

No. 712,794.

Patented Nov. 4, 1902.

D. L. HILL.

BOX HINGING MACHINE.

(Application filed July 20, 1901. Renewed Apr. 7, 1902.)

(No Model.)

4 Sheets—Sheet 1.

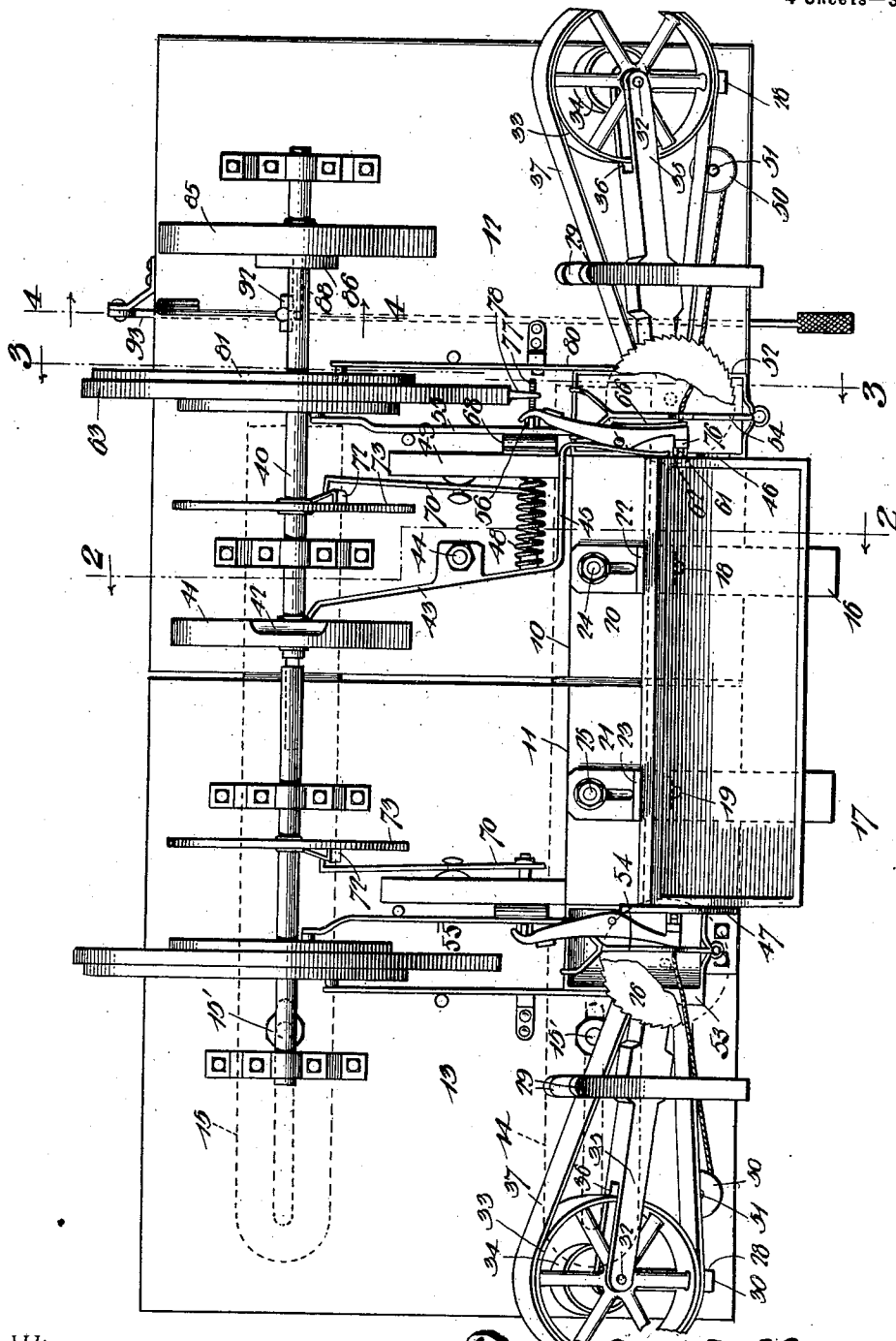


Fig. 1.

Witnesses

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4 Sheets—Sheet 2.

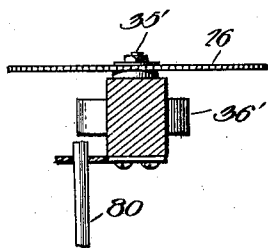
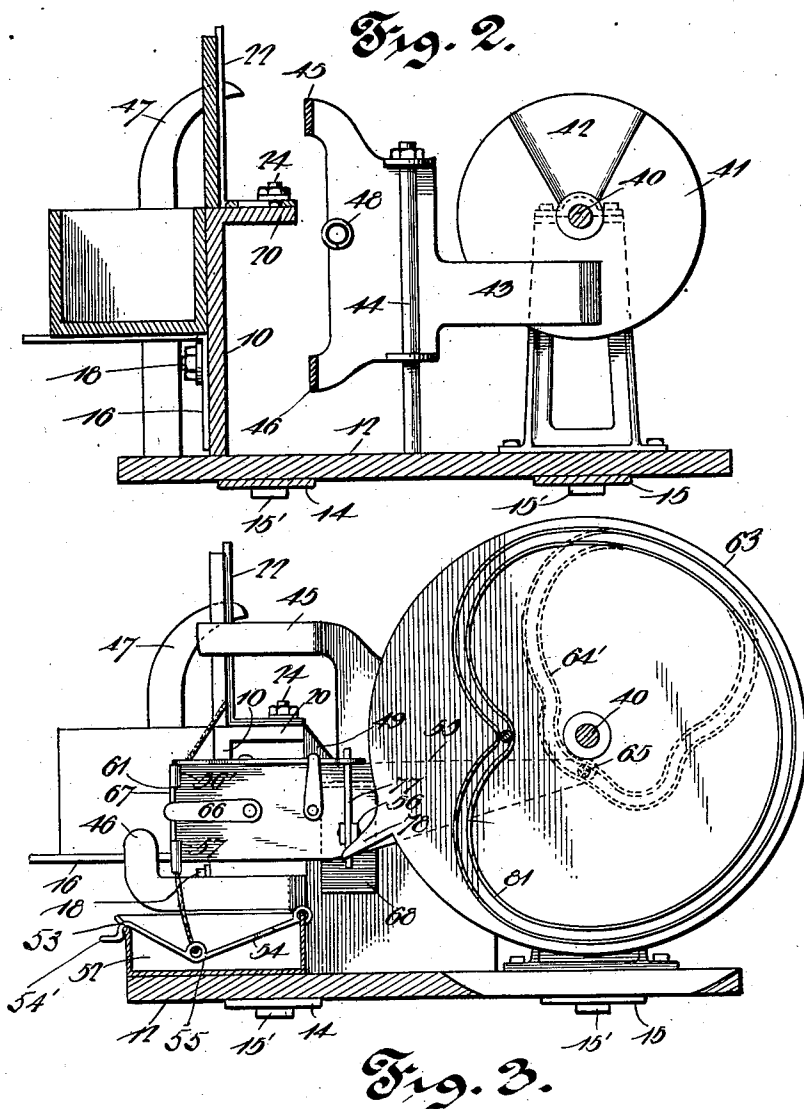


Fig. 10.

Witnesses

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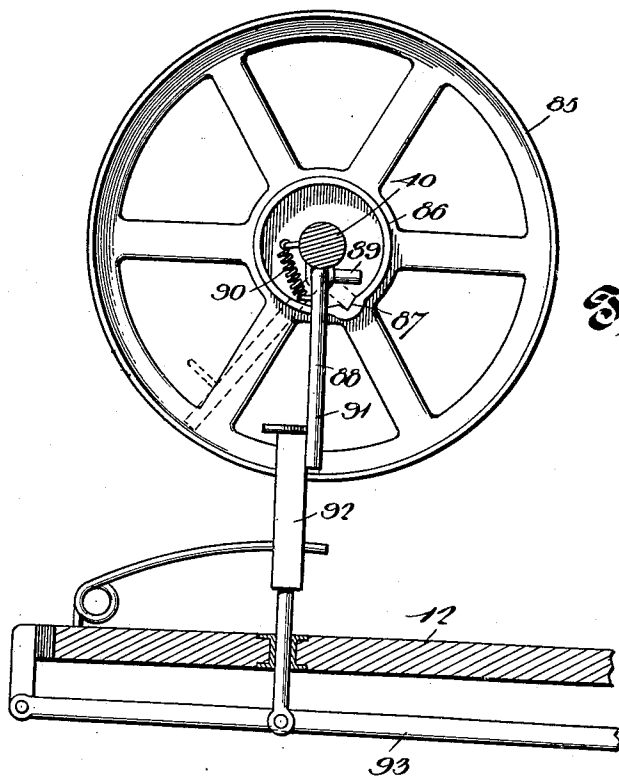


Fig. 4.

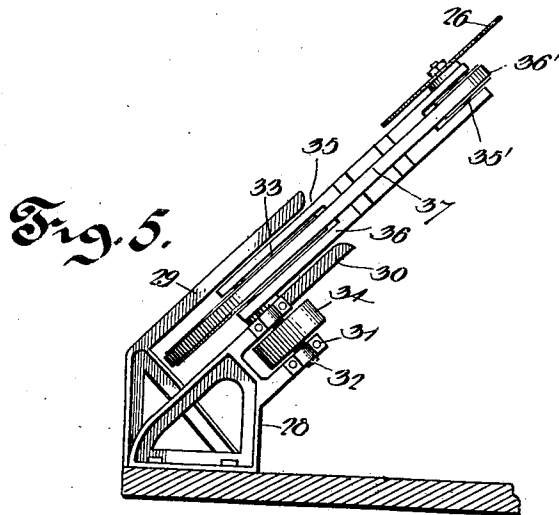


Fig. 5.

Witnesses

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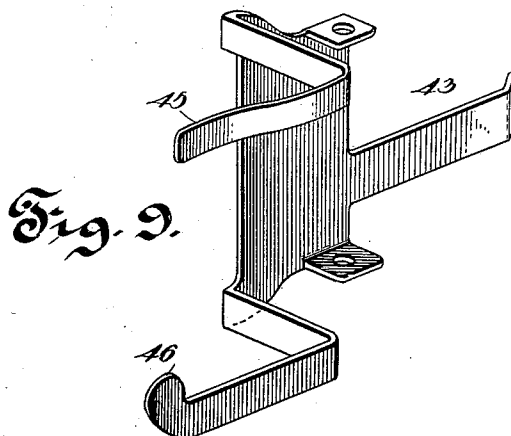
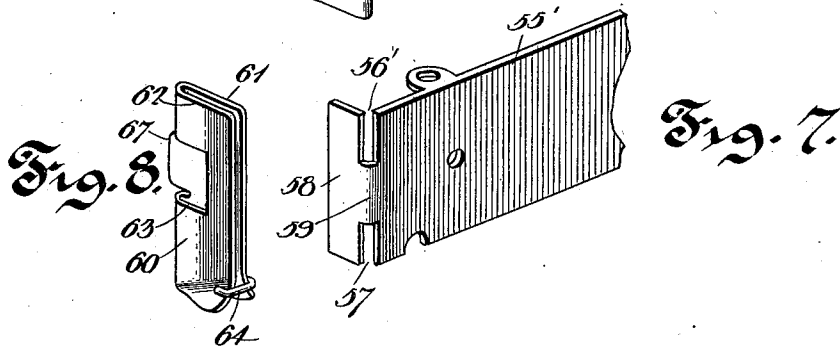
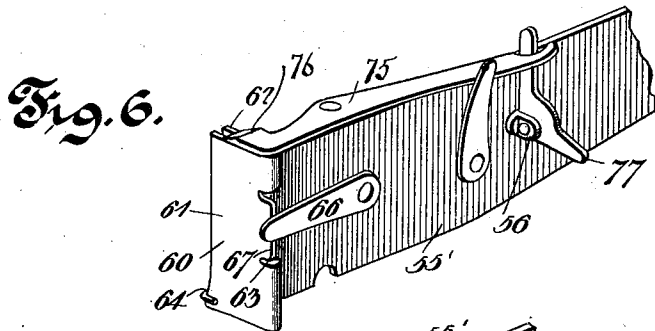
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(No Model.)

4 Sheets—Sheet 4.



Witnesses

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UNITED STATES PATENT OFFICE.

DAN L. HILL, OF KEENE, NEW HAMPSHIRE.

BOX-HINGING MACHINE.

SPECIFICATION forming part of Letters Patent No. 712,794, dated November 4, 1902.

Application filed July 20, 1901. Renewed April 7, 1902. Serial No. 101,775. (No model.)

To all whom it may concern:

Be it known that I, DAN L. HILL, a citizen of the United States, residing at Keene, in the county of Cheshire and State of New Hampshire, have invented a new and useful Box-Hinging Machine, of which the following is a specification.

This invention relates to box-hinging machines; and it has for its object to provide a mechanism of this nature wherein the box and its lid will be slotted and a string-hinge applied and cut off from the ball of string or cord from which it is formed, the box being automatically clamped to hold it rigid during the operation.

Further objects of the invention relate to the specific mechanisms for performing the several steps in the process, all of which will be understood from the following description.

In the drawings forming a portion of this specification, and in which like numerals of reference indicate similar parts in the several views, Figure 1 is a top plan view showing the complete machine. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1 and showing the means for placing the string in the slot or kerf and for cutting it off. Fig. 4 is a section on line 4 4 of Fig. 1 and showing the clutch mechanism for connecting the drive-pulley with the main operating-shaft to rotate the latter. Fig. 5 is a view partly in side elevation and partly in section and showing the saw for forming the kerf in the lid and box. Figs. 6, 7, and 8 are perspective views showing the parts of the lever which carries and places the string in the kerfs in the box and lid. Fig. 9 is a perspective view showing the plate for holding the box and lid while the hinging operation is being performed. Fig. 10 is a sectional detail view of one of the kerf-saws.

Referring now to the drawings, the present machine comprises a box-support including uprights 10 and 11, which are mounted upon the sections 12 and 13 of the base of the machine, these sections being adjustably connected for movement toward and away from each other by means of slotted plates 14 and 15, attached rigidly to one section and having bolts 15' engaged with their slots and with the other section.

On the front faces of the uprights 10 and 11 are mounted angle-irons 16 and 17, held adjustably in place by clamping-bolts 18 and 19, engaged with the uprights and with slots formed longitudinally of the vertical legs of the irons, so that the irons may be adjusted vertically to correspond to boxes of different heights. The upper ends of the uprights are projected rearwardly, and upon these rearwardly-projected portions (shown at 20 and 21) are disposed other angle-irons 22 and 23, held adjustably in place by bolts 24 and 25, engaged with slots in the irons, so that they may be adjusted toward and away from the front faces of the uprights. The rearwardly-directed portions of the uprights are designed to receive and support the box-lid, which rests against the angle-irons, and when a box of a given size is to be hinged the several angle-irons are adjusted so that the box and lid will occupy those relative positions as when the lid is raised to open the box, the lid standing vertical and the box lying horizontal, the front or under face of the lid standing in the same plane with the rear face of the box, so that saws may be moved against the ends of the lid and downwardly into the ends of the box to form alining kerfs at each end of the box to receive a piece of cord to form a hinge. The mechanism for holding the box and lid upon the supports will be presently explained in connection with the other mechanism operated from the same shaft and in cycles therewith.

To form the kerfs in the box and lid, two saws 26 and 27 are provided, which are the same in arrangement and operation, so that a description of one will suffice for them both. A bracket or support 28 is mounted upon a section of the base of the machine, it being understood that one of the saws is carried by each base-section of the machine, and which support includes three parallel and inclined arms, in which are formed alined bearings for a shaft 32, which is inclined and on which are fixed pulleys 33 and 34, the former lying above the upper arm and the latter between the arms 30 and 31. A swinging frame is provided for the saw and includes spaced arms 35 and 36, pivoted at one end upon the shaft 32 above the upper arm and at opposite sides of the pulley 33, these

arms being connected at points between their ends, and in the outer ends of which is journaled a shaft 35, which carries the saw and also a pulley 36', with which is engaged the belt 37, engaged also with pulley 33. As above stated, one of the saws is mounted upon each of the sections of the base of the machine, and when a box is to be hinged the sections are so adjusted that the saws when their carrying-frames are swung will be passed diagonally of the ends of the box and lid and will form kerfs therein of the proper depths to receive the cord-hinges, it being understood that the saws employed are circular saws. After the kerfs are formed the saws are moved back to their former positions by swinging their frames rearwardly. The saws are rotated in the frames by belts from a drive-shaft engaged with the pulleys 34.

To clamp the box and its lid and hold them securely upon their supports during the kerfing and hinging operations, a main drive-shaft 40 is provided, and on this shaft is fixed a disk 41, having a cam-face formed by and lying at opposite sides of a recess 42 in the face of the disk, and against this cam-face bears one end of a lever 43, constituting a clamping-plate which is pivotally mounted upon a vertical shaft 44 and at the opposite end of which are upper and lower fingers 45 and 46, so disposed that when the clamping-plate is moved in one direction on its vertical shaft the fingers will engage with the lid of the box and the end of the box, respectively, and out of the line of the kerfs to be formed. The engagement of the fingers with the box and its lid acts to press the box and lid firmly against the stop-plate 47, which lies out of the line of the kerfs at the opposite ends of the box and lid to hold the box and lid firmly. As the shaft rotates the cam wheel or disk rotates with it, and when the recess 42 reaches the laterally-turned end of the lever the latter drops into the recess to permit pivotal movement of the lever to draw its clamping-fingers away from the box and lid, this return movement of the lever and fingers being effected by a helical spring 48, attached to the lever and to an upright 49 on the base of the machine.

Each section of the base is provided with a mechanism for inserting the string of the hinge into the adjacent kerfs of the box and lid and cutting it off, and a description of one will apply to the other. Referring, then, to the mechanism on the section 12 of the base and which carries the movable clamping member above described, the ball of cord 50, from which the hinges at the adjacent end of the box are to be made, is mounted upon a spindle 51, to rotate freely, and between this spindle and the box or box-support is a glue-box 52, having an outwardly-bent lip 53, forming a tension device, the string from the ball being taken over this lip or across it and then downwardly and through a guide 54 in the glue-box, this guide being hinged at one end

and having a clip 54' at the opposite end, so that it may be lowered to carry the guide-eye 55 thereof into and near to the bottom of the glue-box and may hold the eye in such position so that the string in passing through the box will be thoroughly coated with glue. From the guide in the glue-box the string is taken upwardly and is engaged with the feeding and inserting device. This feeding and inserting device is shown in detail in Figs. 6, 7, and 8, and consists of a lever 55, in the form of a plate, which is pivoted upon a bolt 56, engaged slidably with the upright 49. One end of this lever is engaged with a cam-groove in a cam on shaft 40, hereinafter described, to rock the lever, and the opposite end thereof, which is broader than the cam-engaging end, is slotted at opposite sides, as shown at 56' and 57, to form a head 58 and a connecting-neck 59, the neck being bent laterally, so that the head projects at right angles to the lever. The jaws between which the cord is held while feeding and from which it is pressed into the kerfs of the box and lid are formed from a metal plate 60, which is bent upon itself to form spaced arms 61 and 62, and through the arms and their connecting-web is formed an opening 63, through which the head 58 is passed to lie between the arms and with the neck in the opening, the separation of the arms being such as to snugly receive and hold the cord or string from which the hinges are made. From the guide in the glue-box the string is taken upwardly and between the arms 61 and 62 and lying against the edge of the head 58, so that if the head be moved forwardly to project its edge from between the arms the string will be expelled from between the arms, excepting at the lower ends of the arms, where is disposed a cross-piece 64, under which the string or cord is taken. If, then, the lever is rocked to aline the free edges of the arms with the kerfs in the box and lid and the head be then operated to eject the string from between the arms, it will be forced into the kerfs, and if the lever be then moved to carry the arms downwardly, the cord or string being held in the kerf, the lever will move free of the string, which will slide between the arms, and when the upper ends of the arms are below the lower end of the kerf in the box the string may be cut off above the arms and the string will be left in the kerfs to form a hinge. The cam-wheel for operating this lever is shown at 63' and is fixed upon the shaft 40 and has a cam-groove 64' in one face, in which is engaged the friction-roller 65, mounted on the end of the lever, the cam-groove being of such shape that as the wheel is rotated the lever will be rocked to raise the arms and hold them in raised position while the string is being discharged therefrom and then lower the arms and hold them lowered while the string is being cut at a point between the arms and the lower end of the kerf in the box.

As above stated, the plate of which the arms

61 and 62 are formed is slidable with respect to the head 58 and lies normally projected with the edges of the plate or arms beyond the edge of the head to receive the string between the arms, and to hold the plate with its arms in this position a spring-finger 66 is fastened to the back of the lever 55 and presses against the ear 67, projecting rearwardly from the arm 61. The arms 61 and 62 are of such thickness that when moved against the ends of the box and lid they will not enter the kerfs, and if then when the lever is rocked to bring the arms in such positions the lever be moved to press the arms against the ends of the box and lid the arms will be held against movement and the edge of the head 58 will be moved to eject the string and force it into the kerfs. To thus move the lever 55' laterally to eject the string and force it into the kerfs a compound curved leaf-spring 68 is disposed upon the bolt 56 between the lever 55' and the upright 49 and tends to hold the lever, with the string-holding arms, out of contact with the ends of the box and lid, and when the bolt is drawn through the upright against the tendency of this leaf-spring the arms are moved against the box and lid to eject the string, as above described. To thus draw the bolt through the upright a lever 70 is provided and is fulcrumed upon the upright, one end of the lever having an opening through which the bolt is passed, while the opposite end of the lever is turned laterally into the path of movement of a cam 72 on the face of a wheel 73 on shaft 40, so that when the shaft is rotated and the lever has been rocked to bring the string-holding arms into raised position the lever 70 will be pressed laterally and will draw the bolt to move lever 55' and push the string into the kerfs. After the string is ejected the lever 55' is operated to lower the holding-arms and to bring the cutting-knife into position for cutting off the string between the arms and the lower end of the kerf in the box. The cutting-knife, which is shown at 75, is mounted upon the lever 55', as shown in Fig. 6 of the drawings, for movement in a horizontal plane, said knife consisting of a lever having one end turned laterally and provided with a cutting edge 76, so that when the lever is moved pivotally this cutting edge is brought into contact with the string directly adjacent to the upper ends of the holding-arms and presses the string against the end of the box to cut it off. The knife-lever is operated by a rocker 77, pivoted upon the lever 55, and one arm of which lies in the path of movement of the finger 78, projecting radially from the cam-wheel which operates the lever 55, this finger being so located that it will engage the rocker to operate the knife when the lever 55 has been rocked to lower the holding-arms.

To operate the saw-carrying frame, an angular rock-lever 80 is provided and is pivoted beneath the frame, one end thereof being piv-

otally engaged with a perforation in the under side of the saw-frame, while at the other end is a friction-roller engaged in a cam-groove 81 in the cam-wheel 63, this cam-groove being so formed that the opposite end of the rocker is moved to retract the saw-frame and hold it retracted for somewhat more than one-half of a rotation of the main shaft 40, after which the groove is taken gradually inwardly toward the center of the cam-wheel and then gradually outwardly to raise the engaged end of the rock-lever and lower the saw into operative position to form the kerfs and then to return the frame to raise the saw and permit of insertion of the cord. Thus a single rotation of shaft 40 will actuate the saw-frame to form the kerfs, will raise the arms with the string, insert the string in the kerfs, and cut off the string to complete the hinge.

To rotate the shaft 40, a drive-pulley 85 is mounted loosely thereon and has a hub 86, having a recessed end, and in the annular wall of this recess is a depression 87, and pivoted upon the shaft is a rocker 88, having a finger 89 at one end for engagement with this depression when the rocker is moved in one direction, and the finger is held normally in position to engage this depression by means of a spring 90, attached to the arm 91 of the rocker, which arm projects from the shaft in such manner as to strike a stop 92, mounted upon the base-section 13 for vertical movement into and out of the path of movement of the arm. When the rocker moves to engage the finger with the ratchet, the shaft is locked to the driving pulley or wheel, and when the arm strikes the stop the wheel in its continued rotation moves the shaft until the rocker is operated to draw the finger from the depression to release the shaft from the pulley, and the shaft stops until the stop is again lowered to permit the rocker to move and again engage the finger with the depression of the wheel. The stop is held normally raised into the path of movement of the arm by means of a spring-pedal 93, and when this pedal is depressed the arm is released.

With this construction it will be seen that the box is hinged automatically, as is also the formation of the kerfs, the saws for this purpose being moved into operative positions, as shown, and it will be understood that the machine is set for boxes of a certain size, and the whole number of boxes are then hinged.

What is claimed is—

1. A box-hinging machine comprising means for holding a box and lid in coöperative relation, a saw disposed for movement into and out of operative position to form kerfs in the ends of the box and lid, and means for forcing a flexible connection into the kerfs thus formed.

2. A box-hinging machine comprising means for holding a box and lid in coöperative relation, means for forming alining kerfs therein, and means for carrying a flexible

connection to and forcing it into the kerfs to connect the box and lid.

3. A box-hinging machine comprising means for holding a box and lid in coöperative relation, means for forming kerfs therein, and means for forcing a hinge into the kerfs to connect the box and lid.

4. A box-hinging machine comprising means for holding a box and lid in coöperative relation, means for forming kerfs therein, and means for carrying a hinge to and forcing it into the kerfs when formed, to connect the box and lid.

5. A box-hinging machine comprising means for holding a box and lid in coöperative relation, means for forming kerfs therein, of means for carrying a flexible connection to and forcing it into the kerfs when formed, and means for cutting off the connection between the kerfs and carrying means after the connecting portion thereof has been forced into the kerfs.

6. A box-hinging machine comprising means for holding a box and its lid in juxtaposition, a swinging saw disposed for movement to engage the ends of the box and lid and form kerfs therein, and means for inserting a hinge into the kerfs to connect the box and lid.

7. A box-hinging machine comprising means for holding a box and its lid in juxtaposition, a swinging saw disposed for movement to engage the ends of the box and lid and form kerfs therein, string-receiving arms adapted to receive and convey a string to the kerfs, and means for forcing the string from the arms and into the kerfs to connect the box and lid.

8. A box-hinging machine comprising means for forming alining saw-kerfs in a box and its lid, string-holding arms, means for moving the arms to carry the string to the kerfs in the box and lid, means for forcing the string from the arms into the kerfs, and means for cutting off the string.

9. A box-hinging machine comprising means for holding a box and lid in juxtaposition, a power-shaft, means connected with the power-shaft for rotating it intermittently, a saw constructed and arranged to form kerfs in the box and lid, cord-holding arms operatively connected with the shaft for movement to carry a cord to the kerfs when formed, and means operatively connected with the shaft for forcing the string from the arms and into the kerfs.

10. A box-hinging machine comprising means for holding a box and lid in juxtaposition, a power-shaft with which said means is operatively connected, a lever mounted for pivotal and lateral movement, said lever having a laterally-turned head, string-receiving arms mounted movably upon the lever and between which the head is received to expel

the string, means for forming kerfs in the box and lid, connections between the lever and shaft for moving the lever pivotally to carry the string to the kerfs, and additional connections between the lever and shaft for moving the lever laterally to engage the arms with the box and lid to permit movement of the head from between the arms to expel the string and force it into the kerfs.

11. A box-hinging machine comprising means for holding a box and its lid in juxtaposition, a power-shaft with which said means is operatively connected, a saw mounted for movement into engagement with the saw and lid to form kerfs therein, a lever mounted for pivotal and lateral movement, said lever having a laterally-turned head, string-receiving arms slidably connected with the head and between which the head is received, means for holding the arms yieldably projected beyond the edge of the head to receive a string, connections between the lever and shaft for moving the lever pivotally to carry the string to the kerfs, and additional connections between the lever and shaft for subsequently moving the shaft to contact the arms with the box and lid to permit the head to pass therefrom and force the string into the kerfs.

12. A box-hinging machine comprising a box-support, a saw disposed for movement to engage the box and form a kerf therein, a string-support, string-holding arms disposed to receive the string from the support and adapted for movement to carry the string to the kerf in the box, means operably connected with the shaft for forcing the string from the arms into the kerf, means for returning the arms, a knife constructed and arranged to cut the string above the arms, and means carried by the shaft for operating the knife when the arms have been returned.

13. A box-hinging machine comprising a box-support, a power-shaft, means operable by the shaft for holding the box upon the support, a saw disposed for making a kerf in the box upon the support, a string-support, a lever having arms adapted to receive the string from the support, a glue-box disposed between the arms and string-support, means operably connected with the shaft for paying out the string at a point between the support and box, said lever having connections with the shaft to operate it to carry the string to the kerf in the box, means operably connected with the shaft for forcing the string into the kerf, and means operably connected with the shaft for cutting off the string below the kerf.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAN L. HILL.

Witnesses:

LEWIS W. HOLMES,
EARL G. B. HILL.