(No Model.) 4 Sheets—Sheet 1.

G. H. CUSHMAN & E. H. TAYLOR.

PAPER BOX MAKING MACHINE.

No. 420,901. Patented Feb. 4, 1890.

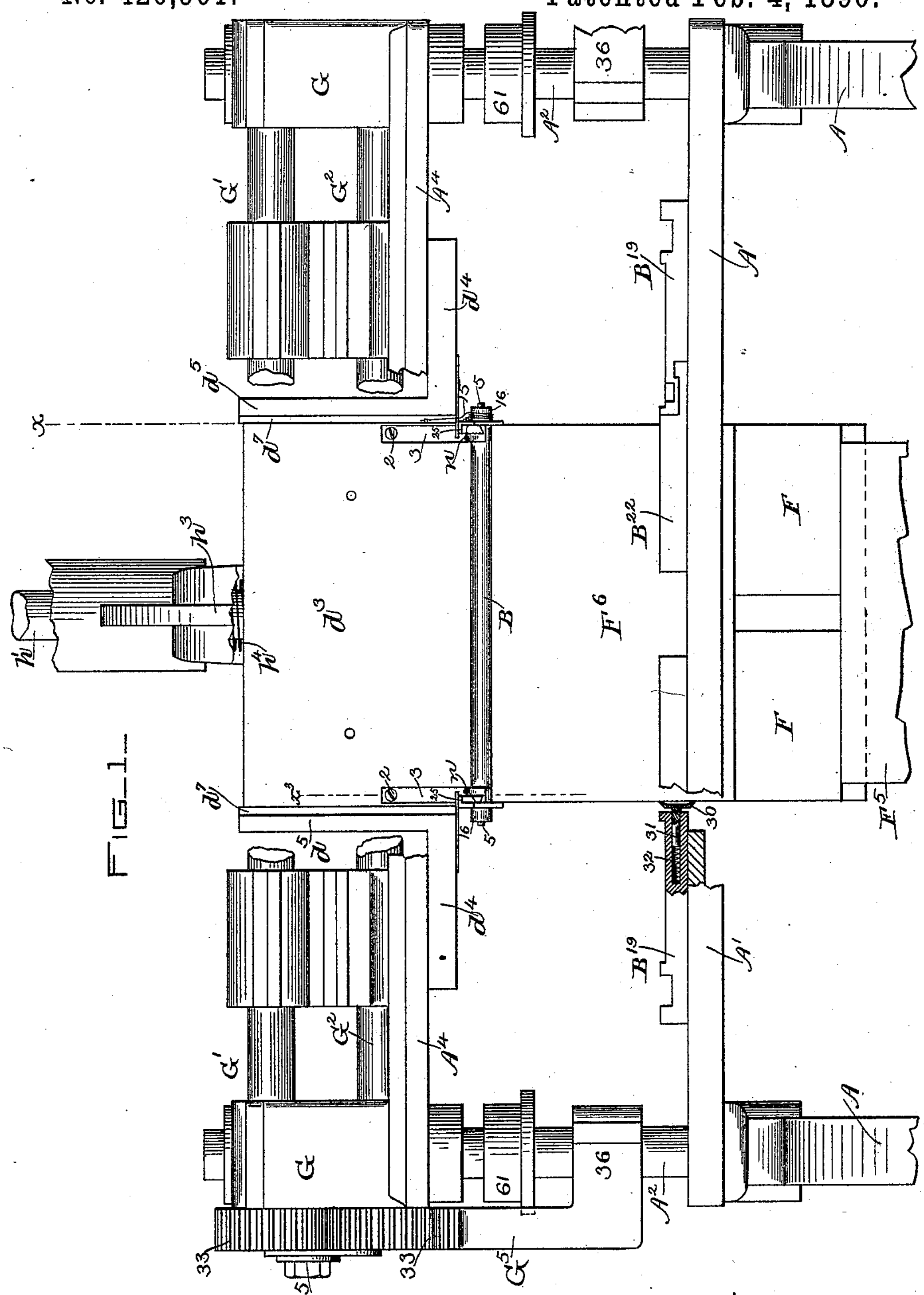

FIG_1_

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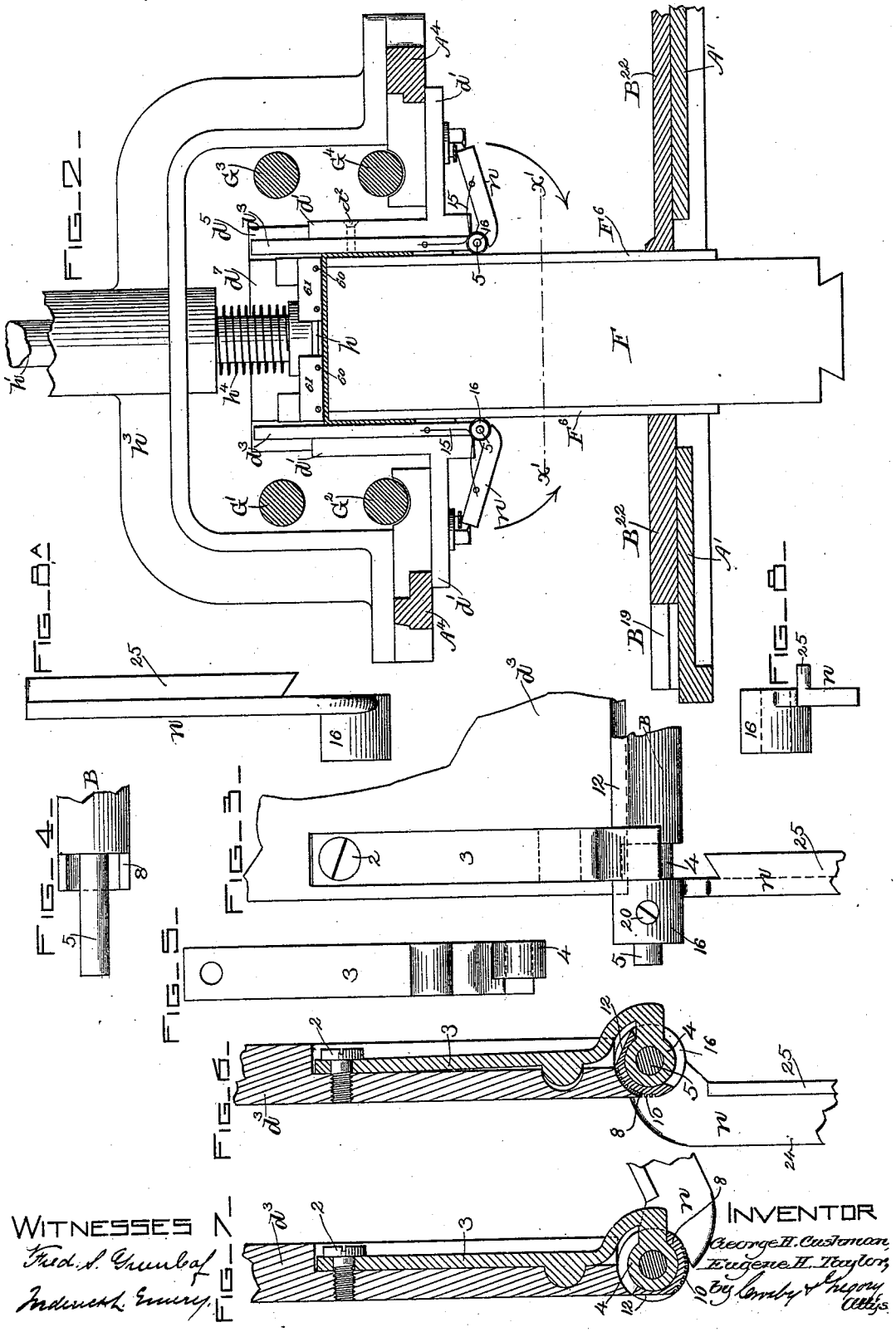
(No Model.) 4 Sheets—Sheet 2.

G. H. CUSHMAN & E. H. TAYLOR.

PAPER BOX MAKING MACHINE.

No. 420,901. Patented Feb. 4, 1890.



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(No Model.) 4 Sheets—Sheet 3.

G. H. CUSHMAN & E. H. TAYLOR.

PAPER BOX MAKING MACHINE.

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FIG. 9.

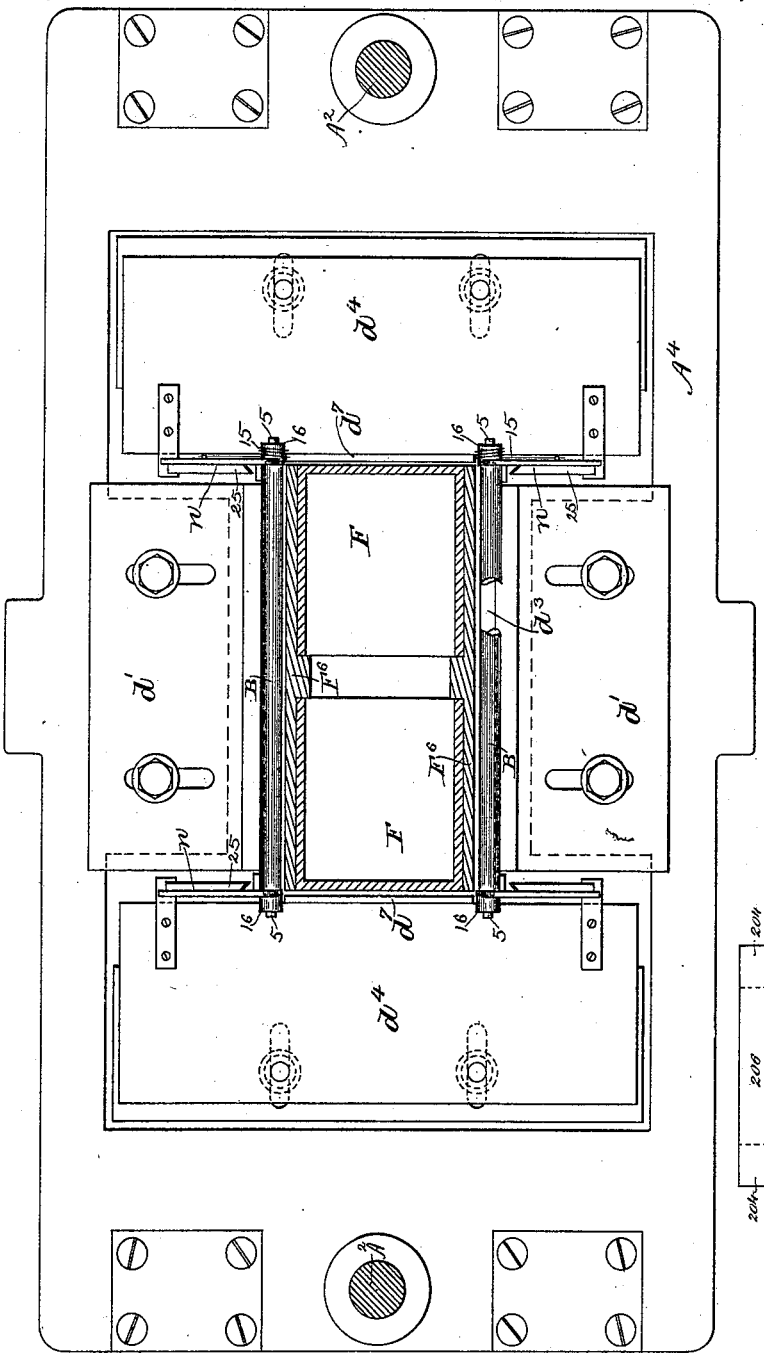


FIG. 11.

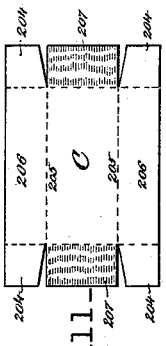
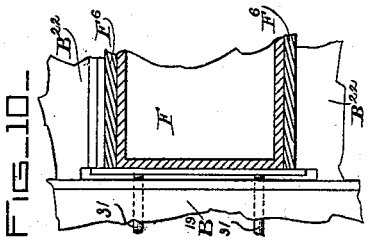


FIG. 10.



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(No Model.) 4 Sheets—Sheet 4.

G. H. CUSHMAN & E. H. TAYLOR.

PAPER BOX MAKING MACHINE.

No. 420,901. Patented Feb. 4, 1890.

FIG. 12.

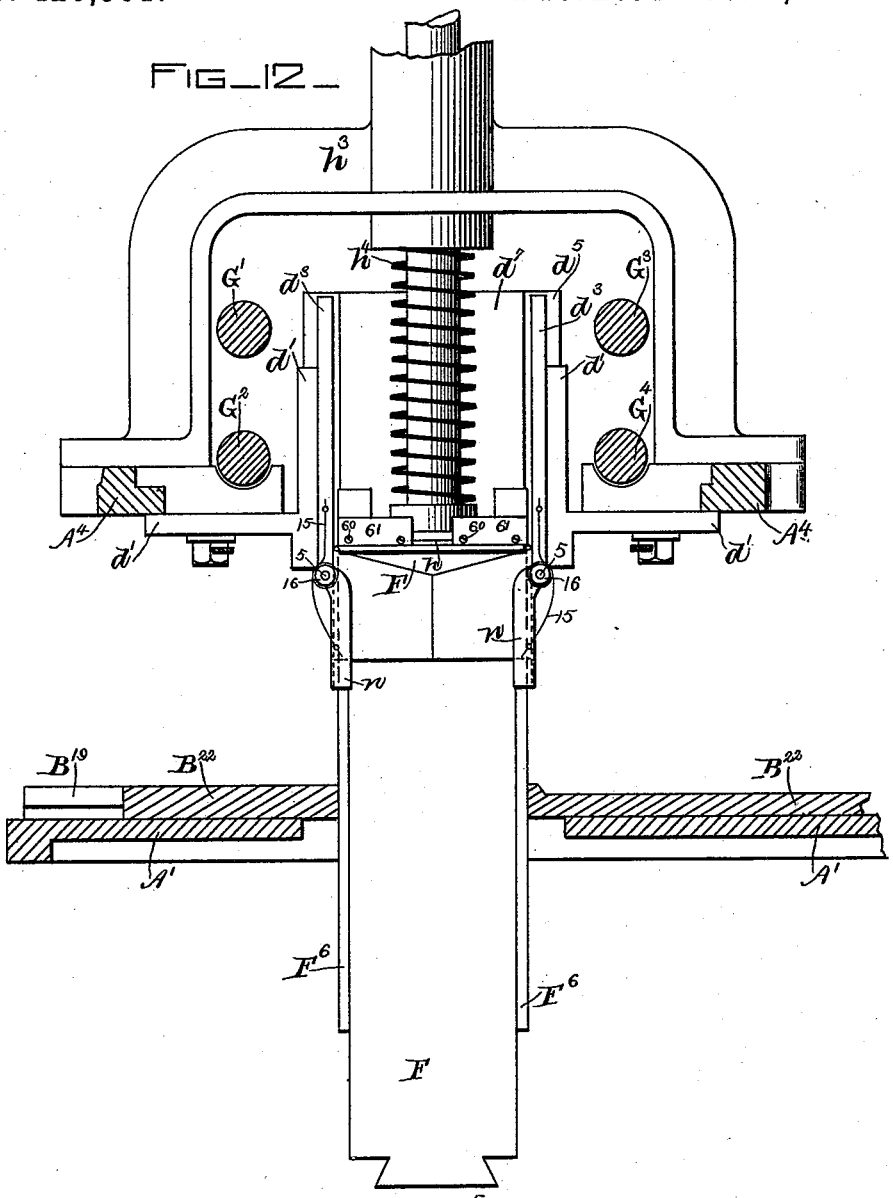
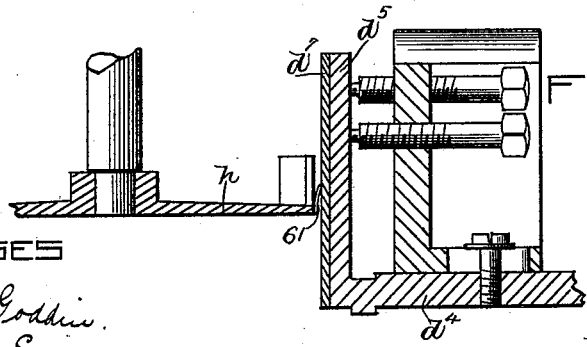


FIG. 13.



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UNITED STATES PATENT OFFICE.

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PAPER-BOX-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 420,901, dated February 4, 1890.

Application filed January 31, 1889. Serial No. 298,212. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. CUSHMAN and EUGENE H. TAYLOR, both of Lynn, county of Essex, and State of Massachusetts, have invented an Improvement in Paper-Box-Making Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object the production of novel mechanism for turning in the lip portions of a blank in the formation of paper boxes, such lip portions, as herein represented, being at the end of the long sides of the box-blank, our invention being more especially designed as an improvement upon the class of machine represented in United States application, Serial No. 276,995, filed June 13, 1888, and Patent No. 418,690, dated January 7, 1890. In the application referred to the "former" had connected with it certain lip-turning plates which co-operated with other devices and acted upon the box-blank to turn over the lips before the sides of the blank to form the box were turned down, the said lip-turners being actuated in advance of and independently of the means employed to turn the sides of the blank. The machine represented in the said application also had corner flap-holders, which for their movement required a number of parts, which necessitated considerable care in their manufacture and adjustment.

In our aim to simplify the construction of and increase the durability of machines for making paper boxes, and especially machines of the class referred to, we have found that the lip-turners may be made to come directly against the outer side of the material of the box-blank and turn the lips of the blank directly upon the ends of the former after the sides or portions of the blanks containing the lips have been brought in contact with the former.

In the best form of our invention now known to us the lip-turners also act to bend over the sides of the box containing the lips and to then turn the lips against the ends of the former. The said lip-turners will in practice preferably derive their movement by or through the box-blank as it is being folded, the said blank being forced against rolls which serve as the pivots or centers about which the lip-turners vibrate. To do this we have provided, as herein shown, the side-forming plates or wipers (inasmuch as the sides of the blanks to be folded are shown as containing the lips) with frictional surfaces, shown as toothed or corrugated rolls, against which the box-blank is forced, the movement of the blank by the former while the blank is against the said rolls or surfaces causing the lip-turners, shown as radius-bars connected to the ends of the said rolls, to swing quickly across and close to the ends of the said former, thus causing the lip-turners to not only act against and aid in turning down the longer sides of the box-blank, but also to thereafter in their further or final movement turn the lips at the ends of the sides of the box over upon the ends of the former, this being done before the former and end plates or wipers by their joint action bend the ends of the box-blanks sufficiently to lay the said ends against the inturned lips of the sides of the blank.

Our invention consists, essentially, in the combination, with a former and co-operating end and side plates or wipers forming a mold, of rolls having toothed serrated or frictional surfaces to be engaged by the box-blank as the latter is being folded, and pivoted lip-turners to act upon and turn the lips of the box-blank directly against the ends of the former, substantially as will be described.

Other features of our invention will be hereinafter described, and particularly specified in the claims at the end of this specification.

Figure 1 is a partial view of the delivery end of a paper-box machine containing our improvements, said figure showing part of the frame-work broken out to better illustrate the particular features in which our present invention consists, the angle-plate by which the side plate or wiper d^3 is supported being omitted. Fig. 2 is a section of part of the delivery end of the machine at the left of the dotted line x, Fig. 1, some of the parts broken out in Fig. 1 being added in Fig. 2. Fig. 3 is an enlarged detail showing one end of one of the side plates or wipers with part of a roll and

part of a lip-turner connected thereto. Fig. 4 is a partial view of one end of one of the rolls carrying the lip-turners. Fig. 5 shows in rear elevation one of the bearings for the said rolls. Figs. 6 and 7 are vertical sections in the line x^3, Fig. 1, taken through the side plates or wipers with their attached journals and the rolls, Fig. 6 showing one of the lip-turners as turned down in vertical position, while Fig. 7 shows the lip-turner in its normal or inactive position. Fig. 8 is a detail looking at one of the lip-turners from its outer end; Fig. 8^a, a plan view thereof. Fig. 9 is a section looking up from the dotted line x', Fig. 2. Fig. 10 is a detail chiefly to show one of the scrapers for cleaning the ends of the former, said figure showing the former in section. Fig. 11, on a smaller scale, shows a box-blank before it is folded, the dotted lines showing the lines of fold. Fig. 12 is a view similar to Fig. 2, but with the parts in different positions, the lip-turners being shown as having been turned in by the action of the blank on the toothed rolls or surfaces carrying the said lip-turners; and Fig. 13 is a detail showing part of the follower and end plates or wipers with scraper attached to the follower.

The frame-work A, the bed-plate A′, the head A^4, to which is attached in adjustable manner the former F, the block F^5, by which it is held, the plates B^{19}, the follower h, the rod h', to which it is attached, the yoke h^3, containing bearings for the follower-spindle h', and the shafts G G^2 G^3 G^4, their attached gears 33, and the rack-bars G^5, attached to the slide-rods A^2, are and may be all as in the application, Serial No. 276,995, referred to, wherein like parts are designated by like letters.

As our invention herein contained relates especially to certain features such as contained in the machine represented in the said application, it has been considered unnecessary to specifically show and describe parts which are common to and fully described and illustrated in the said application. The side plates or wipers d^3 and the end plates or wipers d^7 form a mold, through or into which the box-blank b b (shown in Fig. 11) is forced and made to assume the shape of the former F in cross-section. The plates d^3, held in place by screws d^2, extended through the angle-plates d', have secured to them near their ends by screws 2 certain spring-like arms 3, having at their lower ends bearings or boxes 4 for the support of the journals 5 of the rolls B. These rolls, having portions of their peripheries made as friction-surfaces by corrugating or roughening them, as at 10, are shown as provided with semicircular flanges 8, (see Fig. 4,) to overlap the bearings in which the journals of the rolls turn. Each roll has attached to its journals by a screw, as 20, the hub 16 of one of the lip-turners n, composed of an arm angular or L shape in cross-section. The hub 16 at one end of each roll is shown as having wound about it a spiral spring 15, one end of each spring being fixed to a lip-turner, while the other end is secured to a stud fixed to the side plate d^3 or other stationary part of the machine, the said springs normally acting to keep the said lip-turners in their normal positions, as in Figs. 1 and 2 and in Fig. 7, where but part of the lip-turner is represented. Each roll is slabbed or cut away, as at 12, to leave a flat or plane surface, which, when the roll is in its normal position described, lies flush, or substantially so, with the inner side of the plate d^3. The plates B^{19}, secured to the bed-plate A′, are at their edges opposite the ends of the former F (see Figs. 1 and 10) provided with slide-pins 31, acted upon by springs 32, the outer ends of the said pins serving as means to support pivotally a scraper 30, concaved at its inner side, the said scraper by its contact with the ends of the former as the latter is reciprocated vertically in usual manner scraping from the former any paste or gum thereon. The follower h, normally depressed by the spring h^4 on the rod h and normally standing just below the rolls B, has attached to its ends by screws 60 (see Fig. 2) the clearers 61, shown as thin metal plates, the ends of which normally bear against the inner faces or sides of the end plates or wipers d^7, the said clearers serving by their pressure against the end plates d^7 to clear from them any adhering paste or gum as the follower is raised and lowered in usual manner. The box-blank C (see Fig. 11) has two side pieces 206, provided with lips 204, and two end pieces 207. The dotted lines show the lines on which the blank is folded.

In practice the former F is lowered so that its top is below the plates B^{19}, and while in such condition the blank C is fed into correct position over the former and the former is lifted, carrying with it the box-blank until the blank meets the lower side of the follower. Now, in the further ascent of the former, the follower is lifted against its spring h^4, and the box-blank, as it meets the friction-surfaces of the rolls B, causes the said rolls to be turned, thus moving the lip-turners n quickly in the arcs of the dotted circles, (see Fig. 2,) such movements of the lip-turners causing the edges 24 thereof to meet the sides 206 of the blank, aid in turning it down against the former, and as soon as the edge 24 of the lip-turner arrives at the corner of the former the further movement of the lip-turner causes it to turn over the lip part 204 of the side pieces, thus laying the said lips against the ends of the former, they being turned over after the box-blank has been bent in the dotted line 205. As the lip 204 is fully turned the shoulder 25 of the lip-turner comes to a bearing on the paper where folded or bent to form the lip, thus aiding in making a defined right-angled turn in the part 206 where the lip is formed. The lip-turners having been made to perform their duty, the box-blank in the

further ascent of the former has its end portions 207 bent or turned down between the former and the end plates or wipers d', and the box-blank is carried above the rolls. As soon as the blank passes above the rolls the springs 15 act to restore the rolls into their normal position, as in Figs. 1 and 7, leaving the slabbed side 12 of the roll in position to permit the box to be readily discharged from the mold, as the follower and former are permitted to descend without turning the rolls.

We claim—

1. The combination, with the side and end plates or wipers forming a mold and a follower and former, of rolls having toothed, serrated, or frictional surfaces to be engaged by the box-blank as the latter is being folded, and lip-turners carried by the said rolls, to operate substantially as described.

2. The combination, with the side and end plates or wipers forming a mold and a follower and former, of rolls having toothed, serrated, or frictional surfaces to be engaged by the box-blank as the latter is being folded, and lip-turners having projections 25 and springs to actuate the said rolls in one direction, to operate substantially as described.

3. The combination, with side and end plates or wipers forming a mold, a former, a follower, and rolls having toothed, serrated, or frictional surfaces, and a plane surface, as 12, of lip-turners actuated by the said rolls, to operate substantially as described.

4. The combination, with side and end plates or wipers forming a mold, a follower and rolls having toothed, serrated, or frictional surfaces, and a plane surface, as 12, of lip-turners actuated by the said rolls, and springs to act upon the said rolls and turn them back into their normal position, substantially as described.

5. In a machine for the manufacture of paper boxes, the side plates or wipers and their attached spring-bearings, combined with the rolls having frictional surfaces and with the lip-turners actuated by the said rolls, substantially as described.

6. In a machine for the manufacture of paper boxes, the combination, with the former, of the automatically-adjustable scrapers 30 and springs to actuate them to scrape the ends of the former, substantially as described.

7. In a machine for the manufacture of paper boxes, the combination, with the end plates or wipers, of a follower and clearers secured to the follower to scrape the inner faces of the said end plates or wipers, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEO. H. CUSHMAN.
EUGENE H. TAYLOR.

Witnesses:
GEO. W. GREGORY,
BLANCHE DEWAR.