E. E. FLORA.
BOX BLANK FINISHING MACHINE.
APPLICATION FILED JUNE 17, 1910.
Patented Mar. 18, 1913.

1,056,017.

Witnesses:

Inventor:

Ellsworth E. Flora,
B. Dunlop, J. L. Christon, A. M.

[Diagram of mechanical device with various labeled parts and numbered elements.]
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Inventor:

By: Jaynes.

Attys.

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To all whom it may concern:

Be it known that I, ELLSWORTH E. FLORA, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Box-Blank-Finishing Machines, of which the following is a specification.

My invention relates to an improved machine for use in the manufacture of metal-bound blanks, and especially blanks of suitably assembled materials intended to form the body-portions of boxes of the general type illustrated in re-issued Letters Patent No. 12,800, granted to me May 28, 1908.

The metal-bound box involves, generally stated, a body, formed by the top, bottom and side sheets, and ends all held together by metal binding-strips which present troughs, to receive the end-edges of the box-body sheets, and flanges for the attachment of the box ends.

The present machine is well adapted for employment in connection with setting-up tables on which the sheets and binding-strips are assembled in proper relation and preliminarily fastened together. A setting-up table or assembling apparatus for this purpose is shown and described in Letters Patent No. 995,667, issued to me on the 20th day of June, 1911.

The purpose of the present machine is to complete the fastening together of the assembled parts of the blanks with great security, and furthermore, to crimp the edges of the trough-portions of the binding-strips and indend said edges into the sheets of the blanks.

My object is to provide a machine for securing together the sheets and binding-strips in the manufacture of metal-bound blanks, which will have great capacity for turning out completed blanks, which may be adjusted to operate upon blanks of different dimensions, and which will fasten together the sheets and binding-strips with accuracy, as to their necessary relations, and with great security.

In the drawings—Figure 1 is a plan view of the main portion of the machine, Figs. 2, 3 and 4 broken sections taken on line 2 in Fig. 1 throughout the machine, Fig. 3 being a continuation of Fig. 2, and Fig. 4 a continuation of Fig. 3; Fig. 5 a partly broken elevation of one side of the machine; Fig. 6 a section on line 6 in Fig. 5; Fig. 7 an enlarged section taken on line 7 in Fig. 5; Figs. 8 and 9 sections taken on lines 8 and 9 in Fig. 7; Fig. 10 a sectional detail view of parts; Fig. 11 a section on line 11 in Fig. 9; Fig. 12 a section on line 12 in Fig. 1; Fig. 13 an enlarged view of parts, in perspective, of one of a pair of indenting-roller adjusters; Fig. 14 an enlarged broken plan view of one of a pair of blank channels; Fig. 15 a section on line 15 in Fig. 14; Fig. 16 an enlarged section on line 16 in Figs. 1 and 14; Fig. 17 an enlarged section on line 17 in Fig. 14; Fig. 18 an enlarged section taken 70 on line 18 in Fig. 1, and more especially upon the adjacent coöperating parts of a pair of indenting-rollers, illustrating the operation of indenting one of the binding-strips into the edge-portion of a sheet; Fig. 21 a broken section of the edge-portion of a blank, showing an indentation; Fig. 22 a fragmentary plan view of the parts illustrated in Fig. 21; Figs. 23 and 24 enlarged perspective views of different sides of one of the punches employed to form the indentations; Fig. 25 an enlarged broken section taken on line 25 in Fig. 1, and corresponding with line 25 in Fig. 26, showing binding-strip crimping mechanism; Fig. 26 a section on irregular line 26—26 in Fig. 25; Fig. 27 a plan view on a reduced scale of the entire machine in conjunction with a pair of the setting-up tables above referred to; and Fig. 28 a broken plan view of one side- or edge-portion of a finished box-blank, without, however, the cover sheet.

The machine is constructed with side-frames 31, 32, held together in rigid relation by, more especially, cross-bars 33, 34, and an end bar 35. Journaling at one end in the frame 31 is a pair of transverse screw-shafts 36, 37, passing at their adjacent end-portions through, and journaled in, the side-frame 32, beyond which they carry sprocket-wheels 38 connected by a chain 39. The shaft 37 is equipped with a hand-wheel 40. Both of the shafts 36, 37 are formed with right- and left-hand screws as indicated in Fig. 1.

41, 42 are companion frames resting and laterally slideable upon the cross-bars 33, 34.
which latter have T-shaped sockets 43 in their upper faces to receive the heads of bolts 44, which bolts pass through the frames 41, 42, to fasten the same firmly in adjusted position upon the bars 33, 34. The bolts engaging the bar 33 carry ordinary tightening nuts 45, while the bolts which engage the bar 34 are tightened by means of hand-nuts 46. The frames 41, 42 have threaded openings through them to receive the shafts 36, 37, whereby, when the bolts 44 are loosened, they may be moved coincidentally and in parallelism toward and away from each other by the turning of the handle 40. The frames 41, 42, are fitted with boxes 47, as shown in Figs. 2 and 3 in which the said threaded openings for the shafts 36, 37, are cut. Along their inner faces the frames 42 present channels 48 terminating in flaring ends 49; the frames being constructed as shown in Figs. 14, 15, and 17, with cut-away and offset portions to avoid working parts of the machine, hereinafter described.

Extending across the machine and journaled in the side-frames 31, 32, is the drive-shaft 50 carrying a loose drive-pulley 51. On the hub of the pulley and on the shaft are clutch members 52, the one on the shaft being sliding and operated by handle 53. The drive-shaft carries, beyond the frame 31, a drive-gear 54 meshing with an idler-gear 55, which in turn drives an idle-gear 56, 57 and 58 are cross extending-shafts each provided with a longitudinally extending key-way 59. The shaft 58 is journaled at opposite ends in vertically sliding boxes 60 in the frames 31, 32, and beyond the frame 31 it carries a gear-wheel 61 meshing with the idle-gear 55. The boxes 60 are provided on their under sides with notches 62, as shown in Figs. 2, 8 and 12, and they rest upon companion bars 63 carried by a cross extending-shaft 64. The shaft 57 is journaled toward opposite ends in vertically sliding boxes 65 in the frames 31, 32, which are adjustably suspended upon bolts 66 passing through threaded openings in the tops of said frames. The bolts 66 are formed as shown in Fig. 13, having lower end-enlargements 67 fitting and rotating in T-shaped sockets in the upper ends of the boxes 65. The bolts have hexagonal heads 68 at their upper ends. Resting on the upper surfaces of the side-frames 31, 32, are slotted adjusting-plates 69 with stepped surfaces 70 extending along opposite sides of the shanks of the bolts 66. On the bolts are flanged collars 71 adapted to fit over companion surfaces 70 of the respective adjusting-plates.

The shaft 57 carries a pair of upper indenters 72, and the shaft 58 carries a pair of lower indenters 73. Each indenter is in the form of a collar provided with a spline fitting the keyway 59 and having outer annular ribs 75, 76, separated by an annular groove 77. In the part 76 is an annular series of radially extending sockets 78 of the proper diameter to receive short punches 79, which are shaped as shown in Figs. 23 and 24 with beveled indenting faces 80 having sharp tapering cutting edges 80. Extending from the bases of the sockets 78 through to the inner circumference of the collar are narrow slots 81; and extending through the parts 76 from the annular groove 77 to the sockets 78 are threaded openings 82 for set screws 83, which secure the punches in adjusted position. The set screw openings are in line with openings 84 in the part 75 provided for the insertion of a tool for turning the set screws. The slots 81 are provided for the insertion of a knife blade, or the like, to aid in forcing out the punches when it is desired to remove them from the collars.

The object of the punches is to form indentations 85 in the metal binding-strips 86, the indentations being produced by cutting triangular-shaped tongues or bars from the strips and forcing them into the sheets or sheet sections 87 of box-stock. The indenters are positioned along the shafts 57, 58, as required by the width of the box-stock, and consequently the distance apart of the metal binding-strips, and they are secured in adjusted position by means of set screws 88, bearing against the splines 74.

In order that the upper and lower indenters shall work the same on different thicknesses of box-stock it is necessary that they shall be adjusted or spaced apart just the distance necessary to admit the threaded portions of the binding-strips between them. This adjustment is effected by means of the stepped surfaces of the adjuster-plates 69, the steps of which in practice vary, one from another, by approximately one-sixteenth of an inch. Thus, when it is desired to increase or diminish the space between the upper and lower indenters the bolts 66 are turned to raise the shaft 57, and the collars 71 are slipped upon the surfaces 70 desired, after which the bolts are tightened down upon the collars 71.

The metal-bound box-blanks are sometimes completed with four sheets or sheet-sections or box-stock to form the bottom, sides and top of a box, or with only three sheets or sheet-sections to form the bottom and sides of a box. In the latter case the bottom cover is intended to be sliding and be slipped into and out of the troughed-binding-strips inclosing and opening the box. A blank of the latter description is illustrated in Fig. 28, and in its formation the parts of the binding-strips into which the cover is to be slipped should not be indentured. I, therefore, provide the machine with
means whereby, during the passage of a blank through the machine, the indenters will only operate while metal binding-strips and sheets of box-stock are passing between them, and whereby they cease to operate when only binding-strips are moved between them.

On the shaft 64 is a normally loose driving-gear-wheel 90 carrying a serrated clutch member 91 and engaging the driving-gear-wheel 54 to be constantly rotated thereby. Keyed to the shaft 64 is a collar 92 having an annular circumferential groove 93. In one part of the collar 92 is an opening or socket 94 parallel with the shaft 64, and containing a plunger or clutch pin 95 provided with a groove 96 to register with the groove 93. The plunger 95 carries a pin 97 working in a groove in the collar to prevent angular movement of the plunger; and the said pin 97 bears against a helical spring 98 confined in a socket in the collar, which tends normally to slide the plunger pin into engagement with the teeth of the clutch member 91. The end face of the plunger is beveled to the same angle as the inclined faces of the teeth of the clutch member 91.

Journaled in brackets 99 on the side-frames 31, 32, is a cross extending rock-shaft 100 provided beyond the frame 31 with a crank arm 101. Adjustably mounted upon the rock shaft 100 is a trip-frame or wiper 102 extending normaly downward across the path of the sheets of box-stock 87. The wiper is in its depressed position the shaft 100 is rocked to the position wherein the wiper 105 holds the pin 95 withdrawn after the shaft 64 has been turned to the position of lowering the cams 63 so as to hold the boxes 60 in lowered position. When, as a blank is passed through the machine, a sheet of box-stock 87 raises the wiper to the position shown in Fig. 2, the shaft 100 is rocked to release the wedge 105 from and swing it out of the path of the plunger pin groove 96 and swing the wedge 105 into the path of said groove, thus the plunger is permitted to swing into engagement with the serrated clutch member 91 and cause the shaft 64 to rotate with the gear-wheel 90. As the shaft nears the completion of a half revolution the wedge 108 engages the plunger pin and withdraws it out of engagement with the clutch member 91, whereby the shaft 64 stops, with the cams 63 in the raised position indicated in Figs. 2, 8 and 12. In their movement to this latter position the cams raise the boxes 60, shaft 58 and lower-indenters 73 into position to engage and operate upon the metal binding-strips. The parts are so timed with relation to each other that the forward edge of the box-stock, after contacting with and raising the wiper 102, reaches the vertical plane of the centers of rotation of the shafts 57, 58, just as the latter shaft is raised to indenting position. When the rear end of the blank passes from beneath the wiper 102 the latter is released and drops, causing the wedge 108, to release the pin 95 and the wedge 105 to be swung into the path of the pin, so that the shaft 64 will be turned a half revolution. In the initial movement of the cams they move into register with the notches 62, permitting the boxes 60 and lower indenters to drop quickly to lowered position. On the shaft 58, just within the indenters 73, are rollers 110 to engage the under surface of the box-stock 87, and having annular grooves 111 for the passage of the flange-portions of the binding-strips 86, as shown in Fig. 20. When the indenters 73 are lowered the upper indenters merely touch without indenting the binding-strips.

In the arrangement shown in Fig. 27 the blanks consisting of sheets or sheet-sections 87 and binding-strips 86 are assembled upon set-up tables 112 in the manner described in my aforesaid pending application, and as they are assembled they are transferred to a belt conveyer 113 moving at its upper stretch along a table 114 mounted at one end in the frame of the machine and at its opposite end upon a standard 115. The belt 113 is stretched around a pulley 58 on the shaft 58 and around a pulley 116 on the standard 114, and runs across an idle-pulley 117, also mounted in the main frame. Pivoted to the frame as shown in Fig. 3, is a swinging belt-tightening pulley 118. The belt 113 is driven from the pulley 58. It is desired that in the finished blank the free-edge of the trough-portion of each binding-strip 86 shall be indented into the surface of the sheet, or sheet-sections, 87 to extend flush, or approximately so, therewith and by the gripping effect thus produced tend to strengthen the box. Journaled at opposite ends in the side-frames 31, 32, is a shaft 120, provided beyond the frame 32 with a gear-wheel 212. The gear-wheel 212 meshes with an idle-gear 122, which in turn meshes with an idle-gear 123, which in turn is driven by a gear 124 on the reduced end of the shaft 57. The shaft 120 passes through openings 125 in brackets 126 fastened against the under sides of the guide frames 42. Extending loosely through each opening 125 (see Fig. 25),
and keyed to the shaft 120, is a sleeve 127 provided at one end with a flange or head 128, and fitted at the opposite end with a collar 129 fastened in place by a set-screw 130. Keyed to the sleeve 127 is a drive-wheel 131 shaped as shown, and having an annular groove 132 to receive the flanges of the binding-strips 86. 133, 133, are vertically swinging-arms pivoted at 134 upon the frames 41, 42, and extending at their free ends beneath a cross-extending rock-shaft 135 passing through bifurcated brackets 136 on the frames 41, 42. Each swinging-arm 135 rests upon and is upwardly pressed by a leaf-spring 137, and on the shaft 135, in the bifurcated brackets 136, are cams 138 against which the free ends of the arms 139 bear in the upward direction. Surrounding the rock-shaft between the frames 41, 42, and feathered thereon, is a sleeve 139 which may be slid to different positions on the shaft and fastened in adjusted position by a set-screw 140. Surrounding the sleeve 139 is a collar 141 carrying a downwardly extending arm or wiper 142. The arm 142 may be adjusted to extend normally at different angles with relation to the cams 139 on the shaft 135, the adjustment being done in accordance with a scale 143, and the fastening of the collar 141 when adjusted being effected by a set-screw 144. On the arms 139 are stub-shafts carrying crimping-wheels 145 formed with beveled, and preferably serrated, peripheral edges, as shown. In the adjustment of the frames 41, 42, by means of the hand-wheels 40, all parts carried thereby, including the serrating-wheels 145 and lower presser-wheels 141, are moved to retain their proper positions with relation to the guide-grooves 48 of the said frames. As the box-stock moves through the machine beyond the indenting-rollers described, it contacts with the arm or wiper 142, thereby rocking the shaft 135 and turning the cams 138 to press the arms 133 downward against the resistance of the springs 137, and press the crimping-wheels 145 into engagement with the inner edges of the metal binding-strips 86, as shown in Figs. 25 and 26, to crimp and press the same into the sheet material 87, as shown in Figs. 25, 26 and 28.

When an assembled blank is deposited upon the belt 113, as indicated in Fig. 27, it is moved along until it passes beneath a swinging presser-roller 146 journaled in a swinging-frame 147 pivoted upon a cross extending rod or shaft 148 below the shaft 100 and fastened at opposite ends in the brackets 99. The presser-roller 146 serves to clamp the box-stock against the belt 113 so that, as it advances, it will engage and raise the wiper 142 to rock the shaft 100 and cause the lower indenting-rollers to be raised into operative position, as before described. The blank is then engaged and advanced by the indenting-rollers, and after passing between them it engages and swings the wiper 142 to lower the serrating-wheels 145 into operative position. As before stated, when the cover-sheet is not included in the assembled blank-material the indenting-rollers will not operate upon the binding-strips, along the parts thereof into which the box-cover is to be slid, and as the serrating-wheels are only brought into operative position when the wiper is raised by a sheet of the box-stock the serrating and indenting of the binding-strips will only commence as the forward edge of the box-stock passes beneath them. As before stated, the feed-belt 113 is driven from the pulley 58, which is of less diameter than the collars 72, 73, provided with the indenting-punches, consequently the indenters advance the blanks more rapidly than the feed-belt. This prevents crowding of the machine at any time. The serrating-wheels may be readily thrown out of operation if desired, or, if desired, the machine may be employed for serrating the binding-strips without indenting them. For this latter purpose the wiper 102, which is adequately mounted upon its supporting-arm 140, may be removed, thereby preventing the engagement with the binding-strips of the indenting-rollers.

While I prefer to construct my improvements throughout as shown and described, they may be modified in the matter of details of construction without departing from the spirit of my invention as defined by the claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of means for advancing the assembled blank-material punches, cooperating with said advancing means, to indent, at intervals, the metal binding-strips into the sheet-material, and means controlled by the advancing material for setting the punches in operative position.

2. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of means for advancing the assembled blank-material lengthwise through the machine, punches toward opposite sides of the path of the material, means for causing the punches, while the material is advanced, to indent, at intervals, the metal binding-strips into the sheet-material, and means controlled by the advancing material for setting the punches in operative position.

3. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of means for...
advancing the assembled blank-material lengthwise through the machine, punches toward opposite sides of the path of the material, and means governed by passage of the sheet-material, for controlling the operative position of the punches whereby to cause the punches to indent, at intervals, the metal binding-strips into the sheet-material. 

In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of guides for the assembled blank-material, means for advancing said material in the guides, punches adjacent to the guides, cooperating with said advancing means, to indent, at intervals, the metal binding-strips into the sheet-material, and means controlled by the advancing material for setting the punches in operative position.

5. A machine of the character described comprising U-shaped guides adapted to receive U-shape metal binding strips on the edges of a box blank, rotating punch holders intercepting the U-shape guides, punches in the holders having inclined and sharp edged indenting faces, the length of each punch beyond the surface of the holder being greater than the thickness of the material from which the metal binding strips are formed, whereby each punch will cut a sharp barb in the metal binding strips and force same into the box blank, and means for simultaneously rotating the punch holders and advancing the box blank and binding strips.

6. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of upper and lower punch-holders, means for advancing the assembled blank-material between said punch holders, punches in said holders, cooperating with said advancing means, to indent, at intervals, the metal binding-strips into the sheet-material, and means controlled by the advancing material for setting the punches in operative position.

7. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of upper and lower punch-holders, guides for directing the blank-material between said punch-holders, punches in the punch-holders, means for operating the punches to indent, at intervals, the metal binding-strips into the sheet-material, and means operated by the advancing sheet to set the punches in operative position.

8. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of upper and lower punch-rollers, series of radially extending punches in the rollers, means for guiding the assembled blank-material between the rollers, means for rotating the rollers to cause the punches to indent, at intervals, the metal binding-strips in the sheet-material, and means controlled by the advancing material for setting the punches in operative position.

9. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination, with means for advancing the assembled blank-material through the machine, of upper and lower indenting-rollers, and means in the path of the sheet-material for throwing the said rollers into and out of indenting relation.

10. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of upper and lower shafts, means for advancing the assembled blank-material between said shafts, indenting-rollers on the shafts, and means, in the path of the material through the machine, for raising and lowering one of said shafts to move the indenting-rollers carried thereby into and out of operative position with relation to the indenting-rollers on the other shaft.

11. In a machine for making box-blanks by fastening together sheets and metal binding-strips, the combination of a pair of channel-guides for the assembled box-material, means for positioning said guides coincidently toward and away from each other, and indenting rollers between which the blank-material passes as it is advanced through the guides.

12. In a machine for making box-blanks by fastening together sheets and metal binding strips, the combination of a pair of adjustable guides, a continuously movable bed operating between the guides to advance the assembled blank material, a pair of upper and lower rotating elements, one of which is provided with sharp punches to form sharp barbs in the binding strip and drive said barbs into the sheets, and a rotating element located at one side of one of the pairs of rotating elements to form a support during the punching operation.

13. In a machine of the class described, the combination of a pair of guides, means for simultaneously adjusting the guides toward or from each other, indenting rollers between which assembled strips and blanks pass from the guides, vertical movable bearings for one of said rolls, cams to engage the vertically movable bearings, a tripping device normally in the path of movement of the assembled material, means interposed between said tripping device and the cams to hold the roller supported in the movable bearing out of operative position when the tripping device is in normal position, and means for operating the cams to position said indenting roller when the tripping device is moved by the assembled material into an abnormal position.

14. In a machine of the class described,
the combination of indenting rollers, means for vertically adjusting the upper one of said rollers to accommodate material of different thickness, means for slidably mounting the lower indenting roller, power operating means, and means controlled by the assembled material for causing the lower indenting roller to be elevated and the rollers to operate to indent at intervals the strips and embed the indents into the sheets.

15. In a machine of the class described, the combination of indenting rollers, power means including a clutch, and tripping mechanism acted on by the passage of assembled material for operating the clutch to cause the indenting rollers to operate.

16. In a machine of the class described, the combination of a pair of channel guides, means for simultaneously operating the channel guides, a pair of rollers having a space therebetween in alignment with the channel guides, punches in the periphery of the upper roller to form barbs in strips assembled on sheets, a continuously operated conveyor for advancing the assembled material, and rotating means adjacent the lower roller for supporting and advancing the material during the punching operation.

ELLSWORTH E. FLORA.

In the presence of—

L. HEISLER,
R. SCHAEFER.