

April 10, 1951

M. P. NEAL

2,547,963

BOX FLAP GLUING DEVICE

Filed Oct. 15, 1945

5 Sheets-Sheet 1

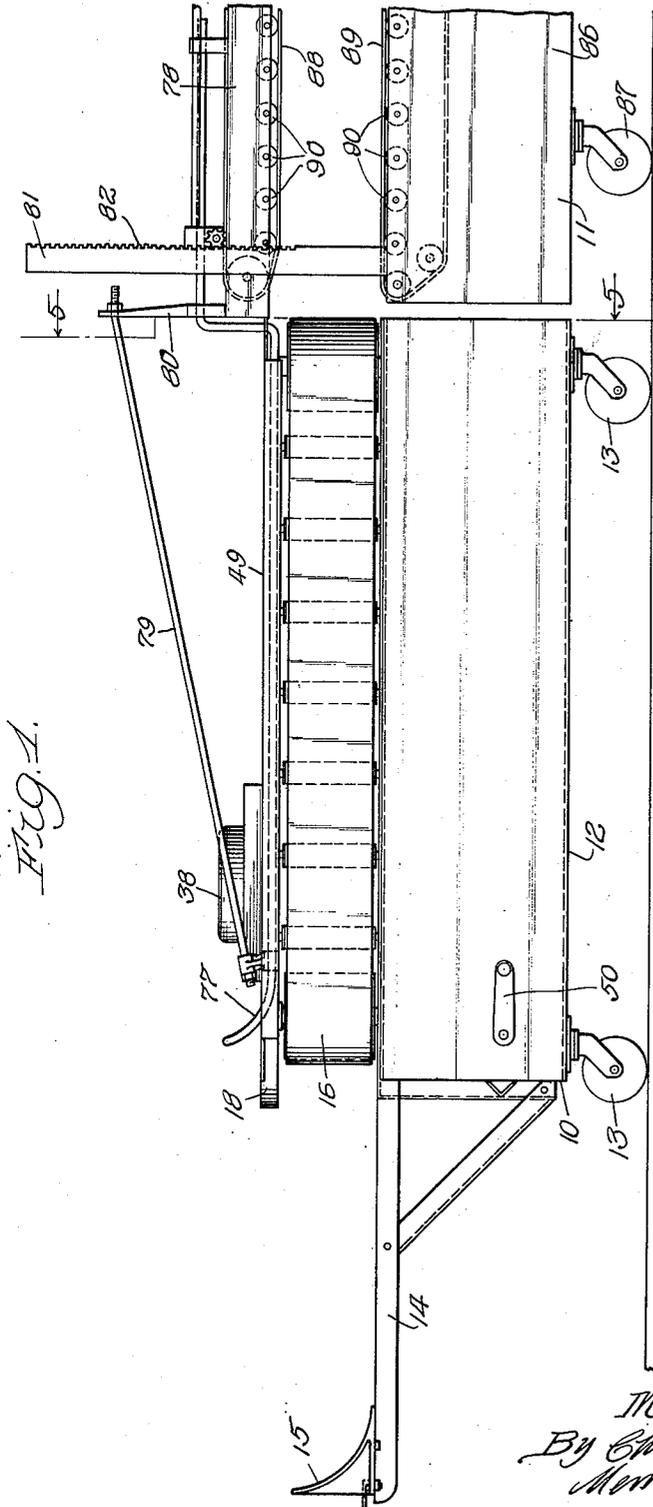


Fig. 1.

Fig. 9.

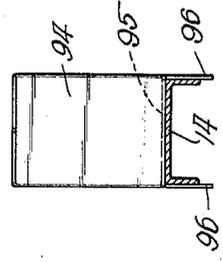
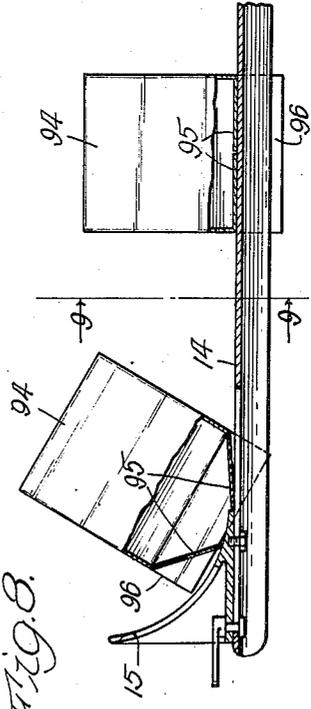


Fig. 8.



Inventor:
Morris P. Neal,
By *Clinton Wiles Schroeder*
Morrison, Wagon, Fetters

April 10, 1951

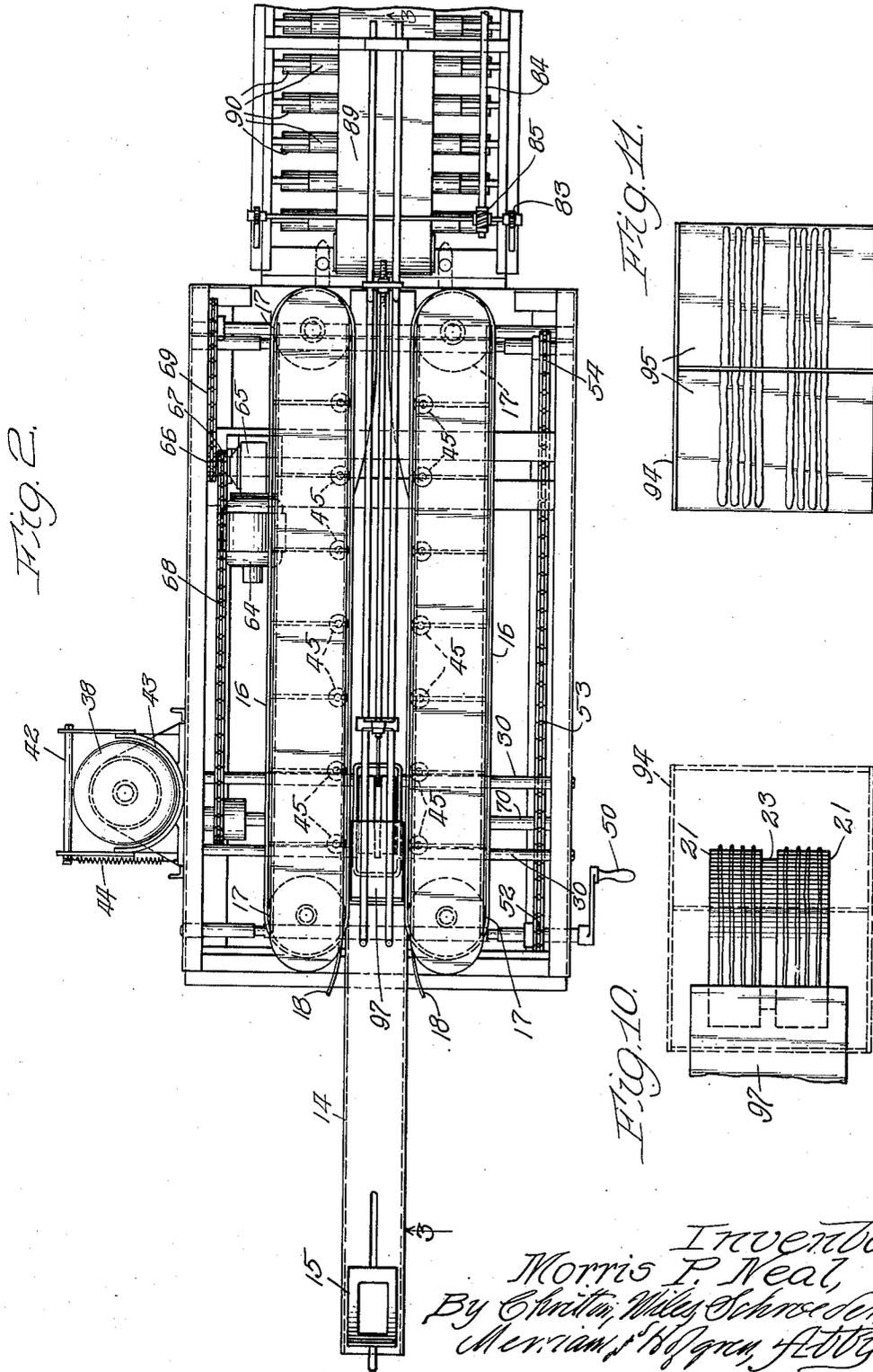
M. P. NEAL

2,547,963

BOX FLAP GLUING DEVICE

Filed Oct. 15, 1945

5 Sheets-Sheet 2



Inventor:
Morris P. Neal,
By Clinton Miles Schorseder,
Merriam & Hooper, Attorneys.

April 10, 1951

M. P. NEAL

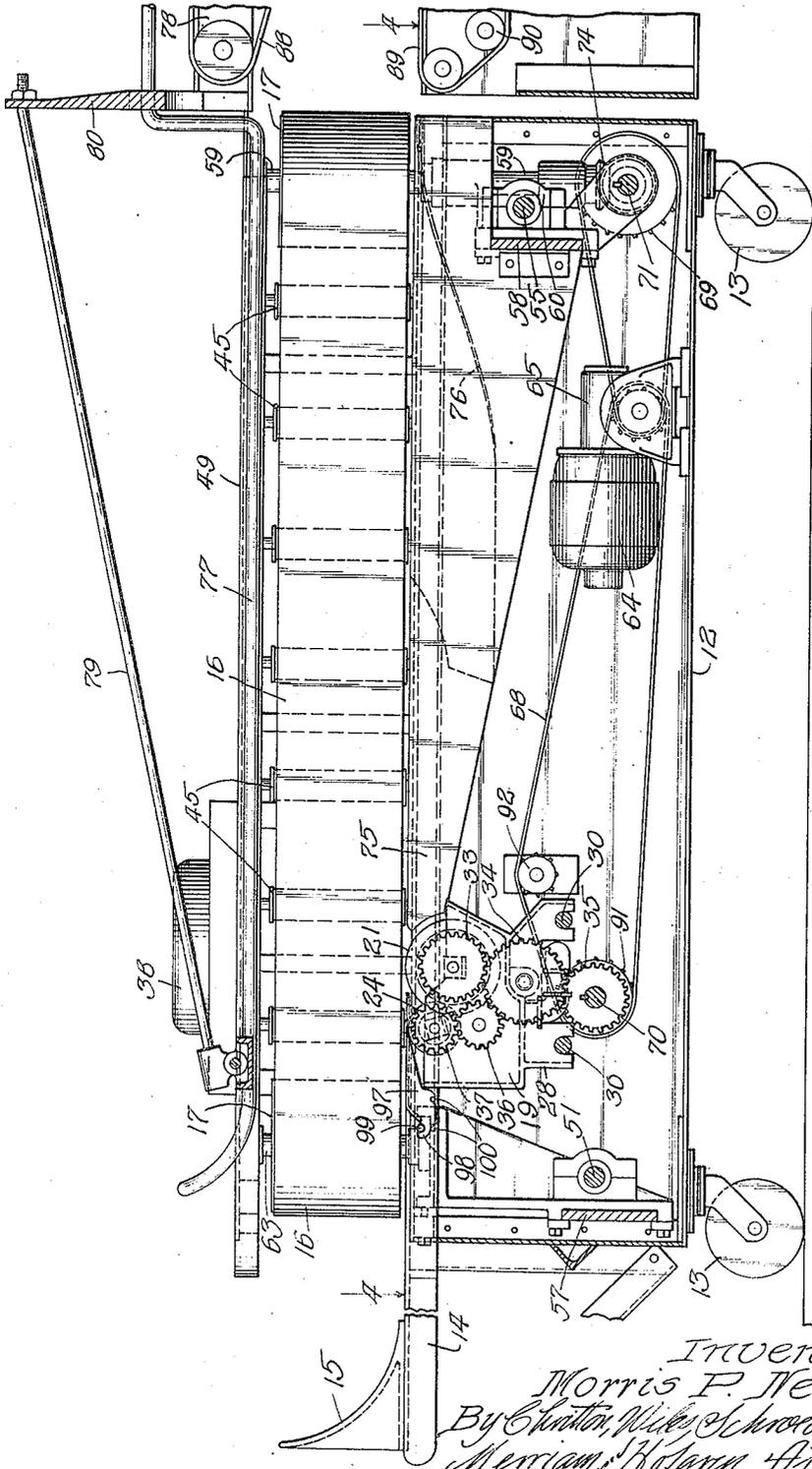
2,547,963

BOX FLAP GLUING DEVICE

Filed Oct. 15, 1945

5 Sheets-Sheet 3

Fig. 3.



Inventor:
Morris F. Neal,
By *Clinton Wiley Schroeder*,
Merriam, Hodgson, Feltus

April 10, 1951

M. P. NEAL
BOX FLAP GLUING DEVICE

2,547,963

Filed Oct. 15, 1945

5 Sheets—Sheet 5

Fig. 5.

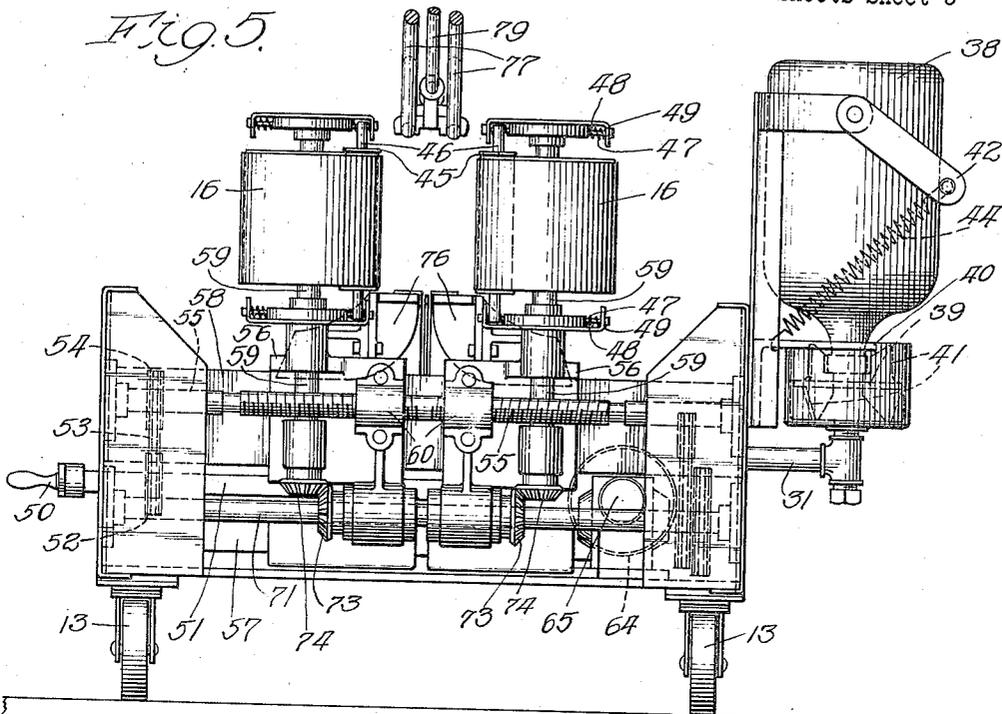


Fig. 6.

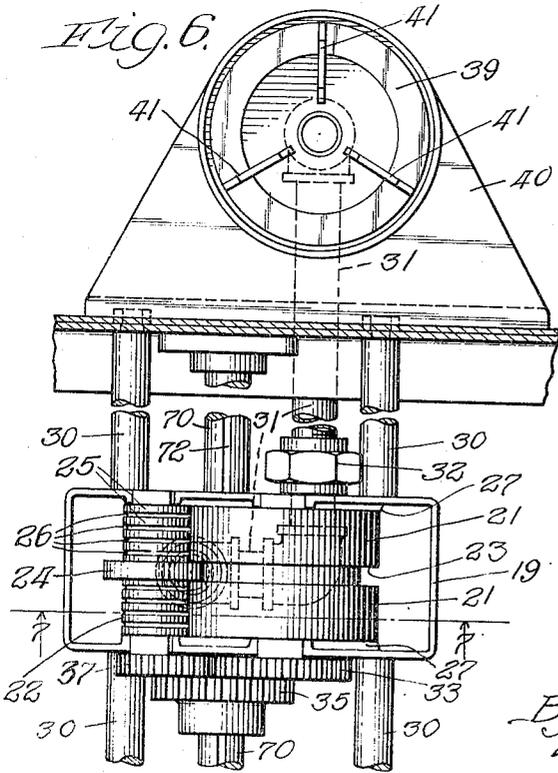
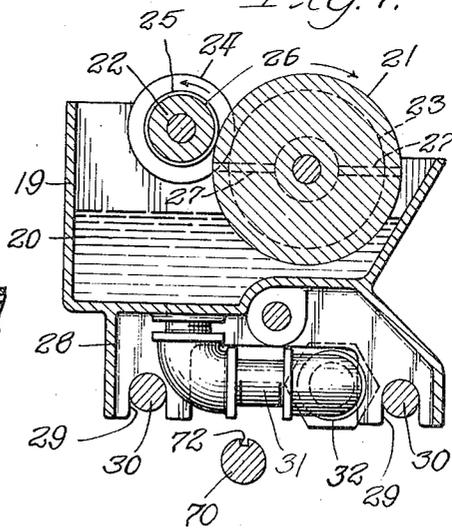


Fig. 7.



Inventor:
Morris P. Neal,
By *Smith, Wilson & Co.*
Merriam, Oregon, Attys.

UNITED STATES PATENT OFFICE

2,547,963

BOX FLAP GLUING DEVICE

Morris P. Neal, Quincy, Ill., assignor to A-B-C
Packaging Machine Corporation, a corporation
of Illinois

Application October 15, 1945, Serial No. 622,354

16 Claims. (Cl. 91—51)

1

This invention relates to a packaging machine for forming boxes, or the like, of paper, cardboard, fiberboard, and the like.

The ordinary shipping cartons of paper, pasteboard, fiberboard, and like materials, are usually provided to the user in a flattened form, and the user proceeds to straighten them out with the opposite sides parallel and to glue the bottom flaps or ears. This involves considerable labor, as the average buyer of this type of container uses a considerable number of boxes. In order to lessen the amount of work involved in forming the boxes, I have invented an automatic packaging machine, wherein the unglued boxes are inserted into the machine and the glue is applied to the outside surfaces of the inner ears on the bottom of the box, and the outer ears are folded over into contact with the glued side of the inner ears while the boxes travel through the machine. The new machine is readily adjustable to receive boxes of all sizes, and it will operate continuously with very little attention.

The new machine has an important advantage in that it can be built to occupy very small space and will be very light in weight. This is accomplished by making the machine automatic in operation with the gluing and folding operations taking place rapidly and with very little, if any, waste motion.

The invention also includes a new apparatus for applying glue to the ears of the boxes as the boxes are passed over the gluing station. This new glue applying means is quite important, as it permits the use of inexpensive glue, such as water glass, which has heretofore been difficult to use because of its tendency to set to a glass-like solid. The glue applying means is constructed as a unit, so that it can be readily inserted into and removed from the machine when it is desired to convert from one size box to another size. This is an important feature for the additional reason that it aids in cleaning the glue applying means. It is especially necessary to clean the glue from the machine when water glass is used, as ordinarily all water glass must be removed when the machine is shut down for any length of time. In the present machine this cleaning is very simple.

The invention will be described as related to the embodiment shown in the accompanying drawings. Of the drawings, Figure 1 is an elevation of the new packaging machine; Figure 2 is a plan view of the machine; Figure 3 is a vertical section, taken along line 3—3 of Fig. 2; Figure 4 is a horizontal section taken along line 4—4

2

of Fig. 3; Figure 5 is a vertical section taken along line 5—5 of Fig. 1; Figure 6 is a plan view of the glue applying apparatus; Figure 7 is a vertical section taken along line 7—7 of Fig. 6; Figure 8 is a vertical section through the front shaping member of a machine; Figure 9 is a vertical section taken along line 9—9 of Fig. 8; Figure 10 is a plan view showing the glue applying roller; and, Figure 11 is a bottom view of a paper box showing the glue pattern on the outer surfaces of the inner ears of the bottom of a box.

The packaging machine shown in the accompanying drawings includes the packaging machine 10 which is the subject of this invention and a conveyor apparatus 11 for conveying the boxes away from the packaging machine. The packaging machine comprises a framework 12 supported on wheels 13. On the top of the framework there is located an extended base member 14 for holding and aligning the boxes as they enter the glue applying portion of the machine. At the end of the base member, away from the machine, is located a curved slide 15 for bending the inner ears on the bottom of the box into the plane of the end of the box, and the box rests on base member 14 with these ears turned in (Fig. 8).

In order to convey the boxes through the machine, there are provided a pair of endless friction members 16, such as belts, each passing around a pair of rollers 17. These friction members may be rubber coated flexible belts and are arranged parallel to each other in a horizontal plane and in vertical alignment. When a box is moved along the base 14 into engagement between the belts 16, the belts immediately grasp the opposite sides of the box and move it through the machine. In order to assist in guiding the box into engagement with the belts, there are provided curved guide members 18, at the entrance of the belts.

As each box moves through the machine, it passes over a station where glue is applied to the outer surfaces of the folded inner ears. The glue applying means includes a glue reservoir 19, wherein the glue 20 is maintained at a constant level. Within the glue reservoir 19 there is located a cylindrical roller 21 with its bottom portion immersed in glue and its top portion normally contacting a box passing thereover. There is also located within the reservoir 19 a second roller 22 above the level of the glue and in contacting relationship with the first roller 21. At the center of the first roller, there is provided a deep circumferential groove 23, while on the second roller

3

22 there is provided a circumferential raised portion 24, for engagement with the groove. The groove 23 is provided so that glue will not be applied to the adjacent edges of the folded ears as the box passes thereover. The raised portion 24 on the second roller 22 is provided so that glue will not pile up within the groove.

The surface of the second roller 22 is provided with narrow circumferential ridges 25 separated by narrow valleys 26. This construction serves to squeeze the glue on the surface of the first roller 21 into narrow parallel strips, as shown in Figure 10, thereby providing more uniform application of the glue to the box. In order to prevent glue from piling up on the ends of the first roller 21 and hardening, there are provided scrapers 27 mounted within the glue reservoir 19 above the level of the glue and in contact with the ends of the first roller 21. As the roller is revolved, substantially all glue is scraped from the ends of the roller.

The glue reservoir 19, first roller 21, second roller 22, and scrapers 27 are all constructed as a unit in order to permit easy insertion of the unit into the machine, and removal therefrom when it is desired to clean the rollers and reservoir, or when the machine is to be changed to receive boxes of different sizes. As shown, the reservoir 19 has a depending portion 28 extending downwardly at the bottom, and this portion has U-shaped indentations 29 so that it will rest on the transverse parallel bars 30. The glue supply conduit 31, leading to the bottom of the glue reservoir, is provided with a separable union 32, so that the conduit may be easily disconnected. A gear 33 which drives the first roller 21 is located on the outside of the reservoir 19 and meshes with a second gear 34, which in turn is driven by a third gear 35. Also contacting the second gear 34 is a fourth gear 36, which drives a fifth gear 37 attached to the second roller 22. When the union 32 on the glue conduit 31 is disconnected, the reservoir 19, with attached gears 33, 34, 36 and 37, may be lifted from the machine. Then later it may be reinserted into the machine by merely lowering it into place, so that the second gear 34 meshes with the third gear 35. The union 32 will then be used to attach the two sections of the conduit 31.

The gear 35 which drives the rollers 21 and 22 is mounted on a shaft 70. This shaft is driven by a gear 91 which is in turn driven by a chain 68 passing over an idler gear 92 and to a gear 67 driven by the motor 64 through a gear reducing box 65. The second roller 22 within the glue reservoir 19 is preferably driven at a faster rate than the first roller 21 so as to have a wiping action thereon. This is provided by having the fifth gear 37 that is attached to the second roller 22 smaller than gear 33 attached to first roller 21.

In order to provide a constant level of glue in the reservoir 19, there is mounted on the side of the machine a bottle 38 in inverted position. This bottle is held in position in a glue pan 39, fastened to the side of the machine by a bracket 40, and the opening in the bottle 38 is held above the bottom of the pan by means of three equally spaced supports 41. The conduit 31 connects the bottom of the pan 39 to the bottom of the glue reservoir 19. The level of glue in the pan 39 and the reservoir 19 is substantially the same and the level is kept constant in the pan 39 by air entering the bottle 38 when the glue in the pan falls below the level of the bottle opening. This permits

4

glue to escape from the bottle into the pan until the glue again covers the bottle opening. The bottle 38 is held in the pan by a yoke 42 contacting one side of the bottle and holding it against a curved seat 43. The yoke 42 is held tightly against the bottle by means of a spring 44 fastened to the yoke and to the framework of the machine.

In order to provide for a tight fit between the belts 16 and the contacting sides of the box passing through the machine, there is provided a series of rollers 45 on the side of the belts away from the path of the boxes. These rollers are held in brackets 46 and are pressed against the belts by springs 47 that force the rollers towards the center of the machine. The springs operate on slidable rods 48, held in horizontal position by mountings 49, with the rods carrying the ends of the rollers. The rods, mountings and springs are provided at each end of the vertical rollers.

The rollers 17 which carry the endless belts 16 are arranged for movement toward and away from each other, so as to accommodate boxes of different sizes. This movement is caused by a crank 50 attached to a horizontal rod 51 extending through the machine. A gear 52 is mounted on this rod, near the crank, and this gear carries a chain 53, passing to the rear of the machine and over another gear 54, attached to a second horizontal rod 55 at the rear of the machine. The rods 51 and 55 are threaded on each side of the center of the machine so that as the rod is turned blocks 56 at the rear of the machine, and blocks 61 at the front of the machine, upon which the rollers 17 are mounted, move upward and away from each other. A block is provided for each roller, there being two at the front of the machine and two at the rear. The blocks 61 at the front of the machine slide on a flat horizontal bar 57, while the blocks 56 at the rear of the machine slide on a second flat bar 58. Each block 56 carries a mounting 59 for a roller 17 and has a thread engaging portion 60 for engaging the threads on the rod 55. Thus, as the crank 50 is turned, blocks 56, with the rollers 17 mounted thereon, are moved and the threads on the rods 51 and 55 are arranged so that each pair of rollers move towards and away from each other.

The machine is operated by means of a motor 64 that drives a gear reducing box 65. This gear box 65 has external gears 66 and 67, with drive chains 68 and 69 operating a drive shaft 70 at the front of the machine and a second drive shaft 71 at the rear of the machine. The first drive shaft 70 operates the glue applying rollers 21 and 22 through gear 35. The gear 35 is movable along shaft 70, to accommodate glue reservoirs 19 of varying widths. This is accomplished by having a long key-way 72 on the shaft 70 with the gear 35 slidably keyed thereto.

The shaft 71 is for driving the rollers at the rear of the machine and this operates right-angle gears 73 and 74, with a pair of these being provided for each roller 17 at the rear of the machine. One gear 73 is keyed to the shaft 71, while the second gear 74 is keyed to the shaft 59 carrying the roller 17. Thus, if the shaft 71 is revolved, the pair of rollers at the rear of the machine are also revolved. Each pair of gears 73 and 74 are mounted on a block 56 and are moved along shaft 71 as the blocks 56 are moved toward and away from each other by the turning of the crank 50. The rollers at the front of the machine are not positively driven, but are merely idler rollers revolving on their shafts 63, held by blocks 61.

The boxes travel on a central dividing plate 75, arranged vertically through the longitudinal center of the machine. On either side of this plate and toward the rear of the machine there are provided curved plates 76 that are gently curved from a vertical alignment near the center of the machine to a horizontal alignment at the rear of the machine in order to turn the depending ears of the box up into the plane of the bottom of the box and press these ears against the glued surfaces of the inner ears.

In order to hold the boxes against the glue applying means as the box travels through the machine, there are provided between the belts 16, but placed above them, two parallel rods 77, with the front of the rods curved upwardly at the front of the machine to receive the boxes. These rods are attached to the top conveyor portion 78 of the rear conveyor machine 11 and are supported by means of a rod 79 extending from the front of the parallel rods 77 to a vertical post 80 attached to the front of the top conveyor portion 78. In order to accommodate boxes of different sizes, the parallel rods 77 are movable vertically. As the conveyor machine 11 must accommodate boxes that emerge from the packaging machine 10, it has been found advisable to have the top conveyor portion 78 of the conveyor machine movable with the rods 77. This is accomplished by providing vertical bars 81 having toothed edges forming racks 82. A small pinion gear 83 meshes with each rack, and this pinion gear is mounted on the top conveyor portion 78. The pinion gears 83 are operated by means of a rod 84 with an attached worm gear 85 meshing with one pinion gear 83. Thus the pinion and rack cause the top conveyor portion 78 and the attached parallel rods 77 to move up and down.

The conveyor machine, which is attached to the packaging machine, conveys the boxes away from the packaging machine and serves to hold the glued flaps pressed to each other while the glue dries. This conveyor machine comprises a body portion 86, mounted on wheels 87, and has endless belts 88 and 89 for contacting the top and bottom of the boxes, respectively. The belts are held pressed against the boxes by rollers 90.

The boxes 94 are opened out into rectangular shape and placed on the curved slide 15 to fold the inner ears 95 into the plane of the bottom of the box with their adjacent edges transverse to the machine. The boxes arranged in this position are moved along base 14 until they are grasped by the parallel belts 16 and moved through the machine. The base 14 stops short of the glue reservoir 19, but a small rectangular plate 97 covers the front of the reservoir and is located over the second glue roller 22. The plate 97 is supported on each transverse edge by hooks 98 grasping studs 99 and resting on parallel studs 100. The plate 97 is held on the studs by its weight only. As each box passes over the gluing roller 21 glue is applied in the pattern shown in Fig. 11. After passing over the gluing roller the box is supported on the top edge of the dividing plate 75. This dividing plate is held at the rear of the machine and rests at its front end on the side of the glue reservoir 19. As the box continues its travel, curved plates 76 bend the outer ears 96 into contact with the glued inner ears 95, and the box passes on out of the machine into the conveyor machine 11. The plate 75 supports the boxes in the central zone lying between the adjacent edges of the outer ears 96. This zone is normally located on either side of a line down the longi-

tudinal center of the box. As the gluing and forming operations take place rapidly the packaging machine can be built very short with resulting savings of space and weight. The boxes follow each other in rapid succession through the packaging machine.

Having described my invention as related to one embodiment of the same, it is to be understood that the invention is not limited by any of the details of description, unless otherwise specified, but is rather to be construed broadly within its spirit and scope, as set out in the accompanying claims.

I claim:

1. Apparatus for applying glue to a surface comprising a glue reservoir, a substantially cylindrical roller having its bottom portion in the glue reservoir and its top portion for contacting the surface to be glued, means for driving said roller to transfer glue from said reservoir to said surface, a second roller rotatably contacting the first roller at a point in the transfer path between the glue in the reservoir and said surface, with the contact surface of the second roller having narrow circumferential ridges separated by narrow valleys and separate means for driving said second roller at a rate faster than that of the first roller and in a direction opposite to that of the first roller.

2. Apparatus for applying glue to a surface comprising a glue reservoir, means for maintaining the glue at a substantially constant level in the reservoir, driven substantially cylindrical roller means in contacting relationship to said glue and arranged for contact with a surface passing thereover, and a second roller means contacting the first with the contact surface of the second roller means being narrow circumferential ridges separated by narrow valleys, the second roller means being arranged for more rapid rotation than the first in order to have a wiping action thereon.

3. Apparatus of claim 2 wherein the first roller means is provided with scrapers located above the level of the glue for scraping glue therefrom.

4. Apparatus of claim 2 wherein the first roller means is provided with a circumferential groove substantially in the center of its surface and the second roller means is provided with an annular raised portion for engagement with said central groove.

5. Apparatus of claim 2 wherein the first roller means is provided with a circumferential groove substantially in the center of its surface and the second roller means is provided with an annular raised portion for engagement with said central groove, said first roller means being provided with scrapers at the ends and above the level of the glue for scraping glue from said ends.

6. Apparatus of claim 2 wherein the first roller means is provided with a circumferential groove substantially in the center of its surface and the second roller means is provided with an annular raised portion for engagement with said central groove, said first roller means being provided with scrapers at the ends and above the level of the glue for scraping glue from said ends, and with said glue reservoir having the first and second roller means and the scrapers mounted therein so that the entire unit may be removed from and inserted into a mounting.

7. Apparatus for applying glue to a surface comprising a glue reservoir, a substantially cylindrical roller having its bottom portion in the glue reservoir and its top portion for con-

7
 tacting the surface to be glued, and a second roller contacting the first with the contact surface of the second roller being narrow circumferential ridges separated by narrow valleys, said first roller being provided with a circumferential groove substantially in the center of its outer surface and the second roller being provided with an annular raised portion for engagement with the groove.

8. Apparatus for applying glue to a surface comprising a glue reservoir, a substantially cylindrical roller having its bottom portion in the glue reservoir and its top portion for contacting the surface to be glued, and a second roller contacting the first with the contact surface of the second roller being narrow circumferential ridges separated by narrow valleys, said first roller being provided with a circumferential groove substantially in the center of its outer surface and the second roller being provided with an annular raised portion for engagement with the groove, said first roller being provided with scrapers at the ends for scraping glue therefrom.

9. Apparatus for applying glue to a surface comprising a glue pan, an inverted container held with its opening spaced from the bottom of the pan, a conduit leading to a glue reservoir and provided with a separable joint near the reservoir, a first roller mounted for rotation within the reservoir and having its bottom portion normally contacting the glue and its top portion normally contacting a surface passing thereover, a second roller mounted for rotation within the reservoir and arranged above the glue level with its surface contacting that of the first roller, said surface of the second roller being provided with narrow circumferential ridges separated by narrow valleys and the first roller being provided with a central circumferential groove, the second roller being also provided with a raised portion on its surface for engagement with said groove.

10. Apparatus for applying glue to a surface comprising a glue pan, an inverted container held with its opening spaced from the bottom of the pan, a conduit leading to a glue reservoir and provided with a separable joint near the reservoir, a first roller mounted for rotation within the reservoir and having its bottom portion normally contacting the glue and its top portion normally contacting a surface passing thereover, a second roller mounted for rotation within the reservoir and arranged above the glue level with its surface contacting that of the first roller, said surface of the second roller being provided with narrow circumferential ridges separated by narrow valleys and the first roller being provided with a central circumferential groove, the second roller being also provided with a raised portion on its surface for engagement with said groove, and scrapers mounted in the reservoir above the glue level in contacting relationship with the ends of said first roller for scraping glue therefrom, said reservoir, rollers and scrapers forming a unit resting on supports so as to be easily inserted on and removed from said supports.

11. Apparatus for applying glue to a surface comprising a glue reservoir, a substantially cylindrical roller having its bottom portion in the glue reservoir and its top portion for contacting the surface to be glued, said roller being provided with a circumferential groove, and a second roller contacting the first roller and being provided with an annular raised portion for engagement with the groove, said second roller being located above the normal level of glue in said reservoir.

12. Apparatus for applying glue to a surface comprising a source of glue, a glue reservoir, a conduit extending between said source and said reservoir and having a separable connection therein adjacent the reservoir, a first roller mounted for rotation within the reservoir and having its bottom portion normally contacting the glue and its top portion normally contacting a surface passing thereover, a first shaft upon which said first roller is mounted with said shaft extending beyond one wall of said reservoir, a second roller mounted for rotation in said reservoir and arranged above the glue level with its surface contacting that of the first roller, a second shaft upon which said second roller is mounted with said shaft extending beyond one wall of said reservoir, driving means operably connected to the outer end of said first shaft for rotating the shaft and the first roller, driving means operably connected to the outer end of said second shaft for rotating the shaft and the second roller, a support upon which the reservoir rests by gravity only, and operating means located adjacent said reservoir and engageable with the driving means of the first and second shafts when the reservoir is on the support for operating said driving means, said operating means being automatically disengaged from the driving means when the reservoir is lifted from its support.

13. Apparatus for applying glue to a surface comprising a source of glue, a glue reservoir, a conduit extending between said source and said reservoir and having a separable connection therein adjacent the reservoir, a first roller mounted for rotation within the reservoir and having its bottom portion normally contacting the glue and its top portion normally contacting a surface passing thereover, a first shaft upon which said first roller is mounted with said shaft extending beyond one wall of said reservoir, a second roller mounted for rotation in said reservoir and arranged above the glue level with its surface contacting that of the first roller, a second shaft upon which said second roller is mounted with said shaft extending beyond one wall of said reservoir, a first gear on the outer end of said first shaft, a second gear on the outer end of said second shaft, a support upon which the reservoir rests by gravity only, and a driving gear located adjacent the reservoir and operably connected to the first and second gears when the reservoir is on the support.

14. Apparatus of claim 13 wherein the surface of the first roller is provided with a circumferential groove, and the surface of the second roller is provided with a raised portion for engagement with said groove, said raised portion extending into said groove at all times to a point beneath the top surface thereof.

15. In a packaging machine for forming paper boxes or the like wherein a box is moved along a path through the machine with at least one flap in glue receiving position, means for applying glue to said flap comprising a glue reservoir adjacent said path, means associated with said reservoir to receive glue therefrom and transfer the glue to said flap, a glue pan, a conduit leading from said pan to the reservoir, an inverted container with its opening spaced from the bottom of the pan, a support for said container, an arm rotatably attached to said support, holding means on said arm for releasably holding said container on said support, and spring means normally urging said holding means into holding position.

16. In a packaging machine for forming paper boxes or the like wherein a box is moved along a path through the machine with at least one flap in glue receiving position, a glue reservoir adjacent said path, means associated with said reservoir to receive glue therefrom and transfer the glue to said flap, a glue pan, a conduit leading from said pan to the reservoir, a support adjacent said pan for supporting a container in inverted substantially vertical position in said pan, said support contacting one side only of said container, a pair of arms rotatably fastened to said support and located on opposite sides of said container and carrying a cross-member for bearing against the container to hold it against the support, and spring means normally urging the cross-member against the container.

MORRIS P. NEAL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
704,434	Chevalier et al. -----	July 8, 1902
1,101,200	Leister et al. -----	June 23, 1914
1,277,928	Helson -----	Sept. 3, 1918
10 1,350,789	Delany et al. -----	Aug. 24, 1920
1,471,924	Saylor et al. -----	Oct. 23, 1923
1,618,631	Becker -----	Feb. 22, 1927
1,737,111	Desautels -----	Nov. 26, 1929
15 1,776,529	Weinerth -----	Sept. 23, 1930
1,844,661	Kimball -----	Feb. 9, 1932
1,943,322	Johnson -----	Jan. 16, 1934
2,160,008	Van Buren -----	May 30, 1939
2,352,149	Gautier -----	June 20, 1944
2,352,150	Gautier -----	June 20, 1944