Aug. 13, 1929. J. S. STOKES 1,724,529

METHOD OF AND APPARATUS FOR SHAPING BLANKS

Filed Nov. 24, 1925 3 Sheets-Sheet 1

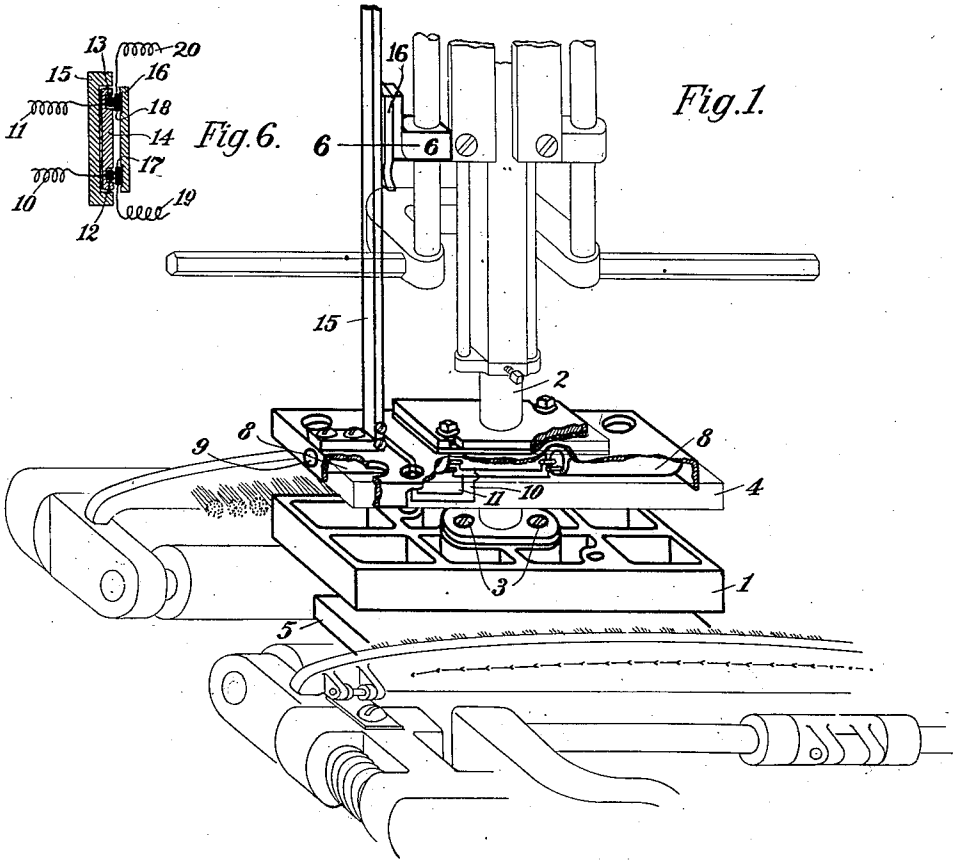


Fig. 1.

Fig. 6.

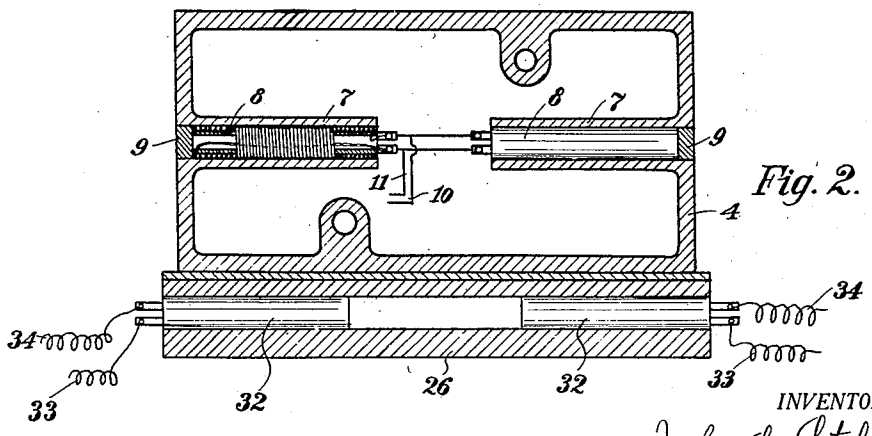


Fig. 2.

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METHOD OF AND APPARATUS FOR SHAPING BLANKS

Filed Nov. 24, 1925 3 Sheets-Sheet 2

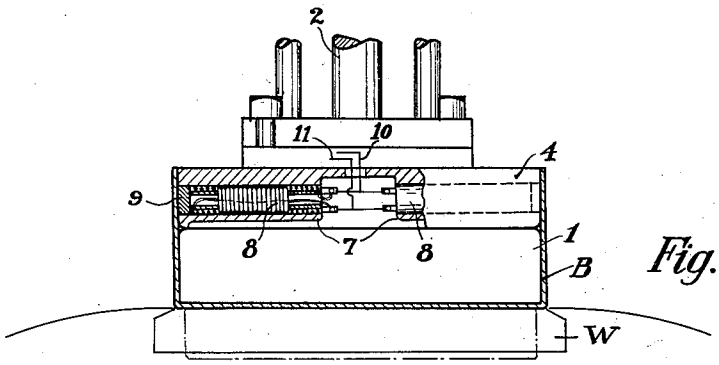


Fig. 3.

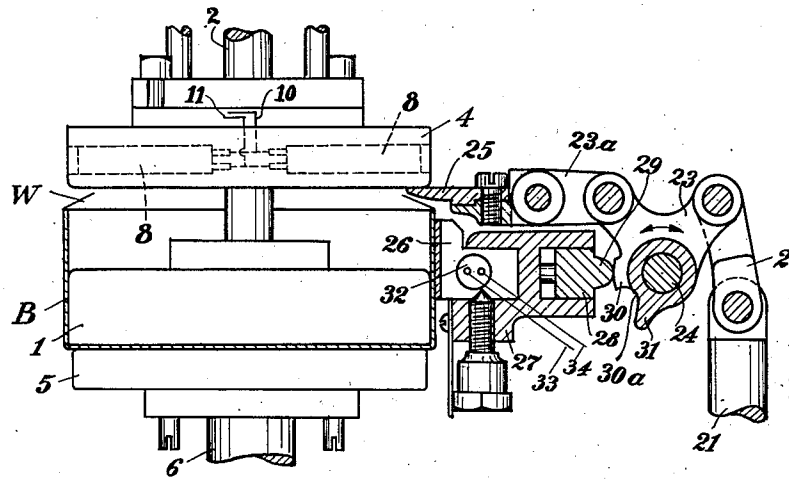


Fig. 4.

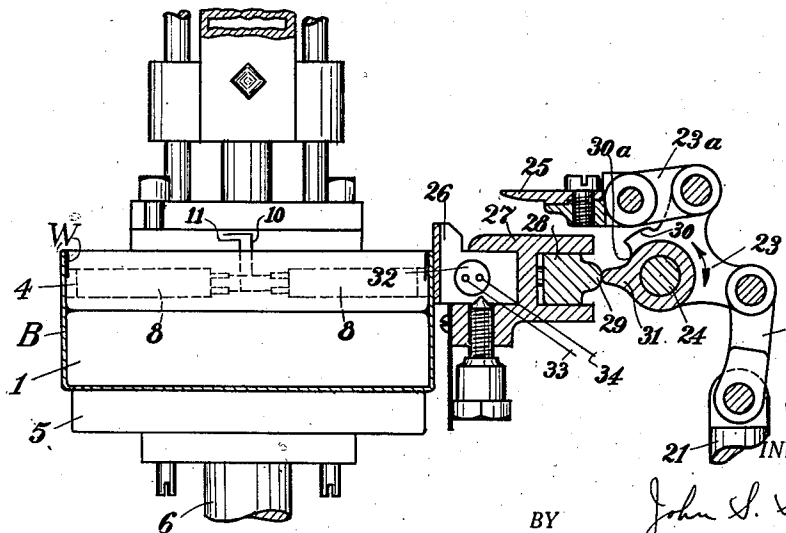


Fig. 5.

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METHOD OF AND APPARATUS FOR SHAPING BLANKS

Filed Nov. 24, 1925 3 Sheets-Sheet 3

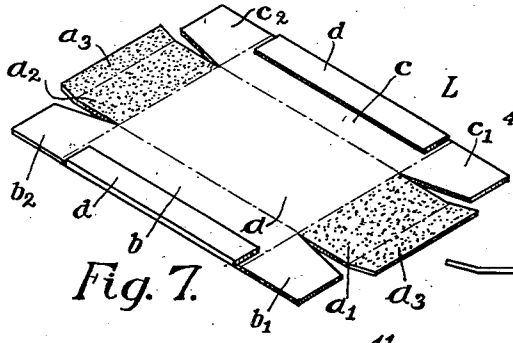


Fig. 7.

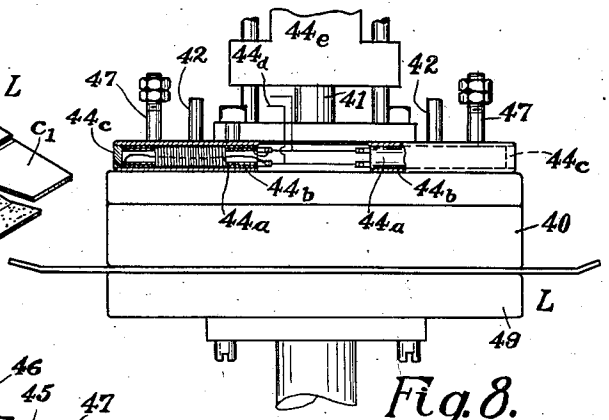


Fig. 8.

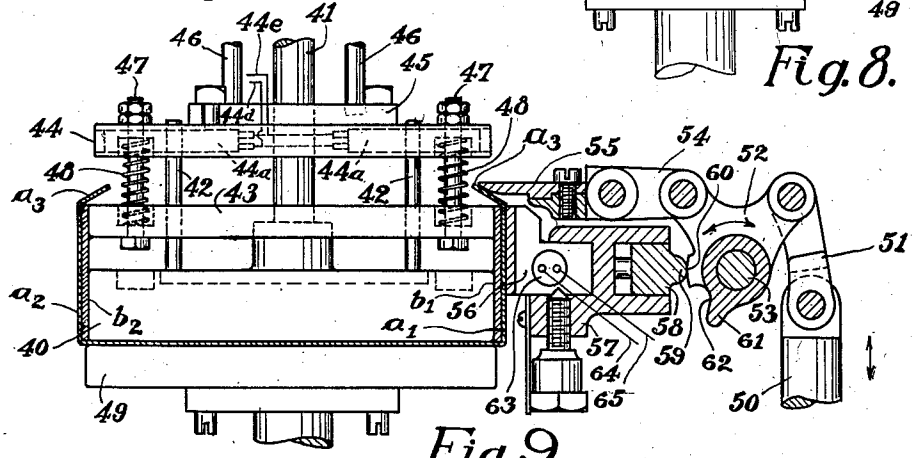


Fig. 9.

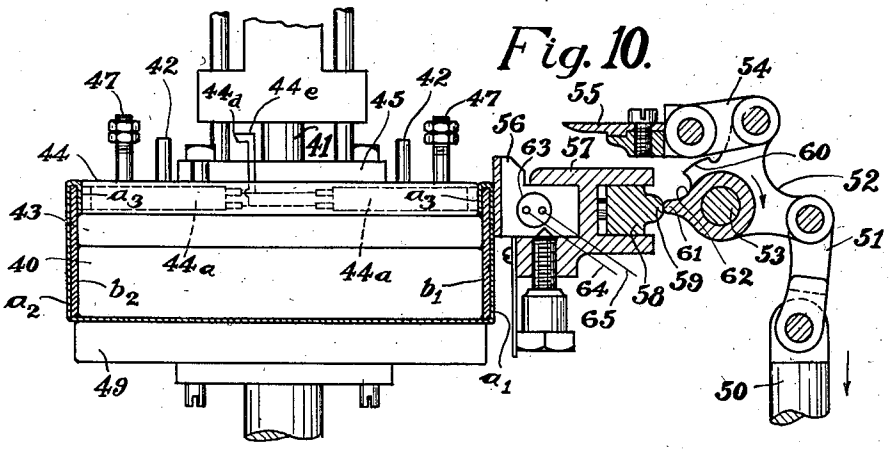


Fig. 10.

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Patented Aug. 13, 1929. 1,724,529

UNITED STATES PATENT OFFICE.

JOHN S. STOKES, OF HUNTINGDON VALLEY, PENNSYLVANIA, ASSIGNOR TO STOKES AND SMITH COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

METHOD OF AND APPARATUS FOR SHAPING BLANKS.

Application filed November 24, 1925. Serial No. 71,178.

My invention relates to a method and apparatus utilizable for dissipating moisture from the adhesive of an adhesive-coated blank.

In accordance with my invention, a blank, as aforesaid, is suitably heated to dissipate moisture from the adhesive, and particularly from a portion of the blank which has been folded toward or upon itself.

Further in accordance with my invention, a reciprocatory form block, or equivalent, of a box-wrapping or box-forming machine is utilized for applying heat to an adhesive-coated blank as it is manipulated or folded by the operating mechanism of said machine.

Further in accordance with my invention, a presser block, or equivalent, comprised in a wrapping or like machine is utilized for applying pressure or heat, and preferably both, to a folded portion of an adhesive-coated blank.

My invention relates to the art of producing box or container structures, or equivalent articles, either from the aspect of applying a wrapper to a formed box or container structure or of forming a box structure, as aforesaid, from a blank, or similar article.

My invention resides in the method and apparatus hereinafter described and claimed.

For an understanding of my method, and for an illustration of some of the various forms my apparatus may take, reference is to be had to the accompanying drawings, in which:

Fig. 1 is a perspective view of apparatus constructed in accordance with my invention.

Fig. 2 is a horizontal sectional view of a form block and presser block.

Fig. 3 is a vertical sectional view showing the form block structure of a wrapping machine with a box and wrapper in the position assumed prior to the wrapping operation.

Fig. 4 is a vertical sectional view showing the form block structure and part of the associated mechanism of a wrapping machine.

Fig. 5 is a vertical sectional view corresponding generally to Fig. 4, but showing another position of the parts.

Fig. 6 is a horizontal sectional view taken on the line 6—6 of Fig. 1.

Fig. 7 is a perspective view of a box or container blank.

Fig. 8 is a vertical sectional view showing the form block structure of a machine for forming container structures with a blank in position on said structure.

Fig. 9 is a vertical sectional view showing the form block structure and part of the associated mechanism for forming container structures.

Fig. 10 is a vertical sectional view corresponding generally to Fig. 4, but showing another position of the parts.

Referring to Fig. 1, there is illustrated a middle form block 1, constructed preferably of suitable metal, secured to the spur 2 in desired manner, as by the screws 3. An upper form block 4, provided with a perforation freely receiving the spur 2, normally rests upon the block 1, but is displaceable therefrom, as hereinafter described. A lower form block 5 carried by a reciprocatory bar or rod 6 (Figs. 4 and 5) forms a support for various articles as they are passed individually through the machine. A set of forms of the character described above is provided for each size of box to be covered or wrapped.

In operating a wrapping machine of the character herein described, wrappers or sheets are usually coated with suitable adhesive in a separate machine and passed individually to an operator, who registers the cardboard blank on the corner cuts of the wrapper or sheet. The operator then passes the box with the wrapper adhering thereto upwardly around the upper and middle form blocks, which are now in their normal position, that is, the upper form block is resting upon the middle form block, (Fig. 3). After the box and adhering wrapper are so positioned, a series of cams comprised in the wrapping machine functions to lower the upper and middle forms to bring the bottom of the box into engagement with the lower form. Thereafter, the combined structure, together with the box and wrapper, are passed downwardly to various operating positions between the various rolls and corner lap plates.

In accordance with my invention, heat is applied to the combined blank and wrapper during certain stages of the wrapping or

covering operation. As one manner of so doing, the upper form block 4 preferably is provided with a plurality of tube-like extensions 7 each containing a suitable heating structure, as a cartridge type electrical resistance unit 8 held against outward movement by a metal filling plug 9. Any suitable arrangement may be utilized for effecting electrical communication between the resistance units 8 and a source of current supply, as the usual 110 volt supply lines. As shown, conductors 10 and 11, connected to each resistance unit 8, are connected, respectively, to suitable elongated contact strips 12 and 13, Fig. 6, embedded in a strip of insulating material 14 carried by an elongated frame 15 suitably secured to and movable with the upper form block 4. A supporting member 16, constructed of suitable insulating material, is carried by some relatively fixed supporting member, as the upper part of the wrapping machine. Support 16 carries two contact members 17 and 18, connected by conductors 19 and 20 to a source of current supply, not shown. Contact members 17 and 18, respectively, frictionally engage contact strips 12 and 13. Accordingly, in the operation of the machine, current is supplied to the resistance units 8 during reciprocatory movement of the upper form block 4 and the structure associated therewith.

Referring to Fig. 3, the formed cardboard blank B is shown in position on the intermediate and upper form blocks 1 and 4 with the adhesive-coated wrapper or sheet W in position therebeneath. It will be noted that the height of the combined forms is the same as the inside depth of the blank B. The two forms move downwardly under the influence of the automatic mechanism comprised in the machine, and initially cause engagement between the bottom of blank B and the lower form 5. Thereafter, the combined form block structure carries the blank and wrapper downwardly between the various rolls and corner lap mechanisms in a manner well understood in the art, and just before the position indicated in Fig. 4 is reached, a cam (not shown) functions to arrest the downward movement of the upper form 4.

Fig. 4 illustrates the position of the parts when in the turn-in position. At this time, the sides of the wrapper W extend substantially vertically, and it is, therefore, necessary that such sides be turned inwardly toward the center of the box. To this end, a rod 21, reciprocatory in timed relation with vertical movement of the form block structure, is connected by a link 22 with a cam 23 oscillatory on a shaft 24. The turn-in finger 25 is connected to cam 23 through link 23^a in a manner well understood in the art, and under the influence of cam 23 functions to bend the upper edge of the wrapper W inwardly, as indicated in Fig. 4. It is well understood that on each of the other sides of the box turn-in fingers are utilized, each controlled by mechanism similar to that just described.

A box squaring or presser block 26 is supported in a housing 27 reciprocatory with respect to the form block structure when the latter is in the position of Fig. 4. A bar 28, suitably supported in a slot in said housing and movable with respect thereto against the expansive force of a plurality of springs (not shown), comprises a cam face 29 alternately engaged by the high points 30 and 31 of cam 23. It is well understood that on each of the other sides of the box, there is utilized duplicate presser blocks and associated structure of the character described above.

As cam 23 rotates in a counterclockwise direction (Fig. 4) to move presser finger 25 inwardly, high point 30 of said cam engages cam face 29 and causes presser block 26 to lightly engage the outside of the box. The other three presser blocks are controlled in similar manner, with the result that the cardboard sides of the box are temporarily steadied.

As cam 23 rotates in the manner just described, presser finger 25 is moved inwardly, carrying the upper edge of the wrapper W over the upper edge of the box. When the turn-in fingers are well under the upper form 4, the cam (not shown) is released from engagement with said form, which is now entirely supported by said fingers. Thereafter, upon rotation of cam 23 in a clockwise direction (Fig. 4), turn-in fingers 25 and the others, not shown, are withdrawn susbstantially simultaneously, with the result that the upper form 4 drops as a dead weight into the upper part of the box and onto the middle form 1 carrying the four turned in sides of the wrapper downwardly and into intimate engagement with the inside walls of the box.

Thereafter, as cam 23 rotates in a clockwise direction the depressed surface 30^a of said cam between high points 30 and 31 permits slight retraction of presser block 26, whereupon the combined form block structure carries the box with the wrapper glued thereto a slight distance downwardly into the position indicated in Fig. 5. Upon reaching this position, the high point 31 of cam 23, which is somewhat higher than point 30, engages cam face 29 and moves bar 28, housing 27 and presser block 26 toward the left, Fig. 5, the springs, not shown, between bar 28 and housing 27 being compressed during this operation and permitting some relative movement between said bar and housing. During the period of time that the form block structure remains in the position of Fig. 5, the four presser blocks under the in-

fluence of the high points of their respective cams function to exert considerable pressure on the walls of the box, which of course, is resisted by the upper form block 4.

In accordance with my invention, heat may be applied to the box exteriorly as well as interiorly in the region where the down-turned edges of the wrapper engage the inner upper surface of the box.

As one manner of so doing, the various presser blocks may be equipped with one or more electrical resistance units 32, preferably of the type described above. Such units are received in suitable openings provided in the respective presser blocks, and each unit comprises conductors 33 and 34 leading to a suitable source of current supply, not shown.

It has been experimentally determined that the application of heat to an adhesive-coated wrapper sheet or equivalent structure hastens the removal of the moisture from the adhesive. Accordingly, when the adhesive is usually "tacky" or when the paper is exceptionally stiff, those edges of the coated sheet which should remain secured to the interior of the box often spring away after the box has been removed from the form block structure. In most cases, this condition arises due to the fact that the adhesive has not had sufficient time to become properly set in order to develop its maximum sticking qualities; in other words, the adhesive has not become sufficiently "tacky"; or a sufficient quantity of moisture has not been dissipated in order to develop the maximum sticking qualities. It is characteristic of my invention that heat is applied to the various members in engagement, or in close proximity to the adhesive-coated sheet in order to more quickly eliminate an amount of moisture sufficient to ensure that the wrapper may be retained in the desired position on the box structure.

Although the foregoing description relates to the application of an adhesive-coated blank to a box structure, it shall be understood that my invention is not to be thus limited. As an example of another aspect of my invention, I have illustrated in Fig. 7 blank L utilizable to produce a container or box structure, my invention possessing marked utility in the manipulation and forming of a blank of this character.

As shown in Fig. 7, the blank L comprises a bottom section a, a front wall section b and a rear wall section c, each of said latter sections having a marginal turn-in section d folded upon and secured to the respective sections. The front wall section b comprises the corner lap sections b^1 and b^2 while the rear wall section c comprises the corner lap sections c^1 and c^2. Bottom section a also comprises the end wall sections a^1 and a^2, each of said latter sections terminating in a turn-in section a^3. It is to be understood that the face of the blank is coated with suitable adhesive in desired regions or zones as indicated by the dotted portions on Fig. 7 and that the blank is scored or creased as indicated by the dot and dash lines of said figure.

A blank of the character described above and others of generally similar nature may be fashioned into container structures by the machine illustrated and described in the patent to Streeper, 1,297,748. In accordance with my invention, I may utilize a machine of this character with the addition thereto of suitable structure for heating and thereby dissipating or removing moisture from the adhesive as the blank is passed through the machine, and particularly just after the blank has been formed into the container structure.

Referring to Figs. 9 and 10, there is illustrated an intermediate form block 40, constructed preferably of suitable material and suitably secured to the spur 41. A plurality of guide pins 42 carried by and rising from block 40 are received in apertures in the upper form blocks 43 and 44, the latter secured to and carried by a plate 45 from which rise the rods 46. A plurality of bolts 47 or equivalent members, depending from block 44 and slidably received in apertures in block 43 function to support the latter in spaced relation with respect to block 44, coiled springs 48, or equivalent devices, confined around said bolts serving to normally maintain this relation. A lower form block or plate 49 serves to support the bottom section of the blank as it is passed through the machine as hereafter described.

In accordance with my invention, one of the form blocks illustrated in Figs. 8, 9 and 10, preferably the uppermost block 44 is equipped with one or more heating elements, as the electrical resistance units 44^a each received in a tube-like extension 44^b and held against outward movement in any suitable manner, as by the metal filling plugs 44^c. Conductors 44^d and 44^e connected to each resistance unit 44^a may be connected to a suitable source of current supply in any suitable manner, for example, as illustrated in connection with the resistance units 8 of Fig. 1.

Referring to Fig. 8, the blank L is shown beneath the three upper form blocks in the position assumed thereby just after engagement with the lower form block 49, after which the combined form block structure with the blank carried between blocks 40 and 49 moves downwardly between the various rolls and corner lap mechanisms under the influence of the automatic mechanism comprised in the machine in a manner well understood in the art, and, just before the

position indicated in Fig. 9 is reached, mechanism, not shown, but described in the patent to Streeper aforesaid functions to prevent further downward movement of block 44. However, movement of block 40 continues and block 43 follows onward with said block 40 under the influence of springs 48 until the distance between blocks 43 and 44 reaches the maximum value permitted by bolts 47, whereupon further movement of block 43 ceases, after which continued downward movement of spur 41 carries block 40 away from block 43.

Fig. 9 is illustrative of the position assumed by the parts when in the turn-in position. At this time, front and rear wall sections b and c have been folded into a substantially vertical position, while the corner lap sections b^1 and c^1 at one end of the blank and the corner lap sections b^2 and c^2 at the other end of the blank have been folded inwardly into position substantially at right angles to the now vertical extending front and rear wall sections b and c. Also, at this time end wall section a^1 has been folded into a vertical position closely adjacent the corner lap sections b^1 and c^1 while end wall section a^2 has likewise been folded into vertical position closely adjacent the corner lap sections b^2 and c^2 and as a result it becomes necessary to turn the turn-in sections a^3 inwardly toward the center of the container structure. To this end, a rod 50, reciprocatory in timed relation with vertical movement of the form block structure, is connected by a link 51 with a cam 52 oscillatory on a shaft 53. A link 54 connects the cam 52 to the turn-in finger 55, and under the influence of said cam functions to bend one of the turn-in sections a^3 inwardly. It is well understood, and, as described in the Streeper patent aforesaid, that another similar turn-in finger controlled by mechanism similar to that described above is utilized on the opposite side of the container structures to turn in the other turn-in section a^3.

A box squaring or presser block 56 is supported in a housing 57 reciprocatory with respect to the form block structure when the latter is in the position indicated in Fig. 9. A bar 58, suitably supported in a slot in said housing and movable with respect thereto against the expansive force of one or more springs, not shown, comprises a cam face 59 alternately engaged by the high points 60 and 61 of cam 52, point 61 being substantially higher than is point 60. It is to be understood that a duplicate presser block and associated structure are utilized on the opposite side of the machine to perform the function hereinafter described.

As cam 52 rotates in counter-clockwise direction, Fig. 9, to move finger 55 inwardly, the high point 60 of said cam engages cam face 59 and causes presser block 56 to lightly engage the outside of the container structure. As finger 55 moves inwardly, the turn-in section a^3 is carried over the upper edge of the now vertical corner lap sections b^1 and b^2, and when said finger, as well as the other turn-in finger, not shown, are well under the topmost form block 44, the automatic mechanism, not shown, releases said form block and the latter is now solely supported by the turn-in fingers. Then, upon rotation of cam 52 in a clockwise direction, Fig. 9, the turn-in fingers are withdrawn from beneath form block 44, and, as a result, said form block drops as a dead weight into the upper part of the container structure and onto the form 43, carrying one turn-in section a^3 downwardly and into intimate engagement with the inside surfaces of the corner lap sections b^1 and c^1, and the other turn-in section a^3 downwardly and into intimate engagement with the inside surfaces of corner lap sections b^2 and c^2.

Thereafter, the depressed surface 62 of cam 52 permits slight retraction of presser block 56, whereupon the combined form block structure is actuated to carry the container structure a slight distance downwardly into the position indicated in Fig. 10. Upon reaching this position, the high point 61 of cam 52, which, as stated, is somewhat higher than point 60, engages cam face 59 and moves car 58, housing 57 and presser block 56 toward the left, Fig. 10, the springs, not shown, between bar 58 and housing 57 being compressed during this operation and permitting some relative movement between said bar and housing. During the period of time that the form block structure remains in the position of Fig. 10, the presser blocks under the influence of the high points of their respective cams function to exert considerable pressure on the walls of the container structure, which, of course, is resisted by the topmost form block 44.

In a manner similar to that described above with respect to Figs. 1–6, heat may be applied to the formed container structure exteriorly as well as interiorly, preferably in the region where the down-turned turn-in sections a^3 engage the corner lap sections b^1 c^1 and b^2 c^2. To this end, the various presser blocks may be equipped with one or more electrical resistance units 63 received in suitable openings provided respectively in said block, each unit comprising conductors 64 and 65 leading to a suitable source of current supply, not shown. In this manner, the down-turned turn-in sections a^3 are heated exteriorly by the presser blocks 56 and interiorly by the topmost form block 44 simultaneously with the application of pressure to hold said turn-in sections respectively in engagement with the adjacent corner lap sections b^1 c^1 and b^2 c^2. As a result of this

application of heat, the adhesive in this region is dried at a more rapid rate than would otherwise occur thereby lessening the tendency of the turn-in sections a^3 to spring away from the adjacent wings when the box is removed from the machine.

In the appended claims, the expression "blank" is to be understood as designating an article such as the wrapper W, the container structure blank L, or other articles of generally similar construction.

What I claim is:

1. In the art of producing a box structure, the method which comprises effecting overlapping, adhesive engagement between adjacent, continuate portions of a blank while carried by the form block structure of a wrapping machine or the like, and applying heat to both sides of box walls comprised of said overlapping blank portions at a rate sufficiently high to remove a substantial amount of moisture from the adhesive before withdrawal of the shaped blank from the form block structure.

2. The combination with the reciprocatory upper form block of a machine having upper and lower form block structure, of means for shaping an adhesive-coated blank carried by the lower form block of said machine, and means for heating said upper form block to dissipate moisture from a shaped portion of said blank after said form block last mentioned has moved into engagement with said shaped portion, and means for moving a presser block into engagement with said shaped portion exteriorly of said box structure.

3. The combination with the reciprocatory upper form block of a machine having upper and lower form block structure, of means for shaping an adhesive-coated blank carried by the lower form block of said machine, means for heating said upper form block to dissipate moisture from a shaped portion of said blank after said form block last mentioned has moved into engagement with said shaped portion, and means for moving a heated presser block into engagement with said shaped portion exteriorly of said box structure.

4. In the art of producing a box structure, the method which comprises imparting to an adhesive-coated blank a form simulating a box structure, folding the extremity of a wall-forming section inwardly and toward the bottom of the box structure into engagement with the inner surface of the wall formed by the remainder of said section, and applying heat to the folded portion of said wall-forming section.

5. In the art of producing a box structure, the method which comprises imparting to an adhesive-coated blank a form simulating a box structure, folding the extremity of a wall-forming section inwardly and toward the bottom of the box structure into engagement with the inner surface of the wall formed by the remainder of said section, and applying heat and pressure to the folded portion of said wall-forming section.

6. In the art of producing a box structure, the method which comprises imparting to an adhesive-coated blank a form simulating a box structure, folding the extremity of a wall-forming section inwardly and toward the bottom of the box structure into engagement with the inner surface of the wall formed by the remainder of said section, and simultaneously applying heat to both sides and pressure to one side of the folded portion of said wall-forming section.

7. In the art of producing a box structure, the method which comprises imparting to an adhesive-coated blank a form simulating a box structure, folding the extremity of a wall-forming section parallel to the remainder thereof and in engagement with another section forming the same wall, and applying heat to the folded portion of said wall-forming section.

8. In the art of producing a box structure, the method which comprises imparting to an adhesive-coated blank a form simulating a box structure, folding the extremity of a wall-forming section parallel to the remainder thereof and in engagement with another section forming the same wall, and applying heat and pressure to the folded portion of said wall-forming section.

9. In the art of producing box structure, the method which comprises imparting to a blank a form simulating a box structure, folding the adhesive-coated extremities of opposite wall-forming sections in opposite directions to parallel position, and applying heat to the folded portions of the sections.

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6

CERTIFICATE OF CORRECTION.

Patent No. 1,724,529. Granted August 13, 1929, to

JOHN S. STOKES.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 1, line 18, strike out the words "wrapping or like" and insert instead box-wrapping or box-forming; page 3, line 24, for the word "usually" read unusually; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 9th day of September, A. D. 1930.

M. J. Moore,
Acting Commissioner of Patents.

(Seal)

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