Aug. 16, 1927. 1,639,283

S. BERGSTEIN

BOX MAKING MACHINE AND THE LIKE

Filed July 14, 1926 5 Sheets-Sheet 1

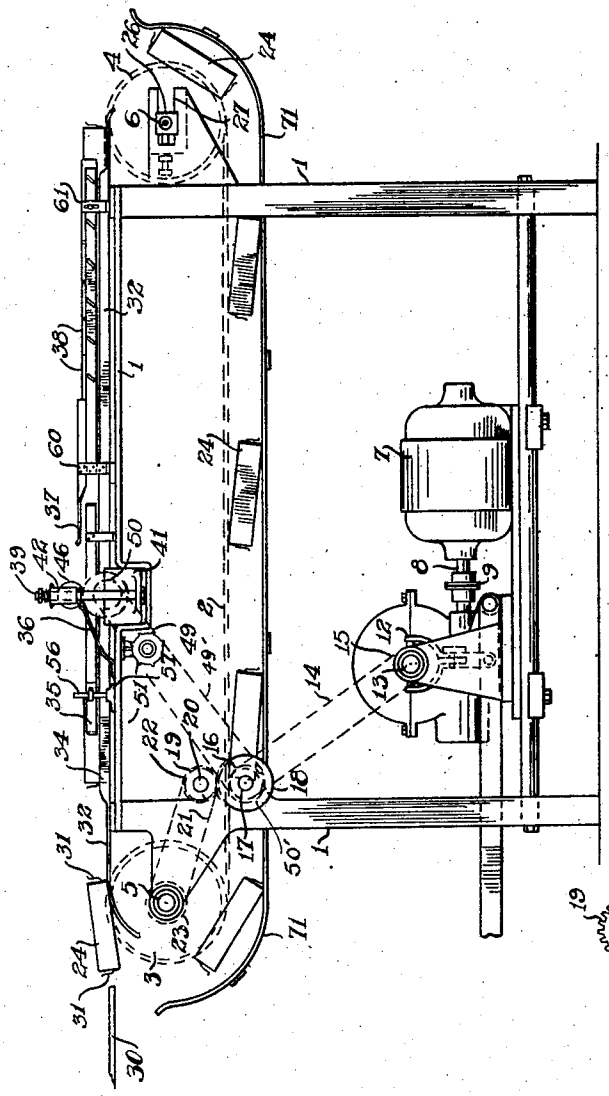


Fig. 1.

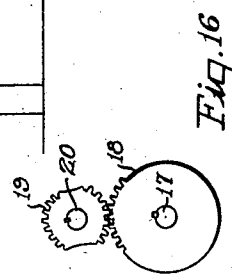


Fig. 16

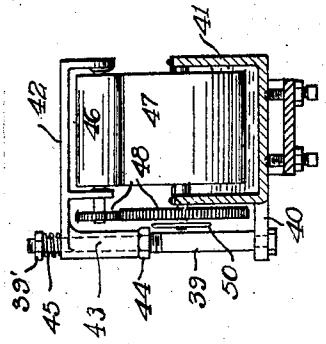


Fig. 15.

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S. BERGSTEIN

BOX-MAKING MACHINE AND THE LIKE

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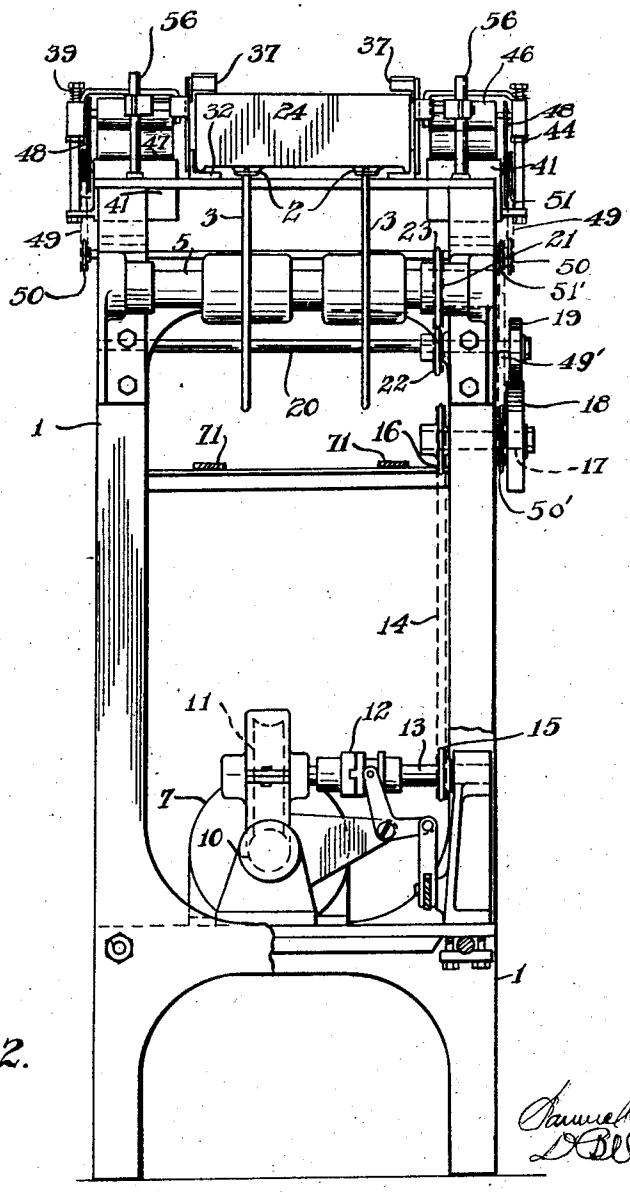


Fig. 2.

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BOX MAKING MACHINE AND THE LIKE

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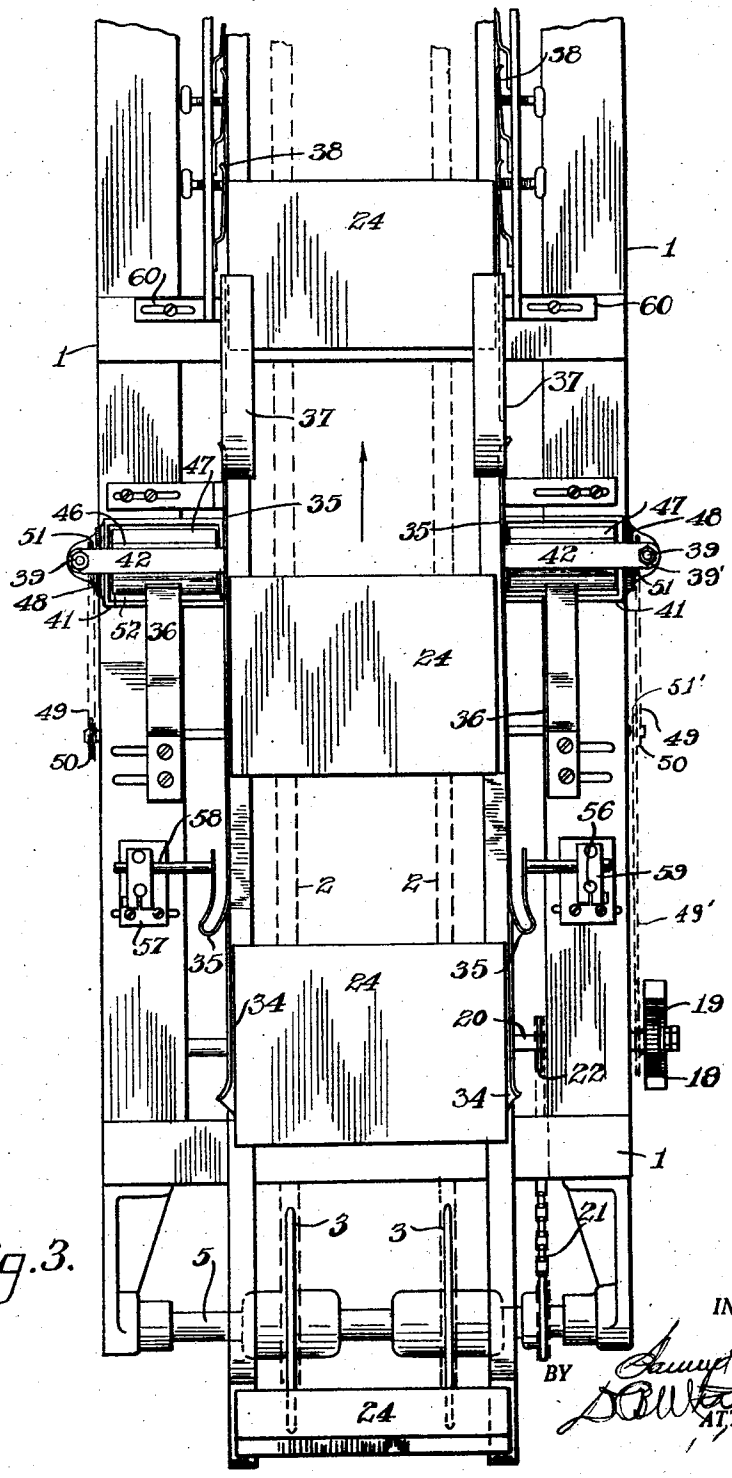


Fig. 3.

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BOX MAKING MACHINE AND THE LIKE

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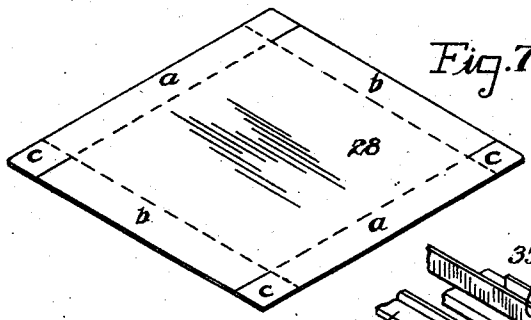


Fig. 7.

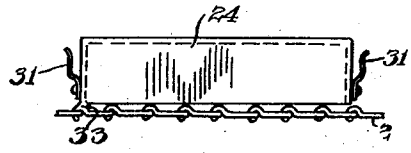


Fig. 6.

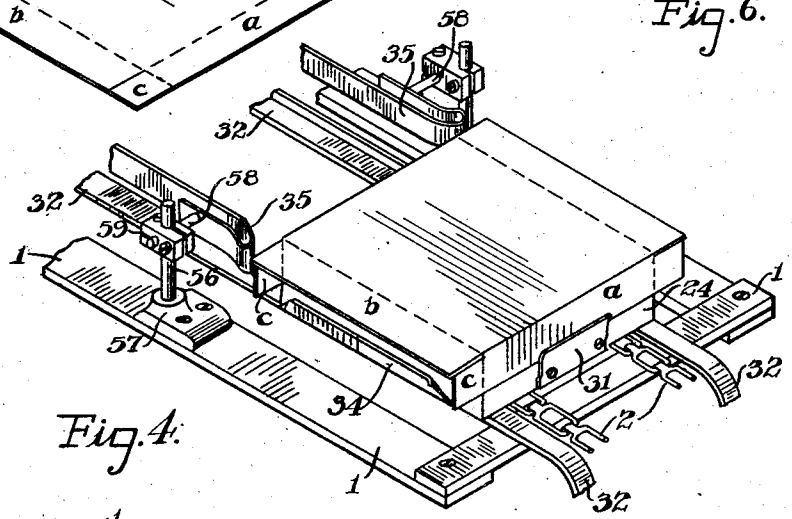


Fig. 4.

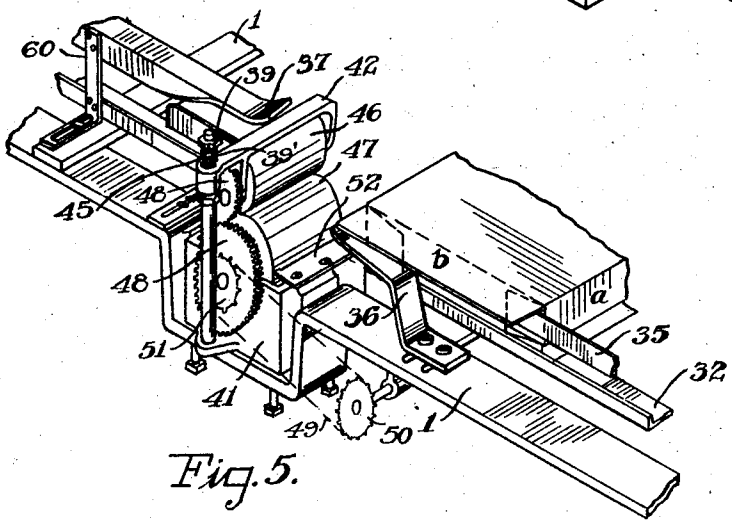


Fig. 5.

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BOX MAKING MACHINE AND THE LIKE

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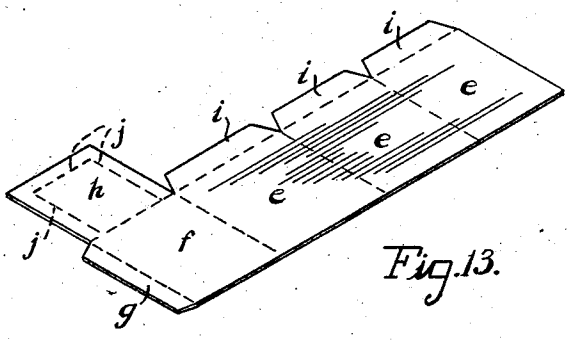


Fig. 13.

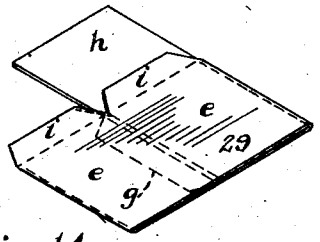


Fig. 14.

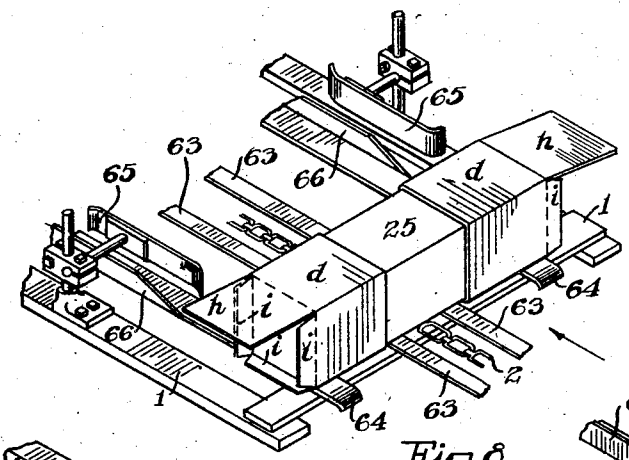


Fig. 8.

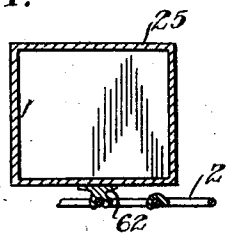


Fig. 12.

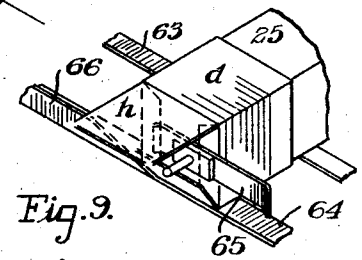


Fig. 9.

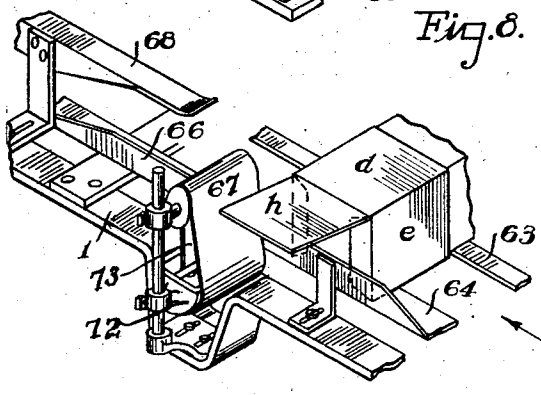


Fig. 10.

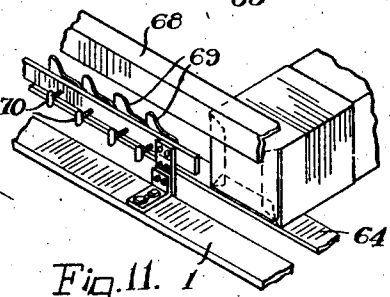


Fig. 11.

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Patented Aug. 16, 1927. 1,639,283

UNITED STATES PATENT OFFICE.

SAMUEL BERGSTEIN, OF MIDDLETOWN, OHIO, ASSIGNOR TO THE INTERSTATE FOLDING BOX COMPANY, OF MIDDLETOWN, OHIO.

BOX-MAKING MACHINE AND THE LIKE.

Application filed July 14, 1926. Serial No. 122,293.

This invention relates to improvements in paper box making machines.

A large percentage of paper box users of the general types the improved machine of this invention is adapted to make require them in a wide range of sizes. The present type of standard machines for making sealed boxes of this character are of heavy construction, high priced and are not readily adaptable for changing from one size of box to another. The changes must be made by skilled mechanics with the added cost and delay in having the machines out of production. The largest size box that can be produced on these standard machines is the size of an ordinary shoe box. Larger boxes must be made up special at much higher cost or manually assembled lock-joint boxes must be used as a substitute for glued boxes, the latter being preferred because of their better construction, neater appearance and lower cost.

The objects attained in the present invention consist in a simple inexpensive machine which does not require a skilled operator, which is capable of large output, which is adaptable for the full range of ordinary boxes and which can be changed from one size to another in a mere fraction of the time required for changing the large box making machines now commonly used.

For larger users who require a constant supply of boxes of different sizes, it will be economical to install a machine of the simpler type, as herein set forth, for each size of box required in regular quantities as the cost and operation of the machines is so low that the saving of time and interrupted production will in a short time pay the cost of the machines.

With the improved machine and the practice of the invention herein set forth the box blanks as furnished to the customer may be prepared with adhesive, requiring only the application of moisture as the same are assembled on the machine, or the adhesive may be applied to the blanks on the box assembling machine, as the boxes are prepared for use. One of the improvements of the machine consists in novel means for supporting the sealing flaps of the boxes one part relative to another as the joints are formed, the arrangement being effective to form a firmer joint with relatively lower pressure.

The machine as herein set forth is readily adaptable by making suitable modifications in the box supporting elements for assembling boxes of varied types and in a wide range of sizes. For the purpose of demonstrating this feature of the invention two forms of the box supporting mechanism and two types of boxes are shown, it being understood that this is for the purpose of illustrating the general practice of the invention both as to modifications of the apparatus and the method or process of assembling boxes.

In the accompanying drawings which serve to give effect to the herein illustrations and description of the invention:

Fig. 1 is a side elevation of the machine;

Fig. 2 is an end elevation;

Fig. 3 is a plan view;

Figs. 4 and 5 are enlarged perspective views of the box forming mechanism in one form illustrating progressive steps of production;

Fig. 6 is a detail view of Fig. 4;

Fig. 7 is a view of the box blank adapted to be formed on the mechanism shown in Figs. 4–6;

Figs. 8 to 11 are perspective views of the box sealing mechanism in a modified construction illustrating progressive steps of forming a box;

Fig. 12 is a detail view of Fig. 8;

Fig. 13 is a view of the box blank illustrated in Figs. 8–11;

Fig. 14 is a view of the box illustrating a step of forming preceding the operations on the machine;

Fig. 15 is an enlarged view of adhesive applying mechanism shown in Fig. 5;

Fig. 16 is a detail view of intermittent gears in the driving mechanism of the machine.

As here shown the machine comprises a suitable frame structure 1 in which an endless carrier, consisting of opposite chains 2 traversing sprockets 3—4 on shafts 5—6, is supported. Operating movement is transmitted to the carrier drive shaft 5 from a motor 7 through connections consisting of the motor shaft 8, coupling 9, worm gearing 10—11, clutch 12, shaft 13, chain and

sprocket connections 14—15—16, the upper sprocket 16 being on a shaft 17 which has an intermittent gear connection 18—19 with a shaft 20 which is connected to shaft 5 by a chain and sprockets 21—22—23. To adapt the carrier to variable spacing of the box supporting members 24—25 of the modified constructions and for adjusting the carrier for right relation to the sprockets, sprocket shaft 6 is supported in slidable bearings 26 adjustable longitudinally of the machine in open bearings 27 at the rear end of the machine.

The intermittent gearing 18—19 serves to transmit a step by step movement to the box carrier and to move the box supporting members 24—25 successively into position at the front end of the machine for having the box blanks 28, as illustrated in Fig. 7, or the tubular box sections 29, as illustrated in Fig. 14, placed thereon manually by the machine attendant, a suitable work table 30 being provided at the front end of the machine for supporting a supply of the box material for the convenience of the operator.

The means here shown for rendering the sealing flaps of the boxes adhesive may consist of an adhesive applying device, illustrated in Figs. 5 and 15, or a moisture applying device illustrated in Fig. 10, the machine being adaptable for either use. In the first instance the box blanks as furnished to the user are without adhesive the same being applied on the box forming machine; in the second instance the adhesive is on the blanks as the same are supplied by the manufacturer, the application of moisture only being required to render the sealing flaps adhesive for forming the joints.

The mechanism and operation for forming the box illustrated in Figs. 4 to 7 consists of a series of the box forming blocks 24 secured to the carrier chains 2, the blocks being equally spaced one from another to present the same in regular sequence adjacent the work table 30. The sides *a*—*a* are turned down over the front and rear edges of the forming block manually and are retained by yieldable clips 31. In the position shown in Fig. 4 the box supporting members 24 as moved along by the chains 2 are supported on guides 32 extended parallel with the chains, the guides being curved downward at their forward ends to support the members 24 as the same are moved upward over sprockets 3, said members being connected pivotally to the chains at their forward ends only as indicated at 33 to adapt the same to traverse the sprockets.

The box blanks supported on the forming blocks, as illustrated in Fig. 4, have the flaps *b*—*c*—*c* at each end of the box extended, the rear flaps *c* being in position to be engaged by guides 34, the flaps being directed manually to pass inside the guides, and the forward flaps by guides 35, the rear flaps *c* also being engaged by guides 35 as the same pass from guides 34, the action of guides 34—35 being to fold flaps *c*—*c* over the side edges of the forming block, the sealing flaps *b* remaining extended in position to be engaged by guides 36, as shown in Fig. 5, which act to direct the same into engagement with the adhesive applying device, the adhesive being applied on the under side of the flaps.

From the adhesive applying devices the sealing flaps are engaged, as the boxes are moved along on the carrier, by guides 37 which act to fold the same over the folded flaps *c*, the folded ends of the box being then acted upon by a series of spring-tensioned pressure devices 38 which act yieldingly but with sufficient pressure upon the folded portions *b*—*c*—*c* to effect adhesion between the same, the pressure being sustained, by reason of the extended arrangement of the pressure devices along the path of the boxes, the required length of time to cause the adhesive to set and to make the joints firm. The sealing flaps being supported by the sides of the forming blocks 24 against the action of the pressure devices 38 the joints are formed at relatively low pressure with the minimum of adhesive. Thus the difficulties arising with high pressure box making machines which require more adhesive and tend to foul the product more or less, as well as the machine, with an excess of adhesive are overcome.

The construction of the adhesive applying devices is best shown in Fig. 15. The device as here shown consists of a vertically extended post or shaft 39 supported at its lower end in a laterally extended bracket 40 of the glue container 41. A bracket 42 is arranged telescopically on the post 39 by a sleeve 43, the sleeve being interposed between an adjusting nut 44, threaded on the post and acting to support the sleeve on its lower end, and a spring 45 retained on the post by a nut 39 and acting yieldingly to exert pressure against the opposite end of the sleeve. A roller 46 is supported in bracket 42 and a roller 47 is supported in the walls of the adhesive container, the rollers being connected by gears 48. The lower roller is driven by a chain on sprocket connection 49—50—51, the sprocket 51 being secured on shaft 17 (see Fig. 1), a continuous operating movement being thus transmitted to the adhesive roller 47. The upper roller adjusting means—parts 39—39′—44 and 45—serve for regulating the coaction between the upper and lower rollers according to the thickness of the box blank stock that is to be run on the machine. By this arrangement uniformity may be obtained in the application of the adhesive on the blanks. To this end also a scraper 52 (see Fig. 5) is provided for the adhesive carrying roller 47, the scraper being

adjustable relative to the periphery of the roller for regulating the amount of adhesive that will be carried up from the container and applied on the sealing flaps of the box blanks as the same pass between the rollers.

The adhesive applying devices, each as a unit, are adapted to be mounted in a recess of the machine frame in any suitable manner to permit of adjusting the devices transversely of the machine for larger or smaller boxes, as the case may be.

To further adapt the machine for boxes of different sizes the box supporting blocks 24 have sufficient depth for the maximum depth of boxes of a given length and width. When these dimensions, the length and width of the boxes, are changed the supporting members 24 are replaced with others of the required size. The guides 35 are also arranged for vertical and lateral adjustments by means of supporting brackets consisting of vertically extended stems 56 supported in slidable bases 57 on the frame of the machine, and laterally extended adjustable stems 58 supported in brackets 59 on stems 56. The guides 37 and pressure devices 38 are also adjustable vertically and laterally of the machine by means of brackets 60 and 61 by a similar arrangement of slotted connections.

The modifications of box and machine shown in Figs. 8–14 are merely for illustrating the ready adaptability of the machine for a wide range of boxes of different types, the principle of the invention as applied in the modifications being the same. The box as here shown consists of opposite sections *d—d* as illustrated in Fig. 8, the same being adapted to be disposed telescopically one section relative to the other for closing the box, one of the sections being accordingly sufficiently larger than the other to permit of telescoping the sections. Each section comprises side walls *e—e—e—f*, the portion *f* having a sealing flap *g* adapted to be joined to portion *e* at the opposite end of the blank to effect a tubular shape of the box as illustrated in Fig. 14. The portion *—f* also has the outer sealing flap *h*, the margins *j* having adhesive applied thereto, and parts *e—e—e* having the inner flaps *i*, the modification as here shown serving to illustrate the practice of applying adhesive to the box blanks before the same are run on the machine. This may be done by applying the adhesive on the paper sheets before the box blanks are cut from the sheets, or by applying the adhesive to the blanks after the same are cut.

Special machines and processes for an improved practice of paper box making in which adhesive tape or liquid glue are used for preparing the box blanks constitute inventions subject matter of separate applications for patents I have pending. The practice of present invention, however, contemplates the use of any suitable means and methods for preparing the box blanks with adhesive.

The box supporting members 25 as best shown in Figs. 8–12 are preferably of hollow formation, as are also the members 24, to reduce their weight. The supports are connected to chain 2, a single chain being used in the modified construction, pivotally as indicated at 62 to adapt the same to move over the sprockets 3—4, the opposite ends of the supports being extended laterally beyond guides 63, which serve to balance the box supporting members, thus presenting the ends free, before the supports are engaged by outer, lower guides 64, for having the tubular box sections placed thereon by the machine attendant, this step of the operation being illustrated in Fig. 8. In view of the difference in size of the box sections, one end of the box supporting member is made correspondingly larger than the other end so that a loose fit of both box sections on the supporting member 25 is obtained.

As the box supports are moved along from the position illustrated in Fig. 8 the forward sealing flaps *—i* are folded by guides 65, the lower flaps *—i* are folded by guides 66, the rearward flaps *—i* being directed under guides 65 by the machine attendant and all the flaps *—i* being retained, as folded, by guides 66. The outer sealing flaps are then acted upon by moistening devices which are similar in construction and operation to the adhesive applying devices herein described except that a web 67 is substituted for the rollers, moisture being conveyed to the web by capillary action from the container 72 by a wick 73 to render the portions *—j* of the sealing flaps *—h* adhesive.

Following moistening of the sealing flaps the same are acted on by guides 68 which fold flaps *h* over flaps *i*, the latter moving out of engagement with guides 66 as flaps *h* are folded, the folded ends of the boxes being then acted on by pressure devices 69, in a manner similar to the action of the pressure devices 38 to effect firm adhesion between portions *h—i* the same being supported from within by the box supporting members 25 as the pressure of the springs 69 is brought to bear on the ends of the box, the action being effective to form firm joints without the difficulties arising which are incident to common practice where ordinary methods of making paper boxes are followed.

As shown in Fig. 11 adjusting screws 70 are employed for regulating the tension of springs 69 to the requirements of the sealing operation. The means for adjusting the various parts of the modified construction to adapt the machine for boxes of different sizes are similar to the arrangements de-

scribed in connection with Figs. 4–5 and do not require further description for a clear understanding of the invention.

Opposite guide rails 71, as best shown in Fig. 1, serve to support the box supporting members 24 in the lower course of the box carrier and to direct the same around the sprockets 3—4, the forms being open on the under side to permit of their free movement over sprockets 3, as illustrated in Fig. 1.

From the foregoing detailed description and the illustrations in the drawings the construction and operation of the improved box making machine and the new method of making boxes are practiced on the machine will be readily understood by those experienced in the art to which the invention relates. The underlying principle of the invention, generally stated as applied to the machine consists in positioning the blanks over a form approximating dimensions of the boxes to be made, in rendering the sealing flaps adhesive, in folding the coacting flaps one relative to another and in applying sustained pressure to the adhering portions to effect joints therebetween. The broader novelty of the invention consists in the improved apparatus with its modifications and the method of practicing the invention thereon.

Having described my invention, I claim:

1. A box making machine including a box carrier for moving box blanks through a sequence of forming operations, a series of box supporting forms movable with the box carrier, said forms being adapted to have initially formed box members of sizes adapted to be arranged telescopically one with the other positioned thereon oppositely one of the other with sealing flaps extended, means acting to fold certain of said flaps, in rendering other flaps adhesive and folding the same over the first folded flaps, and pressure means coacting with said forms to effect adhesion between the flaps.

2. A box making machine including a box carrier for moving box blanks through a sequence of forming operations, a series of horizontally disposed box supporting forms movable with the box carrier having oppositely extended ends adapted to have initially formed box members positioned telescopically thereon, with sealing flaps extended, means acting to fold certain of said flaps, in rendering other flaps adhesive and folding the same over the first folded flaps, and pressure means coacting with said forms to effect adhesion between the flaps.

3. A box making machine including a box carrier for moving box blanks through a sequence of forming operations, a series of box supporting forms movable with the carrier and having oppositely extended ends of different sizes, adapted to have initially formed box members positioned telescopically thereon with sealing flaps extended, means acting concurrently on the box members to fold certain of said flaps, in rendering other flaps adhesive and folding the same over the first folded flaps, and pressure means coacting with said forms to effect adhesion between the flaps.

In testimony whereof, I affix my signature.

SAMUEL BERGSTEIN.