(No Model.) 5 Sheets—Sheet 1.

J. H. RUSSELL.

PAPER BOX MAKING MACHINE.

No. 604,546. Patented May 24, 1898.

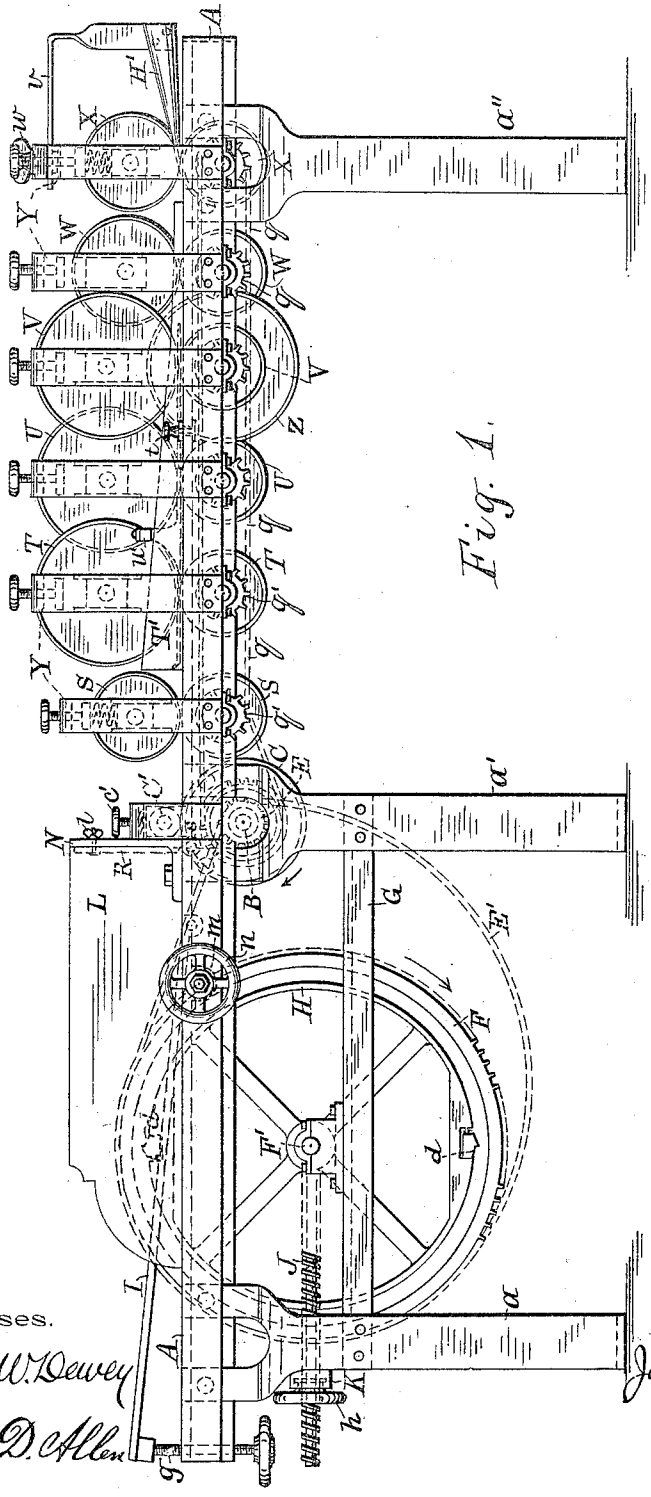


Fig. 1.

Witnesses.

Mark W. Dewey

Alvin D. Allen

Inventor.

John H. Russell

By C. H. Duell

his Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 2.

J. H. RUSSELL.

PAPER BOX MAKING MACHINE.

No. 604,546. Patented May 24, 1898.

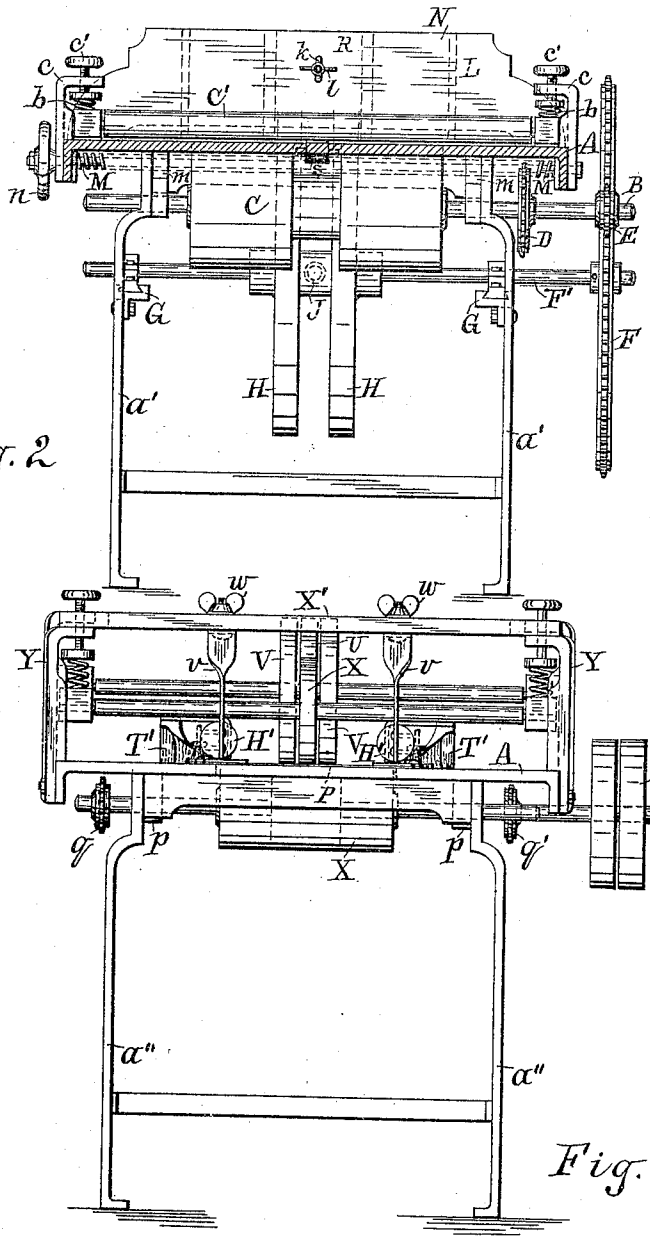


Fig. 2

Fig. 3.

Witnesses.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 3.

J. H. RUSSELL.

PAPER BOX MAKING MACHINE.

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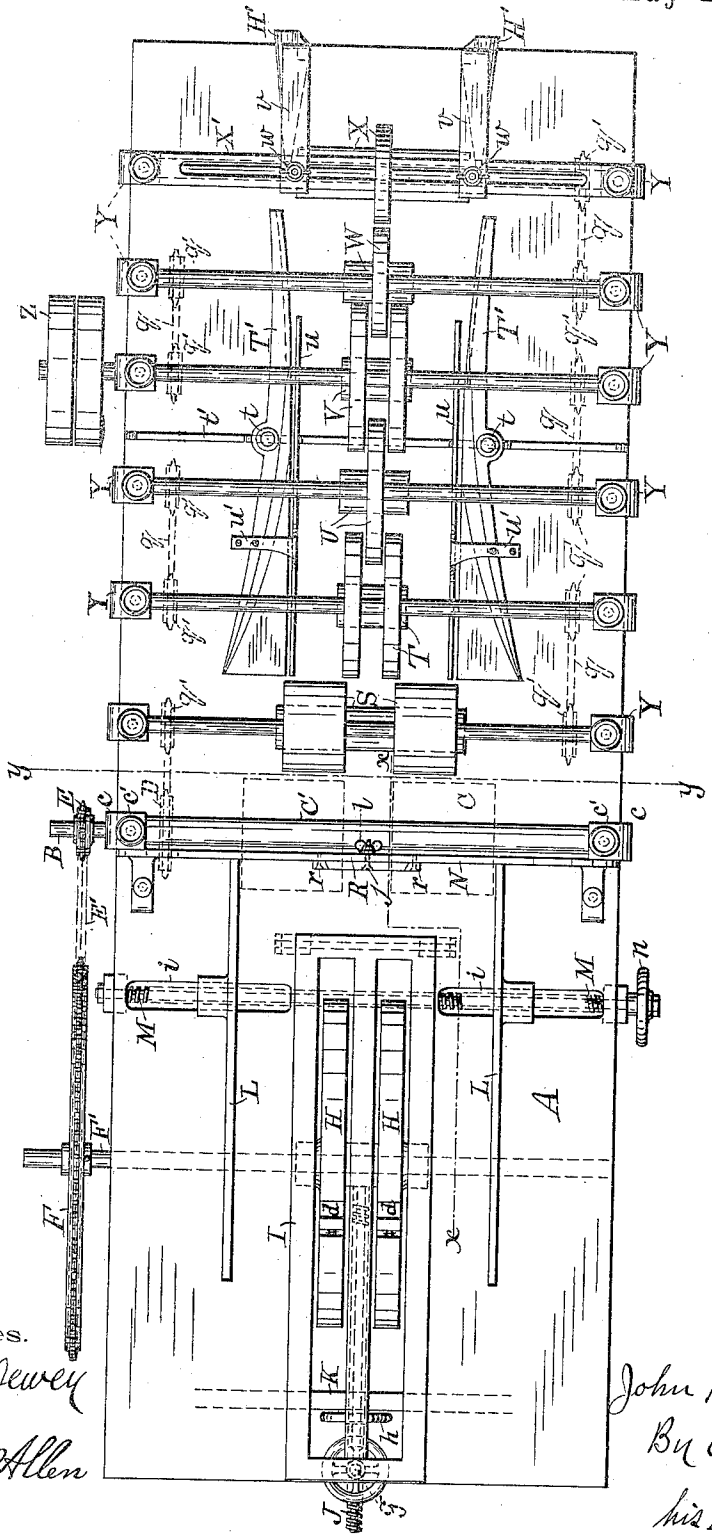


Fig. 4.

Witnesses.
Mark W. Dewey
Alvin D. Allen

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 4.

J. H. RUSSELL.

PAPER BOX MAKING MACHINE.

No. 604,546. Patented May 24, 1898.

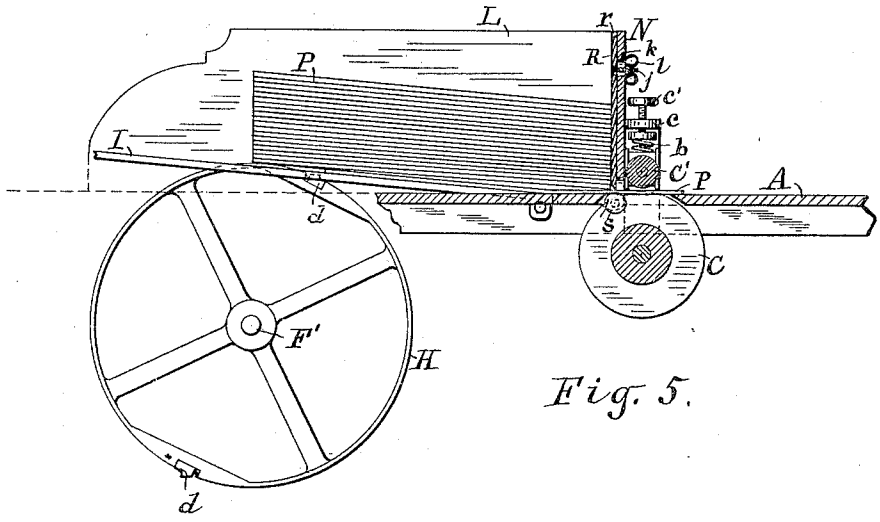


Fig. 5.

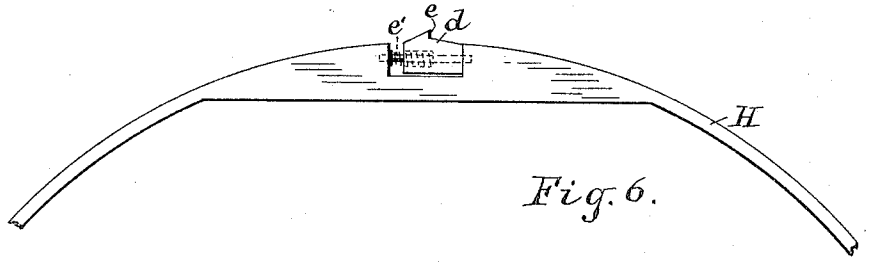


Fig. 6.

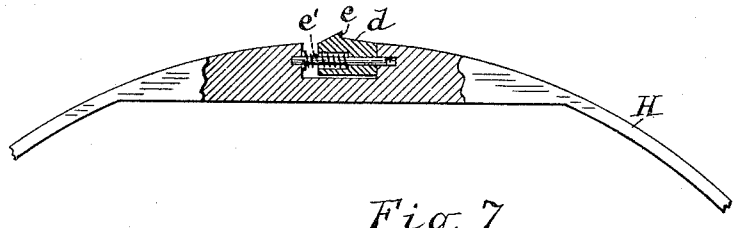


Fig. 7

Witnesses.

Mark W. Dewey

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Inventor.

John H. Russell

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THE PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 5.

J. H. RUSSELL.

PAPER BOX MAKING MACHINE.

No. 604,546. Patented May 24, 1898.

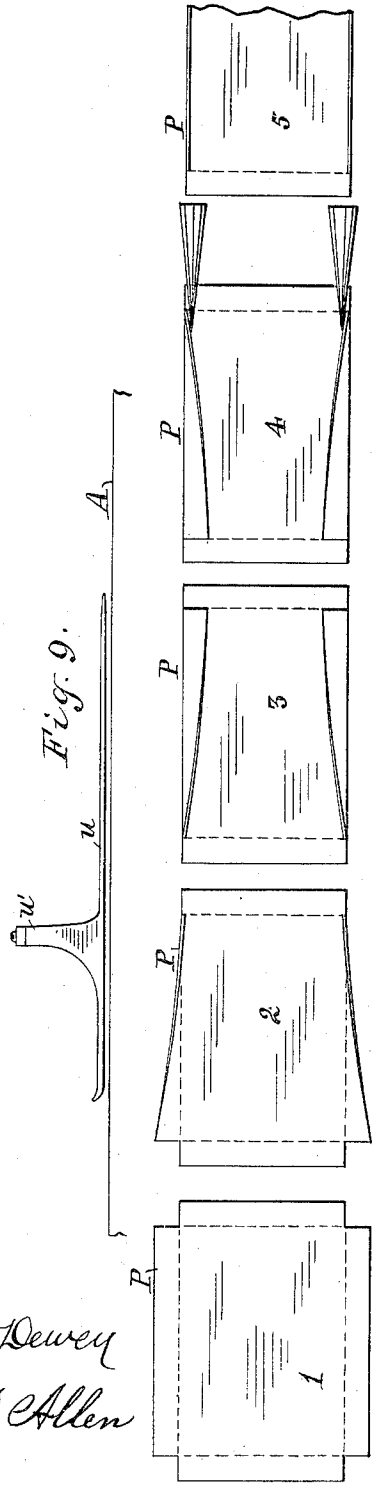


Fig. 9.

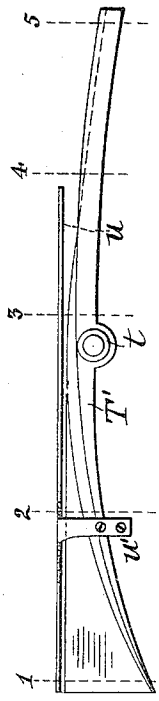


Fig. 10.

Fig. 15.

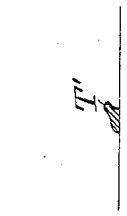


Fig. 14.

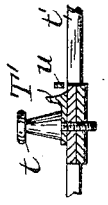


Fig. 13.

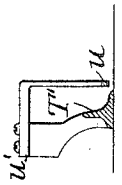


Fig. 12.

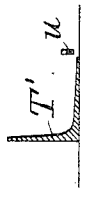


Fig. 11.

Witnesses.
Mark W. Dewey
Alvin D. Allen

Inventor.
John H. Russell
By C. H. Duell
his Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN H. RUSSELL, OF AMSTERDAM, NEW YORK, ASSIGNOR OF ONE-HALF TO JOHN H. GILES, OF SAME PLACE.

PAPER-BOX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,546, dated May 24, 1898.

Application filed July 26, 1897. Serial No. 645,904. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. RUSSELL, of Amsterdam, in the county of Montgomery, in the State of New York, have invented new and useful Improvements in Paper-Box-Making Machines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to paper-box-making machinery; and the object is to provide a suitable and efficient means for folding the paper-board and automatically feeding it to the folding means.

To this end my invention consists in the combination, with devices for feeding a sheet of material and simultaneously folding the side edges, of means for confining a pile of sheets in an inclined position and suitable rolls for catches thereon for pushing the sheets successively from the pile to the feeding devices; and my invention consists in certain other combinations of parts hereinafter described, and specifically set forth in the claims.

In the drawings hereto annexed and forming a part of this specification, Figure 1 is a side elevation of my improved paper-box-making machine. Fig. 2 is a sectional view taken on line *y y* of Fig. 4 and looking from right to left of the figure. Fig. 3 is an end view of Fig. 1, looking from right to left of the figure. Fig. 4 is a top plan view of the machine. Fig. 5 is a sectional view taken on line *x x* of Fig. 4. Figs. 6 and 7 are side and sectional views, respectively, of the catches or pushing devices on the large feeding-disks. Fig. 8 shows the sheet of paper in the several different conditions it assumes when passing through the machine. Fig. 9 is a side elevation of one of the feet for holding the sheet down. Fig. 10 shows a top plan view of one of the edge-folding guides; and Figs. 11 to 15, inclusive, are sectional views taken on lines 1, 2, 3, 4, and 5 of Fig. 10.

Referring specifically to the drawings, P represents the paper sheets to be fed and folded for making boxes or the covers of boxes. The material may be paper, metal, or other flexible material. The sheets in the pile are each preferably cut and creased, as shown at 1 in Fig. 8 of the drawings. Then as it passes through the machine its side edges are bent over upon the central portion of the sheet gradually, as shown in 2 and 3 of the same figure, and then the horns or cones act to raise the side edges, so that they stand at right angles to the central portion of the sheet, as shown at 4 and 5 of the figure, after which the end edges are bent up also, the last operation being preferably performed by hand as the sheet emerges from the machine and falls on the receiving-table. (Not shown.)

A is a table having six legs *a a*, *a' a'*, and *a'' a''*. Near the center of the table, below the top surface, and extending transversely across the same is a shaft B. Mounted on the center of this shaft to turn with it is a large roll or cylinder C, having a central peripheral groove therein for a small roller, to be hereinafter referred to. The periphery of the roll C extends slightly above the surface of the table. Above the roll C is a smaller roller C', which has its ends fulcrumed in yielding bearings working in brackets *c c*, mounted on the sides of the table. *b b* are coil-springs above said bearings, and *c' c'* are adjusting-screws passing through the brackets *c c* and bearing upon the springs to regulate the pressure of the roll C' upon the sheet passing between the rolls C and C'.

A sprocket-wheel D on the shaft B serves to drive the shaft at the proper speed, depending upon the speed of the folding apparatus. Another smaller sprocket-wheel E on the same shaft is connected by a chain E' with a large sprocket-wheel F, keyed to a shaft F', turning in bearings adapted to slide in dovetailed grooves in a pair of rails G G, secured at their ends to the legs of the table.

The chain connecting the sprocket-wheels E and F is loose or of sufficient length to allow the shaft F' to be moved a greater distance from the shaft B to accommodate longer sheets of paper or board when necessary.

Mounted on the shaft F', near its center, are a pair of large narrow disks or rollers H H, separated from each other. These rollers extend a considerable distance above the top surface of the table and have at diametrically opposite points on their peripheries transverse inclined ribs *d*, which are yielding. The ribs are provided with catches *e*, which

engage the rear edge of the lower sheet of the pile when the rolls or disks are turned in the direction of the arrow and force said sheet from beneath the pile between the feed-rolls C and C′. As clearly shown in Figs. 6 and 7, the ribbed part is mounted on a spindle *e′*, which passes through said part, its ends being retained in recesses in the rim of the disk. A coil-spring on the spindle serves to force the yielding part toward one end of the recess in which it is mounted. This structure allows the yielding part to rock on the spindle and conform to the edge of the sheet, if the latter is warped, and insures a proper engagement of the catch with the edge of the sheet and does not mutilate the edge in any way.

The rear end of the pile of paper-boards P is raised by the rolls to an inclined position, and this also helps the catches to operate properly on the edge of the sheet.

In order to provide a smooth inclined surface for the paper, a frame I, having three parallel longitudinal plates joined together at their ends, is hinged below the surface of the table between the rolls H and C and held at the other end above the table by a screw *g*, passing through the table and bearing upon its lower side. By means of the screw the inclination of the frame I may be varied as desired. The large rolls H H are moved toward and from the roll C by means of a screw J, connected with the shaft F′ between the rolls H H and passing through a cross-bar K, extending between the legs *a a* and a wheel *h* on the screw, fulcrumed in said bar.

L L are parallel side guides for the paper mounted upon the top of the table and adjustable toward and from each other by means of a transverse screw-shaft M below the top of the table, said screw-shaft having right and left threads engaging studs *m m*, extending downward from the said guides. The studs *m m* pass through slots *i i* in the top of the table. The screw-shaft M is turned by means of a small wheel *n* on the end of the shaft at one side of the table.

Between the roll C′ and the front ends of the guides L L is an upright board N, secured at its ends to the table. This board has its lower edge cut away to provide a passage for the lower sheet of paper when it is forced forward by the large rolls H H. Said board N is cut away to accommodate the thickest sheets that may be fed, and in order that this passage may be closed more or less I provide an adjustable sliding board or gate R, which may be raised or lowered as desired. Said gate slides between two vertical ribs *r r*, secured to the board N. A screw *j* projects from the gate through a small slot *k* in the board N, and upon the end of the screw and bearing upon the opposite side of the board is a thumb-nut *l*, which secures the gate in position. The lower end of the gate is beveled, as shown in Fig. 5, so that the sheet of paper may be more easily passed through even if somewhat warped. Directly below the board N below the surface of the table, but projecting slightly above the same, is a small roller *s*, fulcrumed in suitable bearings. This roller decreases the friction at the commencement of the movement of the lower sheet of paper. Said roller *s* is located in the groove in the center of the roll C.

The sheets of paper to be fed are cut to the same size and placed upon the inclined frame of the table with their front edges bearing against the gate R. The side guides are then moved together to hold the sheets in place loosely. The rolls H H are moved so that the shaft F′ is directly below the rear edges of the sheets P. When in operation, the rolls H H will catch and carry successively the lower sheet to and between the rolls C and C′, and these rolls carry the sheets to the folder of the box-making machine. Small rollers may be set in the plates of the frame I to decrease friction.

When feeding sheets, especially large sheets confined between guides, it has been found that when there are two unyielding ribs or catches to engage the edge of the sheet to push it from beneath the pile the sheet is liable to bind at its edges on the side guides, which prevent its free movement, something like a bureau-drawer when it is moved unevenly. This is due to either a slight irregularity in the rear edge of the sheet of board or one catch striking the edge of the sheet before the other. When the catches are made yielding, this is overcome, for if one catch strikes the edge before the other it will yield slightly, allowing the other to engage also.

The above description refers particularly to the feeding mechanism of my machine, and I will now describe the folding mechanism.

The folding mechanism is provided with a series of pairs of feed-rollers S T U V W X, one of each pair being above the table and the other below the table. The rollers below the table have their edges or peripheries extending through apertures in the table and slightly above the top surface thereof. The said upper feed-rollers are preferably of different sizes, and some are narrow and resemble disks. Some of the shafts are provided each with a pair of these rolls or disks, which are separated sufficiently to allow a single disk on an intermediate shaft to turn between them or overlap. This allows the use of large rolls within a short distance or an increased contact with the sheet P with fewer feed-rolls. The shafts of the rolls below the table are stationary, extend across from side to side, are parallel with each other, and turn in bearings *p p*, fixed to the frame of the table. As before mentioned, the shafts of the upper feed-rolls are directly above the lower ones. The ends of these shafts are all fulcrumed in yielding bearings working in brackets Y Y, mounted on the side of the table A, the same as the shaft of roller C′, hereinbefore described, and each shaft may be adjusted to accommodate sheets of any thickness. The feed-rolls of the

folding part of the mechanism receive the sheet as it passes from between the rolls C and C'. The shafts below the table are all connected together by chains q and sprocket-wheels q', so that all are driven in unison, and one of said shafts is provided with a loose and fast pulley z for the driving-belt. Upon opposite sides of the upper rolls on the folding part of the table are two folding-guides T' T', so shaped as to turn the side edges of the sheet over upon itself gradually as it is passed between them by the feed-rolls, as clearly shown in Fig. 8 of the drawings. These folding or turning guides are extended longitudinally on the table, are parallel with each other, and are adjustable toward and from each other by means of a set-screw t and a slot t', extending transversely in the top of the table.

In order to hold the sheet down near the folding-guides T' T' and near the creases indicated by broken lines in Fig. 8, I provide a pair of feet u u, which extend parallel with the folding-guides just inside of or between them and secured to them by angular arms u' u', as shown clearly in Figs. 9, 10, and 12 of the drawings. These feet are raised above the top surface of the table sufficiently to allow the sheet of pasteboard P to pass freely below them. The shape or form of the folding-guides will be understood by reference to Fig. 10, together with Figs. 11 to 15, inclusive, of the drawings, which show cross-sections taken on the lines 1, 2, 3, 4, and 5 of Fig. 10.

The horns or cones H' H' for opening or raising the turned-over edges of the sheet as it passes from the guides are supported by angular adjustable brackets v v, mounted on a slotted cross-bar X', extending between the last pair of brackets Y Y, secured to the sides of the table. The position of the said horns will depend upon the width of the sheets P. By simply loosening the thumb-nuts w w on the upper side of the bar X' the brackets with the horns may be shifted as desired. The points of the horns should be located so that they will enter between the sheet and the turned-over edges. As the sheet P passes toward the large ends of the horns the sides are raised by them until they stand at right angles to the central portion of the sheet, as shown at 5 in Fig. 8 of the drawings, after which operation the end edges of the sheet are bent up also at right angles to the central part of the sheet preparatory to securing the corners of the box or cover by covering or other means.

I do not wish to be limited to the precise construction shown and described, as it may be varied without departing from my invention.

Any matters pertaining to the feeding mechanism shown and described herein, but not claimed, are not dedicated to the public, but form the subject-matter of another application filed February 27, 1897, Serial No. 625,346.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a paper-box-making machine, the combination with the table and the guides, L, L, of horizontal feed-rollers between which the sheet is passed, large rolls, catches on the peripheries of the rolls to engage the edge of the sheet, said catches consisting of ribs having inclined surfaces forward of the catches and supported to yield and conform to the inclination of the sheet to be fed, as set forth.

2. In a paper-box-making machine, the combination with the table and the guides, L, L, of horizontal feed-rollers between which the sheet is passed, large rolls on a shaft parallel with the said feed-rollers, said large rolls having recesses in their peripheries, a block having a transverse rib and an inclined surface forward of said rib in said recess, a spindle extending through the block and entering recesses in the rolls, and a spring on the spindle to hold the said block and spindle in place, as set forth.

3. In a paper-box-making machine, the combination with devices for feeding a sheet of paper and simultaneously folding the side edges, of means for confining a pile of sheets in an inclined position, rolls beneath the pile, and catches on the peripheries of the rolls to engage the edge of the lower sheet to push it from the pile to the feed-rollers, as set forth.

4. In a paper-box-making machine, the combination with means for confining a pile of sheets, and rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of pairs of feed-rolls to convey the sheet, folding-guides to turn over the said edges of the sheet during transit, and feet to hold the sheet down upon the table while the edges are turned, substantially as described and shown.

5. In a paper-box-making machine, the combination with the table, means for confining a pile of sheets, and rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of a plurality of pairs of feed-rolls to convey the sheet lengthwise of the table, adjustable folding-guides to turn over the side edges of the sheet during transit, and feet mounted on the folding-guides to hold the sheet down while the edges are turned, substantially as described.

6. In a paper-box-making machine, the combination with the table, means for confining a pile of sheets, rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of pairs of feed-rolls to convey the sheet over the table, a driving-pulley on one of the shafts of the feed-rolls, gearing connecting the lower feed-roll shafts together, folding-guides to turn over the side edges of the sheet during transit, and feet to hold the sheet down upon the table while the edges are turned, substantially as described and shown.

7. In a paper-box-making machine, the com-

bination with the table, means for confining a pile of sheets, rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of pairs of feed-rolls to convey the sheet over the table, a driving-pulley on one of the shafts of the feed-rolls, sprocket-wheels on the shafts of the lower feed-rolls, chains connecting the sprocket-wheels together, folding-guides to turn over the side edges of the sheet during transit, and feet mounted on the folding-guides to hold the sheet down while the edges are turned, substantially as described and shown.

8. In a paper-box-making machine, the combination with the table, means for holding a pile of sheets, rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of pairs of feed-rolls to convey the sheet over the table, gearing between the lower-feed-roll shafts, folding-guides to turn over the side edges of the sheet upon itself during transit, feet mounted on the folding-guides to hold the sheet down while the edges are turned, and horns adapted to raise the said edges of the sheet after it passes from the folding-guides, as set forth.

9. In a paper-box-making machine, the combination with the table, means for holding a pile of sheets, rolls having catches on their peripheries to engage the edge of the lower sheet to push it from the pile, of pairs of feed-rolls to convey the sheet over the table, gearing between the lower-feed-roll shafts, folding-guides to turn over the side edges of the sheet upon itself during transit, feet mounted on the folding-guides to hold the sheet down while the edges are turned, and adjustable horns having their points extending toward the folded edges of the sheet to pass between the sheet and the edge, substantially as and for the purpose described.

10. In a paper feeding and folding machine, a table, feeding devices to convey the sheet, folding-guides to turn over the side edges of the sheet, and wedge-shaped horns suitably mounted to open the folded edges, as set forth.

11. In a paper feeding and folding machine, a table, feed-rolls to convey the sheet, folding-guides to turn over the side edges of the sheet, a cross-bar with brackets mounted adjustably thereon, and cone-shaped horns mounted on the brackets to raise the folded edges, substantially as described and shown.

12. In a paper feeding and folding machine, a table, feed-rolls to convey the sheet, folding-guides to turn over the side edges of the sheet upon itself, a slotted cross-bar above the table, angular brackets mounted adjustably on said bar, and horns secured to the said brackets and adapted to open the folded side edges of the sheet, substantially as described and shown.

In testimony whereof I have hereunto signed my name.

JOHN H. RUSSELL. [L. S.]

Witnesses:

JAMES W. FERGUSON,

JOSEPH N. WHITE.