

H. A. EDMONDS ET AL
UNIT STACKING APPARATUS

Filed June 19, 1957

Fig. 1.

10, 11, 12, 13, 14, 15, 20, 21, 22

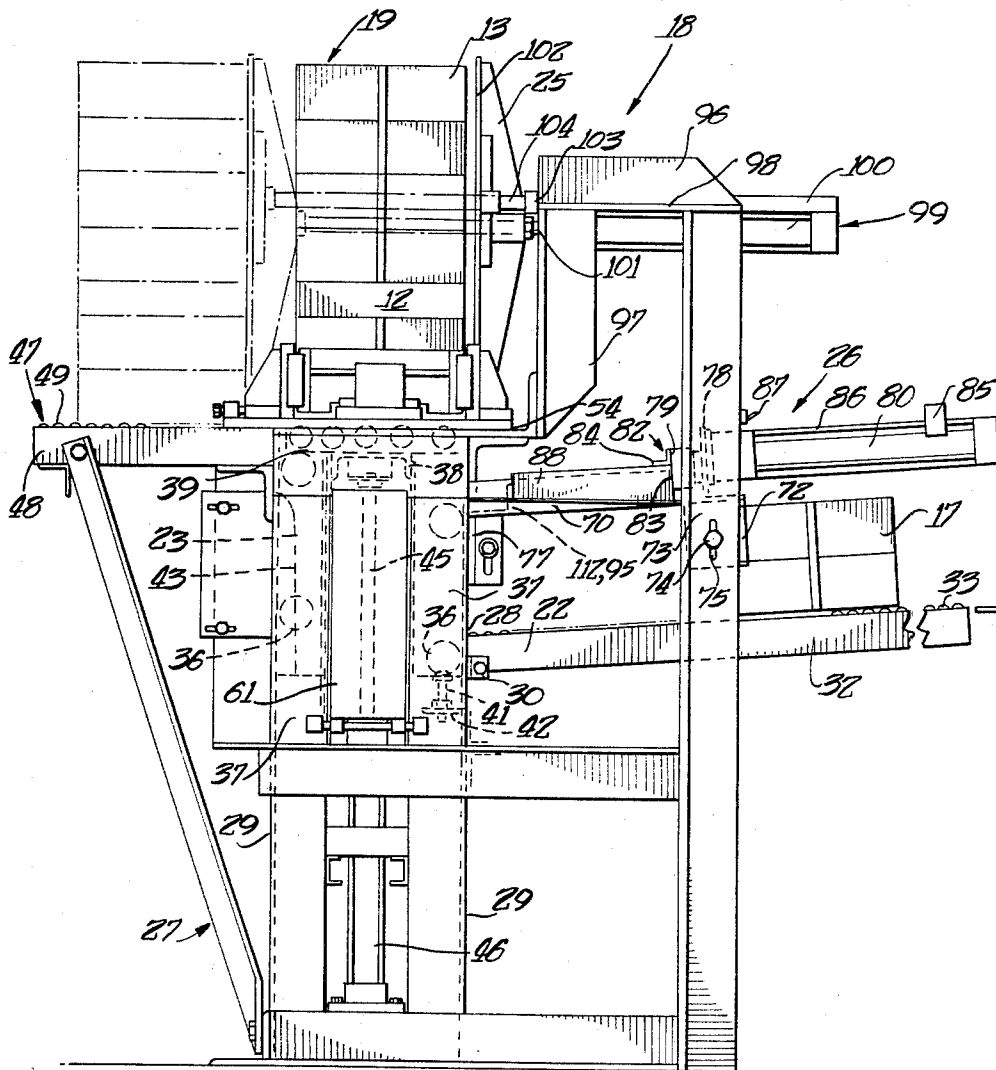
Inventors
 Harvey A. Edwards
 Clifford E. Edwards
 William S. Gilbert

Inventors
Harvey A. Edwards
Clifford E. Emerson
William S. Gilbert
Dalbert H. Shefte
Attorney

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Fig. 2.



Truextors
 Harvey A. Edmonds
 Clifford E. Emerson
 William S. Gilbert
 Walbert H. Sheple
 Attorney

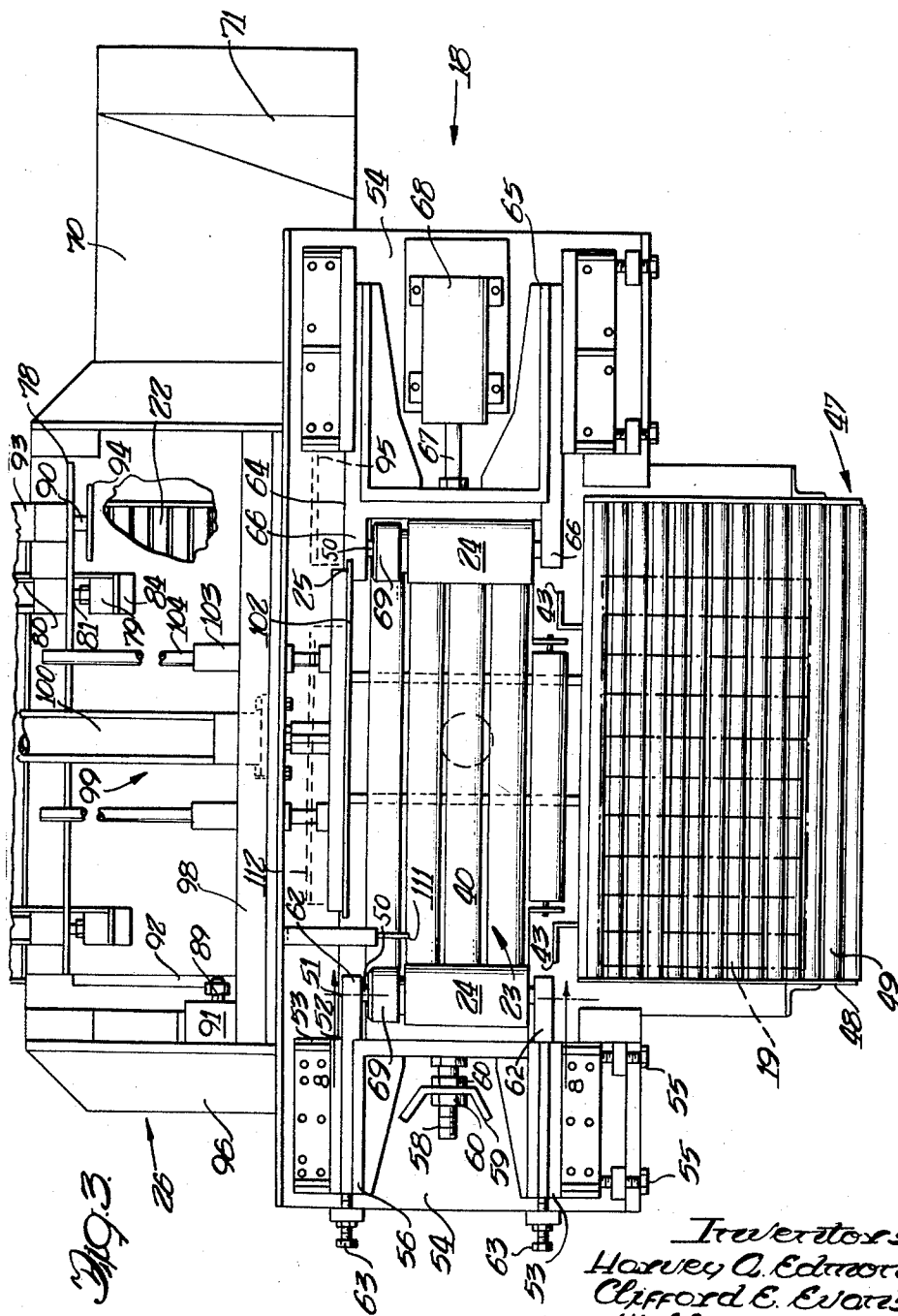
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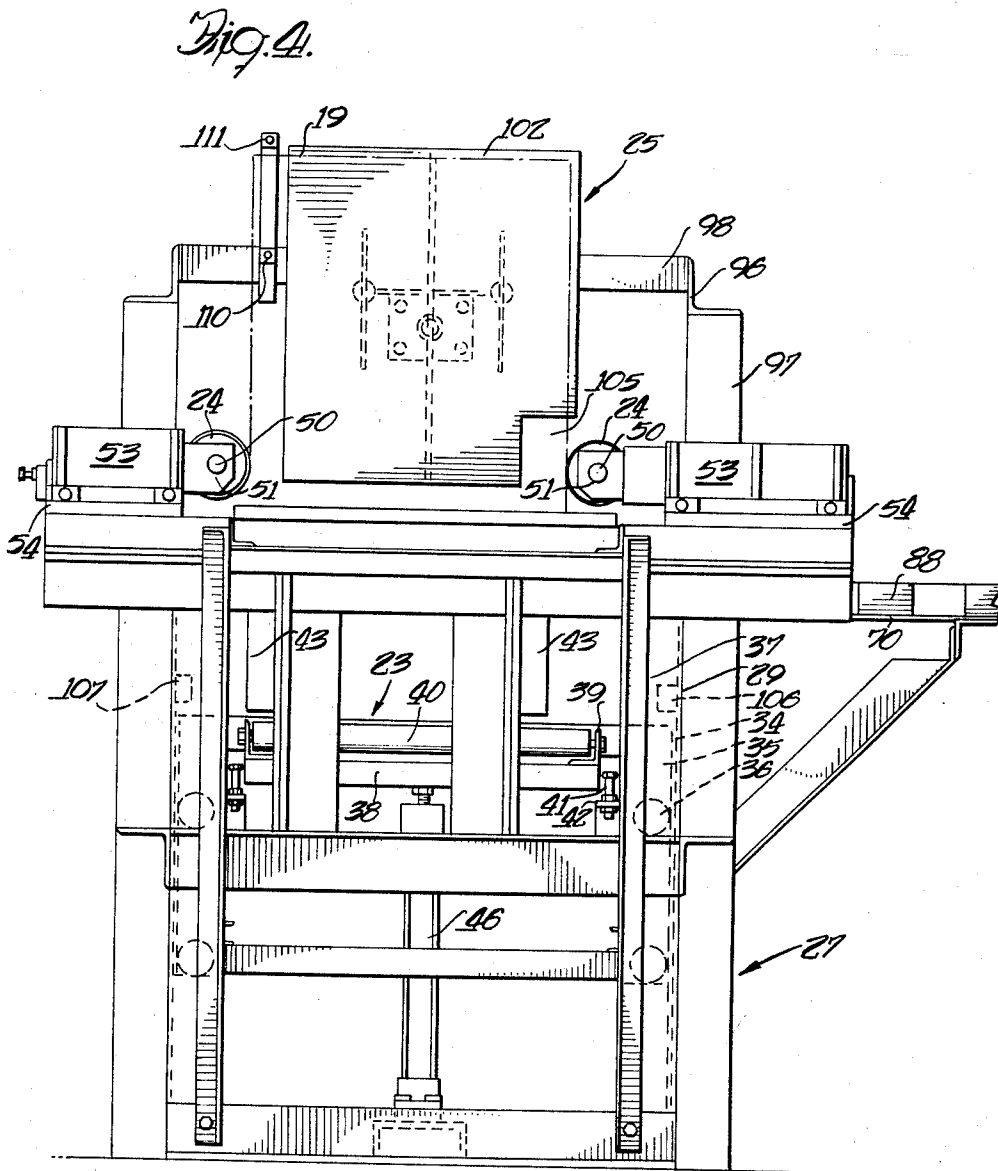


Inventors
Harvey A. Edmonds
Clifford E. Evanson
William S. Gilbert
Dalbert H. Shupe
Attorneys

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UNIT STACKING APPARATUS

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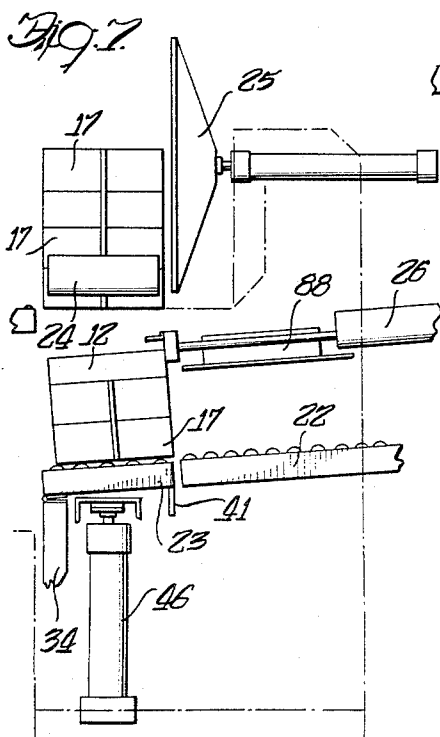
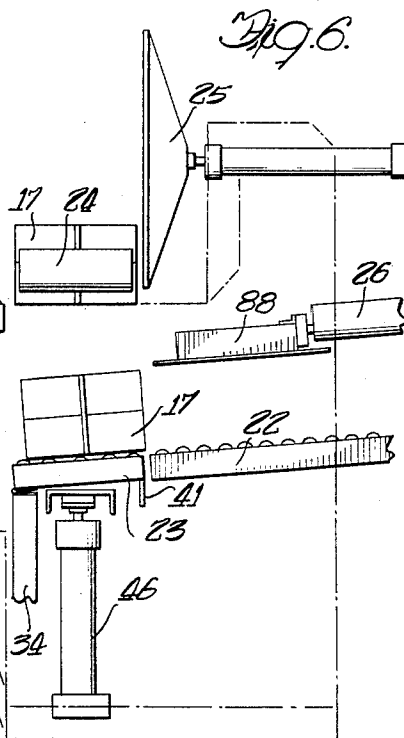
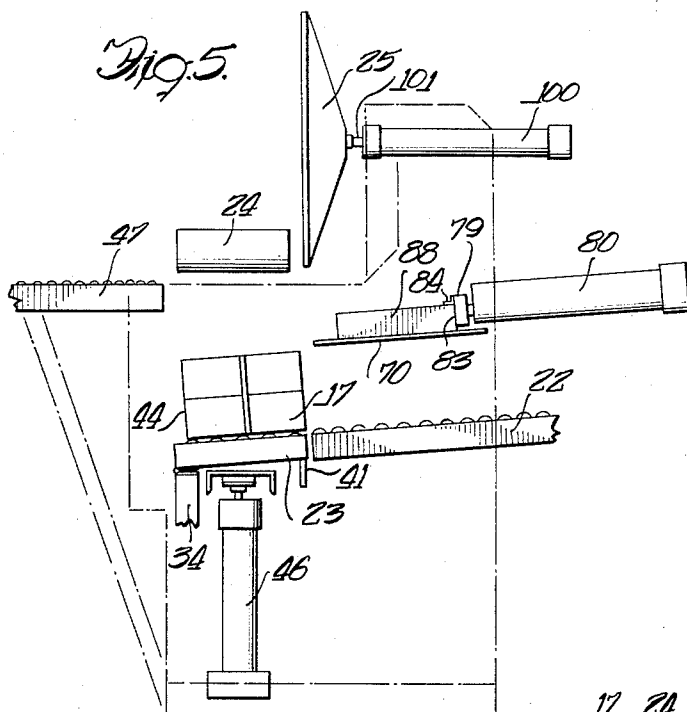


Inventors
Harvey A. Edwards
Clifford E. Evanson
William S. Gilbert
Dalbert H. Shaffer
Attorney

H. A. EDMONDS ET AL
UNIT STACKING APPARATUS

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Tutors
Harvey A. Edmonds
Clifford E. Evanson
William S. Gilbert
Dalbert H. Shultz
Attorney

April 19, 1960

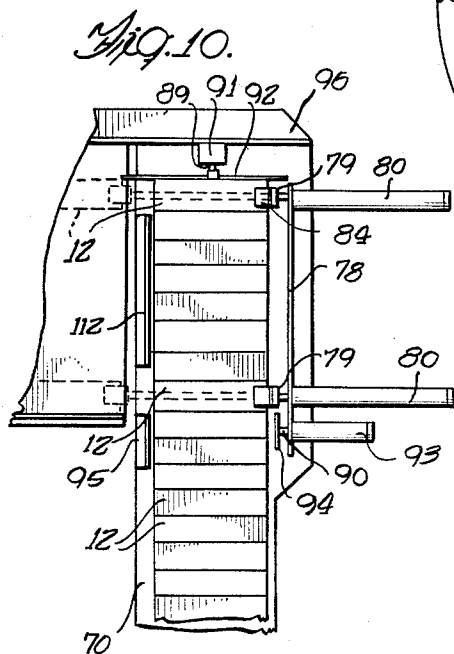
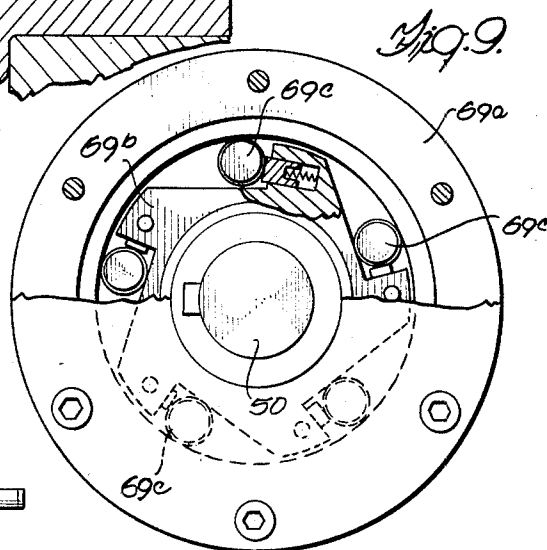
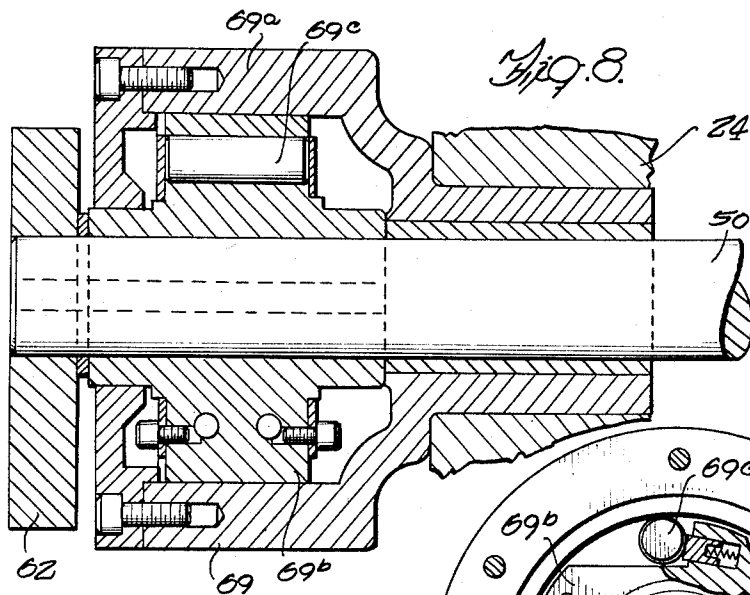
H. A. EDMONDS ET AL

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UNIT STACKING APPARATUS

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6 Sheets-Sheet 6



Inventors
Harvey A. Edmonds
Clifford C. Swanson
William S. Gilbert
By Donald L. Welsh
Attorney

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2,933,207

UNIT STACKING APPARATUS

Harvey A. Edmonds and Clifford E. Evanson, Chicago,
and William S. Gilbert, Lincolnwood, Ill., assignors to
Structural Clay Products Research Foundation

Application June 19, 1957, Serial No. 667,074

8 Claims. (Cl. 214—6)

This invention relates to a unit stacking apparatus and more particularly to an apparatus which receives rows of units and stacks them for discharge therefrom as a package of units.

In the art of automation, it is often desirable to accumulate units into a stack for packaging or for further processing of the units. Such is the case at the end of an assembly line where units have been progressing individually or in rows. It is then desirable to accumulate units into a composite stack for packaging or efficient handling at the discharge end.

The Structural Clay Products Research Foundation of Geneva, Illinois, has developed a package containing structural clay units, such as brick strapped together for ease of handling. This package is disclosed in U.S. Letters Patent No. 2,778,491, issued January 22, 1957, and is shown herein in Figure 1. It is seen that this package 10 is provided with a space 11 for the insertion of lift hooks or other handling means, the space being provided by the use of spacer units 12 between adjacent rows 13 of units so as to provide lateral spacing.

In order to efficiently form such a package 10, the Structural Clay Products Research Foundation has developed an automatic packaging conveyor on which units are loaded at one end and are automatically accumulated in double tier rows which are strapped and stacked for final strapping which results in a finished pack. This structure is disclosed in the co-pending application No. 667,073, filed June 19, 1957. A portion of this packaging line 14 is shown in Figure 1, which shows rows of brick which have been accumulated into double tier stacks 15 by previous operations on the line. These stacks are conveyed through a first strapper 16 which straps the double rows to form sub-packs 17 which are then conveyed onto the stacking apparatus 18. The stacking apparatus 18 stacks the sub-packs 17 and inserts spacer units 12 to form the final stack 19 which is then conveyed through a second strapper 20 to form a final package 10. The final package 10 is then removed from the line 14 for transportation or storage.

The spacer units 12 mentioned previously are fed into the stacking apparatus 18 from the side of the line by a conveyor system 21 which is disclosed in the co-pending application No. 667,075, filed June 19, 1957, now Patent No. 2,918,161.

It is to the apparatus 18 for stacking the sub-packs 17 and inserting the spacer units 12 that the present invention is directed. Generally, the apparatus of this invention includes a feed conveyor 22 which discharges sub-packs 17 onto an elevator 23. The elevator raises each sub-pack so as to be held between clamping rollers 24.

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A second sub-pack is similarly raised and held between the rollers with the first sub-pack being supported on the second sub-pack. When a third sub-pack is discharged onto the elevator 23, spacer units 12 are fed on top of the third sub-pack so that when the elevator rises a third time, a final stack 19 will have been formed having the proper open space 11 provided therein. A pusher 25 then discharges the final stack 19 and it is conveyed away for strapping to form the final pack.

It is the principal object of the present invention to provide a new and improved apparatus for stacking units.

Another object of the present invention is to provide a new and improved apparatus for stacking rows of units into a vertical stack.

A further object of the present invention is to provide a new and improved apparatus for combining rows of units and spacer units to form a stack of units having a space provided therein.

Still another object of the present invention is to provide a new and improved apparatus for stacking rows of units wherein an elevator raises rows of units which are clamped in the raised position and are stacked by successive elevator operations.

A still further object of the present invention is to provide a new and improved apparatus for stacking rows of units as described in the preceding paragraph wherein spacer units are inserted onto a row of units on the elevator prior to raising the elevator so that the resulting stack will be provided with a space therein.

Yet another object of the present invention is to provide a new and improved apparatus for stacking rows of units, as described above, which will operate automatically.

Other and further objects and features of the present invention will be apparent from the following description and drawings in which:

Fig. 1 is a diagrammatic view of a portion of a unit packaging line including perspective sketches of the accumulation of units as they pass along the line;

Fig. 2 is a side elevational view of one embodiment of a stacking apparatus according to the present invention;

Fig. 3 is a top plan view of the device of Fig. 2;

Fig. 4 is an elevational view of the device of Fig. 2;

Figs. 5, 6 and 7 are views similar to Fig. 2 showing only a portion of the structure and illustrating the stacking and feeding of spacer units to form the finished stack;

Fig. 8 is a fragmentary sectional view taken along the line 8—8 of Fig. 3;

Fig. 9 is an end view of the clutch in Fig. 8 looking to the right in that figure;

Fig. 10 is a schematic plan view of the pusher feed mechanism shown in Fig. 3.

While this invention is susceptible of embodiments in many different forms, there is shown in the drawings and will herein be described in detail several embodiments with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the embodiment illustrated. The scope of the invention will be pointed out in the appended claims.

Referring now to the drawings, the stacking apparatus 18 of the present invention consists broadly of the feed conveyor 22, elevator 23, a spacer unit feeding mechanism 26, clamping rollers 24 and discharge pusher 25. All of these elements are mounted on a framework 27

which interconnects the elements to permit a continuous flow of rows of units 13 onto the apparatus, and discharge of complete stacks 19 from the apparatus. The controls are arranged to provide automatic operation.

The feed conveyor 22 has a discharge end 28 secured to vertical L-bars 29 of the supporting framework 27 as by adjustable bolts 30 so that the discharge end 28 of the feed conveyor 22 will be on the same level as the lowered elevator 23. The receiving end 31 of the feed conveyor 22 is attached to the adjacent structure such as the first strapper 16 shown in Figure 1 and mentioned above. The feed conveyor 22 in detail consists of spaced side members 32 having freely rotatable rollers 33 mounted horizontally therebetween. The rollers 33 are in a plane which is inclined downwardly in the direction of the discharge end 28 of the feed conveyor 22 so that the strapped sub-packs 17 will be fed by gravity down the feed conveyor 22 and onto the elevator 23 as seen in Fig. 2.

The elevator 23 is mounted within the supporting framework 27 and is formed with vertical L-bars 34 at each corner. The sides 35 of the L-bars 34 extend outwardly and rollers 36 are provided on each side 35 which extend slightly beyond the extremity of the side. These rollers 36 engage the sides 37 of adjacent vertical L-bars 29 of the supporting framework 27 which are arranged to form an enclosure and to engage the rollers 36 so that the elevator 23 is prevented from moving in a horizontal direction. The vertical L-bars 34 of the elevator 23 are secured to a central inverted channel member 38. This channel member 38 supports spaced members 39 between which rollers 40 are mounted. When the elevator 23 is in the raised position, as shown in Fig. 2, the side members 39 and rollers 40 are in a horizontal position and are supported on the central channel member 38. When the elevator is lowered, the side members 39 engage adjustable stops 41 attached to flanges 42 extending from the supporting framework 27 adjacent the feed conveyor 22. These stops 41 prevent further lowering of the elevator roller 40 adjacent the feed conveyor 22 and cause the spaced sides 39 to pivot on the vertical L-bars 34 farthest from the feed conveyor 22. Thus, when the elevator 23 is in the lowered position, the plane of the rollers 40 will decline and can be adjusted by adjustment of the stops 41 to be coplanar with the feed conveyor rollers 33 so that the sub-packs of units 17 moving down the feed conveyor 22 will pass freely on to the elevator rollers 36.

Stop plates 43 are attached to the supporting framework 27 extending vertically and are parallel to the front face 44 of the sub-packs 17 on the elevator 23. These stop plates 43 are positioned to stop the sub-pack when wholly supported on the elevator and properly align the sub-pack 17 which may have moved slightly out of alignment while traveling along the feed conveyor. The plates 43 are slightly angled from the vertical so as to be flush with the front face of the sub-pack which is at an angle because of the inclination of the lowered elevator rollers. The stop plates 43 extend vertically sufficiently to also engage and stop the spacer units 12, the insertion of which will be described below.

The elevator 23 is mounted on a piston 45 which operates in an hydraulic cylinder 46 to raise and lower the elevator. The stop of the piston 45 is secured to the channel member 38 and the lower end of the piston moves in the cylinder 46. The controls for operation of the piston-cylinder will be described below.

A drop panel 61 is hingedly mounted between the vertical L-bars 29 of the supporting framework 27 so as to swing away from the supporting framework and permit a worker to remove obstructions or to work on the structure within the supporting framework 27.

The elevator rollers 40 when in the raised position are in the horizontal plane of the discharge conveyor 47 which is attached to the supporting framework 27 and extends away therefrom. The discharge conveyor 47 has

sides 48 and rollers 49 similar to the feed conveyor 22 but is arranged in a substantially horizontal plane. Thus, units on the elevator may be pushed into the discharge conveyor 47 by the pusher 25, the details of which will be described below.

The clamping rollers 24 are mounted on the supporting framework 27 adjacent and above the sides 35 of the elevator 23. One of the two clamping rollers 24 is mounted in an adjustable position and is aligned to engage one side of a sub-pack 17 raised by the elevator. The roller 24 is mounted on a shaft 50 which in turn is secured in a yolk 51 which is adjustably movable in the channels 52 of supporting members 53. These supporting members 53 are attached to a table 54 of the supporting framework 27 and one of the supporting members 53 is laterally adjustable as by adjusting screws 55 to vary the tension on the yolk 51.

The inner U-frame 56 of the yolk 51 is adjusted by a locking screw 58 extending through a flange 59 formed in the table 59 of the supporting framework 27. The locking screw 58 is locked in position by tightening locking nuts 60 on either side of the flange 59. The shaft supporting arms 62 of the yolk 51 are movable with respect to the inner U-frame 56 and are adjustable by screws 63 so that the roller can be fixed in a desired position.

The other clamping roller 24 is movably mounted on the table 54 of the supporting framework 27 so as to move from a position out of engagement with a raised sub-pack 17 into a clamping position whereby the sub-pack is held between the rollers 24. This roller is mounted somewhat similarly to the first roller having a similar yolk 64 but with the U-frame 65 secured to the arms 66 for unitary movement. Movement of this roller and yolk is controlled by a piston 67 and cylinder 68 secured to the table 54 of the supporting framework 27. The stroke of the piston 67 being adjusted so that when in the outer position a sub-pack 17 can move freely between the rollers 24 and when in the inner position, the rollers 24 firmly clamp a sub-pack 17 therebetween.

Each of the rollers 24 is prevented from rotating in a direction which would permit the sub-packs 17 to move downwardly by a one way clutch 69 (Figs. 3, 8 and 9). This clutch comprises an outer element 69a secured to the roller and an inner element 69b secured to the shaft with an annular space between the elements. Five cam members 69c are mounted in the annular space and are arranged to permit free rotation of the shaft in a direction of upward movement of sub-packs and to lock instantly by cam action upon reversal of direction. Thus, when sub-packs 17 are fed between the rollers 24 and because of dimensional discrepancies strike the rollers as they move upward, the rollers are free to rotate with the sub-packs and not obstruct the operation of the apparatus and yet when the rollers are in the clamping position the clutch prevents downward movement of the sub-packs.

The spacer unit feeding mechanism 26 will now be described. As mentioned earlier, spacer units 12 are fed into the present apparatus by a spacer unit conveying system 21 seen in Fig. 1. This structure continuously feed spacer units 12 to the spacer unit feeding mechanism 26 by forcing units onto the plate 70 of the feed mechanism 26. As seen in Figs. 2 and 3, this plate 70 is horizontal at the receiving end so as to smoothly receive the spacer brick from the horizontal conveyor system 21. The plate 70 is bent as at 71 so that the portion in the supporting framework is inclined downwardly in the direction of the elevator 23, the inclination being similar to the inclination of the elevator 23 so that as brick are pushed off the plate 70 in the direction of the elevator, they will be parallel to the sub-packs on the elevator. The plate 70 has depending flanges 72 adjustably attached to legs 73 of supporting framework 27 as by bolts 74 passing through the flanges 70 and through a slot 75 on the leg 73. Flanges 76 also

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depend from the plate 70 adjacent the vertical L-bars 29 of the supporting framework 27 and are attached to lugs 77 extending from the L-bars 29.

An upwardly extending bar 78 is secured to the plate 70 and has a pair of spacer brick pushers 79 attached thereto (Figs. 2, 3, 5 and 10). These pushers 79 consist of hydraulic cylinders 80 and pistons 81, the forward end of each piston 81 has a brick engaging portion 82. This brick engaging portion 82 has a vertical pushing surface 83 and a horizontal brick holding surface 84 extending outwardly to engage the top of the unit and prevent the unit from pivoting as it is pushed off the plate 70. The stroke of the piston 81 is adjusted so that as a unit is pushed from the plate 70 it will strike the stop plate 43, which properly aligns the unit so as to fall into position on the third sub-pack 17. The control of the stroke is accomplished by an actuating arm 85 adjustably secured to rods 86 extending rearwardly from the piston 81. This actuating arm 85 engages a switch 87 mounted on the bar 78 of the plate 70 when the brick is a short distance from contacting the stop plates 43. When the switch is contacted, the momentum of the piston will carry it forward sufficiently to push the brick against the stop. The switch reversing the direction of the piston so as to return the piston to its inner position.

As seen in Fig. 3, the spacer unit pushers 79 are aligned so as to push spacer units onto the sub-pack adjacent the sides of the sub-pack. However, as there is a continuous line 88 of spacer units on the plate, a retaining angle 112 is provided which extends upwardly from the plate at its discharge side and is located between the paths of the pushers 79. This angle 112 prevents units between the units being pushed from moving off the plate. In order to release the pressure on the units pushed, pressure releasing pistons 89 and 90 are mounted on the plate 70. The first pressure releasing piston 89 is mounted adjacent the end of the plate opposite from the spacer unit conveyor 21. This piston 89 is operable in a cylinder 91 secured to the plate 70 and has a bar 92 attached to its free end which abuts the first spacer unit on the plate 70. The second pressure releasing piston 90 is mounted in a cylinder 93 attached to the plate 70 adjacent the spacer unit pusher 79 nearest the spacer unit conveyor 21 and has a bar 94 at its free end approximately the length of two unit widths. Opposite the second piston 90 is a stop 95 extending upwardly from the plate 70. The stroke of the piston 90 is controlled so that the bar 94 clamps two units against the stop 95 thereby taking the pressure off of the preceding units on the plate 70 and also aligning the two brick engaged so as to be in proper position for subsequent engagement by the spacer unit pushers 79. This second piston 90 is operated prior to the operation of the pushers 79 and prior to the operation of the first piston 89. The first piston 89 is operated to move away from the units so as to relieve pressure and is operated intermediate the operation of the second piston 90 and the pushers 79. Thus, the second piston 90 is advanced to clamp units against the stop 95 and relieve the pressure of the row of incoming units. Then the piston 89 is retracted to relieve the pressure on the spacer units 12 between the pusher pistons 79 and finally the latter are advanced as shown in Fig. 7 and in dotted outline in Fig. 10 to push the spacer units onto the strapped sub-packs 17. During this movement, the units in between the units being advanced are held back by a stationary stop bar 112 on the plate 70. When the pusher pistons are retracted, first the end piston 89 is advanced and then the other pressure piston 90 is retracted to permit advance of the incoming units to fill the gaps left by the spacers.

The legs 73 of the supporting framework 27 to which the plate 70 is attached extend upwardly above the plate in an inverted J fashion so as to have a horizontal top 96 extending over the plate 70, and a depending short leg 97 extending from the top 96 to the table 54 of the

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supporting framework 27. A cross piece 98 extends between the tops 96 of the legs and supports the discharge pusher 25 and the operating mechanism 99 therefor. This operating mechanism consists of a cylinder 100 fixed to the cross piece 98 and having a piston 101 therein attached to a pusher plate 102 at its free end. Also attached to the cross piece 98 are two bushings 103 which receive rods 104 attached to the pusher plate 102. These rods 104 move in the bushings 103 as the pusher plate 102 is moved thereby guiding the pusher plate 102 and stabilizing the direction of movement. As seen in Fig. 4, the pusher plate 102 has a notch 105 cut in its lower corner adjacent the movable roller 24 so as to accommodate the roller when pushed between the rollers. The stroke of the pusher plate 102 is sufficient to push full stacks 19 supported on the elevator 23 in the raised position from the elevator onto the discharge conveyor 47.

The controls for the operation of the automatic stacker apparatus of this invention will now be described. A photoelectric source 106 is mounted on the supporting framework 27 adjacent the stop plates 43 and casts a beam across the path of the elevator 23 to a photoelectric receiver 107. The beam is interrupted by a sub-pack 17 fully received on the elevator 23. The interruption of this beam actuates the operation of the elevator 23 thereby raising the elevator which when it reaches the raised position contacts a switch 108 extending into the path of the elevator. This switch controls the clamping of the rollers 24 so as to clamp the first sub-pack therebetween. The elevator then moves to its lower position and upon the interruption of the beam by a second sub-pack, once again raises. When the elevator is partially raised so that the second sub-pack is near contact with the first sub-pack, the elevator actuates a switch 109 mounted on the supporting framework 27 which releases the clamping rollers dropping the first sub-pack onto the second sub-pack. The elevator continues to the raised position and once again engages switch 108 to clamp the rollers against the second sub-pack.

A first contact 110 mounted on the cross piece 98 and extending into the path of the sub-packs is contacted by the first sub-pack when resting on the second sub-pack in the raised position. This contact thereby actuates a stepping relay (not shown) so that upon the subsequent breaking of the light beam by the third sub-pack, the spacer unit pushers 79 will be operated thereby feeding spacer units 12 onto the top of the third sub-pack. When the third sub-pack with the spacer units thereon is raised, the release switch 109 is again contacted permitting the first and second sub-packs to drop onto the spacer units to form the final stack 19. As the elevator moves to the raised position, a second contact 111 mounted on the cross piece 98 engages the first sub-pack and operates the discharge pusher 25 and also prevents operation of the clamping rollers 24 so that the pusher 25 can push the final stack 19 off of the elevator 23 onto the discharge conveyor 47.

From the above, it is apparent that the present invention provides an ingenious apparatus for automatically stacking units into a desired pack without the need for manual operation or control. The invention can be utilized for many different purposes and is heavy enough for use in stacking brick.

We claim as our invention:

1. A unit stacking apparatus, comprising: a supporting framework; a unit feeding conveyor secured to said framework and supporting rows of units for advance into the apparatus along a horizontal path in a vertical plane; an elevator mounted in the supporting framework for vertical movement in said plane; a unit discharging conveyor secured to said framework at a level above said feeding conveyor and in said plane to receive stacks of units discharged from the apparatus; means for moving the elevator between a lowered unit receiving position

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adjacent said feeding conveyor and a raised position adjacent the discharging conveyor; holding means secured to the supporting framework and operable to hold rows of units raised by the elevator in the raised position thereby stacking rows of units; means supported in said plane and operating to insert horizontally spaced units on top of a row of units on the elevator to form an opening in the stack of units; and means for discharging stacks onto the discharging conveyor, said unit inserting means comprising at least one pusher element movable horizontally in said plane and disposed above said feeding conveyor and below said discharging means for depositing said spaced units on said row of units on said elevator when the latter is in said lowered position.

2. A unit stacking apparatus, comprising: a supporting framework; a unit feeding conveyor secured to said framework and upon which rows of units are fed into the apparatus; an elevator mounted in the supporting framework for vertical movement therein; a unit discharging conveyor secured to said framework upon which stacks of units are discharged from the apparatus; means for moving the elevator between a lowered unit receiving position adjacent said feeding conveyor and a raised position adjacent the discharging conveyor; a pair of clamping rollers secured to the supporting framework adjacent and above said elevator and spaced apart on opposite sides of the path of units on the elevator, the rollers being laterally spaced to permit rows of units to move therebetween when the elevator rises and at least one of said rollers being movable toward the other roller to clamp a row of units in the raised position; clutch means permitting rotation of the rollers only in the direction of upward movement of the rows of units; means for moving said movable roller into engagement with raised rows of units to permit the elevator to return to the lowered position for receipt of additional units thereby accumulating rows of units into a stack; and means for discharging stacks onto the discharging conveyor.

3. A unit stacking apparatus, comprising: a supporting framework; a unit feeding conveyor secured to said framework and upon which rows of units are fed into the apparatus; an elevator mounted in the supporting framework for vertical movement therein; a unit discharging conveyor secured to said framework upon which stacks of units are discharged from the apparatus; means for moving the elevator between a lowered unit receiving position adjacent said feeding conveyor and a raised position adjacent the discharging conveyor; a pair of clamping rollers secured to the supporting framework adjacent and above said elevator, the rollers being laterally spaced to permit rows of units to move therebetween when the elevator rises and one of said rollers being movable toward the other roller to clamp a row of units in the raised position; clutch means permitting rotation of the rollers only in the direction of upward movement of the rows of units; means for moving said movable roller into engagement with raised rows of units to permit the elevator to return to the lowered position for receipt of additional units thereby accumulating rows of units into a stack; a discharge pusher mounted on the framework above and to the feeding conveyor side of the elevator, said pusher being horizontally movable to engage the stack of units and push said stack onto the discharging conveyor; and means for operating said pusher upon the accumulation of a stack of units.

4. A unit stacking apparatus on which units are accumulated to form a stack having spacer units which provide an opening in the stack, the unit stacking apparatus comprising: a supporting framework; a unit feeding conveyor secured to said framework and supporting rows of units along a horizontal path in a vertical plane for feeding of the rows into the apparatus; an elevator mounted in the supporting framework for movement therein; a unit discharging conveyor secured to said framework in said vertical plane but at a level above said feeding con-

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veyor and receiving units discharged from the apparatus; means for moving the elevator between a lowered unit receiving position adjacent said feeding conveyor and a raised position adjacent the discharging conveyor; holding members secured to the supporting framework and movable into engagement with rows of units raised by the elevator to hold the rows in the raised position thereby stacking rows of units; a support for spacer units secured to the supporting framework above the feeding conveyor in said plane and adjacent the elevator; means movable horizontally in said plane and engageable with spacer units on said support for moving the spacer units off the support and onto a row of units on the elevator; and means for discharging stacks onto the discharging conveyor.

5. A unit stacking apparatus on which units are accumulated to form a stack having spacer units which provide an opening in the stack, the unit stacking apparatus comprising: a supporting framework; a unit feeding conveyor secured to said framework and upon which rows of units are fed into the apparatus; an elevator mounted in the supporting framework for movement therein; a unit discharging conveyor secured to said framework upon which stacks of units are discharged from the apparatus; means for moving the elevator between a lowered unit receiving position adjacent said feeding conveyor and a raised position, said elevator having one position adjacent the discharging conveyor; holding members secured to the supporting framework and engageable with rows of units raised by the elevator to hold the rows in the raised position thereby stacking rows of units; a support for spacer units secured to the supporting framework adjacent the elevator; means for conveying a row of spacer units onto said support; laterally spaced spacer unit pushers mounted on the support and operable to push nonadjacent spacer units from said row off the plate and onto a row of units on said elevator; means for operating said pushers; and means for discharging stacks onto the discharging conveyor.

6. A unit stacking apparatus on which units are accumulated to form a stack having spacer units which provide an opening in the stack, the unit stacking apparatus comprising: a supporting framework; a unit feeding conveyor secured to said framework and upon which rows of units are fed into the apparatus; an elevator mounted in the supporting framework for movement therein; a unit discharging conveyor secured to said framework upon which stacks of units are discharged from the apparatus; means for moving the elevator between a lowered unit receiving position adjacent said feeding conveyor and a raised position, said elevator having a position adjacent the discharging conveyor; holding members secured to the supporting framework engageable with rows of units raised by the elevator to hold the rows in the raised position thereby stacking rows of units; a plate secured to said framework above the feeding conveyor and adjacent the elevator; conveyor means for continuously forcing a row of spacer units onto said plate; pressure relieving means engaging units in said row to release the pressure caused by units being forced onto the plate; laterally spaced spacer unit pushers mounted on the plate and operable to push nonadjacent spacer units from said row off the plate and onto a row of units on said elevator; means for operating said pushers and said pressure relieving means; and means for discharging stacks onto the discharging conveyor.

7. An apparatus for conveying and inserting horizontally spaced units into a unit stacking apparatus which accumulates units into a stack having an opening formed by the spaced units, said apparatus for conveying and inserting spaced units comprising: a supporting framework; a flat plate secured to said framework and upon which units may be moved, said plate having a discharge side; means for forcing units onto said plate in a row parallel to said discharge side; spaced pushers each

mounted on said framework to move perpendicular to said row from a position on the side of said row away from said discharge side in a path through the row of units to a position adjacent the discharge side of said plate, said pushers engaging nonadjacent units and pushing them out of said row, off the discharge side of the plate and into the unit stacking apparatus; and means for operating said pushers.

8. The apparatus for conveying and inserting horizontally spaced units into a unit stacking apparatus of claim 7 wherein the pushers are provided with horizontal flanges which extend over the top of the units and hold the units

on the plate so the units will not pivot while being pushed off the discharge side of the plate into the stacking apparatus.

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