July 14, 1959 C. PETERS ET AL 2,894,433

PARTITION ASSEMBLY MACHINE

Filed July 16, 1957 3 Sheets-Sheet 1

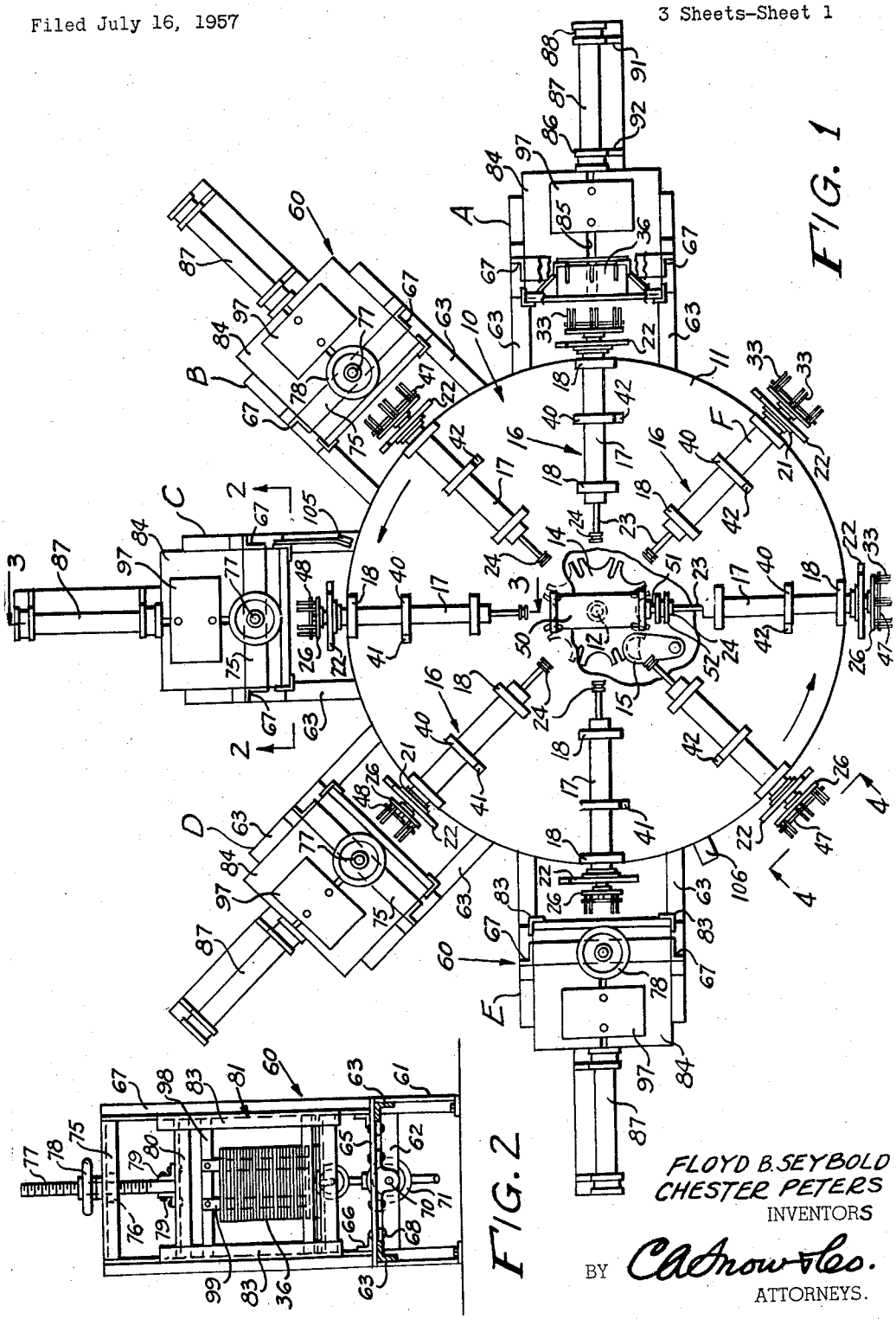


FIG. 1

FIG. 2

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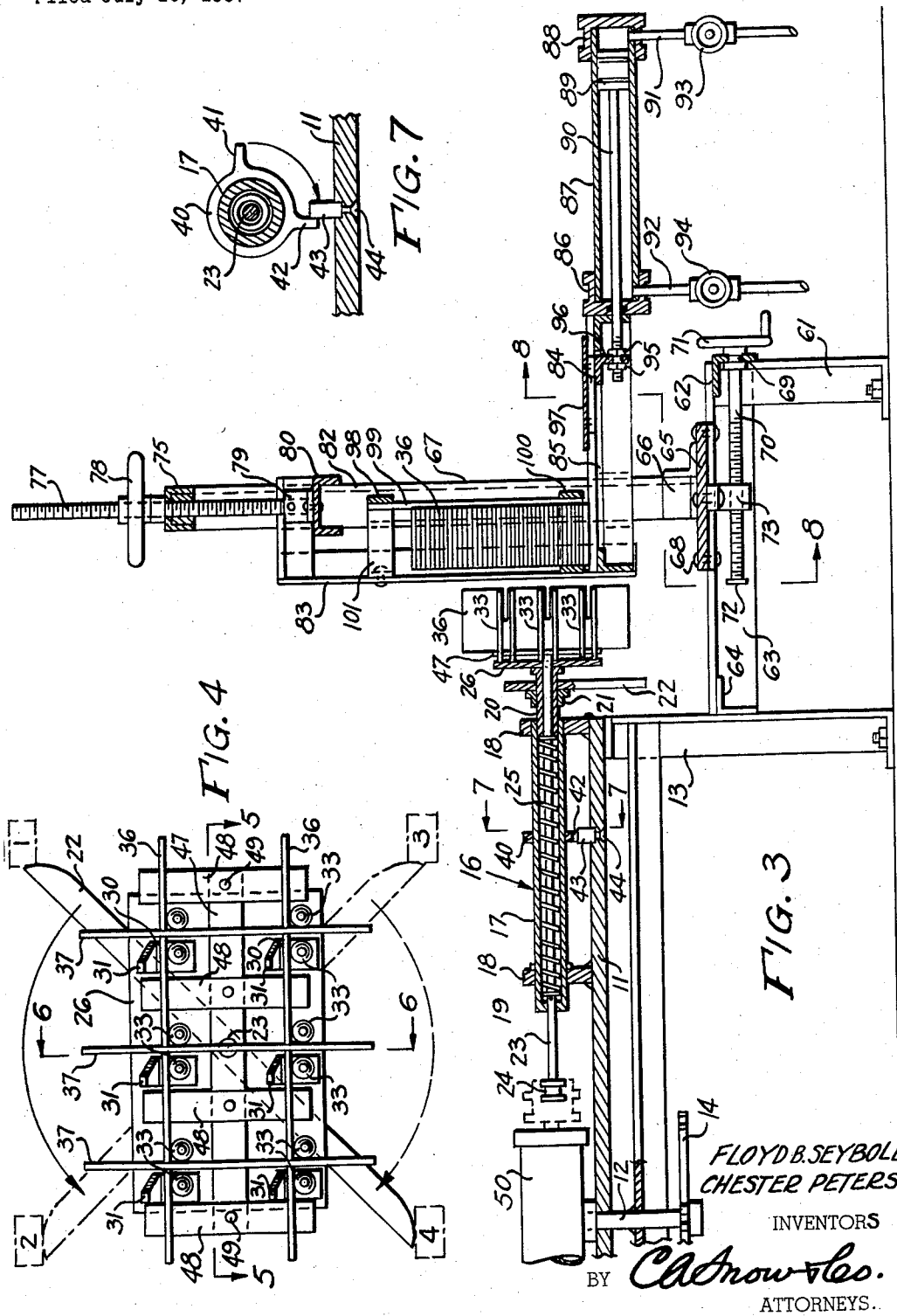


FIG. 3

FIG. 4

FIG. 7

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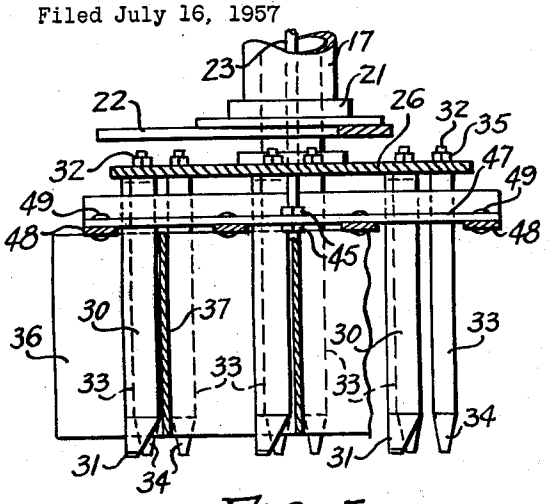


FIG. 5

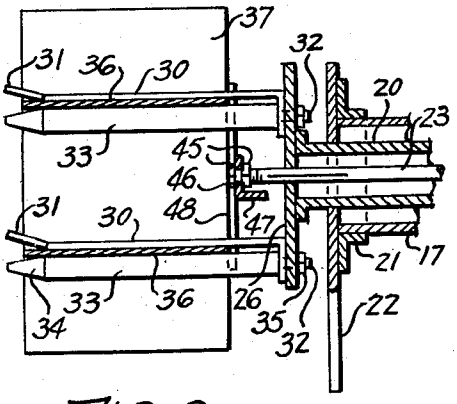


FIG. 6

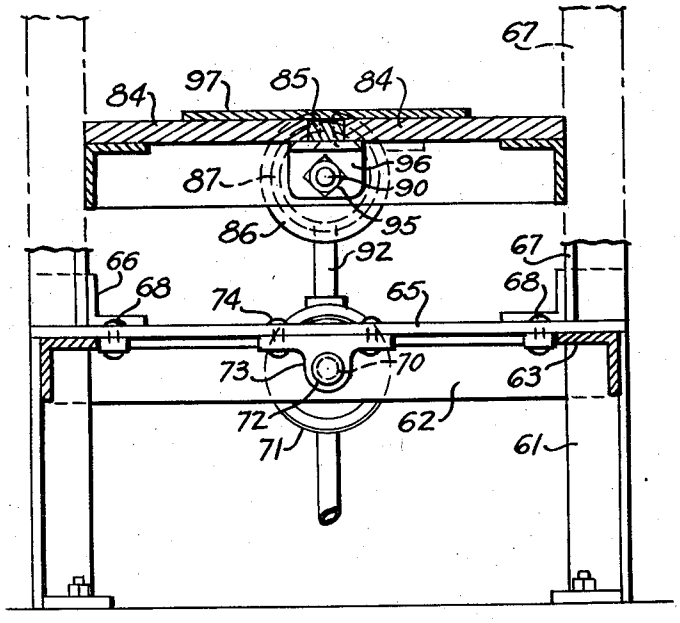


FIG. 8

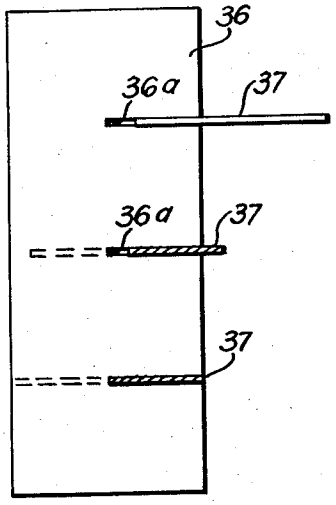


FIG. 9

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2,894,433

PARTITION ASSEMBLY MACHINE

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Application July 16, 1957, Serial No. 672,273

6 Claims. (Cl. 93—38)

This invention relates to a partition assembly or nesting machine, and more particularly to such a device for the assembly of partitions of corrugated board or the like, adapted for insertion into boxes or similar containers for the separation of the boxes into compartments.

A primary object of this invention is the provision of an improved partition assembly device characterized by a rotatable table carrying a plurality of partition nesting finger assemblies and a plurality of spaced magazine units carrying partition blanks, together with feeder mechanism, so arranged as to be entirely automatic in operation, whereby a complete partition is assembled upon one complete rotation of the table.

A further important object of the invention is the provision of such a device which will be substantially entirely automatic in operation, completely to obviate the necessity of manual adjustment or manipulation in the nesting and assembly of partitions.

A further object of the invention is the provision of such a device characterized by a multiplicity of stations, whereby a multiplicity of partition nesting operations may be carried out on separate partitions simultaneously.

Still another object of the invention is the provision of a device of this character having magazine and feeding units, which may be adjusted both laterally and vertically, for the purpose of centering the positions exactly relative to the nesting fingers of the partitions assembly head, or relative to other partitions carried thereby.

Still another object of the invention is the provision of such a device having automatic mechanism for ejecting the assembled partition into a storage receptacle, or to a conveyor belt, or the like.

A still further object of the invention is the provision of a device of this character which will be sturdy and durable in construction, reliable and efficient in operation, and relatively simple and inexpensive to manufacture, assemble and utilize.

Other objects reside in the combinations of elements, arrangements of parts, and features of construction, all as will be more fully pointed out hereinafter, and shown in the accompanying drawings wherein there is disclosed a preferred embodiment of this inventive concept.

In the drawings:

Figure 1 is a top plan view, partially broken away, of one form of apparatus embodying features of the instant inventive concept.

Figure 2 is a sectional view taken substantially along the line 2—2 of Figure 1 as viewed in the direction by the arrows, disclosing in front elevation one of the magazine and feeder units.

Figure 3 is an enlarged sectional view taken substantially along the line 3—3 of Figure 1 as viewed in the direction indicated by the arows.

Figure 4 is an end elevational view of one of the partition holding assembly heads, or taken substantially

along the line 4—4 of Figure 1 as viewed in the direction indicated by the arrows.

Figure 5 is a sectional view taken substantially along the line 5—5 of Figure 4 as viewed in the direction indicated by the arrows.

Figure 6 is a sectional view taken substantially along the line 6—6 of Figure 4 as viewed in the direction indicated by the arrows.

Figure 7 is an enlarged detailed sectional view taken substantially along the line 7—7 of Figure 3 as viewed in the direction indicated by the arrows.

Figure 8 is a sectional view taken substantially along the line 8—8 of Figure 3 as viewed in the direction indicated by the arrows.

Figure 9 is an end view partially in elevation and partially in section, disclosing a partition in various stages of assembly, certain concealed elements thereof being indicated in dotted lines.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Having reference now to the drawings in detail and more particularly to Figures 1 and 2 there is generally indicated at 10 a rotatable table, having a top surface 11, suitably mounted for rotation on a central axle 12, and carried by supporting legs 13. The table is adapted to be rotated in step by step manner by means of a conventional Geneva drive, which includes a Geneva rotating gear or rotator 14, and a Geneva drive member 15, the latter being actuated in any desired conventional manner, as by a suitable motor or the like.

The top surface 11 of table 10 carries a plurality of partition holding head assemblies, each generally indicated at 16, and each comprised of a tubular cylinder 17, supported adjacent its ends in mounting bracket 18.

Each cylinder 17 is closed at its inner end by an apertured partition 19, and at its outer end by a bushing or sleeve 20, the latter being rotatably mounted, and carrying a collar 21, provided with a pair of diametrically disposed radial arms 22.

A piston rod 23 extends through the entire length of cylinder 17, and carries a head 24, at its inner end. A coil spring 25 may surround the piston rod interiorly of the cylinder 16, and biases, by its engagement with a cross head 26 pinned to the piston rod 23, the rod inwardly relative to the rotary table top 11. Alternatively, the cylinder may be actuated in either direction by the hydraulic or pneumatic cylinder. The outer end of the piston rod 23 extends through a central aperture in a plate 26, fixedly secured in the sleeve 20, which plate carries, on its outer face, as best shown in Figures 4, 5 and 6, a plurality of flat fingers 30, each having an outwardly tapered extremity 31, and a right angularly bent inner portion, apertured to receive a bolt 32. A plurality of cylindrical fingers 33, each having its outer or free extremity tapered as at 34 are also carried by the plate 26, and are secured in position in overlying relation with the ends 31 of the members 30 as by means of nuts 35 carried by bolts 32. The fingers 30 and 33 are arranged, as best shown in Figure 4 in spaced groups, and comprise partition holding elements. Each finger 30 overlies one of a pair of fingers 33, the other of each pair being spaced laterally therefrom, to hold, as shown in Figure 4, transverse partition elements 36, and vertical partition elements 37, the partition elements being inserted individually and at separate times, and nested, in a manner to be more fully described hereinafter

The sleeve 20 may be rotated, by means of the arms 22 through an arc of ninety degrees in either a clockwise or counter clockwise direction, in a manner and for a purpose to be more fully described hereinafter, and stop means are provided for limiting the rotation to sub-

stantially exactly ninety degrees. Such stop means take the form of a collar 40, as best shown in Figure 7, provided with lugs 41 and 42 spaced substantially ninety degrees apart, and coaxial with the cylinder 17, and the piston rod or shaft 23. The lugs are adapted selectively to enage a stop bar 43, which is held in position in a suitable recess in table top 11, as by means of a counter sunk screw 44 inserted from the under side of the table.

The end of each piston rod 23 is secured by lock nuts 45 in a suitable aperture 46 in the transverse bar 47 of an ejector grid, which includes a plurality of bars 48 secured in perpendicular relation to bar 47 as by means of rivets 49.

The table top 11 also has mounted thereover, in fixed position a hydraulic or pneumatic cylinder 50, provided internally with a suitable piston (not shown) and having an outwardly extending piston rod 51 carrying an operating head 52. The cylinder 50 is fixed on the top of axle 12, and retains its relative position, while the table top 11 revolves therebeneath. The piston and cylinder 50 is actuated upon engagement with a selected one of heads 24 of rods 23, for the purpose of moving the ejector grid comprised of bars 47 and 48, in a manner and for a purpose to be described more fully hereinafter.

Each of the units 16 hereinbefore described is substantially identical, and each has the outermost of its supporting brackets 18 positioned adjacent the rim of the table top 11. The units extend radially and are equidistantly spaced, and any desired number may be employed, although in the illustrative embodiment of the invention seven of the units are shown.

A plurality of partition magazine and feeding units 60 are equidistantly spaced peripherally of the rim of table 11. Each unit 60 comprises a frame including supporting legs 61, and horizontal channel bars 62 extending transversely of the leg 61, from which in turn extend horizontal channel bars 63 which are connected to and supported by channel bars 64 carried by the radially disposed legs 13 of the supporting frame for the table top 11.

Extending transversely across and supported by the members 63, is a plate 65, which carries at its opposite ends a pair of angle irons 66, which in turn support uprights 67. Guide bolts and nuts 68 extend through the plate 65, and are adapted to ride along the inner side of angle iron supporting members 63, when the plate is linearly moved. The member 62 is provided with a central aperture 69, through which extends a threaded bolt 70, having an operating wheel 71 at one end, and a head or stop plate 72 at its other end. The bolt 70 extends through a threaded aperture in a depending lug 73, secured as by means of rivets 74 to the under side of plate 65. The arangement is such that rotation of the operating wheel 71 will, through rotation of bolt 70 occasion linear movement of plate 65, and hence linear movement of uprights 67 toward and away from the partition holding unit comprised of fingers 30 and 33, for a purpose and in a manner to be more fully described hereinafter.

Extending across the tops of the parallel uprights 67 is a transverse angle iron bar 75, which is provided with a centrally positioned aperture 76, for the accommodation of the threaded bolt 77, which has threaded thereon an operating wheel or handle 78. The lower end of bolt 77 is suitably secured to angle iron brackets 79, which are in turn suitably secured as by bolts or the like to a cross piece 80, comprising the top of a magazine frame generally indicated at 81. The frame also includes side plates 82, and front angle iron plates 83, as well as a channel shaped base plate 84, having a centrally positioned elongated slot 85 therein. The base plate 84 extends a substantial distance outwardly beyond uprights 67, and has secured thereto the apertured end cap 86 of a hydraulic cylinder 87, the other end of which is closed by an end cap 88. A piston 89 carrying a piston rod 90 is movable within the cylinder 87, and hydraulic or pneumatic fluid for the forward and rearward movement of the piston 89 is supplied by lines 91 and 92 equipped with manual valves 93 and 94 respectively.

The outer end of piston 90 is secured as by lock nuts 95 to a depending lug 96, which extends through the slot 85, and is carried by the under side of feeder plate 97. The slot extends substantially to the forward end of the frame assembly 81, and since the lug 96 is positioned at the rear end of feeder plate 97, the plate 97 is adapted to project well forwardly of the front of the frame assembly 81.

Extending between the side bars 82 at an intermediate point below the cross piece 80 is a transverse guide plate or sheet 98, from which a pair of vertical strips 99 extend to a frame member 100, positioned a slight distance above plate 86, to provide a clearance for the forward movement of the feeder plate 97. Partitions 36 or 37, in accordance with the position of the unit are stacked within the frame provided by the cross member 98 and its associated end plates 101, and the depending plate members 99. These partitions are adapted to be loaded into the magazine structure manually as may be necessary.

From the foregoing the operation of the device should now be understandable. Assuming the parts to be in the position as shown in Figure 1, the magazines of all of the units 60, which, for illustrative purposes have been indicated as A B C D and E, reading counterclockwise, there being, in the illustrative embodiment shown five of the units 60, each of which is substantially identical as previously described, the operation of the mechanism is started, and by means of the Geneva movement 14 and 15, which is of any conventional design, the rotatable table 10 is rotated by a stage of one unit. At this time all of the finger assembly heads are empty. The unit 16, as the initial step in the operation is moved to a position confronting the unit A, it being noted that in this position the plate 26 is in what may be termed a horizontal position, or the position as indicated in Figure 4. As the device is moved into confronting relation, an automatic switch of any desired conventional type (not shown) is actuated to energize the cylinder of 87 of unit A through line 91, to actuate its internal piston 89 to move the slide 97 forwardly, which in turn moves one of the partitions 36 by virtue of the slot 85 into position between the lower row of cylindrical fingers 33 and their adjacent flat fingers 30, the arrangement being such that the slots in the partitions 36 are each positioned between a pair of the fingers 33, the fingers 30, which may be resilient serving to hold the parts in related assembly. The next movement of the Geneva movement will then move the assembly F adjacent the unit B, which has ben adjusted, vertically, by means of the hand wheel 78 previously described to a higher level so that the second of partitions 36 is inserted between the upper row of fingers 30 and 33, as shown in Figure 4. The two partitions 36 are thus aligned in parallel relation, with their respective slots 36*a* correspondingly aligned. Upon the next operation of the movement of the Geneva movement the member F is moved adjacent the unit C, but before moving into position adjacent the unit C a stop member 105 located at a suitable distance above the table, strikes one of the arms 22, which turns the entire head assembly, including the sleeve 20, and the plate 26 and its associated fingers 30 and 33 through an arc of ninety degrees, so that the hitherto described horizontal partitions members 36 are now arranged vertically. This movement is completed before the head is aligned with the slide 97 of the unit C, and simultaneously the lowermost of partitions 37 is pushed forwardly from the magazine by means of slide plate 97 into intersecting relation with the lowermost of the notches or slots 36*a* in the members 36. The next Geneva movement will juxtapose the head of

the member F to the unit D, which has been adjusted to a level next above, and the intermediate or central partition **37** is then inserted in its appropriate slots at the central portions of partitions **36** in the manner previously described. The next step of the movement to the unit E which again is progressively spaced higher will cause the insertion in the manner previously described of the last partition **37**, and the assembly is thus completed. The next step of the operation will cause the arm **22** to engage a stop member **106** substantially flush with the table top, which will turn the assembly back to its original position so that the plate **36** is again horizontal, while the next step will juxtapose the head **24** of the rod **23** to the piston rod head **52** of the piston rod **51** carried in the fluid cylinder **50**. The hydraulic or pneumatic cylinder **50** is actuated simultaneously by means of the switch previously described with each of the cylinders **87**, so that upon juxtaposition of the head **24** of unit F to the head **52** the piston is pressed forwardly, to move the piston rod forwardly, and hence move the grid comprised of the bars **47** and **49** outwardly, to slide the assembled partition off of the fingers **30** and **33** into a suitable receptacle, or onto the conveyor belt, or the like, discharging the assembly from the mechanism. It will thus be seen that one complete rotation of the unit completes the nesting and assembly of a five part partition, entirely automatically, and that this action is continued by the return of the assembly F to its original position. It is to be noted that when the unit F leaves its position confronting unit A the next successive unit moves into position, so that while the unit B is operating on the unit F, the unit A is simultaneously operating on the next succeeding unit counter clockwise of the table face. Thus during the actual operation of the device after the initial starting, each unit **60** is operating simultaneously to effect a different nesting operation on a partition assembly, so that when the completed unit of unit F is ejected from the apparatus the unit immediately ahead of the unit F is waiting for action by the assembly A, while the next successive unit ahead of this is being provided with first of its partition elements. Thus six partitions are continuously in various stages of assembly and nesting during the operation of the device, so that each time a unit **16** is juxtaposed to the piston head **52**, a completed assembly is ejected from the apparatus.

The vertical adjustment may be provided with relatively great exactness by means of the hand wheel **78**, so that accurate nesting of partitions of a given size may be assured, and similarly the transverse alignment of the unit **60** may be accurately gauged by means of the hand wheel **71**, so that the partitions are nested only to the exact required depth in accordance with the slots in the respective partition units **36** and **37**.

Obviously any desired number of units may be used, in accordance with the type of partition it is desired to assemble, a larger number of units being employed for six piece or nine piece, or any desired number of pieces of partitions.

The speed of the apparatus may be governed, the table being rotated from any desired source of power, as by means of an electric or gasoline motor or the like (not shown), and the automatic actuation of the several cylinders **87** and cylinder **50** simultaneously may be controlled by any type of automatic hydraulic valve.

From the foregoing it will now be seen that there is herein provided a partition assembly apparatus which accomplishes all of the objects of this invention, and others, including many advantages of great practical utility, and commercial importance, which accomplishes all of the objects of this invention, and others, including many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept, and as many modifications may be made in the embodiment herein before shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative, and not in a limiting sense.

We claim:

1. In a partition nesting apparatus, the combination of a horizontally disposed rotatable circular table, a plurality of radially disposed partition holding finger assemblies equidistantly spaced about the periphery of said table, said assemblies each comprising a grid, and a plurality of groups of four closely positioned fingers extending outwardly from said grid, two of the fingers of each group comprising rollers, and the other two fingers of each group comprising resilient strips having their ends outwardly flared relative to said rollers, said grid being mounted on a centrally positioned shaft, said shaft being rotatably mounted on said table means for rotating said table in step by step progression, a plurality of partition magazine and partition feeding units equidistantly positioned radially about the periphery of at least a portion of said table, said units being spaced from the rim of said table and means for moving a partition from said unit to an adjacent finger assembly when said assembly is juxtaposed in confronting relation to said unit.

2. In a partition nesting apparatus, the combination of a horizontally disposed rotatable circular table, a plurality of radially disposed partition holding finger assemblies equidistantly spaced about the periphery of said table, said assemblies each comprising a grid, and a plurality of groups of four closely positioned fingers extending outwardly from said grid, two of the fingers of each group comprising rollers, and the other two fingers of each group comprising resilient strips having their ends outwardly flared relative to said rollers, said grid being mounted on a centrally positioned shaft, said shaft being rotatably mounted on said table means for rotating said table in step by step progression, a plurality of partition magazine and partition feeding units equidistantly positioned radially about the periphery of at least a portion of said table, said units being spaced from the rim of said table means for moving a partition from said unit to an adjacent finger assembly when said assembly is juxtaposed in confronting relation to said unit, and means positioned adjacent said table for ejecting an assembled partition from its associated finger assembly upon completion.

3. In a partition nesting apparatus, the combination of a horizontally disposed rotatable circular table, a plurality of radially disposed partition holding finger assemblies equidistantly spaced about the periphery of said table, said assemblies each comprising a grid, and a plurality of groups of four closely positioned fingers extending outwardly from said grid, two of the fingers of each group comprising rollers, and the other two fingers of each group comprising resilient strips having their ends outwardly flared relative to said rollers, said grid being mounted on a centrally positioned shaft, said shaft being rotatably mounted on said table means for rotating said table in step by step progression, a plurality of partition magazine and partition feeding units equidistantly positioned radially about the periphery of at least a portion of said table, said units being spaced from the rim of said table means for moving a partition from said unit to an adjacent finger assembly when said assembly is juxtaposed in confronting relation to said unit, means positioned adjacent said table for ejecting an assembled partition from its associated finger assembly upon completion, and means for synchronizing the step by step rotation of said table with the actuation of feeding units and the actuation of the ejector means.

4. The structure of claim 2 wherein said units each includes a frame for holding stacked partition elements, a plate slidable towards said table for ejecting the bottom partition element, and a fluid actuated cylinder for moving said plate.

5. The structure of claim 5 wherein means are pro-

vided for rotating said partition holding finger assemblies through an arc of ninety degrees in a vertical plane at predetermined points during the horizontal rotation of said table for juxtaposition to a unit in a selected position.

6. The structure of claim 5 wherein the ejector means comprises a slidable grid adjacent said first mentioned grid and a fluid actuated cylinder for moving said slidable

grid toward the periphery of said table to disengage the assembled partition from said finger assembly.

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