Oct. 23, 1951 M. P. NEAL 2,572,047

GLUE SUPPLY MEANS FOR PACKAGING MACHINES

Filed July 1, 1947 6 Sheets-Sheet 1

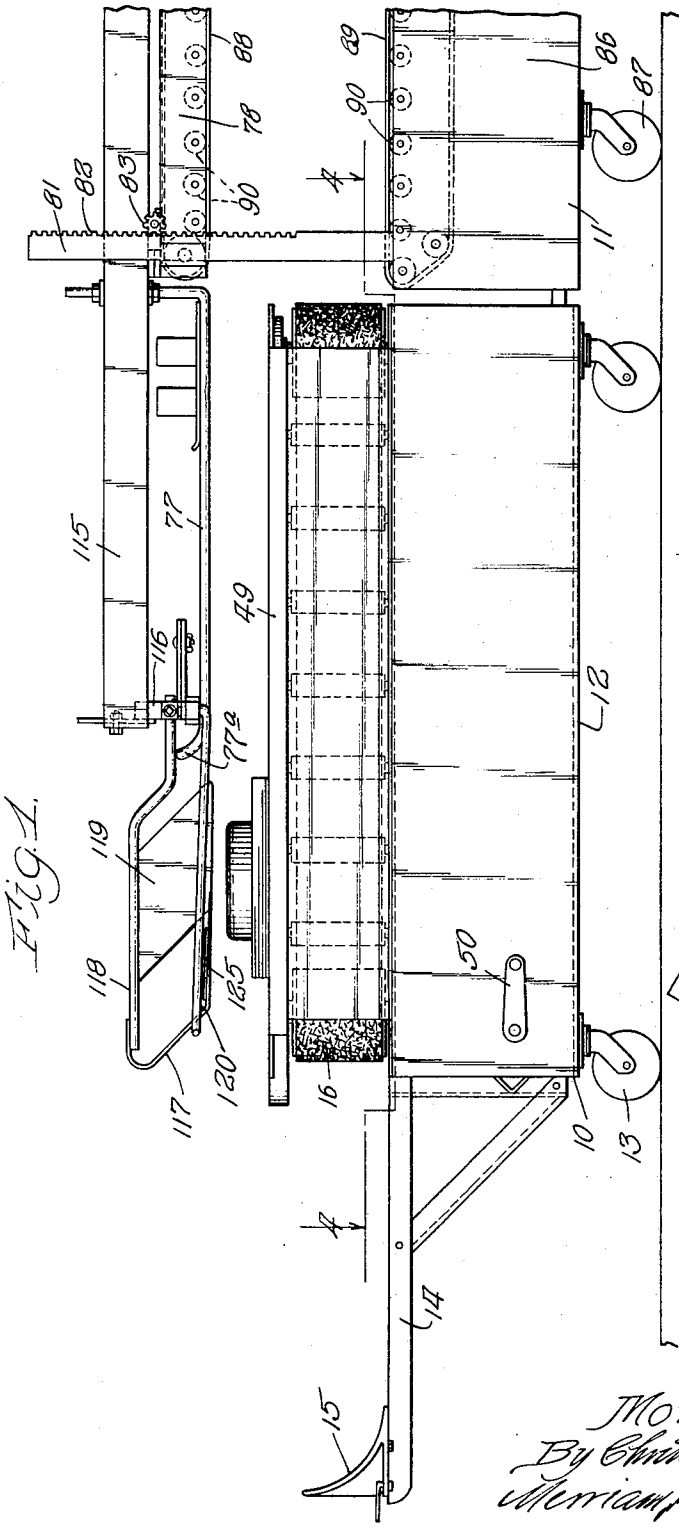


Fig. 1.

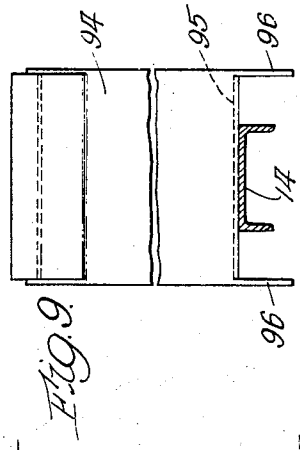


Fig. 9.

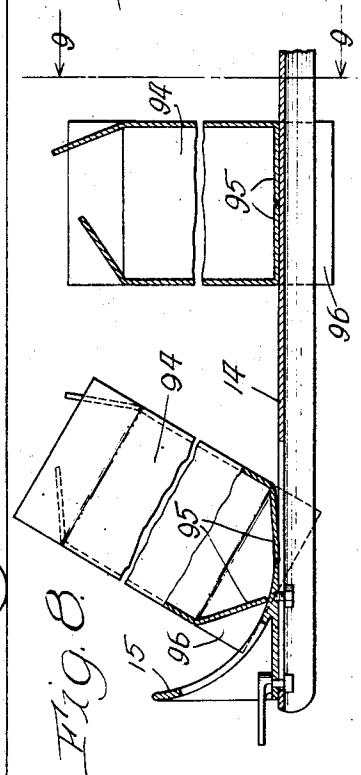


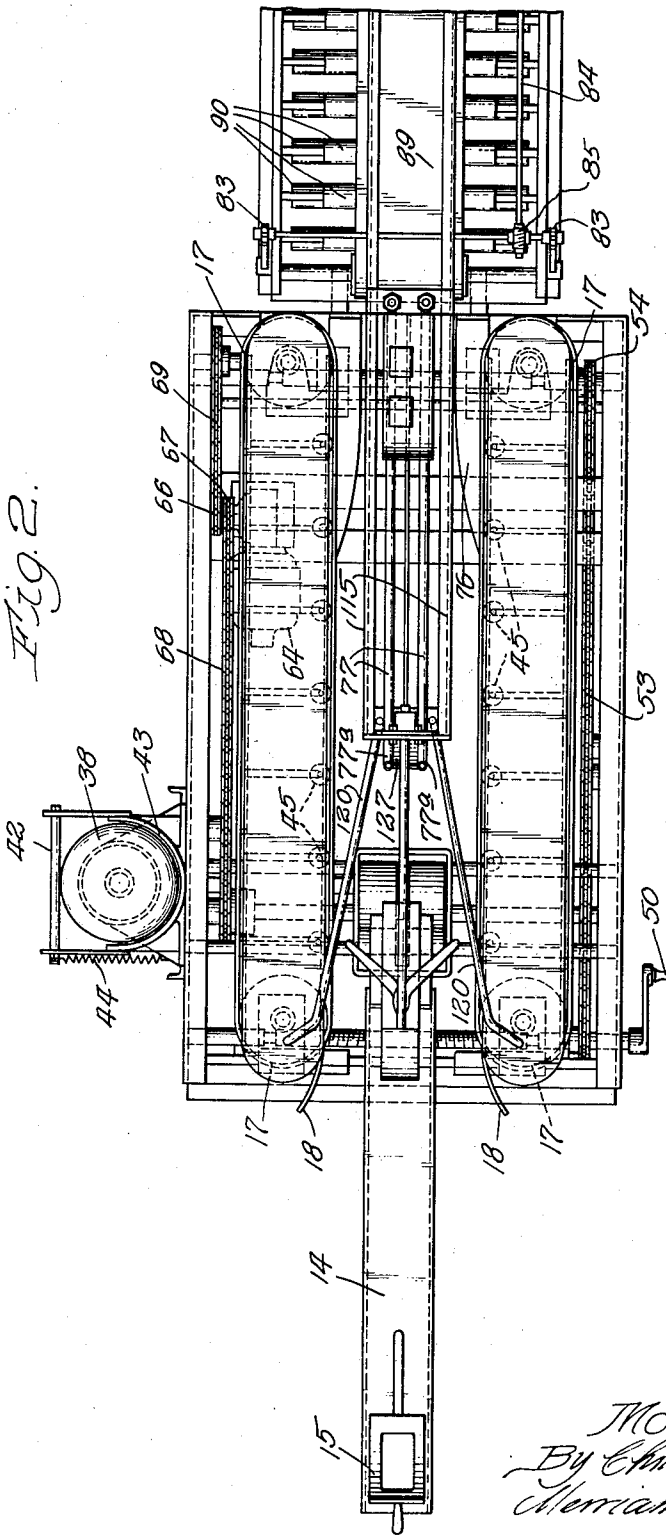
Fig. 8.

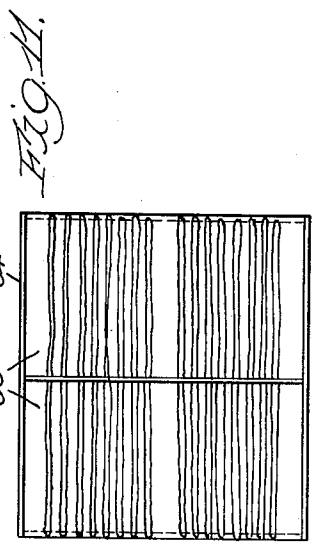
Inventor:
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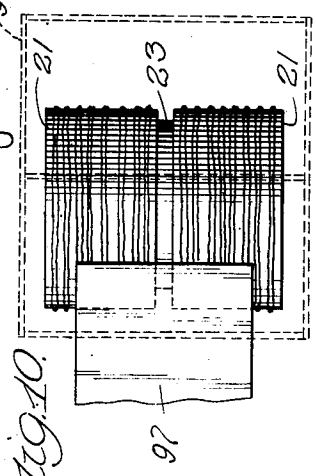
Oct. 23, 1951 M. P. NEAL 2,572,047

GLUE SUPPLY MEANS FOR PACKAGING MACHINES

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GLUE SUPPLY MEANS FOR PACKAGING MACHINES

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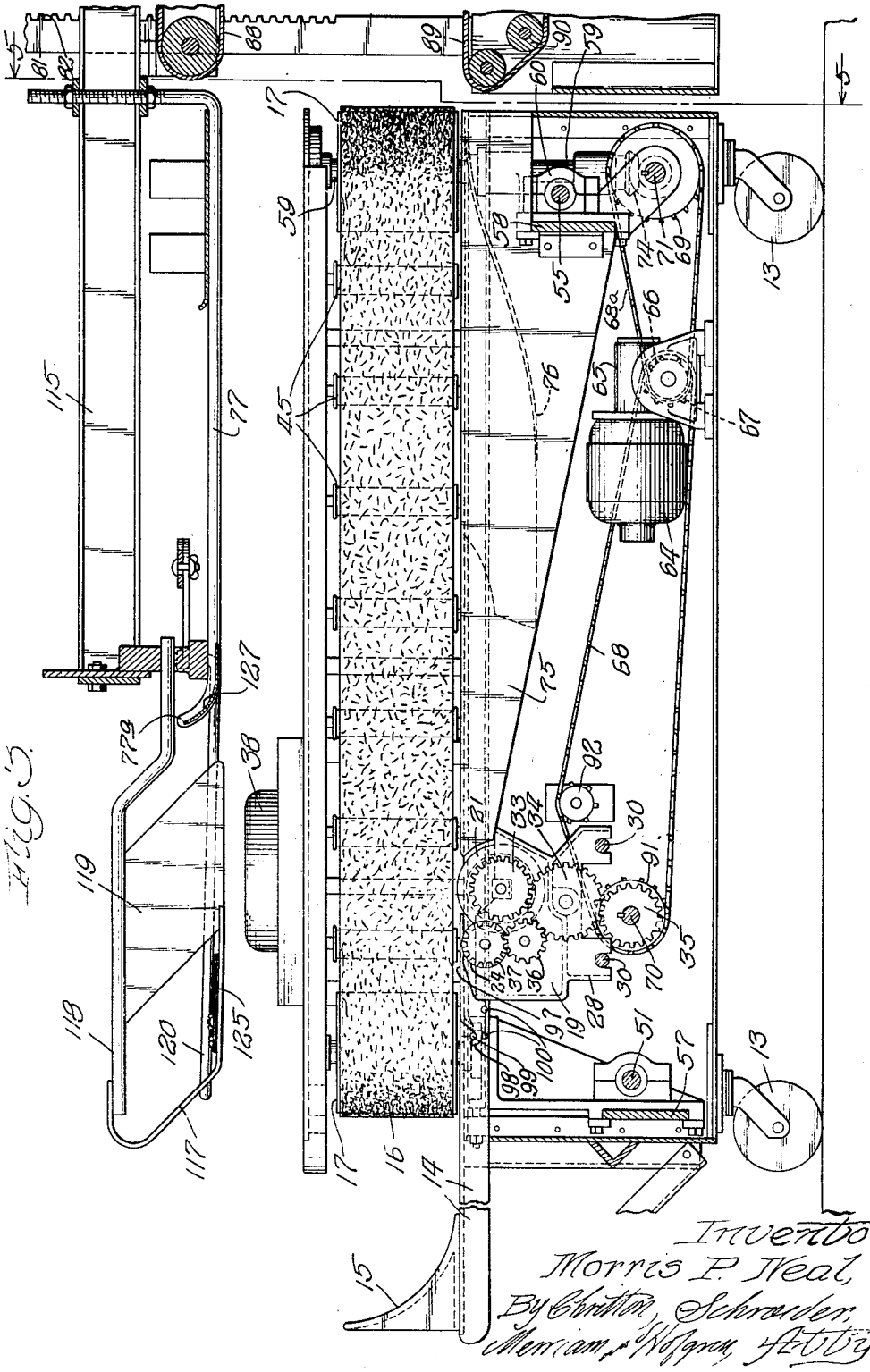


Fig. 3.

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GLUE SUPPLY MEANS FOR PACKAGING MACHINES

Filed July 1, 1947 6 Sheets-Sheet 4

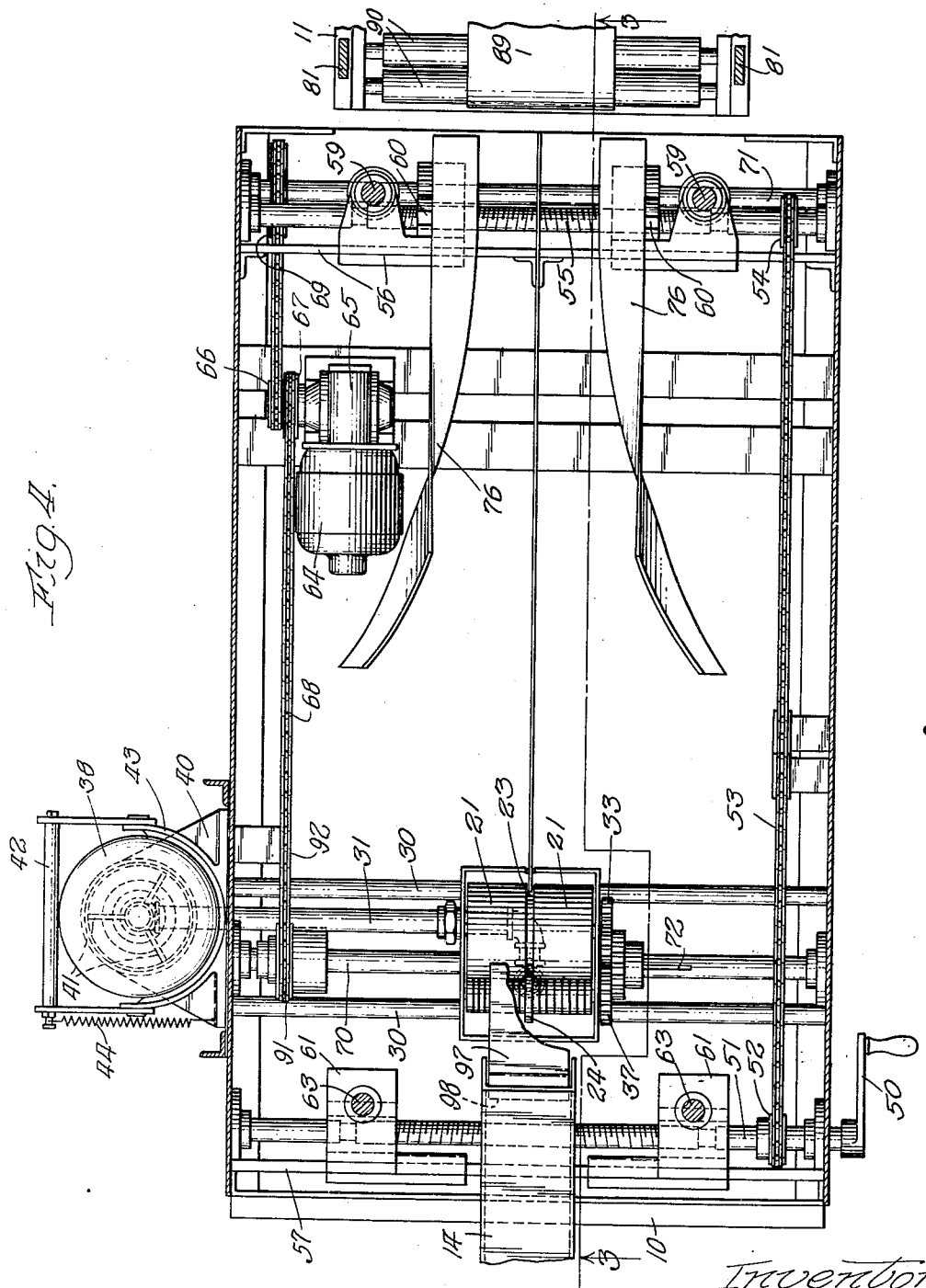


Fig. 4.

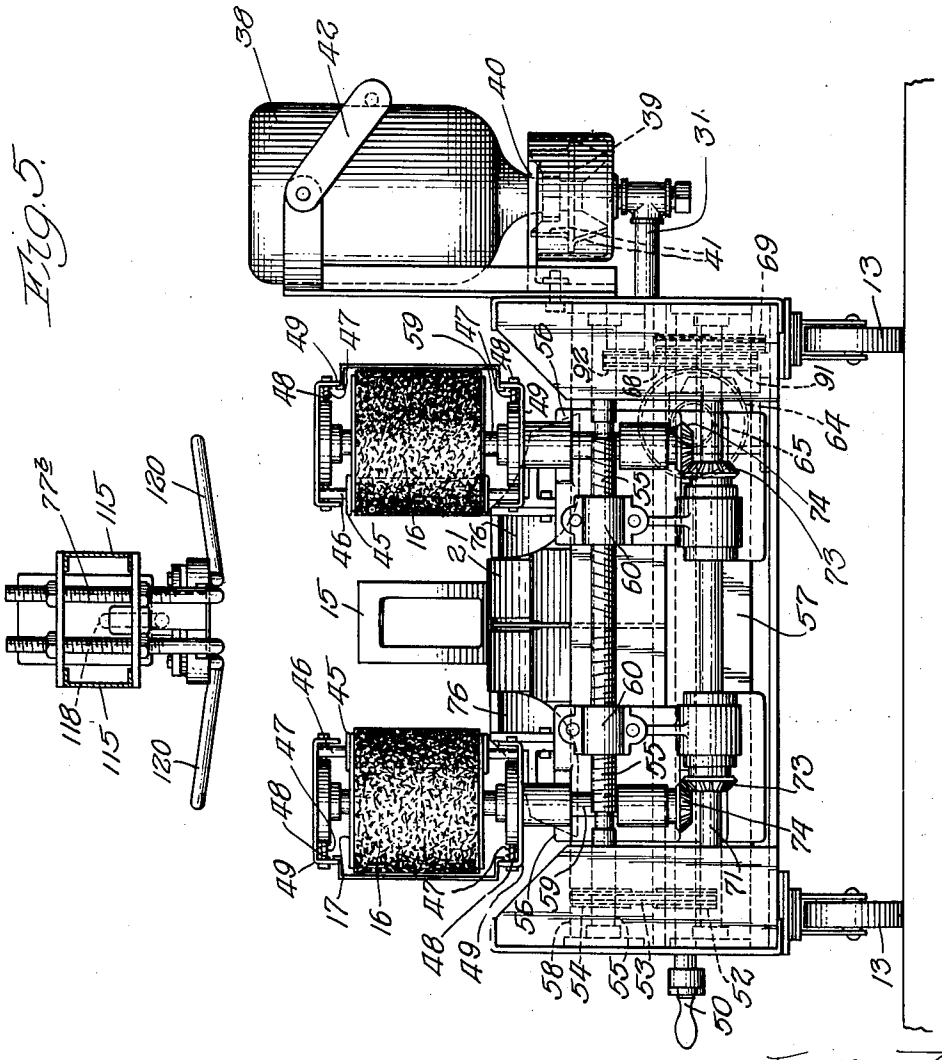
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Oct. 23, 1951 M. P. NEAL 2,572,047

GLUE SUPPLY MEANS FOR PACKAGING MACHINES

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Fig. 5.



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GLUE SUPPLY MEANS FOR PACKAGING MACHINES

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Fig. 7.

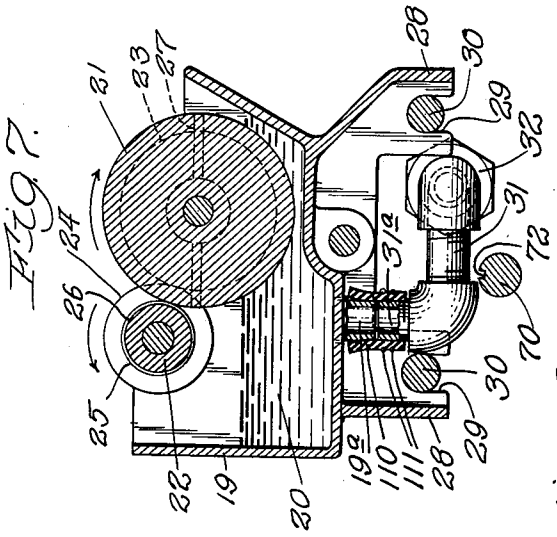


Fig. 13.

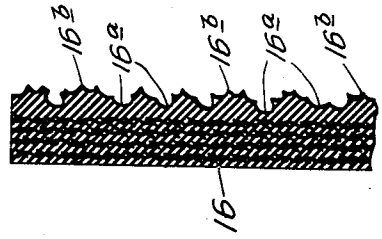


Fig. 12.

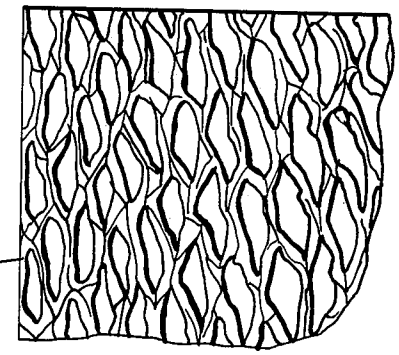
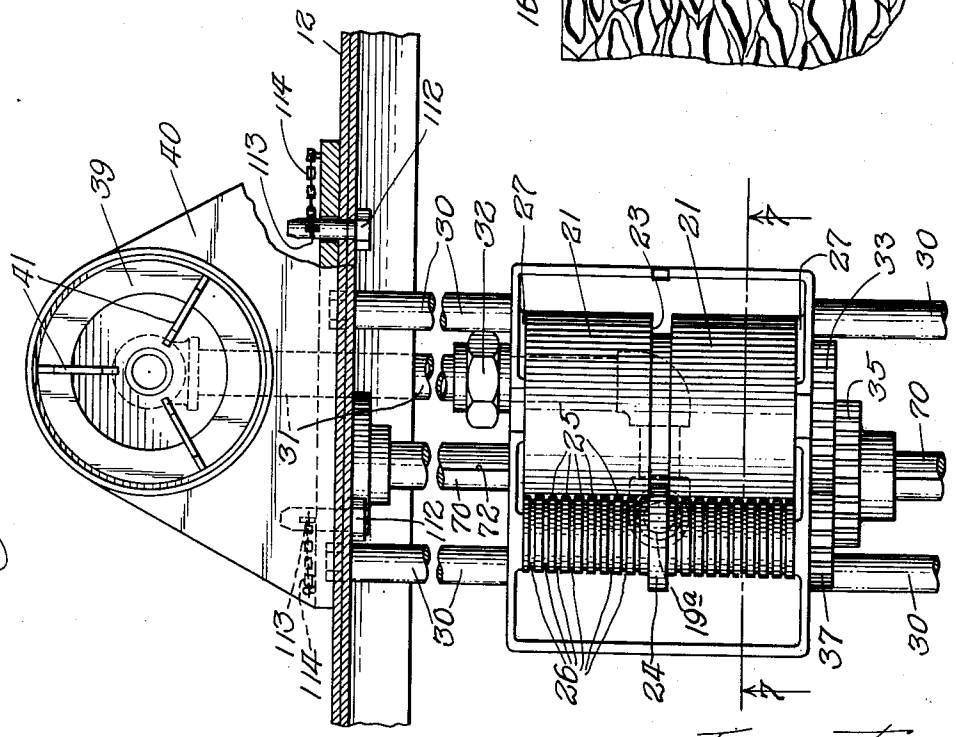


Fig. 6.



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Patented Oct. 23, 1951

2,572,047

UNITED STATES PATENT OFFICE

2,572,047

GLUE SUPPLY MEANS FOR PACKAGING MACHINES

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

Application July 1, 1947, Serial No. 758,418

2 Claims. (Cl. 91—18)

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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 likewise includes an improved belt for forcing the boxes through the machine. As in the ordinary installation, the boxes are forced through the machine empty and as they are quite light in weight, it was found necessary to provide belts having extremely rough surfaces so that they would not slip on the boxes. Each belt is provided with a surface of rubbery material having relatively deep, sharp-edged, roughly formed indentations therein. Also, improved means have been provided for readily assembling and disassembling the glue container and conduit and improved means have been provided for folding the top ears of the boxes and holding the boxes against the glue applying means.

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The invention will be described as related to the embodiment shown in the accompanying drawings. Of the drawings, Fig. 1 is an elevation of a packaging machine embodying the invention; Fig. 2 is a plan view of the machine; Fig. 3 is a vertical section taken along line 3—3 of Fig. 4; Fig. 4 is a horizontal section taken along line 4—4 of Fig. 1; Fig. 5 is a vertical section taken along line 5—5 of Fig. 3; Fig. 6 is a plan view showing the glue applying apparatus; Fig. 7 is a vertical section taken along line 7—7 of Fig. 6; Fig. 8 is a vertical section through the front shaping member of the machine illustrating how the bottom inner ears of a box are folded preparatory to applying glue thereto; Fig. 9 is a vertical section taken along line 9—9 of Fig. 8; Fig. 10 is a plan view showing the glue applying roller; Fig. 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; Fig. 12 is an enlarged sectional elevation of a portion of one belt used in forcing the boxes through the machine; and Fig. 13 is a section through the belt of Fig. 12.

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 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.

Each belt 16 is provided with a rubber surface with this surface having deep indentations 16a therein so as to provide sharp, rough-edged projections 16b on the surface of the belt that is adapted to engage the sides of the boxes. It was found that ordinary belts slipped against the sides of the boxes as the boxes are ordinarily put through the machine empty. The present improved belt avoids this slipping.

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 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. The reservoir 19, with attached gears 33, 34, 36 and 37, may be easily 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 permits regulating the effective length of the conduit 31.

The glue supply conduit 31 leading to a point beneath the glue reservoir 19 is provided with an upwardly extending annular portion 31a beneath the reservoir. The bottom of the reservoir is provided with a downwardly extending annular portion 19a that is adapted to be aligned directly above the annular portion 31a. Mounted on the annular portion 31a there is provided a rubber collar 110 attached to the portion 31a as by wire rings 111. The collar 110 is adapted to telescopically receive the annular portion 19a on the bottom of the glue reservoir 19. Due to the resiliency of the rubber collar, it forms a seal with both annular portions 19a and 31a. With this arrangement there are no unions to unscrew as the glue conduit to the reservoir 19 may be assembled by merely placing the reservoir on the parallel bars 30 and at the same time inserting the extension 19a into the collar 110 as is shown in Fig. 7. When it is necessary to clean the reservoir and the conduit any adhesion between the extension 19a and the collar 110 may be easily broken by manipulating the flexible rubber collar 110.

The gear 35 which drives the rollers 21 and 22 is mounted on a shaft 70. This shaft is driven by a sprocket 91 which is in turn driven by a chain 68 passing over an idler sprocket 92 and to a sprocket 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 the 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 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.

The bracket 40 which supports the bottle 38 is removably mounted on the outside of the framework 12 of the machine. This support is maintained by having a pair of pins 112 extending through openings in the framework 12 and in the bracket 40 as is shown in Fig. 6. Each of these pins 112 is provided near its outer end with a hole adapted to receive a smaller pin 113, as is shown in Fig. 6. Each pin 113 is preferably attached to the bracket 40 by means of a chain 114 or similar flexible attachment so that the pin 113 will be handy when needed. With this arrangement, the bracket 40 is firmly held against the framework 12, but may be easily removed by merely withdrawing the small pins 113 from

their holes in the large pins 112. The bracket 40 may be just as easily replaced against the side of the framework once it has been removed.

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 sprocket 52 is mounted on this rod, near the crank, and this sprocket carries a chain 53, passing to the rear of the machine and over another sprocket 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 toward 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 sprockets 66 and 67, with drive chains 68 and 68a 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 is operated by a sprocket 91 that is engaged by chain 68 and the second drive shaft 71 is operated by a sprocket 69 that is engaged by chain 68a. 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 glue surfaces of the inner ears.

In order to hold the boxes against the glue applying means as each box travels through the machine, there are provided between the belts 16, but placed above them, two parallel rods 77. These rods, as shown in Fig. 2, extend from the rear of the machine to a point just beyond the center of the machine. The rods have their front ends 77a curved upwardly. The rods are held in a framework 115 which is attached to the top conveyor portion 78 of the rear conveyor machine 11. The framework 115 is located above the rods 77 and extends back above the conveyor portion 78 with this conveyor portion also being mounted on the framework 115. The rods have their rear ends 77b extending upwardly and bolted to framework 115. The front ends of the rods immediately behind the upwardly curved portion 77a are attached to the front end of the framework 115 by means of a bracket 116.

In order to fold the front top inner end of the box into the plane of the top of the box, there is provided a plate 117 sloped downwardly and inwardly, as shown in Fig. 1. This plate has its top edge attached to a rod support 118 which in turn is attached to the bracket 116 that extends between the rods 77 and the framework 115. The bottom edge of the sloped plate 117 extends back and is attached to a vertical plate 119 which is in turn attached to the rod support 118. This vertical plate 119 gives rigidity to the structure and also serves to hold the inner flaps on the top of the box in the plane of the top of the box. This plane is adapted to be located between the adjacent edges of the outer top flaps of the box when they have been turned into the plane of the top of the box.

The outer flaps of the box are turned into the plane of the top of the box by means of a pair of rod members 120 also attached to the bracket 116 that supports the parallel rods 77. These rod members 120 are arranged in a single plane and have the inner ends adjacent each other as can be seen in Fig. 2. As a box is moved into the machine, these rod members 120 engage the outer top flaps of the box and fold them over into the plane of the top of the box. With this arrangement, the top inner flaps are folded over into the plane of the box and the outer flaps are folded over on top of the inner flaps by the time the box reaches the parallel rods 77.

In order to move the rods 77 and the top conveyor portion 78 of the rear conveyor machine 11 up and down to accommodate boxes of different sizes, there are provided vertical bars 81 mounted on the rear conveyor machine 11. These bars are provided with toothed edges forming racks 82. A small pinion gear 83 meshes with each rack with these pinion gears being mounted on the top conveyor portion 78. The pinion gears 83 are operated by means of a rod 84 which is provided with a worm gear 85. The worm gear

causes rotation of the pinion gears 83 on rotation of the rod 84.

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 longitudinal 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.

There is provided on the rear portion of the sloped plate 117 an adjustable V-shaped member 125 with the point of the V extending toward the rear of the machine. The sides of the V extend toward but are spaced from the rod members 120. This V-shaped member 125 holds the outside edges of the inner flaps down as the top flaps are folded over by rod members 120 into the plane of the top of the box. The vertical plate 119 prevents the top flaps from overlapping and also aids in holding the inner flaps down.

The front ends 77a of the parallel rods 77 are provided with a plate member 127 attached thereto. This aids in guiding the inner flaps under the rods 77.

When a box is moved along the base member 14, the sloped plate member 117 folds the front inner top flap into the plane of the top of the box. The rear top inner flap is pushed down by band so that it also will be held down by the approximately horizontal portion of the plate member 117.

Certain features of the machine which is the subject of this invention are described and claimed in my copending application Serial No. 622,354, filed October 15, 1945, now Patent No. 2,547,963.

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. In a packaging machine for forming paper boxes and the like, apparatus comprising a glue receptacle, a removable glue reservoir, a conduit for conducting glue from the receptacle to the reservoir including a rigidly mounted conduit portion having its inner end extending upwardly and adjacent the bottom of the reservoir, a short downwardly extending second conduit portion on the reservoir aligned with said upwardly extending end of the rigid conduit portion, a flexible connector sleeve joining the adjacent ends of said conduit portions when the removable reservoir is placed in position in said machine, said sleeve being attached to one of said end portions and slidably receiving the other end portion, and means for guiding the movement of said reservoir in the machine so that said ends of the conduit portions are automatically aligned and the slidably-received end of said other conduit portion is automatically introduced into said flexible connector sleeve to make sealing engagement therewith.

2. The packaging machine of claim 1 wherein said flexible connector sleeve comprises a rubber collar attached to the upwardly extending end of said rigid conduit portion and receiving said second conduit portion.

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