

April 29, 1952

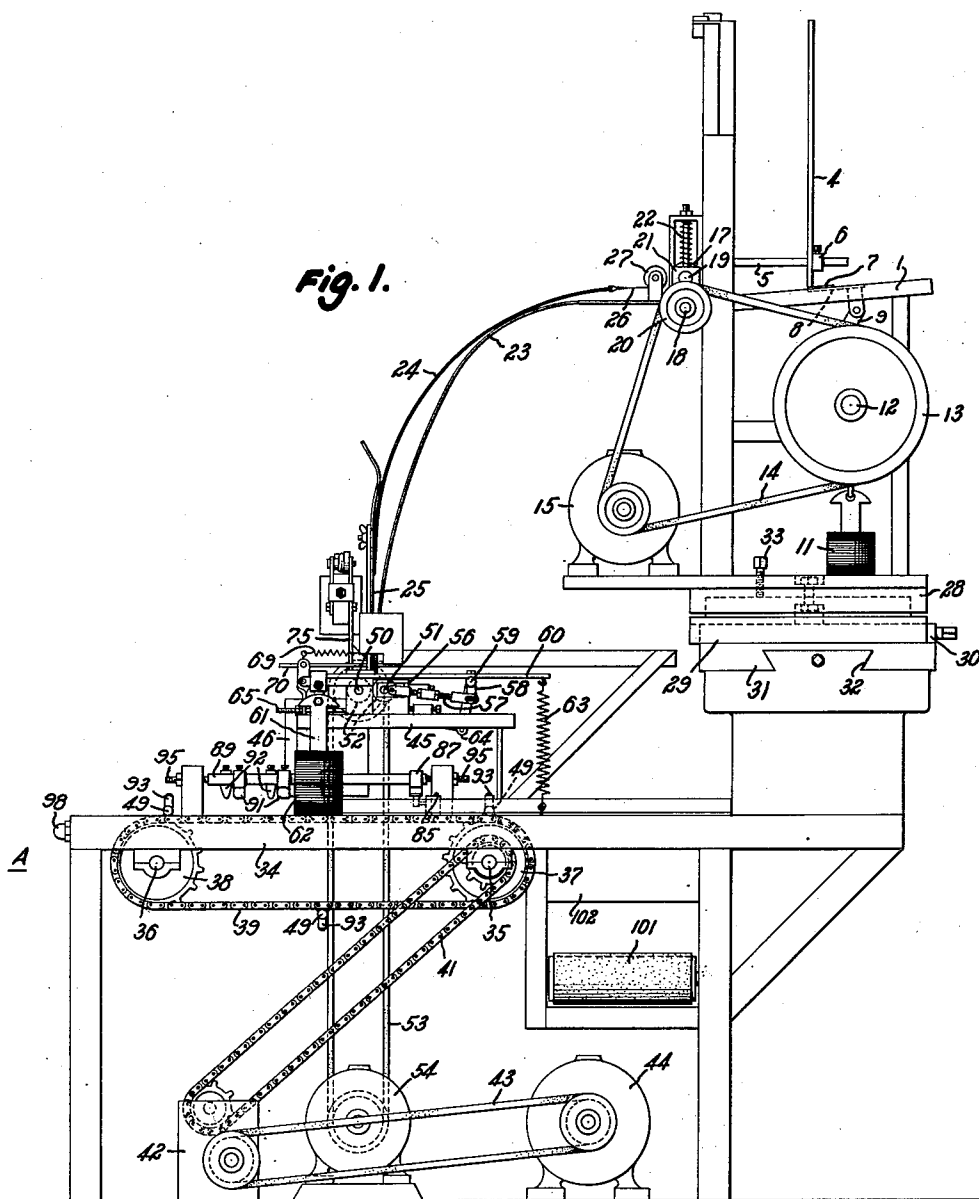
R. J. HICKIN

2,594,924

PARTITION ASSEMBLING MACHINE

Filed July 22, 1947

9 Sheets-Sheet 1



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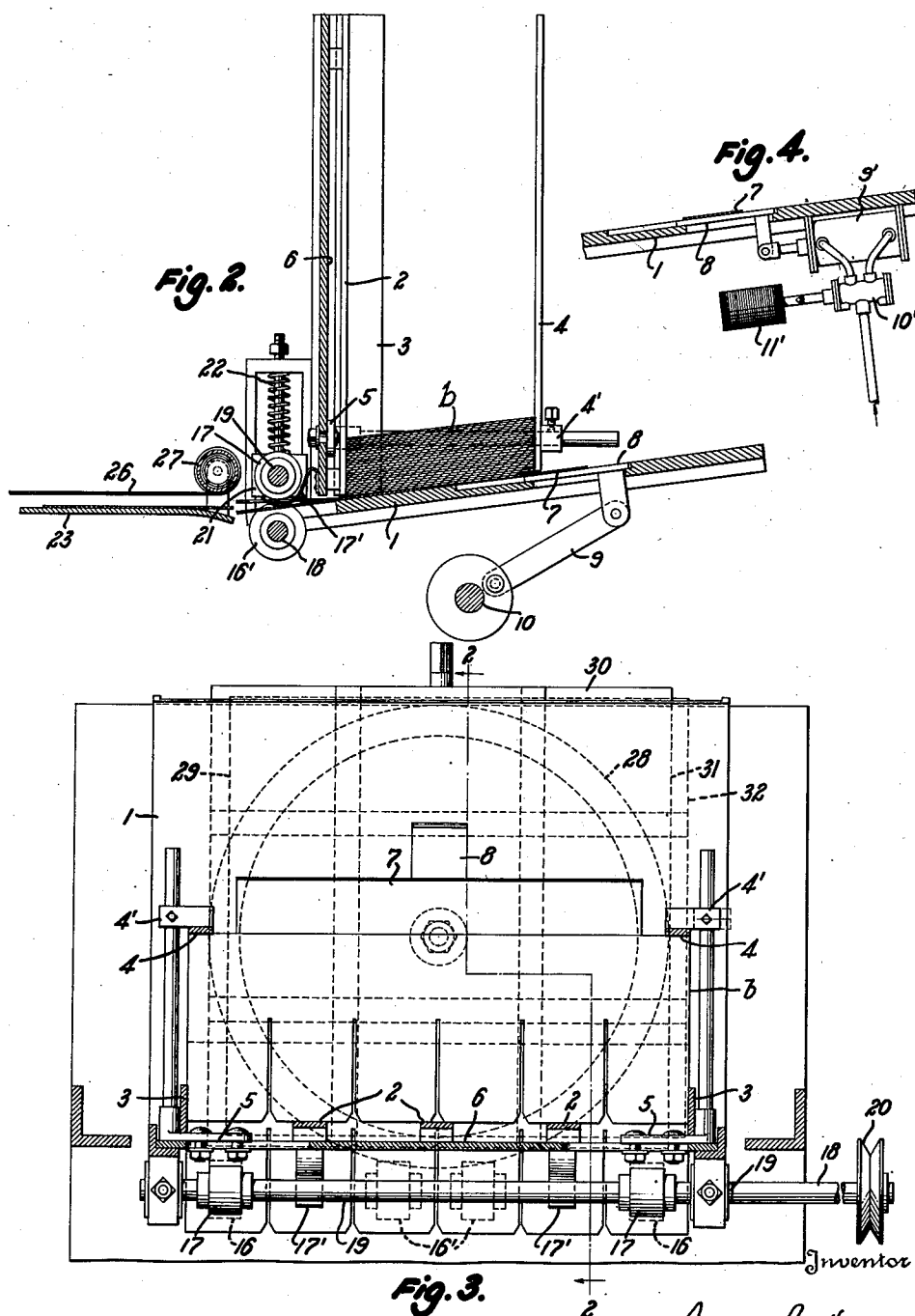
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PARTITION ASSEMBLING MACHINE

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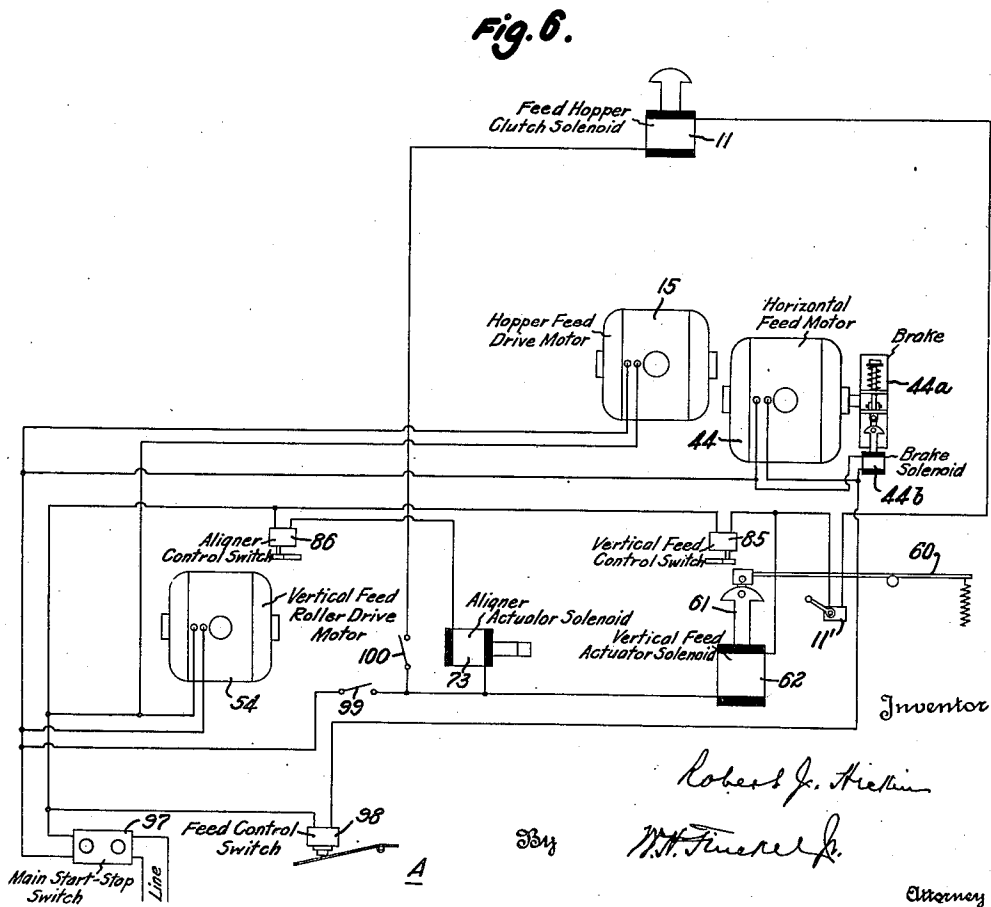
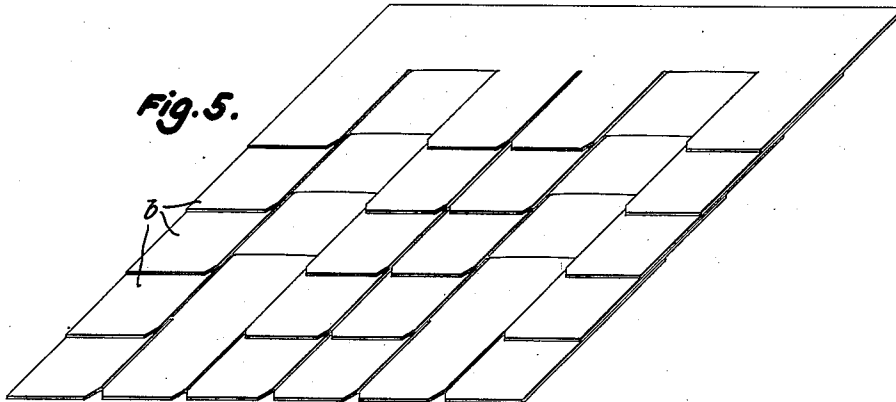
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PARTITION ASSEMBLING MACHINE

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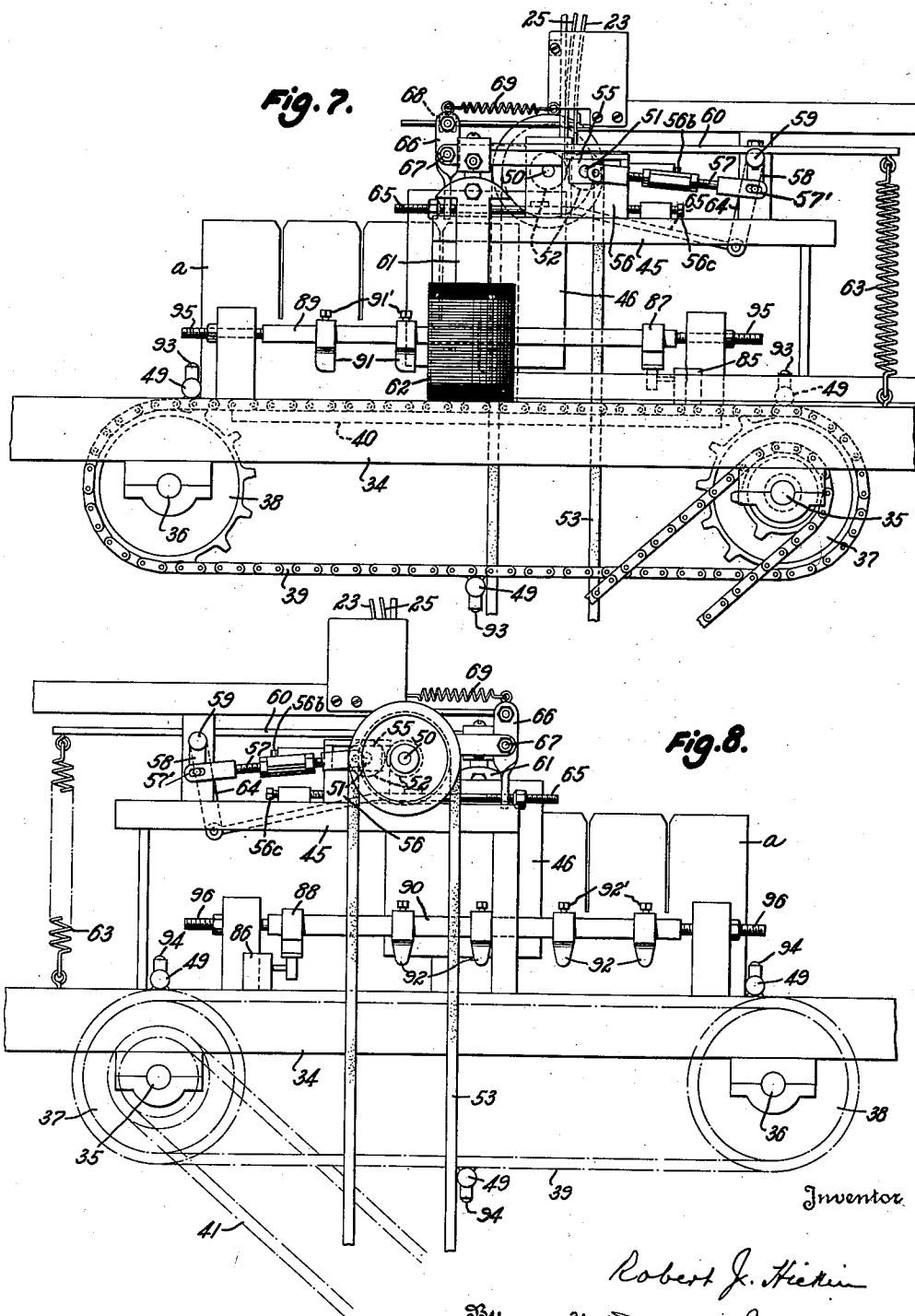
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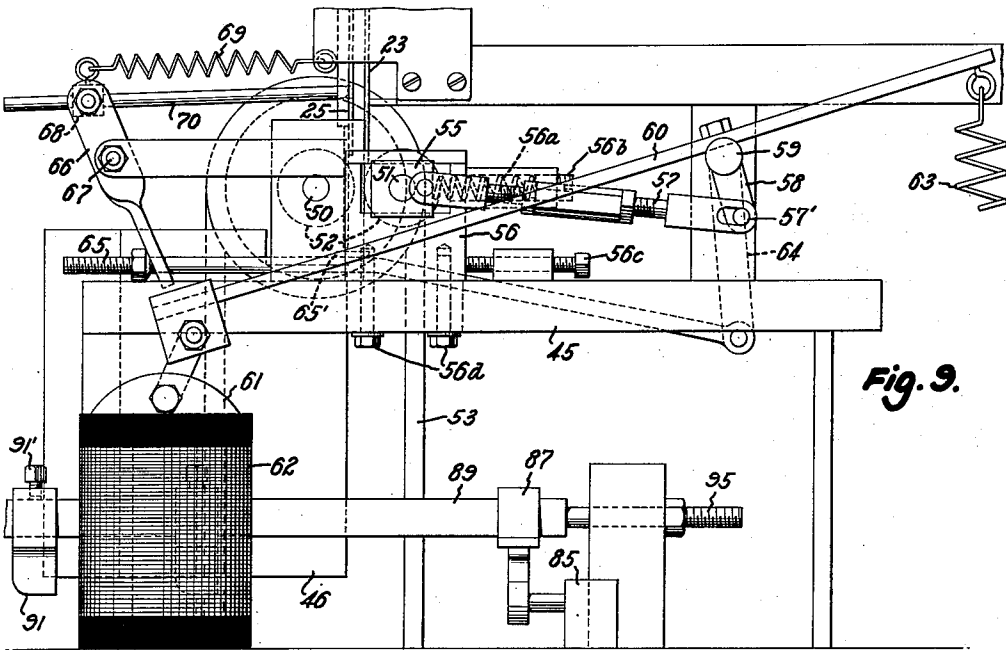


Fig. 9.

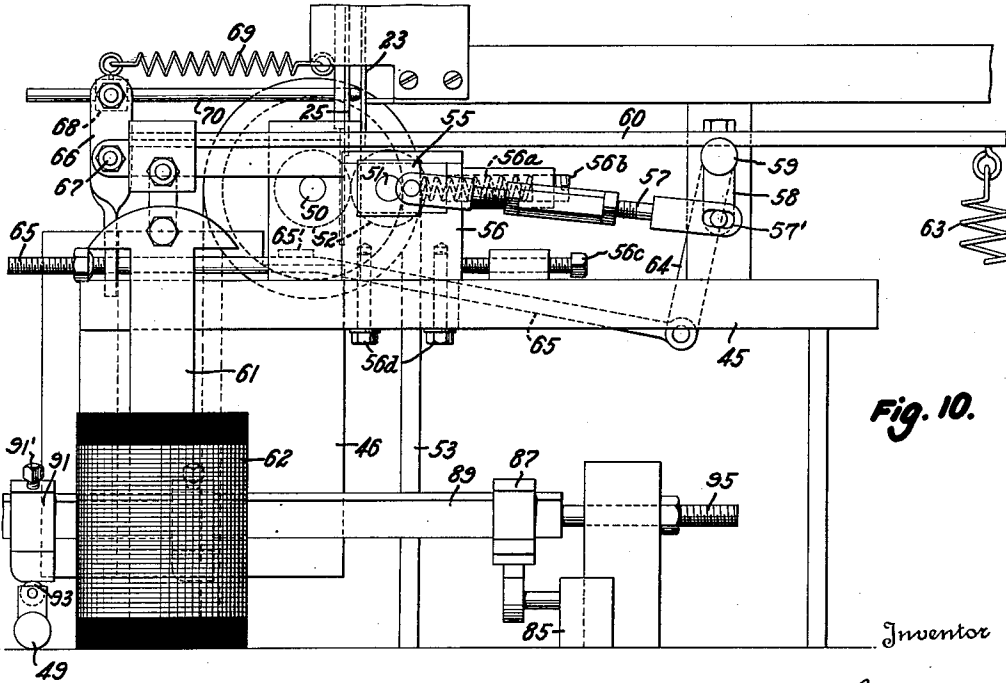


Fig. 10.

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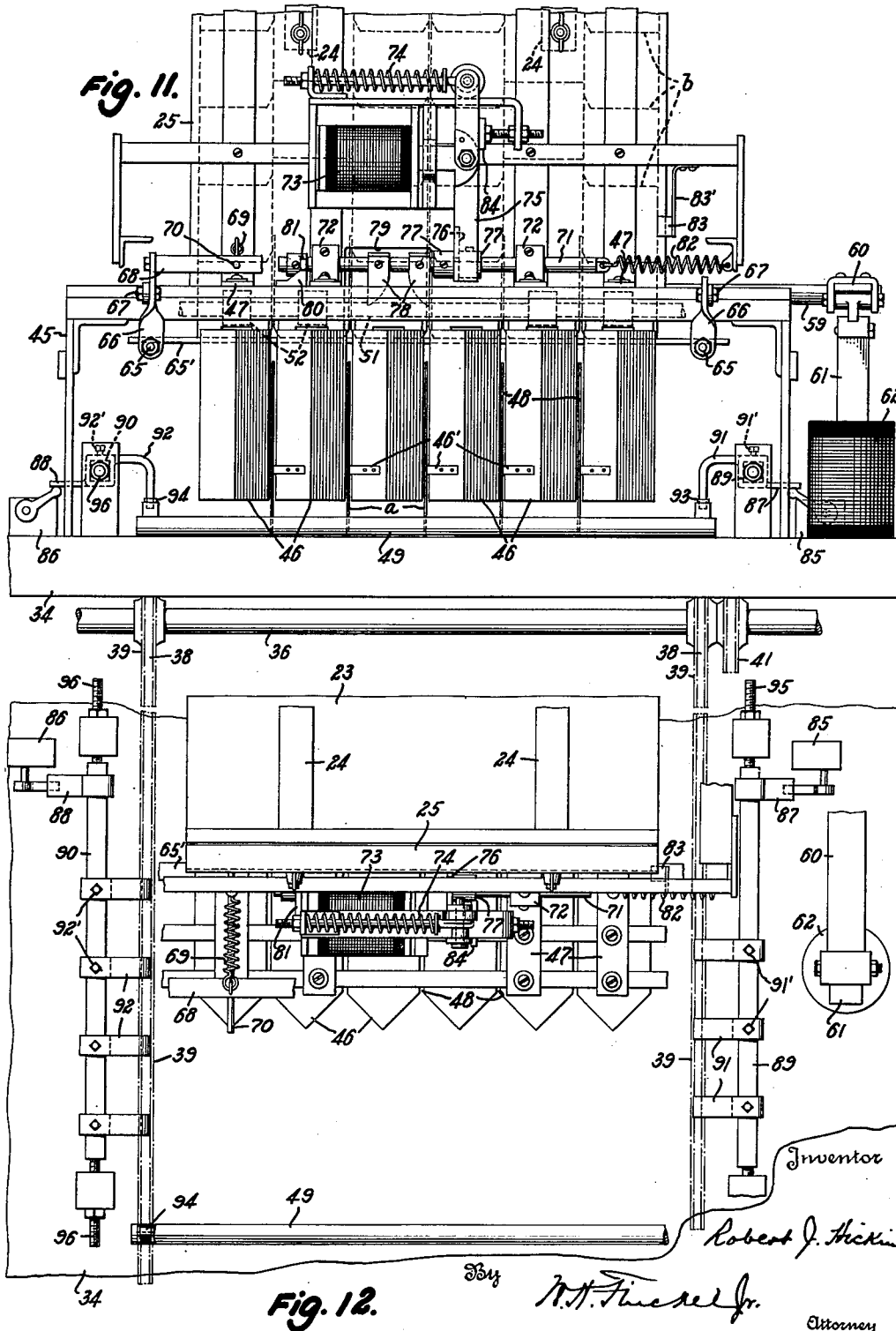
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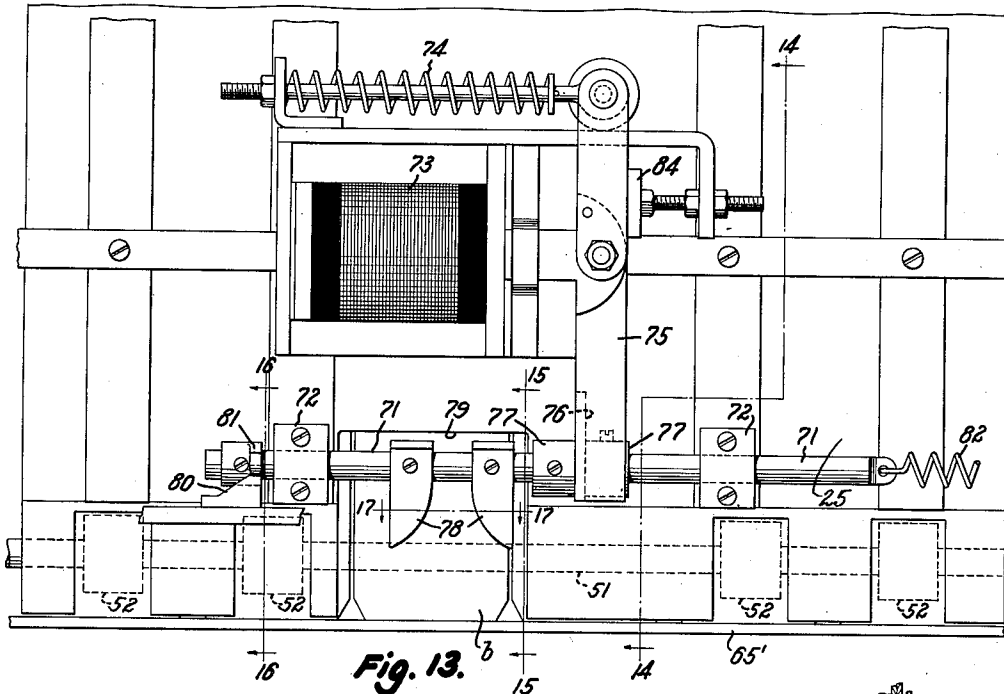


Fig. 13.

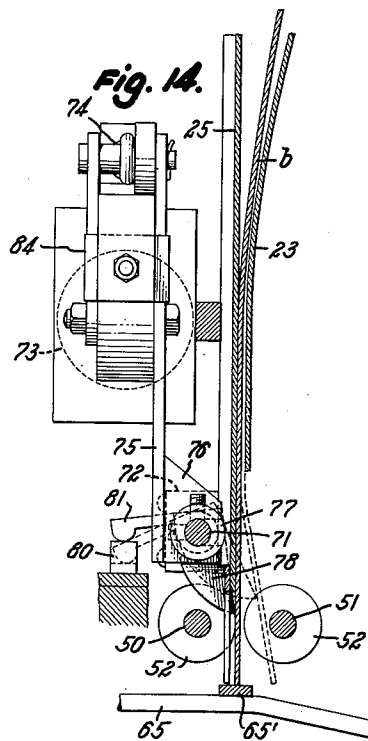


Fig. 14.

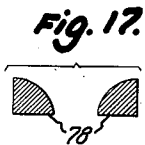


Fig. 17.

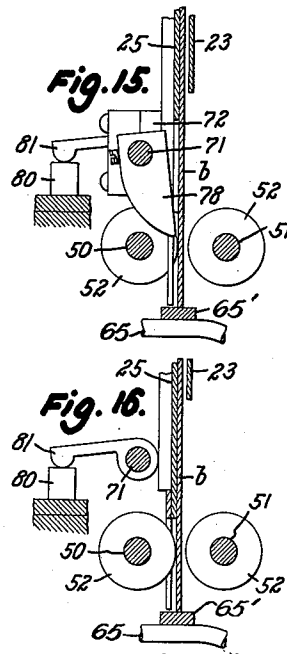


Fig. 15.

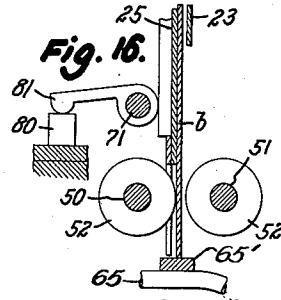


Fig. 16.

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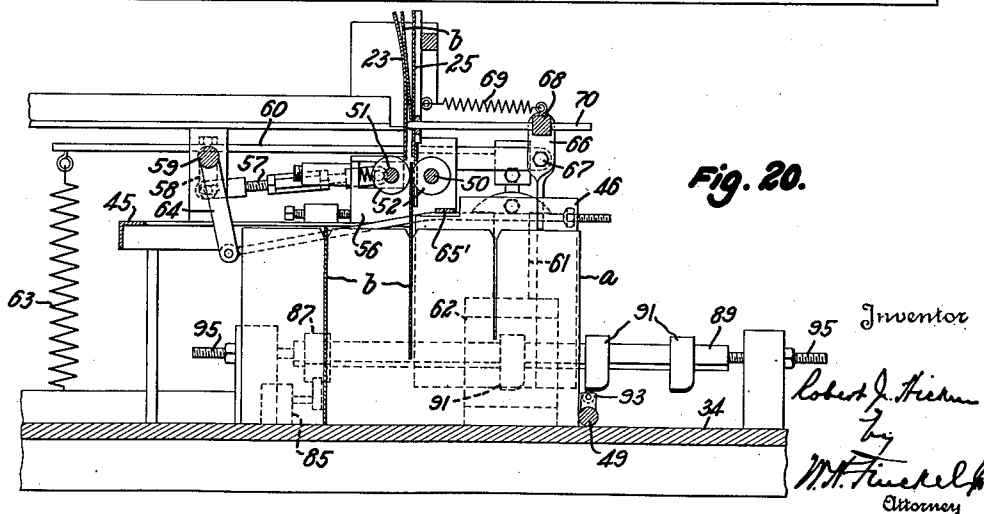
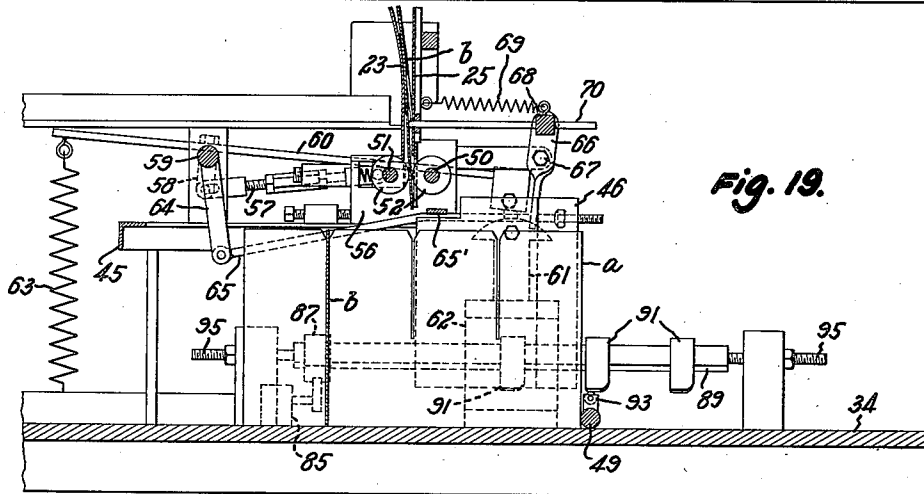
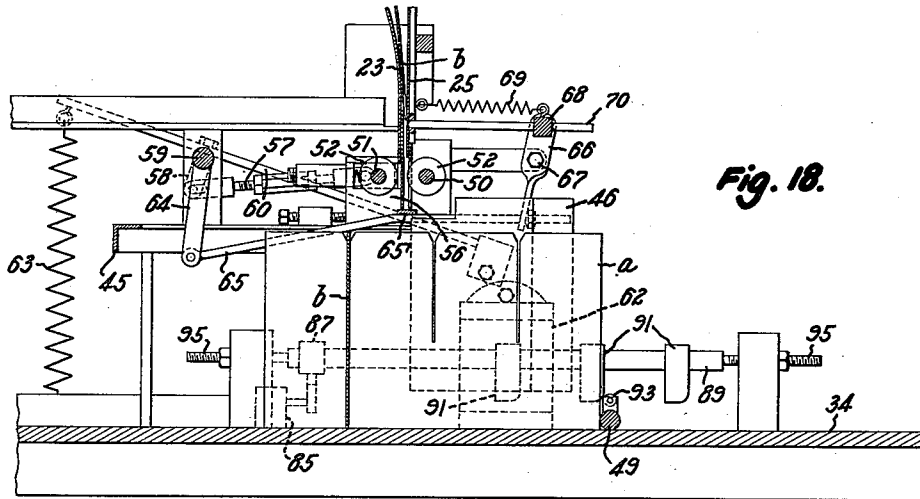
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**2,594,924**

## PARTITION ASSEMBLING MACHINE

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9 Sheets-Sheet 8



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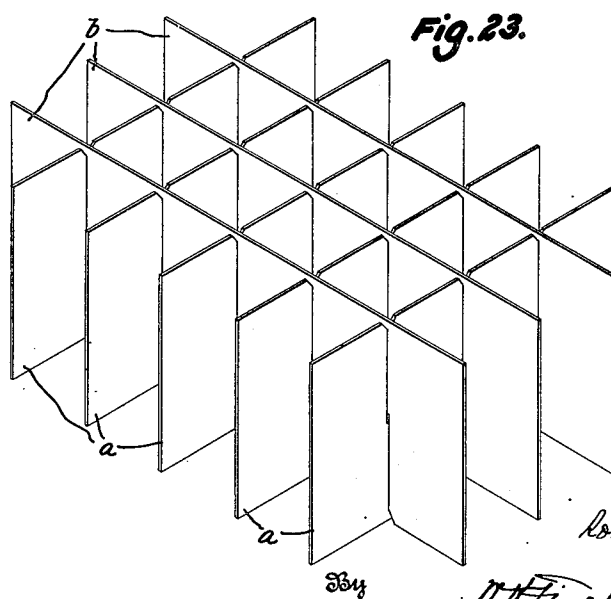
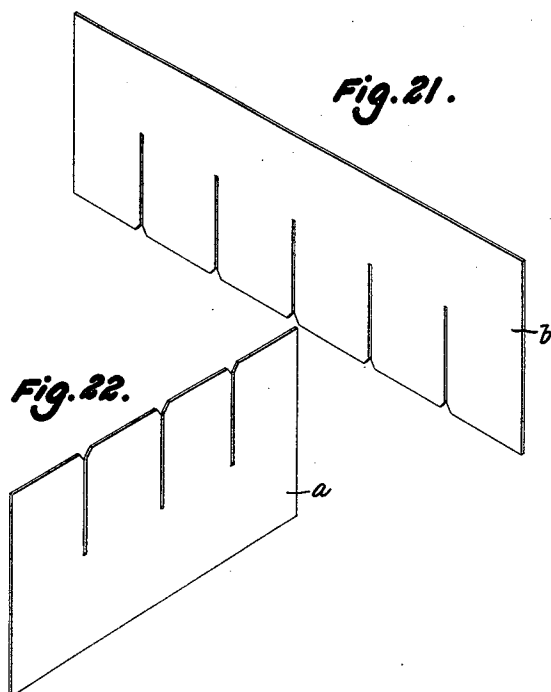
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PARTITION ASSEMBLING MACHINE

Filed July 22, 1947

9 Sheets-Sheet 9



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## UNITED STATES PATENT OFFICE

2,594,924

## PARTITION ASSEMBLING MACHINE

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Application July 22, 1947, Serial No. 762,616

15 Claims. (Cl. 93—37)

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This invention relates to partition assembling machines, and it has special reference to semi-automatic machines for assembling the slotted paperboard strips of cellular partitions of the type generally used in the packaging of bottled goods.

The machine in the embodiment hereinafter described is particularly designed for, and has its parts adjusted to, the assembling of partitions for use in cases of beer and similar bottled goods where provision must be made to separately accommodate twenty-four bottles. It is to be understood, however, that the machine is capable of adjustment to adapt it for operation on other types and sizes of partition assemblies.

It is well recognized that hand assembling of the paperboard partition strips is a tedious and time-consuming operation, even when performed by experienced and skilled operatives, and makes the manufacturing cost and sales price of the partition assemblies out of proportion to the value of the materials entering into their fabrication. Also, due partly to the relatively flimsy nature of the partition strips, machines heretofore devised for their assembling in cellular arrangement have not been entirely satisfactory, and have resulted in waste of strips and hence their unfitness for future use other than as scrap for return to the board mill.

One object of the present invention is to provide a machine for assembling the complementary strips of two groups in interlocked criss-cross cellular arrangement in such a manner that the operation may be successively performed for long machine runs without failure and hence without the accumulation of waste.

A further object is to provide the machine with feeding means for the partition strips whereby a series thereof may be fed in interleaved arrangement, thus taking advantage of a multi-layer thickness of the strips as fed to increase their rigidity and thus facilitate the control, direction and course of their feed.

Having in mind the fact, as will hereinafter appear, that certain of the partition strips are fed in a horizontal direction and standing on edge, and their mating strips are fed in a vertical direction and transversely of the first-mentioned strips, a still further object of the invention is to interengage the mating slotted and solid portions of the longitudinally and vertically fed strips in a manner simulating hand assembly operations and without subjecting the strips to such edgewise pressure as might cause them to buckle.

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Another object is to so interrelate the feed of the horizontally and vertically fed strips, by interresponsive control means, that required register of their respective slots and solid portions will automatically be assured.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated,

Fig. 1 is a side elevation of a machine embodying the features of the invention,

Fig. 2 is an enlarged sectional elevation, taken on the line 2—2 of Fig. 3, of the feed hopper and associated feed mechanism for the vertically fed partition strips,

Fig. 3 is a sectional plan view of the feed hopper of Fig. 2,

Fig. 4 is a fragmentary sectional side elevation of a modified form of hopper feed means,

Fig. 5 is a perspective view of a number of partition strips in interleaved arrangement as they leave the feeding means of Figs. 2 and 3,

Fig. 6 is a diagram of appropriate wiring for the electrically operated and controlled mechanisms of the machine,

Figs. 7 and 8 are enlarged fragmentary elevations of the assembling station of the machine and the operating and control means thereat, as viewed from opposite sides of the machine,

Figs. 9 and 10 are partial side elevations, upon a larger scale, of the assembling station of the machine, similar to Fig. 7, but showing the parts in two positions of operation, respectively,

Fig. 11 is a front view, with parts broken away, of the assembling station with associated mechanism,

Fig. 12 is a fragmentary top plan view of the mechanism shown in Fig. 11, with parts omitted,

Fig. 13 is a fragmentary front elevation, upon a larger scale, of operative parts of the strip aligning mechanism for the vertical feed,

Fig. 14 is a sectional elevation taken on the line 14—14 of Fig. 13,

Figs. 15 and 16 are sectional elevations taken, respectively, upon the lines 15—15 and 16—16 of Fig. 13,

Fig. 17 is a sectional view of the aligner fingers taken on the line 17—17 of Fig. 13,

Figs. 18, 19 and 20 are similar sectional side views of the assembling station of the machine, viewed in the direction of Fig. 8, illustrating three successive stages in the assembling operation,

Figs. 21 and 22 are perspective views of the two types of conventional slotted partition strips customarily used in assemblies of cellular partitions

for cases of beer and other bottled goods of twenty-four unit capacity, and

Fig. 23 is a perspective view of such a partition assembly as the machine is especially designed to produce from slotted partition strips of the types shown in Figs. 21 and 22.

In Figs. 1, 6, 7, 8, 11 and 12 the parts of the machine are shown in the positions assumed by them when the supply of electric current is cut off at the main start-stop switch, as will later appear.

Referring particularly to Fig. 1, wherein the complete assembling machine is shown, it will be noted that an operator seated or standing at position A, at the front end of the machine, will be in control of the machine and will have available, preferably in suitable open-sided troughs or bins (not shown), stacks of partition strips *a* of the short, three-slot, four section form shown in Fig. 22, one stack convenient to his right hand and one to his left hand. These partition strips are introduced into the machine five at a time, as will be described more fully hereinafter, the operator using both hands for the purpose with three strips held separated between the fingers of one hand and two strips similarly held in the other hand. The three-slot partition strips are chosen for manual introduction into the machine because of their relative shortness as compared with the five-slot partition strips *b* of Fig. 21, and their concomitant relative stiffness, both of which attributes makes them easier to handle and better suit them to the vertical, on-edge position in which they are conducted through the assembling station of the machine, as will later appear.

Moreover, due in some measure to the shortness and stiffness of these three-slot strips *a*, it has been found that the operator who introduces them into the machine, though originally unskilled, can, after a short term of practice, develop a remarkable facility and speed in handling them five at a time and appropriately feeding them into the machine.

A supply of long, five-slot, six section partition strips *b* (Fig. 21) is stacked upon the bed 1 of the elevated hopper and held in vertical alignment thereon by the front guides 2, side guides 3 and rear guides 4 (Figs. 2 and 3), these side and rear guides being carried on supports 5 slidable by slot and securing bolt means (Fig. 3) for adjustment laterally of the front 6 of the hopper and the rear guides being independently adjustable upon the rearwardly extending rods of the supports 5 by means of slidable brackets 4' to accommodate the hopper for the reception of partition strips of various dimensions.

The partition strips are advanced from the bottom of the stack, one at a time, by a feed plate 7 to which reciprocatory motion is imparted by a slide 8 operated through suitable mechanism 9 from the driven shaft 10 of a single-revolution clutch mechanism of conventional form (not shown) actuated by a solenoid 11, power being applied to the driving shaft 12 of the clutch through a pulley 13 and belt 14 from a motor 15.

Instead of employing this type of mechanism for operating the feed plate 7, including the single-operation clutch, the modified means illustrated in Fig. 4 may be used. Here the feed slide 8 is connected with the piston rod of an air cylinder 9', control of which is afforded by a four-way valve 10' of conventional commercial form actuated by a solenoid 11' adapted to be energized in the same manner as is the solenoid 11, as will hereinafter appear.

As the individual partition strips are fed for-

ward from the hopper by the feed plate 7, they are engaged between sets of knurled or other friction rollers 16, 16' and 17 mounted upon shafts 18 and 19, respectively, the rollers 16, 16' being driving rollers and turning with their shaft 18, whereas the rollers 17 are idlers and preferably turn on anti-friction bearings upon their shaft 19. It will be noted that there are two sets of rollers 16 and 17 spaced upon their shafts in such arrangement as to mate with one another in pairs above and below the marginal sections of the partition strips (see Figs. 2 and 3), whereas the rollers 16' merely support and guide the central sections of the strips. For engagement with the sections of the strips between those engaged by the rollers 16 and 16' spring depressor fingers 17' are provided. The shaft 18 is driven through a pulley 20 from the belt 14 and motor 15, and is held against vertical movement in suitable bearings rigidly attached to the hopper framework. The shaft 19 is mounted in spring pressed slide bearings 21 the pressure springs 22 of which function to force the rollers 17 against the marginal sections of the partition strips to engage them in frictional feeding relation to the driven feed rollers 16.

As the partition strips *b* are fed forward by the rollers 16—17 they rest upon the shelving feed guide 23 leading to the throat of the assembling station of the machine, and their upper surfaces are engaged and guided in conjunction with the feed guide 23 by a plurality, preferably two, of flexible guide straps 24 (Figs. 1, 11 and 12) the forward or lower ends of which may be rigidly attached to the vertical guide plate 25 of the assembling station, and the rear or upper ends of which are yieldably mounted by connection through cables 26 with a spring tensioned roller 27 similar in construction and operation to an ordinary shade roller. Optionally, however, the rear ends of the straps 24 may be tensioned by other obvious types of yielding tension means such as extensible helical springs.

Referring particularly to Figs. 2 and 3, it will be seen that the pairs of feed rollers 16—17 which engage the two outer or marginal sections of the partition strips are preferably of such diameters, the lower rollers 16 greater than the upper rollers 17, that these outer or marginal sections will be bent upwardly out of the normal plane of the fed strips, and this is true also of the central sections engaged by the rollers 16'. The intermediate sections will be held in planar alignment with the bodies of the strips, or possibly slightly depressed, by the spring fingers 17'. This results in the interleaving of the sections of following fed strips with the solid portions of strips preceding them, as shown in Fig. 5, to thus produce a relatively rigid, rather than flimsy, and longitudinally and laterally interengaged web of the strips in their travel to the assembling station of the machine. Hence, as each strip is fed from the hopper into this web the whole web will be advanced forwardly and downwardly in the guides 23, 24, 25 a distance equal to approximately one-half the height of a strip.

In order that the feed of the strips, and the resulting web thereof, may be properly directed to insure appropriate presentation of the web at the assembling station, the feed hopper is mounted upon a stand similar in construction to the bed of a turret lathe and having a rotatable head 28 directly carrying the hopper, the motor 15 and other operative adjuncts, and right an-

gularly adjustable guides and slides 23—30, 31—32. Thus the hopper may be moved longitudinally and laterally of the machine in direct line, and may be swung to any desired angle with respect to the longitudinal axis of the guides 23, 24, 25. Appropriate means, such as set screws 33, may be provided for maintaining the angular adjustment of the rotatable head 28.

The partition strips *b* thus fed from the hopper are, for convenience in description, referred to as in the vertical feed.

In order to accomplish the feed of the short, three slot, four section partition strips *a*, which, for convenience in description will be referred to as in the horizontal feed, to the assembling station, the machine table 34, Figs. 1, 7, 8, 11 and 12, is provided with two spaced parallel shafts 35 and 36 each of which has affixed to it a pair of laterally spaced similar sprockets 37—37, 38—38, respectively carrying chains 39. The upper flights of these chains preferably run on tracks 40 of the table (Fig. 7), and power to drive them is imparted to the sprocket of shaft 35, clockwise as viewed in Fig. 1, through a chain and sprocket transmission 41, change speed gearing 42 and belt drive 43 from a motor 44.

At the assembling station a framework 45, supported upon the table 34, carries a plurality of separator guides or gates 46 equal in number to the number of sections in the partition strips *b* in the vertical feed, and so adjustably spaced as by means of clamps 47 (Figs. 11 and 12) as to provide between them ways 48 for reception of the partitions strips *a* in the horizontal feed and for supporting these strips in vertical, on-edge, arrangement and in alignment with the mating slots of the partition strips *b* in the vertical feed. It will be noted that the forward faces of the separator guides or gates 46 are provided with a double bevel or V shape, Figs. 11 and 12, thus facilitating the manual introduction by the operator at A into the ways 48 between them of the strips *a* in the horizontal feed in the manner hereinbefore referred to. In order to prevent the inertia of the hand-fed strips *a* from causing their introduction too far into the ways 48, friction producing springs 46' (Fig. 11) are provided upon the gates 46 adjacent to the forward or V-shaped edges thereof.

Extending transversely of the table 34, with their ends affixed to the chains 39 at appropriately spaced intervals, are a plurality of feed bars 49 (three as shown) which, as they travel toward the assembling station in their movement with the chains 39, will engage the forwardly projecting edges of the partition strips *a* in the horizontal feed and carry the strips along into the ways 48 in uniform alignment and at uniform speed (see Figs. 7, 8, and 11).

At the assembling station, where the feed guide 23 and guide plate 25 form the feed throat for the partition strips *b* in the vertical feed, the frame 45 carries two shafts 50 and 51, respectively, each of which has mounted upon it a plurality of feed rollers 52 spaced axially of the shafts, and in mating pairs on the two shafts adjacent to the ends thereof for feeding engagement with at least the two sections adjacent to the margins of the partition strips in the vertical feed, the rollers on the shaft 50 being preferably knurled and capable of driving engagement with the strips.

The shaft 50, and with it its rollers 52, is driven by a pulley and belt transmission 53 from a motor 54 (Fig. 1). The shaft 51 is preferably

non-rotative and its rollers 52 are mounted on anti-friction bearings carried by it. The ends of the shaft 51 are carried in slide blocks 55 (Figs. 7 to 10) mounted to slide in ways 56. Movement of the shaft 51 away from shaft 50 is imparted in response to intermittent movement of the adjustable links 57 pivotally secured at one end to the slide blocks 55 and having their other ends connected at 57' by a lost motion connection including a pivot pin and slot, as shown, to lever arms 58 carried by a rock shaft 59 actuated by a power lever 60 rigidly attached intermediate its ends to the shaft 59 and having one of its ends pivotally connected to the core 61 of a solenoid 62 and its other end tensioned by a spring 63. Movement of the shaft 51 toward shaft 50 is imparted by heavy springs 56*a* which bear against the blocks 55 and against adjustable compression screws 56*b* carried by the ways 56, see Figs. 9 and 10. Major relative adjustment of the ways 56, and hence of the shaft 51, with respect to the shaft 50 is provided for by adjustable stop screws 56*c* and clamping bolts 56*d*. By these means it will be apparent that the driven rollers 52 of the shaft 50 may be utilized to impart a downward drive thrust to successive partition strips in the vertical feed as these strips are presented between them and the rollers 52 of the shaft 51 when said latter shaft is acting under the influence of the springs 56*a* to frictionally engage the two sets of rollers 52 with opposite faces of the strips.

Also actuated by the lever 60 through the rock shaft 59 by means of lever arms 64, links 65 and rock levers 66 having fixed pivots 67 carried by the frame 45, is a stop bar 68 (Figs. 7 to 10 and 18 to 20) biased by springs 69 and carrying stop pins or fingers 70 intermittently projecting into and closing the feed throat formed by the guide parts 23 and 25 of the vertical feed. Also carried by the links 65 is a shuttle bar 65' which moves with the links 65 into and out of position to obstruct the exit end of the throat.

As a means for insuring proper register of the slots of the partition strips *b* in the vertical feed with the mating portions of the strips *a* in the horizontal feed, and supplementing the initial direction of the feed of the web of such first-mentioned strips with appropriate adjustment of the hopper by means of the rotatable and laterally and longitudinally shiftable mounting means of the hopper (parts 28 to 33) hereinbefore described, there is provided at the feed throat 23—35 adjacent to the final feed rollers 52 an aligner mechanism which serves to positively attain aligning register just prior to actual individual successive feed of the strips from the web of same.

This aligner mechanism (Figs. 1 and 11 to 17) comprises a transverse shaft 71 mounted for reciprocation and oscillation in bearings 72 carried upon frame members of the vertical guide plate 25. The shaft 71 is reciprocated under the influence of a solenoid 73 and return spring 74 through a reciprocating bar 75 connected to the core of the solenoid 73 and having a yoke 76 embracing the shaft 71 and confined between similar collars 77 adjustable axially of the shaft. The shaft 71 carries a pair of fingers 78 spaced apart a distance somewhat less than the width of a single section of a partition strip and these fingers extend through an opening 79 formed in the guide plate 25. Normally, under the influence of a fixed surface cam 80, and a cam follower 81 reciprocating with the shaft 71, the

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fingers 78 are maintained in an angular position out of contact with partition strips in the throat 23—25, as shown particularly in Fig. 15. However, upon reciprocation of the shaft under the influence of the solenoid 73, the cam follower 81 will engage the low portion of the cam 80 and the shaft will be oscillated by a torsion spring 82 to press the free ends of the fingers 73 into contact with a partition strip in the throat. These fingers are so located axially of the shaft 71 as to be able to press against the outer or forward face of a single section of the leading strip in the vertical feed and adjacent to the leading edge of such section and displace it slightly rearwardly toward the shaft 51 between the adjacent rollers 52 (Fig. 13), as shown in broken lines in Fig. 14. Hence, with the finger at the right (Fig. 13) accurately adjusted to insure proper alignment of the strip in the leading end of the web, it will be apparent that one full left and right reciprocation of the shaft 71 will actuate the fingers 78 to accomplish the desired alignment, and at the end of the right hand stroke of reciprocation the cam follower 81 will ride up onto the high point of a cam 80 to return the fingers to inoperative position. It will be noted, moreover, by reference to Fig. 17, that the conformation of the strip engaging faces of the fingers 78 is such that they will be capable of aligning engagement with adjacent edges of sections of the strips only when traveling in one direction, the left hand finger when travelling to the left, and the right hand finger when travelling to the right. Moreover, as will be described hereinafter, this aligning operation will be performed when the leading edge of the leading strip *b* of the web of same is resting upon, and its downward movement arrested by, the shuttle bar 65'.

Preferably, in order to insure proper alignment of the strips under the influence of the fingers 78, and to prevent misalignment which might result from inertia in the web under the influence of their movement to the right, the throat will be provided with a stop member or edge gauge 83 extending into the throat and resiliently biased inwardly of the throat by a spring mounting member 83' (Figs. 11 and 12). Also, an adjustable stop 84 is provided for limiting return movement of the core of the solenoid 73, and hence of the shaft 71, under the influence of the spring 74.

In order properly to energize and deenergize the solenoids 62 and 73, switches 85 and 86, respectively, are provided. These switches close and open in timed relation to the travel of the partition strips *a* in the horizontal feed, and particularly with respect to the passage of the slots in such strips, by switch lever depressors 87 and 88 mounted on rocker bars 89 and 90 to which rocking motion is imparted by series of trip levers 91 and 92 actuated by trip cams 93 and 94, respectively, carried adjacent to the opposite ends of the feed bars 49. Adjustable bearing mounts 95—95 and 96—96 are provided for permitting axial adjustment of the rocker bars, and the trip levers are individually adjustable axially of the rocker bars and are capable of being fixed in proper adjustment by set screws 91' and 92' in order to insure proper timing of the tripping of the switches 85 and 86 with respect to travel of the partition strips *a* in the horizontal feed, as will hereinafter appear in the description of the operation of the machine.

It will be noted that there are three trip levers

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91 for control of the solenoid 62, and four trip levers 92 for control of the solenoid 73. The three trip levers 91 correspond in number and operative spacing to the three slots in the partition strips in the horizontal feed. The four trip levers 92 will cause the aligning mechanism to function just prior to each actuation of the vertical feeding mechanisms and just subsequent to the third strip assembling operation.

Referring to the wiring diagram of Fig. 6, it will be seen that the motors 15 and 54 are in the circuit controlled by a conventional "start-stop" switch 97 within reach of the operator stationed at A, so that, when a run on the machine is to be made, these motors may operate, respectively, to constantly drive the clutch drive shaft 12 and hopper feed roller drive shaft 18, and the throat feed roller shaft 50.

The circuit through the motor 44 which drives the horizontal feed chains 39 is controlled by a knee or thigh switch 98 within easy reach of the sitting or standing operator at position A, thus leaving both of the operator's hands free for supplying partition strips *a* to the horizontal feed mechanism.

It will be seen also that the solenoids 11 and 62 are connected in such a manner as to be simultaneously energized under the control of the switch 85, but solenoid 11 is deenergized in response to movement of the lever 60 by a switch 11' adapted to open when the lever has about completed its downward travel in response to energization of its operating solenoid 62. The solenoid 73, which actuates the final aligning mechanism, is controlled solely by the switch 86.

In order to avoid overrunning of the feed chains 39 of the horizontal feed due to inertia in the drive of the motor 44 therefor, this motor is provided with a brake 44a released by a solenoid 44b in circuit with the motor under control of the feed control switch 98.

For convenience in making adjustments in the feed mechanisms, simple on-off switches 99 and 100 are provided. The switch 99 can function to cut all of the solenoids 11, 62 and 73 out of operation, whereas the switch 100 can function to cut only the solenoid 11 out of operation.

As shown in Fig. 1, a belt conveyor or the like 101 is provided to take the assembled partitions from the assembling machine to a point of packaging or storing. Normally, when dropped onto the conveyor 101 from the table 34 the partition assemblies will collapse to flat condition, but to insure that they thus collapse a baffle 102 is provided.

The operation of the machine is substantially as follows:

Prior to functioning of the machine in the actual assembling of the strips *a* and *b* fed in the horizontal and vertical feeds, respectively, the vertical feed hopper is supplied with an appropriate stack of uniformly arranged partition strips *b* of the six section type (Fig. 21) and the motors 15 and 54 started by operation of the switch 97 "Start" button. Then without supplying any of the four section strips *a* (Fig. 22) in the horizontal feed, the operator will allow the normally closed switch 98 to remain closed, thus resulting in release of the brake 44a and energization of the feed motor 44 to cause travel of the chains 39, and operation of the solenoids 62 and 11, but particularly the clutch operating solenoid 11, until a web of partition strips *b* (Fig. 21) is formed between the guides 23—24 and extending into the throat of the as-

sembling station where, when it is arrested by the shuttle bar 65', the switch 98 is depressed to open the circuit through the solenoids 62 and 11 in order not to jam the vertical feed.

The initial web of partition strips may also be formed by manually operating solenoid 11 with the circuit at switch 98 open but with the motors 15 and 54 running.

While the web of strips is being formed, the direction of its travel between the guides 23 and 24 may be observed and appropriate adjustment of the position (to right or left, forward or backward) of the feed hopper, and its angular adjustment, may be made through the instrumentality of the parts 28 to 33, to correct any deviation in such direction of travel from that deemed proper for correct functioning of the mechanism at the assembling station. It will be noted here that similar adjustment may be made during the subsequent assembling run of the machine.

With the web of partition strips *b* thus formed and extending into the throat, the operator at station A will permit the switch 98 to close again and, prior to approach of a feed bar 49 to the top of the table 34, will arrange five of the short partition strips *a* in the ways 48 between the guides 46 in the manner hereinbefore explained. As the feed bar 49 approaches and contacts the near upright edges of these five strips it will push them, in uniform alignment, into the ways 48 and the further functioning of the mechanism will be, sequentially, as follows, bearing in mind the fact that the vertical feed solenoid 62 is normally energized, and the hopper clutch solenoid 11 is therefore normally deenergized by switch 11', that the chains 39 travel continuously and at uniform speed, that the feed roller shafts 18 and 50 are constantly driven, and that other elements in the hopper and throat feeding mechanisms function intermittently in timed relation to the travel of the chains 39: When the trip cam 94 of the feed bar 49 which is in contact with the strips *a* rides under the first of the trip levers 92 the oscillation of the rocker bar 90 will close the aligner control switch 86 by operation of its switch lever depressor 88 and will energize the aligner control solenoid 73 to cause operation of the aligner mechanism including the fingers 78 and thus produce a final proper alignment of the web of partition strips *b*, particularly the leading or lowermost strip thereof. Almost immediately following this operation the trip cam 93 of this same feed bar 49 will ride under the first of the trip levers 91 of rocker bar 89 and will oscillate this rocker bar to open the vertical control switch 85 by operation of its switch lever depressor 87 to deenergize the vertical feed control solenoid 62.

This deenergization of the solenoid 62 permits a number of functions of the feed mechanism to take place while the trip cam 93 is riding under the trip lever 91, and substantially as follows: As the forward end of the lever 60 rises, the links 65 will move forward under the influence of their lever arms 64 carrying with them the shuttle bar 65' so that it no longer obstructs the throat and permits the web of strips *b* to descend just slightly until the leading edge of the second strip in the throat will rest upon the ends of the pins 70 which have been moved into the throat under the influence of their springs 69 as their actuating levers 66 are released by the aforesaid movement of the links 65.

It will be noted that, because of the difference

in length of the levers 58 and 64, the links 65 will advance more rapidly than the links 57, and hence the just described functioning of the shuttle bar 65' and pins 70 will occur before the pressure rollers 52 of shaft 51 bear against the lowermost partition strip *b* with sufficient pressure to force the strip against the constantly driven rollers 52 of the shaft 50. However, as release of the links 57 continues, the force of the pressure springs 56*a* acting against the cross-heads 55 will force the rollers of the shaft 51 into such proximity to the rollers of the shaft 50 as to grip the lowermost or leading strip *b* in the vertical feed and, almost instantaneously, project it downwardly into the aligned first set of slots in the partition strips *a* which have been so timed in their progress by the feed of the bar 49 as to have exactly registered with the feed throat and the nip of the rollers of the shafts 50 and 51. Just as this projection of the strip *b* is completed the trip cam 93 will ride from beneath the trip lever 91 and the solenoid 62 will again be energized by the consequent closing of the switch 85.

These operations will be repeated for each of the sets of aligned slots in the partition strips *a* in the horizontal feed, as shown in Figs. 18, 19 and 20, wherein the first set has been filled with a partition strip *b* from the vertical feed, the second set is being filled and the third set is advancing to be filled. In other words, in Fig. 18 the parts are in the initial position, with the solenoid 62 energized, as is normal, Fig. 19 shows the parts in the position where the solenoid 62 is deenergized, the shuttle bar 65' is withdrawn from beneath the feed throat and the rollers 52 of shaft 51 are approaching the lowermost or leading strip *b* of the vertical feed, and Fig. 20 shows the parts in the position just instantaneously following that of Fig. 19 with such leading strip *b* partially inserted and the trip cam 93 just about to ride from beneath the trip lever 91. Obviously, the position of the parts just following that of Fig. 20 will be the same as is illustrated in Fig. 18.

It should be noted here that the operation of the hopper feed clutch solenoid 11 which took place when the solenoid 62 was energized by current passing through the switch 11', which closed when the arm 60 moved out of contact with it, will have permitted the clutch to engage and feed another strip *b* to the vertical feed, thereby advancing the web of strips in the vertical feed a distance equal to approximately one-half the height of a strip, the advance of the web being stopped by return of the shuttle bar 65' to throat-closing position (Fig. 18) and further immediate feed of strips *b* in the vertical feed being stopped upon opening of the switch 11' by movement of the lever arm 60 under the influence of the reenergized solenoid 62.

After the operation has been completed for all three sets of slots of the group of partition strips *a*, the finished partition assembly is carried along the table top out of the assembling station and is permitted to drop through an opening in the table top and onto the conveyor 101 where it collapses, or is collapsed by the baffle 102, into flat condition.

Of course, as each of the feed bars 49 rises to the table top a group of the partition strips *a* will be positioned in the ways 48 of the assembling station ahead of it, and the speed of approach of the bars 49 may be accommodated to the manual speed of the operator, to thus

determine the speed of production of complete partition assemblies by the machine, by appropriate adjustment of the change speed gearing 42.

It is in accomplishing the proper position of register of the strips *a* in the horizontal feed with the feed throat that the adjusting means 95 and 96 of the rocker bars 89 and 90 becomes effective, for, apparently, the location of the trip levers with respect to the direction of travel of the chains 39, and hence the timing of their operation for energizing of the solenoids 62, 11 and 73, will determine the proper actuation of the feed mechanisms with respect to the location of the slots of the constantly travelling partition strips *a* relative to the throat.

It will be understood, moreover, that in order to accommodate the feed of the strips *b* in the vertical feed to a spacing of the slots therein and in the strips *a* in the horizontal feed serving for a different size of the cellular structure of the finished partition assemblies, the trip levers 91 and 92 may be individually adjusted with respect to their rock shafts 89 and 90 by means of their respective set screws 91' and 92'. Also, appropriate adjustment of the hopper parts, the aligning fingers 78, and the like members which must be accommodated to a change in size of the strips, or in the spacing of their slots, may be made.

Various changes and modifications are considered to be within the principle of the invention and the scope of the following claims.

What I claim is:

1. In a partition assembling machine, means defining an assembling station, and means for feeding two sets of partition strips thereto for relative assembly in cellular arrangement, one of said feeding means including a holder for a plurality of partition strips, and means for successively feeding individual strips from such plurality including means for distorting from their normal plane portions of the successively fed strips whereby they may be interleaved with portions of previously fed strips.

2. A partition assembling machine as claimed in claim 1, in which said distorting means include two sets of feed members conjointly operating upon opposite faces of the successively fed strips and having their relative strip contacting surfaces in planes relatively displaced from the plane of feed of the strips.

3. A partition assembling machine as claimed in claim 1, in which the distorting means include feed members conjointly operating upon opposite faces of the successively fed strips, and the feeding means include also feed rollers for forcing the distorted leading edge portions of one strip into interleaved relation with the trailing edge portion of the strip just previously fed.

4. In a partition assembling machine, a feed table provided with means for feeding groups of partition strips, a feed hopper associated with said table and adapted to feed another group of partition strips complementary to said first named group and extending transversely thereof, means defining an assembling station located intermediate said feed table and feed hopper, guide means affording a path between said hopper and assembling station and adapted to receive and conduct to said station strips fed from said hopper, said guide means converging at said station to form a restricted throat for the passage of said partition strips, stop finger means having guides presenting them transversely of and ca-

pable of obstructing said throat, means for feeding strips intermittently and successively from said hopper to said guide means, means for feeding said strips intermittently and successively from said guide means to said assembling station, said stop finger means being operatively connected with and movable in response to actuation of said last-named strip feeding means so that upon operation of such feeding means the finger means will be moved to clear said throat for the passage of a partition strip therethrough, individual control means for the respective means for feeding said strips relatively to said guide means, and control means operable in response to movement of the table feeding means for activating and deactivating said individual control means in timed relation to the movement of strips fed by said table feeding means.

5. A partition assembling machine as claimed in claim 4, in which the means for feeding the strips from the guide means to the assembling station comprise friction feed rollers, said feed rollers being arranged in pairs upon a pair of shafts one of which is movably mounted with relation to said throat for engaging and disengaging movement of its rollers with respect to a partition strip within the throat and contacting the rollers of the other shaft, one of said shafts being provided with rotation imparting means whereby its rollers are provided with a partition strip feeding drive.

6. A partition assembling machine as claimed in claim 4, in which the feed mechanism at said assembling station includes friction feed rollers, said feed rollers being arranged in pairs upon a pair of shafts one of which is movably mounted with relation to said throat for engaging and disengaging movement of its rollers with respect to a partition strip within the throat and contacting the rollers of the other shaft, one of said shafts being provided with rotation imparting means to impart strip feeding drive to its rollers, said stop finger means and said movable shaft being operatively connected and simultaneously movable to clear said throat and permit feeding positioning of a partition strip between said pairs of rollers.

7. A partition assembling machine as claimed in claim 6, in which the movable shaft is supplied with pressure applying means which, when a partition strip is in feeding position, will cause said shaft to present its rollers in frictional driving engagement with said strip.

8. In a partition assembling machine, means defining an assembling station, means for feeding slotted partition strips to said station in horizontal feed, means for feeding to said station in vertical feed slotted partition strips complementary to the strips in horizontal feed, and means for aligning the strips in vertical feed for proper presentation of their slots relative to the slots of the strips in horizontal feed at said assembling station, said aligning means including finger means reciprocable transversely of the strips in vertical feed and means for causing said finger means to be pressed against and distort a portion of each said strip between slots therein whereby said finger means may during reciprocation be engageable with the strip portions adjacent to slots bordering said distorted portion.

9. A partition assembling machine as claimed in claim 8, in which control means are provided for said aligning means and control actuating means interrelated with said control means are provided for actuation responsive to feeding movement of the strips in horizontal feed, where-

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by actuation of said aligning means is responsive to movement of the strips in horizontal feed.

10. In a partition assembling machine, a feed table provided with means for feeding a group of partition strips, a feed hopper associated with said table and adapted to feed another group of partition strips complementary to said first named group and extending transversely thereof, means defining an assembling station located intermediate said feed table and feed hopper, guide means affording a path between said hopper and assembling station and adapted to receive and conduct to said station strips fed from said hopper, solenoid actuated means for initiating feed of strips intermittently and successively from said hopper to said guide means, solenoid controlled means for feeding said strips intermittently and successively from said guide means to said assembling station, and means including electrical switch means and actuating means therefor operable in response to movement of the table feeding means for energizing and de-energizing said solenoids in timed relation to the movement of strips fed by said table feeding means.

11. A partition assembling machine as claimed in claim 10, in which the said guide means converge at said assembling station to form a restricted throat for the passage of partition strips, and stop finger means having guides presenting them transversely of and capable of obstructing said throat, said stop finger means being operatively connected with and movable in response to actuation of said second named solenoid so that upon the energizing of said solenoid they will be moved to clear said throat for the passage of a partition strip therethrough.

12. A partition assembling machine as claimed in claim 11, in which the feed mechanism at said assembling station includes said stop finger means and friction feed rollers, said feed rollers being arranged in pairs upon a pair of shafts one of which is rigidly and the other movably mounted with relation to said throat, said stop finger means and said movable shaft being operatively connected with said second named solenoid and being simultaneously movable when said solenoid is energized to clear said throat for the passage of a partition strip.

13. A partition assembling machine as claimed in claim 12, in which the said movable shaft is supplied with pressure applying means which, upon deenergization of said second named sole-

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noid, will cause it to present its rollers in frictional driving engagement with a partition strip fed through said throat past said stop finger means.

14. In a partition assembling machine, an assembling station, means for feeding partition strips to said station in horizontal feed, means for feeding complementary partition strips to said station in vertical feed, the feeding means for the vertical feed including a shuttle bar and means whereby it is supported and actuated so as to be movable into and out of the path of the partition strips in vertical feed and serving temporarily and intermittently to arrest vertical feed of said strips, and means including mechanism connected with said supporting and actuating means and actuated in timed relation to feed of strips in the horizontal feed for controlling movement of said shuttle bar.

15. In a machine for assembling to cellular form partition strips of the type provided with slots spaced apart to define cell sections, an assembling station for partition strips fed thereto in horizontal and vertical feed respectively and normal to each other in the two feeds, constantly driven mechanical means for feeding the strips in the horizontal feed to said assembling station, intermittently actuated mechanical means for feeding the strips in the vertical feed to the assembling station, electro-responsive means for actuating the mechanical means of the vertical feed, and means for controlling the operation of said electro-responsive means, said controlling means including switch mechanism and operating means therefor actuated in timed relation to the passage of the slots of the partition strips in the horizontal feed as said strips are fed to the assembling station.

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