Sept. 13, 1932. S. PEARCE 1,877,043

BOX FORMING AND GLUING MACHINE

Filed Nov. 28, 1930 2 Sheets-Sheet 1

Fig. 1

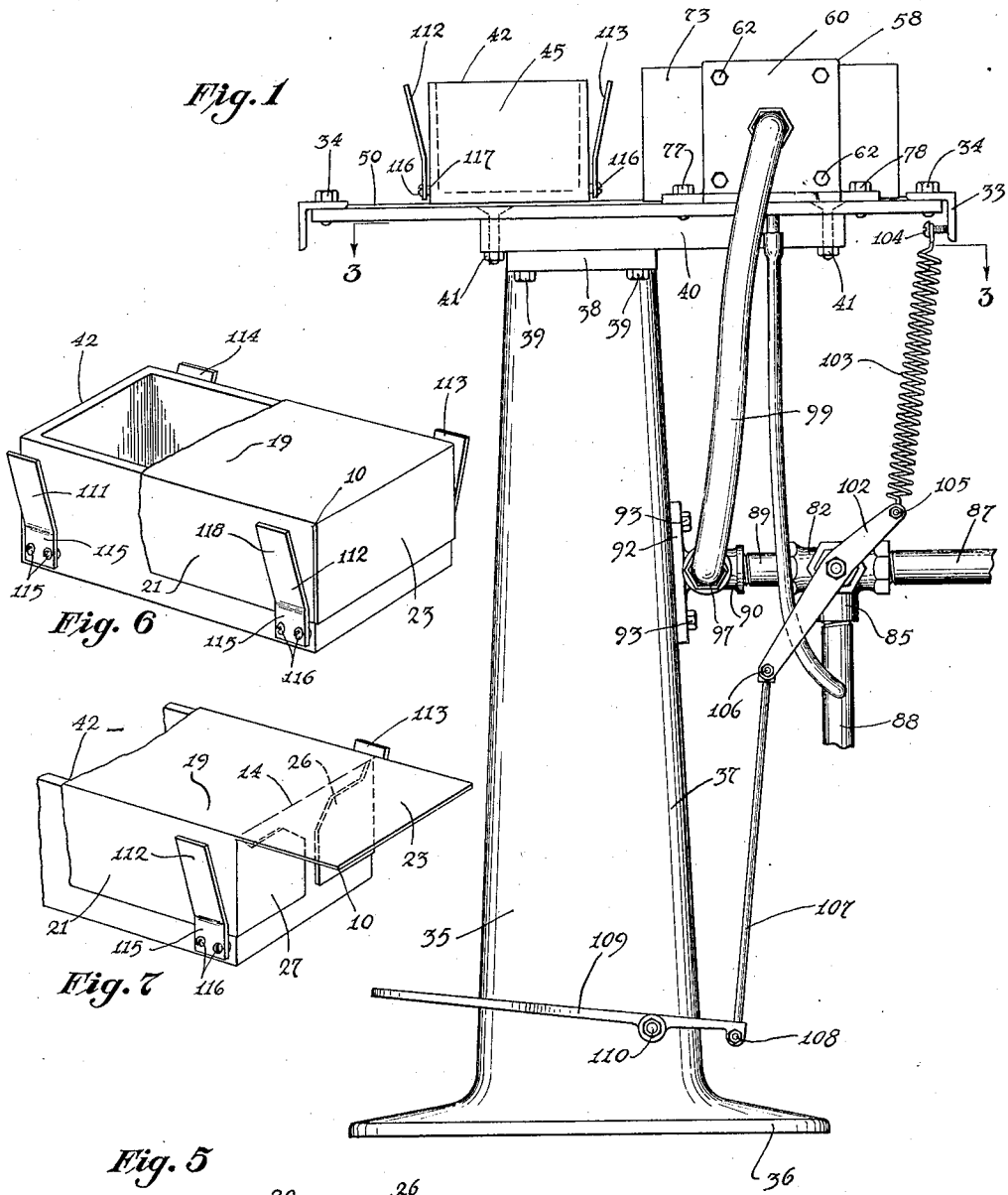
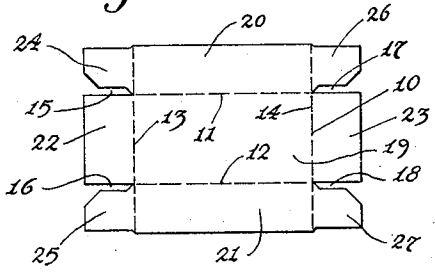


Fig. 6

Fig. 7

Fig. 5



Inventor

Sidney Pearce

By Caswell & Lagaard

Attorneys

Sept. 13, 1932. S. PEARCE 1,877,043

BOX FORMING AND GLUING MACHINE

Filed Nov. 28, 1930 2 Sheets-Sheet 2

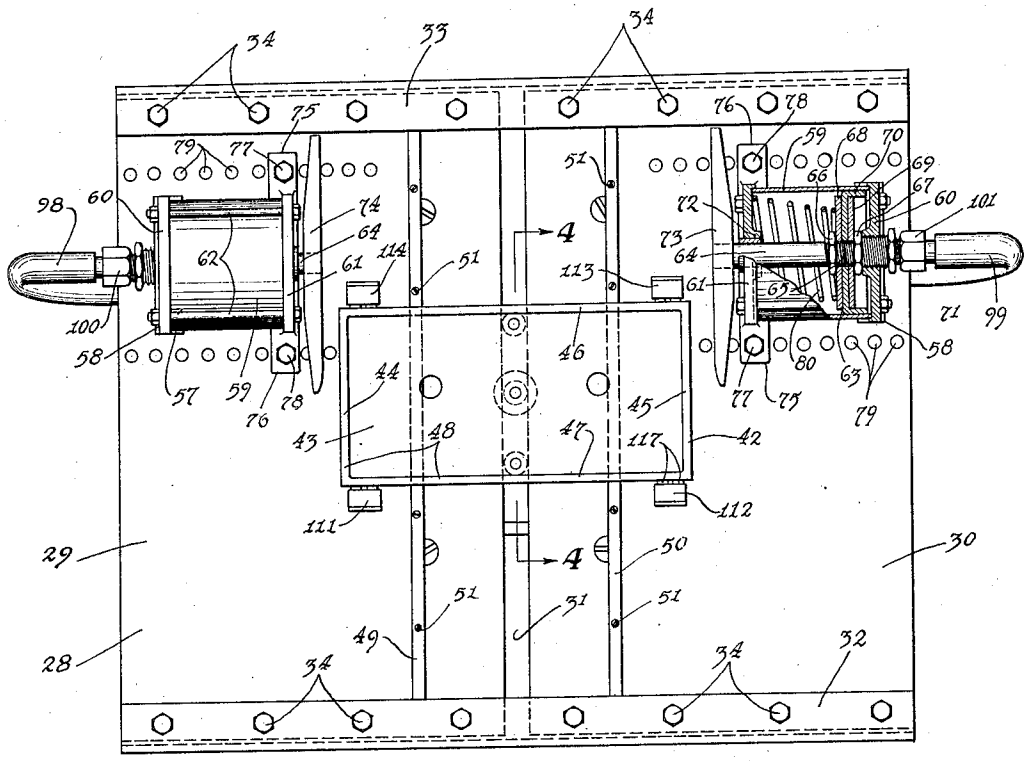


Fig. 2

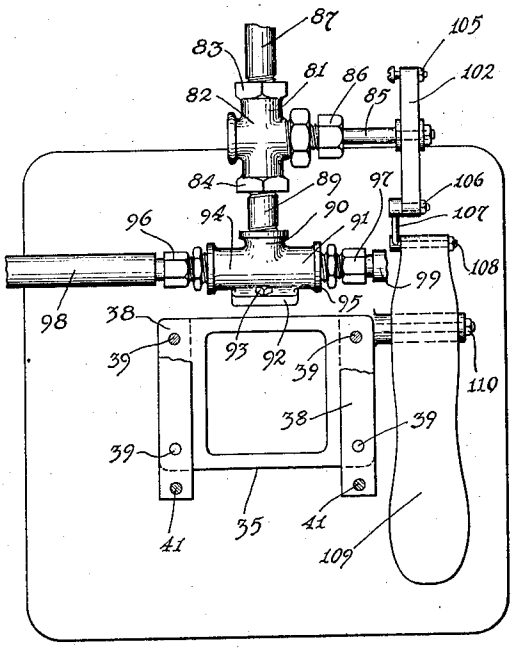


Fig. 3

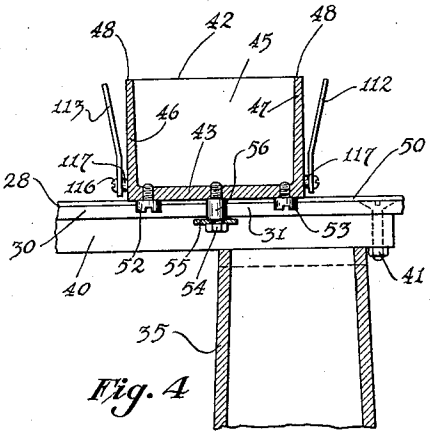


Fig. 4

Inventor

Sidney Pearce

By Caswell & Lagaard

Attorneys

Patented Sept. 13, 1932 1,877,043

UNITED STATES PATENT OFFICE

SIDNEY PEARCE, OF MINNEAPOLIS, MINNESOTA

BOX FORMING AND GLUING MACHINE

Application filed November 28, 1930. Serial No. 498,671.

My invention relates to box forming and gluing machines and particularly to machines for forming and gluing box blanks constructed with sides and ends integrally connected with a top or bottom and with flaps issuing from the sides and adapted to overlie the ends of the box.

An object of the invention resides in providing an inexpensive and simple machine whereby such box blanks may be readily formed and glued together.

Another object of the invention resides in providing a forming block on which the blank is placed and over which the sides, ends and flaps are bent to form the box.

A still further object of the invention resides in providing a pair of pressers for pressing the overlying parts of the box together during the setting of the adhesive used for attaching the flaps to the ends.

An object of the invention resides in providing a table supporting said pressers in spaced relation at one end thereof and in further slidably supporting said forming block thereon, said block being movable from a position to be engaged by said pressers to a position remote therefrom.

Another object of the invention resides in providing means for simultaneously operating said pressers in a manner to equalize the pressure exerted thereby upon the box blank.

A still further object of the invention resides in constructing said pressers with cylinders having pistons movable therein and having presser heads operated by said pistons.

A feature of the invention resides in adjustably attaching said pressers to said table to permit of the operation of the pressers upon boxes of various dimensions.

An object of the invention resides in disposing said pressers with the presser heads thereof facing one another.

Another object of the invention resides in simultaneously operating both of said pistons through a single source of fluid under pressure so as to equalize the pressure exerted by the two pistons upon the presser heads.

A feature of the invention resides in constructing the table with a slot having means extending therethrough for engagement with said forming block to slidably guide the same along said slot.

An object of the invention resides in providing rails disposed on either side of said slot for supporting the forming block.

Another object of the invention resides in providing a pedestal for supporting said table and in further providing a bracket disposed between said table and pedestal for causing the attaching means for the forming block to clear said pedestal throughout the sliding movement thereof along said slot.

A still further object of the invention resides in providing the forming block with fingers secured thereto and issuing outwardly therefrom in diverging relation to guide the sides of the box blank into formed position.

A feature of the invention resides in disposing said fingers upon the portions of said block receiving the sides of the box and in a position to be free from said pressers while operating upon the end of the box.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

Fig. 1 is a side elevational view of a box forming and gluing machine illustrating an embodiment of my invention.

Fig. 2 is a plan view of the structure shown in Fig. 1.

Fig. 3 is a plan sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a developed view of a form of box blank used with the invention.

Figs. 6 and 7 are perspective views of the forming block illustrating the method of forming the box blank thereon.

In the packing of merchandise, a great many two part or telescopic boxes are used which have many advantages over other types. Each of the parts of such boxes are usually constructed with a top or bottom having sides and ends integrally connected therewith and is further constructed with flaps issuing outwardly from the ends. With

boxes of this type considerable time is required in forming and gluing up the blanks where the operations have to be performed by hand. Where only a small number of such boxes are to be formed and glued at one time, it becomes uneconomical to purchase fully automatic machinery for accomplishing the purpose, and particularly where the machine must necessarily remain idle for a considerable period of time due to the infrequent use thereof. The present invention provides a simple and inexpensive machine in which the boxes can be rapidly and economically formed and glued by a single operator at a considerable saving in time over and above the hand method and without the necessarily large investment required for fully automatic box machinery.

My invention is particularly adapted to be used in conjunction with the ordinary two piece telescopic box such as is now well known in the art. Both of such parts being similar except as to size, only the body of the box has been shown in the drawings and described in the specification though it can be readily understood that the cover is constructed substantially the same and the method of gluing and forming the cover is exactly the same as the body of the box. A blank from which such a box may be constructed is shown in Fig. 5 which comprises a body portion 10 scored along two longitudinal lines 11 and 12 and along two transverse lines 13 and 14 intersecting the score lines 11 and 12 intermediate the ends thereof. The box blank is severed along lines 15, 16, 17 and 18 which coincide with the score marks 11 and 12 and which extend from the outer edges of the box up to the score marks 13 and 14. By means of this construction the blank is divided to provide a top or bottom 19 as the case may be, side members 20 and 21, and end members 22 and 23. In addition the side members 20 and 21 are formed with flaps 24, 25, 26 and 27 which are in continuation of said side members and which when the box is folded are adapted to overlie the end members 22 and 23. Although I have shown a particular type of box with which the device may be used, yet it can readily be comprehended that the invention is equally as well adapted for forming and gluing other similar types of boxes.

In the ordinary construction of boxes of the nature described, the flaps 22 and 23 are gummed or otherwise coated with an adhesive. The side members 20 and 21 are next bent at right angles to the bottom 19 and the flaps 24, 25, 26 and 27 turned inwardly toward one another. The end members 22 and 23 may next be brought into engagement with the flaps 24, 25, 26 and 27 to secure the same to the end members 22 and 23. During the setting of the glue, the end members must be held under pressure in contact with the flaps after which the box is complete and ready to be used. This is usually accomplished manually. The construction of boxes in this manner causes considerable waste of time of the operator while the glue is becoming set which is greatly reduced by the method employed and with the machine forming the present invention.

My invention proper comprises a table which I have indicated in its entirety at 28. This table consists of two plates 29 and 30 of suitable material which are spaced from one another leaving a groove 31 extending throughout the length thereof. The parts 29 and 30 of table 28 are held together through two angle cleats 32 and 33 which may be secured thereto through bolts or machine screws 34.

The table 28 is supported upon a pedestal 35 (Fig. 1) which is formed with a base 36 and an upright portion 37 terminating in two outwardly extending flanges 38. These flanges have secured to them through cap screws 39, two bars 40 which extend rearwardly of the device and which are attached to the plates 29 and 30 of table 28 through bolts 41. These bars serve as brackets and in addition to supporting the table 28 serve to hold the same spaced from the pedestal 35 for a purpose later to be described.

In conjunction with the table 28, a forming block is employed which is indicated in its entirety at 42. This block is preferably constructed as a casting and is formed with a bottom 43, end walls 44 and 45, and side walls 46 and 47 all integrally connected. The dimensions of the block 42 are such that the blank 10 when placed upon the upper edges 48 thereof may be folded so as to cause the bottom 19 of said box to rest upon said edges and so as to cause the sides 20 and 21 to lie along the sides 47 and 46 of the forming block and the ends 22 and 23 to lie along the ends 44 and 45 of said forming block.

The forming block 42 is slidably supported upon two rails 49 and 50, the same being fastened, respectively, to the two plates 29 and 30 of the table 28 by screws 51. These rails are equally spaced from the slot 31 and are disposed along opposite sides thereof and in parallel relation with respect thereto. Along the medial line of the bottom 43 of the forming block 42 is arranged two screws 52 and 53 whose heads are of such dimensions as to snugly fit within the slot 31 and guide the block 42 for movement along the rails 49 and 50. In addition to these two screws another screw 54 is employed which extends completely through the slot 31 and which has mounted upon it a washer 55 engaging the underside of the table 28 and holding the heads of the screws 52 and 53 within said slot. A sleeve 56 on the screw 54 holds the washer 55 properly spaced from the bottom of the block 42 in order to prevent binding of the

device when the block is moved along the rails 49 and 50. By means of this construction the block 42 may readily be slid from one end of the slot 31 to the other in a manner and for a purpose as will soon appear.

Operating in conjunction with the forming block 42 are two pressers represented by the reference numerals 57 and 58. Both of these pressers being identical in construction only the presser 58 will be described in detail. This presser comprises a cylinder 59 provided with cylinder heads 60 and 61 at the ends thereof. These heads may be bolted together through bolts 62 to form a fluid tight connection between said heads and cylinder. Within the cylinder 59 is slidably mounted a piston 63 which includes a piston rod 64 centrally located with respect thereto. This piston rod is threaded at its inner end as designated at 65 to receive two nuts 66 and 67. The piston 63 is mounted between these two nuts and is attached to the piston rod 64 therethrough. The piston 63 consists of two plates 68 and 69 between which is disposed a piston leather 70 having the edge 71 thereof turned over to form a fluid tight joint with the cylinder 59. The piston rod 64 passes freely through a boss 72 in the cylinder head 61 and has attached to the free end thereof a presser head 73 which is of suitable dimensions to form and press boxes of the desired form and size. The presser 57 is similarly provided with a presser head 74 and as will be noted in Fig. 2, the two pressers being so disposed that the presser heads 73 and 74 face one another and are adapted to exert pressure against an object placed therebetween. The piston 63 is urged toward its retracted position as shown in Fig. 2 through the action of a compression coil spring 80 which is seated at one end against the cylinder head 61 and at the other end against the plate 68. The cylinder 59 is constructed with two feet 75 and 76 issuing therefrom through which the presser may be attached to the table 28. For this purpose two bolts 77 and 78 are employed which are adapted to extend through said feet and through any of a number of holes 79 in the table 28. These holes are disposed so that the pressers may be positioned in any suitable relation to the medial plane of the machine so as to be capable of operating upon different sizes of boxes.

For the purpose of actuating the two pressers 57 and 58 a three-way valve 81 is employed. This valve may be of any suitable construction and such devices being well known in the art the same has not been shown in detail. The valve 81 includes a body 82 which is provided with an inlet 83, a service connection 84 and a waste outlet 85. The valve is further constructed with a rotary valve member (not shown) by means of which the service connection 84 may be connected either to the inlet 83 or to the waste outlet 85. This valve member is operated through a spindle 185 which is journaled in the body 82 of the valve and which passes through a stuffing box 86. The inlet 83 is connected to a pipe or conduit 87 which in turn is connected to a source of fluid under pressure which may be a water supply system or to any other pipe or reservoir having air under pressure or any other suitable fluid under pressure. The outlet 85 is connected to a waste pipe 88 which in turn may be connected to a reservoir for the return of the fluid utilized or which may be connected to a sump or to a sewer as would be the case where the operating fluid utilized were water. The service connection 84 of the valve 81 is connected to a short nipple 89 which in turn is connected to the central branch 90 of a T 91. The T 91 is constructed with flanges 92 whereby the said T may be bolted through cap screws 93 to the upright portion 37 of the pedestal 35 as best shown in Figs. 1 and 3. The other branches 94 and 95 of the T 91 have hose connections 96 and 97 attached thereto which in turn have secured to them short lengths of hose 98 and 99. These two lengths of hose are connected to hose connections 100 and 101 which are threaded into the cylinder heads 60 of cylinders 59 of the two pressers 57 and 58. By means of this construction fluid under pressure is simultaneously delivered to both of the cylinders 59 of the pressers 57 and 58 so that the presser heads 73 and 74 thereof are simultaneously moved in such a manner as to equalize the pressure exerted by the same. By use of flexible hose, the pressers can be adjusted without disconnection from the source of fluid under pressure.

The valve stem 85 of valve 81 is provided with a lever 102 which is rigidly secured thereto. A tension coil spring 103 is attached at one end to a pin 104 secured to the angle member 33 of the table 28 and is secured at its other end through a bolt 105 to one end of said lever. The other end of the lever 102 is pivotally connected through a bolt 106 to a depending operating rod 107 best shown in Fig. 1. This rod is connected at its other end through a bolt 108 to a pedal 109 which in turn is pivoted on a stud 110 secured to the upright portion 37 of pedestal 35. The pedal 109 extends forwardly of the machine and upon depressing the same at the forward portion thereof, the rod 107 is raised and the lever 102 swung against the action of the spring 103 to rotate the valve stem 85 and to operate the valve.

The forming block 42 is provided with four fingers 111, 112, 113 and 114. These fingers are all identical in construction and are attached to the two sides 46 and 47 of said block near the ends thereof. All of these fingers being identical in construction only finger 112 will be described in detail.

This finger is constructed with an attaching portion 115 adapted to be secured to the lower portion of the wall 47 of block 42 in close proximity to the bottom 43 thereof. Two screws 116 extend through this portion of the forming block and through two spacer washers 117 and are threaded into the structure of the forming block 42. By means of these spacer washers the portion 115 of the finger 112 is held a distance away from the wall 47 of said spacer block sufficient to receive the formed side wall 21 of box blank proper. The free end of the finger 112 which is indicated at 118 flares outwardly from the attaching portion 115 and serves to guide the side wall 21 of the box into position when applied to the forming block.

My invention is utilized as follows. A proper block having suitable dimensions for forming the particular box blank decided upon is first mounted for sliding movement upon the rails 49 and 50 by screwing the bolt 54 into the same. The two pressers 57 and 58 are next mounted in proper position upon the table 29 by applying the bolts 77 and 78 in the proper holes 79 in said table. When properly mounted sufficient space is left between the ends of the block to permit of readily sliding the same between the presser heads 73 and 74 of said pressers and away from the same as desired. Some suitable device for applying glue or adhesive to the box blank is next mounted upon the table and preferably at the free right hand forward corner thereof. Such device may include a gluing roller which is well known in the art or a brush and glue pot may be employed, if desired.

In the forming of the box, the two ends 22 and 23 of the box are first coated with glue. Where a brush is used, this may be accomplished by laying the blank upon a flat surface and applying the glue to the particular localities desired. Where the glue is to be applied through the ordinary gluing rolls, the blank is grasped between the thumb and fingers folding the side members 20 and 21 inwardly and also folding the flaps 24, 25, 26 and 27 at right angles to the side. The arrangement of parts will then be as illustrated in Fig. 7. The free ends of the blank may then be passed through the gluing rolls to apply adhesive to the underside of the ends 22 and 23. The block 42 is next slid along the slot 31 to the forward portion of the machine where the same is readily accessible to the user. With the blank folded as described the same is slipped over the block proper causing the bottom 19 of the blank to rest upon the edges 48 of said block and to cause the sides 20 and 21 of said blank to lie between the various fingers 111, 112, 113 and 114 and the respective sides 46 and 47 of the block. Where the sides 20 and 21 of the box are not folded fully into proper position, the fingers 111, 112, 113 and 114 aid in guiding the sides of the box into formed position. When the extreme edges of the sides 20 and 21 reach the portions 115 of said fingers, said sides are held in place while the operator continues with the forming and gluing of the box. The operator then folds the two ends 23 and 22 downwardly and over the flaps 24, 25, 26 and 27 causing the adhesive on the under side of the ends 22 and 23 to stick to the said flaps and attach the same together. While holding the ends 22 and 23 in proper position, the entire forming block, together with the blank thereon, is slid to the other end of the table 28 and between the two presser heads 73 and 74 of the pressers 57 and 58. The operator then steps upon the pedal 109 which rotates the valve stem 85 of the valve 81 in such a manner as to bring the T 91 into communication with the pipe 87 connected with the source of fluid under pressure. Fluid is then conducted through the two hose 98 and 99 up to the cylinders 59 of the two pressers 57 and 58. This forces the pistons 63 thereof outwardly to bring the presser heads 73 and 74 against the ends of the box blank 10. By retaining the foot upon the pedal 109 the pressure is maintained in the cylinders 59 which holds the end walls 22 and 23 of the box blank in contact with the flaps 24, 25, 26 and 27 while the glue or other adhesive is setting. During the setting of the glue the operator picks up another blank and proceeds to fold and glue the same as previously described. As soon as the second blank is properly glued and folded the foot is released from the pedal 109. Spring 103 then swings lever 102 to cut off the supply of fluid under pressure to the two cylinders 59 of the pressers 57 and 58 and at the same time connecting the T 91 with the waste pipe 88. The two springs 80 of pressers 57 and 58 then urge the presser heads 73 and 74 away from one another releasing the box and forming block. The formed box may next be removed from the forming block and the forming block moved back into accessible position toward the front of the machine. The newly gummed and folded blank may thereafter be placed upon the block and the operations repeated. In this manner the blank is being folded and gummed while the glue is setting on the previously formed box. By employing a suitable glue, the glue may be set sufficiently during such interval so that the ends remain permanently glued to the flaps of the sides of the box thereby permitting the rapid formation of the boxes without waste of time. As soon as the second folded blank is placed upon the block 42 the operations previously described are repeated and the block slid into position between the pressers 57 and 58 and the presser heads 73 and 74 operated to press the end of the sec-

ond blank against the flaps of said blank as previously brought out.

The advantages of my invention are manifest. The device can be constructed at a nominal cost and is exceedingly simple in operation. Considerable time and effort may be saved over and above that required in strictly hand methods. By equalizing the pressure on the two pressers, irregularities in construction of the box or block may be overcome so that both of the ends are simultaneously and equally well secured to the flaps of the adjoining sides of the box. The device is readily adjustable to handle a number of different sizes of boxes without requiring reconstruction thereof. The forming blocks for the formation of the box may if desired be constructed of wood and in such case may be readily built by the user so that the different sizes of boxes can be formed and glued without appreciable expense and without the need of individual machines.

Changes in the specific form of the invention as herein described may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described my invention what I claim as new and desire to protect by Letters Patent is:

1. In combination, a support, a forming block for the reception of a box blank on said support, a pair of pressers on said support one on each side of said forming block, said pressers being adapted to exert pressure against said block, and means for equalizing the pressure exerted by both of said pressers upon said block.

2. In combination, a support, a forming block for the reception of a box blank on said support, a pair of pressers on said support, one on each side of said forming block, said pressers each including a cylinder, a piston movable therein, a head operated by said piston for engagement with the box blank on said forming block, and means for simultaneously conducting a fluid under pressure to both of said cylinders to equalize the pressure on said presser heads.

3. In combination, a support forming a table and having a slot therethrough, a forming block for the reception of the box blank movable along said slot, means on the underside of said table extending through said slot for holding said block in slidable position upon said table, a pedestal for supporting said table, and a bracket interposed between said pedestal and table for holding said block attaching means away from said pedestal.

4. In combination, a table having a slot extending therealong, rails attached to said table and disposed on either side of said slot, pressers on either side of said slot at one end of said table, a block slidable along said rails and slot from a position between said pressers to a position remote therefrom, and means movable along said slot and attached to said block for guiding said block for movement upon said rails.

5. In combination, a support, a forming block for the reception of a box blank on said support, two cylinders, one on each side of said forming block and movable relative to the support in a direction toward and from the forming block, means for holding said cylinders in fixed position relative to said support, two presser heads movable relative to the cylinders in a direction toward and from the forming block and pistons in said cylinders for moving said presser heads.

6. In combination, a support, a forming block for the reception of a box blank on said support, two pressers, one on each side of said forming block and having presser heads movable toward and from the forming block, means for adjusting said pressers to vary the limit of movement of said presser heads, and flexible energy transmitting devices for moving said presser heads at some of the adjusted positions of the pressers.

In testimony whereof I affix my signature.

SIDNEY PEARCE.