

[54] **CARTON FEED MECHANISM FOR SPOUT INSERTING MACHINE**

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[57] **ABSTRACT**

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Combined with a magazine from which flat-folded carton blanks are advanced step-by-step, is a machine for withdrawing the leading blank from the magazine and erecting the blank into a carton body between juxtaposed conveyor elements which carry the carton bodies in succession past a predetermined station at which a pouring spout is inserted into a wall of each carton body. The machine is readily adaptable to handle different cartons and for use with magazines in different relations to the machine.

[21] Appl. No.: **119,539**

[52] U.S. Cl.93/53 R

[51] Int. Cl.B31b 1/76

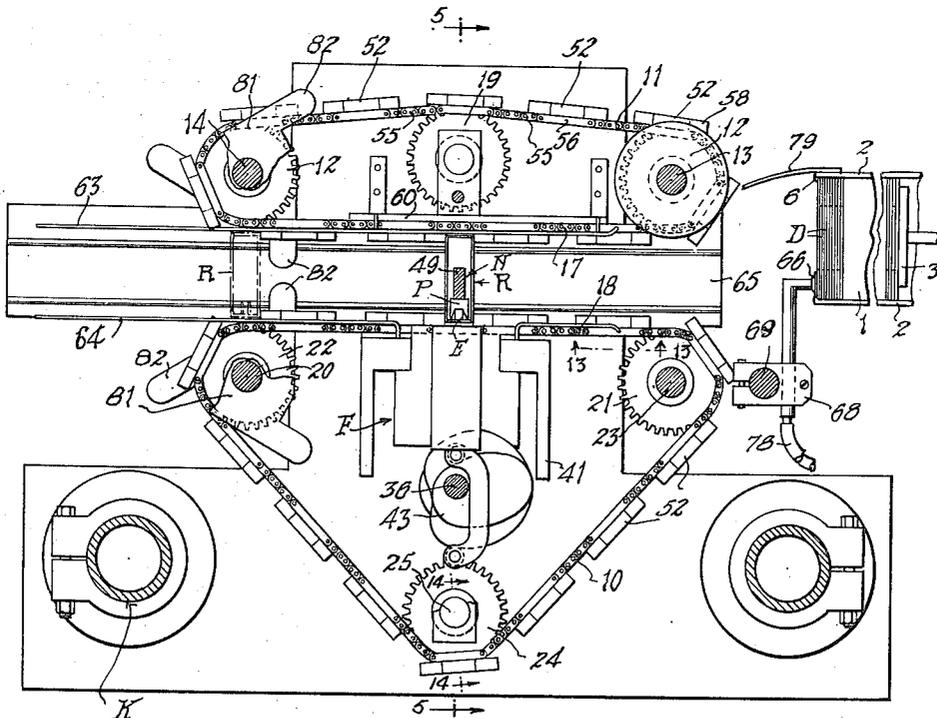
[58] Field of Search93/53 SD, 53 R

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6 Claims, 18 Drawing Figures



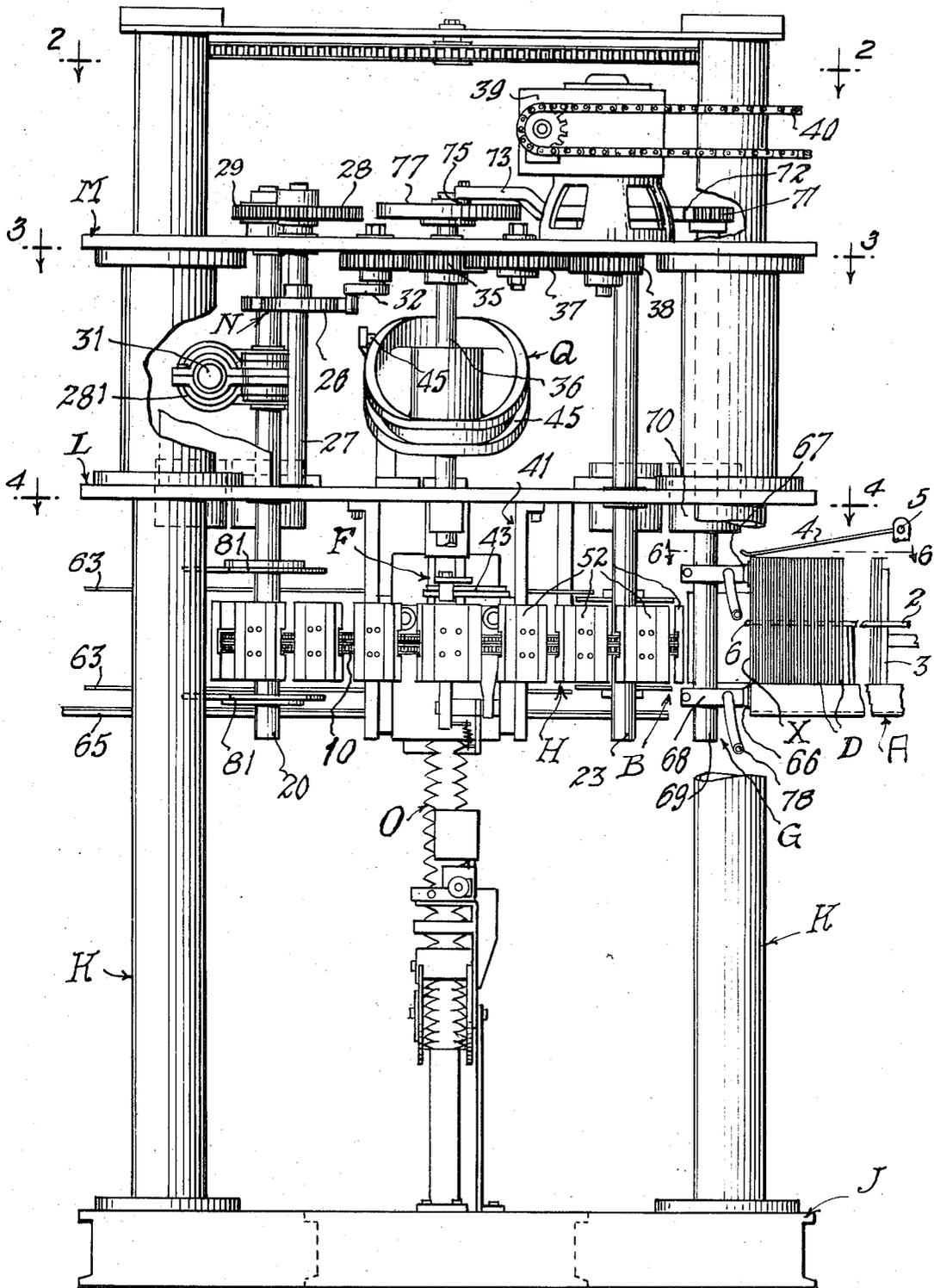


Fig. 1.

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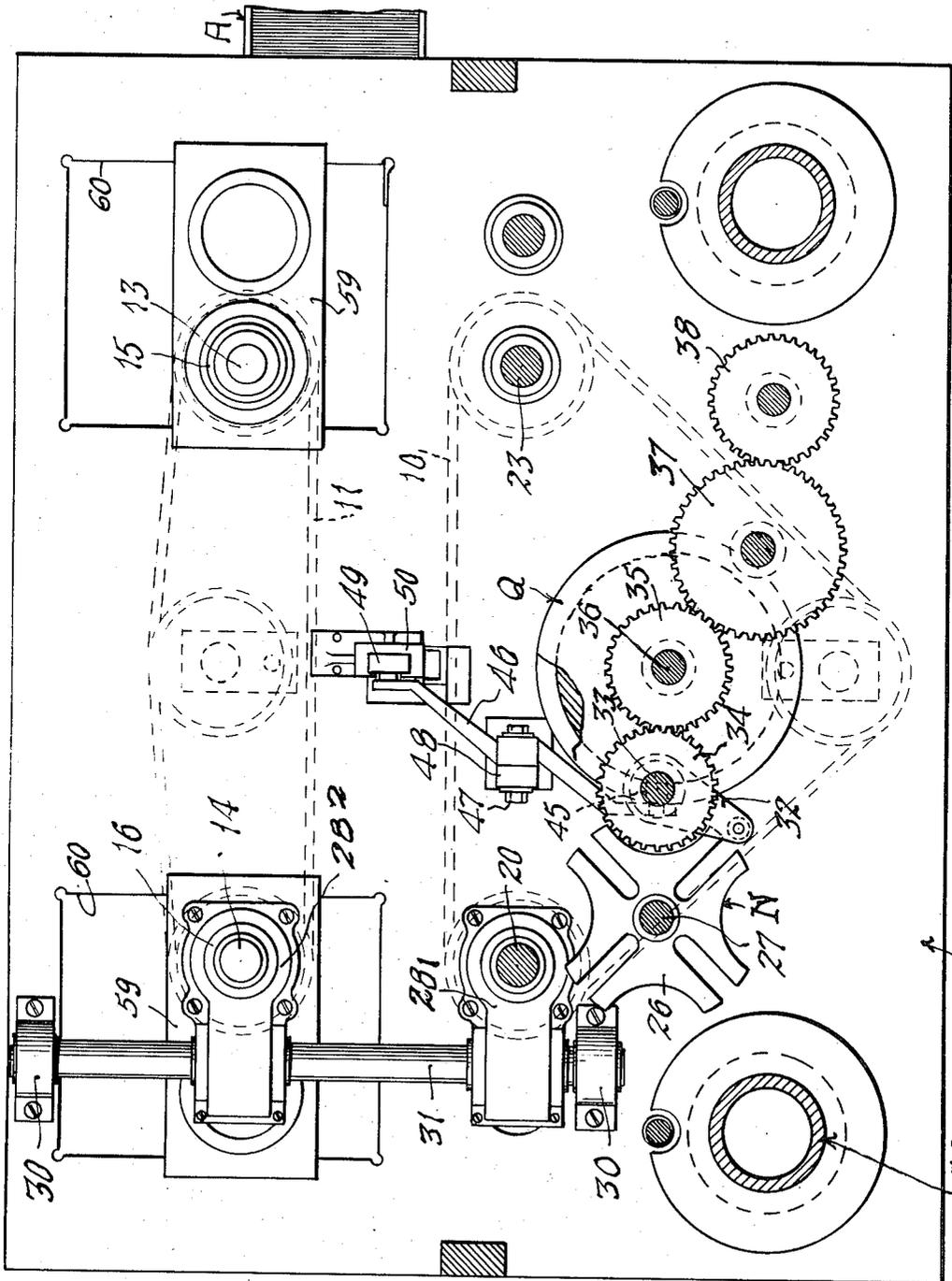
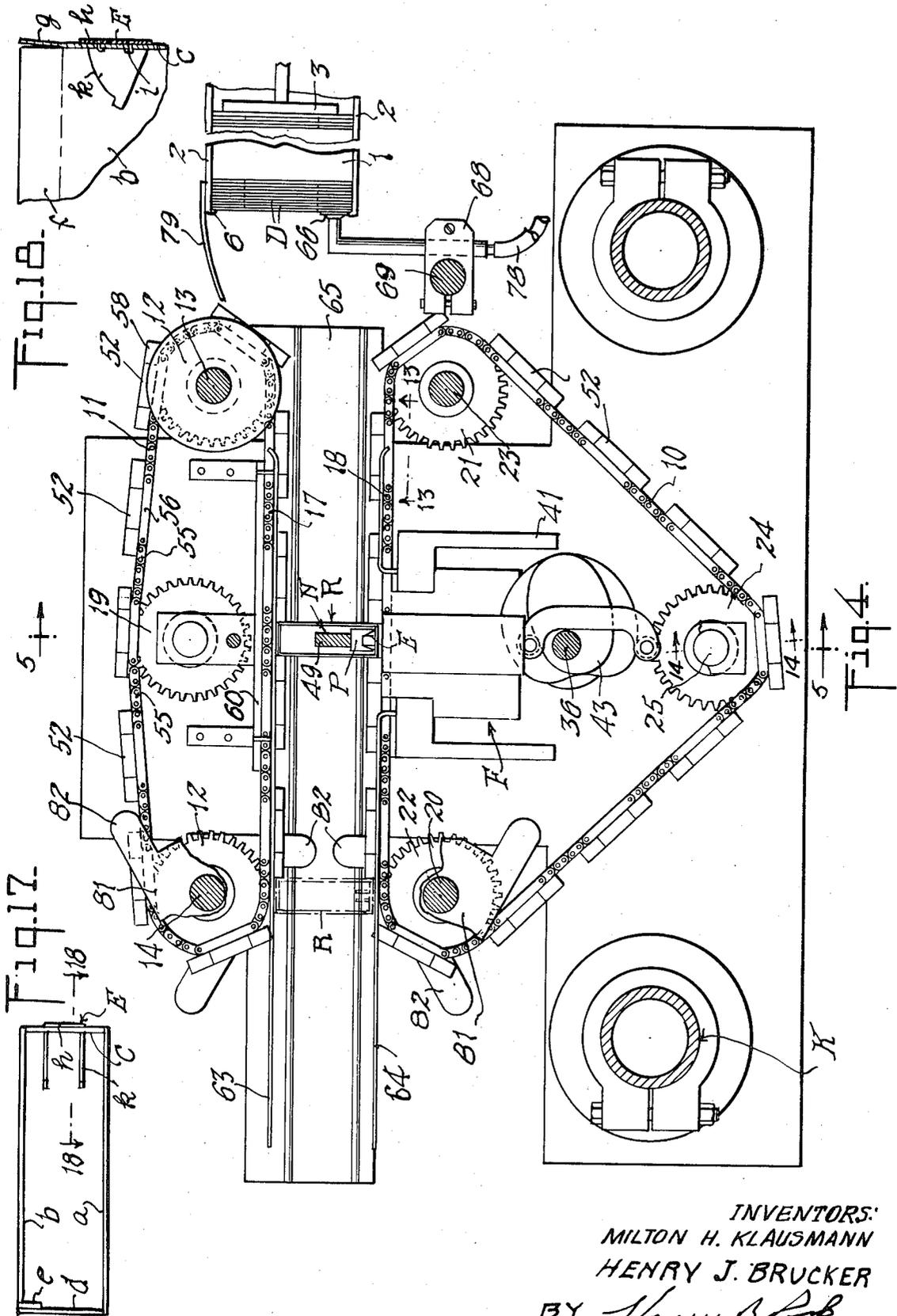


Fig. 3.

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Figs. 5.

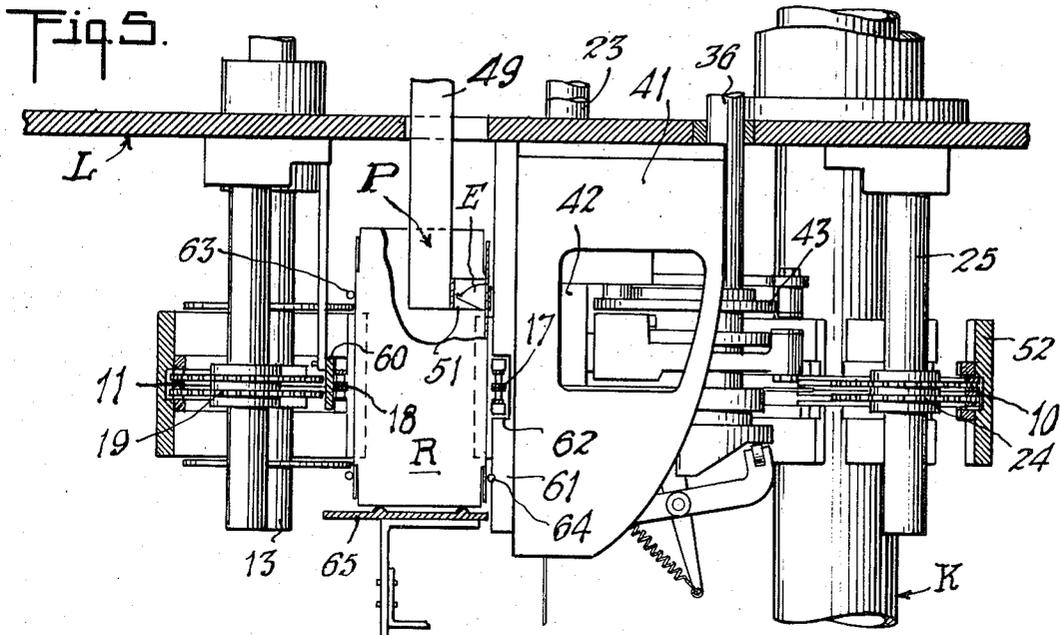


Fig. 6.

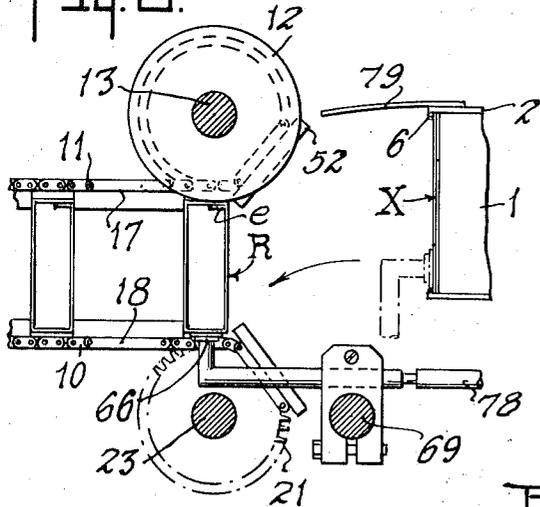


Fig. 8.

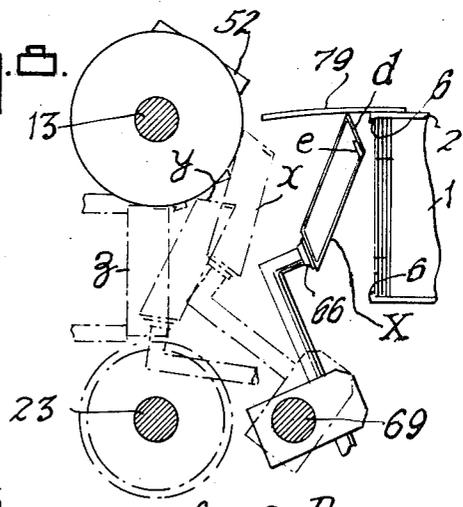


Fig. 7.

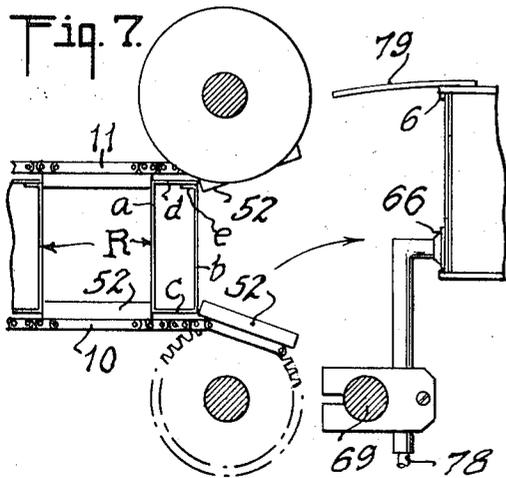


Fig. 15.

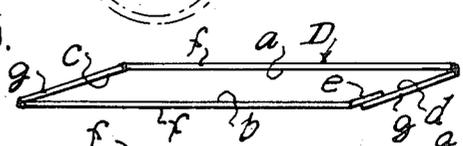
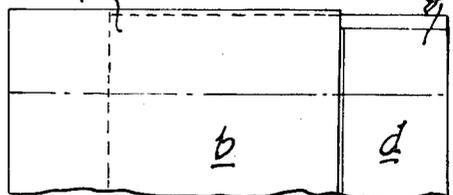


Fig. 16



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Fig. 9.

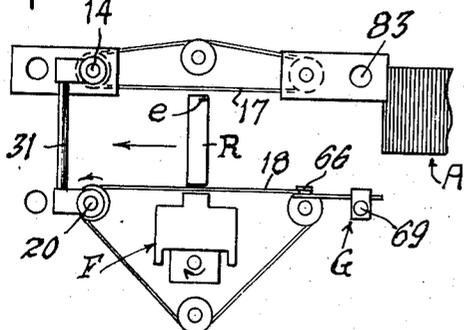


Fig. 10.

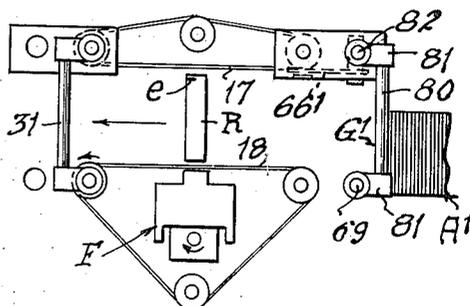


Fig. 11.

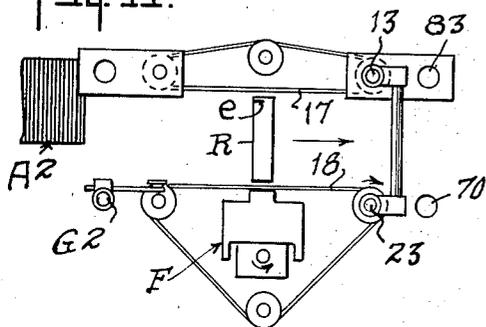


Fig. 12.

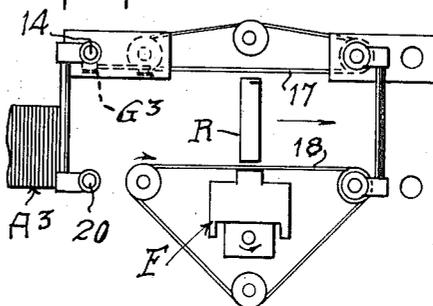


Fig. 13.

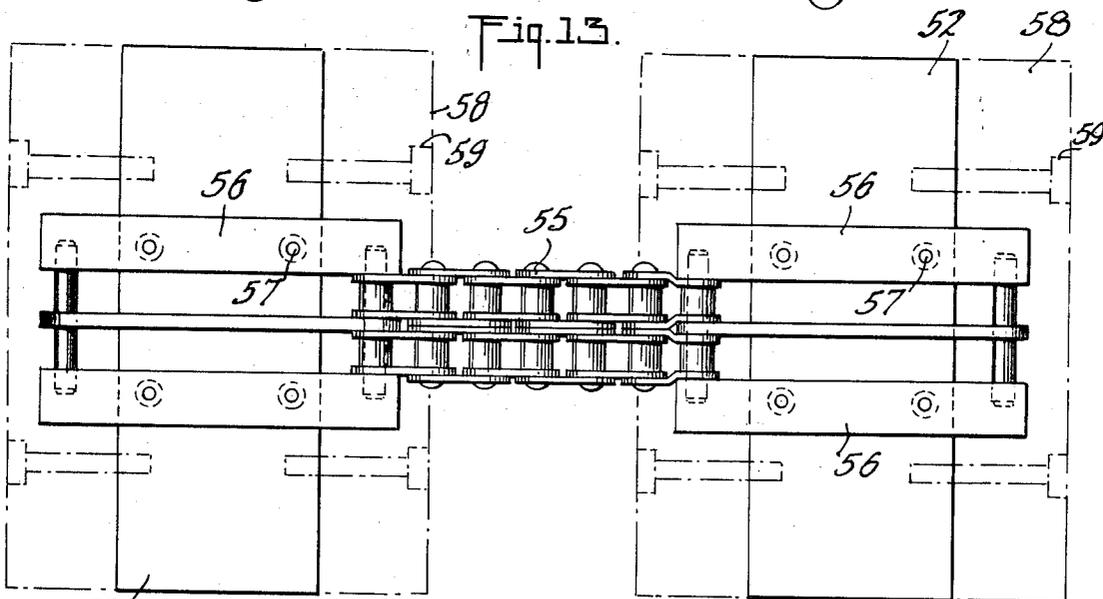
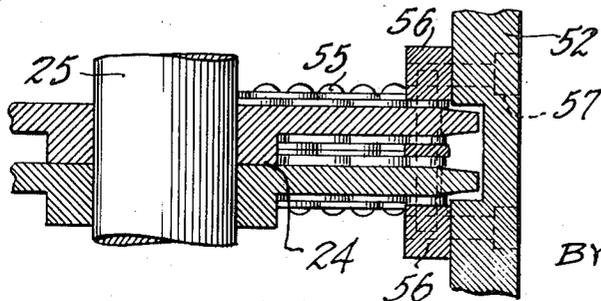


Fig. 14.



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CARTON FEED MECHANISM FOR SPOUT INSERTING MACHINE

BACKGROUND OF THE INVENTION

1. The Field of the Invention

The invention relates a machine for removing cartons from a carton magazine, conveying them in succession to a mechanism which inserts a spout into a wall of each carton and then discharging the carton to a filling machine.

2. The Prior Art

In most of the prior art machines the cartons are moved in set-up or erected condition with one end open in file formation from a magazine to a spout-inserting mechanism and thence to a filling machine.

Such machines leave much to be desired because they are costly and require an excessive amount of space, and the cartons must be set-up or erected from flat-folded blank condition before they are placed in the magazine which requires a separate operation.

SUMMARY OF THE INVENTION

A primary object of the invention is to provide a machine which overcomes the objections to and disadvantages of prior machines and which is relatively inexpensive, occupies a small space, and in which the flat folded blanks are stored in file formation in the magazine and are automatically unfolded and erected into cartons with their end flaps open during their movement from the magazine to the spout-inserting mechanism, thereby eliminating the separate erecting operation of the prior art.

Another object is to provide in such a machine novel and improved means for withdrawing the folded carton blanks and for automatically unfolding or erecting the blanks into cartons and conveying the cartons to the spout inserting machine.

The invention also contemplates a novel construction and combination of two endless chains each having a reach in horizontally spaced relation to a reach of the other chain and each chain having spaced blocks to receive a carton between them, and means coacting with said chains and blocks for first removing the folded blanks from the magazine and then unfolding and erecting the blanks into cartons between said blocks.

Cartons are made of different sizes and with the sealed seam at different locations with respect to the walls and the printing on the carton walls, and the spouts are preferably inserted at wall spaced from said seam and in predetermined relation to the printing; and the invention contemplates a machine adaptable to use with such different cartons which require magazines in different relations to the machine of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a rear elevational view of a carton feed mechanism for spout inserting machine embodying the invention;

FIG. 2 is a top plan view with portions broken away on the plane of the line 2—2 of FIG. 1;

FIG. 3 is a horizontal sectional view on the plane of the line 3—3 of FIG. 1;

FIG. 4 is a horizontal sectional view on the plane of the line 4—4 of FIG. 1;

FIG. 5 is a transverse vertical sectional view approximately on the plane of the line 5—5 of FIG. 4;

FIG. 6 is a schematic fragmentary top plan view of the mechanism for transferring the cartons from the magazine to the conveyor approximately from the plane of the line 6—6 of FIG. 4 and illustrating a carton erected between the conveyor chains;

FIG. 7 is a similar view showing the next step in the operation of the mechanism;

FIG. 8 is a similar view showing the transfer of the carton from the magazine to the conveyor chains;

FIGS. 9 and 10 are schematic plan views of the machine as shown in FIG. 4, illustrating the arrangement of the machine parts to handle cartons having their glued seams in different relations to the walls of the cartons, respectively;

FIGS. 11 and 12 are views similar to FIGS. 9 and 10, respectively but showing the parts in the positions required when the magazines are at the side of the machine opposite that shown in FIG. 9;

FIG. 13 is a greatly enlarged fragmentary rear elevation of one of the conveyor chains and two of the carton pusher blocks viewed from approximately the plane of the line 13—13 of FIG. 4;

FIG. 14 is an enlarged fragmentary vertical sectional view approximately on the plane of the line 14—14 of FIG. 4;

FIG. 15 is an enlarged end view of a carton blank partially unfolded;

FIG. 16 is a fragmentary side elevation thereof;

FIG. 17 is a top end view of an erected carton body and a pouring spout therein, and

FIG. 18 is a fragmentary vertical sectional view on the plane of the line 18—18 of FIG. 17.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention contemplates a novel combination of a magazine A for blanks of cartons having four rectangular walls hingedly connected together and flat-folded into mutually abutting file formation and including means for advancing the blanks step-by-step to the discharge end of the magazine, means B for withdrawing the leading folded carton blank from the magazine and simultaneously unfolding and erecting or setting up the blank to dispose the adjacent hingedly connected walls in perpendicular relation to each other and thereby form a carton body and conveying the erected carton bodies in succession step-by-step with alternate periods of movement and rest past a predetermined point or station, and a spout-inserting mechanism F disposed at said predetermined point for inserting a pouring spout into one wall of each carton body during a period of rest of the carton at said point.

For the purpose of illustrating the principles of the invention, we have shown a carton formed of one sheet of cardboard D scored and folded to provide two opposed wide side walls *a* and *b* and two opposed relatively narrow side walls *c* and *d*, one end of the strip having a sealing flap *e* on one wide wall adhesively connected to one of the narrow walls. At the ends of the wide walls and the narrow walls are the respective end or closure flaps *f* and *g*. The blanks are initially flat-folded and arranged in mutually abutting file formation in the magazine A as shown in FIG. 1. The folded blanks are

advanced step-by-step by any suitable mechanism which forms no part of the present invention but which is shown as comprising a horizontal chute-like bottom portion 1 on which are mounted guide rods 2 between which the blanks are vertically disposed and slidable by a pusher plate 3 which is moved step-by-step by suitable means (not shown) to advance the blanks, preferably one at a time. Movement of the leading blank is momentarily interrupted by a detent rod 4 pivotally mounted at one end at 5 with its other end frictionally resting on the upper edge of the leading blank, and by abutment of the blank against round protuberances 6 on the ends of the guide rods 2.

In accordance with the invention, a known type of pouring spout E is inserted by any suitable spout-inserting mechanism F into one of the narrow walls of the erected carton body as shown by FIGS. 4, 5, 17, and 18. The spout has a body portion *h*, prongs *i* on the body portion to penetrate and be clinched upon a predetermined portion of said carton wall, and wing or flanges *k* which are pushed through said wall to slidably engage the edges of the pouring opening as the spout is swung from closed to open position on said predetermined wall portion which serves as a hinge.

To effect the insertion of the spout into the carton, the leading folded blank X is withdrawn by suction-cup mechanism G from behind the stop protuberances 6 and the pivoted rod 4 at the discharge end of the magazine and simultaneously unfolded and transferred to a conveyor mechanism H on which the blank is erected or set-up into a carton body and moved step-by-step with alternate periods of movement and rest to a predetermined point or station at which is located the spout-inserting mechanism F which inserts a spout into a wall of the carton during a period of rest of the carton at said point.

The carton-withdrawing mechanism G and the conveyor mechanism H and the spout-inserting mechanism F are preferably mounted on the same frame so that they can be placed as a unit in the proper relation to, for example, a carton blank magazine and a carton filling mechanism. As shown, the frame comprises a base J having secured thereon vertical columns K on which are mounted two horizontal vertically spaced plates L and M.

The conveyor mechanism H and the spout-inserting mechanism F are supported by the lower plate L. The conveyor mechanism is shown as including two endless conveyor elements or chains 10 and 11 each having one reach in horizontally spaced and parallel relation to one reach of the other element. As shown, the chain 11 is mounted on sprockets 12 carried by the vertical shafts 13 and 14 which are journaled in bearings 15 and 16, with one reach 17 in spaced opposed relation to one reach 18 of the other chain 10. The other reach of the chain 11 passes over an idler chain-tightening sprocket 19. The other chain 10 is mounted on sprockets 22 and 21 carried respectively by shafts 20 and 23 and the chain passes over an idler chain-tightening sprocket 24 carried by a shaft 25 which is so located on the frame plate as to provide a space for the spout-inserting mechanism F as best shown in FIGS. 4 and 5.

The chains 10 and 11 are driven in synchronism with a step-by-step motion by suitable means which is shown as including a Geneva gear N, the driven member 26 of

which is mounted on a shaft 27 journaled in the upper frame plate M and having thereon a gear 28 which meshes with a pinion 29 on the shaft 20 which has a right-angled gear connection 28¹ of generally known construction with a counter shaft 31 journaled in bearings 30 on the frame plate M which has a right-angled gear connection 28² with the shaft 14. The driving member 32 of the Geneva gear is mounted on a shaft 33 which carries a pinion 34 which is connected to a gear 35 on a shaft 36 which is connected by a train of gears 37 and 38 to a known type of motion transmitting gearing 39 which is driven as by a chain 40 from a suitable source of power such as another machine in a packaging line.

The shaft 36 also drives the spout-inserting mechanism which is only partially shown but is substantially identical with the mechanism described and claimed in U.S. Pat. No. 2,892,430; United Kingdom Pat. No. 3,799,563; West German Pat. No. 1,095,644; and Canadian Pat. No. 615,391. This mechanism includes a support bracket 41 suspended from the lower frame plate L and having a guide for a continuous strip 0 of spout blanks each of which is shaped to provide the body portion and the side wings of a finished spout. The strip is fed through a guideway step-by-step and at the upper end of the guideway is a spout-forming mechanism 42 including a plurality of coating dies to shape the spout wings and the prongs. At the upper end of the guideway the leading spout is severed from the strip and pushed by a ram through a channel into the predetermined portion of the wall of the carton which at that moment is being held stationary by the conveyor mechanism during a period of rest thereof. The dies and ram are actuated by a cam system 43 mounted on the shaft 36, and just prior to the pushing of the spout flanges through the carton wall, an anvil P is inserted into the carton through the open upper end thereof close to the wall of the container to support said wall and receive the thrust of the spout-inserting ram.

The anvil is operated in timed relation to the spout-inserting mechanism by a box cam Q carried by the shaft 36 and in whose groove rides a follower roller 45 on one end of a lever 46 that is pivoted at 47 on a bracket 48 that is mounted on the lower frame plate. (FIG. 3) The other end of the lever has a pin and slot connection with an anvil bar 49 that is slidably mounted in a guide 50. The anvil bar projects downwardly through an opening in the frame plate and carries an anvil block 51. (FIG. 5) The face of the anvil block corresponds in size and shape to the body portion of the spout and preferably has depressions therein to deflect the prongs of the spout and facilitate clinching thereof on the carton wall as the spout flanges are pushed through the container wall. (FIGS. 4 and 5) After completion of the insertion of the spout, the anvil is withdrawn from the carton body which is designated R in FIGS. 4 and 5.

Now referring in more detail to the conveyor mechanism for moving the carton bodies to the spout-inserting mechanism, the chains are spaced apart a distance slightly greater than the width of the wide wall, and each chain has a plurality of rectangular carton pusher blocks 52 secured thereon, adjacent ones of which are spaced apart along the length of the chain a distance approximately equal to the width of the nar-

row wall of the carton body to receive the carton body between the juxtaposed chain reaches and in the spaces between the blocks. As shown best in FIGS. 13 and 14, the chains preferably include link portions 55 and block carrier bars 56 to which the blocks 52 are separably secured as by screws 57. In accordance with the invention, the spaces between the blocks may be varied by supplemental blocks 58 of different widths which may be interchangeably connected to the edges of the blocks 52 by said screws 59.

In accordance with the invention, the chain 11 is adjustable horizontal toward and away from the chain 10 to accommodate cartons of different widths, and for this purpose the shafts 13 and 14 are journaled in slide blocks 59 which are adjustably mounted in openings 60 in the lower frame plate.

The parallel reaches of the chains are firmly guided against accidental separation, the reach 17 having a back-up plate 60 mounted on the frame and the reach 18 being backed up by the face plate 61 of the spout-inserting mechanism F which has a groove 62 through which passes the chain reach. (FIG. 5)

Also, preferably parallel guide rods 63 and 64 are mounted on the frame to guide the carton bodies as they are moved by the conveyor chains; and a horizontal support plate 65 is provided along which slide the lower edges of the bottom flaps of the carton as shown in FIGS. 4 and 5, said plate being vertically adjustably mounted by a bracket 65 a.

The receiving end of the conveyor mechanism is located in closely spaced relation to the discharge end of the magazine as best shown in FIG. 4 and schematically in FIGS. 6-8 and the flat-folded cartons are arranged in the magazine with the printing upright so that when they are withdrawn the narrow side of the carton body opposite the sealing flap will be presented to the spout-inserting mechanism and the lower end flaps will rest on the plate 65. The carton withdrawing mechanism is shown as comprising two vertically spaced suction cups 66 and 67 each mounted in a support block 68 which is fastened on a vertical operating shaft 69 journaled in a bearing 70 on the lower frame plate and extending upwardly through the upper frame plate and having a pinion 71 at its upper end which meshes with a gear quadrant 72 at one end of a lever 73 which is pivotally mounted at its ends at 74 on the frame plate and has a follower roller 75 at its other end riding in a groove 76 in a cam 77 secured to the cam shaft 36, whereby the suction cups are swung horizontally in timed relation to the movement of the conveyor mechanism.

The suction cups are connected by flexible tubes 78 to a suction producing and controlling mechanism of known construction (not shown) which are operable in timed relation to the movement of the suction cups. The suction cups and their mounting are of such size and shape that when a carton blank is to be withdrawn, the suction cups will be in contact with one narrow wall of the leading carton blank as shown in FIG. 4 and when the suction is applied and the shaft 69 is oscillated to move the suction cup away from the magazine, the carton blank will be withdrawn from behind the rod 4 and the stops protuberances 6 and partially unfolded as shown in FIG. 8. It is desirable that guide plate 79 be mounted adjacent the discharge end of the magazine so

that the edge of the blank remote from the suction cup will be pressed against and pulled along the guide plate and thereby further unfolded into the condition shown by the broken line *x* and said edge of the partially unfolded blank will be disposed in the space between adjacent pusher blocks, whereupon further movement of the suction cup and the conveyor chains will complete the unfolding and erection of the carton body as indicated by the broken lines *y* and *z* and as shown by solid lines in FIG. 6. At this point the conveyor chains are at rest and a spout is being inserted into the carton body that is located at the spout-inserting station. When movement of the conveyors is resumed, the suction cups are freed from the carton body and returned to their initial position ready to withdraw the next blank, as shown in FIG. 7.

As hereinbefore pointed out, the invention makes it possible to adapt the machine to use with cartons having the sealed flap *e* in different relations to the carton walls and the printing and with magazines in different relations to the conveyor mechanism. FIG. 9 schematically illustrates the embodiment of the invention shown in FIGS. 1 to 8, inclusive, 13 to 18, where the magazine A at one side of the conveyor mechanism, while FIG. 10 illustrates the magazine A¹ at the other side of the conveyor. In the machine of FIG. 10, the operating shaft 69 of the suction cup mechanism G¹ is connected by a counter shaft 80 and two right-angled gear transmissions 81 to another shaft 82 mounted in a bearing opening 83 in the frame plate L, and the suction cups 66¹ are mounted on the shaft 82.

In FIG. 11, the magazine A² and the suction cup mechanism G² are at the opposite end of the conveyor mechanism from the magazine A and the direction of movement of the conveyor is reversed by connecting the driving gear to the shafts 13 and 23 of the conveyor chains.

In FIG. 12, the magazine A³ and the suction cup mechanism G³ are at the opposite side of the conveyor mechanism from the magazine A² and suction cup mechanism G², and the suction cup mechanism includes shaft 69² corresponding to 69, and right-angled transmission gearing 81¹ corresponding to gearing 81, and shaft 82¹ corresponding to shaft 82 with reverse direction of drive.

In all forms of the machine, after the spout has been inserted into the carton wall, the conveyor mechanism conveys the carton to a desired point of discharge, usually the conveyor of a carton filling machine; and in accordance with the invention means is provided for pushing the carton body from between the pusher blocks 52 of the conveyor mechanism H. This means is shown as comprising disks 81 rigidly mounted on the shafts of the conveyor chains at the discharge end of the mechanism. Preferably one disk 81 is mounted on each shaft below the corresponding conveyor element while another disk is mounted above the conveyor element and the disks have a plurality of circumferential equi-distantly spaced fingers 82 so arranged that the fingers of the disks on the two shafts engage the trailing walls of the carton bodies in succession so as to push the carton bodies out of the spaces between the blocks 52 and from between the chains as illustrated by the dot and dash lines in FIG. 4 of the drawings.

I claim:

1. The combination with a magazine to hold a plurality of blanks for cartons that have four rectangular walls hingedly connected together and flat-folded in mutually abutting file formation and means for advancing said folded cartons step-by-step to the discharge end of the magazine, of a frame, carton feeding and erecting means mounted on said frame and including conveyor elements for withdrawing the leading folded carton blank from the magazine and simultaneously unfolding and erecting the blank to dispose the adjacent hingedly connected walls in perpendicular relation to each other and thereby form a carton body and conveying the erected carton bodies in succession step-by-step in a continuous path with alternate periods of movement and rest past a predetermined point in said path, said carton feeding and erecting means including endless conveyor elements adjacent the discharge end of the magazine each mounted on two shafts journaled in the frame having a reach in horizontally spaced and parallel relation to and movable in the same direction and at the same speed as a reach of the other element and each element having carton pusher blocks each on one reach directly opposite a block on the opposite reach spaced apart along the length of the element to grip a carton body between said reaches and in the spaces between the blocks thereon, spout inserting mechanism mounted at said predetermined point on said frame having parts movable intermittently transversely of said path in timed relation to the step-by-step movement of said conveyor elements for inserting a pouring spout into one wall of each erected carton during a period of rest of the carton at said point, a motion transmitting gearing on said frame and driving connections between said gearing, said spout inserting mechanism, and one shaft of each conveyor element of said carton feeding and erecting means, providing for withdrawal of the carton blanks from the magazine erecting and gripping them between the blocks on the carton conveyor elements in timed relation to the actuation of the said conveyor elements and in timed relation to the actuation of said spout-inserting mechanism.

2. The combination as defined in claim 1 wherein said carton feeding and erecting means includes endless conveyor elements adjacent the discharge end of the magazine each mounted on two shafts journaled in the frame having a reach in horizontally spaced and parallel relation to and movable in the same direction and at the same speed as a reach of the other element and each element having carton pusher blocks each on one reach directly opposite a block on the opposite reach spaced apart along the length of the element to grip a carton body between said reaches and in the spaces between the block thereon and carton blank withdrawing means coactive with said elements to withdraw from the magazine in timed relation to the movement of said conveyor elements the leading folded carton blank and simultaneously unfold and erect the blank to form and dispose a carton body in the space between adjacent blocks, and with the addition of a support plate along which are slidable the lower end flaps of the carton blanks, guide rods parallel

to said reaches between which the carton bodies are slidable, and means on the shafts at the discharge end of the conveyor element to dislodge the carton bodies from between said blocks.

3. The combination as defined in claim 2, wherein each conveyor element comprises two vertical shafts journaled in said frame and having sprockets thereon and an endless chain running on said sprockets, means for driving said chains with one reach of each chain horizontally spaced from and parallel to and movable in the same direction and at the same speed as a reach of the other chain, said carton pusher blocks are secured on said chains, one of said shafts for each chain is disposed at the side of the discharge end of said carton magazine opposite the corresponding shaft of the other chain providing for the entry of the carton blanks from the magazine into the space between said chains, and the means for withdrawing the carton blanks from the magazine includes a shaft journaled on a vertical axis and having a suction cup mounted thereon, and means for oscillating said shaft and for controlling application and release of suction to and from said suction cup respectively providing for the swinging of said cup horizontally first into contact with the leading blank in the magazine and then the moving of the blank attached to said cup into the space between said chains and into the spaces between said blocks on the chains.

4. The combination as defined in claim 1 wherein means for driving said shafts includes a Geneva gear the driven element of which is connected to one of said two shafts of one conveyor element, a countershaft journaled on said frame on an axis perpendicular to said shafts, and right angle gear connections between said countershaft and said one shaft of one conveyor element and the corresponding shaft of the other conveyor element, respectively.

5. The combination as defined in claim 4 wherein said spout-inserting mechanism has a drive shaft and there is a train of gears between said motion transmitting gearing said spout inserting mechanism drive shaft and the driving element of said Geneva gear, and said spout inserting mechanism includes cams on said drive shaft and spout-inserting parts actuated by said cams in timed relation to the step-by-step movement of said conveyor elements.

6. The combination as defined in claim 1 wherein said spout-inserting mechanism has spout-inserting parts, and a drive shaft therefor driven by said motion-transmitting gearing and having cams thereon for actuating said spout-inserting parts in timed relation to the step-by-step movement of said conveyor elements and the means for withdrawing the carton blanks from the magazine includes a shaft journaled on a vertical axis and having a suction cup mounted thereon, and means for oscillating said shaft and for controlling application and release of suction to and from said suction cup respectively providing for the swinging of said cup horizontally first into contact with the leading blank in the magazine and then the moving of the blank attached to said cup into the space between said chains and into the spaces between said blocks on the chains.

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