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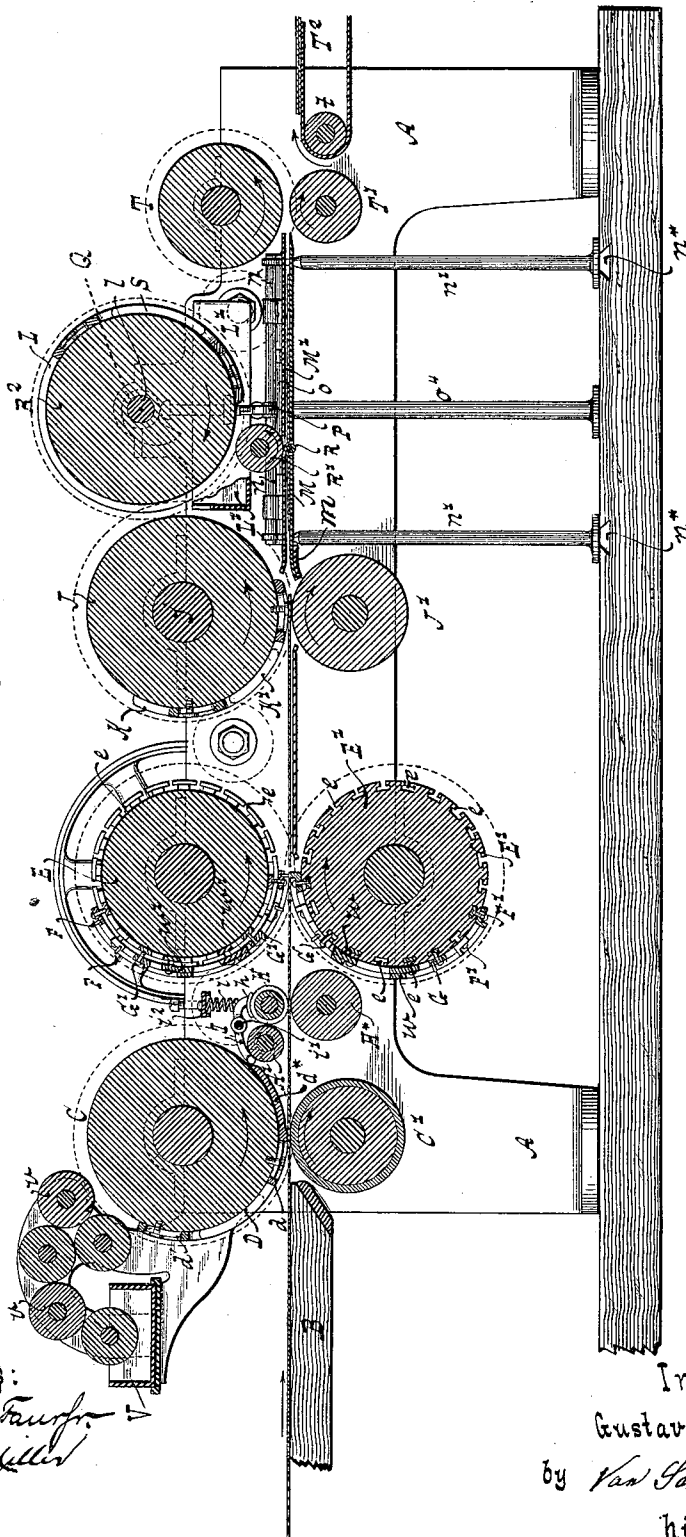
6 Sheets—Sheet 1.

G. L. JAEGER.
PAPER BOX MACHINE.

No. 372,624.

Patented Nov. 1, 1887.

Fig. 1.



Witnesses:

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William Miller

Inventor:

Gustav L. Jaeger.

by *Van Gontz & Hauff*
his Attorneys.

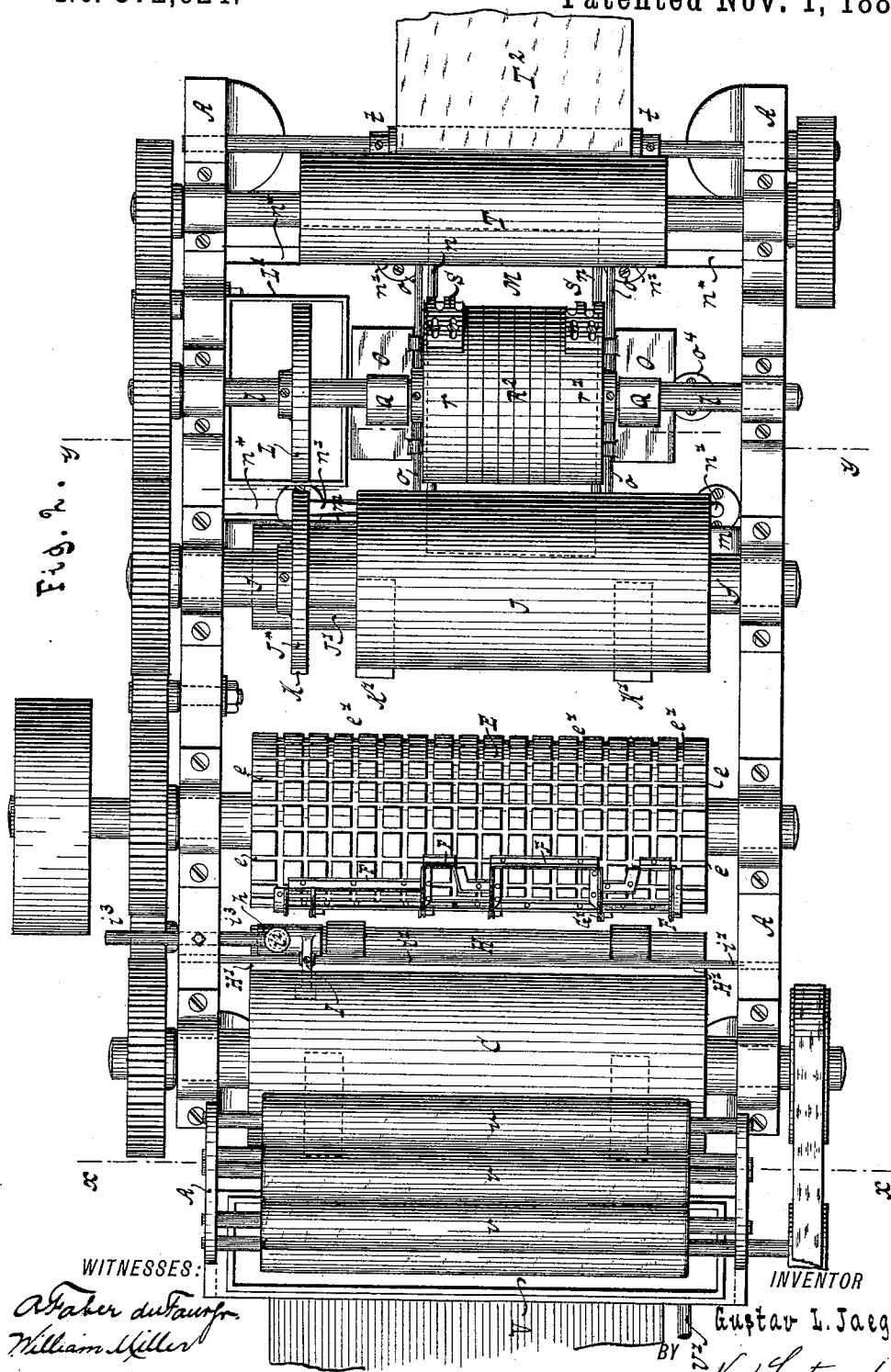
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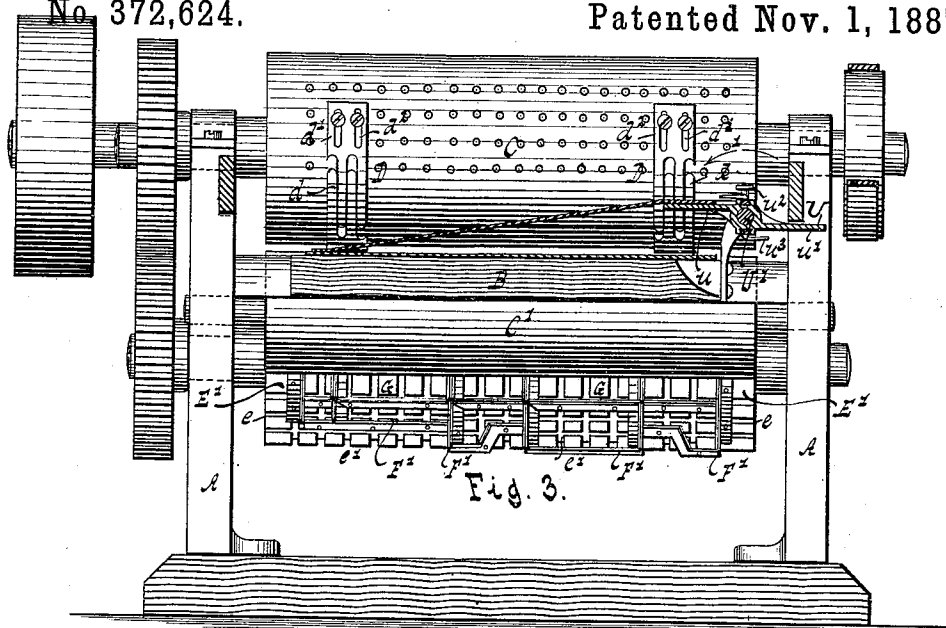


Fig. 3.

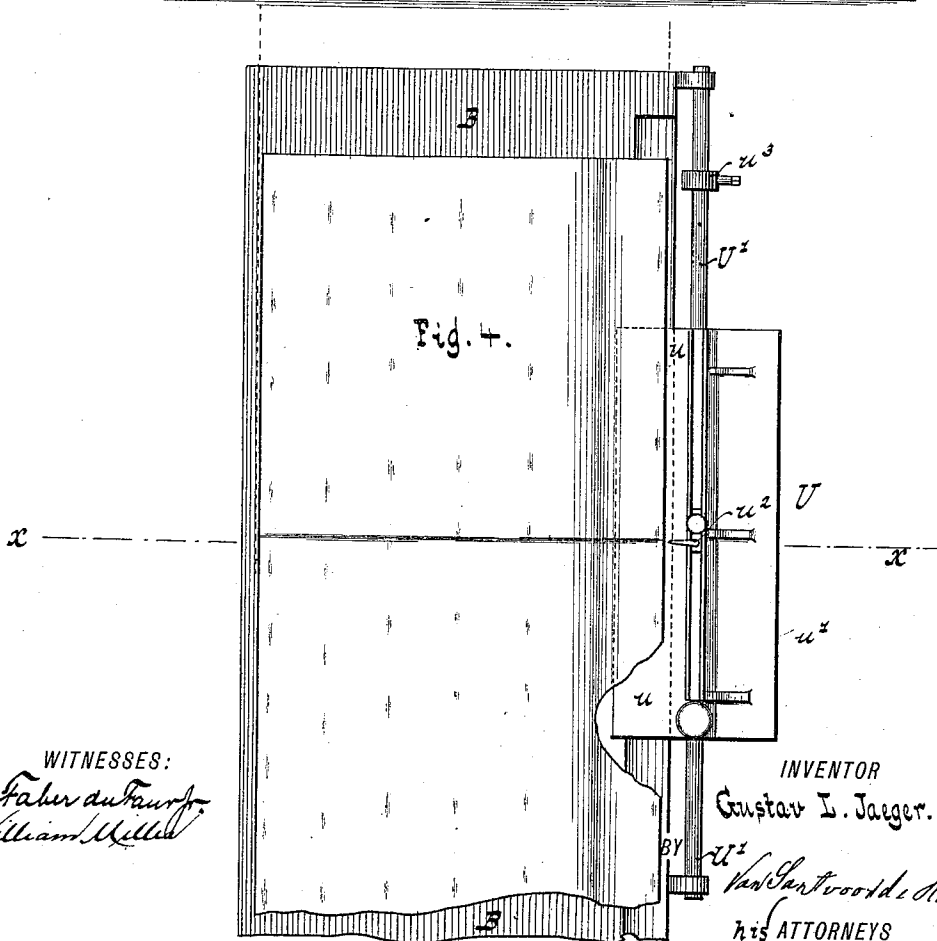


Fig. 4.

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his ATTORNEYS

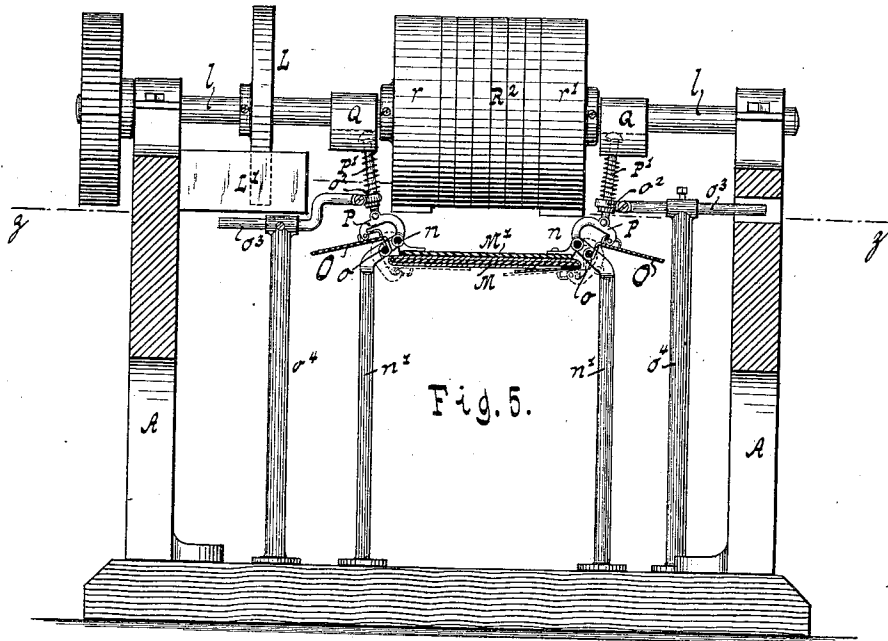
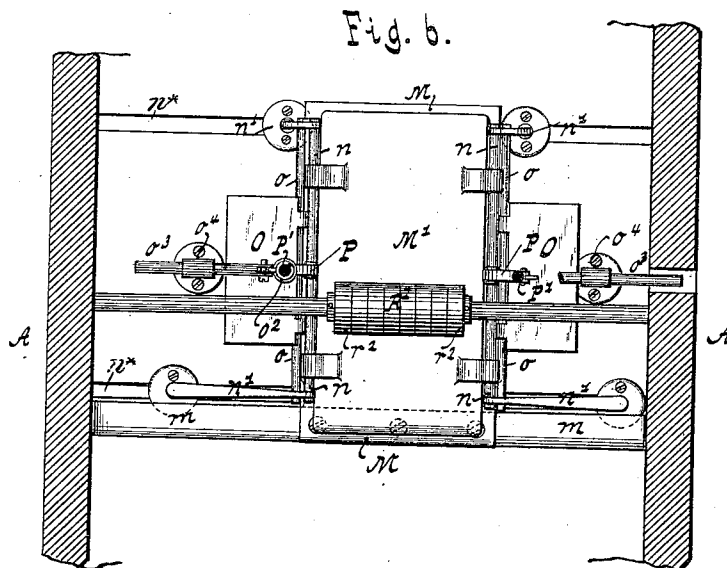
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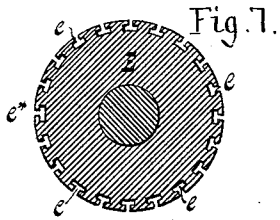
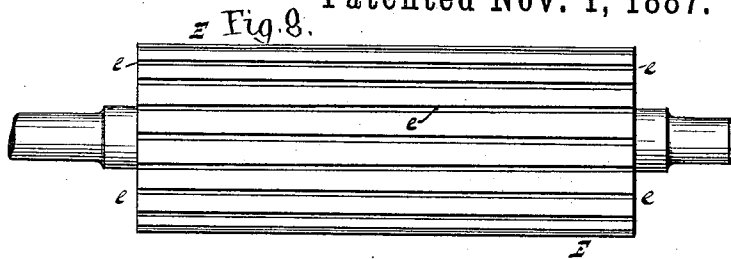
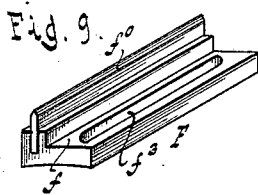
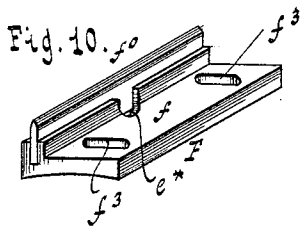
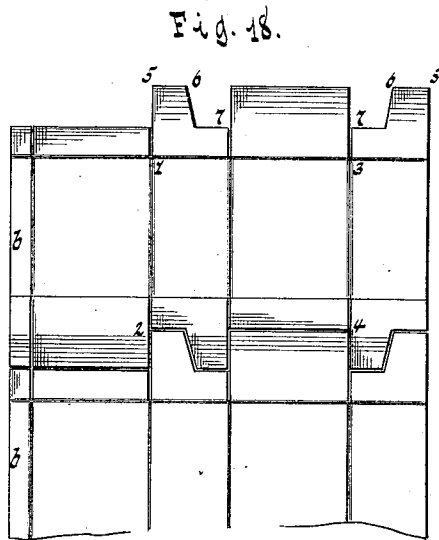
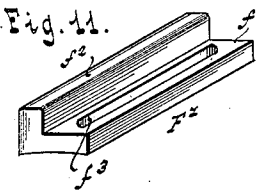
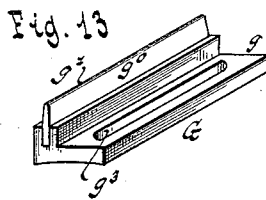
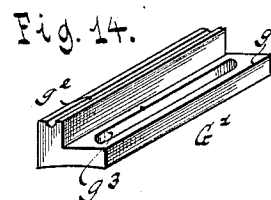
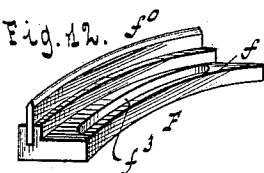
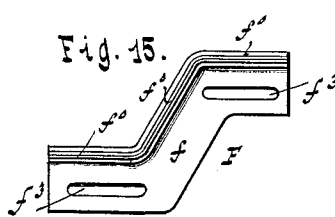
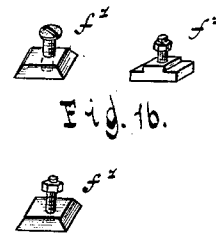
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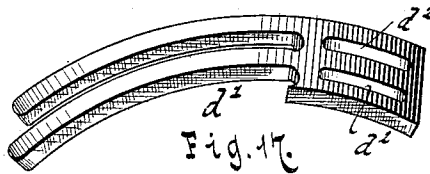
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PAPER BOX MACHINE.

No. 372,624.

Patented Nov. 1, 1887.



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(No Model.)

6 Sheets—Sheet 6.

G. L. JAEGER.
PAPER BOX MACHINE.

No. 372,624.

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Fig. 19.

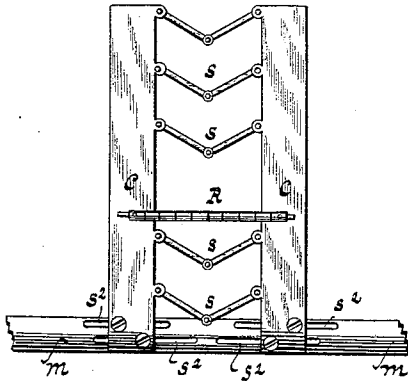


Fig. 20.

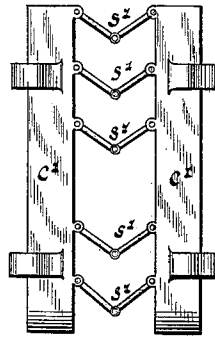


Fig. 21.

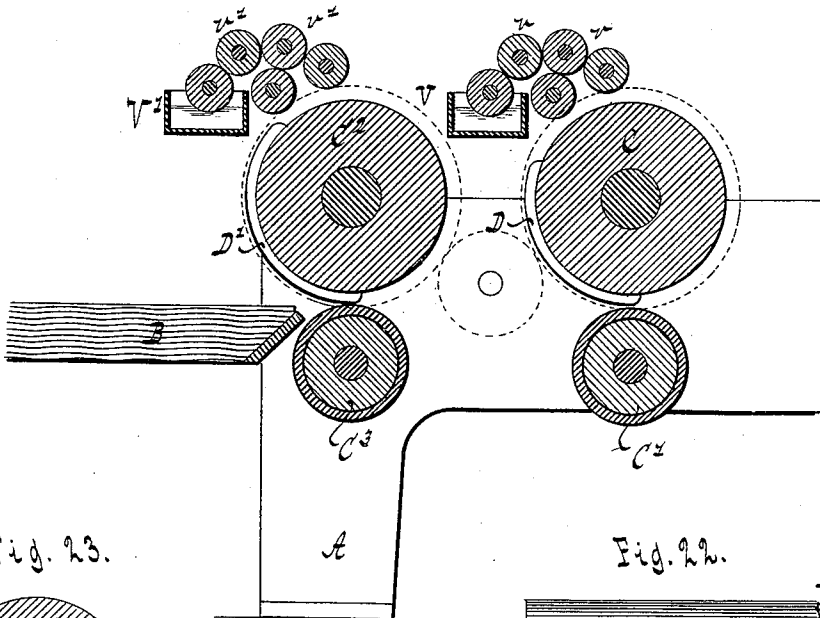


Fig. 23.

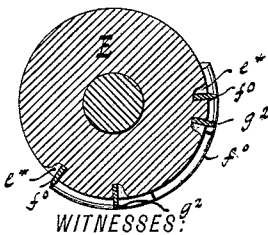


Fig. 22.

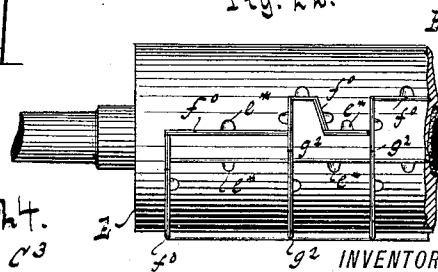
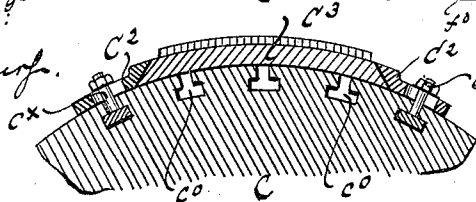


Fig. 24.



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UNITED STATES PATENT OFFICE.

GUSTAV L. JAEGER, OF NEW YORK, N. Y.

PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 372,624, dated November 1, 1887.

Application filed December 16, 1886. Serial No. 221,773. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV L. JAEGER, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Paper-Box Machines, of which the following is a specification.

My invention relates to improvements in paper-box machines of that class in which the blank is fed, cut, creased, and folded, respectively, by feed-rolls, rotary cutter-rolls, and hinged wings, such, for instance, as illustrated in a patent granted to me February 25, 1873, No. 136,246.

The object of my present invention is to provide a machine fitted for the manufacture of boxes of various sizes, which object I accomplish by a novel construction and arrangement of operating parts, all such parts being either adjustable or exchangeable.

The peculiar features in the construction of this box-machine are more fully pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a central longitudinal section of a box-machine embodying my invention. Fig. 2 is a plan or top view thereof with part broken away. Fig. 3 is a vertical section in the plane $x x$, Figs. 2 and 4. Fig. 4 is a top view of the feed-table and the sheet or strip adjusting device attached thereto. Fig. 5 is a vertical section in the plane $y y$, Fig. 2. Fig. 6 is a horizontal section in the plane $z z$, Fig. 3, showing the folding-wings and their actuating mechanism. Fig. 7 is a transverse section of a cutter-roll. Fig. 8 is an elevation of the same. Figs. 9, 10, 12, and 15 are perspective views, on a larger scale than the preceding figures, of various forms of cutters and cutter-heads. Fig. 11 is a perspective of a die for the cutters. Fig. 13 is a perspective of a creaser. Fig. 14 is a similar view of a die for such creaser. Fig. 16 represents various devices for securing the cutters, creasers, and dies to the cutter-rolls. Fig. 17 is a perspective of a section of a feeding-segment. Fig. 18 is a face view of a blank when properly cut and creased. Fig. 19 is a plan or top view of a modification of the folding-table. Fig. 20 is a similar view of the guide-plate. Fig. 21 is a sectional view show-

ing supplemental rolls for color-printing. Fig. 22 is a plan view of a portion of a modification of the cutter-roll. Fig. 23 is a transverse section of Fig. 22. Fig. 24 is a cross-section of a modification of a printing or feed roll.

Similar letters indicate corresponding parts.

In the drawings, the letter A designates a frame supporting the working parts of the machine. At the front end of the frame is located a table, B, upon which rests the sheet or strip from which the boxes are to be manufactured.

C C' are rollers which feed the sheet forward to the cutter-rolls E E', where it is properly cut and creased. It being essential that the sheet should be fed forward, at each revolution of the feed-rolls C C' a distance equal to the length or depth of the blank to be cut, the upper feed-roll, C, is made sufficiently large in diameter to permit a length of feed requisite for the largest blank; but its periphery does not come into contact with the sheet, as such feed must be varied with different boxes. For this purpose, feeding-segments D D, Figs. 1 and 3, are secured to said roll C, each of which consists of pronged sections $d d'$, Figs. 1 and 17, that are adjustable toward and from each other, so as to vary the ultimate length of the segments. This adjustment can be effected by providing the sections with the longitudinal slots d'' , through which extend the fastening bolts or screws whereby the sections are secured to the roll. The lateral adjustment of the segments D D is effected by providing the roll C with series of tapped holes, or, preferably, such holes may be subsequently drilled and tapped as conditions may require.

The cutter-roll E is provided with cutters F and with creaser-dies G, both of which are adjustable within longitudinal grooves or ways e , as shown in Figs. 7 and 8, or also in peripheral ways e' , intersecting the longitudinal ways e , as in Figs. 1 and 2. Each cutter consists of a bent or angular body or head having a flange, f , which is slotted at f^3 , either longitudinally, as in Fig. 9, or transversely, as in Fig. 10, and a blade, f^0 , containing a sharp or pointed edge. This blade f^0 is forced into a longitudinal recess in the body or head and is held therein by friction, such being the simplest method of securing said blade to the body or head. The cutters are secured to the roll by

bolts f' , of the usual construction. The cutters containing the longitudinal slots, Fig. 9, are intended to be used when the roll is provided with intersecting ways e and e' , and those with the transverse slots, Fig. 10, when the roll has only longitudinal ways e . The dies F' for the cutters are secured in a similar manner as the cutters to the lower roll, E , and are provided with flat or nearly flat working-faces f'' , Fig. 11.

The creasers G are adjustably secured in the roll E' , their bodies or heads having flanges g , containing slots g'' , Fig. 13. Said creasers have their blades g' provided with blunt or rounded edges g' , and the dies G' , Fig. 14, for the creasers, which are secured in the upper roll, E , have concave faces or cavities g'' , so that the material of the blank is pressed into said cavities and a crease is formed.

By forming simply creases or depressions in the blank the box is not materially weakened and the blank can be readily folded, and the folded parts have but little tendency to return to their original positions.

It will be observed that by the proper adjustment of these cutters and creasers and their dies, and by adjusting the feeding-sections on the feed-rolls $C C'$, a blank of any desired outline or dimensions, within limits, can be cut.

The cutter and creaser blades and the dies, instead of being secured in the bodies or heads, as described, can be fitted directly into grooves in the rolls $E E'$, Figs. 22 and 23; and in this case lifting-out recesses e^* are provided, into which a properly-shaped tool can be inserted and the cutter or creaser blade drawn out, as when they are to be sharpened. In this case the cutters and creasers and dies extending about the periphery of the rolls are made in sections, so that they can be fitted in the grooves. Similar lifting-out recesses e^* , Fig. 10, can be provided for the blades of the cutters and creasers, such recesses being formed in the bodies or heads, as shown. The cutter-blades for irregular forms—such as the outlines 5 6 7 of the blank, Fig. 18—can be inserted in a properly-shaped body or milled out of steel. On inspection of the drawings it will be noticed that for any particular size of box-blank the cutters and creasers fill out or extend over only a definite portion of the periphery of the roll E , and consequently during that period of time in which the roll is rotating without cutting the blank must remain stationary. This is accomplished by means of the segments $D D$ on the feed-rolls which feed the sheet or strip forward only a distance equal to the length of the blank, after which the upper feed-roll is out of contact with the sheet.

The feeding forward of the sheet takes place simultaneously with the cutting of the blank. The sheet, after passing under the cutter-rolls $E E'$, is received by rolls $J J^* J'$. The upper roll consists of a paste-distributing section, J^* , Fig. 2, and a separating-roll, J , which is pro-

vided with feed-segments $K' K'$ in sections, as before, which are adjusted to the length of the blank as cut. This separating-roll is somewhat larger in diameter than the feed-rolls $C C'$; or the feeding-sections are made thicker, so that their contact-surfaces move with a greater speed than the sheet as it leaves the cutter-rolls, whereby the blanks are separated, it being understood that the feed and separating rolls rotate with the same angular velocity. To prevent this action of these separating-rolls from drawing the sheet forward and out of register, in case the blank does not separate, or separates hard, a stop mechanism is situated between the feed and cutter rolls, which holds the sheet at the time of separation. This stop mechanism consists of two feed-rolls, $H H^*$, Figs. 1 and 2, one of which, H , is rotated by the feed-segments $D D'$, through an intermediate roll, H' , and feeds the sheet or strip in conjunction with the feed-rolls. A brake-shoe, h , carried by one arm of a lever, I , is normally pressed against said roll H by a spring, i , Fig. 1, and said brake-shoe is removed from said roll by the action of the feeding-sections D upon the second arm of the lever I . The lever I is secured to a rock-shaft, i' , having bearings in the frame, and is longitudinally adjustable thereon, so that it can be shifted as the position of the feeding-segment $D D$ of the feed-rolls is adjusted laterally for different sizes of boxes. The spring i can be moved with the lever I , its upper end being received in a cap, i' , the supporting-arm of which is adjustably secured to the frame. When such a stop mechanism is used, it is necessary to make the length of the feeding-segments as much shorter than the length of the blank to be cut as the peripheral distance from the point of tangency of the segments with the sheet or strip to the end of the contact-arm of the lever I . To lift the brake-shoe h from the roll H , as soon as the rolls $C C'$ commence to feed the sheet, the section d of the feeding-segment D is provided with an extension, d^* , Fig. 1, which is thinner than said segment and does not come into contact with the sheet or strip, but is thick enough to cause the brake-shoe h to be lifted from the roll H when it comes into contact with the lever I . This extension d^* reaches from the end of section d to the end of lever I .

The paste-distributing roll J^* , previously mentioned, can be laterally moved on the shaft j , Fig. 2, so as to adjust it to different widths of blanks; and it is also provided with an adjustable segment, K , constructed similar to the segment D , such segment K being adjustable to the length of surface which is to be supplied with paste. Paste is supplied to the distributing-roll J^* by a paste-roll, L , mounted on a shaft, l , and laterally adjustable thereon, so that it can be moved with the paste-distributing roll. This paste-roll L revolves within a paste-fountain, J' . The paste-roll L may be made wide enough to extend across

the entire width of the paste-fountain, and in this case it need not be made adjustable on its shaft.

The folding-table M, Figs. 1, 5, and 6, consists of a thin plate of a rigid material—such as hard steel—which is secured at its front end to supports of any description—such, for instance, as a cross-bar, *m*, which extends between the standards of the frame A. Above this folding-table is rigidly suspended a plate, M', which prevents the blank from buckling while being folded. This plate M' can be suspended, as shown in this example, from shafts *n n*, that are supported in vertical posts *n' n'*, secured to the bottom of the frames. The folding-table M is equal in width to the distance between the lines 1 2 and 3 4 of the blank, Fig. 18.

The folding-wings O O are mounted on arbors *o o*, having bearings in the posts *n' n'*, and are operated to move through a semicircle by means of the bent levers P P, which are pivoted to the shafts *n n*, and the free ends of which are attached to the folding-wings near their hinges. The levers are depressed by means of spring-pressed rods P' P', that are engaged by cams Q Q, Figs. 1, 2, and 5, secured to the shaft *l*, the springs returning the levers, and consequently the wings O O, to their normal positions. The rods P' P' are supported in sleeves *o' o'*, which can be set at any angle about the ends of supports *o' o'*, movably secured in standards *o' o'*.

The blank, after leaving the paste and the separating rolls, is seized between a small roll, R, Fig. 1, supported in the folding-table M, and a roll, R', which is actuated by a roll, R², on the shaft *l*, and said sheet is fed over the table M and below the plate M'. The roll R² is provided with the adjustable segments S, similar to the adjustable segments D, previously described, which segments S are so located or adjusted that while the folding-wings O O are actuated to fold the blank such blank is held stationary.

That portion of the blank which contains the outer or paste-receiving flap *b*, Fig. 18, is folded slightly in advance of the remaining portions of the blank, so as to insure a proper uniting of the ends. This is accomplished by setting the actuating-cam of the proper folding-wing slightly in the lead of the other. After the blank is properly folded it is fed forward to the pressure or ejector rolls T T', by which the folded blank is firmly pressed together. On passing from these rolls T T' the blanks are piled up or received upon a moving endless apron or belt, T², which extends around two pulleys, Z, (one of which is omitted in the drawings,) from which belt or apron the blanks are removed as desired. For different sizes of boxes the distance between the lines 1 2 and 3 4, Fig. 18, will vary, and consequently the folding-table M and plate M' must be replaced by one of a proper size and the posts *n' n'* moved correspondingly. To fa-

cilitate this changing in the position of the posts *n' n'*, their bases can be guided in ways or grooves *n* n** in the base of the machine, Figs. 1, 2, and 6. The position of the rods P' P', in connection with the actuating-levers P P, can be changed by shifting the supports *o' o'*, if necessary; but for smaller changes an adjustment of the obliquity of the rods P' P' will suffice. The rolls R R' are made in sections, so that they can be varied in length, the end sections, *r' r'* and *r² r²*, having hubs, through each of which extends a bolt or screw that impinges on the shaft. If desired, however, the roll R² may consist only of two end sections, *n n'*, which can be moved laterally.

Instead of making the folding-table M and plate M', respectively, of one piece, they may consist of end strips, *c c'*, Figs. 19 and 20, which are joined by means of toggle-levers *ss'*, so that the same can be made narrower or wider. In this case the roll R, Figs. 1 and 20, of the folding-table is made in sections—that is, a number of sleeves mounted on a common shaft—and the support or cross-bar *m* is provided with slots *s²*, through which the fastening-bolts extend. In order that the sheets or strips can be moved to the feed-rolls C C', so as to bring their forward ends directly to a line drawn between the roll-centers, which insures accurate feeding in register to the cutter-rolls, I provide the following strip or sheet adjusting device, Figs. 3 and 4. On one side of the table B (preferably the right-hand) is secured, in standards, a rod, U', upon which is supported a feed-board or supplementary table, U, which is movable in the direction of its length and capable of turning about said rod as an axis.

The feed-board or supplementary table U is constructed with two plane faces, *u u'*, which can be brought alternately in a horizontal plane above the table B. In suitable ways on each side of said table U are fitted index hands or pointers *u²*, which can be moved in said ways and secured at any desired point by means of thumb-screws. An adjustable stop, *u³*, on the rod U', serves to limit the forward motion of the table. In the use of this device the stop *u³* and the pointers *u²* are so adjusted that if some convenient mark on the sheet or strip—such as a printed line—is brought in line with the pointer the forward end of the sheet will be brought between the feed-rolls C C', when said table, together with the sheet, is moved until the motion of the table is arrested by the stop *u³*.

Suppose the face *u* of the feed-board U is above the table B. The sheet to be fed is placed upon the table B, with one edge resting upon the feed-board U, such edge being retained upon the same by the operator, the proper position of the sheet having been previously determined and the stop *u³* properly set. As the sheet at present under the feed-rolls nears its end, the feed-board U, together with the sheet held thereon, is moved forward on the rod U', and the end of said sheet or

strip is brought in the proper position between the rolls C C', and is grasped by the same as the feeding-segments D D rotate.

After the sheet or strip is grasped by the feed-rolls C C' the feed-board U is turned one hundred and eighty degrees, in this example about the rod U', in the direction of arrows, Fig. 3, whereby the sheet or strip is deposited upon the table B, and the face *u'* of the feed-board is ready for the next sheet after such feed-board has been drawn toward the operator. By this means a sheet or strip is always ready to be accurately fed when the end of the sheet or strip previously deposited upon the table has been reached.

When it is desired to print the blank, the type is set up on the feed-cylinder C, and ink is supplied to the same from ink-fount V, Figs. 1 and 2, by a set of receiving, transmitting, and distributing rolls, *v*, as usual. To adapt the machine for color-printing, Fig. 21, supplemental printing-rolls—such as C² C³—are arranged ahead of the feed-rolls D D, and such rolls C² C³ are provided with feeding-sections D' D'. The necessary ink is supplied to the rolls from ink-founts V' by rolls *v'*. Such supplemental printing-rolls being constructed and set in a similar manner to the feed-rolls, the register of the sheet or strip is not disturbed.

To emboss the blank at the same time that it is cut, I make use of embossing punches and dies *w w'*, Fig. 1, which are provided with slotted flanges similar to the cutters and dies F F', in the same manner as the latter. The feed or printing roll C, as shown in Fig. 24, is provided with grooves or ways *c'*, in which are secured adjustable clamping-dogs C², such dogs consisting of a slotted plate having an inclined clamping-edge. A bolt or bolts, *c**, extend through the slots in the dogs, and their heads are within the grooves, whereby said dogs can be secured in any position on the roll. The type-plate C³ is provided with bevel-edges which are engaged by the dogs. By this means the cylinder is adapted for any size (within limits) of type-plate, and said type plate can be secured in any position.

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

1. The combination, in a box-making machine, of the upper and lower cutter-rolls, E E', and the upper and lower rolls, C C', one of the latter rolls being provided with slotted segments *d'*, for intermittently feeding the material to the cutter-rolls, which latter are provided with cutters and dies F and F', substantially as described.

2. In a box-making machine, the combination, with the upper and lower cutter-rolls, E E', of the upper and lower feed-rolls, C C', the cutter-rolls being provided with adjustable cutters and dies, and the feeding-rolls having segments which are adjustable toward and from each other and laterally, substantially as described.

3. In a box-machine having an intermittent feed, the combination of the feed and cutter rolls, the separating-rolls J J', and a stop mechanism for the sheet or strip controlled by the feed-rolls, substantially as shown and described.

4. The combination, with the feed, cutter, and separating rolls, of the folding-table M, the plate M', the rolls R and R', for feeding the sheet over the folding-table, the driving-roll R², the adjustable segments S thereon, for intermittently feeding the sheet, the folding-wings O O, and means, substantially as described, for actuating said wings, substantially as shown and described.

5. In a box-machine, the rolls E E', in combination with interchangeable cutters and creasers, dies for the same, all adjustable on said rolls, and means, substantially as described, for securing the cutters, creasers, and dies, substantially as set forth.

6. In a paper-box machine, the combination of the rolls E E', containing grooves or ways *e*, the cutters F and creasers G, dies F' and G' for the same, all adjustable in the grooves or ways, and means, substantially as described, for securing the cutters, creasers, and dies, substantially as shown and described.

7. In a box-machine, the combination of the rolls E E', containing ways *e*, the cutter and creaser blades F and G, dies F' and G' for the cutters and creasers, all of the same having slotted bodies or heads, and the bolts *f'*, provided with blocks adapted to fit the ways for securing the cutters, creasers, and dies to the rolls, substantially as shown and described.

8. The combination, with the rolls E and E', of the creasers G, each composed of a body or head, *g*, and a creasing-blade, *g'*, set therein and having a rounded edge, and the dies G', having longitudinal cavities, said dies and creasers being adjustable upon the rolls, substantially as described.

9. The combination, with a roll, C, of feeding-segments attached to said roll and laterally adjustable thereon, substantially as shown and described.

10. The combination, with a feed roll, C, of the feeding-segments D D', each consisting of curved sections *d*, adjustable laterally and toward and from each other, substantially as shown and described.

11. In a box-machine, the combination, with the cutter-roll and the paste-roll L, of the paste-distributing roll J*, laterally adjustable on its shaft, substantially as shown and described.

12. The combination, with the feed and cutter rolls, of the paste-roll L, the paste-distributing roll J*, and the pasting-segment on said roll, adjustable to the length of the surface to be pasted, substantially as shown and described.

13. The combination, with the cutter-rolls and the feed-rolls having feeding-segments D, of the separating-rolls J J', the auxiliary roll H,

and the brake-shoe acting on said roll while the sheet or strip is being separated and actuated by one of the feeding-segments to release the roll, substantially as shown and described.

5 14. The combination of the cutter-rolls and the feed-rolls having a feeding-segment provided with an extension, the auxiliary roll H, and the brake-shoe and the lever carrying the same, said extension acting upon the lever to
10 release the brake-shoe as the feed-rolls begin to feed, substantially as shown and described.

15 15. The combination, with the cutter-rolls and the feed-rolls having laterally-adjustable segments D, of the separating-rolls J J', the auxiliary feed-roll H, the transmitting-roll H', actuated by the feeding-segments, brake-shoe, and a lever carrying said brake-shoe and adjustable laterally on its shaft, substantially as shown and described.

20 16. The combination, with the folding-table M and its plate M', of the roll R, supported in the folding-table, the roll R', for feeding the sheet, in conjunction with the roll R, the driving-roll R', the folding-wings O O, and
25 means, substantially as described, for actuating the same, substantially as set forth.

30 17. The combination, with the folding-table M and its plate M', of the folding-wings O O, the levers P P, attached to the same, the rods P' P', and the cams Q Q on shaft I, acting upon said rods, substantially as shown and described.

35 18. The combination, with the folding-table M and its plate M', of the folding-wings O O, the levers P P, attached to the same, the adjustable rods P' P', and the cams Q Q, substantially as shown and described.

40 19. The folding-table M and the plate M', in combination with the folding-wings O O, adjustable to the folding-table and plate, and adjustable means for actuating said wings, substantially as shown and described.

20. In a box-machine, a folding-table and plate, both adjustable to the sheet to be folded, substantially as shown and described.

45 21. In a box-machine, a folding-table consisting of end strips, c c, movable toward and from each other, substantially as shown and described.

50 22. The combination, with a support, as m, of a folding-table and plate, each consisting of end strips, c c and c' c', levers s s', between said end strips and hinged thereto, and means, substantially as described, for securing the end strips of the folding-table and plate, substantially as shown and described.

23. The combination, with a folding-table consisting of end strips movable toward and from each other, of a sectional roll, R, having bearings in said table, substantially as shown and described. 60

24. The combination, in a box-machine, of the rolls E E', having adjustable cutters, and the separating-rolls having adjustable feeding-sections K, substantially as shown and described. 65

25. A mechanism for feeding the sheets or strips to the feed-rolls, which consists of a feed-board movable in the direction of its length, and a stop, as u', substantially as shown and described. 70

26. The combination, with a table, B, of the rod U', the feed-board U, located above the table B, and movable about said rod and in the direction of its length, a stop, as u', and a pointer or index, u'', substantially as shown and described. 75

27. The combination, with the feed-rolls and the table B, of the feed-board U, having two faces, u u', on opposite sides, a guide for said feed-board, about which the latter can rotate to bring either of the faces above the table and to deposit the sheet on the table under the rolls, and a stop, as u'', substantially as shown and described. 80

28. The combination, with the feed-rolls and the table B, of a guide-rod, U', a feed-board, U, having a pivotal connection with the guide-rod and movable longitudinally thereon, faces u u' on opposite sides of the feed-board, adjustable pointers or indexes for said faces, and an adjustable stop on the guide-board, substantially as shown and described. 85

29. In a sheet forwarding or registering mechanism for paper-box machines, a feed-board, U, constructed to turn about its axis to deposit the sheet, substantially as shown and described. 90

30. In a box-machine for intermittently feeding the blank, the combination of the feeding, printing, cutting, embossing, and separating rolls, and a folding mechanism, substantially as described. 100

In testimony whereof I have hereunto set my hand and seal in the presence of two subscribing witnesses.

GUSTAV L. JAEGER. [L. S.]

Witnesses:

W. HAUFF,

E. F. KASTENHUBER.