No. 654,964. Patented July 31, 1900.

J. T. FERRES.

PAPER CUTTING MACHINE.

(Application filed Mar. 9, 1899.)

(No Model.) 2 Sheets—Sheet 1.

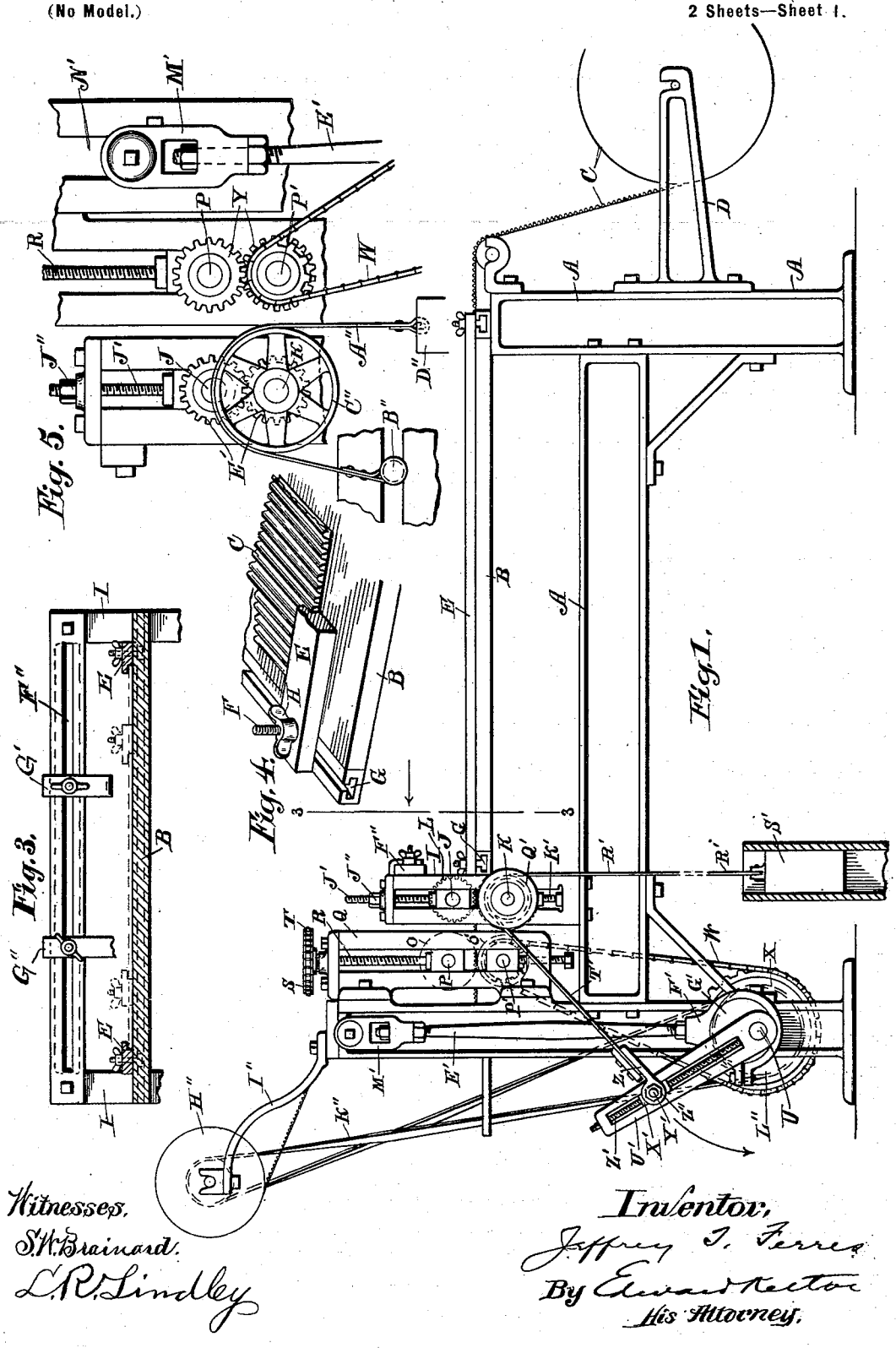


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

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(No Model.) 2 Sheets—Sheet 2.

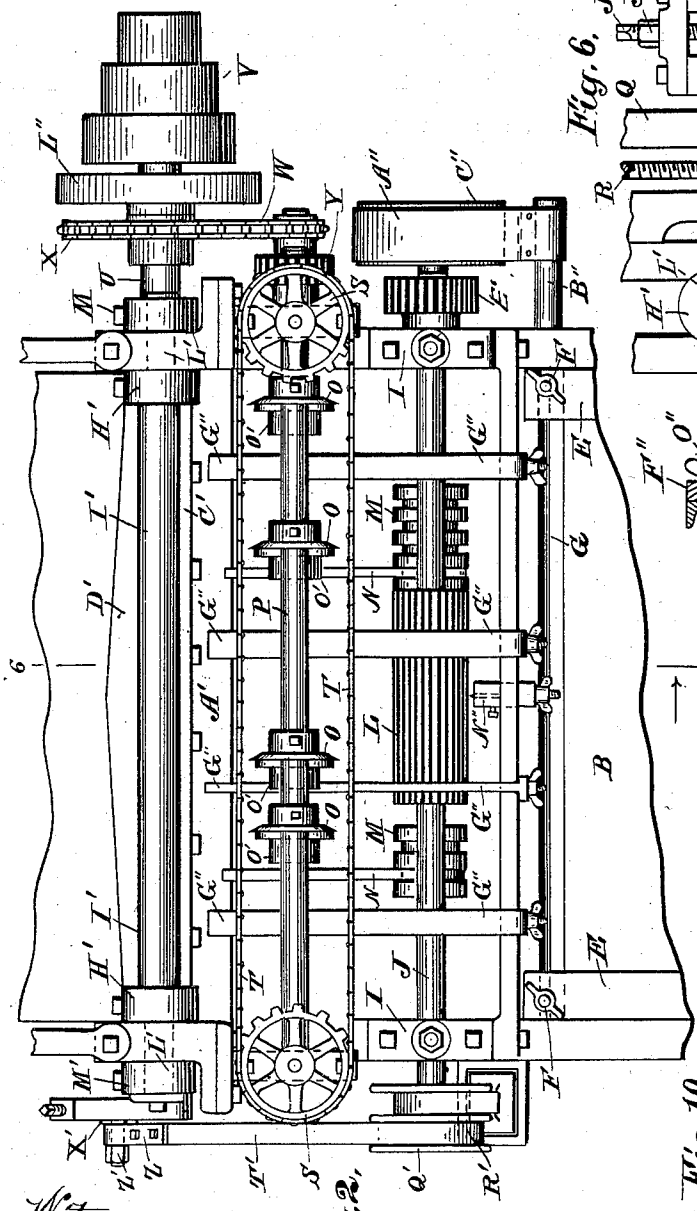


Fig. 2.

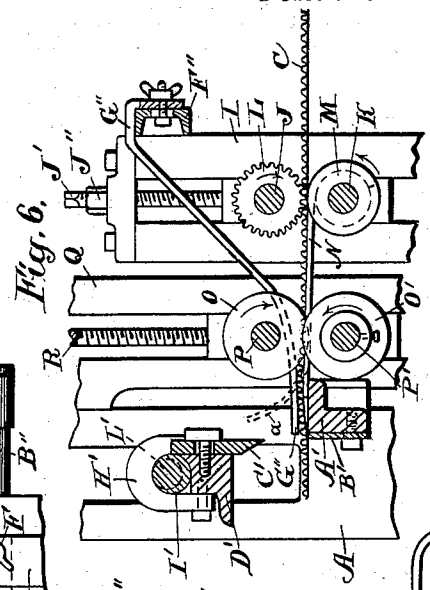


Fig. 6.

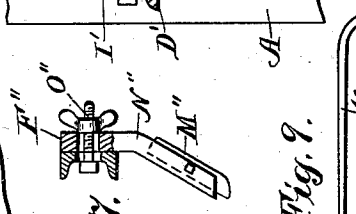


Fig. 7.



Fig. 9.

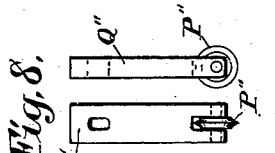


Fig. 8.

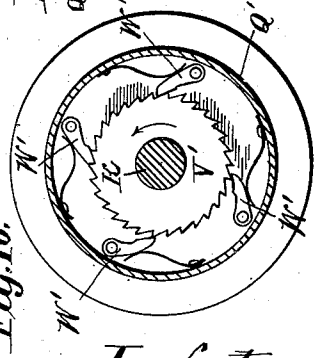


Fig. 10.

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UNITED STATES PATENT OFFICE.

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PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 654,964, dated July 31, 1900.

Application filed March 9, 1899. Serial No. 708,368. (No model.)

To all whom it may concern:

Be it known that I, JEFFREY T. FERRES, a citizen of the United States of America, residing at the city of Anderson, in the county of Madison, in the State of Indiana, have invented a certain new and useful Improvement in Paper-Cutting Machines, of which the following is a description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates more particularly to that class of machines in which a web of paper continuously fed to the machine is cut both longitudinally and transversely into pieces of the desired size; but some of the features of my invention have relation solely to the longitudinal cutting of the paper and others solely to the transverse cutting of it and may be employed in machines capable of cutting the paper one way, but not the other. My machine has also been designed more especially for cutting corrugated paper and been used by me exclusively for that purpose; but several features of my invention are applicable as well to machines for cutting other paper or, indeed, other materials than paper. Its novelty will be hereinafter set forth, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the machine; Fig. 2, a top plan view with the rear half of the feed-table and supporting-frame broken away; Fig. 3, a sectional detail approximately on the line 3 3 of Fig. 1; Fig. 4, a perspective detail of the forward left-hand corner of the feed-table, showing the forward end of one of the laterally-adjustable guides for the paper; Fig. 5, a detail side elevation of the front end of the machine opposite the side shown in Fig. 1; Fig. 6, a detail vertical section on the line 6 6 of Fig. 2; Fig. 7, a detail of one of the detachable cutting-scorers; Fig. 8, details of one of the creasing-scorers; Fig. 9, a side elevation of one of the guides, and Fig. 10 an enlarged sectional detail of the ratchet-drum of the feed-roller.

The same letters of reference are used to indicate corresponding parts in the several views.

A is the framework of the machine, which supports at its forward end the feeding and cutting mechanisms and in rear thereof the horizontal feed-table B, over which the strip of paper to be cut is drawn from a supply-roll C, supported in bracket-arms D upon the rear end of the machine. In its forward movement over the table B the strip of paper C is confined laterally and properly guided by laterally-adjustable longitudinal guide-bars E, Figs. 1, 2, 3, and 4, which carry at their front and rear ends inverted screws F, whose flat heads are confined in transverse T-slots G across the front and rear ends of the feed-table B and whose upper ends have threaded upon them thumb-nuts H, by means of which the guide-bars may be securely clamped in their different adjusted positions, according to the width of paper to be guided by them.

Secured upon the two longitudinal side bars of the frame at the forward end of the feed-table B are two vertical posts or standards I, which are vertically slotted to receive the vertically-adjustable bearings of a pair of feed-roller shafts J K, Fig. 1, the former of which are carried by the lower ends of rods J′, extending through cross-heads on the tops of the posts I and vertically adjustable by means of nuts J″ upon their upper ends, and the latter of which are supported upon adjusting-screws K′ in the bottoms of the vertical slots in the posts I. The shaft J has fast upon it near its middle a corrugated feed-roller L, whose corrugations correspond to and accurately fit the corrugations of the paper C, upon which the machine is designed to operate, the roller L coöperating with the strip of paper as a pinion with a rack to draw the paper forward when the roller is turned. Fast upon but longitudinally adjustable of the lower shaft K are a series of short rollers M, one or more of which (not necessarily adjustable) are located immediately beneath the corrugated roller L and serve to support the corrugated strip of paper in mesh with the roller L as it is drawn forward between the rolls. Part or all of the rollers M are provided with circumferential grooves to receive and support the rear ends of guides N, which are hooked around said rolls in their grooves

and extend forward and rest at their front end upon a cross-bar A′ of the framework, Figs. 2, 6, and 9. These guides N serve to support the paper in its passage from the feed-rollers L M forward to the slitting or cutting disks O O′, which are fastened upon but adjustable longitudinally of two shafts P P′, journaled, like the shafts I and K, in vertically-adjustable bearings mounted in vertical guides in bracket-supports Q upon the framework. The bearings for the upper shaft P are suspended upon the lower ends of screw-rods R, threaded through nuts upon the upper ends of the brackets Q, and having fast upon their upper ends sprocket-wheels S S, Figs. 1 and 2, around which wheels passes an endless sprocket-chain T, by moving which the wheels may be turned simultaneously to uniformly raise or lower the bearings for the opposite ends of the shaft P. By turning the wheels in one direction by means of the chain the shaft P may be raised and its cutting-disks O withdrawn from coöperation with the disks O′ on the shaft P, which will be done when it is desired to cut the strip of paper C only transversely (by means hereinafter described) and not longitudinally.

U is the driving-shaft of the machine and has fast upon its right-hand end, Fig. 2, a cone-pulley V, over which the belt from the counter-shaft is passed and by means of which the machine may be driven at different rates of speed. A sprocket-chain W, passed around a sprocket-wheel X, fast upon the shaft U, and around a smaller sprocket-wheel fast upon the shaft P′, Figs. 1, 2, and 5, serves to drive the shaft P′, and the latter is geared to the shaft P above it by intermeshing gears Y upon the right-hand end of the shaft, Figs. 2 and 5. The two shafts P P′, carrying the cutting-disks O O′, are thus continuously driven from the main driving-shaft in the direction of the arrows in Fig. 6, and the several pairs of cutting-disks will serve to cut the paper strip C into longitudinal strips of different widths, according to the lateral adjustment of the several pairs of disks along their shafts P P′. The feed-rollers L M are intermittently operated to intermittently advance the paper C to the cutting-disks by means hereinafter described. From the cutting-disks the strips of paper pass forward onto the upper surface of the cross-bar A′, Fig. 6. The vertical front face of this cross-bar A′ (or a separate plate B′, secured thereto) coöperates with a vertically-reciprocating knife C′, carried upon the rear side of a transverse cross-head D′, which is supported at its opposite ends upon a pair of vertically-reciprocating connecting-rods E′, whose lower ends carry straps F′, surrounding eccentrics G′, fast upon the driving-shaft U, Fig. 1, by means of which the cross-head D′ and knife C′ are reciprocated vertically at each revolution of the driving-shaft.

The exact connection of the upper ends of the rods E′ with the cross-head D′ in the present instance is as follows: The cross-bar D′ has formed or secured upon its opposite ends yokes H′, Figs. 2 and 6, through which is passed a transverse shaft I′, extending the entire length of the cross-head and projecting beyond its opposite ends, Fig. 2. At its opposite ends this shaft is turned down to form eccentrics L′, as indicated by the dotted lines in Figs. 2 and 6, and these eccentric projections fit in eyes in adjustable heads M′ upon the upper ends of the connecting-rods E′. The opposite ends of the cross-head D′ are guided upon the inner faces of the vertical uprights of the front end of the framework, and the ends of the shaft I′ beyond the ends of the cross-head pass through vertical slots N′ in said uprights, Fig. 5. The purpose of the particular connection of the cross-head with the upper ends of the connecting-rods E′ is this: Whenever it is desired to slit the paper C longitudinally, but not to cut it transversely, the knife C′ may be thrown out of operation by turning the shaft I′ a half-revolution in its bearings in the upper ends of the connecting-rods E′, such turning of the shaft having the effect, as will be apparent from Fig. 6, of lifting the cross-head and knife relatively to the connecting-rods, so that when so adjusted the knife will not descend far enough to sever the paper passed beneath it. The shaft may be turned by any suitable means and be held in its opposite adjusted positions by set-screws or otherwise.

It remains to describe the means by which the feed-rollers L M are given their intermittent movement to intermittently advance the paper to the cutting devices and the means by which the length of paper advanced by these rollers at each intermittent movement of them may be varied and regulated and gaged as desired, this part of the machine constituting in some respects the most broadly novel and important feature of my invention. Loosely mounted upon the left-hand end of the shaft K, Figs. 1, 2, and 10, is a hollow circular casing or drum Q′, provided upon its exterior with three circular flanges forming between them two deep grooves. Secured to the periphery of the drum or casing in the bottom of the inner one of these two grooves is the upper end of a strap R′, which is wound about the drum in the direction shown in Fig. 1 and has attached to its depending lower end a heavy weight S′. Secured to the drum at the bottom of the outer groove and wound in the opposite direction is a second strap T′, extending downwardly and forwardly and connected at its forward end in the manner hereinafter described to a long crank-arm U′, fast upon the driving-shaft U. The weight S′, acting through the strap R′, tends to turn the drum Q′ in one direction, while at each revolution of the driving-shaft U the strap T′ will be drawn forward and turn the drum in the opposite direction, thereby lifting the weight S′ and the weight serving to turn the drum backward again as the revolution of

the shaft U and crank-arm U′ permits. Fast upon the shaft K within the casing Q′ is a ratchet V′, Fig. 10, with which coöperate the four spring-pressed pawls W′, pivoted to the side wall of the casing Q′. It results from this construction and arrangement of the parts that when the casing Q′ is turned forward by the drawing forward of the strap T′ it will turn the shaft K with it, while during its backward movement under the action of the weight S′ it will turn upon and independently of the shaft. The forward movement of the casing produced by its connection with the crank-arm U′ of the driving-shaft will therefore serve to turn the feed-rollers L M and advance the paper to the cutting devices, while during the backward movement of the casing under the action of the weight S′ the shaft and feed-rollers will remain stationary.

In order to prevent lost motion between the casing and shaft at the beginning of the forward movement of the parts and at the same time not be obliged to employ a ratchet V′ having objectionably-small teeth, I employ the four pawls W′, which are set in succession at increased distances from the respective teeth of the ratchet with which they coöperate at the forward movement of the parts. To illustrate, in the particular machine from which the drawings have been made the teeth of the ratchet V′ are a quarter of an inch apart, and in Fig. 10 the uppermost pawl W′ is shown in direct contact with the tooth of the ratchet with which it coöperates at the forward movement of the casing Q′, while the succeeding pawl on the right is withdrawn one-sixteenth of an inch from its tooth, the third pawl two-sixteenths of an inch, and the fourth pawl three-sixteenths of an inch. In this manner and by these means a ratchet having one-quarter-inch teeth may be employed and yet the feed be regulated by sixteenths of an inch, any lost motion between the parts at the beginning of the forward movement being necessarily less than one-sixteenth of an inch.

It will be understood from the foregoing description that at each revolution of the driving-shaft U the feed-rollers L M will be turned forward to advance a given length of the paper to the cutting devices, and it remains now to describe the adjustment by means of which the length of paper so advanced at each revolution of the driving-shaft may be varied as desired. The crank-arm U′ is provided with a longitudinal slot, in which is fitted to slide a nut X′, Figs. 1 and 2, from which projects a stud Y′, fitting an eye in a connecting-piece Z, fastened to the lower forward end of the strap T′, a nut Z″ serving to confine the parts. Extending longitudinally of the arm U′ and through its slot is a screw-rod Z′, which passes through the nut X′ and is free to be turned in its bearings in the crank-arm U′ at its opposite ends, but is held from any longitudinal movement. The outer end of the rod Z′ is squared or otherwise suitably shaped to receive a wrench for turning the rod, and thereby adjusting the nut X′ and connection of the strap T′ longitudinally of the crank-arm U′. As will be readily understood, adjustment toward the shaft U will shorten the movement communicated to the feed-rollers L M at each revolution of said shaft, and adjustment away from the shaft lengthens it. The crank-arm U′ is provided with a scale extending longitudinally of it and indicating inches and fractions of inches, so that by adjusting the connecting-point of the strap T′ longitudinally of the crank-arm U′ the parts may be set to advance any desired given length of the paper strip at each revolution of the driving-shaft U, and as the transverse knife C′ is reciprocated once at each revolution of the driving-shaft this adjustment will therefore determine the exact length of paper which shall be cut off at each operation of the knife. In the particular machine from which the drawings in the present case were made the arrangement is such that the machine may be set to cut the paper into pieces of any length from one-half inch up to twenty inches. The cutting-disks O O′ it will be understood are driven at a uniform speed, but at a sufficiently high rate to take care of the paper advanced to them by the feed-rollers under all the different adjustments of the feed within the range provided. Where the paper is being cut into short lengths, the machine can be run at a higher rate of speed than where long lengths of the paper have to be advanced to the feed-rollers at each revolution of the driving-shaft, and I therefore employ the cone-pulley V′, Fig. 2, as the driving-pulley on the driving-shaft, so that the machine may be driven at different speeds, according to the lengths of paper being cut. Where the machine is set for long lengths of paper, the feed-rollers L M will be given one or more complete revolutions, according to the adjustment, and in order to restrain them from being overthrown by their own momentum at the quick forward movement imparted to them I apply a brake-strap A″ to the shaft K, said strap being fastened at one end to a fixed rod B″, projecting from the framework, Figs. 2 and 5, and passing over a friction-wheel C″, secured upon the end of the shaft K and having hung to its front end a weight D″. The shafts J K are geared together by intermeshing gears E″, Fig. 5.

Secured at its opposite ends to the rear sides of the vertical standards I, Figs. 1, 2, and 3, is a transverse horizontal and longitudinal slotted bar F″, adapted to support and permit lateral adjustment of several attachments to the machine. One set of these attachments consists of presser-arms or guides G″, Figs. 2 and 6, which are detachably secured at their upper rear ends to the bar F″ and extend thence downward and forward and rest at their front ends upon the cross-bar A′ of the framework. The several strips of paper C

pass forward from the cutting-disks O O′ beneath the front ends of these arms G″, and the latter hold them down upon the top of the cross-bar A′ and prevent their front ends being carried upward with the knife C′ as the latter rises. These arms G″ can be attached and detached and adjusted laterally to correspond with the adjustment of the several pairs of cutting-disks O O′ for the cutting of the paper into strips of different widths.

It is sometimes desired to cut the paper into several strips longitudinally, but not to cut all of such longitudinal strips transversely, and to provide for delivering one or more of the longitudinal strips from the machine in continuous form in such instances while passing the remaining strips beneath the knife C′, I provide some of the guide-arms N, heretofore referred to, with upturned forward ends, as indicated by the dotted lines at *a* in Fig. 6. By placing one or more of such guide-arms beneath the strip which is to be delivered from the machine uncut such a strip will be directed upward over the rear side of the knife C′ and cross-head D′ after passing the cutting-disks and may be wound upon a reel H″, Fig. 1, supported in bracket-arms I″, secured to the top of the framework and turned to wind up the strip by a belt K″ passing around a small pulley upon the spindle of the reel and around a pulley L″ upon the driving-shaft U, Figs. 1 and 2. In the case of the strips thus delivered from the machine in continuous form no guide or presser arms G″ will be employed to hold the strips down upon the cross-bar A′ and direct them beneath the knife C′.

The horizontal longitudinally-slotted cross-bar F″ also serves to support the detachable scoring devices, (shown in Figs. 7 and 8,) which are employed when it is desired to score the paper C longitudinally for the purpose of permitting it to be readily bent along the lines of the scores, but without cutting it entirely through, as is done by the cutting-disks O O′. If it be desired to use the machine simply as a scoring-machine, the shaft P, carrying the upper set of cutting-disks O, will be raised by manipulation of the sprocket-chain T, as heretofore described, to withdraw the disks O from coöperation with the disks O′ and permit the paper to pass through the machine uncut longitudinally; but the machine may be employed both as a cutting-machine and a scoring-machine when it is desired to feed a wide strip of paper to the machine and cut it into several narrower strips, and also score each of the narrower strips longitudinally, in which case the pairs of cutting-disks will be properly adjusted laterally of the machine for cutting the paper into strips of the desired width and the scoring devices be adjusted between the lines of cutting-disks to score the several strips. The scoring device shown in Fig. 7 is what is called a "cutting-scorer," since it consists of a knife adapted to cut through the corrugations of the strip of corrugated paper fed to the machine, while not cutting through the flat base or facing of such paper. In Fig. 7 the cutting-knife M″ is detachably secured to a depending arm N″, which is adjustably secured to the supporting-bar F″ by a bolt and thumb-nut O″. The scoring of the corrugated paper by cutting scores such as this permits the paper to be bent into rectangular and other forms, with the corrugated surface outside and the plain surface inside. The scorer shown in Fig. 8 is a "creasing-scorer," consisting of a blunt creasing wheel or roller P″, journaled in the lower end of a depending arm Q″, adapted to be adjustably secured at its upper end to the supporting-bar F″ in the same manner as the arm N″ in Fig. 7. The creasing-roller P″ simply breaks down the corrugations of the paper C in longitudinal lines and permits the paper to be folded into rectangular and other angular forms, with the corrugated surface inside and the plain surface outside. It will be understood that the cutting and creasing scorers may be employed upon the machine at the same time to score one or more of the strips in one way and the remainder in the other way or may be employed at different times, one set being removed when the other is to be attached.

Having thus fully described my invention, I claim—

1. A feed mechanism comprising a feed-roller, a forwardly and backwardly rotatable member connected to said roller to turn the latter with it in one direction but not in the other, a rotary driving-shaft, a crank-arm upon said shaft, a member adjustably connected to said crank-arm and engaging the forwardly and backwardly rotatable member for causing the latter to be turned in one direction at each revolution of the driving-shaft, and means for turning said member in the opposite direction at each revolution of said shaft, for the purpose described.

2. A feed mechanism comprising a feed-roller, a forwardly and backwardly rotatable member connected to said roller to turn the latter with it in one direction but not in the other, a rotary driving-shaft, a crank-arm upon said shaft, a member connected to said crank-arm and adjustable to different points in its length and engaging the forwardly and backwardly rotatable member, to cause the latter to be turned in one direction a greater or less distance at each revolution of the driving-shaft, depending upon the point of connection with the crank-arm, and means for turning said member in the opposite direction at each revolution of said shaft, for the purpose described.

3. A feed mechanism comprising a feed-roller, a forwardly and backwardly rotatable member connected with said feed-roller to turn it with it in one direction but not in the other, a rotary driving-shaft, a crank-arm fast on said shaft, a strap connected at one end to said crank-arm and at its opposite end wound around the forwardly and backwardly rotatable member, whereby the latter

is turned in one direction at each revolution of the driving-shaft, and means for turning said member in the opposite direction at each revolution of said shaft, for the purpose described.

4. A feed mechanism comprising a feed-roller, a forwardly and backwardly rotatable member connected with said feed-roller to turn it with it in one direction but not in the other, a rotary driving-shaft, a crank-arm fast on said shaft, a strap having at one end an adjustable connection with said crank-arm and at its opposite end wound around the forwardly and backwardly rotatable member, whereby the latter is turned in one direction at each revolution of the driving-shaft, and means for turning it in the opposite direction at each revolution of said shaft, for the purpose described.

5. A feed mechanism comprising a feed-roller, a forwardly and backwardly rotatable member connected therewith to turn the feed-roller with it in one direction but not in the other, a rotary driving-shaft, a crank-arm fast upon said shaft, a rotatable screw-rod extending longitudinally of the crank-arm, a nut threaded upon said rod and adjustable longitudinally of the crank-arm by the turning of said rod, a strap connected at one end to said nut and at its other end wound upon the forwardly and backwardly rotatable member, whereby the latter is turned in one direction at each revolution of the driving-shaft, and means for turning said member in the opposite direction at each revolution of said shaft, for the purpose described.

6. A feed mechanism, comprising a feed-roller to be intermittently turned in one direction, a rotatable member adapted to turn the feed-roller in one direction, a rotary driving-shaft, a crank-arm fast upon said shaft, a flexible member connected to said crank-arm and engaging said rotatable member to turn it in one direction, and means acting to turn said rotatable member in the opposite direction, substantially as described.

7. A feed mechanism comprising a feed-roller to be intermittently turned in one direction, a rotatable member adapted when turned in one direction to turn the feed-roller, a rotary driving-shaft, a crank-arm on said shaft, a flexible member connected to said crank-arm and directly engaging said rotatable member for turning the same, and means for adjusting the connection of said member with said crank-arm, substantially as described.

8. A feed mechanism comprising a feed-roller, to be intermittently turned in the same direction, a rotary driving-shaft, a crank-arm fast thereon, a connecting member guided longitudinally upon said crank-arm, a screw-rod extending longitudinally of the crank-arm and coöperating with said member to adjust the latter longitudinally of the arm, and a flexible connection between said member and the feed-roller for turning the latter a greater or less distance, according to the adjustment of the connecting member upon the crank-arm, at each revolution of the latter.

9. The combination of the shaft K, the drum Q′ mounted to turn forwardly and backwardly upon said shaft and having a clutch connection therewith which causes the drum to turn the shaft forward with it but permits the drum to turn backward independently of the shaft, the rotary driving-shaft U, the crank-arm U′ fast thereon, the strap T′ having at its forward end a connection with the crank-arm U′ adjustable longitudinally of said arm and wound at its rear end upon the drum Q′, and the strap R′ wound in the opposite direction upon the drum Q′ and carrying the weight S′, for the purpose described.

10. The combination of the shaft K, the drum Q′ mounted to turn forwardly and backwardly thereon and having a clutch connection therewith causing the drum to turn the shaft with it in one direction but not in the other, the rotary driving-shaft U, the crank-arm U′ fast upon said shaft, the screw-rod Z′ extending longitudinally of said crank-arm, the nut X′ mounted upon said rod and guided longitudinally of the crank-arm, the strap T′ connected at one end to the nut X′ and at its other wound upon the drum Q′, and the strap R′ wound in the opposite direction upon the drum Q′ and carrying the weight S′, for the purpose described.

11. The combination of the shaft K, the drum Q′ mounted to turn forwardly and backwardly thereon and having a clutch connection therewith causing the drum to turn the shaft with it in one direction but not in the other, the driving-shaft U, the crank-arm U′ fast thereon and having the longitudinal slot, the nut X′ fitting in said slot and having the projecting stud Y′, the screw-rod Z′ extending longitudinally of the crank-arm and passing through the nut X′, the connecting-piece Z having the eye fitting the stud Y′, the strap T′ connected at one end to the piece Z and wound at its opposite end upon the drum Q′, and the strap R′ wound in the opposite direction upon the drum Q′ and carrying the weight S′, for the purpose described.

12. The combination of the shaft K having the ratchet V′ fast upon it, the drum Q′ mounted to turn forwardly and backwardly upon said shaft and carrying a plurality of pawls W′ coöperating with the ratchet V′ and set relatively to each other and to the teeth of the ratchet in the manner described, the rotary driving-shaft U, the crank-arm U′ fast thereon, the strap T′ having at one end a connection with the crank-arm adjustable longitudinally thereof and at its other end wound upon the drum Q′, and the strap R′ wound in the opposite direction upon the drum Q′ and carrying the weight S′, for the purpose described.

13. The combination of a feed-roller M having a circumferential groove therein, a guide

N having a hooked or bent end resting in said groove in the feed-roller, whereby the guide is supported, substantially as described.

14. The combination of the feed-rollers L M, the several pairs of cutting-disks O O′, the transverse vertically-reciprocating knife C′, the guides N provided at their rear ends with hooks fitting in circumferential grooves in the rollers M and part of them having upturned forward ends *a*, and the storage-reel H″ for winding up the strip or strips directed upward by the upturned ends *a* of the guides N.

15. The combination of the corrugated feed-roller L meshing with the corrugations of the paper C to advance the latter, the cutting-disks O O′, and the transverse vertically-reciprocating knife C′, substantially as described.

16. The combination of the corrugated feed-roller L meshing with the corrugations of the paper C to advance the same, and the coöperating supporting roller or rollers M upon the opposite side of the paper, substantially as described.

17. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over said table, and the cutting-scorer M″ N″ adjustably secured to the frame in rear of the roller L, substantially as described.

18. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over said table, and the creasing-scorer P″ Q″ adjustably secured to the frame in rear of the roller L, substantially as described.

19. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over the table, the transverse longitudinally-slotted cross-bar F″ secured to the frame above and in rear of the roller L, and the depending scorers attached to said cross-bar by the bolts and thumb-nuts O″ and adjustable longitudinally of said bar, substantially as described.

20. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over said table, the supporting-rollers M beneath the roller L, the pairs of cutting-disks O O′ in front of said rollers, for cutting the paper C longitudinally, and the transverse vertically-reciprocating knife C′ in front of the cutting-disks O O′, for cutting the paper strips transversely, substantially as described.

21. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over said table, the longitudinal guide-bars E at the opposite edges of the paper C and adjustable transversely of the table B, the cutting-disks O O′, and the transverse vertically-reciprocating knife C′, substantially as described.

22. The combination of the feed-table B, the corrugated feed-roller L meshing with the corrugations of the paper C to draw the latter forward over said table, the longitudinal guide-bars E at the opposite edges of said paper, the inverted bolts F passed vertically through the opposite ends of the guide-bars E and having their heads confined in and movable longitudinally of the T-slots G extending transversely of the feed-table B, and the thumb-nuts H threaded upon said bolts and coöperating with the guide-bars E, substantially as described.

23. The combination of the vertically-reciprocating knife-carrying cross-head D′, the shaft I′ extending longitudinally thereof and rotatable therein and provided at its opposite ends with the eccentrics L′, the driving-shaft U, and the connecting-rods E″ provided at their upper ends with the heads M′ having eyes fitting the eccentrics L′, substantially as described.

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Witnesses:
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