Nov. 23, 1965 R. A. PEARSON 3,218,940

CARTON SETTING UP MACHINE

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Fig 1

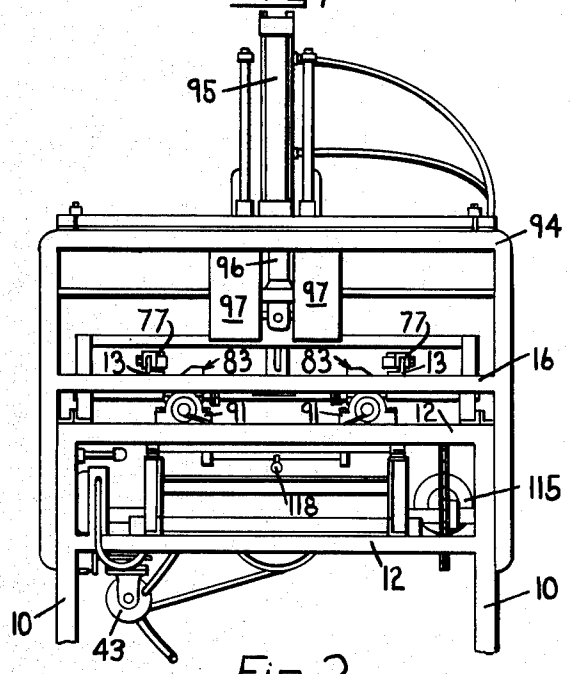
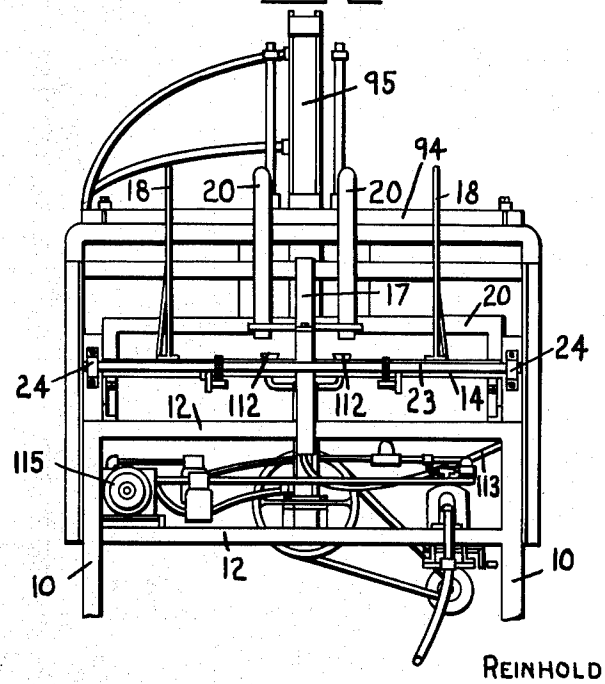


Fig 2



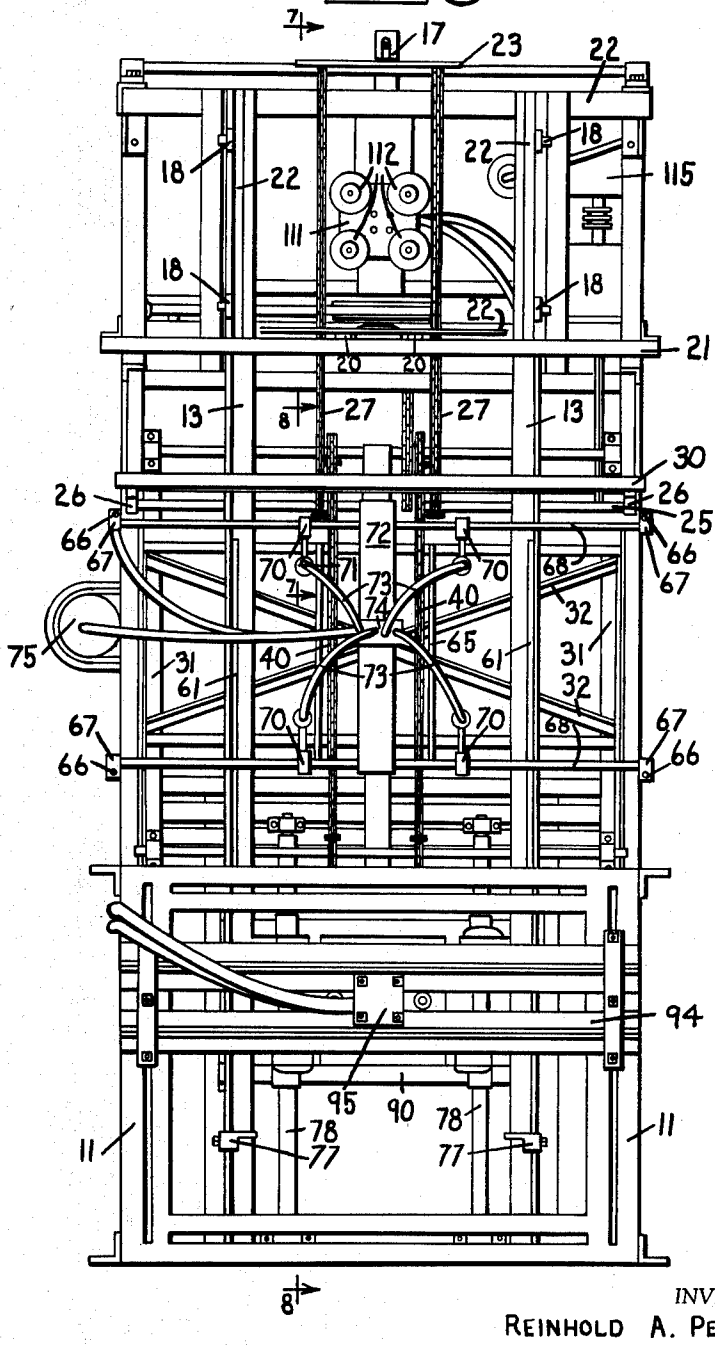
INVENTOR.
REINHOLD A. PEARSON
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Fig 3



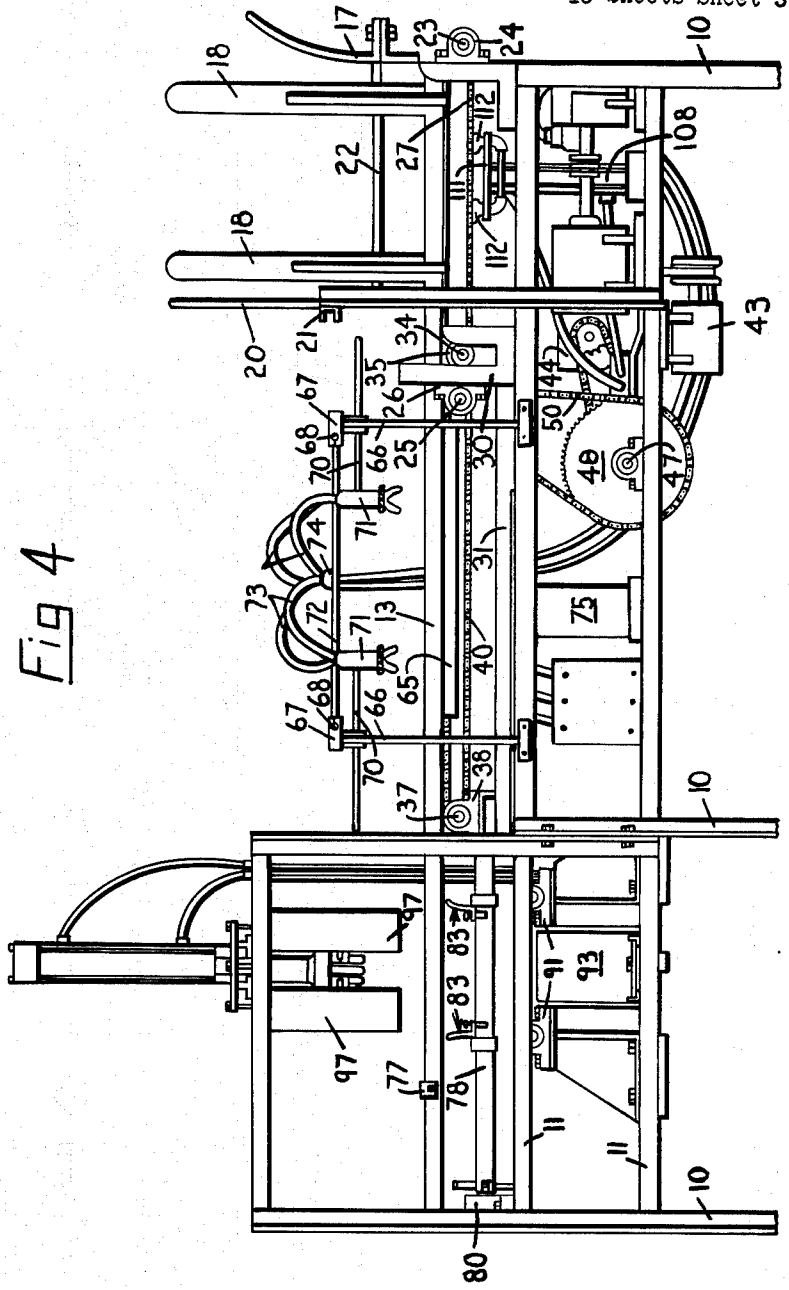
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CARTON SETTING UP MACHINE

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Fig 4



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CARTON SETTING UP MACHINE

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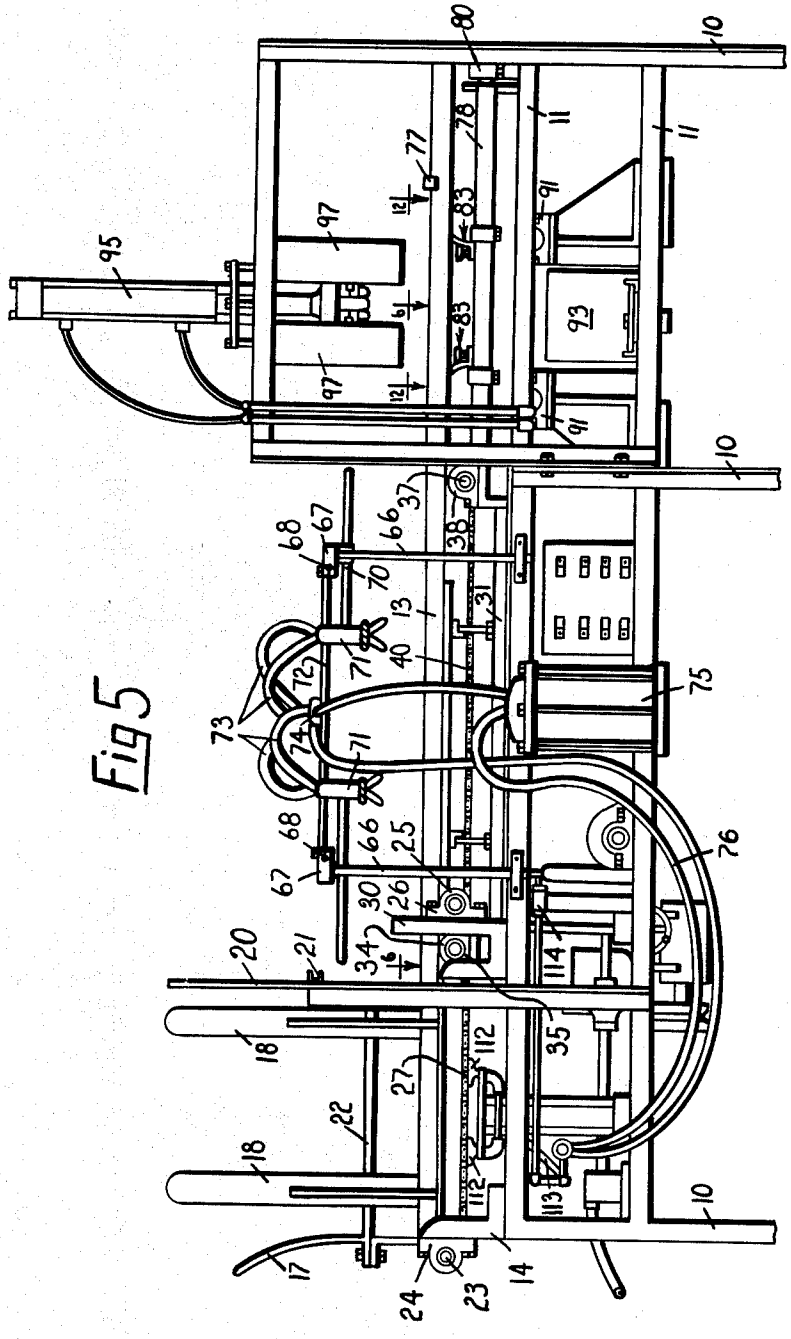


Fig 5

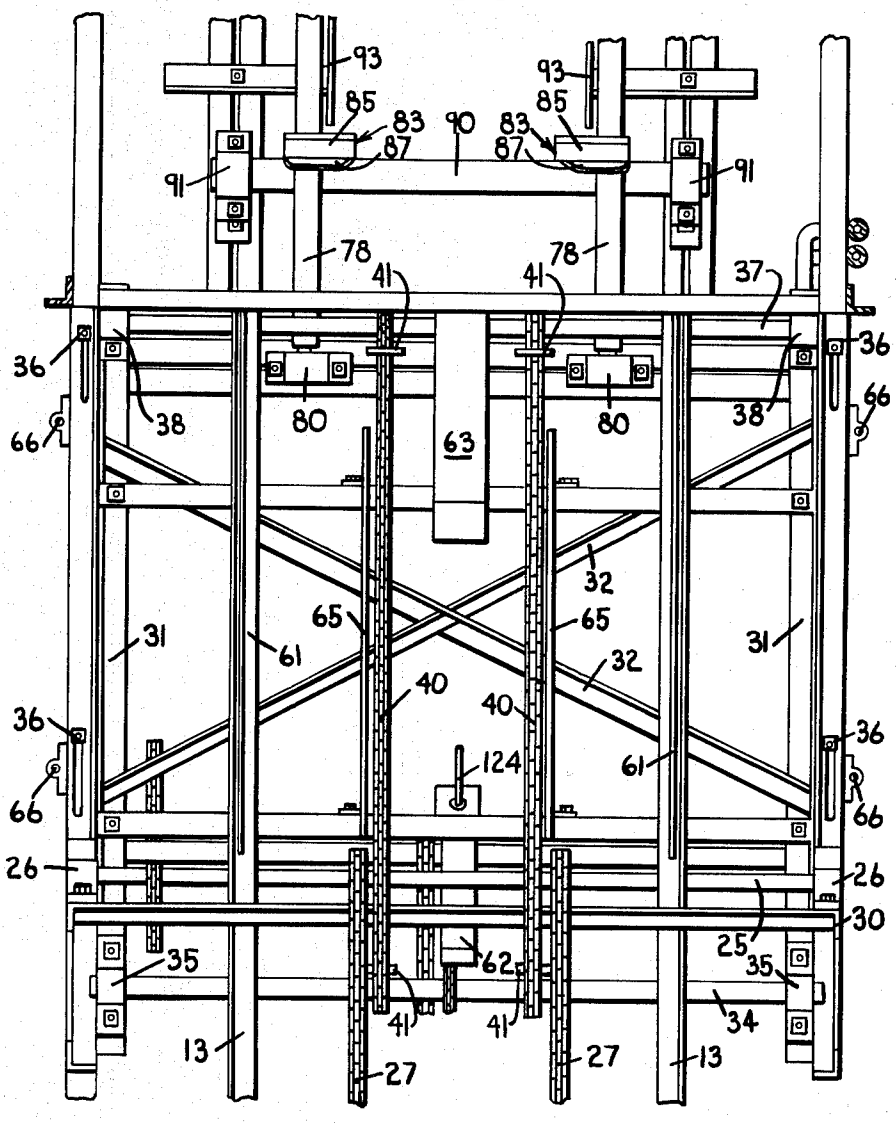
INVENTOR.
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Fig 6



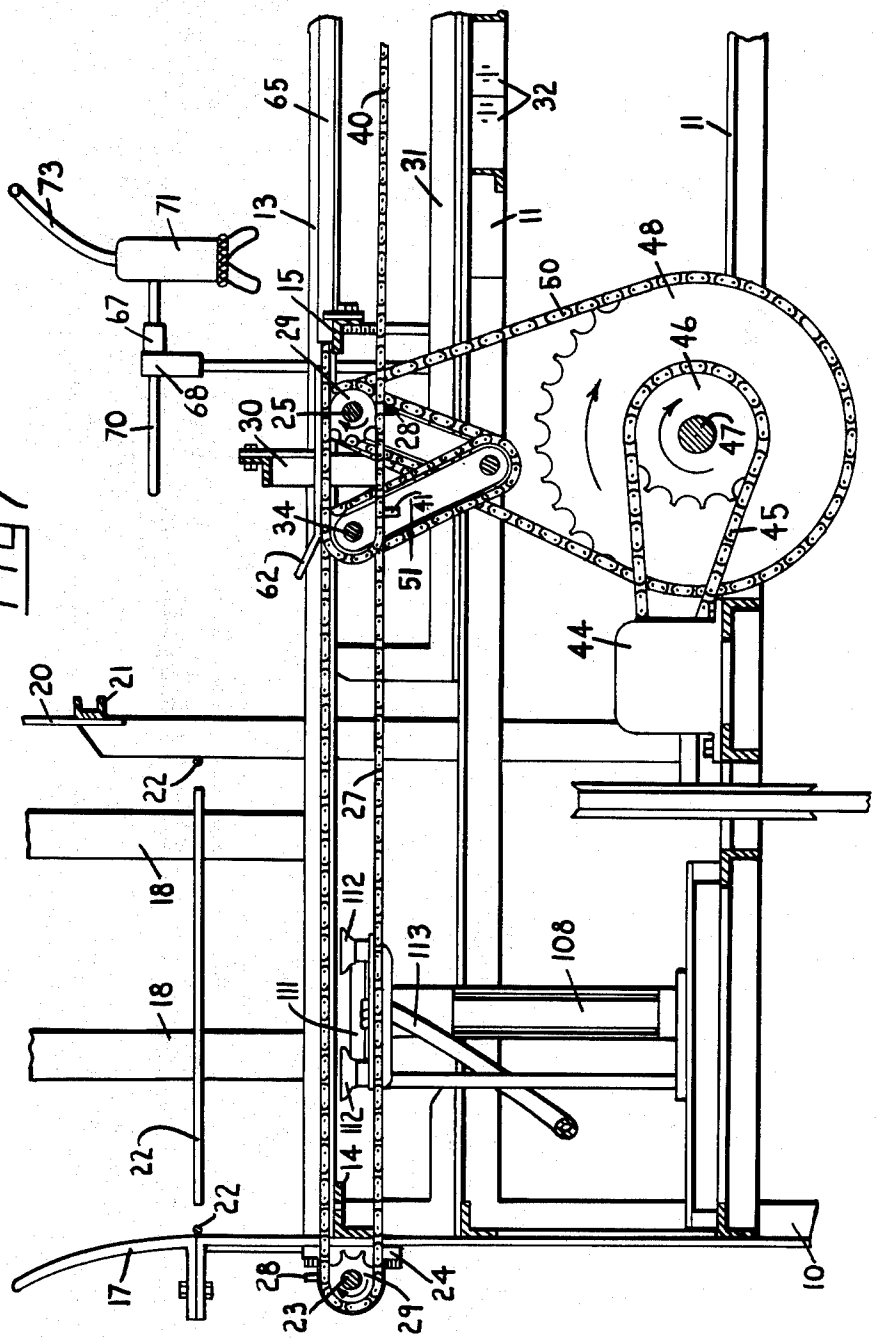
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Fig 7



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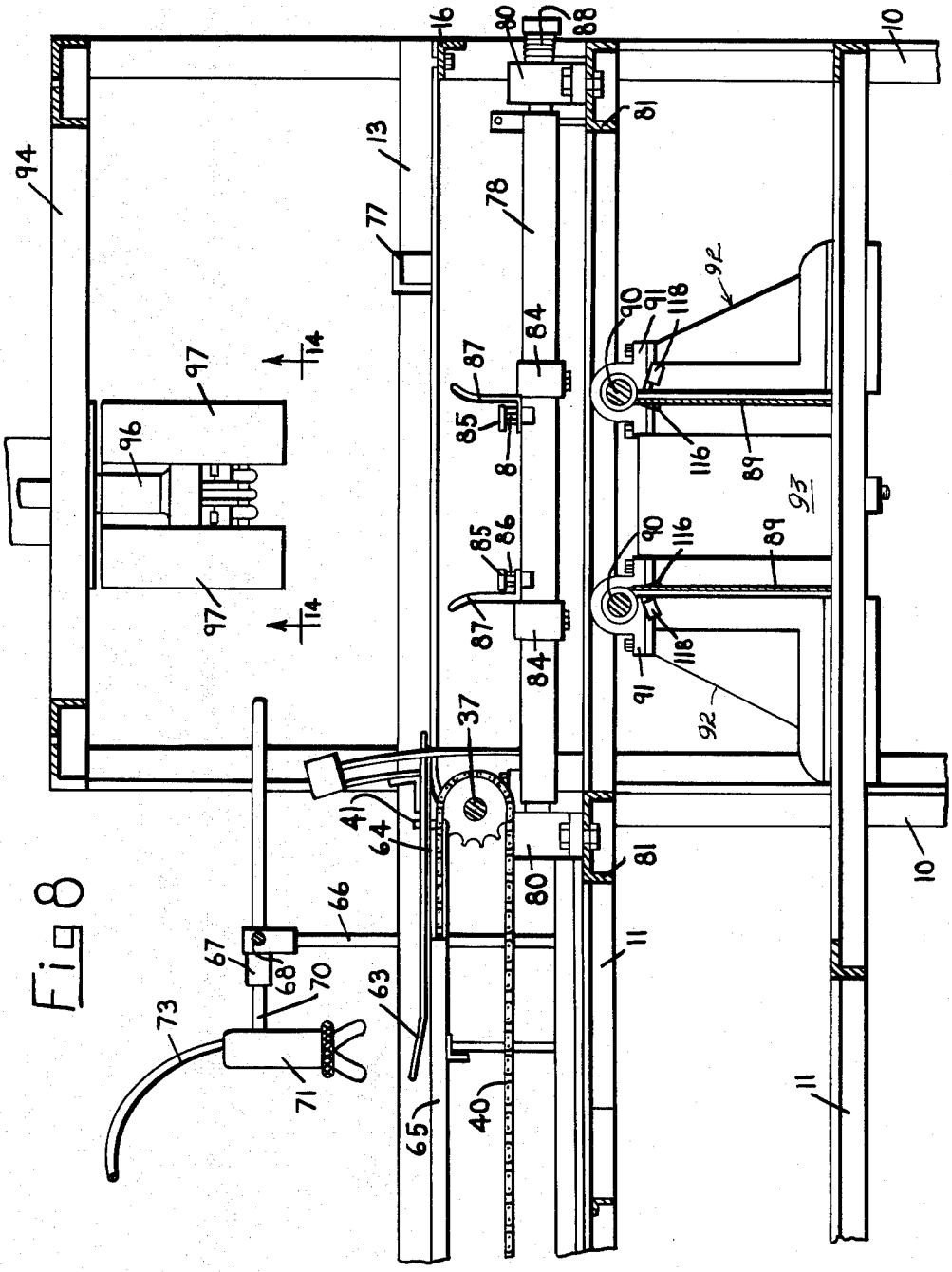


Fig 8

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Fig 9

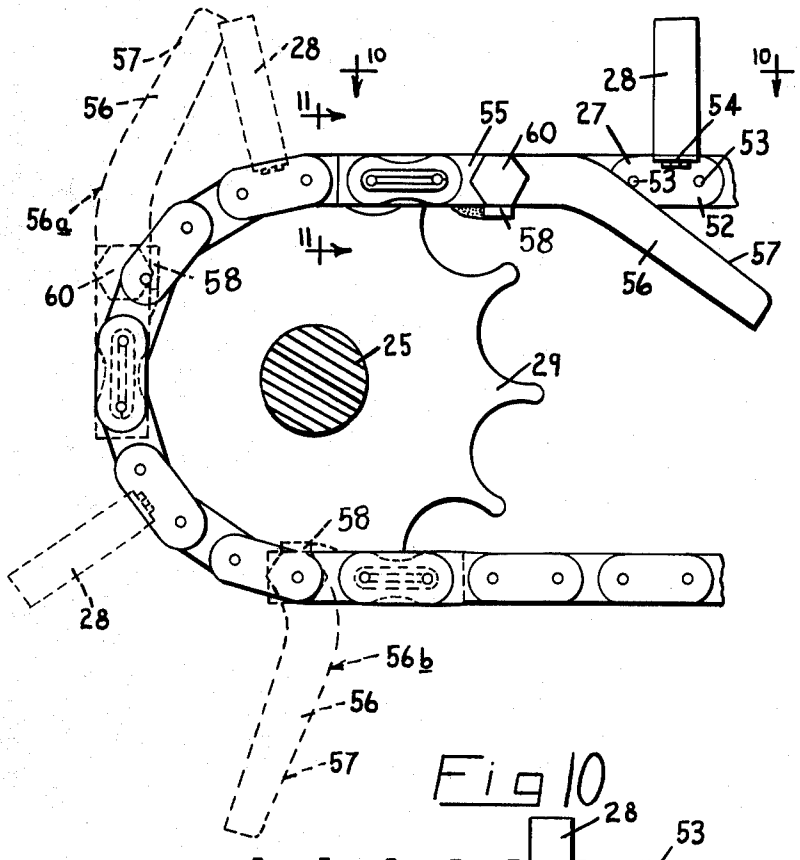


Fig 10

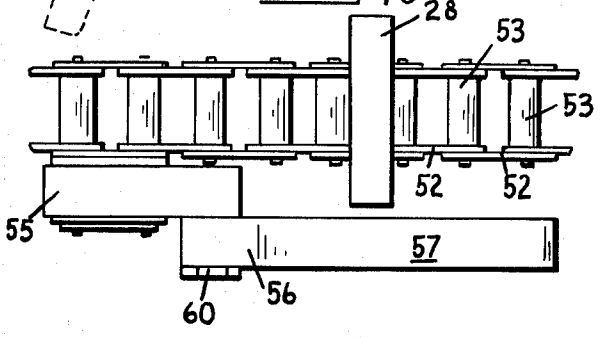
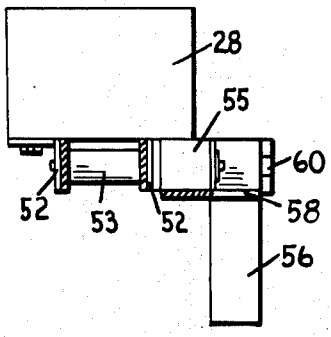


Fig 11



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Fig 12

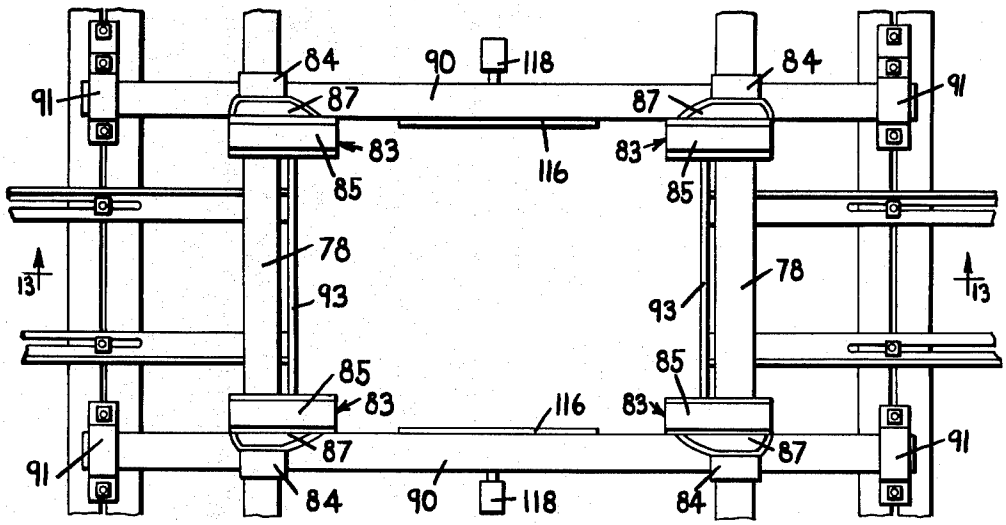
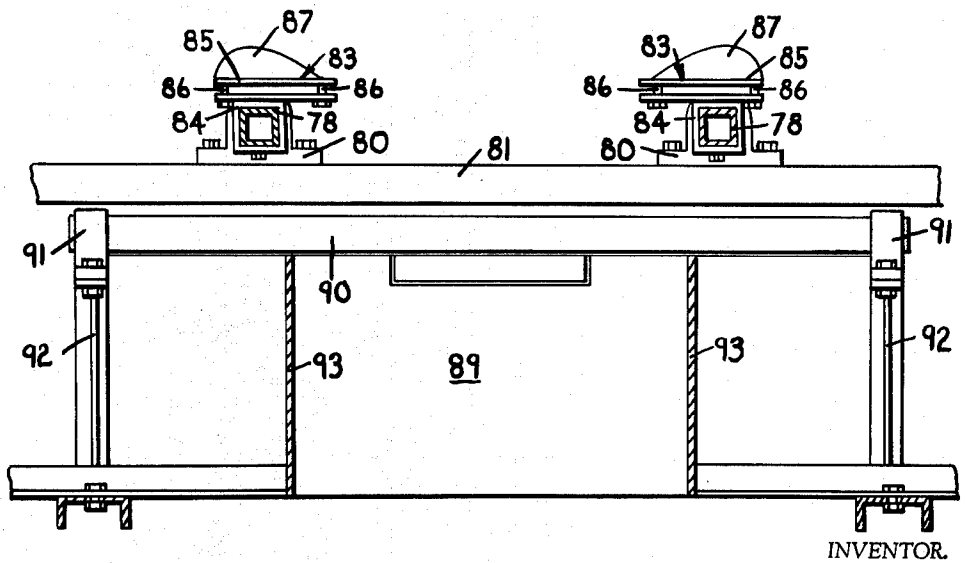


Fig 13



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Fig 15

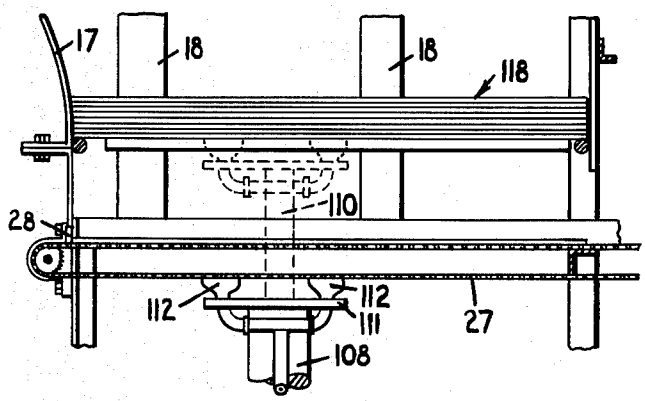


Fig 16

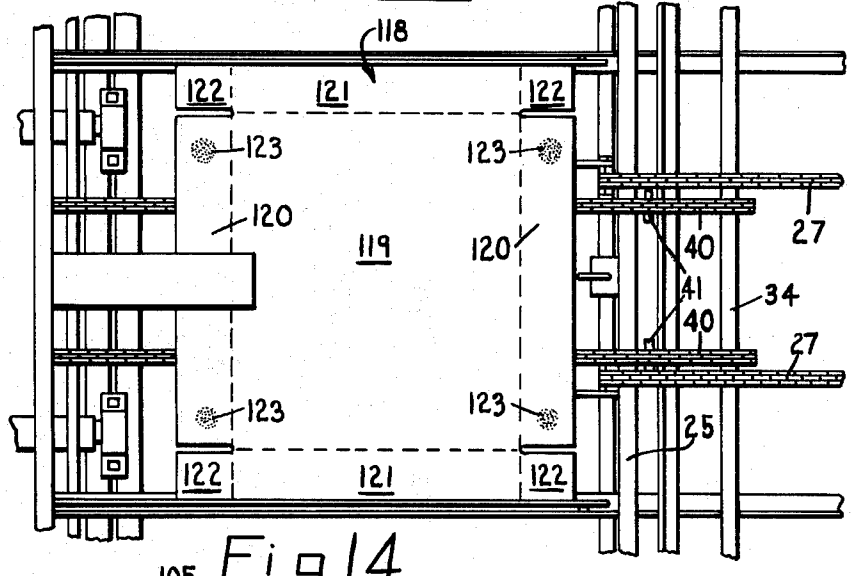
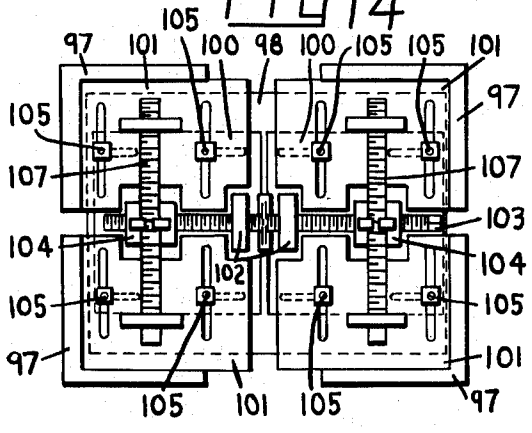


Fig 14



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Fig 17

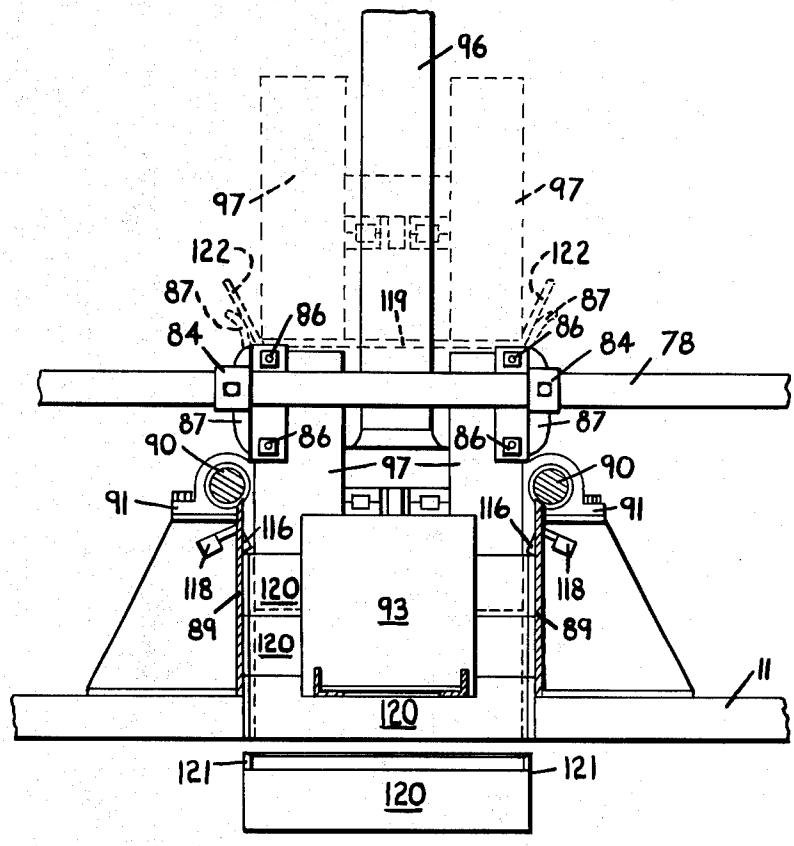
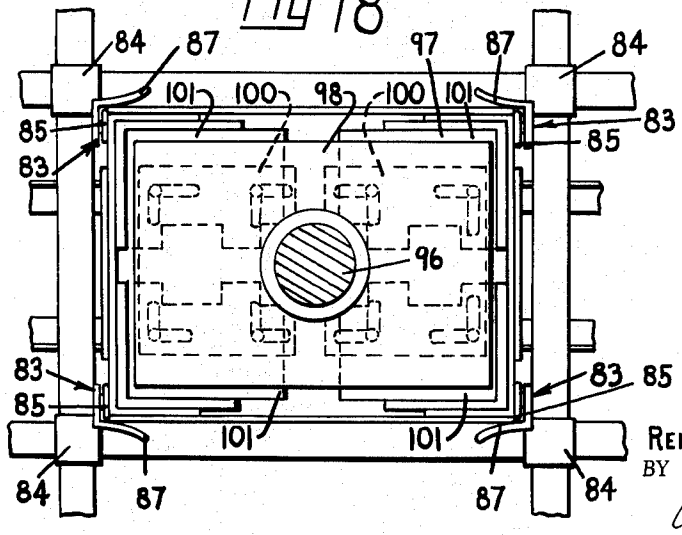


Fig 18



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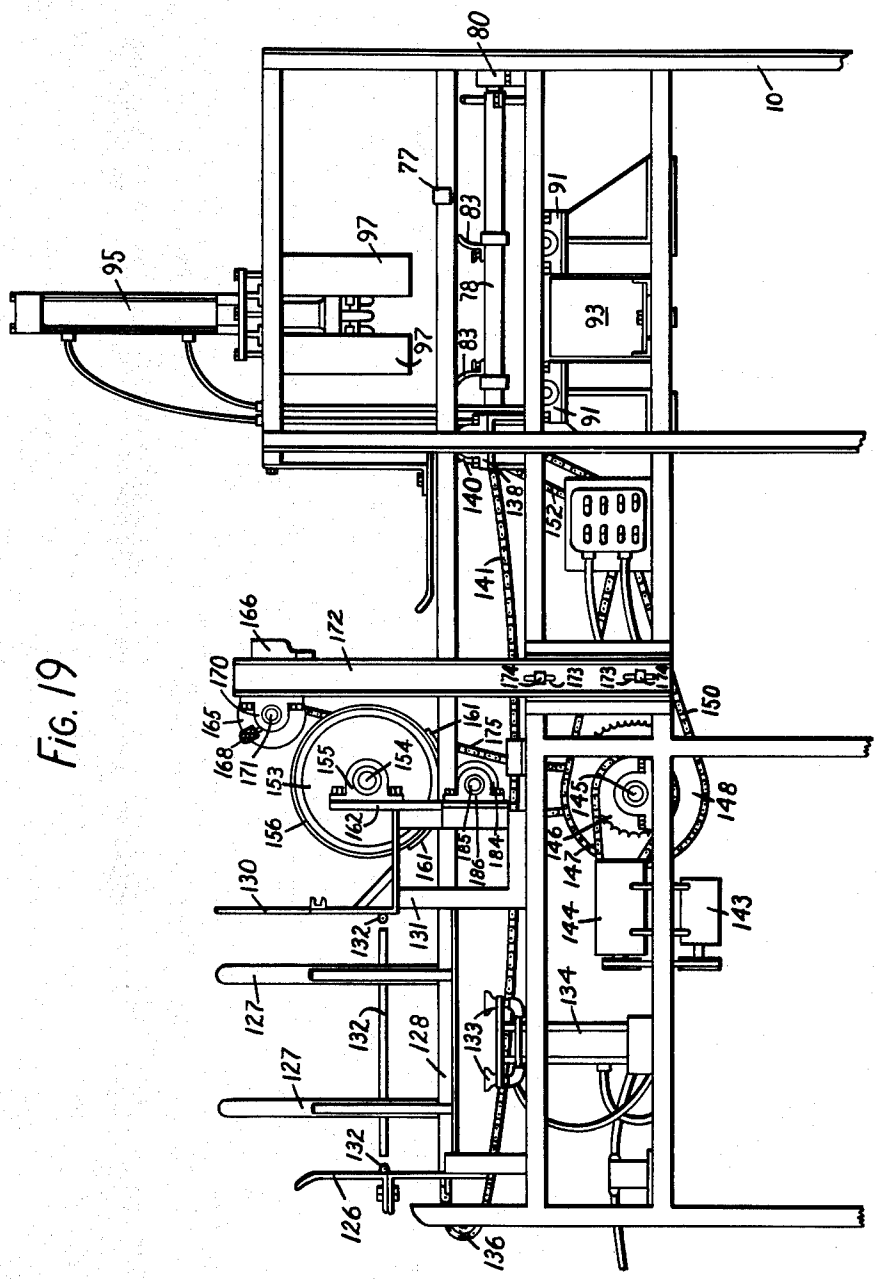


Fig. 19

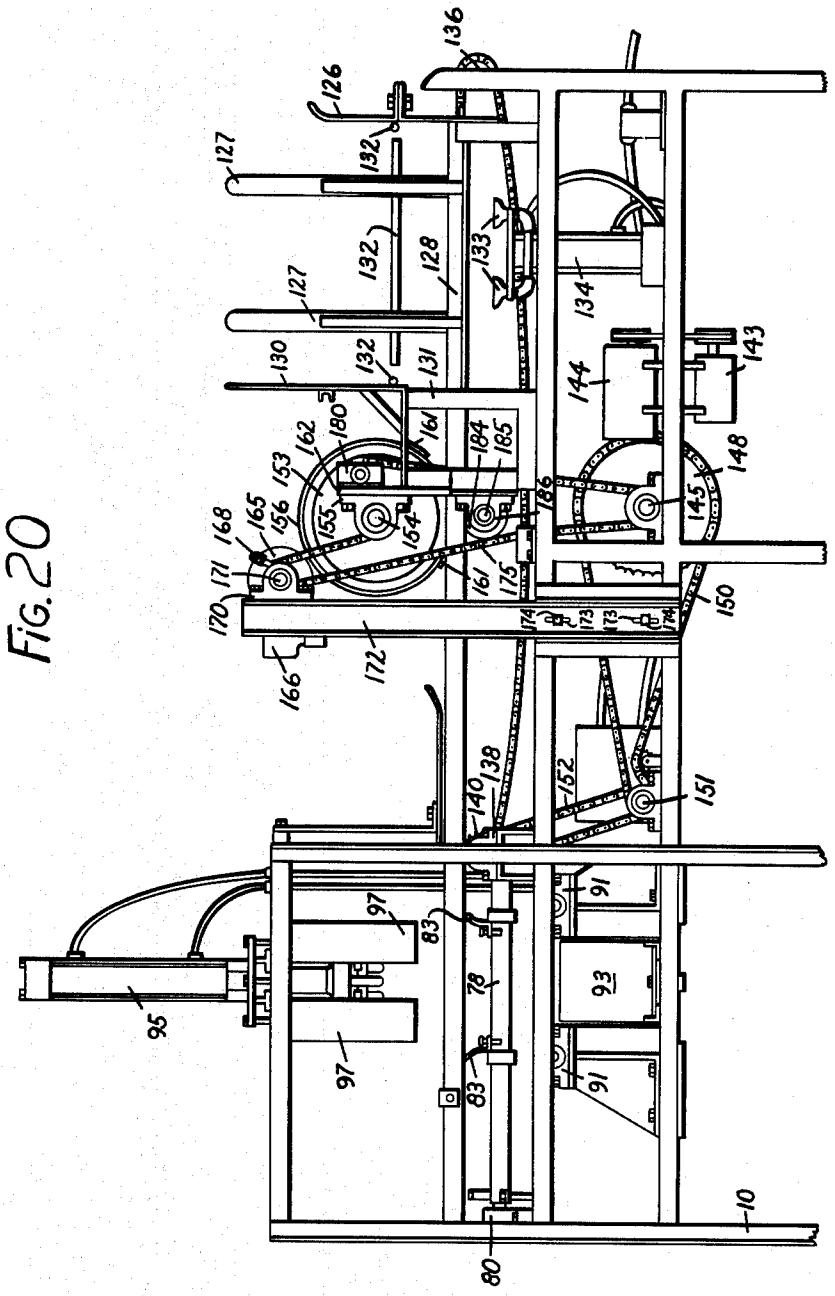
INVENTOR.
REINHOLD A. PEARSON
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Fig. 20



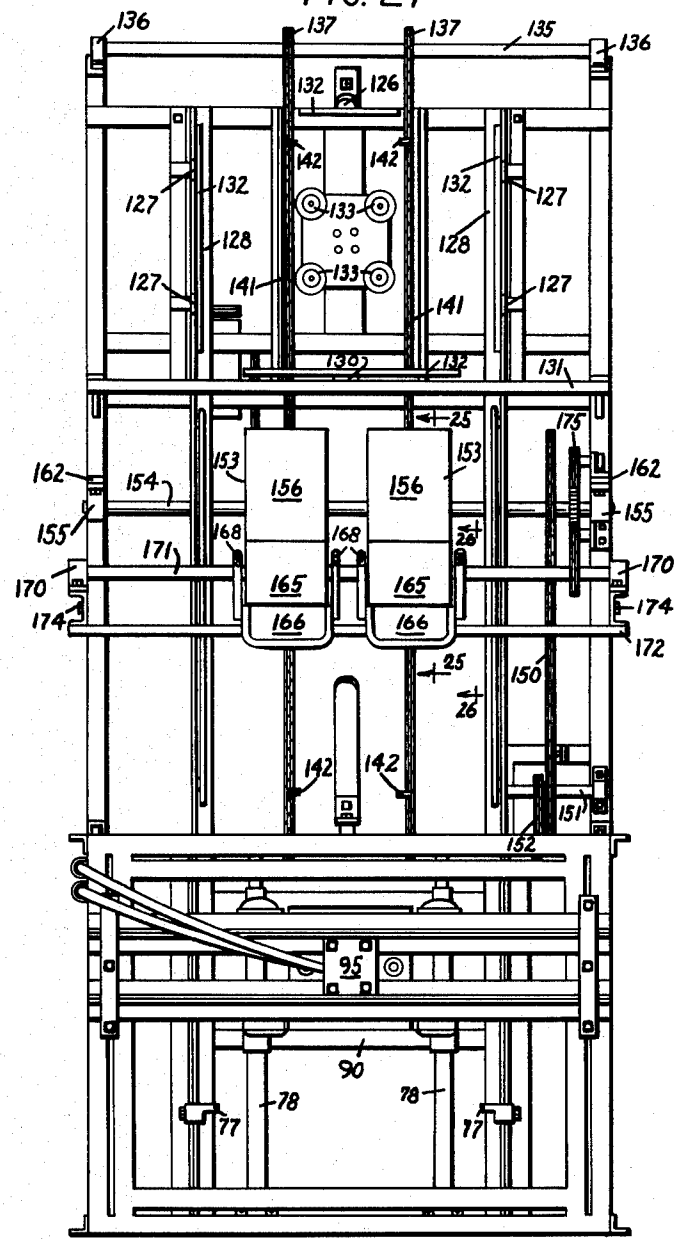
INVENTOR.
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CARTON SETTING UP MACHINE

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FIG. 21



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FIG. 22

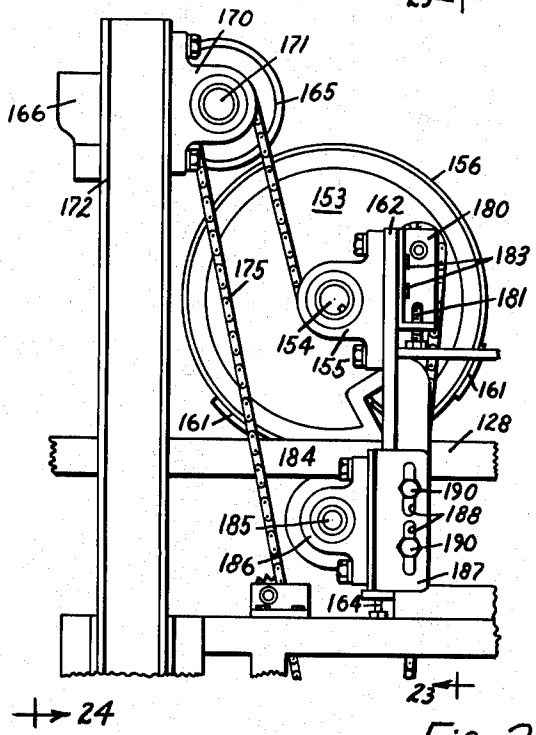


FIG. 23

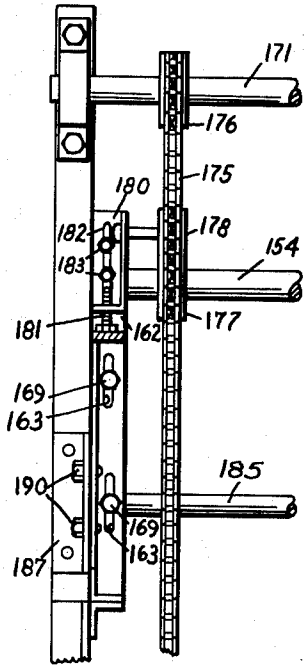
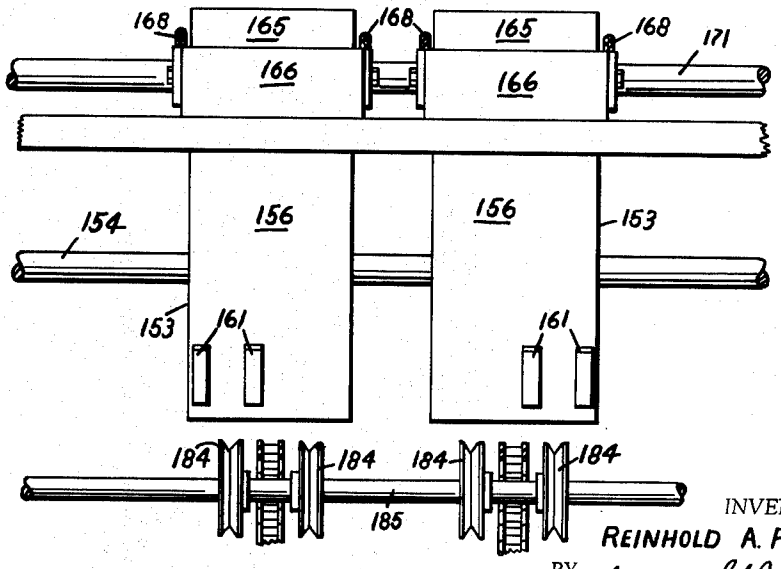


FIG. 24



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CARTON SETTING UP MACHINE

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FIG. 25

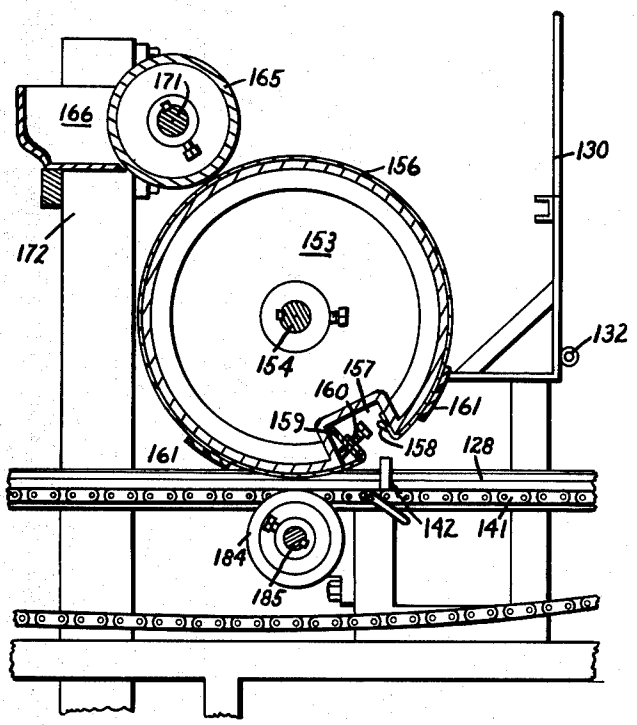
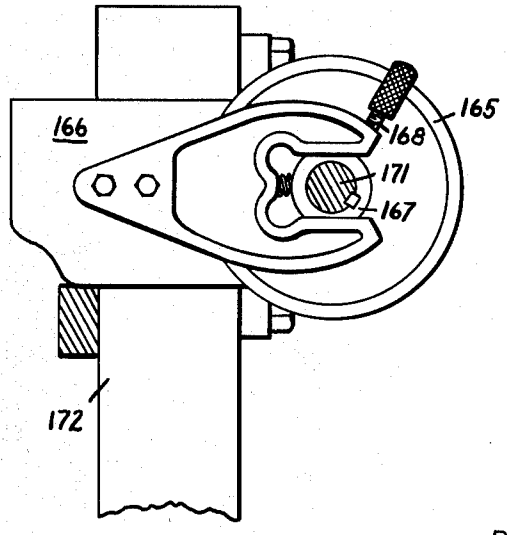


FIG. 26



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Nov. 23, 1965 R. A. PEARSON 3,218,940

CARTON SETTING UP MACHINE

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FIG. 27

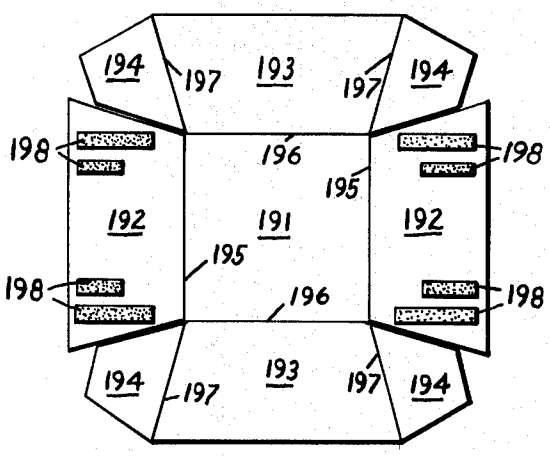


FIG. 28

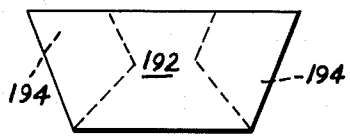
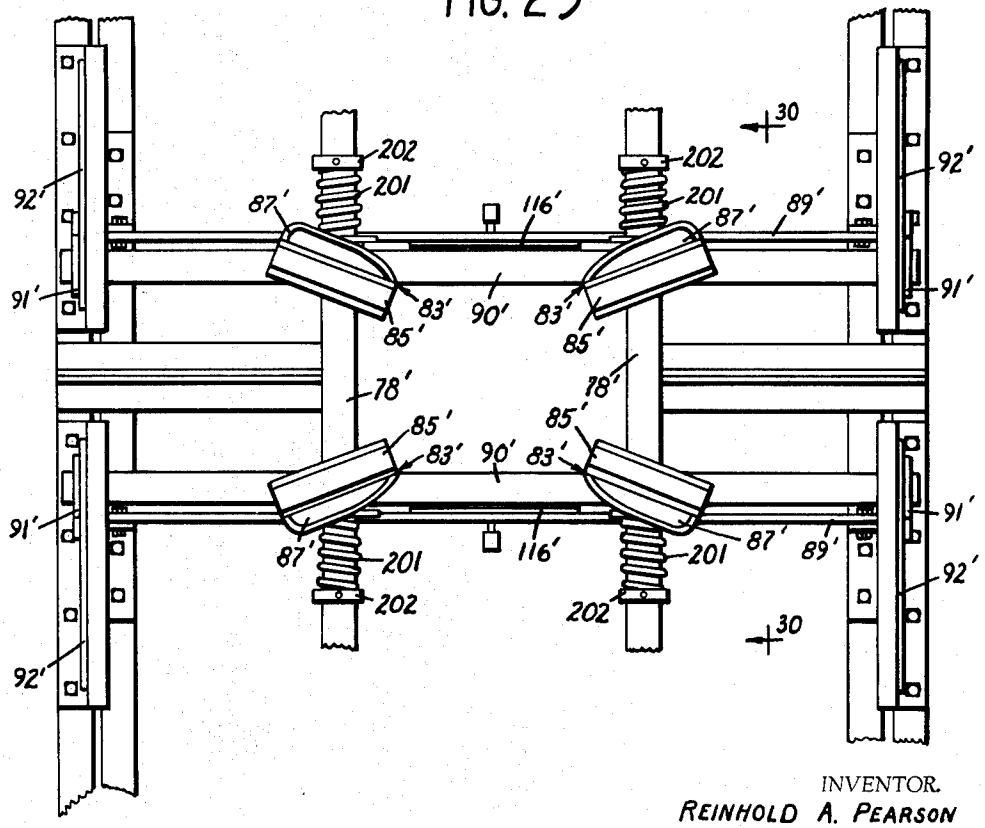


FIG. 29



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CARTON SETTING UP MACHINE

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Fig. 30

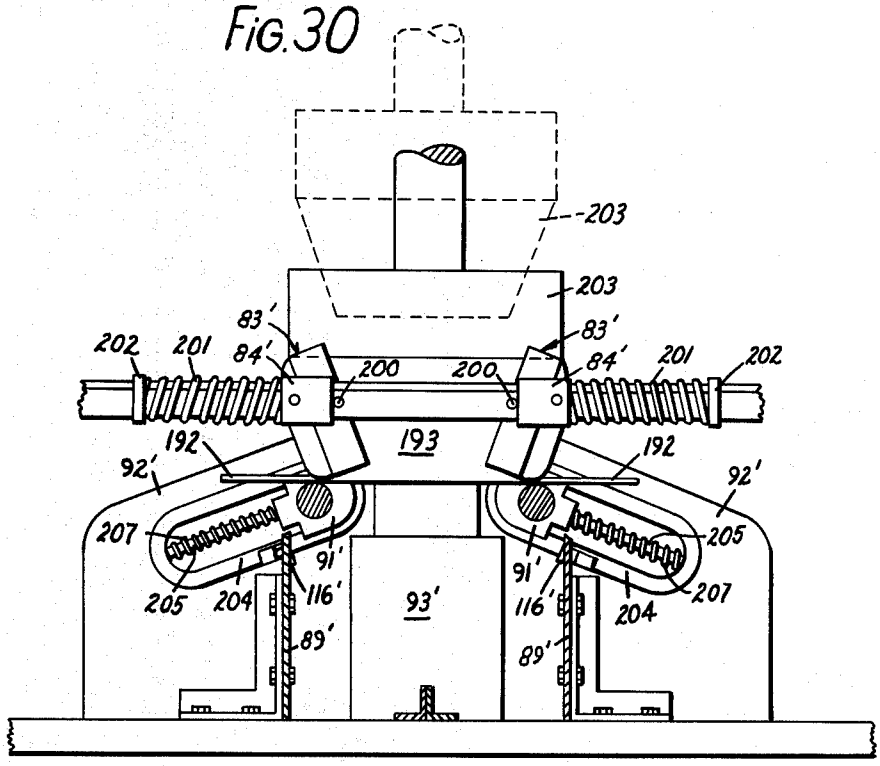
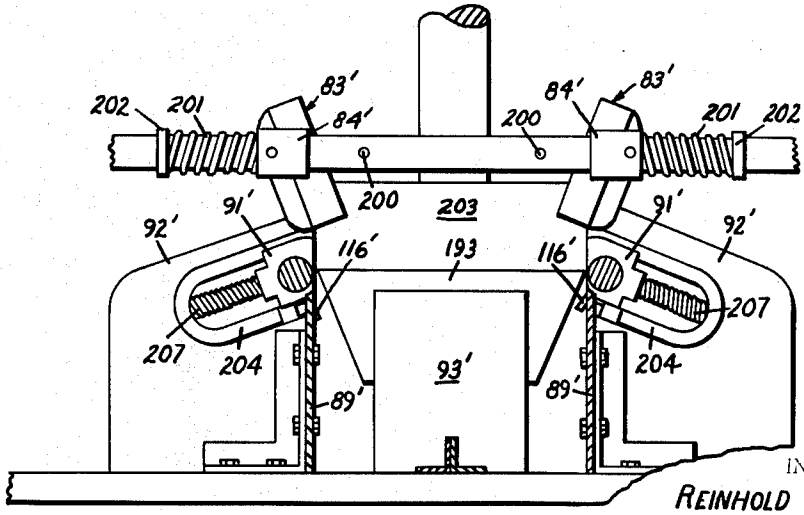


Fig. 31



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FIG. 32

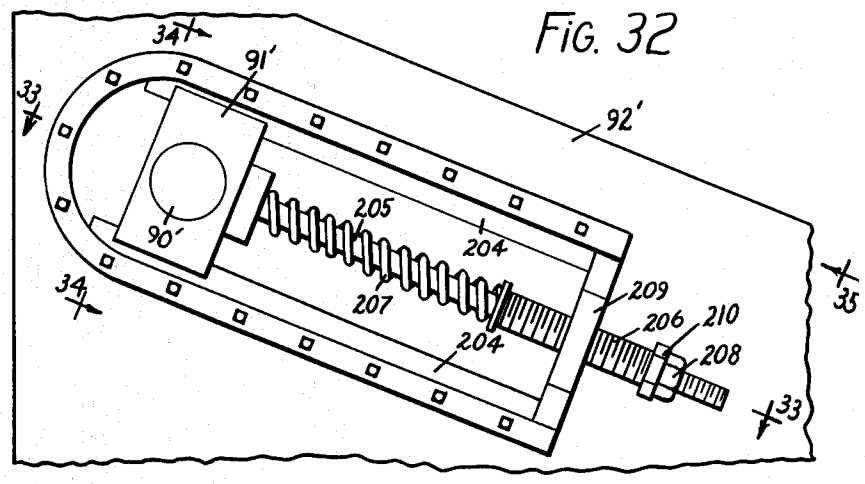


FIG. 33

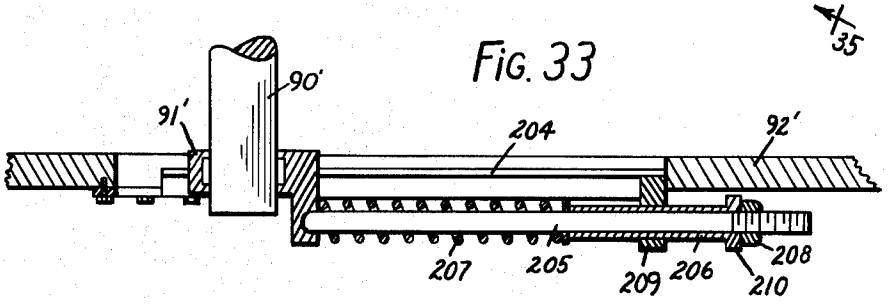


FIG. 34

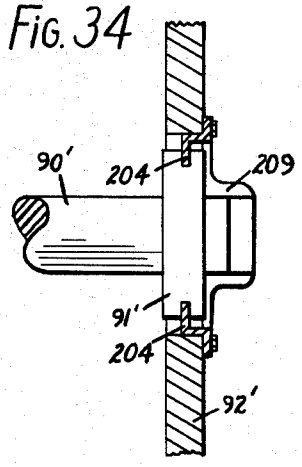
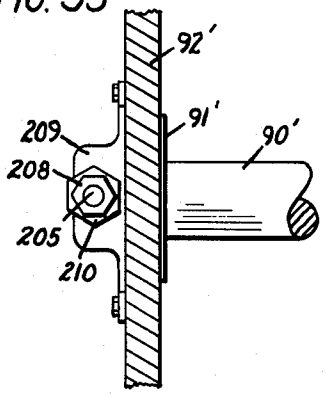


FIG. 35



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United States Patent Office 3,218,940 Patented Nov. 23, 1965

3,218,940

CARTON SETTING UP MACHINE

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Filed Sept. 26, 1963, Ser. No. 313,408
5 Claims. (Cl. 93—51)

This is a continuation in part of patent application Serial No. 218,023, filed August 20, 1962, now abandoned.

This invention relates to a novel carton setting up machine.

The invention disclosed herein is concerned with the setting up of carton blanks wherein the blanks must be glued along their side walls. The particular carton for which this apparatus was designed is used extensively in the beverage industries as a "tray" or outer package. It comprises a bottom wall, a pair of scored side walls and a pair of scored end walls. The end walls are provided with scored flaps at each side thereof. When fully set up, the flaps of the end walls are glued to the inside surfaces of the side walls at the four respective corners of the carton. Normally this carton has no top covering, although such could be provided if desired.

The present invention contemplates an apparatus for continuously setting up such cartons by a folding and gluing process which operates on more than one carton blank simultaneously. The apparatus divides the functional steps into three groups—feeding, glue application and folding—and each step is carried on simultaneously during operation of the other steps.

It is a first object of this invention to provide such an apparatus which is uncomplicated and simple to operate. The apparatus utilizes basic mechanical mechanisms to effect the various functions of the machine and can be readily utilized without manual effort. No manual steps are involved in the process as practiced by the machine.

A second object of this invention is to provide a machine which is fully adjustable so as to be adaptable to a carton blank of any size. The necessary adjustments are simple and allow a person using the machine to accurately set the various machine components to accommodate the carton being set up. Since several of these adjustments are extremely critical, these adjustable features are very necessary to ease in operation.

Another object of this invention is to provide an accurate conveyor system for the carton blanks which can position the carton blanks with extreme accuracy along a rigid framework for the application of glue to the individual blanks and for the folding steps. It is necessary that the final carton be uniform and that the fold be both permanent and accurately bent. Unless the final carton is uniform, difficulties will arise in subsequent manufacturing steps where automatic machinery is widely used. In order to accomplish this object, a novel conveyor lug and release apparatus has been devised which is disclosed herein.

Another object of this invention is to provide a novel die and plunger apparatus for bending the cartons. The die according to this invention involves only two members that require accurate positioning. The members that fold the end flaps are provided with yieldable adjustments which can accommodate slight variations in the carton structure. Slight variations in the blanks will thus not affect the uniformity of the cartons after they have been set up. The plunger according to this invention is fully adjustable for a carton of any size. No parts of this machine must be substituted in order to set it up for cartons of various sizes, since every element of the machine is adjustable when necessary.

These and further objects will be evident from a study of the following disclosure taken in conjunction with the accompanying drawings which illustrate various forms of the invention. This description is not intended to limit or restrict the scope of the invention, since many mechanical variations could be introduced without deviating from the invention.

In the drawings:

FIGURE 1 is a front end view of one embodiment of the machine;

FIGURE 2 is a rear end view of the machine shown in FIGURE 1;

FIGURE 3 is a top view of the complete machine shown in FIGURE 1;

FIGURE 4 is a side view of the machine taken from the bottom of FIGURE 3;

FIGURE 5 is a side view of the machine taken from the top of FIGURE 3;

FIGURE 6 is an enlarged sectional view of a portion of the machine as seen along line **6—6** in FIGURE 5;

FIGURE 7 is an enlarged elevational sectional view seen along line **7—7** in FIGURE 3 showing the rear conveyors;

FIGURE 8 is a continuation of FIGURE 7 as seen along line **8—8** in FIGURE 3;

FIGURE 9 is an enlarged elevational view of a conveyor chain and sprocket showing the novel lug arrangement;

FIGURE 10 is a top view of the apparatus seen in FIGURE 9, looking down along line **10—10**;

FIGURE 11 is a sectional view taken along line **11—11** in FIGURE 9;

FIGURE 12 is an enlarged sectional view taken along line **12—12** in FIGURE 5;

FIGURE 13 is a sectional view taken along line **13—13** in FIGURE 12;

FIGURE 14 is a bottom view of the plunger assembly shown on an enlarged scale;

FIGURES 15 through 18 illustrate the operations of the invention; FIGURE 15 being a view taken along line **15—15** in FIGURE 3, and showing the feeding of carton blanks to the first conveyor;

FIGURE 16 is a view taken along line **16—16** in FIGURE 5 showing the application of glue to a carton blank;

FIGURE 17 is a view taken along line **17—17** in FIGURE 3, showing the motion of the plunger and the carton blank through the die;

FIGURE 18 is a top view taken along line **18—18** in FIGURE 5, showing the plunger fully received within the die while finishing a carton blank;

FIGURE 19 is a side elevation view showing a second embodiment of the invention;

FIGURE 20 is a side elevation view taken from the side opposite to that seen in FIGURE 19;

FIGURE 21 is a top view of the embodiment illustrated in FIGURES 19 and 20;

FIGURE 22 is an enlarged fragmentary side view of the glue apparatus as seen in FIGURE 20;

FIGURE 23 is an enlarged fragmentary view of the driving mechanism for the glue apparatus as seen along line **23—23** in FIGURE 22;

FIGURE 24 is an enlarged framentary view of the glue apparatus as seen along line **24—24** in FIGURE 22;

FIGURE 25 is an enlarged fragmentary view through the glue apparatus as seen along line **25—25** in FIGURE 21;

FIGURE 26 is an enlarged side view of the glue supply means as seen along line **26—26** in FIGURE 21;

FIGURE 27 is a plan view of a second form of tray blank;

FIGURE 28 is an elevation view of a completed tray formed from the blank shown in FIGURE 27;

FIGURE 29 is a view similar to FIGURE 12, showing the die apparatus as modified to accommodate the blank shown in FIGURE 27;

FIGURE 30 is a sectional view of the modified die and plunger apparatus as seen substantially along line **30—30** in FIGURE 29;

FIGURE 31 is a view similar to FIGURE 30, showing the plunger in a lower position relative to the die;

FIGURE 32 is an enlarged view of the movable bearing assembly seen along line **32—32** in FIGURE 29;

FIGURE 33 is a longitudinal sectional view taken along line **33—33** in FIGURE 32;

FIGURE 34 is a sectional view taken along line **34—34** in FIGURE 32; and

FIGURE 35 is a sectional view taken along line **35—35** in FIGURE 32.

First embodiment

A first emodiment of the invention, showing the application of glue by a spray arrangement, is illustrated in detail in FIGURES 1 through 18.

Referring now to the drawings, the general views of the machine are illustrated in FIGURES 1 through 5. The machine consists of a rigid supporting framework mounted on supporting legs **10** which are adapted to stand on a floor or other supporting surface. The lower portions of legs **10** have been broken off in many of the views in an attempt to utilize as large a scale drawing as possible. The framework includes a pair of longitudinal members **11** on each side of the machine and corresponding members **12** at each end of the machine. The framework further includes a pair of transversely spaced longitudinal guides **13** which are adjustably mounted on the rigid portions of the framework. Each guide **13** basically comprises an inwardly facing angle iron having an upright surface which, in use, will longitudinally guide the side edges of a carton blank being set up in the machine. The guides **13** are adjustably mounted on the framework by means of a rear brace **14**, intermediate supports **15** and a front end brace **16**. The guides **13** are parallel to one another and may be adjusted relative to the framework to vary the separation between them so as to accommodate carton blanks of various widths.

Throughout this description the front of the machine shall designate the end thereof shown in FIGURE 1, that is, the end toward which the carton blanks are moved during operation of the machine. Conversely the rear of the machine as seen in FIGURE 2, shall be the opposite end thereof, where the carton blanks begin the several operations.

Feed mechanism

At the rear of the machine is a rack adapted to store carton blanks. This may be best seen in FIGURES 2, 4, 5 and 7. This rack includes an adjustable rear upright member **17** which may be moved forwardly or rearwardly relative to the fixed portion of the framework. It also comprises laterally adjustable side supports **18** which are mounted on the longitudinal guides **13** and adjustable therewith. The rack is completed by front uprights **20** which are fixed to an overhead brace **21** which is fixed on the main framework members. The rack is provided with horizontal supporting rods **22** at the lower ends of uprights **17, 18** and **20**. The rods **22** are adapted to support the outer edges of the flat carton blanks stacked in the area bounded by the uprights **17, 18,** and **20**. Thus the storage rack will support a vertical stack of carton blanks in a controlled position spaced vertically above the supporting surfaces of guides **13**.

The flat carton blanks are adapted to be individually placed on the guides **13** by means of vacuum cups **112** which are mounted in a fixed cylinder assembly **108**. The cylinder assembly **108** is mounted on the framework

directly below the rack and between the guides **13**. The vacuum cups **112** can thus be moved upwardly or downwardly to grip the bottom surfaces of the lowermost carton blank in the stack and to carry that blank past the rods **22** and deposit it upon the guides **13**. The vacuum cups **112** are supplied with a vacuum pressure through line **113** which is connected to a breaker **114**. The vacuum breaker **114** is cam controlled, as will be described hereafter, and is connected to a suitable vacuum pump **115**, also mounted on the framework.

Conveyor mechanism

The carton blanks, after being placed on the guides **13**, must be moved longitudinally from the rear of the machine to its forward end. This movement is accomplished in two steps by separate conveyors. The rear conveyor is best seen in FIGURES 4, 5 and 7. It comprises a rear shaft **23** rotatably mounted by bearings **24** on the framework and a front shaft **25** rotatably mounted by bearings **26** on the framework. The bearings **26** are mounted on brackets **30** fixed to the member **11** of the framework. The position of each shaft **23** and **25** is fixed and no adjustment of these positions is required. Each shaft **23, 25** has two sprockets **29** fixed thereto in transversely spaced positions and each longitudinally aligned pair of sprockets **29** has an endless roller chain **27** entrained about them. The chains **27** each carry two tarnsversely aligned lugs **28** which project outwardly and which are spaced equally along the length of the two chains **27**. Thus each chain **27** has two working stations along its length where carton blanks may be individually abutted and pushed along a portion of the length of guides **13** by means of lugs **28**. The lugs **28** project outwardly beyond the supporting surface of the guides **13**.

The conveyor just described extends completely below the storage rack and slightly beyond this area, where the carton blanks are released from engagement with the lugs **28**. The second conveyor overlaps the length of the first conveyor and carries the carton blanks from this first intermediate position to a final position along the guides **13**. The second conveyor is longitudinally adjustable on the framework and is mounted on a movable frame which can be seen in FIGURE 6. This frame includes side rails **31** which are adjustably mounted on the longitudinal members **11** for sliding movement in a forward or rearward direction. The rails **31** are adapted to be secured to the remainder of the framework by means of bolts **36**. The two rails **31** are fixed to one another by means of cross braces **32** which extend across the width of the movable frame. The assembly is also strengthened by a front arch **33** connected across the tops of the rails **31**.

The conveyor comprises a rear shaft **34** rotatably journalled by bearings **35** and a front shaft **37** rotatably journalled by bearings **38**. The bearings **35** and **38** are fixed to the rails **31** and are adjustable along the framework along with the remainder of the movable frame. The shafts **34** and **37** each have two transversely spaced sprockets **42** fixed to them. The sprockets **42** have a pair of transversely spaced chains **40** entrained about them respectively. Each chain **40** also includes a pair of outwardly projected lugs **41** which extend above the supporting surfaces of guides **13**.

The two conveyors are driven by a common drive mechanism which can be seen in FIGURE 7. This mechanism includes a driving motor **43** and an intermediate transmission **44** which operates a driven chain **45** entrained about a sprocket **46** on a main shaft **47**. The shaft **47** is a transverse shaft and extends across the width of the framework. Mounted on the shaft **47** is a driving sprocket **48** which drives a chain **50** connected to a sprocket on the shaft **25** of the rear conveyor. Connected between the fixed shaft **25** and the longitudinally movable shaft **34** of the two conveyors is a connecting elbow **51** which transmits driving forces from the shaft

25 to the shaft 34. The elbow 51 allows free movement of the shaft 34 relative to the shaft 25 without disturbing the driving connection between the two conveyors.

Thus the conveyor system, according to this invention, is concerned with the movement of carton blanks from a first position directly below the storage rack where the carton blanks are deposited by the vacuum cups 112 to an intermediate position along the guides 13 at the front end of the rear conveyor chain 27 and finally to a final position at the forward ends of the chains 40. Each conveyor utilizes a working upper flight having lugs 28 or 41 which merely push against the rear edge of the carton blanks being moved thereby. It has been found that the lugs 28 or 41 must be projected beyond the supporting surfaces of guides 13 by a distance greater than the normal thickness of the carton blanks in order to accommodate curled edges and other deformities in the carton blanks. This creates a problem due to the tendency of the carton edges to catch on the forward surfaces of the lugs 28 or 41 as the lugs 28 or 41 come downwardly over the forward sprockets 29 or 42 respectively. This tendency of the lugs 28 or 41 to catch upon the carton blanks resulted in a non-uniform placement of the blanks in the intermediate and final positions along the guides 13. In order to remedy this defect the following lug assembly has been devised.

As seen in FIGURES 9, 10 and 11, a lug 28 is shown mounted on its supporting chain 27 entrained about a forward sprocket 29. These particular elements are exemplary only, and the same apparatus is utilized in connection with lugs 41, chains 40 and sprockets 42. Each of the chains 27 is a conventional roller chain comprised of links 52 connected by cross pins 53. The lugs 28 are rectangular metal projections which are mounted on brackets 54 carried at the sides of the links 52 at the desired positions. Mounted on the chain 27, forwardly of the lug 28 in the direction of travel of chain 27, is a side bracket 55. The bracket 55 is pivotally carried by a pair of adjacent cross pins 53 so that the bracket 55 will maintain a position tangential to the individual link 52 beside which is mounted. The bracket 55 pivotally carries a lever 56 which extends rearwardly slightly beyond the lug 28. The lever 56 is pivotally mounted about an axis parallel to the axes of the cross pins 53, and therefore parallel to the supporting shaft of the sprockets 29, by means of a bolt 60. The lever 56 has a smooth curved front surface 57 and has the back surface thereof adapted to abut a projecting stop 58 extending outwardly from the bracket 55 in a transverse direction. The stop 58 limits motion of the lever 56 in a rotational direction opposite to that of the sprocket 29.

The lever 56 is designed to pivot about an axis parallel to the axis of shaft 25 and to be raised upwardly from the chain 27 as chain 27 carries it downwardly over the forward surface of the sprocket 29. This raising of the lever 56 by the stop 58 is adapted to lift the rear edge of a carton from engagement with the lug 28 and to push the carton forwardly to an accurate longitudinal position on the guide 13. The lever 56 is designed so as to prevent engagement of the top corner of the lug 28 with the rear edge of the carton blank. The pushing position of the lever 56 is illustrated in FIGURE 9 and has been designated by the numeral 56*a*. The lever 56, after tangentially contacting the rear edge of the carton, then is free from engagement with the carton blank and falls to a free position designated by the numeral 56*b*. The lever 56 is entirely free to swing upwardly to a tangential position along the chain 27 should it engage a fixed brace or other member along the length of the conveyor. Likewise on the top flight of the conveyor chain 27 the lever 56 is free to swing upwardly in order to clear any obstacles or guides which might be contacted thereby. It has been found that this assembly makes accurate placement of the carton blanks possible and insures uniformity of the carton when finally set up by the apparatus described herein.

Glue apparatus

The carton blanks, after being fed from the storage rack, are adapted to be sprayed with a suitable glue or adhesive while at the intermediate position located on the framework at the forward ends of chains 27. Since the placement of the glue on the upper surface of each carton blank is critical to the quality of the carton, the position of the carton blank on the guides 13 must be accurately determined. This is assured by longitudinal guide rods 61 fixed to the guides 13 so that the side edges of each carton blank must pass between the supporting surface of guide 13 and rod 61 at each side of the carton blank. There is also provided a rear central guide 62 which is adjustable in height and mounted on brackets 30. This rear guide 62 aids in directing the forward edge of each carton blank as it approaches this intermediate position. There are also provided forward upper and lower guides 63 and 64 which are adjustably mounted on the framework, and between which the forward edge of each carton blank must emerge when leaving the intermediate position along the guides 13. The central area of each carton blank is vertically supported by adjustable guides 65 which are carried on the movable frame of the second conveyor and which are located adjacent the chains 40. The upper surface of each guide 65 will normally be substantially level with the supporting surface of the guides 13. By critical adjustment of these various guide members, one may accurately position each carton blank in the intermediate position of the framework.

The glue or adhesive is adapted to be sprayed on the carton blanks by means of a spray gun assembly, which may be seen in FIGURES 3, 4 and 5. The assembly is mounted on upright rods 66 fixed to the framework members 11. At the upper end of each rod 66 is a bracket 67. Each transverse pair of brackets 67 carries a cross rod 68 on which is mounted a pair of gun brackets 70. The glue guns 71 are conventional in manufacture and will not be described further herein. Each gun 71 includes a built in control valve operated by pneumatic valve controls which are not shown in detail in the drawings. The guns 71 are supplied with glue from a reservoir 75 by means of hoses 73 connected to a central valve 74 on a platform 72 carried between the cross rods 68. The reservoir 75 is supplied with air under pressure from a supply hose 76. Glue from the reservoir 75 is atomized and sprayed downwardly by the guns 71 when they have been triggered pneumatically. The longitudinal and transverse positions of each gun 71 is adjustable by manipulation of the bracket 67 and cross rods 68 so that the spray pattern may be varied to meet each job requirement.

Forming apparatus

The final position of each carton blank on the guide 13 is limited by an adjustable stop 77 mounted on each of the guides 13. Each carton blank is adapted to be pushed into engagement with the stops 77 by the lugs 41 of the second conveyor. The stops 77 are adapted to accurately position each carton blank above a die mechanism within which the carton itself is formed.

The die mechanism comprises a pair of longitudinal pivot shafts 78 which are adjustably mounted for transverse movement relative to the framework by means of bearings 80 connected to channels 81 of the framework. The lateral separation between the shafts 78 will depend upon the width of the carton blank being set up in the machine in each particular instance. The shafts 78 are provided with flap engaging members 83 fixed to longitudinally adjustable collars 84 mounted on each shaft 78. The collars 84 are non-rotatably mounted on the shafts 78 so that each shaft 78 and the members 83 mounted thereon must rotate about the shaft axis in unison. Each

member 83 is provided with a movable pad 85 resiliently mounted on pins 86 for movement toward or away from the axis of the shaft 78. Each member 83 further comprises a rigid upstanding ear 87 which is bent slightly outward along its outer edge, as may be seen in FIGURE 8. Each shaft 78 is biased to the position illustrated in FIGURE 8, by means of a coil spring 88 which rotates the shaft 78 into engagement with an adjustable stop 79.

Mounted at an elevation below the shafts 78 are a pair of cross shafts 90 which are circular in cross section. The shafts 90 are carried by bearings 91 mounted on upstanding brackets 92 adjustably connected to the rigid supporting framework. The brackets 92 include vertical walls 89 which have inwardly facing surfaces located tangentially relative to the inner surfaces of the shafts 90. The shafts 90 and brackets 92 are adjustable longitudinally and will normally be in a position so that the inner surface of wall 89 and the corresponding tangential surface of each shaft 90 will lie directly under the corner formed between the ears 87 and pad 85 of the respective members 83 when in their vertical positions. The area below the shafts 78 also is provided with side walls 93 which are adjustable in a transverse direction. The inner surface of each side wall 93 will normally be tangent to the outer surface of the pads 85 located above it when the pads 85 assume a vertical position about the axes of the shafts 78 upon which they are mounted. Thus a carton pushed past the shafts 78 and 90 will be in engagement with the walls 89 and 93.

In order to push the carton blank from its final position on the guides 13 and through the die mechanism mounted on shafts 78 and shafts 90, a plunger is provided, which can be seen in detail in FIGURES 8, 16, 17 and 18. This plunger comprises a cylinder 95 which is fixed to a supporting frame 94 so that the position of the cylinder 95 may be varied longitudinally relative to the framework. The movable piston rod 96 has a horizontal plate 98 fixed to its lower end and centered thereon. The plate 98 is merely a solid rectangular plate and is illustrated in dashed lines in FIGURE 14. The upper plate 98 mounts two middle plates 100 and four lower plates 101. The four lower plates 101 carry four angular vertical plates 97 which actually form the working outer surfaces of the plunger. The purpose of the plates 98, 100, and 101 is to allow complete adjustment of the positions of plates 97 so as to accommodate a rectangular carton blank of any size or relative shape. The outside surfaces of the plates 97 must conform exactly to the inner area of the bottom of the carton blank being set up.

The adjustment of plates 97 is accomplished by providing for adjustment of each plate 100 and 101 relative to the fixed plate 98 on the piston rod 96. A pair of bearings 102 are fixed to the plate 98 and extend downwardly therefrom. These bearings 102 rotatably mount shaft 103 which is threadably received by collars 104 fixed respectively to the split plates 100, the outlines of which are shown in FIGURE 14. Thus, by turning the shaft 103, one may vary the position of each plate 100 relative to the plate 98 in a direction parallel to the axis of shaft 103. After the length of the carton has been set by adjustment of the shaft 103, the width may be set by turning a shaft 107 at each side of the assembly. The shaft 107 is rotatably journalled by bearings 106 extending downwardly from each plate 100 and threadably received by brackets 109 on each of the plates 101. The three plates 98, 100 and 101 are connected by guide pins 105 which are fixed to the upper plate 98 and serve to aid in the positioning of the plates relative to one another. It is believed to be obvious that by means of this construction the plunger shape and size may be varied to meet each job requirement without necessitating the removal or replacement of the plunger mechanism.

In order to prevent upward movement of the carton after being pushed past the shafts 90, pivoted stops 116 are provided in each wall 89 of the die mechanism. These stops 116 may be seen in FIGURES 8 and 17. Each stop 116 is counterbalanced by a weight 118 so that the stops 116 will normally assume the position shown in FIGURES 8 and 17, but are free to pivot out of the way of the carton being pushed past them. Should the carton tend to move upwardly during upward motion of the plunger mechanism, the stop 116 will engage the top edge of the carton and prevent such motion.

Operation

The operation of this machine is not complicated and is believed to be somewhat evident from the above description. The basic operational steps are illustrated in FIGURES 15 through 18. As described above, all operating parts of this machine are fully adjustable so as to accommodate themselves to carton blank sizes which would normally be set up at a particular installation. Each carton blank designated in FIGURES 15 through 18 by the numeral 118, includes a bottom wall 119, a pair of scored side walls 120 and a pair of end walls 121. Each end wall 121 is provided with a scored flap 122 at each side thereof. Each carton blank 118 is normally manufactured in a flattened condition with the walls 120 and 121 scored and the flaps 122 cut and scored, as shown in FIGURE 16. The carton blanks 118 are stored in the machine in the storage rack between the uprights 17, 18 and 20, the lowermost carton blank 118 being supported on the rods 22. As seen in FIGURE 15, this lowermost carton blank 118 may be gripped by the vacuum cups 112 when the piston rod 110 has been elevated to the position illustrated in dashed lines in FIGURE 15. Downward motion of the piston rod 110 will then carry the foremost carton blank 118 past the rods 22 and place it on the upper supporting surface of each guide 13. The vacuum in the cups 112 is then released and the blank 118 rests freely on the guide 13.

The chains 27, which move continuously in the direction illustrated by the arrows in FIGURE 15, will then bring lugs 28 into engagement with the rear edge of the carton blank 118, resting on guides 13. Movement of the lugs 28 will carry the blank 118 to the intermediate position illustrated in FIGURE 15. At this position motion of the blank 118 will stop momentarily due to the timing between the chains 27 and 40. The lugs 41 are positioned so as to allow a slight delay between the placement of each blank 118 at the intermediate position and its subsequent travel to its final position. During this timed delay glue will be applied by means of guns 71 in a suitable pattern as illustrated at 123 in FIGURE 16. In order to provide a safety control during application of the glue, a sensing device 124 is mounted on the framework directly below the carton blank 118, and must be gripped as the glue apparatus is to be activated.

After the glue 123 has been applied to the upper surface of each side wall 120 adjacent the sides thereof, the carton blank 118 is carried by lugs 41 to its final position along the guides 13. This position will place the bottom wall 119 directly above the opening formed between the members 83 and shafts 90, and between the walls 89 and 93. The plunger plates 97 are then moved downwardly and engage the bottom wall 119. The first folding operation is illustrated in dashed lines in FIGURE 17 and is accomplished by the pushing of the blank 118 against the upstanding ears 87 of member 83. This action initially bends each flap 122 upwardly relative to the end wall 121 to which it is attached. Further movement of the plunger apparatus pushes the bottom wall 119 past the axes of the shafts 78 and pivots the members 83 to thereby fold the integral end walls 121 and flaps 122 relative to the bottom walls 119. Finally, the side walls 120 will engage between the plates 97 and shafts 90 and they too will be bent along their scored lines relative to the bottom wall 119. The clearance between the roller 90 and plates 97 is such that pressure will be applied perpendicular to the glue line separating each flap 122

and the inner surface of the side walls **120**. The carton will then be pushed downwardly past the stops **116** and the plunger will be retracted in preparation for the reception of the next carton. The successive cartons **118** will push themselves out the bottom of the die apparatus where they may be received by a conveyor or other suitable apparatus (not shown).

The three basic operations—feeding, application of glue, and the folding of the carton are carried on simultaneously at each station along the machine. Thus, while glue is being applied to the carton blank **118** at the intermediate position, another carton blank **118** is being formed in the die apparatus and a third carton blank **118** is being placed on the guides **13** by means of the vacuum cups **112**. The entire apparatus is controlled from the main shaft **47**. The vacuum breaker **114** is operated by a cam **125** mounted on the shaft **47** and partially seen in FIGURE 5. The remaining controls for the mechanism are not critical to the practice of this invention and therefore have not been shown in detail in the drawings. The cylinders **108** and **95** are preferably double acting pneumatic cylinders having a suitable length to carry out the functions described above. Each cylinder **95** and **108** is preferably controlled from the shaft **47** by suitable cams which may operate a relay control valve so as to time the motions of the cylinders **95** and **108** in relation to the other operations described. Similarly the controls for the guns **71** should also be cam operated from the shaft **47** in a timed relationship so that the glue **123** will be applied during the time at which the blanks **118** are stationary in the position along the guides **13**. Such controls are conventional in machines of this nature and would be obvious to a person in this field.

Thus the above machine provides a fully adjustable and highly accurate mechanism by which cartons may be glued along their side walls in a continuous fashion requiring no manual operations. The machine provides accurate placement of carton blanks regardless of minor deformities which may exist in individual blanks. The machine further provides a period of time between application of glue and the application of pressure to the glue line so that the glue may become "tacky" or partially set before the carton is set up. The machine provides a positive seal along each glue line and accurately controls the bending of each carton wall so that the final cartons are uniform in size and shape. It is simple to operate and repair and also easily adjusted to varying conditions.

Second embodiment

There is illustrated, in FIGURES 19 through 26 a second embodiment of this invention, having the same basic feed apparatus and forming apparatus, but utilizing a roller applicator for the glue necessary to secure the carton flaps. The glue application by a roll is desirable in instances where fast setting glues are usable, and allows greater variation of glue patterns and more accurate placement of the glue than is possible with a spray method. The following description will set out the changes in this second embodiment, the basic apparatus being merely generally described where it is identical or similar to that previously disclosed with regard to the first embodiment.

The feed mechanism used to supply carton blanks to the device is basically the same as previously described. The rack at the rear of the machine, which holds a vertical stack of flat carton blanks, includes an adjustable rear upright member **126** and laterally adjustable side supports **127** extending upwardly from longitudinal guides **128** that support the side edges of the carton blanks during movement along the length of the machine. The rack is completed by front uprights **130** mounted on a transverse brace **131** that is part of the main supporting framework. The carton blanks rest in the rack on horizontal rods **132** and are selectively pulled downwardly by vacuum cups **133** carried by a cylinder assembly **134** controlled as described above. This section of the machine is basically unchanged from that previously described.

Conveyor mechanism

In the embodiment of the machine, the carton blanks never stop until they are under the plunger that forms the final cartons. Unlike glues that are sprayed, the glues applied by this roll method are fast setting and do not require the hesitation built into the first embodiment of the invention. Therefore the conveyor system is greatly simplified, the main endless roller chains **141** being entrained over rear sprockets **137** carried by a shaft **135** rotatably journalled in bearings **136** on the framework. The chains **141** are carried over sprockets **140** on a front shaft which is mounted by bearings **138** on the framework. The endless roller chains **141** are provided with lug assembles **142** of the type described above. The conveyor in this embodiment is merely an endless and continuous upper flight conveyor that pushes each carton blank drawn downwardly by the cylinder assembly **134** from the rear of the machine to the front end thereof where it is positioned under the plunger and above the open die.

The conveyor is driven by a motor **143** through a transmission **144** and a main shaft **145** rotatably mounted on the framework. Fixed to the shaft **145** is a driven sprocket **146** which is turned by a chain **147** from the transmission **144**. A larger driving sprocket **148** operates a chain **150** which turns an idler shaft **151**. Idler shaft **151** in turn is connected to the front shaft of the carton conveyor by means of a chain **152**. Thus the endless chains **141** are pulled forwardly by the front sprockets **140**. This serves to maintain the upper flight of the chains in a horizontal position, without requiring any further support for the flights of chains.

Glue apparatus

The basic change in this embodiment of the invention involves the structure of the apparatus used for the application of glue, and more particularly involves the use of a roll device to transfer glue to the desired location on the carton blanks. Mounted across the top of the machine are two glue application rollers **153** fixed to a shaft **154** carried by bearings **155**. The means by which the bearings **155** are carried on the supporting framework will be described below. The rollers **153** each are adapted to carry a removable metal strip **156** that is wound about the periphery of the roller **153** as can be seen in FIGURE 25. One end of the strip **156** is engaged by projecting lugs **158** in an opening **157** formed across the rollers **153** and the remaining end of the strip **156** is similarly engaged on a pivot plate **159**. The plate **159** is positioned by a screw **160** so that thestrip **156** can be wrapped tightly against the outer surface of the roller **153** on which it is mounted. Placed on the strip **156** are resilient pads **161** that are the actual glue transferring portions of the rollers **153**. The spacing between the pads **161** about the periphery of the strip **156** will vary for each size carton and the adjustment for carton size is accomplished by replacing the strips **156** rather than by moving the rollers **153** along the length of the machine.

The bearings **155** are fixed to vertical mounting plates **162** at each side of the machine, as can best be seen in FIGURE 22. The plates **162** are slidably carried on the main supporting framework for adjustment along the length of slots **163** that can be seen in FIGURE 23. The mounting plate **162** is secured to the framework by means of two bolts **169** that project through the slots **163** and engage the plate **162** at each end of the shaft **154**. A positioning screw **164** is located at the lower end of the plate **162** and bears against the framework so that the height of the plate **162** can be accurately located and held in position for the tightening of the bolts **169**.

Glue is supplied to the pads **161** from a pair of transfer rolls **165** equal in width to the width of the individual

rollers 153 and the strips 156 carried thereon. The rolls 165 cooperate with glue reservoirs 166 which are adjustably carried by a mounting bracket 167 and adjustment screws 168 on a transverse shaft 171. This apparatus is shown in detail in FIGURES 25 and 26 and is rather conventional for applying a film of glue to a roller such as that shown at 165. By adjustment of the screws 168, the width of the glue film can be selected for proper flow, depending upon the viscosity of the glue, temperature conditions, etc. The shaft 171 is rotatably journalled by end bearings 170 as shown in FIGURE 22.

Shaft 171 and the glue reservoir 166 are supported on an arched frame 172 mounted on the main framework for vertical adjustment by means of slots 173 and locking bolts 174 that can be seen in FIGURES 19 and 20.

The rollers 153 and 165 are driven by a common chain 175 that is entrained about a driving sprocket on the main shaft 145, a driven sprocket 176 on the shaft 171, a driven sprocket 177 on the shaft 154 and an idler sprocket 178. The idler sprocket 178 as shown in FIGURES 22 and 23 is carried on an adjustable bracket 180 which is positioned by a screw 181 bearing against the fixed portion of the framework, and which is adjustable on the bearing mounting plate 152 by means of cooperative slots 182 and bolts 183.

The various adjustments in the drive mechanism for the rollers 153 and the transfer rolls 165, shown in detail in FIGURES 22 and 23, are necessary in order to provide the precise timing necessary for proper glue application. The rollers 153 must be timed relative to the conveyor mechanism so that the glue will be properly located and also so that the individual lug assemblies 142 will be received within the openings 157 of the roller 153. The peripheral distance around the roll 153 is therefore equal to the separation of the lug assemblies 142 along the length of the chains 141. Likewise, the distance between the rollers 153 and the discharge position of the carton blanks at the front of the machine is equal to the circumference of the rollers 153. The raising of the bearing mounting plate 162 when necessary to accommodate cartons of different thickness, requires the same adjustment of the arched frame 172, in order to provide proper contact between the transfer rolls 165 and the resilient pads 161. It also requires adjustment of the idler sprocket 178, in order to provide the same timed relationship relative to the conveyor chains 141.

The cartons are held in contact with the roller 153 for application of glue from the pads 161 by means of pressure wheels 184 mounted vertically in line with the rollers 153 on a shaft 185 supported by bearings 186. The bearings 186 are each carried on a mounting plate 187 adjustable in a vertical direction relative to the fixed framework of the machine by means of cooperative slots 188 and locking bolts 190, as shown in FIGURE 22.

Normally, pressure adjustments in the machine are accommodated by moving the mounting plate 187 rather than be disturbing the positioning and timing of the glue application rollers 153. In most instances, a pre-set status of the rollers 153 can be maintained, all pressure adjustments being made by varying the position of the pressure wheels 184.

As seen in FIGURE 24, the wheels 184 should straddle the pads 161 rather than be under them. This prevents transfer of glue from the pads 161 to the wheels 184 when the machine is operating without a carton blank between them. Sufficient pressure is forced through the corrugated carton blank without direct alignment of the pads 161 and wheels 184. The wheels 184 are preferably formed in a V-grooved configuration, so as to minimize possible contact for reception of glue, thereby reducing maintenance of the machine.

The glue apparatus of this second embodiment produces basically the same application of glue as that previously described and will normally be used to place two strips of glue on a carton blank 119 (FIGURE 16) along the basic area of end walls 122 that was previously shown as applied at 123. The two strips would be engaged along the two edges of the flaps 122 when folded, so as to positively provide a seal between the end walls 120 and the flaps 122. Any configuration of glue desired can be applied to the carton blank, by simply varying the shape and size of the pads 161.

As the rollers 153 and rolls 165 rotate, the pads 161 will be pressed against the transfer roll 165 and will have a layer of glue adhere to them. The pads 161 will then press against the surface of a carton blank located between rollers 153 and wheels 184 and will transfer the glue to the carton blank. This provides accurate placement of glue on a carton blank 119 (FIGURE 16) along the basic must be of a type that will set up quickly enough so as to be ready for assembly when the carton reaches the ends of the chains 141.

The forming apparatus shown in FIGURES 19 through 21 is identical to that previously described relative to the first embodiment of the invention, and the same numerals have been used to designate the essential parts thereof. The carton is formed in the die in precisely the same manner, and no further description of this part of the machine is deemed to be necessary.

Modified carton shape

The open trays shown and described previously are used widely for packing bottles, cans, and other forms of containers for shipping and storage purposes. There are also widely used open trays or baskets for the merchandising of fresh fruits and similar articles. These trays normally have corners that are not upright, but which are slanted outwardly so that the top of the tray is wider than the bottom. A carton of this type is illustrated in FIGURES 27 and 28. In FIGURE 27 the flat carton blank is shown, including a bottom wall 191, side walls 192, end walls 193 and flaps 194. The blank is scored at 195 between the bottom wall 191 and the side walls 192. It is also scored along line 196 between the bottom wall 191 and the end wall 193. The flaps 194 are joined to the end walls 193 by means of a scored section 197.

In order to secure the carton in its final shape shown in FIGURE 28, glue is applied along the area 198 of each side wall 192, and the flaps 194 must be folded inwardly so as to abut the inside surface of the adjacent side wall 192, to which glue has been previously applied. The following description is concerned with a modification of the above described die and plunger apparatus, adapted to accommodate the form of tray illustrated in FIGURES 27 and 28, with side walls that are not normal to the bottom wall.

The modified die mechanism comprises a pair of longitudinal pivot shafts 78' which are adjustably mounted for transverse movement relative to the framework by means of bearings as described above. The separation between the shafts 78' will be determined by the maximum width of the carton blank being set up in the machine. In the case of a trapezoidal tray or carton as seen in FIGURES 27 and 28, the separation between the inner surfaces of the shafts 78' will be slightly greater than the top width of the carton or tray.

A pair of square shafts 78' are provided with flap engaging members 82' slidably mounted thereon by means of collars 84'. The shafts 78' are provided with inner stops 200 which limit the minimum separation between the respective shafts 78'. The stops 200 are adapted to be abutted by means of the collar 84'. Compression springs 201, which surround the respective shafts 78', bias the collars 84' and the members 83' toward one another along the shaft, and abut outer collars 202 which are fixed to the respective shafts 78'. Thus the members 83' can yield outwardly for motion relative to the length of the respective shafts 78' upon which they are mounted.

The collars 84' are non-rotatably mounted on the shafts 78' so that the members 83' mounted thereon must ro-

tate about the shaft axes in unison. Each member 83' is provided with a resiliently mounted pad 85' and a rigid upstanding ear 87' that has been described above. The shafts 78' are biased to the position illustrated in FIGURE 29 in the same manner as described with regard to the first embodiment of this invention.

The spacing of the shafts 78' on the supporting framework must be such that the separation between the inner surfaces of the pads 85', when turned about the shaft axes to positions wherein the pad surfaces are parallel to one another, is equal to the exterior maximum width across the carton end walls 193 engaged thereby. In this way, the folded walls 193 are enabled to pass the shafts 78' and members 83'. As can be seen in FIGURE 29, the orientation of the corner formed between the ears 87' and the pads 85' is such that it is directly below the scored lines 197 which join the flaps 194 and the end walls 193. Thus, as the carton blank is pushed downwardly through the die, the ears 87' will first fold the flaps 194 relative to the end walls 193, and then the shafts 78' will be caused to rotate, whereby bending the folded flaps 194 and the end walls 193 relative to the bottom wall 191. This movement will bring the carton blank to the position illustrated in FIGURE 30.

In this form of the invention, it is necessary that the plunger, denoted generally by the numeral 203, be formed in a shape complementary to the desired inside configuration of the final carton or tray. In the instance of the tray illustrated in FIGURES 27 and 28, the plunger 203 will have a trapezoidal configuration with external measurements equal to the internal carton measurements. It is also necessary that the walls of the plunger 203 be extended normally beyond the angular portions so as to retain the members 83' in their outward positions during the continued motion of plunger 203 to complete the folding of the carton as seen in FIGURE 31. The plunger 203 can also be adjustable in this instance, in the same manner as was previously indicated relative to the first embodiment of the invention.

Mounted at an elevation below the shaft 78' in the direction of movement of the plunger 203 during the forming of a carton, are a pair of cross shafts 90', which are circular in cross section. The shafts 90' are carried by bearings 91' mounted on upstanding brackets 92' adjustably connected to the rigid supporting framework. The brackets 92' carry vertical walls 89' which have inwardly facing surfaces located tangentially relative to the inner surfaces of the shafts 90' when moved outwardly to their position of maximum separation. The shafts 90' are yieldably mounted on the supporting framework, as will be presently described. Brackets 92' are adjustable on the framework, and will normally be at a location such that the inner surface of the wall 89' and the corresponding tangential surface of each shaft 90' when in its outer position will lie directly under the corner formed between the ears 87' and pad 85' of the respective members 83' when in their vertical or parallel positions. The area below the shafts 78' also is provided with side walls 93' which are adjustable in a transverse direction. The inner surface of each side wall 93' will normally be tangent to the outer surface of the pad 85' located above it when the pad 85' assumes a vertical position about the axes of the shafts 78' on which they are mounted. Thus a carton or tray pushed past the shafts 78' and 90' will engage the walls 89' and 93' along its top edges.

The mounting apparatus for the shafts 78' can best be seen in FIGURES 32 through 35. Mounted on the upstanding brackets 92', which are provided with slotted openings, are bearing tracks 204. The tracks 204 are located perpendicularly to the final position of wall 192 which is to be engaged by the respective shaft 78' carried on the bearing 91' slidably mounted thereon. The bearings 91' are carried by the tracks 204 for movement in this perpendicular direction relative to the final wall surface.

Each bearing 91' has fixed thereto a longitudinal rod 205, which slides freely within an externally threaded collar 206 threadably engaged within an aperture formed through an end bracket 209 fixed relative to the tracks 204. Surrounding the rod 205 and abutting both the bearing 91' and the collar 206 is a compression spring 207. The spring 207 urges the bearing 91', and the respective shaft 78' carried thereby, to the center of the die, as can be seen in FIGURES 30 and 31.

The movements of each bearing 91', due to compression springs 207, is limited by means of a locking nut 208 threadably engaged on the outer end of the respective rod 205. The amount of force exerted by the springs 207 can be varied by turning the individual collars 206 relative to the brackets 209 by means of integral heads 210. Thus this resilient bearing mounting apparatus allows accurate positioning of the inner location of each bearing 91' and allows one to select the amount of compressive force at each bearing 91' by means of the respective springs 207.

Operation

The operation of this form of the device is basicaly similar to that described relative to the first embodiment of the machine. The individual carton blanks are positioned as described with relation to the first embodiment of the invention, thereby centering them above the die apparatus. The plunger 203 is then moved downwardly from the retracted dashed line position illustrated in FIGURE 30, causing the flaps 194 to first bend, and then progressively bending the end walls 193 along the scored lines 196 to their positions shown in full lines in FIGURE 30. At this position the end walls 193 are in their final folded position, and the flaps 194 are then at least partially bent along their scored lines 197.

Further movement of the plunger 203 will retain the end walls 193 in their folded positions, as they slide through the members 83', and will cause the side walls 192 to be engaged by the shafts 90'. The shafts 90' will yield under the compression of springs 207, to accommodate the increasing width of the carton as it is pushed past them. The compressive force exerted by these springs 207 is sufficient to insure proper contact of the glued surfaces 198 between the side walls 192 and the previously bent flaps 194. The downward movement of the plunger will continue to the position shown in FIGURE 30, where the carton has been completely folded and glued, and will continue slightly past this position to a location wherein the top edges of the carton have been engaged by pivoted stops 116' that strip the carton from the plunger 203 during upward movement of the plunger 203, as described before.

Under some circumstances where the end walls 193 are progressively enlarged along a curved line corresponding to the scored line 196, the shafts 78' must also be resiliently mounted on a framework in the same manner as has been illustrated with regard to shafts 90'. This modification is believed to be evident from the description given herein, and is exemplary of many obvious changes that might be necessary in order to accommodate various forms of cartons or trays using the present invention. Because many modifications are necessary and are quite obvious in order to adopt the invention to a particular application, the above examples of the invention are not intended to limit or restrict the scope of this application, except as it is defined in the following claims.

Having thus described my invention, I claim:

1. A carton setting up machine for carton blanks having a central bottom wall bounded by opposed pairs of scored side walls and end walls, the end walls each being provided with scored flaps at each side thereof, comprising:

a rigid supporting framework;

conveyor means on said framework to transfer carton blanks along the length thereof;

means on said framework to apply glue to a carton

blank on said conveyor means along the inner surfaces of each side wall adjacent the side edges thereof;
die means mounted on said framework at the discharge end of said working flight;
and a complementary plunger mounted on said framework at the discharge end of said working flight, said plunger being movable through said die means in cooperation therewith to effect successive folding of the scored flaps, end walls and side walls and to compress the portions of said flaps and side walls separated by a glue line in a direction perpendicular to the plane of the glue line;
said die means comprising:
first and second pairs of opposed members pivotally mounted on said framework about respective axes parallel to the scored lines between the end walls and bottom wall of a carton blank delivered by said conveyor means, said axes being in a plane parallel to the bottom wall, the members of each pair of opposed members being mounted in aligned positions, each member of each pair having a first element directed inwardly toward one another and parallel to said axes and a second element intersecting the outer edge of said first element to form inwardly facing corners, the corners being located along the scored lines between the carton flaps and the walls to be bent thereby, the aligned first elements being spaced apart, when parallel to one another, by a distance equal to the distance separating the top edges of the walls bent thereby during downward movement of the plunger;
and a pair of shafts mounted on said framework for rotation about parallel axes perpendicular to the pivotal axes of said pairs of opposed members, said shafts being rotated beyond said opposed members in the direction of motion of said plunger, the closest separation between said shafts being equal to the separation of the scored lines of the side walls of a carton blank.

2. A carton setting up machine for carton blanks having a central bottom wall bounded by opposed pairs of scored side walls and end walls, the end walls each being provided with scored flaps at each side thereof, comprising:
a rigid supporting framework;
conveyor means on said framework to transfer carton blanks along the length thereof;
means on said framework to apply glue to a carton blank on said conveyor means along the inner surfaces of each side wall adjacent the side edges thereof;
die means mounted on said framework at the discharge end of said working flight;
and a complementary plunger mounted on said framework at the discharge end of said working flight, said plunger being movable through said die means in cooperation therewith to effect successive folding of the scored flaps, end walls and side walls and to compress the portions of said flaps and side walls separated by a glue line in a direction perpendicular to the plane of the glue line;
said die means comprising:
a first pair of shafts pivotally mounted on said framework about axes parallel to the scored lines between the end walls and bottom wall of a carton blank delivered by said conveyor means, said axes being in a plane parallel to the bottom wall;
a pair of opposed members mounted on each shaft in aligned positions, each member of each pair having a first element directed inwardly toward one another and parallel to said axes and a second element intersecting the outer edge of said first element to form inwardly facing corners, the corners being perpendicular to one another and spaced from one another along each shaft by a distance equal to that separating the scored lines of the flaps on each end wall of a carton blank, the aligned first elements on the pair of shafts being spaced apart when parallel, by a distance equal to the separation of the scored lines of the end walls of a carton blank;
and a second pair of shafts mounted on said framework for rotation about parallel axes perpendicular to the axes of said first pair of shafts and located beyond said first pair of shafts in the direction of motion of said plunger, the closest separation between said second pair of shafts being equal to the separation of the scored lines of the side walls of a carton blank.

3. A carton setting up machine for carton blanks having a central bottom wall bounded by opposed pairs of scored side walls and end walls, the end walls each being provided with scored flaps at each side thereof, comprising:
a rigid supporting framework;
conveyor means on said framework to transfer carton blanks along the length thereof;
means on said framework to apply glue to a carton blank on said conveyor means along the inner surfaces of each side wall adjacent the side edges thereof;
die means mounted on said framework at the discharge end of said working flight;
and a complementary plunger mounted on said framework at the discharge end of said working flight, said plunger being movable through said die means in cooperation therewith to effect successive folding of the scored flaps, end walls and side walls and to compress the portions of said flaps and side walls separated by a glue line in a direction perpendicular to the plane of the glue line;
said die means comprising:
a first pair of shafts pivotally mounted on said framework about axes parallel to the scored lines between the end walls and bottom wall of a carton blank delivered by said conveyor means, said axes being in a plane parallel to the bottom wall;
a pair of opposed members mounted on each shaft in aligned positions, each member of each pair having a first element directed inwardly toward one another and parallel to said axes and a second element intersecting the outer edge of said first element to form inwardly facing corners, the corners being located along the scored lines between the carton flaps and walls to be bent thereby, the aligned first elements on the pair of shafts being spaced apart, when parallel to one another, by a distance equal to the distance separating the top edges of the walls bent thereby during downward movement of the plunger;
and a second pair of shafts mounted on said framework for rotation about parallel axes perpendicular to the axes of said first pair of shafts and located beyond said first pair of shafts in the direction of motion of said plunger, the closest separation between said second pair of shafts being equal to the separation of the scored lines of the side walls of a carton blank.

4. A carton setting up machine for carton blanks having a central bottom wall bounded by opposed pairs of scored side walls and end walls, the end walls each being provided with scored flaps at each side thereof, comprising:
a rigid supporting framework;
conveyor means on said framework to transfer carton blanks along the length thereof;
means on said framework to apply glue to a carton

blank on said conveyor means along the inner surfaces of each side wall adjacent the side edges thereof;

die means mounted on said framework at the discharge end of said working flight;

and a complementary plunger mounted on said framework at the discharge end of said working flight, said plunger being movable through said die means in cooperation therewith to effect successive folding of the scored flaps, end walls and side walls and to compress the portions of said flaps and side walls separated by a glue line in a direction perpendicular to the plane of the glue line;

said die means comprising:

a first pair of shafts pivotally mounted on said framework about axes parallel to the scored lines between the end walls and bottom wall of a carton blank delivered by said conveyor means, said axes being in a plane parallel to the bottom wall;

a pair of opposed members mounted on each shaft in aligned positions, each member of each pair having a first element directed inwardly toward one another and parallel to said axes and a second element intersecting the outer edge of said first element to form inwardly facing corners, the corners being located along the scored lines between the carton flaps and walls to be bent thereby, the aligned first elements on the pair of shafts being spaced apart, when parallel to one another, by a distance equal to the distance separating the top edges of the walls bent thereby during downward movement of the plunger;

and a second pair of shafts yieldably mounted on framework for rotation about axes perpendicular to the axes of said first pair of shafts, said second pair of shafts being located beyond said first pair of shafts in the direction of motion of said plunger, said second pair of shafts being biased inwardly toward one another in directions perpendicular to the final orientation of the carton walls engaged thereby, the minimum separation between said second pair of shafts being the width of the carton bottom.

5. A carton setting up machine comprising:

a rigid supporting framework;

carton blank storage means adapted to support a stack of flat carton blanks;

first conveyor means on said framework extending from a location adjacent said storage means, said

conveyor means having a working flight adapted to transfer carton blanks along its length to an intermediate location on said framework;

means on said framework adapted to individually transfer carton blanks to said first conveyor means for transfer by the working flight thereof;

glue means located on said framework adjacent the intermediate location on said framework adapted to apply glue to selected surface areas of a carton blank located at the intermediate location;

second conveyor means on said framework to a final location on said framework, said first and second conveyor means being timed relative to one another so as to allow a pause in the motion of each carton blank prior to transfer thereof of said second conveyor means;

and cooperative die and plunger means mounted on said framework at the final carton blank position adapted to progressively bend the carton walls and to apply pressure to the glued surfaces thereof;

said conveyor means comprising:

first and second parallel shafts mounted on said framework, the shafts of said first and second conveyor means having parallel axes and being in overlapping positions along said framework;

transversely spaced chains wrapped continuously about sprockets on said first and second shafts;

longitudinal guide means located at each side of said framework adjacent corresponding flights of said first and second conveyor means adapted to support and guide the transverse side edges of a carton blank being transferred by said conveyor means;

a plurality of aligned lugs fixed to said chains and projecting outwardly beyond the supporting surfaces of said guide means;

and pivotable release means mounted on each chain adjacent each lug adapted to release a carton blank from engagement with the lug associated therewith as the lug passes over a sprocket at the end of the chain flight.

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