

Feb. 14, 1939.

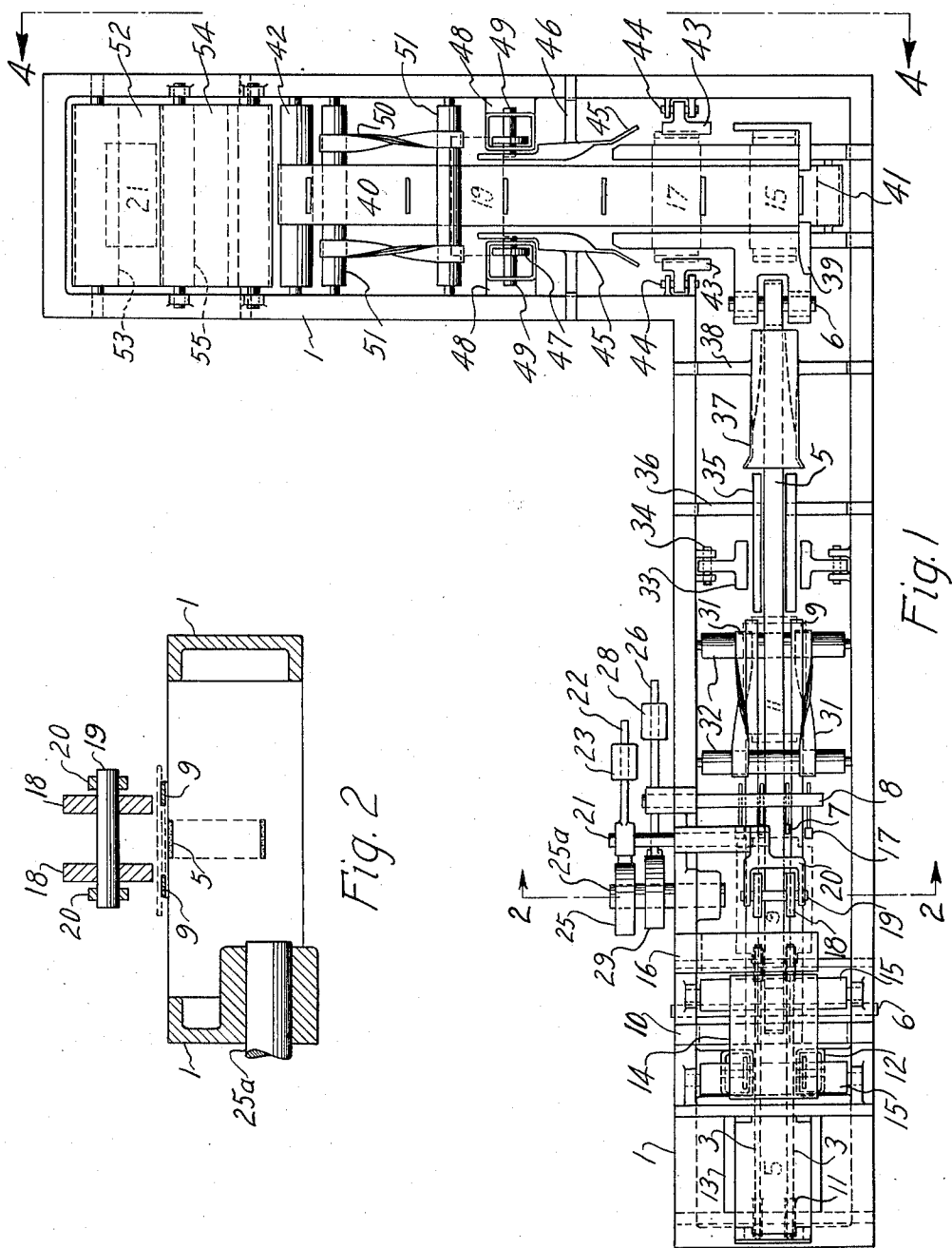
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2,147,614

METHOD AND MACHINE FOR MAKING COVERED FOLDING BOXES

Filed Oct. 8, 1937

5 Sheets-Sheet 1



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METHOD AND MACHINE FOR MAKING COVERED FOLDING BOXES

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5 Sheets-Sheet 2

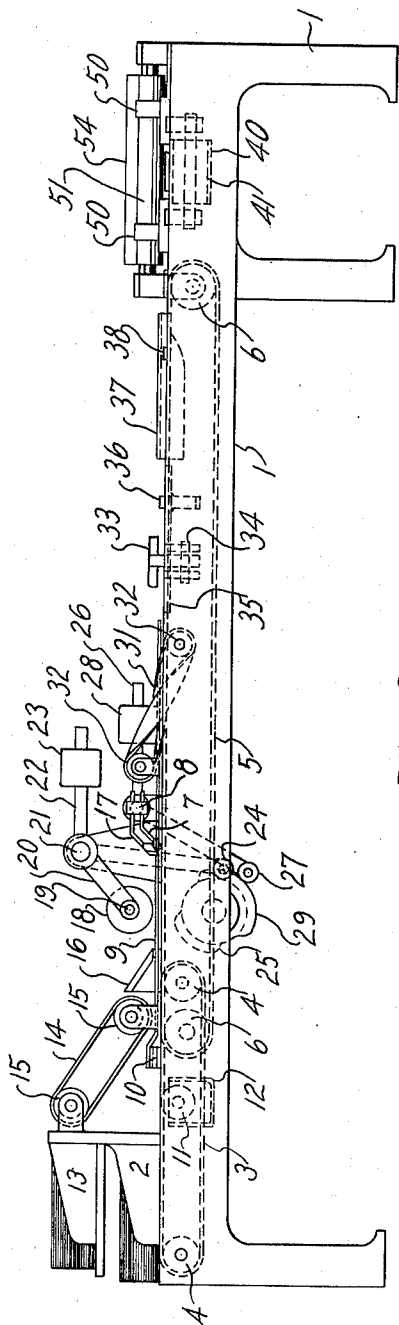


Fig. 3

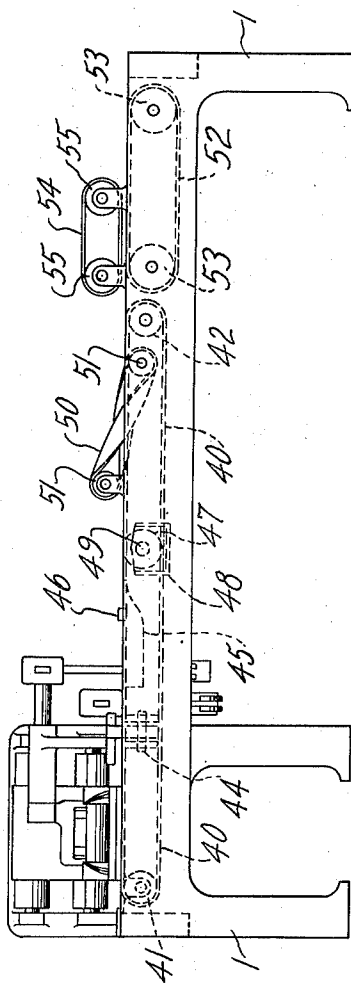


Fig. 4

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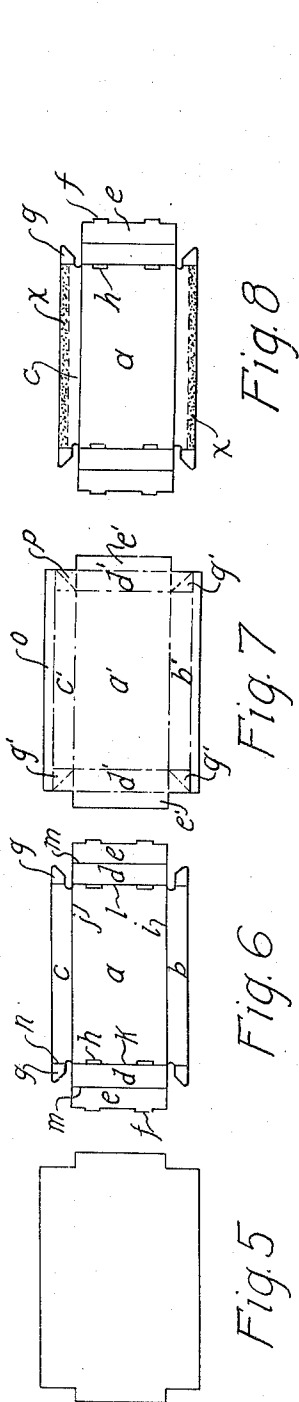
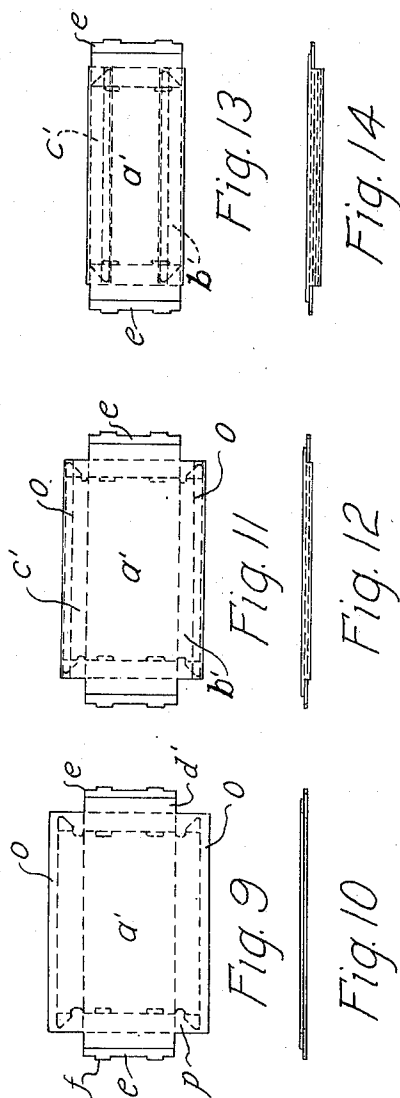
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METHOD AND MACHINE FOR MAKING COVERED FOLDING BOXES

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5 Sheets-Sheet 3



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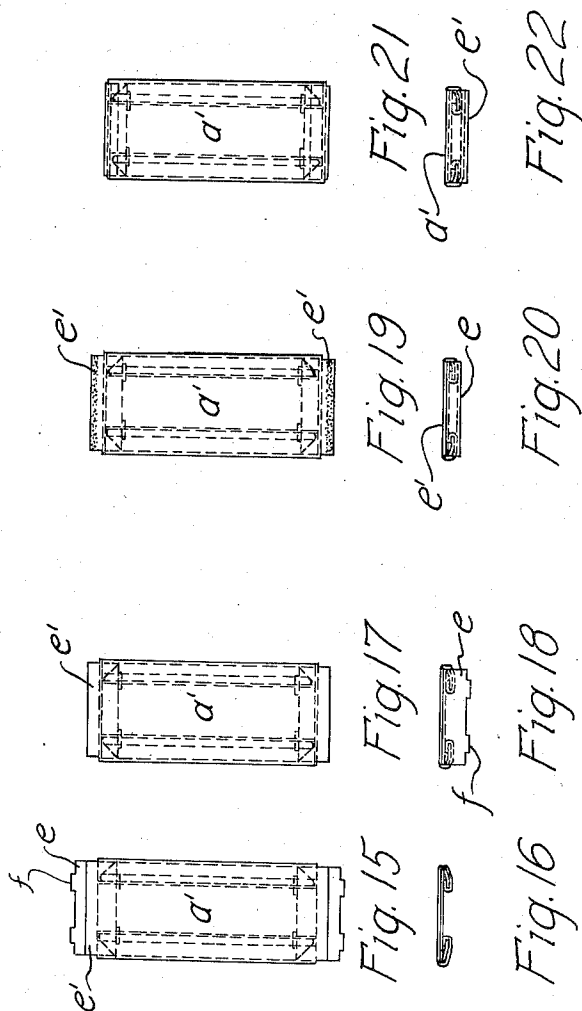
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METHOD AND MACHINE FOR MAKING COVERED FOLDING BOXES

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5 Sheets-Sheet 4



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METHOD AND MACHINE FOR MAKING COVERED FOLDING BOXES

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5 Sheets-Sheet 5

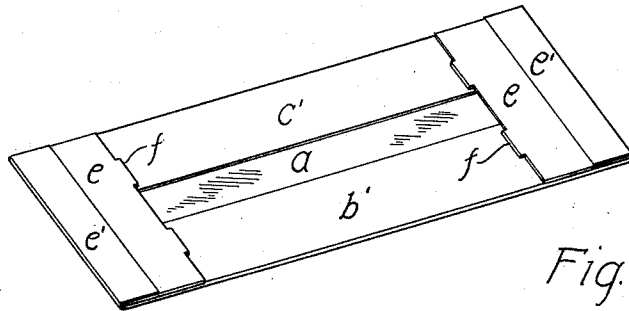


Fig. 23

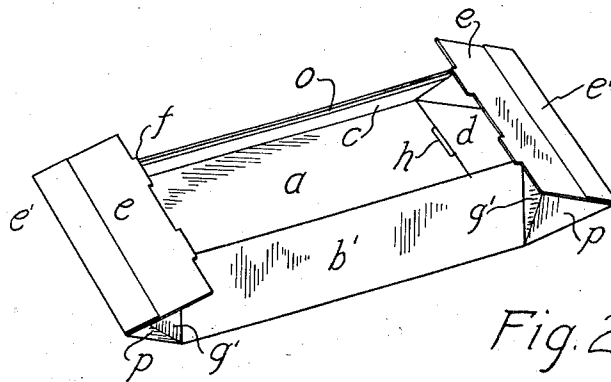


Fig. 24

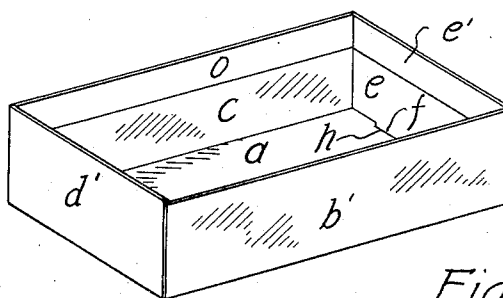


Fig. 25

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UNITED STATES PATENT OFFICE

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METHOD AND MACHINE FOR MAKING
COVERED FOLDING BOXES

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Application October 8, 1937, Serial No. 168,127

11 Claims. (Cl. 93—40)

This invention relates to the manufacture of covered paper boxes of the type commonly known as "loose wrap", "knock-down" wall boxes which are furnished to the trade in flat or collapsed condition for the purpose of saving space in store rooms and in stores where they are to be used, and also for saving transportation costs. Such boxes are "set up" as they are needed for use, and when set up have upright walls.

In general the method for making the box and the operation of the machine consists in superposing a sheet of cover or wrapper material upon a sheet of shell material and adhesively connecting said sheets, then folding the assembly to "knocked-down" box form.

Heretofore, so far as I am aware, boxes of this type have not been manufactured completely by automatic machinery.

One object of this invention is to provide a method and machine by which covered paper boxes may be rapidly produced by automatic machinery.

Another object of this invention is to provide a method and machine for making loose wrapped paper boxes in collapsed condition, whereby sufficient slack is provided in the cover material so that the cover material will not bind or break on the fold lines.

Other more specific objects and advantages of the invention will be apparent to persons skilled in the art as the same becomes better understood by reference to the following description, taken in connection with the accompanying drawings, in which I have illustrated one practical embodiment of the invention, and wherein:—

Figure 1 is a plan view of the entire machine.

Figure 2 is a partial section at 2—2 of Figure 1.

Figure 3 is a front elevation of machine shown in Figure 1.

Figure 4 is a side elevation at 4—4 of Figure 1.

Figures 5 to 22 inclusive illustrate the progressive steps of the method and the operations performed by the machine in the production of the box from a shell blank and a cover blank.

Figure 5 is a plan view of the cover blank.

Figure 6 is a plan view of the shell blank.

Figures 7 and 8 illustrate the relation of the cover material and the shell material as they approach the position of register, the shell blank having had a stripe of adhesive applied to each of the under outside edges thereof in its advance from the supply stack.

Figure 9 is a plan view of the cover blank and shell blank in superposed relation.

Figure 10 is a front elevation of Figure 9.

Figure 11 illustrates the condition of the blank assembly after front and rear margins of the cover blank have been folded over and into contact with the previously applied glue stripes on the shell blank.

Figure 12 is a front elevation of Figure 11.

Figure 13 shows the condition of the blank assembly after the front and rear wall portions thereof have been folded against center areas of the shell blank.

Figure 14 is a front elevation of Figure 13.

Figure 15 is the same as Figure 14 turned at an angle of 90 degrees to show the relative position of the blank at the transfer position with the position of the blank assemblies shown in Figures 17, 19 and 21.

Figure 16 is a front elevation of Figure 15.

Figure 17 is a plan view of the blank assembly after the end wall flap sections of the shell blank have been bent downward and thus separated from the corresponding sections of the cover blank.

Figure 18 is a front elevation of Figure 17.

Figure 19 is a plan view of the blank assembly after the end wall flaps of the shell blank have been folded flat against the underside of the blank assembly. This view also shows areas of the cover blank to which adhesive has been applied, the said adhesive is applied to the underside of the said cover blank.

Figure 20 is a front elevation of Figure 19.

Figure 21 is a plain view of the completed box in collapsed condition.

Figure 22 is a front elevation of Figure 21.

Figure 23 is a perspective view at a larger scale of the completed box in collapsed condition.

Figure 24 is a perspective view illustrating the box in partially erected condition.

Figure 25 is a perspective view of the box in erected position, tilted at an angle to show a portion of the interior thereof.

It will aid toward an understanding of the operation of the machine and of the method of fabricating the box, to first explain the action of the machine which effects the production of the completed box in collapsed condition from a cut and scored shell blank and a suitably cut sheet of cover material.

Figure 6 illustrates the cut and scored shell blank wherein scored lines are indicated by lines *i*, *j*, *k*, *l*, *m* and *n*. The said scored lines effect a division of the blank to form a bottom section *a*,

a front wall section *b*, a rear wall section *c*, end wall sections *d*, end wall flaps *e*, end wall flap lugs *f*, and front and rear wall extension flaps *g*. Cut outs *h* are provided to retain flap lugs *f* when the box is set up for use. Figure 7 illustrates the cover blank which provides the wrapper for the shell blank. Dash lines are shown to illustrate the position of the cover sheet with relation to the shell blank when they are assembled together. Sections of the cover blank marked *a'*, *b'*, *c'*, *d'*, *e'* and *g'* are respectively adjacent to sections of the shell blank marked *a*, *b*, *c*, *d*, *e* and *g* respectively. Sections *o* of the cover blank serve as the attaching means for securing the cover blank to the shell blank. Figure 8 illustrates the condition of the shell blank after adhesive has been applied to the underside of the front and rear walls. The said adhesive is applied to the shell blank while it is being conveyed from the supply stack to the position where it is registered in subtended relation with the cover blank. Figure 9 illustrates the relation of the shell blank with the cover blank at the position of register. Figure 11 shows the condition of the blank assembly after sections *o* of the cover blank have been folded over the edges of the front and rear wall sections of the shell blank to contact the adhesively treated areas of the said shell blank. Figure 13 illustrates the condition of the blank assembly after the front and rear margins thereof have been folded downward and up against center areas of the said blank assembly. The blank assembly is then conveyed to the transfer position from which the blank is advanced to devices which bend end wall flaps of the shell blank downward and at right angles to sections *e'* of the cover blank. Adhesive applying devices then operate to apply adhesive to the underside of said sections *e'* of the cover blank. Folding devices then operate to fold the end wall flaps *e* of the shell blank against the underside of the blank assembly adjacent to the end wall sections. Folding devices then fold sections *e'* of the cover blank against the corresponding end wall flaps *e* of the shell blank and become adhesively secured thereto by means of the previously applied adhesive, thus completing the box in collapsed condition.

Referring to Figure 1, which shows a plan view of the entire machine, some of the positions of the blank assemblies are indicated by dotted lines where the dotted numerals 5, 9, 11, 15, 17, 19 and 21 appear. These dotted numerals are employed because at those points of the machine the blank assemblies are in substantially the condition shown by Figures 5, 9, 11, 15, 17, 19 and 21. In other words, each blank assembly when it reaches the position indicated by dotted numeral 11 (Fig. 1) is substantially as shown in Figure 11; when the blank assembly reaches position 15, it is substantially as shown by Figure 15; and so on until when it reaches position 21 it is substantially as shown by Figure 21. The timing is such that when the machine is in operation different parts of the machine are operating simultaneously on blank assemblies which are spaced about as indicated by the dotted line indications of the blank assemblies in Figure 1. In other words, while one part of the machine is performing an operation on one blank assembly other parts of the machine are at the same time performing other operations on other blanks, all of said blank assemblies following one another progressively through the machine and are delivered therefrom as complete boxes in collapsed condition as shown in Figure 21.

It will be readily understood, without need of illustration, that any suitable motor may be employed for operating the machine, and that suitable gearing is employed in practice to cause the various rolls and shafts to rotate and operate at uniform peripheral speed to effect feeding and registering of the blanks, and to effect travel of the blank assemblies through the machine and to operate the various devices which act on the blank assemblies in the sequence described.

The base of the machine consists of frame 1 (Figs. 1, 3 and 4), suitable bearings and brackets are provided in said frame for attaching the different mechanisms thereto.

Shell blanks which have been shaped, creased and cut, as illustrated by Figure 6 and more fully described above, may be cut, creased and scored by any of the well known methods in common use in the art. Shell blanks of the shape above described are delivered successively from a feed table 2 to feed belts 3 carried by rolls 4 journaled in frame 1 (Figs. 1 and 3). Said feed belts 3 deliver the shell blanks to conveyor belt 5 driven by rolls 6 journaled in frame 1 and transfer table 39. Conveyor belt 5 advances the shell blank until the forward edge thereof contacts the register lugs 7 adjustably secured to shaft 8 journaled in frame 1. In so advancing the shell blank to register lugs 7 the said shell blank is caused to take a position under spacer strips 9 supported by bar 10 secured to frame 1. In the passage of the shell blank from the feed table 2 to the conveyor belt 5 the shell blank is caused to pass over glue wheels 11 rotatably mounted in glue pots 12 secured to frame 1. In so passing over said glue wheels 11 adhesive is applied to the edges *x* (Fig. 8) of the shell blank. Said wheels are coated with adhesive by causing them to rotate in liquid adhesive contained in said glue pots 12.

Cover blanks which have been cut and shaped, as indicated in Figure 5, may be cut by any of the well known methods in common use in the art. The said cover blanks are usually made of fairly thin material and do not require creasing or scoring operations to precede the folding operations, but if the cover material is made of heavy or thick material it is desirable to have the said cover blanks creased or scored prior to folding. The said cover blanks are delivered successively from feed table 13, supported by frame 1, to feed belt 14 supported by rolls 15 journaled in frame 1. From said feed belt 14 the cover blanks pass over the guide 16 secured to frame 1, and come to a position of rest when the forward edge thereof contacts register lugs 17 adjustably secured to arm 8 journaled in frame 1. In so advancing the cover blank to register lugs 17 the said cover blank is caused to take a position above the spacer strips 9 supported by bar 10 secured to frame 1. The timing of the feeding devices which feed the shell blank and the cover blanks is such that a shell blank and a cover blank arrive at the register lugs 7 and 17 with each cycle in the operation of the machine. At the said position of register the cover blank is superposed upon the shell blank as shown in Figure 9, but it will be noted that spacer strips 9 separate the cover blank from the shell blank. When a shell blank and a cover blank arrive at the register lugs 7 and 17 guide rolls 18 operate to hold the cover blank in proper relation with the shell blank. The guide rolls 18 are rotatably mounted on pin 19 secured to arm 20 mounted on shaft 21 journaled in frame 1. At the 75

outer end of shaft 21 is provided a bell-crank lever 22 having a counter-weight 23 and a roller 24 connected thereto. The counter-weight 23 serves to retain the roller 24 in contact with the periphery of cam 25 mounted on shaft 25a secured to frame 1. In the operation of the machine, when a cover blank and a shell blank arrive at the position of register the guide rolls 18 are caused to drop and thus the shell blank and the cover blank are gripped between the said guide rolls 18 and conveyor belt 5. The object in so gripping the blanks together is to start the blank from the register position in proper relationship to each other. It will be apparent that the said rolls 18 operate up and down at predetermined intervals by means of cam 25 which imparts movement through bell-crank lever 22 to shaft 21 and thence to arm 20 supporting pin 19 which carries rolls 18. After the operation of registering the cover blank with the shell blank has been performed the register lugs 7 and 17 adjustably secured to shaft 8 are caused to rise away from contact with the edges of the blanks. The said register lugs operate up and down at predetermined intervals by means of shaft 8 which is caused to rock by bell-crank lever 26 to which is secured roll 27 and counter-weight 28. It will be apparent that an up and down movement will be transmitted to register lugs 7 and 17 from roll 27 which is caused to contact the periphery of cam 29 mounted on shaft 30 journaled in frame 1. From the position of register the blank assembly is carried by conveyor belt 5 to pass between folding belts 31 supported and driven by rolls 32 journaled in frame 1. After the folding operation just described the blank assembly is in the condition illustrated by Figure 11. While the said folding operation is being performed the spacer strips 9 are retained in position between the cover blank and the shell blank. The blank assembly is then advanced by conveyor belt 5 and is thus drawn from engagement with the said spacer strips 9. The blank assembly then passes to devices which bend the side margins of the blank assembly downward. Folding hooks 33 pivoted on pins 34 secured to frame 1, operate at predetermined intervals to bend the front and rear wall portions of the blank assembly downward, guide bars 35 supported by brackets 36 serve to hold the blank assembly in semi-folded condition while the blank assembly is being carried to folding former 37 supported by brackets 38 secured to frame 1. In passing through the said folding former 37 the front and rear wall sections of the blank assembly are folded flat against the underside of the blank assembly, as shown by Figure 13. The blank assembly then passes to transfer table 39 supported by frame 1. From the said transfer table the blank assembly is advanced by conveyor belt 40 driven by roll 41, journaled in transfer table 39. The opposite end of conveyor belt 40 is supported by roll 42 journaled in frame 1. From the transfer table 39 the blank assembly is carried to folding hooks 43 pivoted on pins 44 secured to frame 1. Said folding hooks 43 serve to bend downward end wall flap sections *e* of the shell blank thus separating the said end wall flap sections *e* of the shell blank from the corresponding section *e'* of the cover blank. The blank is then in the condition illustrated by Figures 17 and 18. The blank assembly then passes to folding bars 45 which serve to fold the said end wall flaps *e* of the shell blank flat against the underside of the blank assembly. Said folding bars 45 are

supported by brackets 46 secured to frame 1. The blank assembly then passes to adhesive applying devices which apply stripes of adhesive to end wall flap sections *e'* of the cover blank. Said adhesive applying devices comprise glue wheels 47 which are coated with adhesive by causing them to rotate in liquid adhesive contained in glue pots 48 secured to frame 1. Said glue wheels 47 are rotatably mounted on shafts 49 journaled in said glue pots 48. The blank assembly is then in the condition illustrated by Figure 19. The blank assembly is then advanced to folding devices which fold the end wall flap sections *e'* of the cover blank against the folded end wall flap sections *e* of the shell blank. Said folding devices comprise folding belts 50 driven and supported by rolls 51 journaled in frame 1. After the last mentioned folding operation the box is in complete flat folded condition as illustrated by Figures 21 and 23. The completed box is then conveyed to delivery belt 52 supported by rolls 53 journaled in frame 1. Belt 54 supported and driven by rolls 55 serves to press the boxes as they pass over the delivery belt.

While I have shown one form of mechanism for carrying out the method disclosed herein it is to be understood however that the mechanism shown is merely by way of illustration and is not to be taken as restrictive, except by a fair interpretation of the claims, it being obvious that modifications will suggest themselves without departing from the spirit of the invention.

I wish it to be understood that while the invention includes the combined instrumentalities above mentioned, I consider the aforesaid means not only combinatively novel, but insofar as I am aware, certain of the devices going to make up such means are new in less combinations than the whole and some capable of individual use, as will more clearly appear hereinafter.

Having now described my invention, what I claim is:—

1. A method of producing a substantially flat folded assembly formed from a stiff shell blank and a thinner cover blank so folded and adhesively secured together as to provide a loose wrapped folding box in collapsed condition ready to be set up quickly when required for use; the said method comprises applying adhesive to margins of the underside of the front and rear wall sections of the shell blank, assembling the cover blank to the top side of the shell blank, folding over opposite margins of the cover blank to contact the adhesively treated margins of the shell blank, folding the front and rear wall sections of the covered shell blank downward and up against center areas of said blank, folding end wall flap sections of the shell blank downward and up against under surfaces of the blank assembly, applying adhesive to the underside of the ends of the cover blank, folding said adhesively treated ends of the cover blank against the said end wall flap sections of the shell blank.

2. A method of producing a substantially flat folded assembly formed from a stiff shell blank and a thinner cover blank so folded and adhesively secured together as to provide a loose wrapped folding box in collapsed condition ready to be set up quickly when required for use; the said method comprises, applying adhesive to areas of the underside of the shell blank, assembling the cover blank to the top side of the shell blank, folding under opposite margins of the cover blank to contact the adhesively treated surfaces of the shell blank, folding front and rear

wall sections of the covered shell blank against center areas of said blank, adhesively securing ends of the cover blank to the end margins of the shell blank.

3. A method of producing a loose wrapped paper box blank assembly, comprising, simultaneously feeding a shell blank and a cover blank to a position of register in superposed spaced relation with opposite side margins of the cover blank in contact with side edges of the shell blank, adhesively securing opposite edges of the cover blank to corresponding edges of the shell blank, and advancing the blank assembly to wall folding elements.

4. A method of producing a loose wrapped paper box blank assembly, comprising, assembling a cover blank and a shell blank together with their center areas maintained in spaced relation and with the opposite side margins of the cover blank in contact with the side edges of the shell blank, adhesively securing opposite edges of the cover blank to corresponding edges of the shell blank, advancing the blank assembly to wall folding elements.

5. A method of producing loose wrapped boxes in knocked-down assembly ready to be quickly set up for use, comprising, advancing by mechanical means a cut and scored shell blank, applying adhesive to portions of the shell blank, advancing a cover blank to register in superposed relation with the said shell blank, folding opposite margins of the cover blank to contact the adhesively treated portions of the shell blank, folding the front and rear walls of the covered blank, folding the end margins of the shell blank, applying adhesive to the ends of the cover blank, folding said adhesively treated ends of the cover blank against the end margins of the shell blank.

6. In a machine for making loose wrapped paper boxes in flat folded assembly, devices for feeding a shell blank and a cover blank to a position of register in superposed spaced relation, a spacer element for maintaining the center areas of the cover blank in spaced relation with the shell blank during adhesive securing operations, means for adhesively securing opposite margins of the cover blank to corresponding portions of the shell blank, means for advancing the blank assembly, folding devices to fold front and rear wall sections of the blank assembly against the uncovered center areas of the shell blank, means for folding the end wall flap sections of the shell blank away from contact with the end portions of the cover blank and against the front and rear wall extension flaps, devices for applying adhesive to end areas of the cover blank, and folding devices to fold the adhesively treated end areas of the cover blank against corresponding end wall flap sections of the shell blank.

7. In a machine for making loose wrapped boxes in flat folded condition, means for advancing a cut and scored shell blank, devices for applying adhesive to portions of the shell blank, means for advancing a cover blank to register in superposed relation with the said shell blank,

mechanism for folding opposite margins of the cover blank to contact the adhesively treated portions of the shell blank, devices for folding the end margins of the shell blank, means for applying adhesive to the ends of the cover blank, folding devices to wrap the said adhesively treated ends of the cover blank against the end margins of the shell blank.

8. In a machine for making loose wrapped boxes in flat folded assembly, means for feeding a shell blank and a cover blank to a position of register in superposed spaced relation, a spacer strip for maintaining the center areas of the cover blank in spaced relation with the shell blank, means for securing opposite margins of the cover blank to corresponding portions of the shell blank, means for advancing the blank assembly, folding devices to fold front and rear wall sections of the blank assembly against the uncovered center areas of the blank assembly, folding mechanism to fold the end wall flap sections, and means to fold and secure the end sections of the cover blank to the corresponding end wall flap sections.

9. In a machine for making loose wrapped boxes in collapsed condition, means for registering a shell blank and a cover blank in superposed spaced relation, a spacer strip for holding the center areas of the cover blank in spaced relation with the shell blank, means for folding opposite margins of the cover blank over corresponding margins of the shell blank, and means for advancing the blank assembly out of contact with the said spacer strip.

10. In a machine for making loose wrapped paper boxes in collapsed condition, means for feeding a shell blank and a cover blank to a position of register, a spacer strip for separating the said blanks, means for adhesively securing opposite margins of the cover blank to the shell blank, and means for advancing the blank assembly out of contact with the said spacer strip.

11. In a machine for making covered paper boxes in flat folded assembly, means for advancing a shell blank, means for applying adhesive to areas of the underside of the front and rear wall sections of the said shell blank, means for advancing a cover blank, mechanism for registering the cover blank upon the shell blank, folding devices to wrap opposite edges of the cover blank to contact the adhesively treated areas of the front and rear wall sections of the shell blank, means for folding the front and rear wall sections of the covered shell blank downward and up against the center areas of the shell blank, means for folding the end wall flap sections of the shell blank downward and away from contact with the end portions of the cover blank and up against the front and rear wall extension flaps, mechanism for applying adhesive to end areas of the underside of the cover blank, and folding means to fold the adhesively treated end areas of the cover blank against the end wall flap sections of the shell blank.

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