

Fig. 1.

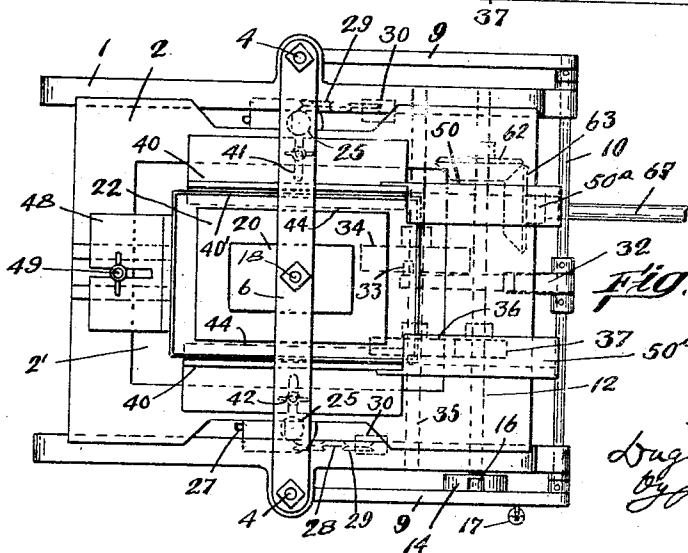


Fig. 2.

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Att'y

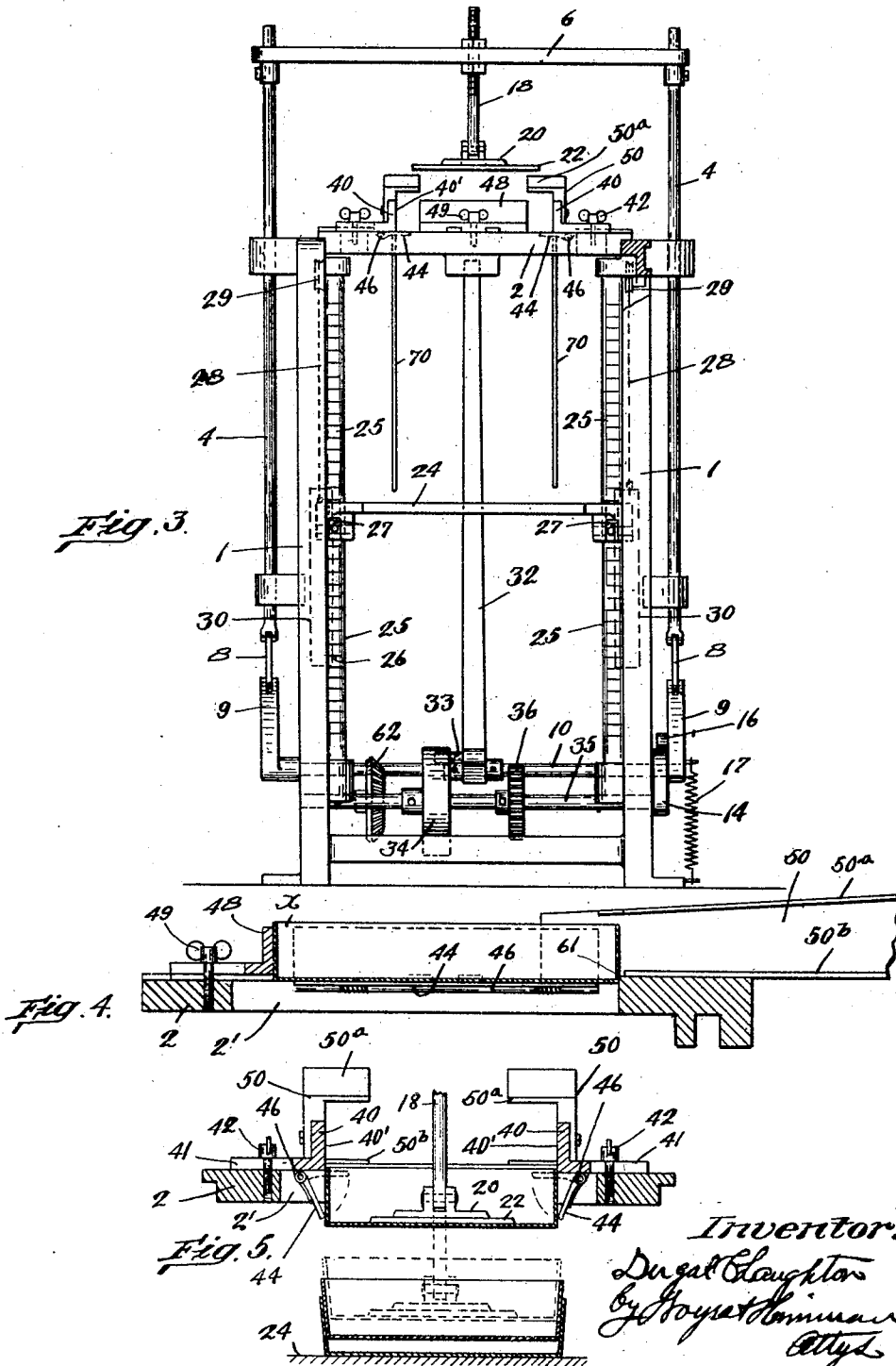
D. C. LAUGHTON.  
BOX COVER STACKING MACHINE.

APPLICATION FILED DEC. 23, 1916. RENEWED MAY 21, 1920.

1,364,562.

Patented Jan. 4, 1921

3 SHEETS—SHEET 2.



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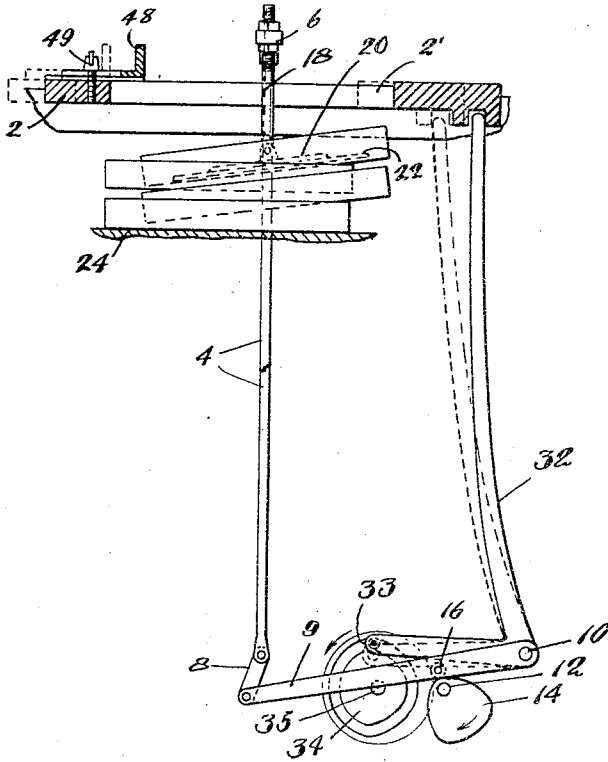
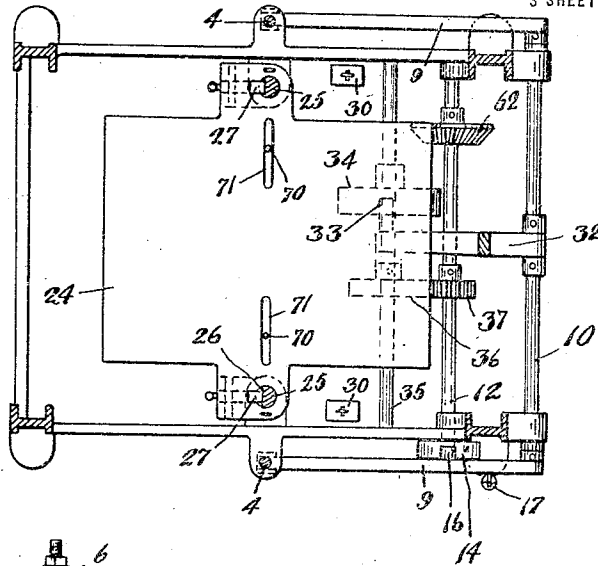
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*Fig. 6.*



*Fig. 7.*

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*Atty's*

# UNITED STATES PATENT OFFICE.

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## BOX-COVER-STACKING MACHINE.

1,364,562.

Specification of Letters Patent.

Patented Jan. 4, 1921.

Application filed December 23, 1916, Serial No. 138,536. Renewed May 21, 1920. Serial No. 383,288.

*To all whom it may concern:*

Be it known that I, DUGAL C. LAUGHTON, a citizen of the United States, residing at Haverhill, in the county of Essex and State of Massachusetts, have invented an Improvement in Box-Cover-Stacking Machines, of which the following is a specification.

In the manufacture of cardboard boxes, after the finished box-covers have been discharged from the cover-making machine, it is customary to place the finished covers in a stack, or to nest them so that each cover sets in the one beneath it. If, however, the sides of the covers do not flare, and they usually do not, it is customary to nest them by having one end of each cover rest on and project over the corresponding edge of the cover next beneath it, the longitudinal sides of each cover springing outward sufficiently to permit the cover which is placed therein to be pushed down to, or nearly to the inner side of the top.

In order that the stack may be practically perpendicular, it is customary, also to alternate the position of the covers successively, *i. e.*, to arrange every other cover to project at one side of the stack, and the others to project at the opposite end.

Prior to my invention, the above-described cover-stacking operation, so far as I am aware, was performed by hand, so that the labor cost for stacking the output of a single cover making machine was a matter of importance.

The object of my invention is to provide an automatic device for receiving the box covers, as they are discharged from the cover-making machine, and arranging them in a stack, so that the covers are partly nested and alternately project, as above described, and which is adapted to be arranged to receive the covers discharged from a cover-making machine of common form, and to operate in unison therewith, so that a single workman may attend to the removal of the covers from a large number of cover-making machines.

I accomplish this object by the means shown in the accompanying drawings, in which a preferred embodiment of my invention is shown, and in which;

Figure 1 is a side elevation of a machine showing the preferred embodiment of my invention.

Fig. 2 is a plan view, and

Fig. 3 is a front elevation thereof.

Figs. 4 and 5 are detail sectional views of the box-cover sustaining-means.

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

Fig. 7 is a detail view illustrating the cover-engaging portions of the machine.

In the drawing, the frame 1 of the machine is composed of a number of suitably-braced uprights, and has a top-frame 2 mounted to slide longitudinally therein, to a limited extent, in suitable guide-ways provided therefor, said top-frame having an oblong opening 2' in the middle portion thereof, the dimensions of which are somewhat greater than the dimensions of the largest box-cover which the machine is designed to receive.

A pair of side rods 4 are mounted to slide vertically in the frame at the opposite outer sides thereof, said rods being connected at their upper ends by a cross head 6 and having links 8 connected at their lower ends, said links being, in turn, connected to arms 9 secured on a shaft 10 extending across the rear end of the machine. A shaft 12 is mounted in the frame and has a cam 14 thereon arranged to engage a cam roll 16 on one of the arms 9, and a spring 17 is arranged to hold said roll against the surface of said cam, the arrangement being such that, for each rotation of the shaft 12, the cross head 6 will be raised and lowered.

A rod 18 is mounted in vertical position in the middle of the cross head 6 and an oblong head 20 is pivotally connected to the lower end of rod 18, so that it may tilt longitudinally, and has a removable or interchangeable face-plate 22 secured thereto, face-plates of different sizes being employed according to the size of the covers to be stacked. With the above-described arrangement, vertical reciprocation of the side rods will cause the plate 22 to be carried vertically down through the middle portion of the opening 2' in the table 2.

A horizontally-disposed table 24 is mounted to slide vertically on vertical guide rods 25 mounted within the frame at each side thereof, said rods each being provided with a series of teeth 26 arranged to be engaged by pawls 27 on the table 24. Cables 28 are connected to the table 24 and extend over pulleys 29 and have weights 30 suspended therefrom, which act to sustain said table 24,

the latter being held against upward movement by said pawls 27, and being free to be pushed downwardly against the gravity action of the weights 30.

5 A bell-crank-lever 32 is pivotally mounted on the shaft 10, one arm of said lever extending vertically into engagement with a recess in the under side of the top-frame 2, and the other arm extending horizontally  
10 and having a cam roll 33 on its end arranged in the path of a cam 34 mounted on a shaft 35, so that, as the latter is rotated, limited reciprocating movement of the frame 2 will be caused. A gear 36 is arranged on shaft  
15 35 in mesh with a gear 37 on shaft 12, to cause shaft 35 to make one revolution for every two revolutions of shaft 12.

A pair of guide brackets 40, having vertical guiding faces 40', are mounted for  
20 transverse adjustment on the frame 2, at opposite sides of the opening 2' therein, said brackets being secured thereon, with said faces in parallelism, by thumb screws 42, which pass through slots 41 therein, extend-  
25 ing perpendicularly to said faces.

Doors 44 are connected by hinges 46 in a horizontal position against said under side of said brackets, and so that they project at right angles to the faces 40' at the lower  
30 edges thereof, see dotted-line position of Fig. 5. A stop-bracket 48 is mounted on the frame 2, at the front end of the opening 2' therein, with its face at right angles to the faces of brackets 40, said bracket being se-  
35 cured in position by a thumb screw 49, passing through a slot therein, permitting transverse adjustment thereof.

A pair of guide-plates 50 are secured in oppositely-disposed positions to correspond-  
40 ing ends of the guide brackets 40, said plates virtually being extensions of said brackets, as they have vertical side faces which are practically continuous with the faces 40' thereof, but which also have horizontal top  
45 and bottom portions 50<sup>a</sup>, 50<sup>b</sup>, which extend toward each other, respectively, to form a guide to the space between said brackets, the top portions 50<sup>a</sup> preferably being slightly in-  
50 clined downwardly to said brackets, as indicated.

It is to be understood that the above-described machine is designed to be operated in conjunction with, and, what is more im-  
55 portant, in time with a box-cover making machine which discharges a finished cover at regular intervals. For the purposes of the present invention, it is unnecessary to disclose such a machine in detail, or more  
60 than to indicate a connection with the cover-ejecting means of such a machine. To this end, a portion 52, of a cover-making machine, is indicated as arranged directly in the rear of the machine hereinbefore de-  
65 scribed, and, as having a support 53 on which the finished cover, as  $x$ , is delivered. In

connection with such machines, a cover-actu-  
ator of some type is provided, which en-  
gages one end of the cover, after it is de-  
livered onto said support 53, and, by the  
action of a sharp blow, impels it therefrom. 70  
The means for impelling the cover, indi-  
cated, comprises a rod 54, having a head on  
its end, which is forced longitudinally, under  
the action of a spring, (not shown) into en-  
75 gagement with one end of the cover, the set-  
ting and releasing of said rod being per-  
formed by a vertical shaft 56, through inter-  
mediate mechanism, (not shown) said shaft  
56 being continuously driven by a main  
80 shaft 58 through worm gears 59, 60. As a  
means for causing shaft 12 to rotate in time  
with said shaft 56, a bevel gear 62 is mounted  
on shaft 12, which is arranged in mesh with  
a similar gear 63 on a shaft 64, the latter be-  
85 ing driven from shaft 58 by intermediate  
gears 65, 66, and 67. The parts are rela-  
tively timed, so that, after each impelling ac-  
tion of the rod 54, the shaft 12 will be caused  
to make a complete rotation.

In practice, the two machines are so ar- 90  
ranged that the guide plates 50, which to-  
gether practically constitute a tubular guide,  
are arranged in position to receive the covers  
as they are impelled from the support 53, and  
95 to direct them onto the doors 44, and against  
the abutment 48, a cover thus being delivered  
thereto on each complete rotation of shaft 12.  
To prevent rebound of the cover after it  
strikes against the stop-bracket 48, the por-  
100 tion of the frame 2, at the rear end of the  
opening 2' therein, is raised somewhat above  
the level of the doors 40, to form a shoulder  
61, in front of which the cover falls as it  
strikes against the bracket 48.

The parts being suitably adjusted, the 105  
stacking operation is as follows: Assuming  
the parts in the position of Fig. 1, and that  
a cover has just been impelled along the tu-  
bular guide 50, under the impulse of a blow  
from the rod 54, against the stop-bracket 48, 110  
so that it is supported on the doors 44 in  
front of shoulder 61, as shown in Fig. 4, the  
rotation of shaft 12 is continued, the head  
20 is drawn down, so that it enters the cover  
supported on the doors 44 and is brought to 115  
bear firmly on the top thereof throughout  
the greater portion of its surface. It is to  
be understood, that the width of the face  
plate 22 must be less than the normal dis-  
tance between the edges of doors 40, and its 120  
length must be very substantially less than  
the length of the covers to be stacked.

Continued downward movement of the  
head 20 causes the doors 44 to be swung  
downwardly and the cover to be pressed 125  
down between them, until it has completely  
passed the same, so that they may be re-  
turned to horizontal position by their  
springs, as shown in Fig. 5. The table 24 at  
the beginning of the operation, is raised to 130

its fullest extent, so that, as soon as the cover has been pressed down far enough to permit the doors to swing back to normal position, it will be pressed against said table and held pressed thereagainst for a brief interval, the cam 14 being formed to cause the head to dwell for a short interval at each end of its vertical reciprocating movement. At the instant the head reaches the limit of its downward movement, the cam 34 causes a swinging movement of lever 32, so that the top-frame 2 is moved toward the rear of the machine, (or from the dotted to the full-line position of Fig. 7) and is held in this position while the head 20 is lifted to its uppermost position, leaving the cover on the table. A second cover is then delivered against the bracket 48, and onto the doors 44, and then the head 20 again descends and engages this cover and presses it through the frame 2 in the manner already described. In this instance, the cover is held in a different longitudinal position with relation to the head 20, and receiving table 24, than the cover previously placed thereon, so that one end-portion of the cover which is being forced down will be pressed against the corresponding end edge of the other cover, while its opposite end portion will be pressed down into the cover on the table, and will thus be held in a slightly-inclined position as shown in Fig. 7, this operation being assisted by the tilting of the head 20, during the last part of its movement. The operation above described will then be repeated, the frame 2 being moved back to its previous position, the head again being lifted, and another cover being pressed down into a position directly over the first cover, so that one of its end-portions will be pressed onto the end edge of the last previously delivered cover, and its other end portion will be pressed onto it, that is, the covers are stacked automatically in exactly the manner in which they have previously been stacked by hand.

As each cover, which is pressed down through the frame 2, must be pressed down to the same extent, it follows that, as the stack of covers increases in height, its supporting table 24 must be correspondingly depressed, the depression thereof being against the action of the weights 30, and the lifting of the table, after it has been depressed, being prevented by the pawls 27.

To prevent lateral movement of the covers, or stack of covers, after they have been delivered to the table 24, guide-rods 70 are mounted in the guide-brackets 40 and depend therefrom vertically in a position as closely as practicable to the plane of the guide faces 40' of said brackets. Elongated apertures 71 are provided in the table 24 to receive said guide-rods 70 which permit the table to be raised to the highest position and

also permit lateral adjustment of the brackets 40 with said guide rods therein.

As the machine is constructed, the table 24 may be depressed nearly to the level of the cam 34, and then the stack of covers may be easily removed at the front of the machine. The pawls 27 will then be disengaged, permitting the table to be raised again to the starting point, so that the above-described operation may be repeated.

#### I claim:—

1. A box-cover stacking machine comprising a table, a support above the table, means to deliver the covers successively onto said support and means to conduct the covers successively downward from said support onto said table in uniform vertical alinement transversely, and alternately at opposite sides of a middle position longitudinally.

2. A box-cover stacking machine comprising a depressible table having means to hold it in different positions of depression, a yielding support above said table, a vertically reciprocating head arranged to force down a cover carried by said support onto said table, and means to deliver a cover to said support in position to be engaged by said head, after each reciprocation thereof.

3. A box-cover stacking machine comprising a depressible table having means to hold it in different positions of depression, a yielding support above said table, a vertically reciprocating head arranged to force down a cover carried by said support onto said table, and means to deliver a cover to said support, after each reciprocation of said head, into position to be engaged thereby, alternately, at opposite sides of a middle position longitudinally of the cover.

4. A box-cover stacking machine comprising a cover-receiving table, a spring-sustained, downwardly-swinging cover-support disposed directly over said table, a head and means to reciprocate the same vertically in a predetermined path to engage a cover on said support, and depress it against the spring action of said support, to deliver it to said table, and means to deliver the covers successively to said support, after each reciprocation of said head, and to hold them thereon alternately at opposite sides of a middle position with relation to its said path.

5. In combination with a horizontally-disposed support having an abutment, means yieldingly to sustain a box-cover in front of said abutment, ejecting-means constructed and arranged to discharge the box-covers successively onto said support and against said abutment, a receiving table beneath said sustaining-means, a vertically-reciprocating head arranged and relatively timed with said ejecting-means to depress the covers delivered to said support onto said table, as

they are delivered, and means, operating in time with the reciprocations of said head, to vary the positions of the covers, longitudinally thereof, to opposite sides of a middle position, after each reciprocation of said head.

6. In combination with a support having horizontally-disposed, downwardly-yieldable box-cover sustaining-means, a depressible table disposed directly beneath said sustaining-means, and having means to retain it in different positions of depression, a vertically-reciprocating head arranged to engage a cover on said sustaining-means, to press it downwardly to be supported on said table, means to deliver a cover to said sustaining-means, and means to carry a cover thereon longitudinally between opposite positions after each reciprocation of said head.

7. In combination with a horizontally-disposed frame having an opening therein, and downwardly-yielding, box-cover sustaining-means at each side of said opening, means to deliver the box-covers successively into a predetermined position on said sustaining-means, a receiving-table beneath said sustaining-means, a cover-engaging head having means to reciprocate the same vertically to depress each cover, as it is delivered to said sustaining-means, onto said table, and means to change the position of said sustaining-means, after each reciprocation of said head, to hold the covers successively at opposite sides of a middle position with relation to the path of movement of said head.

8. In combination with a horizontally-disposed frame having an opening therein, a pair of guide-brackets mounted thereon at opposite sides of said opening, and having upright guide faces arranged facing each other, said brackets being transversely adjustable to carry said faces toward and from each other over said opening, doors pivotally mounted on said brackets beneath said faces and normally spring-sustained in position to extend horizontally beyond said faces, a stop-bracket at one end of said opening, a vertically-movable receiving table beneath said opening, and a head arranged to reciprocate vertically through said opening to and from said table, to engage a box-cover supported on said doors and press it downwardly to deliver it to said table.

9. In combination with a pair of oppositely-disposed supports arranged to yield downwardly and away from each other, means to deliver a series of box-covers successively thereon, a table beneath said supports, a head arranged to reciprocate vertically between said supports to depress the covers as they are delivered thereto, onto said table, and means to alternate the longitudinal positions of the covers, with relation to a middle position, after each reciprocation of the head, to cause the covers to be deliv-

ered out of longitudinal register and to be stacked in overlapping, oppositely-inclined positions.

10. In combination with a horizontally-disposed frame, providing an oblong opening through which a box-cover may be passed, a pair of cover-supports pivotally mounted at the opposite longitudinal sides of said opening and spring-supported normally to extend partly across said opening, means to deliver the covers successively onto said supports in predetermined position, a head arranged to reciprocate vertically through said opening midway between said supports, to engage a cover thereon and press it downwardly therebetween, as they are swung downwardly thereby, and means beneath said supports to receive the covers when freed therefrom.

11. In combination with a horizontally-disposed frame, providing an oblong opening through which a box-cover may be passed, a pair of cover-supports pivotally mounted at the opposite longitudinal sides of said opening and spring-supported normally to extend partly across said opening, means to deliver the covers successively onto said supports in predetermined position, a head arranged to reciprocate vertically through said opening midway between said supports, said head having a flat face of less width than the normal distance between the adjacent edges of said supports and adapted to enter and engage the inner side of a cover resting top side down on said supports, a table beneath said supports, and means to move said head downwardly after each cover has been delivered to said supports to cause said supports to swing aside and permit the cover to be deposited on said table and to return said head to a position above the supports.

12. In combination with a horizontally-disposed frame, providing an oblong opening through which a box-cover may be passed, a pair of cover-supports pivotally mounted at the opposite longitudinal sides of said opening and spring-supported normally to extend partly across said opening, means to deliver the covers successively onto said supports in predetermined position, a head arranged to reciprocate vertically through said opening midway between said supports, and comprising a flat plate pivotally supported to tilt in a longitudinal direction and adapted to enter and engage the middle portion of the inner side of a cover resting top side down on said supports, a table beneath said supports and means to move said head to depress each cover downwardly, after it has been delivered to said supports, to deposit it on said table, and means to alternate the longitudinal positions of the covers, with relation to a middle position after each reciprocation of the

head, to cause the covers to be delivered to the table out of longitudinal register and to be stacked in overlapping, oppositely-inclined positions.

5 13. In combination with a horizontally-disposed frame, providing an opening through which a box-cover may be passed, guiding-brackets mounted thereon at each  
10 side of said opening and having upright, parallel guiding-faces, supports pivotally connected to said guiding-brackets and spring-sustained to project beyond said  
15 faces transversely of said opening, a stop-bracket on said frame at one end of supports having a face at right angles to said  
20 guiding-faces, means permitting adjustment of said guide-brackets transversely of said opening and said stop-bracket longitudinally thereof, means to deliver the covers  
25 successively onto said supports in position between said brackets, means to press the covers, as they are delivered through said opening, against the spring action of said supports, and a table beneath said supports to receive the covers.

14. In combination with a horizontally-disposed frame providing an opening through which a box-cover may be passed, guiding-brackets mounted thereon at each  
30 side of said opening and having upright, parallel guiding-faces, supports pivotally connected to said guiding-brackets and spring-sustained to project beyond said faces transversely of said opening, a guiding-arm  
35 depending from each of said brackets through said opening and correspondingly disposed in the vertical planes of said faces, a horizontal table directly beneath said opening, means to deliver the covers onto  
40 said supports successively in predetermined position, and a vertically reciprocating head

operating, after the delivery of each cover to said support, to move downward and engage the cover and press it between said supports and guiding arms, and then deposit 45 it on said table and return to a position above said supports.

15. In combination with a horizontally-disposed support having an abutment, downwardly-yielding, horizontally-disposed, box- 50 cover-sustaining-means in front of said abutment, cover-guiding means leading to the opposite end of said sustaining-means from said abutment, ejecting-means constructed and arranged to discharge the box- 55 covers past said guiding-means and onto said sustaining-means against said abutment, a stop shoulder at the opposite end of said sustaining-means from said abutment, and extending above the level thereof to en- 60 gage the opposite end of the cover to that engaged by said abutment, to hold the cover against rebound from the latter, a receiving-table beneath said sustaining-means, and a vertically-reciprocating head arranged to 65 force a cover past said sustaining-means onto said table.

16. A box-cover stacking machine comprising a table, means to conduct the covers successively downward so that they are 70 nested on said table in a stack and automatic means to shift the lateral position of successive covers so that they are stacked out of exact coincidence.

In testimony whereof, I have signed my 75 name to this specification, in the presence of two subscribing witnesses.

DUGAL C. LAUGHTON.

Witnesses:

LOUIS H. HARRIMAN,

FREDERICK H. TILTON.