

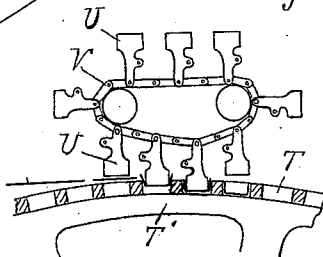
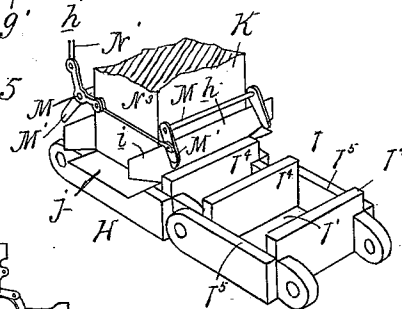
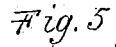
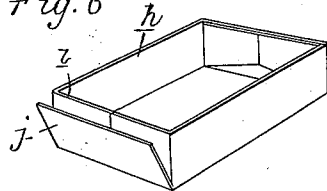
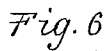
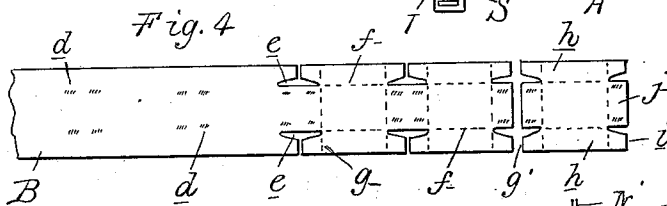
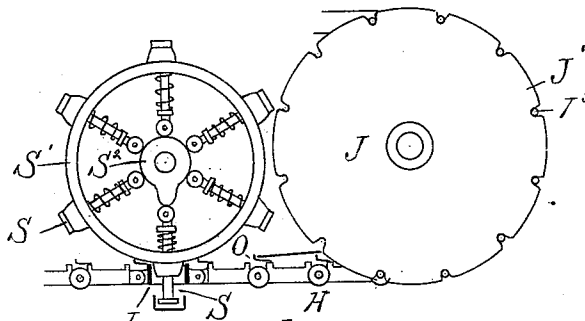
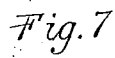
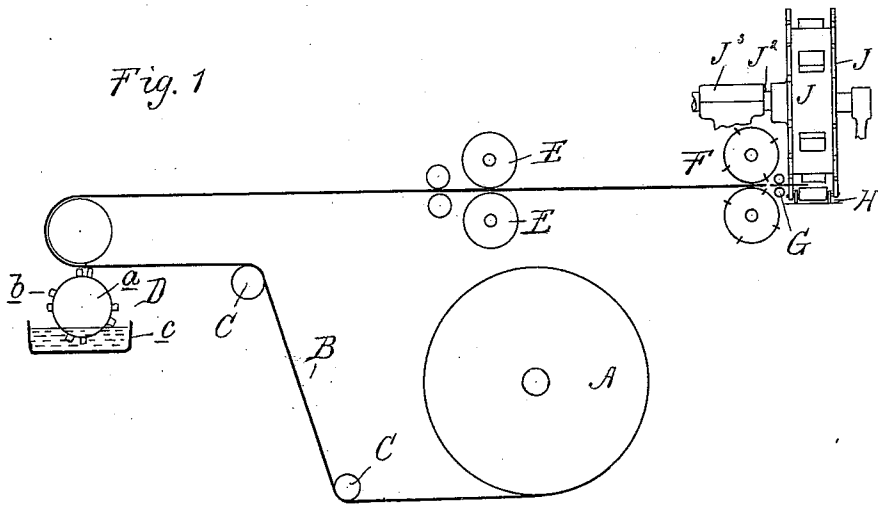
(No Model.)

3 Sheets—Sheet 1.

W. A. PRESTON.  
BOX MACHINE.

No. 560,928.

Patented May 26, 1896.



Witnesses:

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Fig. 3

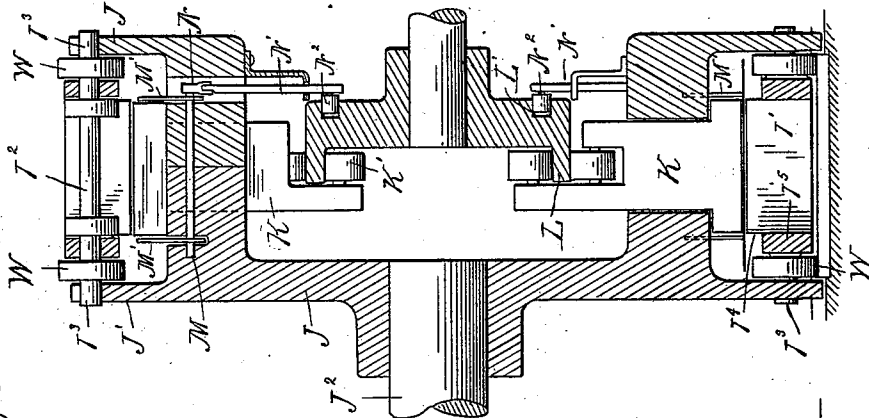
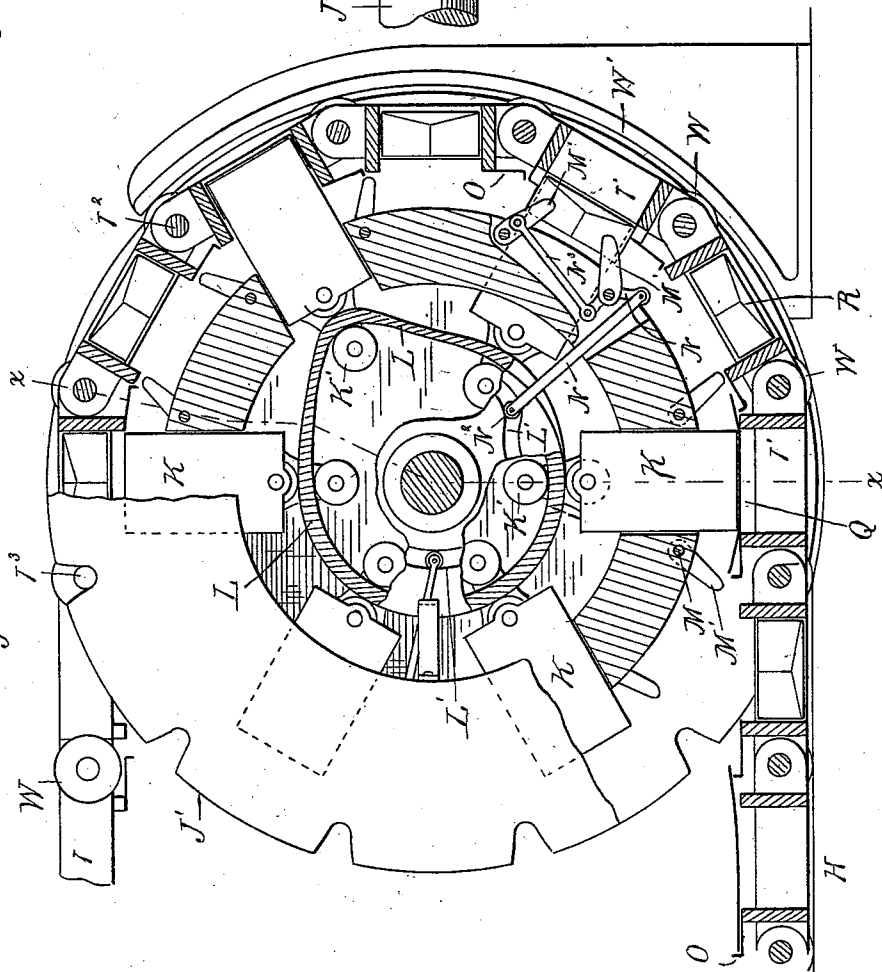


Fig. 2



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(No Model.)

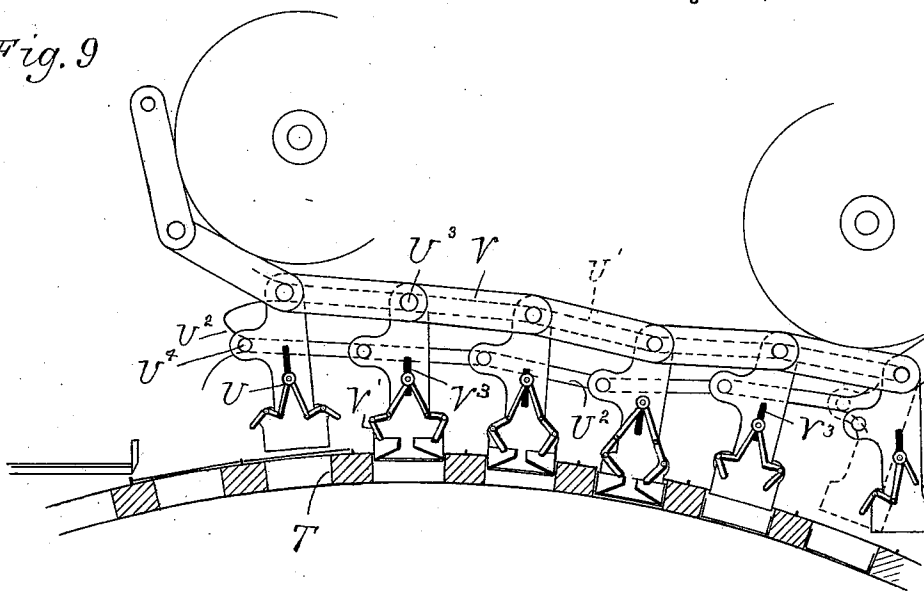
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Fig. 9



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# UNITED STATES PATENT OFFICE.

WILLIAM A. PRESTON, OF DETROIT, MICHIGAN.

## BOX-MACHINE.

SPECIFICATION forming part of Letters Patent No. 560,928, dated May 26, 1896.

Application filed August 20, 1895. Serial No. 559,881. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM A. PRESTON, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Box-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improvement in paper box machines of the known type wherein rectangular boxes are formed from a ribbon of paper or pasteboard which is fed first to a pasting or gluing device and then to the cutters which gore the blank and sever it from the ribbon. Then the blank is carried under an intermittently-reciprocating plunger which in connection with folder devices turns up the sides and ends of the blank and presses it into a link mold of an endless-chain carrier. This carrier is intermittently actuated alternately with the movement of the plunger, carrying the box around through its circuit and giving the glue time to harden before the box is finally pressed out from the mold. The limit of the output of such machine is the time interval required for the folding of the blank. Thus though the blank might be cut and glued more rapidly and by using a sufficient number of molds in the carrier the speed of the latter might be correspondingly increased, any attempt to accelerate the action of the folder mechanism would only result in tearing the blank or improperly forming the box.

It is the object of my invention to increase the speed at which the machine may be successfully run and thereby correspondingly increase its output, first, by substituting a continuous in place of an intermittent action of the operating mechanism, and, further, by adapting the machine to operate upon more than one blank at the same time.

My invention therefore consists, first, in the peculiar combination of an endless mold-carrier and an endless plunger-carrier; further, in the peculiar construction and arrangement of the plunger-carrier, and, further, in the peculiar construction, arrangement, and combination of parts, as more fully hereinafter described.

In the drawings, Figure 1 is a diagram ele-

vation of my machine as in use. Fig. 2 is a vertical longitudinal section, partly in elevation, of the box-forming mechanism. Fig. 3 is a cross-section thereof on line *xx*. Fig. 4 is a plan of the blank and ribbon from which it is formed. Fig. 5 is a perspective view illustrating the operation of the folding mechanism. Fig. 6 is a perspective view of the formed box. Fig. 7 is a diagram view similar to Fig. 2, showing the blank-carrier and pressing-out mechanism. Fig. 8 is a diagram illustrating a modified construction. Fig. 9 is an enlarged diagram similar to Fig. 8, showing the arrangement and operation of the folders.

A is a roll of paper, pasteboard, or any other suitable material from which the boxes are to be formed. From this roll a ribbon of the material B is led over suitable guide-rolls C first to the pasting or gluing device D, which preferably consists of a wheel *a*, provided with a series of points *b*, adapted to dip into the glue contained in a pan *c*, and deposit points of glue upon the ribbon B at suitable intervals, as shown at *d*, Fig. 4. From the gluing device the ribbon passes between stamping and scoring rolls E, which cut out the gores *e* and score the ribbon longitudinally on the lines *f* and also on the cross-line *g*. Next it passes to the cutting-off knife F, which severs the blank from the ribbon on the line *g'*. The blank is then carried by the rolls G or other feed device over the endless mold-carrier H, the parts so far described being all properly timed and driven, preferably continuously, by a suitable drive connection. (Not shown.)

The endless mold-carrier, in the construction shown in Figs. 1, 2, 3, and 5 of the drawings, consists of a series of link molds I, having rectangular apertures I' the size of the box to be formed, and pivotally connected to each other by the pins I<sup>2</sup>.

J is a rotary head around which the mold-carrier H passes, said head being provided with sprocket J', adapted to engage with suitable bearings on the links of the mold-carrier.

K are plungers radially slidingly secured in the head J. K' are antifriction-rolls at the inner ends of these plungers, adapted to engage with a stationary cam L, which is of such a shape that as the head J is rotated

the plungers K are pressed outward into the apertures I' of the links and then withdrawn again.

In Fig. 2 of the drawings I have shown the head J provided with six plungers, but a greater or lesser number may be used, as desired.

M are rock-shafts journaled in the head J upon opposite sides of each plunger. M' are folder-wings secured to said rock-shafts, adapted in the rocking of the shafts to pass in close proximity to the projecting ends of the plunger.

N is a rock-arm on one of the shafts connected to the inwardly-extending sliding rod N', having the antifriction-roll N<sup>2</sup> engaging with the stationary cam L'.

N<sup>3</sup> is a connecting-rod coupling the rock-shafts M' on the opposite side of the plunger and adapted to rock the one by the movement of the other.

The head J is carried by the shaft J<sup>2</sup>, journaled in stationary bearings J<sup>3</sup> and provided with a suitable drive connection (not shown) connected and properly timed with the paper-feeding mechanism.

O are carrier-arms attached to the endless mold-carrier, and projecting above the links I thereof.

The operation of the parts so far described is as follows: The ribbon from the roll A is glued, stamped, and scored, the blank severed and fed above the mold-carrier in the manner before described. Here the blank is caught by the carrier-arms O and fed along with the mold-carrier over one of the links I thereof to the revolving head J, where one of the plungers K registers with the aperture I' of the link, as shown at Q, Fig. 2. As the mold-carrier moves around the head J the plunger K, by the action of the stationary cam L, is pressed down between the sides I<sup>4</sup> of the mold, which latter project up above the ends I<sup>5</sup> thereof. This will fold up the sides h of the blank against the sides of the plunger, bending the former upon the lines f of the scoring. The cam L at this part of the movement is very gradual, so as to give as long a time as needed for the folding of the sides without danger of tearing them off. As the carrier continues to move, the arm N', engaging with the stationary cam L', will be moved outwardly, rocking the shaft M, to which it is attached, and, through the connecting-rod N', the shaft on the opposite side of the plunger. This will turn the folder-wings M' over the ends of the plunger and in so doing fold in the ends i of the sides h. This movement is also a gradual one, so that the ends may not be torn in folding.

In the further movement of the carrier the plunger is pressed down below the end I<sup>5</sup> of the mold, first turning up the glued ends j of the blank over the folded ends i and then pressing the box completely into the mold, after which the plunger is withdrawn by an abrupt portion of the cam L, the whole plun-

ger movement being effected by about a half-revolution of the head.

While the box is in process of formation other blanks are being fed to the following plunger, so that several blanks are operated upon at the same time. After leaving the head J the boxes are carried around the circuit of the mold-carrier, giving time for the glue to harden.

In order to avoid crowding the plungers and yet to have the molds of the mold-carriers as close together as possible, I preferably use a construction in which the plungers in the head register with only every other mold of the mold-carrier and use a number of molds in said carrier which is not an exact multiple of the number of plungers. With this construction the completed box is carried twice around the carrier, the second time passing between the plungers, as shown at R in Fig. 2. After the box has nearly completed its second circuit it is punched out of the mold by the plunger S, carried by the rotary head S' and actuated by the cam S<sup>2</sup> or other suitable device, so that the mold will be ready to receive another blank. In the drawings I have shown but a fragment of the mold-carrier II, which may be of any required length and passes around suitable idler rolls or sprockets, being driven by the sprockets J'.

In Figs. 8, 9, and 10 I have shown a modification of my machine in which the molds T are made in the rim of a wheel T'. The plungers U are carried by a chain V and are successively forced into the molds by stationary cams. The folders may be attached to each plunger and operated by stationary cams.

U<sup>1</sup> U<sup>2</sup> are stationary camways, with which the pins U<sup>3</sup> U<sup>4</sup> on the plungers engage.

V<sup>1</sup> are rock-arms mounted on the plungers, having their inner ends connected by links with a pivot-pin mounted in elongated slots V<sup>3</sup> in the plungers. The pins are worked up and down in the slots V<sup>3</sup> by any suitable means, preferably by a fixed cam similar to the cams U<sup>1</sup> U<sup>2</sup>. These arms V<sup>1</sup> act to fold the ends of the rear side of the box.

I preferably provide the mold-carrier II with the antifriction-rolls W, adapted to run upon a segmental way W', which holds the links against the head J during the movement of the plungers K. These rolls may be journaled upon the pins I<sup>2</sup>, the projecting ends I<sup>3</sup> of which form bearings with which the sprockets J' engage, as shown in Figs. 2 and 3.

What I claim as my invention is—

1. In a box-machine, the combination of an endless mold-carrier, and an endless plunger-carrier adapted to move in proximity to each other, and each having relatively different orbits, the orbit of one member being eccentric to that of the other means for feeding the blanks between the carriers, and independently-movable plungers carried by said plunger-carrier adapted to press the blanks successively into the molds of the mold-carrier.

2. In a box-machine, the combination with an endless mold-carrier, of a rotary head in proximity thereto and moving in a relatively different orbit from that traveled by the carrier, the orbit of one member being eccentric to that of the other plungers loosely connected with and carried by said head adapted to be successively pressed into the molds of the mold-carrier and means for feeding the blanks between said plungers and the molds.

3. In a box-machine, the combination with a rotary head of a mold-carrier comprising an endless series of molds flexibly connected together, adapted to move in proximity to said head and concentrically therewith, radially-sliding plungers carried by said head adapted to register with said molds, means for feeding the blanks between said plungers and molds and means for actuating said plungers to press the blanks successively into the molds.

4. In a box-machine, the combination with a rotary head, of a mold-carrier comprising an endless series of molds flexibly connected together adapted to move in proximity to said head and concentrically therewith, radially-sliding plungers carried by said head adapted to register with said molds, means for feeding the blanks between said plungers and molds, and a stationary cam engaging with said plungers adapted in the movement of the machine to press the blank successively into the molds.

5. In a box-machine, the combination with a rotary head radially-sliding plungers carried by said head and folder-bars adapted to move across the opposite sides of the plungers, of a mold-carrier comprising an endless series of link molds pivotally secured together, adapted to move in proximity to said head and concentrically therewith, the molds registering with the plungers and each being provided with folder-flanges  $I^1$ , means for feeding the blanks between the plungers and molds, and stationary cams adapted to successively actuate said plungers and folders to fold the blanks and press them into the molds.

6. In a box-forming machine, the combination with a mold-carrying member and a plunger-carrying member, one of which members is flexible, means for carrying a section of the flexible member outwardly beyond or out of contact with the other member, means for feeding the blank between the carriers, and independently-movable plungers carried by the plunger-carriers, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM A. PRESTON.

Witnesses:

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O. F. BARTHEL.