C. SEYBOLD.

PAPER CUTTING MACHINE.

APPLICATION FILED MAR. 24, 1913.

1,132,626.

Patented Mar. 23, 1915.

3 SHEETS—SHEET 1.

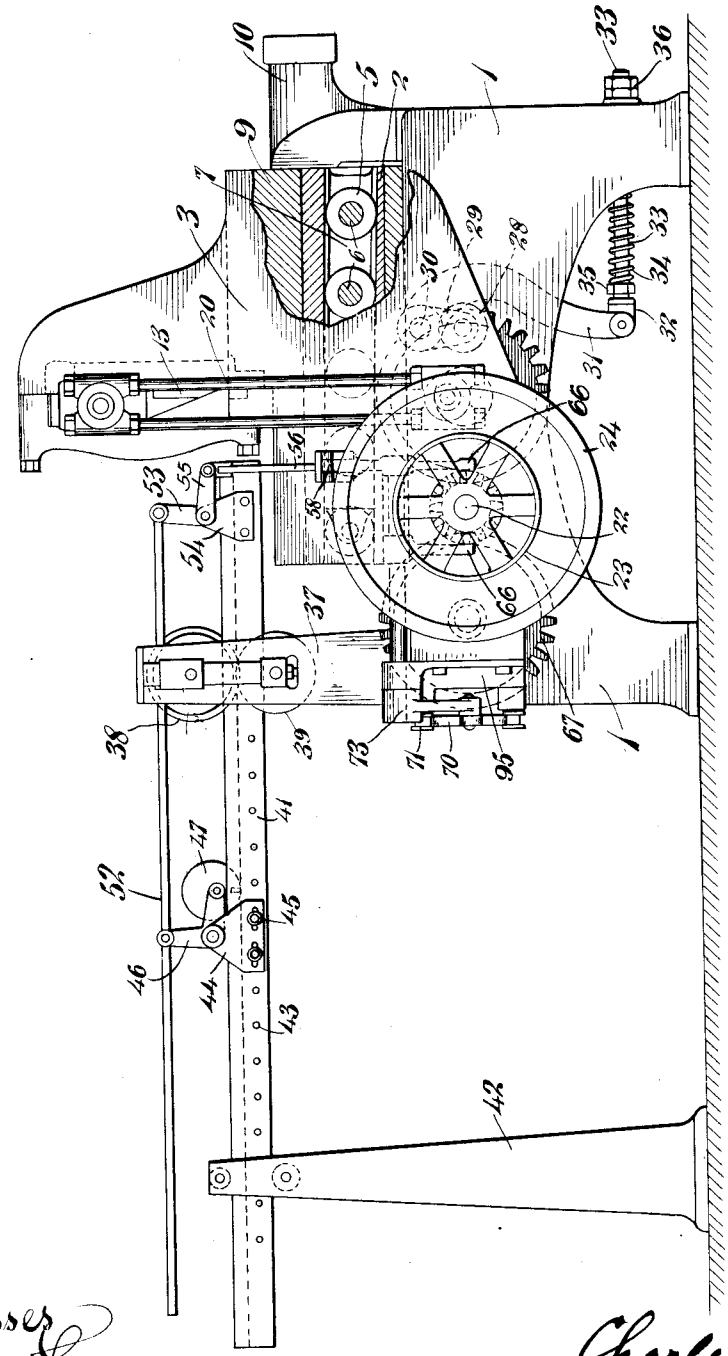


Fig. 1

Witnesses
Oliver E. Harriman
Anna F. Dienst

Inventor
Charles Seybold
by Alfred M. Allen
Attorney

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3 SHEETS—SHEET 2.

Fig. 2.

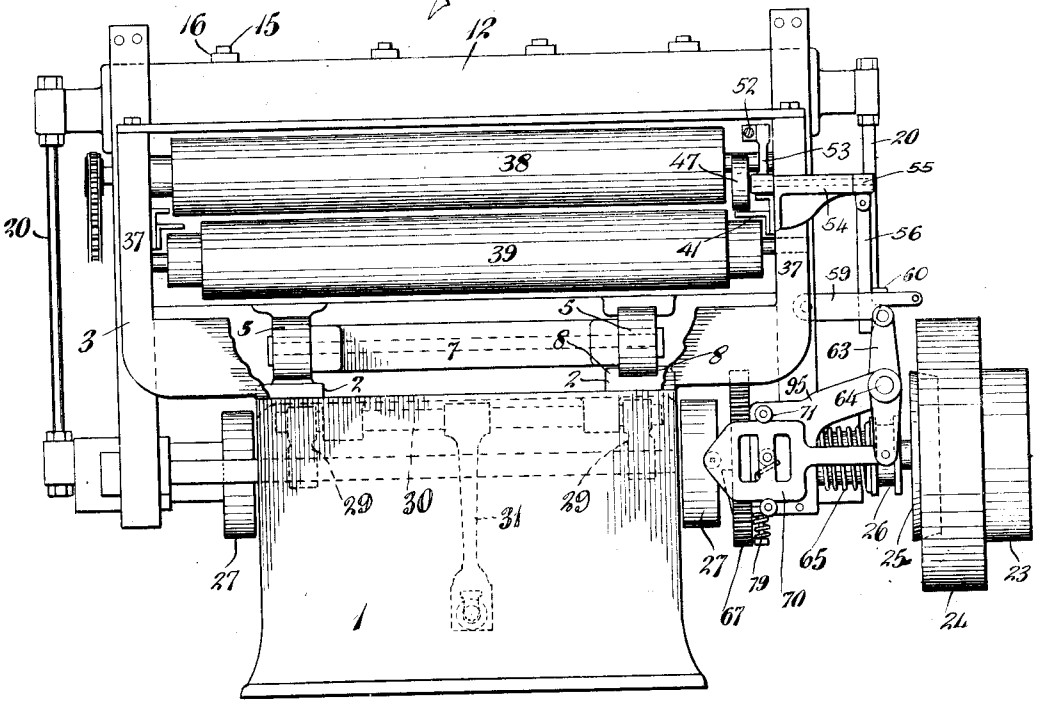
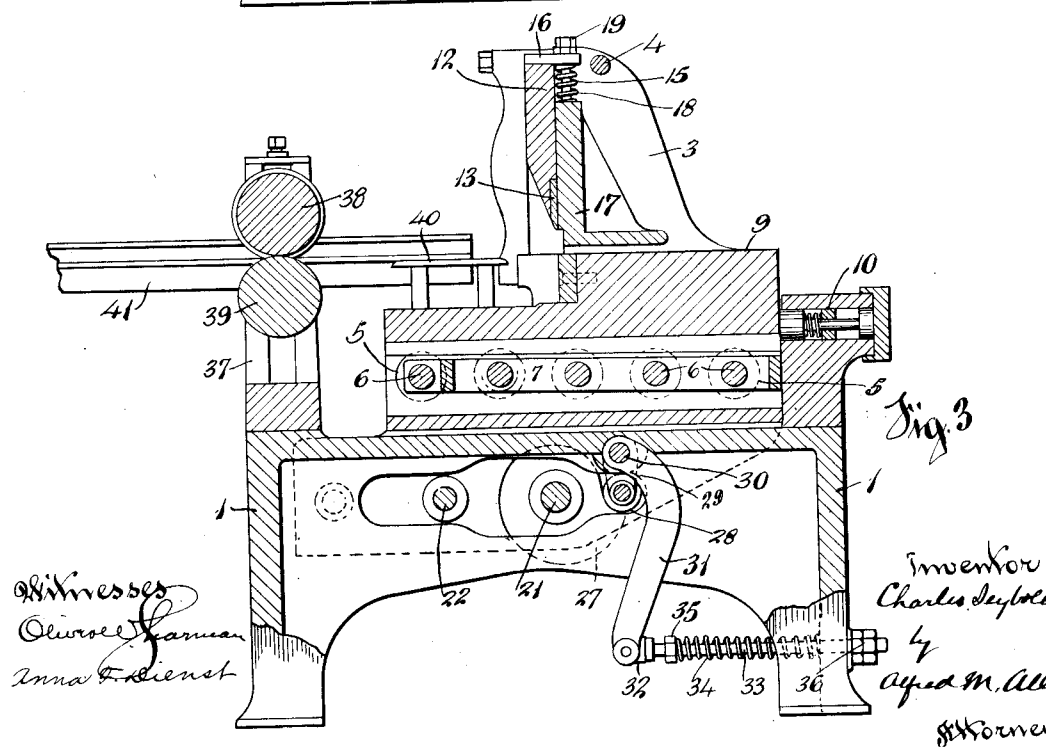


Fig. 3.



Witnesses
Oliver E. Garman
Anna F. Dienst

Inventor
Charles Seybold
by
Alfred M. Allen
Attorney

C. SEYBOLD.

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3 SHEETS—SHEET 3.

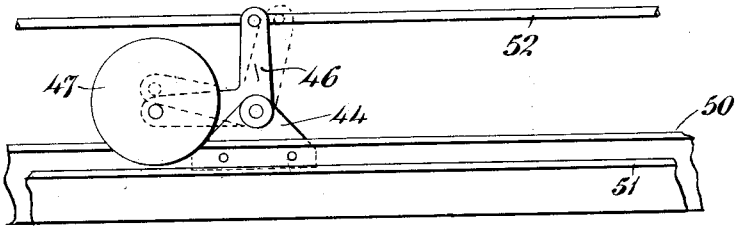


Fig. 4

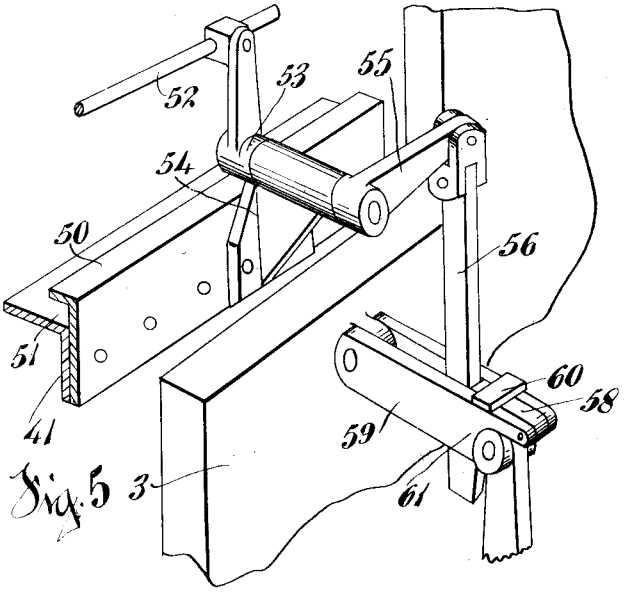


Fig. 5

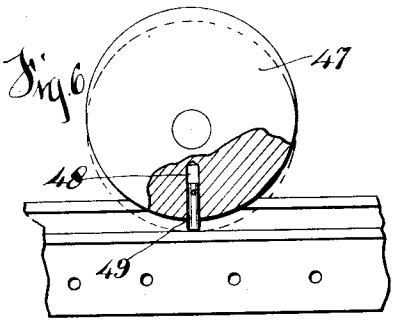


Fig. 6

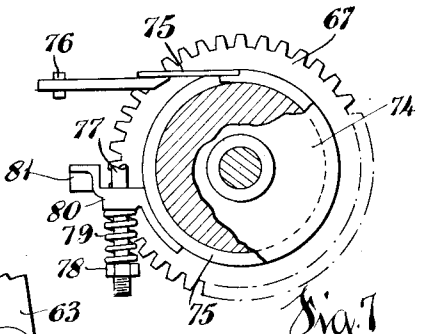


Fig. 7

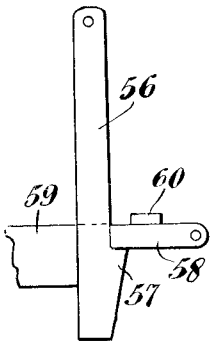


Fig. 9

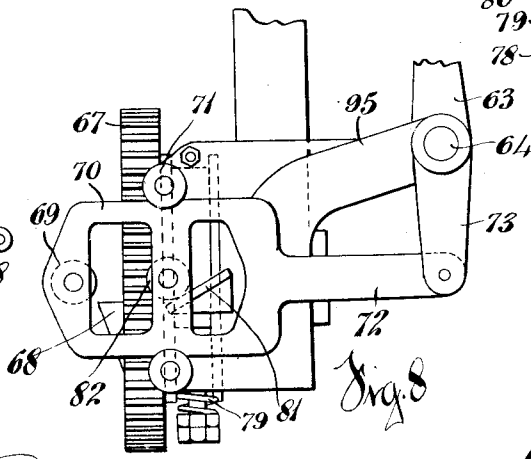


Fig. 8

Witnesses

Oliver L. Harman

Anna E. Dienst

Inventor

Charles Seybold

by Alfred Allen

Attorney

UNITED STATES PATENT OFFICE.

CHARLES SEYBOLD, OF DAYTON, OHIO.

PAPER-CUTTING MACHINE.

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To all whom it may concern:

Be it known that I, CHARLES SEYBOLD, a citizen of the United States, and a resident of the city of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Paper-Cutting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to machines for cutting paper material, particularly paper board which is manufactured by gluing or otherwise securing together several thicknesses of paper board in a suitable gluing machine, from which the paper board is fed in a continuous web.

The object of the invention is to avoid the use of a rotary cutter with which it is difficult to properly sever the continuous web into sheets and to substitute therefor a reciprocating cutter with driving mechanism therefor in which the paper cutting devices may be arranged to automatically follow the travel of the material in the same direction and at the same speed during the cutting operations.

A further object is to regulate and control automatically the operation of the cutting devices so that the web of material may be severed in uniform length of sheets, and the cutting devices actuated in exact conformity to the rate of travel of the material and for proper adjustment of the mechanism to sever any length of sheet desired.

The invention consists of that novel construction and arrangement of parts to be hereinafter particularly pointed out and claimed whereby the above results are accomplished and also more especially the actuation of the cutting devices is controlled by the forward edge of the uncut web of material itself as it is fed through the machine, and in which the edge of the paper board on the uncut web shall trip the mechanism for each operation.

While I have designed my machine for the special purpose of cutting paper board, however, it is of course to be understood that the mechanism can be employed for severing all kinds of material for which the power cutters are adapted, and I do not wish to be limited to a machine for the particular purpose designed, nor to the specific mechanism, as many modifications will readily suggest themselves all of which will come within the spirit of my invention.

In the drawings, Figure 1 is a side elevation of my improved machine. Fig. 2 is a rear elevation of same. Fig. 3 is a vertical longitudinal section. Fig. 4 is a side elevation of the tripping cam. Fig. 5 is a perspective view of the releasing device for the driving clutch. Fig. 6 is a detail view of the tripping cam, partly in section. Fig. 7 is a side elevation partly in section of the band brake. Fig. 8 is a side elevation of the stop mechanism for the cutter. Fig. 9 is a detail side view of a portion of the releasing device.

The machine mechanism is mounted on a solid and substantial base casting 1, upon which is mounted a track 2, 2, designed to carry a complete paper cutting machine, with vertically reciprocating knife and clamp, driving mechanism, friction clutch, starting and stopping devices and all the necessary parts of a power driven paper cutting machine. This entire paper cutting machine is arranged to travel with the paper stock, and at the same rate of speed, as the paper board is fed in a continuous web to the machine, the paper being cut during the forward travel.

The paper cutting machine proper is provided with substantial end standards 3, 3, united together by a substantial cross bar 4 above, and a table 9 over which table the paper is fed, and on which framework the necessary machine parts are mounted. The framework is provided underneath the table with a series of rollers 5, 5, mounted on axles 6, 6, journaled in a suitable frame 7, and these rollers ride on the track 2, 2, and carry the machine proper in its reciprocating movement. One of the tracks 2 is provided with side flanges 8, 8, to serve as a guide for the rollers, and the track 2, 2, is arranged on an upward incline from front to rear, so that the machine itself may return to normal position after its forward travel by gravity. To prevent jarring on the return of the machine, a substantial dashpot 10 is provided on the main casting 1 in front of the table.

Mounted to reciprocate in suitable slots in the side standards 3, 3, is the horizontal knife carrier 12 to which is secured the cutting knife 13 with the cutting edge formed at an angle to the horizontal to give a shearing cut alongside of the table, and sus-

pended by bolts 15 passing up through plates 16 on the top of the knife carrier is the clamp 17. Coiled springs 18 are mounted on the bolts between the plates 16 and the upper edge of the clamp, which give the necessary spring pressure for the clamp upon the paper stock as the knife carrier descends and prior to the action of the knife. Nuts 19 are provided for the ends of the bolts 15 to suspend the clamp and with which the tension of the clamp can be properly adjusted.

The knife carrier is provided at each end with the vertical pulling rods 20, 20, connected at the lower ends to ordinary cranks on the crank shaft 21 journaled in the lower end of the side standards 3, 3, and this shaft is geared to the driving shaft 22 at each end, so that the rotation of the driving shaft will rotate the cranks to draw down the knife carrier knife and clamp for severing the paper material. The driving shaft 22 carries loosely mounted on one end the driving pulley 23 and flywheel 24 bolted together, and 25 is an ordinary friction clutch mounted on the driving shaft and with the shifting of the grooved sliding sleeve 26 adapted to clutch or disconnect the driving pulley from the driving shaft.

While I have illustrated one construction of paper cutting mechanism in the drawings as above described, any other of the ordinary and well known paper cutter constructions can be readily substituted for those shown and described, as there is nothing of novelty in the paper cutting devices *per se*.

In order to shift the paper cutting mechanism so that the machine may travel in the same direction and at the same speed as the paper fed thereto I provide as follows: Mounted on each end of the crank shaft 21 are a pair of cams 27, 27. These cams as the crank shaft is rotated engage with rollers 28, mounted in the lower ends of arms 29, 29, secured to a rock shaft 30, journaled at its ends in the fixed base casting 1. The rock shaft 30 at its middle carries a depending arm 31 secured thereto, which on its lower end is bifurcated and provided with a block 32, pivoted in the fork. This block has screwthreaded engagement with a rod 33 which projects outwardly through an opening in the base casting. A powerful coiled spring 34 is mounted on this rod bearing between the base standard and the nut 35 on the inner end of the rod. On the outer end, the rod carries the adjusting and lock nuts 36 by means of which the tension of the spring 34 may be regulated.

It will be evident from the foregoing description that as the cams 27 are rotated, the arm 31 will push against the spring 34 and that as the driving shaft 22 and cams 27 are mounted in the paper cutter frame carried by the rollers, the cutting machine proper will be driven forward against the tension of the spring 34.

If the cams 27 engaged a fixed portion of the frame and spring tension were not interposed, whenever the clutch 25 was actuated to couple the driving pulley to the driving shaft, the paper cutter frame would be moved forward, the clamp would clamp the paper and the knife would sever the sheet, but the moment the clamp took hold of the paper material fed to it in a continuous web, if the paper was fed more rapidly than the carriage advanced, the paper material would tend to buckle; or if the paper was fed to it at a slower rate than the carriage was advanced, the paper would be torn. For this reason, the cam 27 is arranged to bear not against a fixed portion of the frame, but against spring tension. Then if the paper and cutter are not adjusted for exact timed movement, the parts can give with reference to each other. The aim should be to adjust the rate of feed of the paper cutter to correspond to the rate of delivery from the gluing machine.

If there is any tendency to buckle, the driving pulley must be speeded up by suitable cone pulleys on the power shafting overhead, or in any ordinary way, so that the paper cutter carriage will travel forward as fast as the paper is fed. If the speed of the forward movement of the carriage is too great, however, the coiled spring 34 will give before the paper is ruptured. By observing the action of the rod 31, 33, therefore, the operator can determine the proper speed for the driving pulley, and the speed should be adjusted so that with each operation the nuts 36 on the outer end of the rod 33 just move or shake. This shows that the speed of the paper cutter is just sufficient to keep proper tension on the paper to avoid buckling.

As the operation of the cutting mechanism depends on the actuation of the friction clutch 25, I provide, follows, that the edge of the uncut web of the paper board shall itself trip the devices to throw in the clutch. Mounted in suitable side stands 37, 37, on the base 1 are a pair of feed rollers 38, 39, for feeding forward the paper. One of these feed rollers is preferably driven by belt and pulley, or in any other suitable way from the power shafting, so as to feed the paper before it is cut at the speed it is received from the board machine, and also to feed forward the severed sheet, and for supporting the paper to the feed rollers I provide a platform 40, mounted on the base 1 at a level with the feed table of the paper cutter.

Extending back to the rear of the machine, is an angle bar 41, secured to the table 9 of the paper cutter frame and supported by the movable post 42 (Fig. 1), on a level

with the feed table and carried by rollers on the post, with the movement of the cutter carriage. The angle bar is provided with a series of holes 43 in which a movable bracket 44 is secured, preferably by bolts 45 passed through two of the holes and through slots in the bracket. Pivoted on the upper portion of the bracket is a bell-crank lever 46, in the horizontal arm of which is mounted eccentrically the rotatable eccentric disk 47, and in a socket 48 (Fig. 6). In a periphery of this disk a sliding pin 49 is secured, so that when the disk brings the pin to the lower portion of the disk, the pin will drop down and extend beyond the periphery of the eccentric disk and will rest upon the angle bar or the paper material. The paper board is guided on the angle bar 41 and between the top surface and the overhanging edge of another angle bar 50, so that a guiding groove 51 (Fig. 5) is provided between the two angle plates.

The vertical arm of the bell-crank lever 46 is pivoted to a rod 52 which runs the length of the angle bar and is connected at its inner end to the vertical arm of a bell-crank lever 53, pivoted on a bracket 54. The horizontal arm 55 of this bell-crank lever is connected at its outer end to the lifting bar 56 having at its lower end the beveled lifting lug 57. This lug 57 normally engages under a pawl 58 pivoted in the outer end of an arm 59 pivotally secured to the side of the paper cutter standard. The pawl 58 can drop down but is held from upward movement by the cross piece 60. The arm 59 is cut away on its under side to leave a shoulder 61 against which bears the roller 62 on the upper end of the vertical arm 63, secured to the rock shaft 64 journaled horizontally in suitable brackets 95 on the side standard 3. Two depending arms 66 secured on this rock shaft 64, are provided with pins to engage the groove in the friction clutch sleeve 26, and mounted on the driving shaft 22 is a coiled spring 65 which normally tends to throw the friction clutch 25 into operation, but which is held out of operation by the lock formed between the clutch sleeve and the arm 59 through the rock shaft arms 66 and 63. The raising of the arm 59 by the lifting bar 56 allows the roller 62 to pass the shoulder 61, and the spring 65 throws the clutch 25 to connect the driving pulley with the driving shaft 22 and the clamp and cutting knife are actuated at the same time that the entire cutting machine is caused to travel with the paper board.

To stop the paper cutting mechanism with each operation, the driving shaft is geared to the gear wheel 67 mounted in the side standard 3, and this gear driven at the same speed as the knife operating eccentrics carries on its face a beveled lug 68 which at each rotation of the gear bears against a roller 69 carried on the face of a sliding frame 70 which is guided horizontally in between the guide rollers 71, 71. The outer side of this frame is connected by an arm 72 with an arm 73 secured to and depending from the rock shaft 64, so that the movement of the frame 70 rocks the shaft 64 to shift the clutch sleeve 26 and disconnect the driving pulley, when the arm 63 is at once caught by the arm 59 and the clutch held disconnected until again released by the lifting of the bar 56.

In order to stop the driving mechanism from overrunning, a band brake is provided comprising the disk 74 engaged by the strap 75. The upper end of this strap is held by a nut 76 on the framework and the lower end is provided with a casting 80 through which loosely passes a rod 77, carrying an adjusting nut 78 on its lower end with a coiled spring 79 on the rod bearing between the nut and casting so as to exert spring tension on the band. The outer end of the casting 80 is supported with a beveled lip 81 which is engaged by a roller 82 on the sliding frame 70. It will be evident from the construction that when the sliding frame is shifted upon the throwing in of the driving clutch that the roller 82 will depress the casting 80 to release the band 75 and that with the disconnecting of the clutch the full tension of the band 75 will be exerted on the disk 74 to brake the mechanism.

To return now to the method of throwing in the friction clutch to couple up the driving mechanism. As already indicated, this is done by the action of the eccentric disk 47 and the bell-crank lever 46. The eccentric disk with the pin 49 normally rests in the position shown in Fig. 6, with the pin projecting from the periphery of the disk to the bottom of the guideway for the paper. As the edge of the board reaches the pin, the movement of the paper board causes the eccentric wheel to rotate, and this rotation brings the wheel in contact with the paper, and a continued rotation by the movement of the paper causes the arm of the bell-crank lever in which the eccentric is mounted to rise, rocking the bell-crank and shifting forward the rod 52, which in turn rocks the bell-crank 53 to raise the lifting bar 56 and release the friction clutch to the action of the coiled spring 65 to connect up the driving pulley. The entire paper cutting machine is pushed forward at the speed of the paper travel, and the sheet severed at an exact distance from the releasing eccentric wheel 47.

The moment the severed sheet passes the feed rollers, it is removed by hand, or preferably by delivery rollers which are constantly running at the desired speed. The moment the severed sheet is removed from underneath the eccentric wheel, the pin

drops down on the angle bar ready to receive the edge of the paper board which is being supplied in a continuous web from the gluing or other machine, and as soon as this edge strikes the pin the eccentric wheel is again rotated to raise the bell-crank lever and release the friction clutch to again throw the paper cutting devices into operation. If for any reason, the severed sheet should not be removed, or the feed rollers or eccentric wheel fail to operate properly, then the friction clutch for the driving mechanism will not be released and there will be no operation of the machine and no damage done.

When the machine is operated properly and the severed sheet removed, then the paper cutting devices will be positively and automatically thrown into operation by the advancing edge of the web of paper board itself, and each cut will be of the exact width desired. As it is the paper material itself which throws the machine into operation, the machine can only operate when the paper is properly coming to the machine from the gluing or other independent machine.

By providing a scale along the angle bar, the machine can be readily and easily adjusted for cutting any width of paper stock desired, and as the machine is thrown into operation by the edge of the paper, each sheet will be exactly the same width.

After the cams on the driving shaft have pushed forward the paper cutting machine and the clamp and knife have descended, clamped and cut the paper and returned to their uppermost position, the machine will stop and the paper cutter will roll back on the carriage to its normal position.

I have illustrated a band brake construction for stopping any overthrow of the paper cutting devices, but, if desired, in addition to the band brake, a recessed cam can be provided for the crank shaft 21, with a spring roller to engage this cam and seat itself in the recess in the cam at the end of each rotation of the crank shaft, so as to stop the same at exactly the same position for each rotation. I have not thought it necessary, however, to illustrate any further stopping device than the band brake construction.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a machine of the character specified, a reciprocating cutting knife, with driving mechanism therefor, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a clutch for bringing into operation the driving mechanism, and mechanism for advancing the carriage with the paper material with the operation of the driving mechanism.

2. In a machine of the character specified, a reciprocating cutting knife, with driving mechanism therefor, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a clutch for bringing into operation the driving mechanism, a tripping device in the pathway of the paper and actuated thereby to operate the clutch, and means for advancing the carriage with the paper material during the cutting operation.

3. In a machine of the character specified, a reciprocating cutting knife, with driving mechanism therefor, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a clutch for bringing into operation the driving mechanism, means for actuating the clutch, devices to hold said clutch out of operation, and a tripping device in the pathway of the paper and actuated thereby to release the clutch, to bring into operation the driving mechanism, and means for advancing the carriage with the paper material during the cutting operation.

4. In a machine of the character specified, a reciprocating cutting knife, with driving mechanism therefor, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a clutch for bringing into operation the driving mechanism, a spring for actuating the clutch, devices to hold said clutch out of operation, and a tripping device in the pathway of the paper and actuated thereby to release the clutch, to bring into operation the driving mechanism, and means for advancing the carriage with the paper material during the cutting operation.

5. In a machine of the character specified, a reciprocating cutting knife, a driving shaft and connecting mechanism for actuating said knife, a driving pulley for the driving shaft, with clutch for coupling the shaft and pulley, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a cam on the driving shaft and a fixed abutment against which said cam operates with the rotation of the driving shaft to advance the carriage with the paper material during the cutting operation.

6. In a machine of the character specified, a reciprocating cutting knife and a reciprocating clamp for holding the paper, a driving shaft and connecting mechanism for actuating said knife and clamp, a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material

in a continuous web to the cutting knife and clamp, a cam on the driving shaft and a fixed abutment against which said cam operates with the rotation of the driving shaft to advance the carriage with the paper material during the cutting operation, and a spring interposed between the fixed abutment and cam to prevent rupture of the paper when held by the clamp.

7. In a machine of the character specified, a reciprocating cutting knife, a driving shaft and connecting mechanism for actuating said knife, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a cam on the driving shaft and a fixed abutment against which said cam operates with the rotation of the driving shaft to advance the carriage with the paper material during the cutting operation.

8. In a machine of the character specified, a reciprocating cutting knife, with driving mechanism therefor, and a frame in which said parts are mounted, a carriage for the frame, means for feeding the paper material in a continuous web to the cutting knife, a clutch for bringing into operation the driving mechanism, a spring for actuating the clutch, devices to hold said clutch out of operation, an eccentric wheel with a stop pin in the pathway of the advancing edge of the paper, with connecting mechanism intermediate the eccentric and the clutch holding devices whereby the movement of the eccentric will release the clutch to bring into operation the driving mechanism and means for advancing the carriage with the paper material during the cutting operation.

CHARLES SEYBOLD.

Witnesses:
WILLIAM F. KINZELER,
HENRY G. SCHEI.