 24c. As the chute 56 comes into the delivery positions for the respective feed paths, the solenoid operated pusher 38 advances a leading blank L' of the longitudinal stack along the transfer plane 33 into the chute 56 for delivery to the appropriate feed path.

Upon loading of the station 10 with the blanks to be longitudinally displaced, the feed or pusher member

6

112 traversing the feed paths engages the trailing edges of the inserted blanks and pushes the blanks toward the assembly station 10.

As seen in phantom in Figure 1, the blanks L are delivered along the feed paths with their notches or slots uppermost and transversely aligned in superposed position to receive transverse blanks T at the assembly station 10. In this connection, it is to be further observed that the slots of the transverse blanks T are downwardly directed and appropriately spaced in accordance with the spacing between the longitudinal center planes of the respective feed paths 24a, 24b, 24c.

Thereupon the longitudinal blank pusher 112 successively engages the contact members 116a, 116b, 116c to institute operation of the delivery mechanism for successive transverse blanks. These transverse blanks are then assembled with the longitudinally displaceable set of blanks as the successive groups of aligned notches are brought into the assembly plane 16 under control of the pusher 112.

In the foregoing manner an appropriate set of longitudinally displaceable blanks or partitions L are assembled in cellular arrangement with the correct number of transverse blanks or partitions T, whereupon the completed formation is delivered to the output conveyor 18 for movement to an appropriate take-off point.

Although the entire mechanism has been described in conjunction with transverse and longitudinal partitions having three notches, it is to be expressly understood that any number of slots or notches may be provided in the panels. In appropriate instances, it may be necessary to add one or more contact members 86 for delivery of blanks to the feed paths and one or more contact members 116 for assembling additional transverse panels to an appropriate set of longitudinally displaceable panels.

In the foregoing the invention has been described solely in connection with specific illustrative embodiments thereof. Since many variations and modifications of the invention will now be obvious to those skilled in the art, it is preferred to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a machine of the class described, means for holding an array of slotted partition blanks and means for feeding said array to a feed station, a pusher device for intermittently feeding individual blanks out of said array and toward a transfer chute, a pivotally mounted transfer chute having an input end for receiving successive blanks from said array and an output end successively registerable with a plurality of respective guide means in the course of pivotal motion, wherein successive blanks fed to said pivotal transfer chute by said pusher device are deposited successively in respective guide means, actuating means for effecting pivotal motion of said transfer chute, and means synchronizing the intermittent motion of said pusher device with the pivotal motion of said transfer chute to feed successive blanks to said transfer chutes in timed relation to blanks leaving said transfer chute to be deposited in respective guide means.

2. A machine as set forth in claim 1, said guide means comprising a plurality of spaced panels having parallel portions and flared portions, said flared portions being adjacent the output end of said pivotal transfer chute.

3. In a machine as set forth in claim 2, said panels being adjustable with respect to the spacing therebetween.

4. In a machine as set forth in claim 1, including a table for supporting the blanks in spaced, parallel, vertical array on their bottom edges as they stand in respective guide means and a feed member for simultaneously pushing the blanks out of said guide means in successive steps, the distance of each step being substantially the distance between notches in said blanks, the motion of

said feed member coming to a stop at the end of successive steps.

5. In a machine as set forth in claim 4, including means for supporting and feeding individual blanks having reversed notches, transversely of the planes of said aforementioned blanks at each cessation of motion of said feed member so as to interengage each individual blank with the plurality of standing blanks to form a cellular combination of blanks.

# References Cited in the file of this patent

## UNITED STATES PATENTS

|           |                   |                |
|-----------|-------------------|----------------|
| 1,064,781 | Schrump           | June 17, 1913  |
| 1,373,187 | Freeman           | Mar. 29, 1921  |
| 1,523,652 | La Bombard et al. | Jan. 20, 1925  |
| 1,801,764 | Whitemann         | Apr. 21, 1931  |
| 2,296,758 | Allen et al.      | Sept. 22, 1942 |
| 2,643,590 | Ahlmeyer et al.   | June 30, 1953  |