No. 865,809. PATENTED SEPT. 10, 1907.

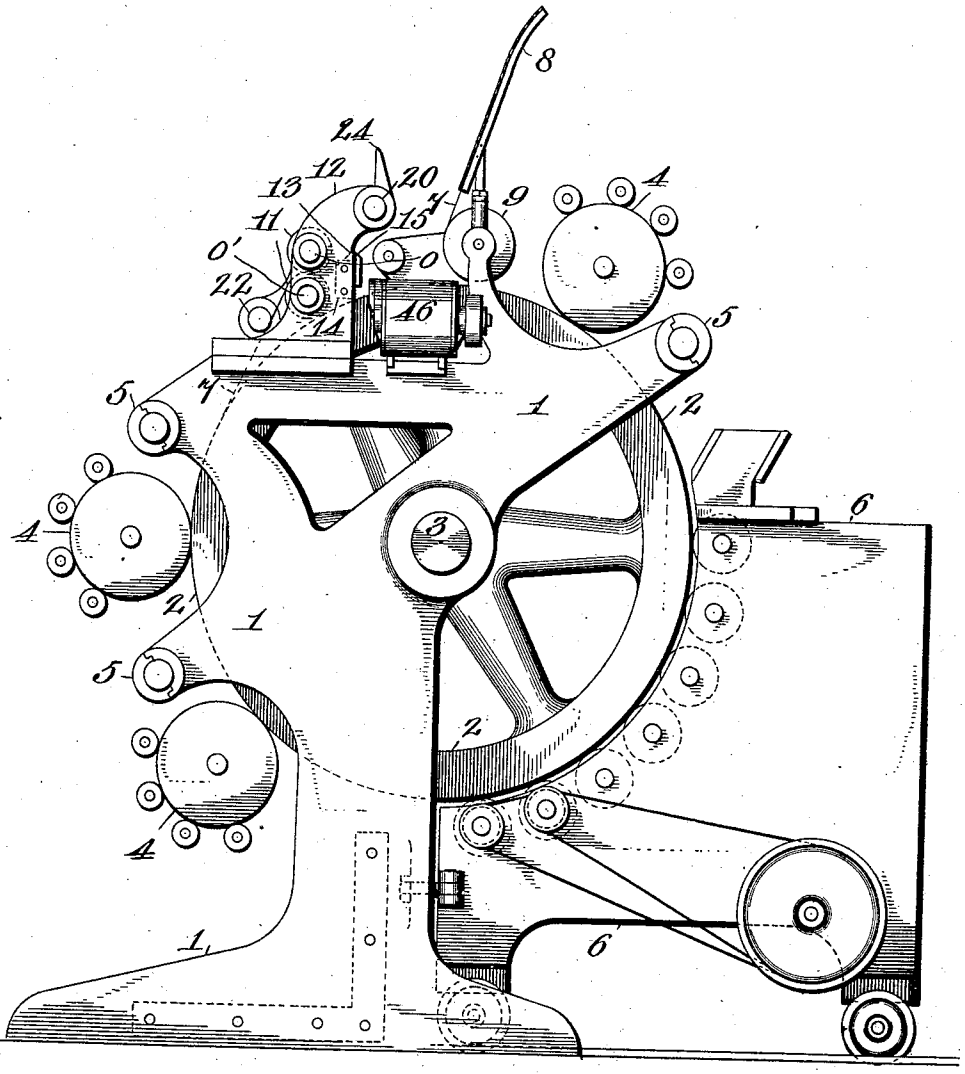
E. Z. TAYLOR.

PAPER CUTTING MACHINE.

APPLICATION FILED JULY 22, 1904.

6 SHEETS—SHEET 1.

Fig. 1.



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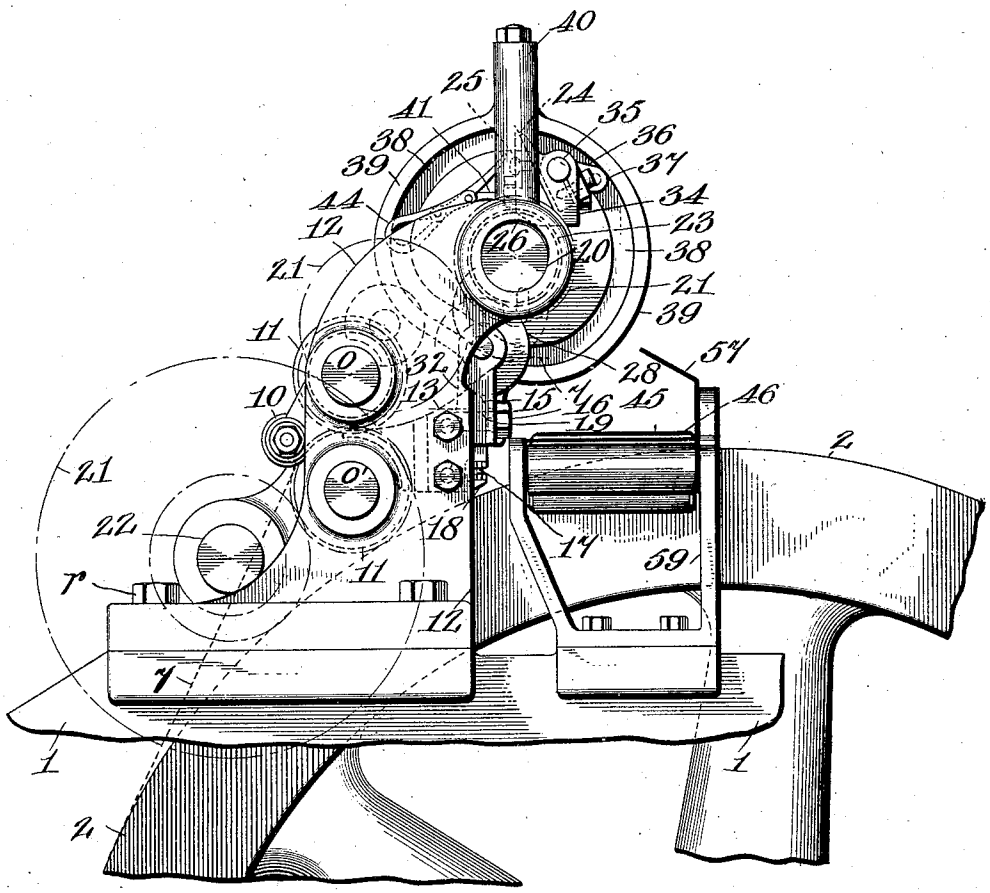
6 SHEETS—SHEET 2.

Fig. 2.



Witnesses

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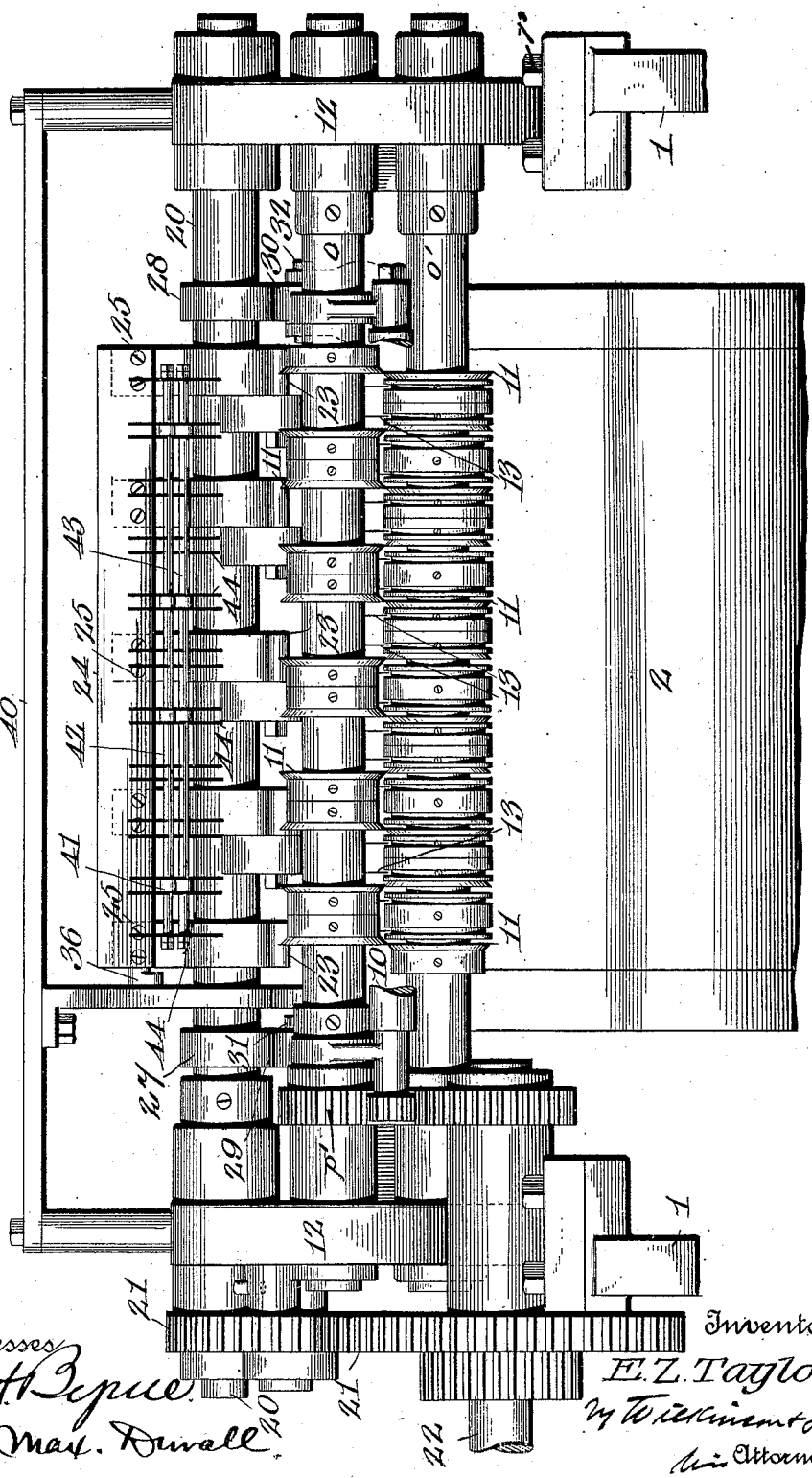
6 SHEETS—SHEET 3.

Fig. 3.



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6 SHEETS—SHEET 4.

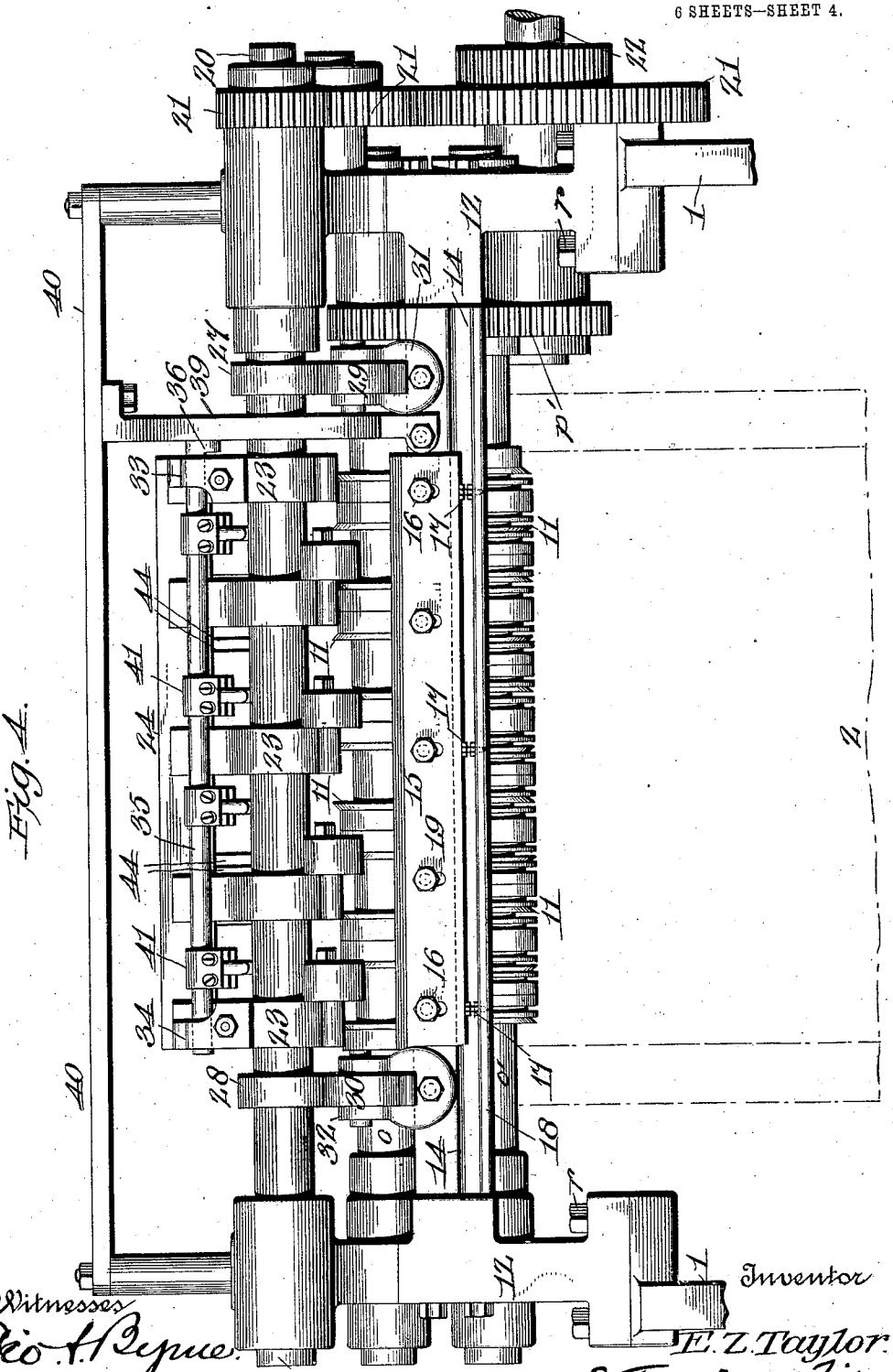

Fig. 4.

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6 SHEETS—SHEET 5.

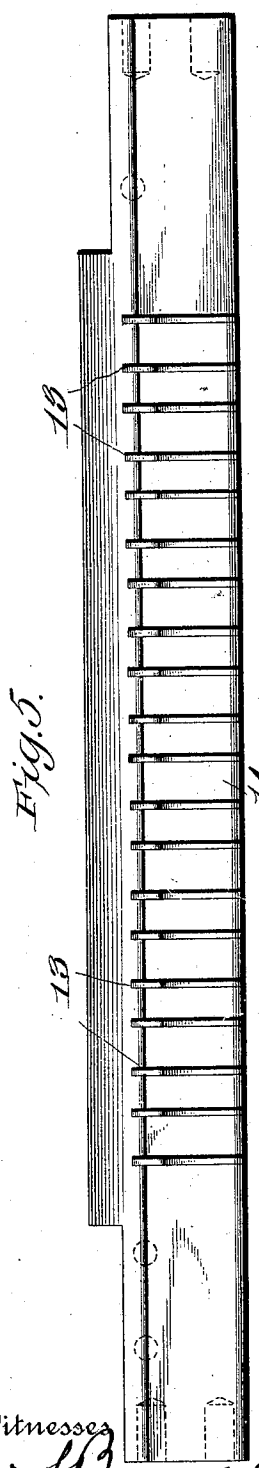

Fig. 5.

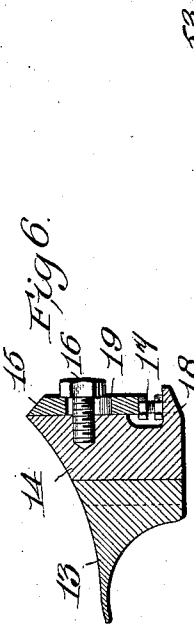

Fig. 6.

Fig. 11.

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E. Z. TAYLOR.

PAPER CUTTING MACHINE.

APPLICATION FILED JULY 22, 1904.

6 SHEETS—SHEET 6.

Fig. 10.

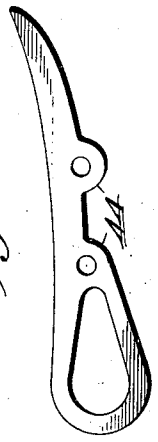


Fig. 9.

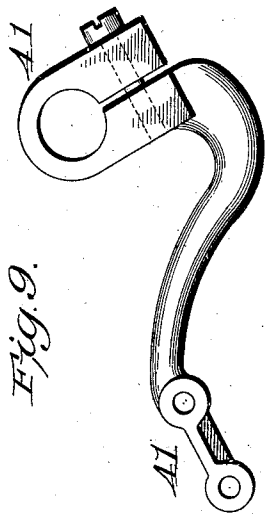


Fig. 8.

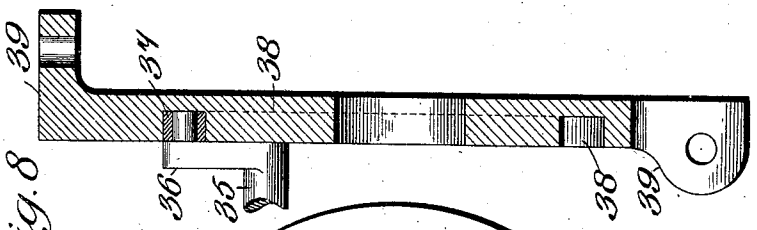
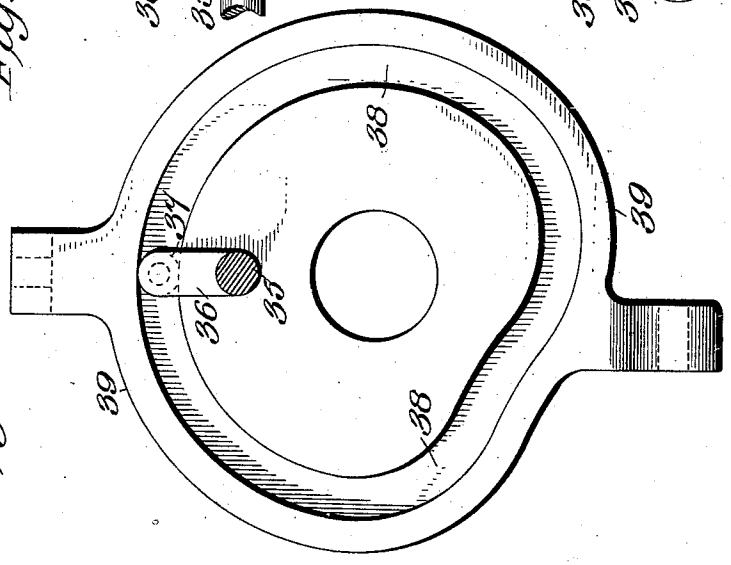


Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

ELMER ZEBLEY TAYLOR, OF LONDON, ENGLAND.

PAPER-CUTTING MACHINE.

No. 865,809. Specification of Letters Patent. Patented Sept. 10, 1907.

Application filed July 22, 1904. Serial No. 217,709.

To all whom it may concern:

Be it known that I, ELMER ZEBLEY TAYLOR, a subject of the King of Great Britain, of 4 Montague street, London, in the county of Middlesex, England, have invented new and useful Improvements in Paper-Cutting Machines, of which the following is a specification.

My invention relates to improvements in machinery for automatically cutting transversely at regular intervals a continuous roll of paper or other material previously cut into longitudinal strips after leaving the impression cylinder of a multi-color or other printing machine, or from other source where colored designs have been printed upon it, so as to form rectangular labels or tablets each having the colored design upon it, and the objects of my invention are, first, to provide mechanism by which the continuous strips into which the roll of paper is divided is automatically cut transversely at regular intervals: second, to provide means for automatically holding down and guiding the rectangular pieces of paper when they are cut off: third, to provide a device by which the rectangular pieces are automatically conveyed away: fourth, to hold the revolving blade of the shears by which the strips are cut transversely, steadily in its exact position at the moment of the cut: fifth, to adjust and hold the fixed blade of the shears exactly in the required position. I attain these objects by the mechanism illustrated in the accompanying drawings, in which

Figure 1 is a side view of a multi-color cylinder printing machine. Fig. 2 is a side view on a larger scale, showing the transverse cutting blades and delivering apparatus, and the method of operating them, and their position relatively to the other parts of the multi-color printing machine and longitudinal cutting apparatus (which form no part of my present invention). Fig. 3 is a front view showing the transverse cutting device: Fig. 4 is a back view showing the transverse cutting device. Fig. 5 is a front view of the transverse bar to which the fixed cutting blade is screwed. Fig. 6 is a transverse section through the transverse bar, the fixed cutting blade and the fingers by which the longitudinal strips of paper are guided over the fixed blade. Fig. 7 is a front view of the cam path by which the position of adjustable guiding fingers on the revolving transverse blade is regulated. Fig. 8 is a transverse section of the same. Fig. 9 is a side view of one of the arms by which the adjustable guiding fingers are carried. Fig. 10 is a side view of one of the adjustable fingers. Fig. 11 is a side view showing the endless traveling belt by which the finished labels are removed, and the means by which the belt is driven.

Similar figures refer to similar parts throughout the several views.

1 is the framing of a cylinder printing machine, and 2 is the impression cylinder carried on the shaft 3 by which it is driven. 4, 4, 4, are the "forms" or cylinders supplied with different colored inks, and carried upon arms (not shown in the drawing) turning upon centers 5. Movable bronzing apparatus is shown at 6, to be used when desired. This printing machine forms no part of my present invention.

7 is the paper coming from a continuous roll along a guide 8, passing under a roller 9, to the impression cylinder 2, and drawn between its surface and that of the printing forms 4. The paper is then drawn under a guide cylinder 10, and from it passes between the cutting disks 11, 11, Figs. 1 and 2, which cut it into longitudinal strips. These knives consist of circular blades which are fixed upon two strong parallel spindles *o*, *o*, which revolve accurately in bearings in separate standards or frames 12, bolted, as at *r* upon the frame 1. The spindles *o*, *o'* are arranged, one directly above the other and are set in revolution at the proper speed, preferably slightly in excess of that of the web of paper by the driving shaft 22 and toothed wheels shown at *p'*, Fig. 4, and in dotted lines, Fig. 2. The edges of the revolving cutting blades are driven at a slightly higher speed than the surface speed of the printing cylinder, and a perfect cut and tension are thus secured. The longitudinal strips into which the paper has been divided are carried forward along curved guides 13 fixed to the strong cross bar 14 which is bolted between two strong standards 12 bolted to or formed upon the side frames 1 of the printing machine, and they then pass over the upper edge of a fixed knife blade 15 firmly screwed to the cross bar 14 by screws 16. The blade 15 can be adjusted accurately by means of screws 17 passing through holes in a projecting rib 18 upon the lower edge of the bar 14, and when adjusted in height the blade 15 is tightened against the cross bar 14 by the screws 16, passing through vertically elongated holes 19 in the cross bar. The curve of the guides 13 is continued to the edge of the blade 15 by the upper edge of the cross bar 14, as clearly shown in Fig. 6.

At a sufficient distance above the fixed blade 15 is arranged a strong and rigid transverse shaft 20 revolving in bearings in the standards 12, and made to revolve at the required speed by toothed wheels indicated by dotted lines 21 actuated by the shaft 22 on the printing machine. The shaft 20 has fixed upon it cylinders or bosses with arms 23 to which the upper blade 24 is firmly screwed by screws 25 and is very accurately adjusted so that as the shaft 20 revolves the edge of the upper blade 24 meets and passes the edge of the lower fixed one 15, so as to sever transversely the set of divided longitudinal strips of paper which are passing over the lower fixed blade 15, the adjustment being made so that the paper is cut into rectangular pieces exactly in the proper position between the transverse sets of printed labels.

In order to further insure the absolute accuracy and steadiness of the upper revolving blade 24 at the mo-

ment of making the transverse cut, against the edge of the lower blade 15, I make the shaft 20 which drives it, fit somewhat freely in its bearings, the upper part of the bearing being made very slightly elliptical or prolonged vertically as shown (magnified) at 26, Fig. 2, so that the shaft 20 ordinarily runs perfectly freely in the lower part of the bearing. Upon the shaft 20, near its ends are fixed two cylindrical collars or disks 27 and 28, which rest normally upon corresponding cylindrical disks 29 and 30 which revolve freely upon pins in adjustable brackets 31, 32, which are very firmly bolted or screwed to the cross-bar or stay 14. The collars 27 and 28 fixed upon the shaft 20, are slightly eccentric, the projecting part being situated in such a position that at the moment when the knife blade 24 is making its instantaneous downward cut, the collars 27 and 28, and with them the shaft 20, and the knife blade 24 upon it, are forced up against the top of the bearings with sufficient pressure to prevent any oscillation or vibration while the cut is being made, but without preventing the continuous revolution of the shaft, and perfect steadiness during the cut is thus obtained. Instead of being eccentric, the collars 27 and 28, may have slightly projecting cams in the required position.

Upon the back of the arms or brackets 23 to which the upper knife blade 24 is fixed, I make bearings 33, 34, in which can turn a light transverse spindle 35, at one end of which is formed or fixed a crank 36 (Figs. 2, 3, 4, 7 and 8) having a pin at its outer end fitted with a bush 37 which fits and moves in a sunk cam path or guide 38, on the inner face of a plate 39, which is strongly fixed at its lower end to the cross stay 14, and at its upper end to a bar 40 extending across the machine above the standards 12. As the shaft 20 revolves, therefore, the spindle 35 will be made to oscillate backward and forward in its bearings the character of the movement being dependent upon the shape of the cam path 38. Upon the spindle 35, so operated, are fixed a sufficient number of adjustable arms 41 through the outer ends of which are passed and fixed, two bolts 42, 43, parallel with the spindle 35, and extending for the full length of the knife blade 24. Upon these bolts 42, 43, are threaded directing fingers or blades 44 (Figs. 3 and 10) which can be adjusted at any desired position apart and retained in such position by pieces of tube of proper length which are fitted upon the bolts 42, 43, between the blades, and before the nuts at the ends of the bolts are tightened up. These fingers or blades 44, when pressed down, as they revolve, prevent the transverse sets of labels (after having been cut off by the blade 24) from being thrown or scattered about, but guide and press them down into a receptacle 45 provided for them (see Figs. 2 and 11) and the bottom of which consists of a traveling belt upon which they fall and are carried away, but at other times allow them to move freely forward into the position to be cut.

The traveling belt and the method of arranging and operating it are shown in Figs. 1, 2 and 11. 46 is a light and flexible endless belt of sufficient width, and of suitable material, passing over rollers 47 and 48, in such manner that its upper surface travels horizontally transversely across the machine in front of the edge of the lower fixed knife blade 15, by which the longitudinal strips of paper are cut transversely as above described, the cut labels falling upon the traveling belt 46 to which they are directed by the fingers or blades 44. The endless belt 46 is carried at one end round a drum 47, the bearings of which are carried by the side frame 1 or other convenient support, and at the other remote end round a similar drum 48, which is shown carried at the outer end of a strong frame 49, the inner end of which is shown bolted to the frame of the machine at 50. The lower, or returning part of the belt is supported upon intermediate pulleys 51, and the two thicknesses of the belt (in front of the knife blade) are shown separated by light partitions of wood or other material 52. The endless belt 46 is made to travel slowly forward by means of a pulley 53 upon the shaft of the drum 48, a belt 54 from which is carried back, and after passing over guide pulleys 55, 56, passes round the driving shaft 3 of the machine or round a pulley upon it.

57 shows a side guard by which the cut labels are prevented from falling off the traveling belt. This guard is fixed to a cross frame 59, (Figs. 2 and 11) and its upper edge is inclined down and formed with recesses 58 which allow the fingers 44 to pass as the shaft 35 revolves. From the outer end of the traveling belt 46 the separate cut labels fall upon a table or receptacle arranged to receive them, or they may fall upon a second traveling belt of the same kind upon which they are transported, either in continuation of the belt 46, or at right angles or in any other direction in relation to it. By using a succession of traveling belts, the labels may be removed to any desired distance.

The devices described for cutting the sheet of paper transversely, may be used for treating an endless roll of paper supplied from any kind of cylinder printing machine instead of for that described and illustrated, or they may be used to cut paper supplied from any source whatever, or for cutting other flexible material as well as paper.

What I claim as my invention and desire to secure by Letters Patent, is:—

1. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife, mounted to meet and pass the edge of said stationary knife, whereby said sheet is cut transversely at regular intervals, and means for tensioning said shaft and knives at the moment the cut is made.

2. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife mounted to meet and pass the edge of said stationary knife, whereby said sheet is cut transversely at regular intervals, and means controlled by said revolving knife for holding down and guiding the severed pieces into a suitable receptacle, substantially as described.

3. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof, a revoluble shaft loosely journaled in said brackets above said knife, a second transverse knife on said shaft mounted to meet and pass the edge of said stationary knife, and means for tensioning said shaft and knives at the moment the cut is made, substantially as described.

4. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof having bearings for a revoluble shaft, a second transverse knife mounted on said shaft to meet and pass the edge of said stationary knife, and a cam on said shaft adapted to tension said shaft and knives at the moment the cut is made.

5. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof provided with elliptical apertures above said knife, a revoluble shaft mounted in said brackets its ends resting in the lower surfaces of said apertures, a second transverse knife on said shaft mounted to meet and pass

the edge of said stationary knife, an anti-friction roller, and a cam adapted to bear on said roller and tension said shaft and knives at the moment the cut is made, substantially as described.

6. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof having bearings for a revoluble shaft, a second transverse knife mounted on said shaft to meet and pass the edge of said stationary knife, an adjustable bearing on the frame-work, an anti-friction roller, and a cam on said shaft adapted to bear on said roller and tension said shaft and knives at the moment the cut is made, substantially as described.

7. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife mounted to meet and pass the edge of said stationary knife, whereby said sheet is cut transversely at regular intervals, means for tensioning the shaft and knives at the moment the cut is made, and a finger carried in advance of said revolving knife for holding down and guiding the severed pieces into a suitable receptacle, substantially as described.

8. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife mounted to meet and pass the edge of said stationary knife whereby said sheet is cut transversely at regular intervals, means for tensioning the shaft and knives at the moment the cut is made, a finger carried in advance of said revolving knife for holding down and guiding the severed pieces into a suitable receptacle, and means for pressing said finger downwardly after engaging the severed pieces, substantially as described.

9. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife mounted to meet and pass the edge of said stationary knife whereby said sheet is cut transversely at regular intervals, a finger for holding down and guiding the severed pieces into a suitable receptacle pivotally mounted to rotate with said revolving knife, and a cam mounted to be engaged by said finger and constructed to impart a downward motion thereto after engaging the severed piece, substantially as described.

10. In a paper cutting machine, means for cutting a sheet of paper into strips, means for cutting said strips transversely at regular intervals comprising a stationary knife over which said strips are fed from said cutting means, and a revolving knife mounted to meet and pass the edge of said stationary knife, carrying fingers in advance thereof for holding down and guiding the severed pieces into a suitable receptacle, substantially as described.

11. In a paper cutting machine, the combination with the means for cutting a sheet into strips, of a tensioned transverse cutter maintaining the tension only at the moment the cut is made.

12. In a paper cutting machine, the combination with the means for cutting a sheet into strips and the stationary transverse cutter, of a tensioned revoluble transverse cutter for automatically cutting said strips transversely and adapted to come into contact under tension at the moment of cutting with the said stationary transverse cutter.

13. In a paper-cutting machine, means for cutting the sheet into strips, means for cutting said strips into rectangular pieces, and means carried by a revoluble transverse cutter for holding down and guiding said pieces into a suitable receptacle when so cut.

14. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a revolving knife mounted to meet and pass the edge of said stationary knife in a tensioned position at the moment the cut is made whereby said sheet is cut transversely after the revolving knife touches the stationary knife, and means controlled by said revolving knife for holding down and guiding the severed pieces into a suitable receptacle.

15. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof having bearings for a revoluble shaft, a second transverse knife mounted on said shaft to meet and pass the edge of said stationary knife, and means for tensioning the knives at the moment the cut is made.

16. In a paper cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof provided with bearings for a revoluble shaft, a second transverse knife on said shaft, an anti-friction roller, a cam on said shaft adapted to bear on said roller and to bring the said knives in tension at the moment the cut is made.

17. In a paper-cutting machine, a transverse stationary knife over which a sheet is fed, a bracket at each end thereof having bearings for a revoluble shaft, a second transverse knife mounted on said shaft to meet and pass the edge of said stationary knife, an anti-friction roller fixed to the stationary knife and a cam on said shaft adapted to bear on said roller and tension said shaft and knives at the moment the cut is made.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ELMER ZEBLEY TAYLOR.

Witnesses:

ALFRED T. BRATTON,

H. D. JAMESON.