UNITED STATES PATENT OFFICE

2,305,130

BOX CLOSING DEVICE

George J. Banta, Dixon, Ill.

Application March 17, 1941, Serial No. 383,703

10 Claims. (Cl. 93—49)

This invention relates to a device for assembling folding boxes of the type having interengaging cooperating flaps. The invention is directed to the device of the general type hereinbefore illustrated and claimed which includes means wherein the cooperating pair of flaps of a typical carton are first brought into proper relative positions wherein the projecting lock and slit are inserted one within the other, and pressed together to hold the flaps of a typical rectangular box in closed position. This means and its operation are applicable and operable both to closing the ends when empty as well as closing the cover flaps when the container has merchandise therein.

An important object of my invention is the provision of an inexpensive device for engaging and closing the end flaps of merchandise cartons, particularly those of substantially rectangular form, wherein the two opposite flaps carrying the key or lock and the slit, respectively, are assembled and locked together through mere manual movement of an empty carton through or along my device. The further object of my invention is the provision of a folding box assembling device in which either one or a plurality of boxes, each having opposed cooperating end flaps may be manually pushed in a path in engagement with my device and wherein the flaps are engaged by the assembling and locking parts thereof.

A further object of my invention is a provision of a device of the described class providing for the self-locking of the opposed closing flaps of fibrous receptacles, which device is of economical and inexpensive construction and which may be mounted upon a counter or any horizontal, vertical or inclined flat surface, and which may be mounted upon a vertical position upon the wall or the like so that the operator may manually pass either one or a plurality of adjacent cartons in operative engagement therewith to cause locking of the end flaps of one panel of the box at a time.

Other and further important objects of my invention will be apparent from the following description and the appended claims.

This invention, in one illustrated form, is illustrated in the accompanying drawings and said illustrated form is herein described by reference to reference numerals.

Fig. 1 is a top plan view of my box assembling device and showing same removably mounted upon a flat base.

Fig. 2 is a cross sectional view taken on a vertical plane of line 2—2 of Fig. 1, and showing in full side elevation a plurality of receptacles having foldable interlocking ends.

Fig. 3 is a cross sectional view on a transverse vertical plane of my device and taken on line 3—3 of Fig. 1.

Fig. 4 is a cross sectional view taken on a transverse vertical plane indicated by line 4—4 of Fig. 1.

Fig. 5 is an enlarged cross sectional view of an upper fragment of my device and taken on a vertical plane indicated by line 5—5 of Fig. 1.

Fig. 6 is an enlarged cross sectional view of the upper position or fragment of my device taken on lines 6—6 of Fig. 1 and illustrating the relative position attained by the lockable flaps prior to the actual inserting movement of the locking tongue of one thereof into the slit of the other.

Fig. 7 is a perspective view of the bevelled flap depressing block or member which is adjustable mounted in position to gradually depress the key or lock-carrying flap of the container.

Fig. 8 is a partially cross sectional view and elevation of the same general type of box locking device illustrated in Figs. 1 to 7 inclusive, though in this figure illustrated as mounted in extended position above a flat base to provide for operation thereof with cartons of greater size and height.

Fig. 9 is a perspective view of a slightly modified form of my device in which same is mounted upon a suitable wall anchoring plate, and in which the flap locking parts are identical to that of Figs. 1 to 8 inclusive.

Fig. 10 is a perspective view of a typical foldable cardboard box having foldable interlocking end flaps at the opposite ends, and representing one of the general types adopted before operation with my device.

Reference numeral 10 in the preferred illustrated form designates a flat metal base of a substantially thin metal, and which is merely shown as an optional supporting base and which optionally may or may not form a part of my device. I desire it to be understood that the flat metal base 10 is illustrated in preferred form for convenience and clarity in explaining operation. As said base is a dispensable element, the tunnel-like casing, shelf or trough or box guide member of my box closing device may be mounted directly upon any suitable flat work surface such as a counter, table, wall, platform or the like with equally satisfactory operation of the device.

Reference numeral 11 designates a casing, guide member, cover or tunnel preferably made of sheet metal and of U-shaped cross section and adapt-
ed to be of various and desired sizes so as to provide tunnel passages to conveniently receive and permit passage therethrough of one or more sizes of folding cartons having foldable end flaps, which flaps are adapted to be releasably locked together. In other words, the internal width dimension of the casing, shell or guide member is such as to receive the desired size or sizes of foldable boxes. The length of the tunnel, shell or guide member is preferably such that a desired plurality of boxes may be pushed through the device, one adjacent to the other and be projected from the outlet opening and end thereof with the end flaps at the upper end thereof locked together as herein described.

I desire it to be understood that my use of the words “shell,” “casing,” “guideway” or “guide member” has reference to a unit of the general class having either vertically or upwardly extending side walls 11a having substantially parallel internal surfaces or to any retaining or guide members whose side elements such as suitable bars or rods will guide the boxes during travel through the device.

The side walls or members 11a of the tunnel-like shell 11 preferably have at their lower ends integral and apertured suitably spaced apart extensions or ears 12 providing means by which my device may be securely mounted to a suitable flat surface such as the top of a counter, table or platform, or to a flat metal base 18 such as illustrated in Figs. 1 to 4 inclusive. In Figs. 1 and 3, the cover, shell or guideway 11 is illustrated as secured to the metal base 18 by suitable bolts 13 which pass through the apertures of ears 12 and thread into the threaded apertures of the base 18.

Construction of the guideway and adjacent and connected parts

As illustrated in the top plan view of Fig. 1, the inlet ends 14 of the side walls 11a are gradually bent and flared outwardly and in opposite directions and said gradually flared ends are defined by edges which are curved, receding and gradually extend from the upper part of the casing 11 toward the bottom edge of said side walls 11a. These outwardly flared flaps, aprons or ends 14 present gradually curved and inner opposed surfaces which engage and cause the two opposite lockable flaps to be positioned in substantially vertical planes as a box is pushed against the open end of the device, and so that, as the box whose end 15 is to be assembled enters the device, the flaps will be in substantially vertical positions prior to and when ready to be engaged by the flap folding and assembling parts hereinbefore described, the box flaps are bent partly inwardly from the vertical, the same will be separated by the beveled reduced end of the guide block hereinafter described.

Referring to Fig. 2, it will be noted that each of the side walls 11 immediately adjacent the folding cartons forming the bridge 15 which is in the general shape of an inverted U. The uppermost circular portion of the bridge 15 is provided with a pair of spaced apart apertures 16a, one spaced longitudinally behind the other. One of the apertures 16a is adapted to receive a removable manually operated thumb bolt or the like which is used for mounting and holding the guide block, and the other aperture is adapted to receive the end of a stud mounted in one end of the guide block in order to suitably mount said guide block against movement.

It will be noted that formed integral with the left hand or lower side wall 11b shown in the lower portion of Fig. 1, there is a substantially triangular projection, tongue or flap folding member 17 which is partially defined by diagonally extending gradually flared curved edge flange 16 which extends from a point adjacent at left hand upper extending portion of the bridge 15 to beyond a point midway between walls 11 and 11a. This gradually curved edge flange 16 is slightly bent and turned upwardly, as indicated in Fig. 1 so that as the slotted flap of a conventional box is pushed in its travel in said tunnel, said flap will be gradually turned downwardly and inwardly by said triangular projection 17 to substantially the flap position illustrated in Fig. 5. On a plane transversely of the device, the projecting tongue 17 is arcuate in cross section, and one edge of said tongue partially defines an arcuate groove in conjunction with the intermediate parts of the guideway 11.

The box illustrated in respective views of drawings is designated by reference numeral 20 and has at each end the integral foldable transversely extending inner flaps 21 and 22 and also has the outer foldable locking flaps 23 and 24 combined into a formed integral with each end wall thereof. As shown in Figs. 1 and 2 the cardboard flaps 23, one of which is at each end of each box are provided with the recessed integral locking tongue 23a, and flap 24 is provided with transversely extending slit 24a which is adapted to receive and interlock with the projecting tongue 23a of the opposite flap 23.

Referring particularly to Fig. 1, it will be noted that the intermediate connecting portion of the guideway forming the rounded upper wall or top 11b of the guideway, or channel-like trough 11 is cut at its forward edge to provide an elongated upwardly curved flange 16a which extends forwardly in a gradually curved direction from the wall 11a and which partially defines the arcuate recess 18. The substantially triangular projecting tongue 17 partially defines said recess or slot 15 as shown. It will be noted that the edge flange designated as at 16 in Fig. 1 is gradually curved outwardly to present a beveled diagonally extending surface which is frictionally engaged by one of the box flaps.

As the respective foldable cartons to be closed are pushed through the device the tongue-carrying flap 23 will be gradually bent and folded inwardly by frictional engagement of said flap with the flared edge flange 16a, to place the flap 23 successively into the position illustrated in Fig. 4 and thence into the position illustrated in Fig. 5.

Illustrated in Figs. 1 to 6 inclusive, and shown at various points, is the guide block 25 preferably made of metal and which has its forward end 25a reduced and substantially pointed and gradually beveled to form a rounded surface 25b having a substantially apex to the side edge surface of the block. The guide block 25 has formed on its forward end and extending perpendicularly from the pointed reduced end 25a thereof an abutment or projection 26 which may preferably be cast or otherwise formed integrally with the guide block 25. The forward end of said upwardly projecting integral projection 26 is formed to present a forwardly and upwardly inclined end surface 26a as illustrated in Fig. 2.

The projection 26 provides a means for mount-
ing the guide block 25 on the connecting bridge 26 and in the desired horizontal position in the device, the upper end of said projection 26 being provided with a threaded aperture and with an upwardly projecting stud 27. The threaded aperture in said projection 26 is adapted to receive the threaded portion of a suitable mounting bolt or screw indicated in Fig. 2 by reference numeral 28. The guide block 25 is so mounted.

It will be noted particularly from Figs. 2 and 3 that the forward projecting nose-like projection of the projecting end 25 presents a gradually curved and beveled under surface 26a as indicated in Figs. 3 to 6 inclusive. This bifurcation provides a pair of spaced apart rearwardly projecting parallel integral arms 29. It will be noted from Fig. 2, which shows one of the arms 29 broken away, that the bifurcation or recess 29 extends substantially one-half the length of the guide block 25, the length of which may be varied according to the particular sizes and requirements.

It is to be noted that the mounted position of guide block 25 is such that as the partially bent over box flaps are pushed into the device, they pass through the relatively narrow paths between the oval or rounded upper surfaces of the guide block and the curved intermediate top 11b of the guideway 11, as illustrated in Figs. 4, 5 and 6.

As shown in Figs. 2 and 7, a flap-engaging and depressing element 31 is provided in the form of a beveled block or projection. Said block 31 has a flat side 31a, and opposite curved, beveled and gradually converging surface 31b which extends from the relatively thin block end 31c. The reduced end 31c is apertured and said block is partially releasably and adjustably mounted or secured in a beveled surface of the adjustable block 31 to cause the thicker part thereof to flex the tongue portion of one flap and the thinner portion of the other flap into the downwardly inclined position illustrated in Fig. 6 and wherein the edge of the tongue engages the slot of the opposite flap. As the block progresses the flaps pass the terminal of the arms—of the guide block though at the same time are gradually depressed to a flat position by the inner inclined surface 37 of the downwardly extending end 38 of the top of the guideway. This gradually frictional engagement of the partially flattened flaps flattens them to normally closed position and simultaneously projects or inserts the tongue 32a of each flap into locking position in the slot 24a of opposed flap 24.

Referring to Fig. 8, it will be noted that this view illustrates in transverse cross section an elevated or higher position of the box assembling device which I have herein before described. The device is identical in that which has been described and which is claimed herein, but it is supported in a substantially higher position from a supporting base 10 by means of a plurality of suitable metal interposed standards 40 which may be either removable or permanently secured at their lower ends to a base 40 or other supporting surface such as a work table, platform, etc.

In the particular illustration of the drawings, the lower ends of the spacers or standards 40 are secured by suitable threaded bolts 41 which pass through properly positioned apertures in the base and which thread into the lower ends of said spacer or standards 40. These spacers or standards 40 may be either four or more in number, and may for example assume various shapes and designs.

It is found that one form of standard quarter size ice cream container or box is of the same thickness dimension as the pint size, though the height or depth of the quart size is substantially double that of the pint size. In order that one device might be transferred by a user from one to use of the standard pint size boxes, I have provided said supporting and spacing means such as illustrated in one form in Fig. 8.

In this figure, the elevated or heightened position of the device shown proportionately permits use thereof in connection with the quart size boxes with equal efficiency and identical operation.

It will be readily apparent that both the height of the guideway which includes the opposed substantially parallel side walls, as well as the width and distance apart thereof may be made such as to conform to cardboard boxes of varying size and accordingly to the prevailing box size standards, and I do not desire that any of the foregoing description shall be interpreted to in any way limit the proportions or dimensions of the respective parts.

Referring to Fig. 9, I have illustrated one form in which my device of the type herein before described may be mounted on a vertical or inclined surface, where space and convenient accessibility are important factors. In this illustration, the functioning or operating portions of the device are in all respects like that herein before described with the exception that in this form these elements being in the form of angular flanges 43 and 44 respectively are preferably integral with the top or connecting portion 15. Similarly, the outlet end of the guideway shown as the lower portion of the figure terminates in the downwardly inclined top portion which pre-
sents the inner inclined friction surface 31 as heretofore described with reference to Fig. 2.

In the form of Fig. 9, entrance ends of the narrower side flanges or walls 43 and 44 merge with and form a continuation of the outwardly flap-engaging aprons 45 and 46 which diverge inwardly any of the two opposed box flaps to be assembling at the time of the entering movement of the box entering the device. In this form the device is shown as connected to a flat base or mounting plate 47 by a connecting arm 48 and suitable screws (not shown) which secure said arm to the top wall 11b and also secure projection 52 to said plate 47. Said plate 47 may be secured by screws or the like (not shown) to either a vertical, inclined or horizontal support.

I am aware that various changes may be made in the embodiment of the invention herein specifically described without departing from or sacrificing any of the advantages of the invention or any features thereof, and nothing herein shall be construed as limitations upon the invention, its concept or structural embodiment as to the whole or any part thereof.

I claim as my invention:

1. In a box assembling device, a metal hood having substantially parallel vertically extending side walls and forming a tunnel-like path through which the boxes are moved, the top portion of said hood being arched upwardly and extending from a point substantially near the longitudinal center of the hood to the outlet end thereof to thereby expose from above a substantial portion of the hood-enveloping area, the edge of the top portion nearest the entrance end of said hood being beveled and curved and extending diagonally from one side wall of said hood; a curved metal tongue extending inwardly from the opposite, side wall and toward said diagonal beveled edge and lying in a curved plane lower than the remainder of said hood top portion; in the form of one edge beveled and extending diagonally; a guide block having a rounded upper surface and mounted longitudinally beneath and adjacent said hood top portion, said block having its end nearest the outlet of said hood bifurcated; a flap depressing member mounted on said hood top portion and projecting into said guide block recess, the manual movement of a box causing the opposite male and female flaps thereof to be folded successively inwardly one over the other by said tongue and said top beveled edge and causing said finger to place said flaps in interlocking position.

2. In a device for interlocking opposite flaps of a box through movement of the latter, a metal hood of substantially inverted U-shaped cross section and including vertically extending side walls and an arched top portion connecting the outlet end portions of said side walls, the inlet ends of said side walls terminating in exposed edges; the inlet edges of said top portion forming two curved outwardly flaring flanges extending diagonally from said side walls respectively, an inclined flap-depressing element on said hood top portion and projecting partially into said guide block recess; the forward portions of said top and said flanges being adapted to position the opposed box flaps into overlapping relation and said element depressing the interlocking tongues of the box flaps into interlocking engagement and screws for adjustably positioning the said flap depressing element with respect to said recessed portion of said guide block.

3. In a device for interlocking flaps of boxes or the like, a pair of flat substantially parallel side walls; a metal top connecting or bridging the entrance end of said side walls, said top extending substantially over one half the area between said walls the forward part of said top being defined by two diagonal edge portions converging from the side walls to a central intersecting point, one of said edge portions merging into a slot aligned therewith, said edge portions being curved; an adjustable tongue depressing element on the interior of said top; a recessed elongated oval-surfaced guide block mounted below and adjacent said top and providing paths for edgewise movement of the box flaps; means for mounting said block; the movement of a flap carrying box through said device causing said diagonal curved edge portions to flex said flaps in overlapping relation and causing said element to depress and move the overlapped flap and area into the guide block recess to cause the tongue of one of said flaps to be inserted into the slot of the other flap, the top edge portion at the outlet of said device substantially flattening said flaps to complete interlocking of said flaps.

4. In a device for interlocking flaps of boxes or the like, a pair of flat substantially parallel side walls; a metal top connecting the upper edges of the outlet ends of said side walls, said top extending substantially over one half the area between said walls the forward part of said top being defined by a diagonal flanged edge portion extending from one side wall diagonally to a point near the other side wall, said edge portion forming an upwardly curved flange; an integral metal projecting apron extending from the opposite side wall and in a curved plane below said said top and having a curved flanged edge extending diagonally from said side wall; an oval surfaced guide block mounted longitudinally below and adjacent said top and said apron flange and having its inner end recessed and its forward end beveled to a substantial point; a bracket-like U-shaped mounting member extending from the upper side wall edges and forming a connecting bridge, said block being secured to said bridge portion of said member; an inclined surface tongue engaging member on the inner surface of said top and extending into the recess of said guide block on movement of a box through said device; said apron being adapted to fold down one box flap and said flanged edge portion of said top being adapted to overlap the opposite box flap on said first folded flap member being adapted to depress the tongue of one flap and the underlying slotted portion of the other flap into inserted interlocking position, and the outlet end portion of the top substantially flattening said flaps on positive movement of the box to interlock said flaps.

5. In a device for interlocking the cooperating flaps of a box by movement of the box in engagement with the device, a metal guideway including parallel side members and curved intermediate connecting wall; said side members projecting forwardly and outwardly; said edge of said connecting wall extending diagonally
from one side member toward the other; a metal apron projecting from one side wall and carrying
a diagonally extending curved flange; an oval surfaced elongated recessed guide block mounted
on said guideway and forming a path for movement of box flaps therethrough; means for
mounting said block to maintain it in position; an inclined element on said guideway extending
into said block recess; said apron flange and said guideway wall forming a path for
movement of a box through said device causing overlapping of the opposite box flaps and said element depressing the overlapped tongue and slot portions of the flaps into inserted position and said guideway wall flattening said flaps to complete interlocking thereof.

6. In a device for interlocking the cooperating flaps of a box by movement of the box in engagement with the device, a metal guideway including parallel side members and curved intermediate connecting wall; said side members projected forwardly; the forward edge of said connecting wall extending diagonally from one side member toward the other; a metal apron projecting from one side wall and carrying a diagonally extending curved flange; an oval surfaced elongated recessed guide block mounted on said guideway and forming a path for movement of box flaps therethrough; means for mounting said block to maintain it in position; an inclined element on said guideway extending into said block recess; said apron flange and said guideway wall forming a path for movement of a box through said device causing overlapping of the opposite box flaps and said element depressing the overlapped tongue and slot portions of the flaps into inserted position and said guideway wall flattening said flaps to complete interlocking thereof and means for securing said guideway and connected parts to a stationary surface.

7. In a device for assembling the flaps of a folding box by moving said box in a predetermined path through said device, a sheet metal guideway having opposite upwardly extending side walls and an arched convergent-like connecting wall connecting portions of the upper edges of said side walls, the outlet end of said guideway being of U-shaped cross section, the forward edge of said connecting wall extending diagonally and terminating in an outwardly curved flange; an integral apron extending from one side wall toward an intermediate portion of said flange and an elongated guide block extending longitudinally in said guideway and having its entrance end reduced and its opposite end portion longitudinally bifurcated; an adjustably mounted inclined element on said top connecting wall and projecting partly into the bifurcation of said block; the movement of a box through said device caused said apron and said connecting wall flange to flex the box flaps into overlapping relation and causing depression of the tongue and slotted portions of the respective flaps into said block recess and into Inserted position.

8. In a device for interlocking cooperating tongued and grooved box flaps, a channel-like guide member having side guide flanges for guiding a box moved in engagement; a transversely extending flanged projecting apron extending from one of said side guide flanges and into the normal path of one of the box flaps and adapted to fold down one of said flaps during movement of the box; the foremost edge of the intermediate portion of the guide member extending diagonally from the other side guide flange and being in position to cause folding down of the second flap of a box moved in engagement therewith and into position over said first flap; an elongated oval surfaced guide-block having a forward beveled end stationarily connected to the forward end of said guide member and providing an elongated arcuate path for movement therethrough of the partially folded down flaps, said block having its free end recessed; a projecting element connected to the inner surface of the intermediate portion of said guide member and projecting into said block recess and adapted to cause depression of the tongued and grooved overlapped flap ends into said block recess and to cause interlocking movement thereof as the box is moved through said device.

9. In a device for interlocking cooperating flaps of a box or the like by movement of the box in engagement therewith; a tunnel-like guide member for guiding the box in its movement; a diagonally extending flange on the forward edge of the intermediate portion of said guide member adapted to fold down one of the flaps to be interlocked; a diagonally extending projecting tongue connected to one side of said guide member and adapted to turn down the other box flap prior to folding down of said first-mentioned flap, said guide member having a downwardly inclined top portion converging downwardly to its exit end; a guide block having a reduced projecting nose portion and for guiding the flaps in partially folded down positions during movement of the box thereof, said block having a recessed end; and an adjustable projecting element mounted on said guide member and projecting into said block recess and adapted to cause depression of the overlapped flaps into said block recess to cause interlocking of said flaps as the flaps are moved in frictional engagement therewith.

10. In a device for interlocking cooperating flaps of a box or the like by movement of the box in engagement therewith; a guide member for guiding the box in its movement; a diagonally extending flange on the forward edge of the intermediate portion of said guide member adapted to fold down one of the flaps to be interlocked; a diagonally extending projecting tongue connected to one side of said guide member and adapted to turn down the other box flap prior to folding down of said first-mentioned flap; a guide block for guiding the flaps in partially folded down positions during movement thereof, said block having a recessed end; a connecting and mounting member for mounting and connecting said guide member and said guide block; and an adjustable projecting element mounted on said guide member and projecting into said block recess and adapted to cause depression of the overlapped flaps into said block recess to cause interlocking of said flaps as the flaps are moved in frictional engagement therewith.

GEORGE J. BANTA.