(No Model.) 4 Sheets—Sheet 1.

# J. E. HINDS.

## MACHINE FOR MAKING PAPER BOXES.

No. 454,908. Patented June 30, 1891.

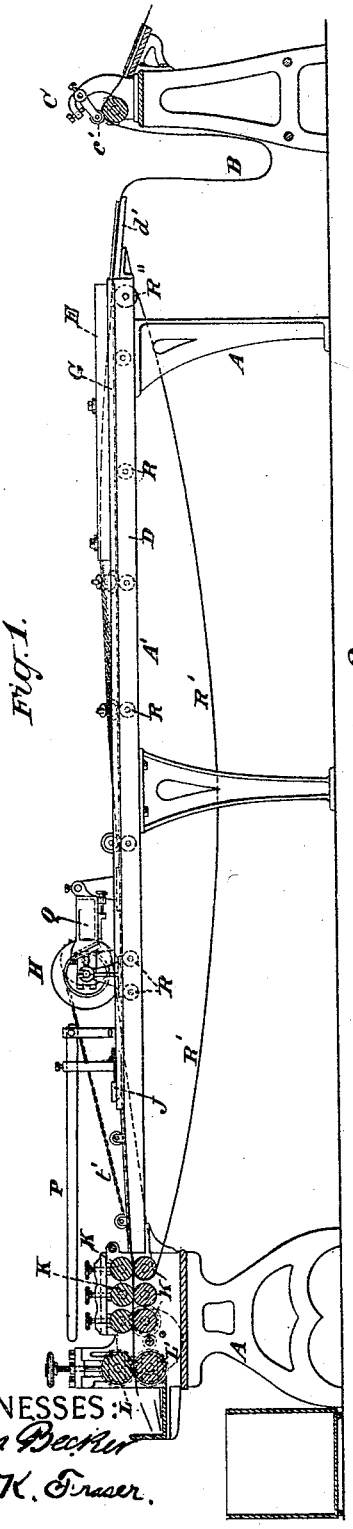

Fig. 1.

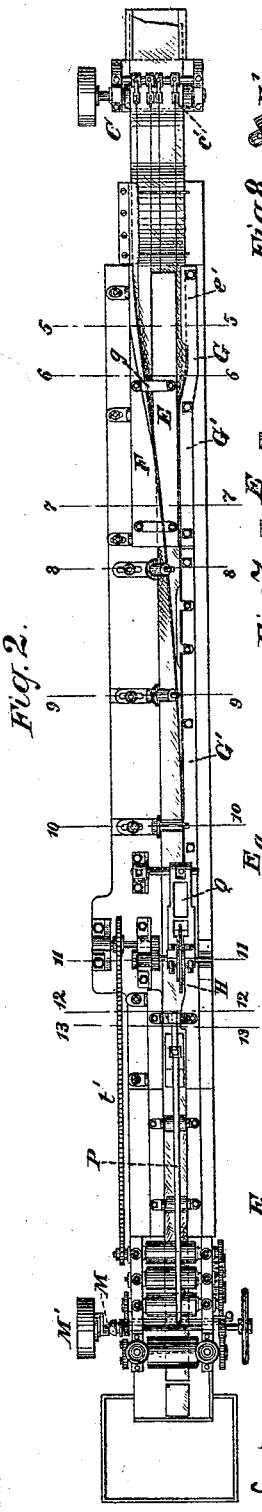

Fig. 2.

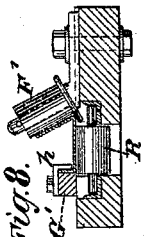

Fig. 8.

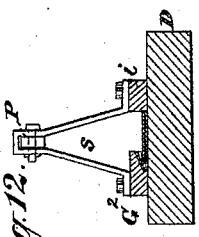

Fig. 12.

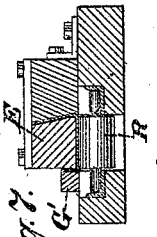

Fig. 7.

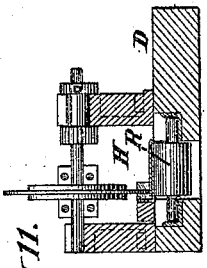

Fig. 11.

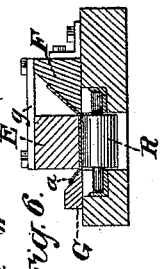

Fig. 6.

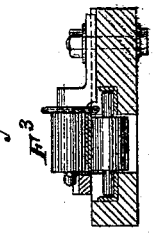

Fig. 10.

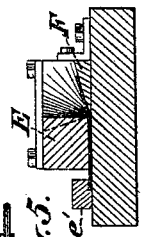

Fig. 5.

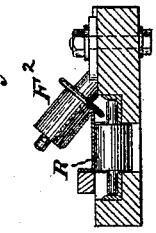

Fig. 9.

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## MACHINE FOR MAKING PAPER BOXES.

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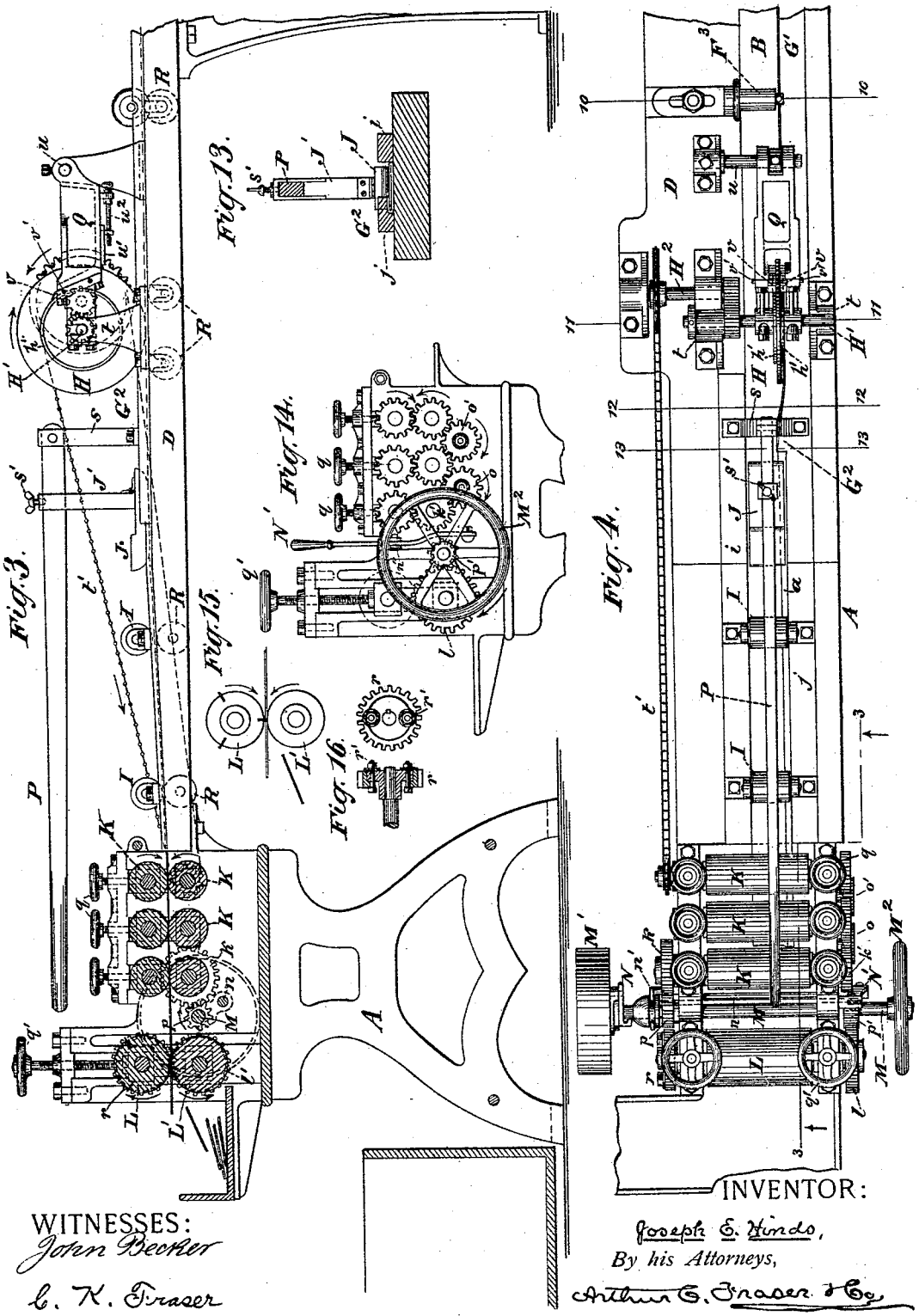


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# J. E. HINDS.

## MACHINE FOR MAKING PAPER BOXES.

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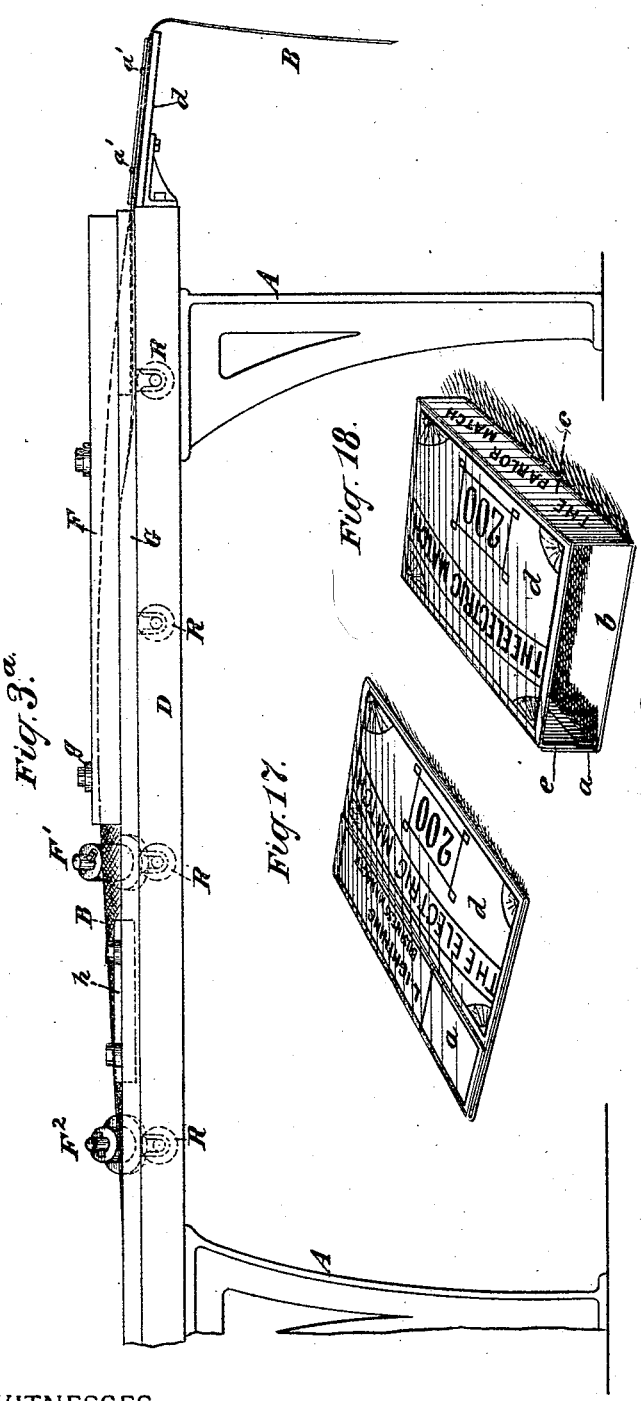

Fig. 3a.



Fig. 18.



Fig. 17.

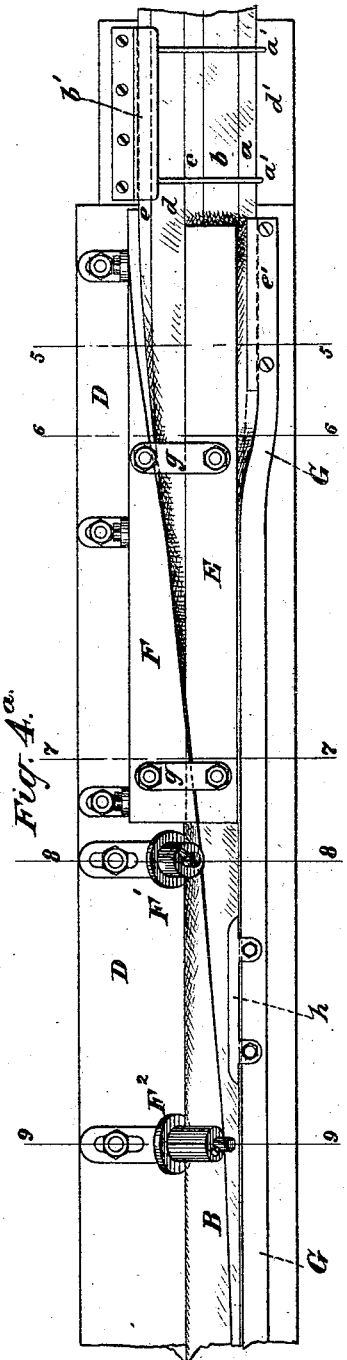

Fig. 4a.

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(No Model.) 4 Sheets—Sheet 4.

# J. E. HINDS.

## MACHINE FOR MAKING PAPER BOXES.

No. 454,908. Patented June 30, 1891.

*Fig. 19*

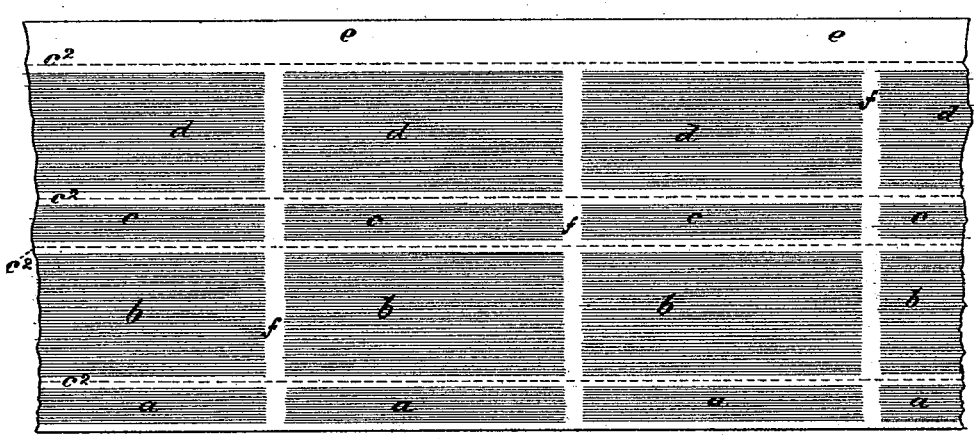



*Fig. 20.*

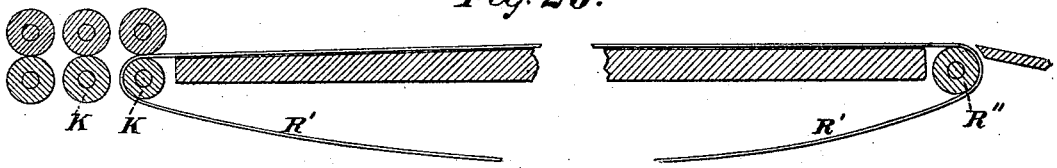



*Fig. 21.*

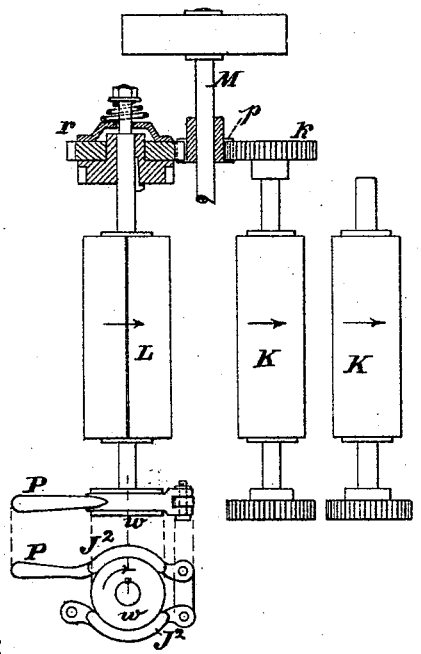
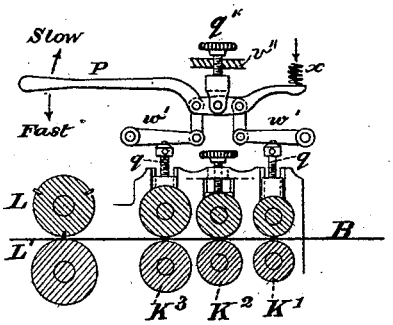



*Fig. 22.*

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INVENTOR:
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# UNITED STATES PATENT OFFICE.

JOSEPH E. HINDS, OF BROOKLYN, NEW YORK.

## MACHINE FOR MAKING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 454,908, dated June 30, 1891.

Application filed November 12, 1888. Serial No. 290,567. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH E. HINDS, of Brooklyn, Kings county, New York, have invented certain new and useful Improvements in Machines for Making Paper Boxes, of which the following is a specification.

My invention provides an improved machine for making the drawer-cases for match-boxes and other boxes from paper or analogous material.

My invention is also applicable to other apparatus wherever a continuous strip of paper or other material previously printed or subdivided in sections of measured length is to be rapidly cut up coincidently with such sections.

In the manufacture of printed paper boxes, labels, &c., I first print a strip of paper or other material with the successive labels or other printed matter in any suitable printing-press and set it aside to dry. When the impression is thoroughly dried, I pass the strip through the machine, which performs the remaining operations—viz., in the case of a box-machine, which folds the strip into a tube and pastes the lap and finally cuts off the sections.

This machine, which is the subject of the present application for patent, comprises a feeding apparatus for propelling the paper, a cutting apparatus for cutting off the sections, and a speed-governor under the control of the operator, by which he is enabled to determine at will and instantly the relative speeds of feed and cutter, so that in case the cut varies from exact coincidence with the printed sections or subdivisions the cutter may be operated more or less rapidly relatively to the speed with which the strip of paper is traveling, in order to vary the point at which the cut is made, and thereby bring the cut into exact coincidence with the printed subdivisions or sections. This feature of my invention is applicable wherever a strip of paper or analogous material is previously printed or otherwise subdivided into measured lengths or sections which have to be subsequently cut apart. It may consequently be used for cutting apart labels of any kind that have been printed in a continuous strip. Instead of actually severing the successive sections they may be partially severed by means of a line of perforations, such, for example, as those employed for preparing sheets of postage-stamps. My invention, however, finds its chief and most advantageous application in the manufacture of paper boxes or drawer-cases. My improved machine for this purpose takes a continuous flat strip of paper or pasteboard previously printed in sections and divided longitudinally and transversely to form the printed labels for the top, bottom, and right and left sides of the box, and it performs upon this strip the following operations, viz: First, it scores the strip with parallel score marks or creases along the lines on which the bends or angles of the box to be made will come; second, it bends or folds this strip over upon itself, leaving the portion which is to form the lap not folded down; third, it applies a coating of glue, paste, or other cementing substance along the line of the lap; fourth, it folds down the lap upon this line of cement; fifth, it presses together the flat tube thus formed and holds the lap down for a sufficient time to allow the glue or cement to set, and, sixth, it cuts off the sections coincidently with the spaces between the printed labels, so that each section thus cut forms a complete box or drawer case printed upon all sides and requiring only to be opened out from its flat condition in order to insert the drawer or box within it.

The features or improvements which are essential to my invention, a general idea of which is given by the foregoing description, will be exactly defined in the claims forming part of this specification.

I will now proceed to describe my improved machine with reference to the accompanying drawings, wherein—

Figure 1 is a side elevation of the machine on a reduced scale, partly in vertical section. Fig. 2 is a plan thereof on the same scale. Figs. 3 and $3^a$ are an enlargement of Fig. 1. Figs. 4 and $4^a$ are a similar enlargement of Fig. 2. Figs. 5 to 13, inclusive, are transverse sections on the same scale as Figs. 3 and 4, and cut, respectively, in the planes denoted by the like-numbered lines 5 5 to 13 13, inclusive, respectively, in Figs. 2, 4, and $4^a$. All these views are looking from right to left or in the direction in which the paper is traveling. Fig. 14 is a fragmentary side elevation of the left-hand end of the ma-

chine on the same scale as Fig. 3. Fig. 15 is a side elevation of the cutting-rollers separated from the remainder of the machine. Fig. 16 is a fragmentary view showing the construction of the slip-gear through which the upper cutting-roller is driven. Fig. 17 is a perspective view of one of the completed cut-off sections as it is delivered from the machine. Fig. 18 is a perspective view of the same when opened out to form the box or drawer case. Fig. 19 is a plan of the printed strip from which the drawer-cases are made. Fig. 20 is a fragmentary vertical longitudinal mid-section, showing the portion of the machine near the two opposite ends in order to illustrate the application of an endless traveling belt. Fig. 21 is a fragmentary plan view, partly in horizontal section, of a modified construction of the feeding, cutting, and governing mechanisms. Fig. 22 is a vertical longitudinal section of another modification.

Referring to the drawings, let A designate in general the fixed frame of the machine upon which the several moving parts are mounted with suitable bearings. The precise construction of the frame-work is immaterial and may be altered or modified according to the judgment of the designer. The strip of paper or pasteboard B is printed in the manner indicated in Fig. 19, with labels or sections *a b c d* corresponding to the four sides, (viz., the left, top, right, and bottom sides,) and along the right-hand side it is left unprinted at *e* to form the lap. The printed sections *a b c d* are separated from those which precede and follow them by a blank space *f*, extending transversely across the strip. This strip, which has previously been printed and dried and which will usually be in the form of a roll, is conducted, as shown in Figs. 1 and 2, in an inverted position to a scorer C, which is provided with four scoring knives or rollers *c' c'*, set at suitable distances apart in order to make score-marks in the spaces between the printed sections *a b c d* and the lap *e*, as shown by the dotted lines $c^2$ in Fig. 19. This scorer, which is or may be of ordinary construction, is driven in any suitable way at the proper speed. The scored strip then passes into the box-making machine. It enters on an inclined plane *d'*, passing beneath guide-rods *a' a'*, which hold it flat, while its right-hand edge passes under an overhanging guide *b'*, which prevents its lateral displacement. From this plane the strip passes onto the table D, forming part of the fixed frame of the machine. On this table the left-hand edge of the sheet passes under a guide *e'*, which holds down the edge and prevents its lateral displacement toward the left. On this table D are the folding and gumming mechanisms, which will now be described.

*Folding.*—The strip is folded around a shoe or former E by means of two folders F and G. The shoe E is of a width equal to the top or bottom and one side of the box and is designed to hold down the portions *b* and *c* thereof while the remaining sections are being folded. The shoe rests on these sections and is held only by connecting pieces or bars *g g* at the top, which resist the tendency of the shoe to move forward with the strip. The folder F is somewhat in the form of a plowshare, being shaped to gradually turn up the sections *d e* of the strip as the latter advances. The folder G has a similar action and serves to turn up the section *a* of the strip to a vertical position and hold it there against the perpendicular side of the shoe E. Fig. 5 is a cross-section showing the commencement of the folding of the strip by the folder F. In Fig. 6 the strip has been further folded by this folder, and the folder G has commenced to turn up the section *a*. In Fig. 7 both sides of the strip have been turned up to the perpendicular and are being held against both sides of the shoe E. The folder F might be continued until its spiral or plowshare like face had folded over the sections *d e* of the strip of paper and brought them down flat upon the sections *b c;* but for the avoidance of friction I prefer to continue the folding operation by means of folding-rollers arranged at intervals. I have shown three such rollers or roller-folders, lettered F', $F^2$, and $F^3$. The roller F' is arranged close beyond the end of the folder F and serves to continue the bending of the strip, as shown in Fig. 8. The roller $F^2$ is arranged farther along and still further bends down the strip, as shown in Fig. 9. The roller $F^3$ is arranged on a horizontal axis and serves to finally flatten down the sections *d e* upon the sections *b c*, as shown in Fig. 10. Meanwhile the section *a* is held turned up vertically, as shown in Figs. 7 to 10, inclusive. To insure the retention of this section in this vertical position, a guide-plate *h* (shown in Figs. $4^a$ and 8) is provided, which overhangs and embraces the upturned section, holding it against the strip G', which is a continuation of the folder G. The portion of the table between G G' on one side and F on the other constitutes a channel through which the strip is drawn.

*Gumming.*—The strip then, while this section or flap *a* remains thus vertical, is passed beneath the gumming roller, disk, or wheel H, as best shown in Fig. 11, which applies a line of glue or other cement to the edge or flap *e* of the folded-down portion of the strip. (The construction and operation of the gumming mechanism will be described hereinafter.) On the movement of the strip past the gummer its flap or section *a* is folded down upon the gummed edge by a folder $G^2$, as shown in Figs. 4 and 12. This edge or flap *a* is then held down in contact with the line or strip of glue while the paper traverses a suitable distance or sufficiently far to cause the glue to set and gum together the flaps *a* and *e*. These two flaps are pressed together at intervals by rollers I I, of which two are shown, but of which any number may be used. A shoe or runner J also bears upon and presses together these flaps, as shown in

Figs. 4 and 13. The folding down of the flap *a* has converted the paper strip into a flat tube, and it remains in this condition during the remainder of its travel, being guided on one side by a strip *i* and on the other by a strip *j*, the latter being a continuation of the folder $G^2$. Thus the channel before referred to is made approximately continuous and extends practically the entire length of the table. The rollers I I press the paper flat against the bottom of the trough thus formed.

*Feeding.*—The paper tube is propelled by feed-rollers K K, of which there may be one or more pairs, and which are driven at suitable speed and pressed tightly together, so as to grip the paper tube between them with the pressure necessary to give them a sufficient tractile hold upon it. I prefer three pairs of feeding-rollers, as shown, all being geared together and driven at a uniform speed. The pressure of these rollers serves to more intimately join the glued lap of the tube in addition to feeding the tube forward.

*Cutting.*—The paper tube, on passing beyond the feeding-rollers, enters between two rollers L and L′, the former of which is armed with radially-projecting knives at intervals, which, as the rollers revolve, come against the periphery of the roller L′ and sever the intervening tube, as shown in Fig. 15, thereby cutting it up into sections of the same length as the printed sections or labels on the strip B. The cutting apparatus is governed in the manner presently to be described, so that the operator can cause the cut to be made in the space *f* between two successive printed sections, so that the severed section will appear as in Fig. 17, with its own proper label or printed matter upon it. In this condition the severed sections are superposed in piles or bundles and packed and shipped to the user, who, in filling the boxes or trays, will open out the section shown in Fig. 17 until it becomes a rectangular tube or drawer case, as shown in Fig. 18, into which the filled box or drawer will be thrust.

*Feeding and cutting mechanism.*—The feeding-rollers and cutting-rollers are both driven from a power-shaft M, which is driven by a pulley M′ through the medium of a clutch N of any ordinary construction, which is applied or released through the medium of a block *n′* on a rod *n*, which is arranged to slide longitudinally, and to which motion is imparted by a hand-lever N′, Fig. 14, fulcrumed at *n″*. The operator standing on the left of the machine may thus instantly stop it by pushing the handle of this lever from him or start it by pulling this handle toward him. The driving-shaft M carries a hand-wheel $M^2$, by which it may be turned by hand when necessary, and two pinions *p* and *p′*. The former communicates motion to the feed-rollers and the latter to the cutters. The pinion *p* meshes with a gear *k* on the shaft of the lower feed-roller of the final pair, as shown in dotted lines in Fig. 3. On the opposite end of the shaft of the same roller is fixed a gear *k′*, Fig. 14, which meshes with a gear on the shaft of the roller K immediately above. The three pairs of feed-rollers are geared together in like manner. The gear *k′* also communicates motion to the lower gear of the next pair through the medium of an idler-gear *o*, and in like manner power is communicated from the lower gear of the second pair to the lower gear of the third pair of feed-rollers through the medium of an idler-gear *o′*, all as shown in Fig. 14. The feed-rollers are pressed together with the desired pressure by means of hand-screws *q q*, which press down the bearing-blocks in which turn the journals of the upper feed-rollers. The pinion *p′* of the driving-shaft M meshes, as shown in Figs. 4 and 14, with a gear *l*, fixed on the end of the shaft of the roller L′. The other end of the shaft of this roller carries a gear *l′*, which meshes with a clutch-gear *r*, connected frictionally in the manner shown in Fig. 16 to the shaft of the upper cutting-roller L. Thus the lower roller L′ is driven positively, and in its turn drives the roller L through the gear *r*. This clutch-gear *r* consists of two parts—an outer ring formed with cog-teeth and an inner hub keyed on the shaft of the roller L. The ring and hub constitute two the parts of a friction-clutch and are connected together by means of screw-bolts *r′*, carried by one of the two parts, and when tightened up bearing frictionally upon the other part. This is in order that by releasing this clutch the roller L may be rotated independently of the feeding-rollers in order to bring its knives into proper coincidence with the intervening spaces *f* on the paper strip in starting the machine. To this end the bolts *r′* are loosened and the roller L held stationary, while the machine is turned slowly until the advancing end of the tubular strip is brought through between the cutting-rollers, whereupon the roller L is turned to bring its knives into the proper position against the strip, and the bolts *r′* are then tightened, so that henceforth the gear *r* turns as one part and the roller L is driven positively. The cutting-rollers are pressed together by means of hand-screws *q′*, which force down the bearing-blocks of the upper roller.

*Speed-governor.*—Although the machine may be started with the cutting-rollers adjusted to cut off the sections exactly in the middle of the intervening spaces *f f* of the prepared paper strip, yet it is found in practice that it is impossible so to adjust the machine that in running the feed of the paper strip and the speed of the cutter shall be and shall remain so accurately graduated that the cut will come always in the right place, it being found in time that the cut will encroach upon either the rear portion of the printed matter of the preceding section or the forward portion of the printed matter of the succeeding section. To overcome this difficulty I provide

means for governing at will the relative speeds of the cutter and feed, so that the operator, who stands watching the sections as they are delivered from the cutter, can by a slight and instantaneous movement alter the position of the cut relatively to the section. The preferred mechanism for this purpose is that shown best in Figs. 3 and 4. The shoe J, already referred to, which rides over the newly-completed flat tube, is a brake-shoe, which can be pressed with more or less force against the paper tube in order to retard more or less its forward travel. The means for pressing this shoe against the paper tube consists, preferably, of a long hand-lever P, the handle end of which projects over the feeding and near to the cutting rollers in position to be operated by a person standing at the delivery end of the machine. The other end of this lever is fulcrumed to a standard *s*, and the pressure of the lever is imparted to the shoe J through the medium of a bar J′, which, with the shoe, may be adjusted longitudinally by means of a set-screw *s′* in order to vary the leverage. The proportions of the gearing driving the cutting and feeding rollers are such that the feeding-rollers tend to drive the strip of paper a little too fast. This tendency the operator corrects by pressing down with more or less pressure upon the lever P. If the operator finds that the sections are being cut too far back in the spaces *f f*, he knows that the paper strip is being fed forward too rapidly proportionally to the speed of the cutter, and he presses down a little harder on the lever P, which causes the brake to engage the paper strip more firmly and retard it. If he finds the cut is being made too far forward, he eases the pressure which his hand is imparting to the lever P, thereby accelerating the motion of the strip.

*Gumming mechanism.*—The gumming wheel or disk H is fixed on a shaft H′, the ends of which rest in forked or open-topped bearings *t t*. The shaft H′ is driven through intermeshing pinions from a counter-shaft $H^2$, mounted permanently in closed bearings, and on which is fixed a sprocket-wheel driven by a chain *t′* from a similar but preferably smaller sprocket-wheel fixed on the shaft of one of the feeding-rolls K or on any other suitable revolving part of the machine. The shaft $H^2$ turns in such direction that the thrust of the pinions tend to press the shaft H′ down into its forked bearings. To this end, and in order that the gumming-wheel H shall revolve in the same direction as the travel of the paper strip, the shaft $H^2$ is arranged back of the shaft H′, as shown in Figs. 3 and 4. The gumming-wheel H turns in a slit formed in the front side of the glue-box Q, which is pivotally mounted on a fixed shaft or stud *u*, so that it may be thrown upward around this center, and it is prolonged forward and formed with bearings engaging the shaft H′, so that when thus thrown upward it carries the shaft H′ and gumming-wheel with it, thereby lifting the gumming-wheel off from the strip of paper. The forked or open bearings *t t* permit of the shaft H′ being thus lifted. The bottom of the glue-box Q is fitted with a slide *u′*, Fig. 3, adjusted longitudinally by a screw $u^2$, and which consequently may be brought closer to or farther from the periphery of the gumming-wheel, whereby the quantity of glue or other cement carried from the glue-box by this wheel and deposited upon the lap of the paper strip may be adjusted to a nicety. The glue-box also has two blades or strickles *v v*, which wipe against the opposite sides of the gumming-wheel H and scrape the glue therefrom continually. The gumming-wheel H is preferably formed with a concentric rib or boss *h′* on each side, and the upper ends of the scrapers *v* are bent forward and press elastically against this boss *h′*. The blades *v v* are provided with screws *v′*, by which they can be adjusted laterally toward each other to press more or less strongly upon the sides of the wheel H.

*Anti-friction devices.*—In order to reduce the friction resulting from the drawing of the long strip of paper or pasteboard through the machine, I have provided means for easing the movement of the paper. The rollers F′ $F^2$ $F^3$, already referred to, form part of these means. In addition I have arranged anti-friction rollers R R at intervals in the table D, as shown in dotted lines in Figs. 1, 3, and $3^a$ and in full lines in Figs. 6 to 11, inclusive. These rollers project very slightly above the top of the table in the guideway or channel in which the paper moves, so that they slightly lift the paper from the channel and reduce its drag thereagainst. I prefer to place these anti-friction rollers under the several rollers F′ $F^2$ $F^3$ and under the pressure-rollers I I, as shown. In addition to these rollers R R, I prefer the use of an endless apron R′. (Shown only in Figs. 1 and 20.) This apron is of the same width as the flat tube and extends from end to end of the table D. It passes around one or more of the lower feed-rolls K and around a roller R″ at the entering end of the machine. This apron being drawn along by the feed-rollers K K serves to carry the paper strip with it, and consequently to reduce the friction. Its principal purpose, however, is to form a traveling bed or bottom in the trough through which the paper strip travels in order to facilitate the insertion of the advancing end of a new strip into the machine at starting. For this purpose the machine is started in order to give motion to the apron R′, and the operator presses the advancing end of the new strip firmly down upon this apron at one or more points, at the same time urging the strip forward with the hand, so that it is drawn along through the gutter by the apron. In thus entering a new strip the gumming mechanism is raised sufficiently to lift the gumming-wheel H, so that it cannot soil the apron. The brake-shoe J is also to be lifted to facili-

tate the entrance of the new strip. The strip is thus urged along by hand until its end comes between the feeding-rolls K K and until the cutting-roller L has been angularly adjusted to bring its knives into correct coincidence with the spaces between the printed sections or labels, as already described, whereupon the machine may be set into rapid and regular operation.

*Modifications.*—My invention may be variously modified without departing from the essentials of the principal feature—viz., the governing of the cutting in order to bring the cut into proper coincidence with the spaces between the printed sections. This may be accomplished in several ways—viz., first, by driving the cutter at a uniform speed and varying the speed of the feed, or, second, by feeding the strip at a uniform speed and varying the speed of the cutter, or, third, by making the speed of both feed and cutter inversely variable at will. In either case the variations in the speed may be effected by any known system of gearing or mechanical movements by which a driven part may be geared more or less up or down at will, or it may be effected by driving normally at a speed somewhat too rapid and by applying a brake to reduce this speed. As illustrations of such modifications I have introduced the constructions shown in Figs. 21 and 22.

In Fig. 21 the driving-shaft M drives through a single pinion $p$ both the feeding and cutting mechanisms, the feed-rollers K K being driven at uniform speed through positive gearing, while the cutting-roller L is driven normally at a uniform but somewhat excessive speed through the medium of a frictional gear $r$, meshing with the pinion $p$. On the shaft of the roller L is a pulley $w$, embraced by brake-shoes $J^2$, which are pressed against the pulley by pressing down on a lever or handle P. On thus applying the brake the resistance of the cutting-roller L is increased and the friction-gear $r$ is caused to slip more or less, thereby enabling the strip of paper to gain upon or overtake the cutter.

Fig. 22 shows another construction, wherein no brake whatever is employed, the cutting and feeding rollers being all driven positively at uniform speed. The three pairs of feeding-rollers, however, are of three different diameters, the rollers K′ being smaller and the rollers $K^3$ larger than the intermediate rollers $K^2$. These intermediate rollers are pressed together in the same manner as in the previous construction. The rollers K′ and $K^3$, however, are pressed together by the pressure of a screw $q''$ turning in the fixed frame (a fragment of which is shown at $v$) and acting upon their bearings through a system of compound levers and adjusting-screws. The adjusting-screw $q$ of each bearing of the outer rollers reacts upwardly against the lever $w'$, and these levers are connected by links with the handle-lever P on opposite sides of its fulcrum, against which fulcrum the tension-screw $q''$ acts. The spring $x$ presses against the lever P in such direction as to tend to transmit the pressure of the screw $q''$ to the feed-rollers K′ and relieve its pressure from the feed-rollers $K^3$. The diameter of the rollers K′ being smaller than that of the other rollers, all of which travel at the same axial velocity, the pressing together of these rollers tends to hold the paper back, making it travel slower than the average of the surface speeds of the three pairs of rollers. The operator by pressing down on the handle end of the lever P can transfer more or less of the pressure from the rollers K′ to the rollers $K^3$, thereby proportionally increasing the speed of the paper by the increased traction of the more rapidly moving surfaces of the rollers $K^3$ upon it. The speed of the paper will vary in proportion to the varying pressures of the respective pairs of rollers multiplied by their surface velocities, the paper slipping more or less relatively to each pair of rollers. Thus the speed of the paper is under ready and instant control of the operator.

It will be understood that the various elements employed in my invention may be substituted by equivalent elements or mechanisms of any known kinds. For example, the cutter, instead of consisting of a knife-armed roller turning against another roller, may consist of any other construction of cutter that is suitable for cutting off lengths from a continuous strip or tube; and the feeding mechanism, instead of consisting of rollers gripping the strip and dragging it along by their tractional adhesion to it, may consist of any other known device or mechanism for imparting a continuous or substantially continuous feed to a strip or tube.

I claim as my invention the following-defined novel features and combinations, substantially as hereinbefore specified, viz:

1. In machinery wherein a strip of paper or other material previously marked or printed in measured lengths or sections is fed along continuously and cut off, the combination, with the cutting mechanism and feeding or propelling mechanism, the latter geared to slightly outrun the former, of a speed-governor under the constant control of the operator for determining at will the relative speeds of the feed and cutter and consisting of a brake applied to retard the feed.

2. In machinery wherein a strip of paper or other material previously marked or printed in measured lengths or sections is fed along continuously and cut off, the combination, with the cutting mechanism and feeding or propelling mechanism, both driven at uniform speeds, of a speed-governor under the constant control of the operator and consisting of a brake applied to the strip of paper, whereby the operator is enabled to retard the feeding of the strip and thereby to effect the cutting off of the sections coincidently with their previous printing.

3. The combination, with feeding and tube-

forming mechanisms for continuously folding and gumming a strip of paper or other material to form a tube, of a cutter for severing the tube into lengths, and a speed-governor under the control of the operator for governing at will the relative speeds of the tube and cutter.

4. The combination, with tube-forming mechanism for folding and gumming a strip of paper or other material to form a tube, of a cutter for severing the tube into lengths, and a speed-governor under the control of the operator for governing at will the speed of the tube relatively to the cutter, consisting of a brake acting upon the tube.

5. The combination, with feeding and tube-forming mechanisms for continuously propelling, folding, and gumming a strip of paper or other material to form a tube, of a cutter for severing the tube into lengths, and a speed-governor consisting of a brake-shoe bearing upon the tube and a lever arranged to be operated by a person standing at the delivery from the cutter and communicating pressure to said brake-shoe.

6. The combination, with feeding mechanism for continuously propelling a strip of paper, a table over which the strip is drawn, formed with a channel to guide the strip in its travel, and tube-forming mechanism for continuously folding and gumming the traveling strip of paper to form a tube, of a cutter for severing the tube into lengths, and a speed-governor for controlling the feed of the tube to the cutter, consisting of a brake-shoe resting upon the strip of paper and a lever under the control of the operator for communicating pressure to said brake-shoe.

7. The combination of feeding mechanism for propelling a strip of paper or other material, a table over which said strip travels, a shoe mounted over said table and beneath which said strip travels, having a width equal to half the width of the strip less the seam and formed with a perpendicular wall on one side, a folder adapted to bend up one edge of the strip against the perpendicular side of said shoe, and another folder on the opposite side of said shoe adapted to bend up the opposite side of said strip against the shoe and to fold it down upon the portion which passes beneath the shoe preparatory to forming it into a flat tube.

8. The combination of feeding mechanism for propelling a strip of paper or other material, a table formed with a channel through which said strip travels, a shoe arranged in said channel and beneath which the strip travels, having a width equal to half the width of the strip less the seam, a folder on one side of the shoe adapted to bend one side or flap of the strip up against the shoe and merging into the wall of the channel, by which said flap is held turned up, and a folder on the opposite side of the shoe adapted to bend the opposite side or flap of the strip up and fold it against the shoe.

9. The combination, with feeding mechanism for continuously propelling a strip of paper or other material, of a table formed with a channel in which said paper travels, one side of said channel formed with a perpendicular wall and provided with two folders, the first adapted to turn up the side or flap of the strip perpendicularly against said wall and the second adapted to fold said flap down upon the strip, a folder arranged to act upon the opposite side of the strip, and a gummer intermediate of said two last-named folders.

10. The combination, with feeding mechanism for continuously propelling a strip of paper or other material, of a table provided with folders, the one adapted to fold down one side or flap of the strip and the other adapted to turn up the opposite flap perpendicularly, and with a perpendicular wall for guiding said turned-up flap, and a guide-plate *h*, adapted to hold said turned-up flap against said wall.

11. In a tube-forming mechanism for acting upon a continuously-moving strip of paper, the combination, with a folder constructed with a spiral working-face adapted to bend up one side or flap of the strip, of two or more inclined folding-rollers placed to act subsequently upon said flap and adapted to fold it down upon the strip.

12. In a tube-forming mechanism, the combination, with a table and shoe between which the strip to be acted upon passes, of a folder having a spiral working-face arranged on one side of said shoe and adapted to fold one side or flap of the strip against the shoe, and folding-rollers placed to act subsequently upon said strip and arranged at angles successively more acute in order to fold the flap down by successive bendings upon the remainder of the strip.

13. The combination, with a feeding mechanism for continuously propelling a strip of paper or other material, of a tube-forming mechanism comprising folders and a table over which the strip travels, rollers I I over said table, arranged to press upon the completed tube, and anti-friction rollers R R, arranged directly beneath said rollers I I and projecting slightly above the surface over which the tube travels.

14. The combination, with feeding mechanism for continuously propelling a strip of paper or other material, of a tube-forming mechanism comprising a table over which the strip travels, folders for bending the strip, and inclined folding-rollers at intervals, with anti-friction rollers R R arranged directly beneath said angular folding-rollers with their peripheries projecting slightly above the surface over which the strip travels, whereby they are adapted to receive the pressure imparted to the strip by said inclined folding-rollers and to decrease the friction of the strip.

15. In a tube-forming mechanism, the combination, with the folders, of a gummer con-

sisting of a glue-box and a rotating disk turning therein and arranged to be lifted to bring its periphery out of contact with the strip of paper to be gummed, and gearing for driving the shaft of said disk, arranged with reference to the direction of its rotation, so that its thrust tends to press down said disk into contact with the strip.

16. In a tube-forming mechanism, the combination, with folders, of a gummer comprising a glue-box and a disk rotating therein fixed on a shaft mounted in open bearings, so that it may be elevated to bring the periphery of the disk out of contact with the strip to be gummed, a pinion on said shaft, a counter-shaft mounted in bearings and having a pinion meshing therewith, and driving mechanism for rotating said counter-shaft in such direction that the thrust of its pinion tends to press the shaft of said disk down into its bearings.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOSEPH E. HINDS.

Witnesses:
JNO. S. BARKER,
WM. A. MORRIS.