July 27, 1943. O. BELLAR 2,325,030

PAPER CUTTER

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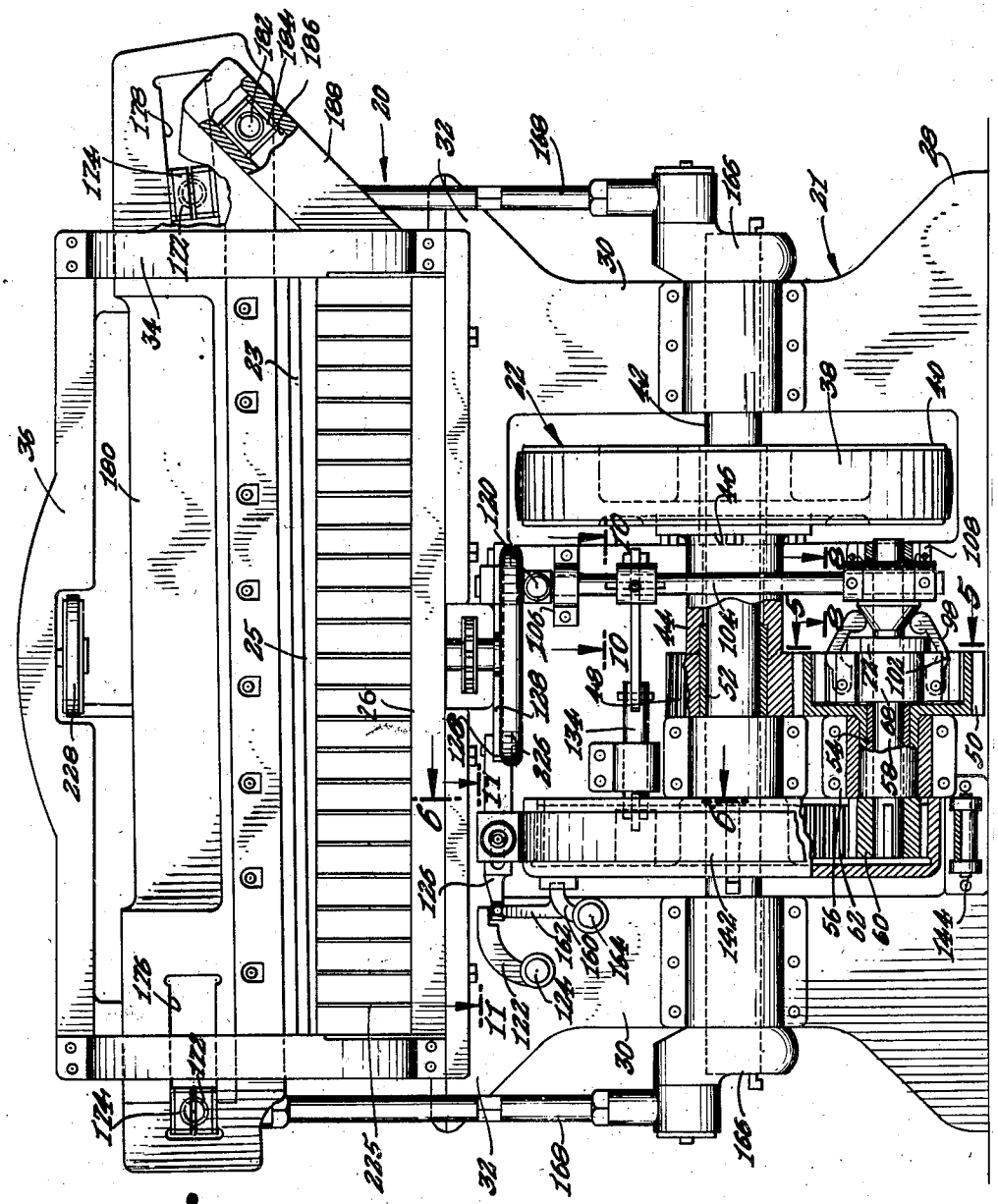


FIG. 1.

INVENTOR.
OSCAR BELLAR

BY

ATTORNEY.

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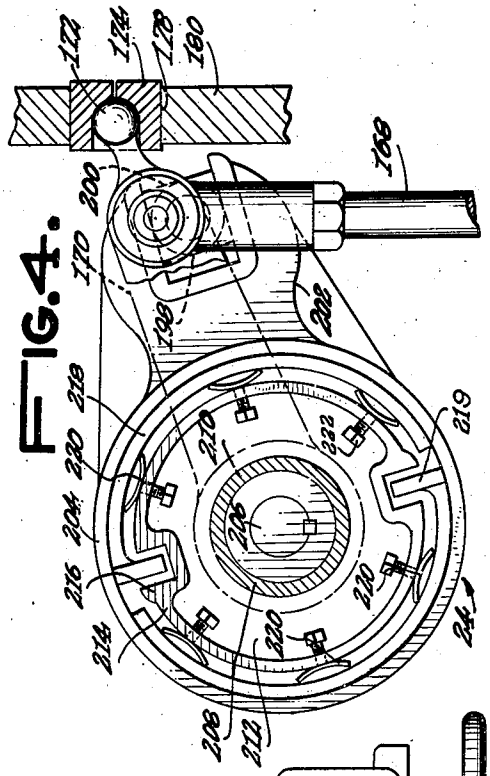


FIG. 4.

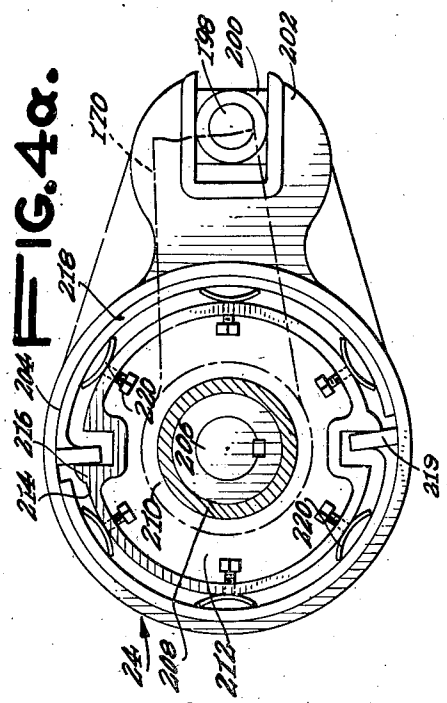


FIG. 4a.

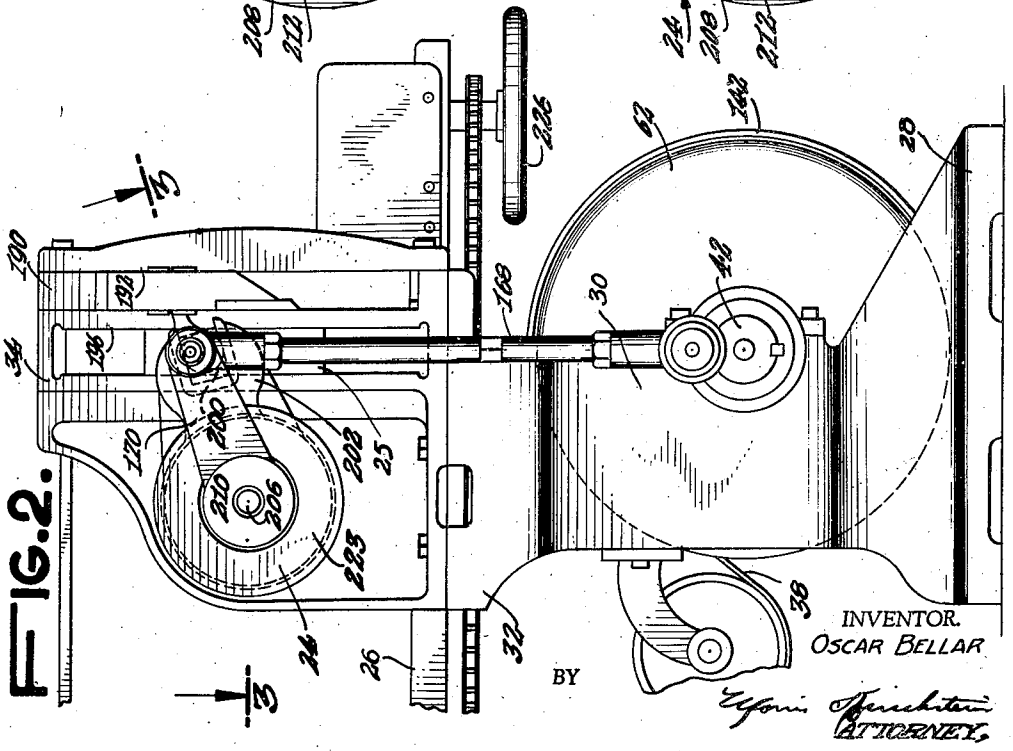


FIG. 2.

INVENTOR.
OSCAR BELLAR

BY

ATTORNEY.

July 27, 1943. O. BELLAR 2,325,030

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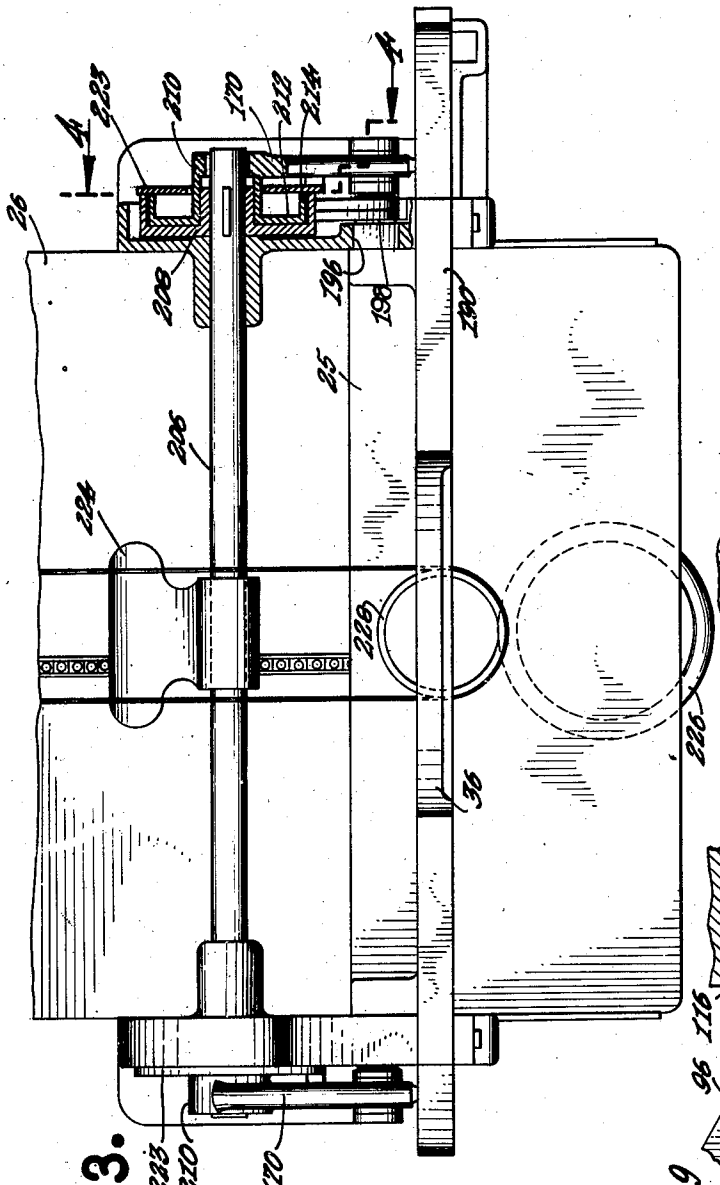


FIG. 3.

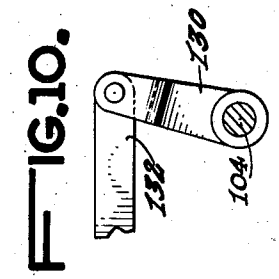


FIG. 10.

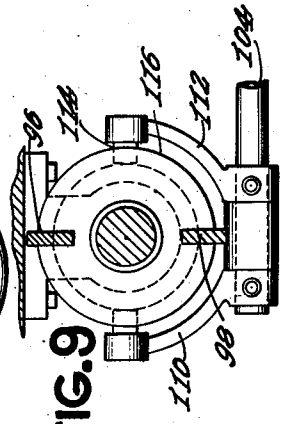


FIG. 9

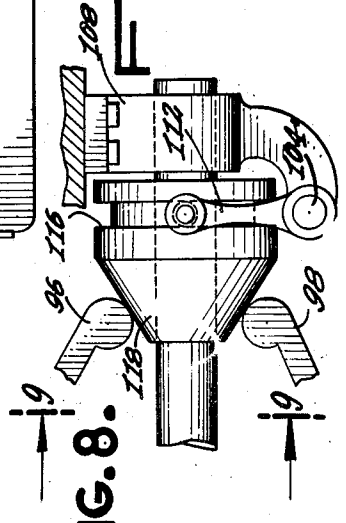


FIG. 8.

INVENTOR.
OSCAR BELLAR

BY

ATTORNEY.

July 27, 1943. O. BELLAR 2,325,030

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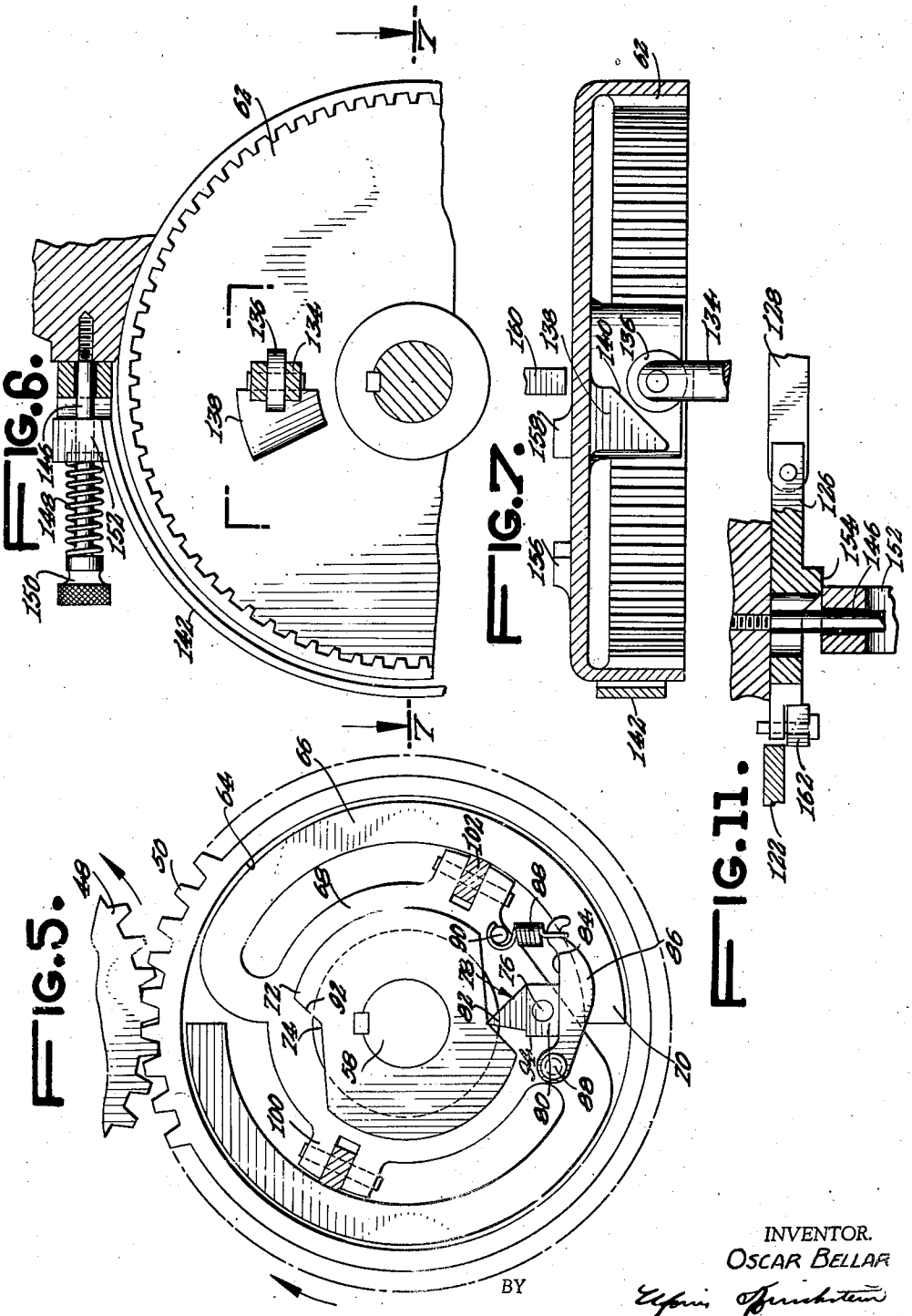


FIG. 6.

FIG. 7.

FIG. 11.

FIG. 5.

INVENTOR.
OSCAR BELLAR
BY
ATTORNEY.

July 27, 1943. O. BELLAR 2,325,030

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FIG.15.

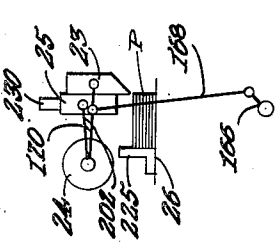


FIG.14.

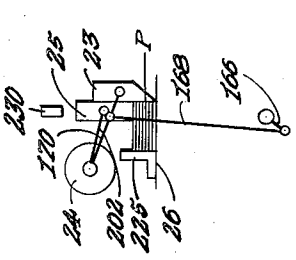


FIG.13.

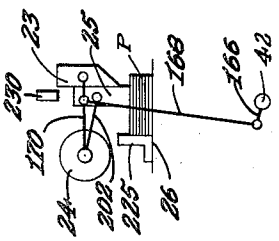


FIG.12.

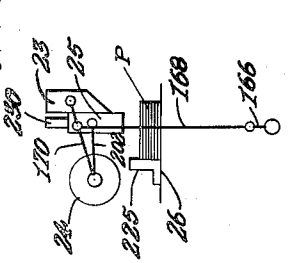


FIG.18.

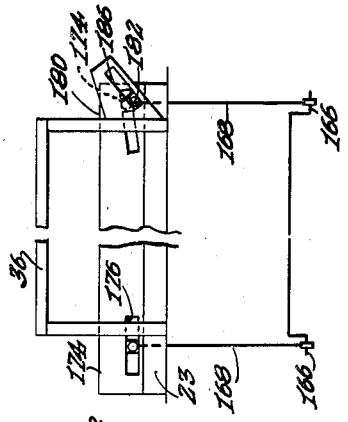


FIG.17.

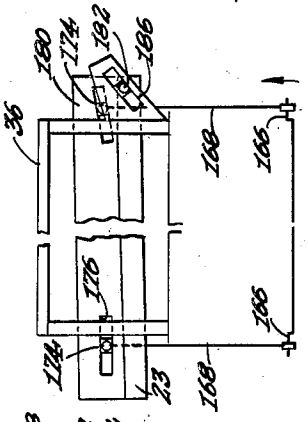
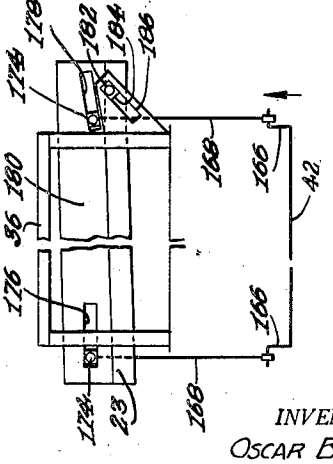


FIG.16.



INVENTOR.
OSCAR BELLAR

BY

Ulysses Weinstein
ATTORNEY.

Patented July 27, 1943 2,325,030

UNITED STATES PATENT OFFICE

2,325,030

PAPER CUTTER

Oscar Bellar, Brooklyn, N. Y.

Application September 26, 1941, Serial No. 412,395

34 Claims. (Cl. 164—54)

This invention relates to paper cutters and more particularly to power-driven heavy duty paper cutting machines.

One of the objects of my invention is to provide a paper cutter of the character described wherein the driving mechanism and associated devices for actuating the knife blade and paper clamp are so arranged that the paper cutter may be passed through an ordinary doorway of a building without disassembling said mechanism or devices or removing the same from said machine.

Another object of my invention is to provide a paper cutter of the character described wherein the driving mechanism and associated devices for actuating the knife blade and paper clamp comprise relatively few and simple parts which are so disposed in the machine as to be readily accessible for replacement or repair.

Another object of my invention is to provide a paper cutter of the character described wherein no part of the heavy driving mechanism is disposed behind the base of the supporting frame for the paper cutter so as to thereby prevent strain or injury to persons working on such heavy mechanisms in cramped or dangerous positions.

A further object of my invention is to provide a paper cutter of the character described wherein the driving mechanism and associated devices for actuating the paper clamp are disposed at the side of the machine above the level of the paper bed and are driven from an end member of the driving mechanism which actuate the knife blade.

An additional object of my invention is to provide a highly simplified and improved driving train for actuating the knife blade and the paper clamp.

Still another object of my invention is to provide a highly improved slip-drive in the actuating mechanism which operates the paper clamp, said slip-drive being so devised as to apply a relatively light pressure during compression of the paper in a stack to be cut, and a relatively heavy pressure subsequent to compression, which heavy pressure is maintained during the cutting action of the knife blade.

Yet another object of my invention is to provide a paper cutter of the character described wherein both the knife blade and the paper clamp are driven from a member reciprocably mounted at the side of the cutter.

A still further object of my invention is to provide a paper cutter of the character described having a knife blade which cooperates with the knife driving mechanism in such manner that no pressure is exerted against bearing surfaces which guide the knife in its vertical movement, whereby said blade constantly remains square to the paper being cut.

Still an additional object of my invention is to provide a paper cutter of the character described having an improved, highly compact, one-revolution clutch associated with the driving mechanism.

Another object of my invention is to provide a paper cutter of the character described having an overload mechanism for preventing breakage or damage to any parts of the machine upon the occurrence of an overload, said mechanism being resettable without substitution of any parts after overload conditions have been removed.

Another object of my invention is to provide a paper cutter of the character described which shall comprise relatively few and simple parts, and which shall be rugged in construction and efficient in operation to a high degree.

Various other objects of my invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the claims.

In the accompanying drawings, in which is shown one of the various possible embodiments of this invention.

Fig. 1 is a front view of a paper cutter embodying my invention with various portions thereof broken away to show details of the driving mechanism and guides for the knife stock;

Fig. 2 is a fragmentary side view thereof, being illustrative of the positioning of the driving mechanism and associated devices for actuating the knife stock and paper clamp within the confines of the supporting frame for the cutter;

Fig. 3 is a sectional view of the paper cutter taken substantially along the line 3—3 of Fig. 2 and showing in detail one of the slip-drives associated with the paper clamp;

Fig. 4 is an enlarged sectional view taken substantially along the line 4—4 of Fig. 3 and showing the various parts thereof when both the knife blade and paper clamp are positioned above the work at the top of their stroke;

Fig. 4a is a similar sectional view wherein the

various parts are shown at an intermediate step in the operation of the paper cutter;

Fig. 5 is an enlarged sectional view taken substantially along the line 5—5 of Fig. 1 and showing the details of the overload device and clutch in the driving mechanism;

Fig. 6 is an enlarged sectional view taken substantially along the line 6—6 of Fig. 1 and showing details of the brake and stopping cam in the one-revolution device associated with the driving mechanism;

Fig. 7 is a sectional view taken substantially along the line 7—7 of Fig. 6 and showing details of the positive stop and stopping cam;

Fig. 8 is an enlarged sectional view taken substantially along the line 8—8 of Fig. 1 and showing the device employed to start operation of the clutch;

Fig. 9 is a sectional view taken substantially along the line 9—9 of Fig. 8;

Fig. 10 is an enlarged sectional view taken substantially along the line 10—10 of Fig. 1;

Fig. 11 is an enlarged sectional view taken substantially along the line 11—11 of Fig. 1 and showing details of the operating members for actuating the positive stop and brake; and

Figs. 12 through 18 are line diagrams showing schematically from the side and front successive relative positions of the various elements of my paper cutter at different stages of operation.

Referring now to the drawings, and more particularly to Figs. 1 through 11, the paper cutter 20 comprises basically a supporting frame 21 on which all the various elements are mounted, to wit: a driving mechanism 22 which motivates both the knife blade 23 and the clamp driving mechanism 24, a clamp 25, a paper bed 26, and other auxiliary devices usually associated with a power-driven paper cutting machine.

The supporting frame

The supporting frame 21 comprises a heavy, massive base 28 on either side of which are integrally formed ponderous vertical standards 30 terminating in specially formed upper ends 32 to which are bolted the side pieces 34 forming the upper portion of the machine. The side pieces are held in properly spaced relationship by a horizontally positioned casting 36. The various portions of the supporting frame are suitably apertured and formed, as will be hereinafter set forth in detail, to receive and carry the several operating devices to be described. The overall dimensions of the supporting frame, however, must be such that the same is capable of being passed through a standard doorway of a building.

The driving mechanism

Any suitable source of motive power, for example an electric motor or a rotating power shaft (not shown), is employed to drive a belt 38 which engages the circumference of a fly wheel 40. The fly wheel is disposed substantially centrally of the standards 30 (as viewed from the side of the machine), being rotatably supported on a drive shaft 42 which is journalled in the said standards and projects beyond the same.

To mount the fly wheel 40 in this manner I provide a sleeve 44 having at one end thereof a flange 46 which is bolted to the fly wheel 40. The other end of the sleeve is enlarged and cut to provide a gear 48 which is permanently in mesh with a gear 50. The sleeve 44 and gear 48 are recessed to receive a bushing 52 which rotatably engages the surface of the shaft 42. The gear 50 has an elongated, hollow hub 54 rotatably received in a journal 56 bolted to the support 21. A counter-shaft 58 which is journalled inside of the hub 54 carries a gear 60 permanently in mesh with a ring gear 62 attached to the drive shaft 42. Said counter shaft is disposed substantially vertically in line with the drive shaft 42 for compactness and accessibility.

It will be seen that when the shaft 58 and gear 50 are caused to rotate together, the drive shaft 42 which actuates the knife blade and paper clamp will be set in operation. To this end the following clutch mechanism is provided:

The gear 50 is dished out to provide a recess whose side walls act as a friction drum 64 (see Fig. 5). Cooperating with this drum 64 are a pair of spring arms 66 integrally formed on a ring 68 which rotates with the shaft 58. The ends 70 of the arms 66 are spaced a short distance away from the friction drum 64 so that when the arms are urged towards the drum they will engage the latter in heavy frictional contact causing the shaft 58 and gear 50 to turn together.

In order to prevent breakage of parts of the machine in the event of an overload caused, for example, by inadvertent disposition of a block under the descending knife blade, I provide an overload device, preferably kinematically interposed between the ring 68 and the counter-shaft 58. Such device comprises a hardened plate 72 keyed to the shaft 58 and provided with a pair of recesses 74. Pivotally mounted on a stud 76 projecting from the ring 68 is a cam member 78 comprising a rectangular block 80 and wedge 82. During normal driving disposition of the overload device the face of the rectangular block 80 opposite the wedge 82 lies flat against the plane face 84 of a lever arm 86 pivotally mounted by means of a stud 88 on the ring 68. The free end of the lever 86 is urged towards the plate 72 by a spring 88 maintained under tension between the lever 86 and a pin 90 fixed to the plate 68. Under ordinary driving conditions one point of the wedge 82 will lie at the innermost point of the recess 74 and thus interconnect the ring 68 and counter-shaft 58 for rotation. When the load increases, the ring 68 will forge angularly ahead of the plate 72, causing the rectangle 80 to rotate in a clockwise direction (as viewed from Fig. 5) about the pivot 76 until one face of the wedge lies against a steeply inclined face 92 of the recess 74. As a further load is applied the force tending to move the ring 68 angularly ahead of the plate 72 will rotate the block 80 through approximately 90° and cause one of its flat faces 94 to be presented to the said plate 72. At such time there will be no operative driving action between the ring 68 and the counter-shaft 58.

The overload device may be reset by simply turning the rectangular block 80 in a counter-clockwise direction with a suitable tool, such as a wrench.

Engagement between the ends 70 of the spring arms 66 and the friction drum 64 may be effected by means of a pair of fingers 96 and 98 (Figs. 1, 5 and 8) which are pivotally mounted in yokes 100 projecting radially from the ring 68. The portion of the fingers 96 and 98 adjacent the arms 66 is provided with a hump 102 disposed in abutment with the inner surface of said arms. It will thus be seen that when the free ends of the fingers are moved outwardly of the counter-shaft 58 they will cause a corresponding move-

ment of the arms 66 towards the friction drum 64.

To bring about such outward movement of the fingers 96 and 98 at the beginning of each cycle of operations of the paper cutter, and to shift said fingers back to their inoperative position at the end of a cycle, the following actuating device is provided:

A vertically disposed actuating shaft 104 is journalled in bearings 106 and 108 fixed to the supporting frame 21. On the lower end of said shaft are mounted a pair of spaced fingers 110 and 112 (see Figs. 8 and 9) each having a pin 114 which is slidably received in an annular groove 116 in a cone-shaped member 118 slidably mounted on the counter-shaft 58. Said cone-shaped member 118 is centrally disposed between the fingers 96 and 98; so that when the shaft 104 is rotated in a counterclockwise direction (as viewed from Fig. 8) the member 118 will engage the fingers 96 and 98 to spread the same apart and consequently cause engagement between the spring arms 66 and friction drum 64.

The actuating shaft 104 is normally caused to rotate in a direction to begin operation of a cutting cycle by manipulation of a handle 120 fixed to the said shaft. However, it is desirable to provide in power-driven machines of this type another manually operable member which must be operated by the other hand of the operator (one of his hands being applied to the handle 120), so that both of an operator's hands will be fully engaged and accidents thus prevented. Such auxiliary manual device comprises a lever 122 which is pivoted on a stud 124 fixed to the supporting frame 21. The free end of said lever 122 normally lies in the path of a translatable rod 126 (see Figs. 1 and 11) which is slidably mounted on the supporting frame 21 and which is positively moved through a link 128 by the actuating shaft 104. It will be seen that it is thus necessary to move the lever 122 in a counterclockwise direction (as viewed from Fig. 1) before the handle 120 may be manipulated to start a cutting cycle.

When the operating handle 120 is moved to rotate the actuating shaft 104 at the beginning of a cutting cycle, a rocker arm 130 (see Fig. 10) affixed to said shaft will shift a link 132, interconnecting said arm and a rod 134 slidably mounted on the supporting frame 21. A roller 136 (see Figs. 6 and 7) carried by the rod 134 will then be positioned in the path of a cam 138 projecting from the inner surface of the ring gear 62. The roller 136 when first placed in the path of travel of the said cam 138 is spaced angularly slightly less than 360° from the sloped working face 140 of the cam. After an almost full revolution of the driving shaft 42 and ring gear 62, the said cam will approach the roller 136 as shown in Figs. 6 and 7 and then force said roller and associated rod 134 towards the actuating shaft 104 to rotate said shaft back to its inoperative position with the cone-shaped member 118 retracted from the fingers 96 and 98 and the clutch disengaged.

Due to the considerable momentum of the massive driving and operating parts, a brake is provided to bring the machine to a quick stop. Such brake comprises an arcuate brake band 142 which engages the outer surface of the ring gear 62. Said brake band is pivotally connected at its lower end by means of a stud 144 to the supporting frame 21 and is slidably mounted at its upper end on a shaft 146 threadedly received in the said supporting frame. A spring 148, maintained under compression between a knurled knob 150 at the free end of the shaft and a block 152 fixed to the upper end of the brake, normally urges the said brake band to a braking position. The rod 126 which forms part of the two-handed safety operating device passes between the block 152 and the supporting frame 21. Said rod 126 has a cammed projection 154 which, when the actuating shaft is oscillated for operation of the knife, urges the brake block 152 away from the supporting frame 21 to disengage the brake band 142 from the outer surface of the ring gear 62.

When engagement of the roller 136 and cam 138 ends a cutting cycle the cam 154 and block 152 will be disengaged to permit the brake to quickly bring the drive shaft 42 to a dead stop.

Means may also be provided to positively stop the machine in the event of failure of the brake band 142. Such means may comprise a pair of spaced lugs 156 and 158 which are angularly positioned a few degrees beyond the cam 138. These lugs are adapted to be engaged by an abutment member 160 projecting from a lever 162 having one end thereof pivotally mounted on a stud 164 projecting from the supporting frame 21 and the other end thereof pinned to the rod 126; so that movement of the roller 136 upon completion of a cutting cycle will cause corresponding movement of the abutment member 160 to position the same between the said lugs 156 and 158.

The knife and associated structure

Pinned to the projecting ends of the drive shaft 42 are cranks 166 having crank pins on which are rotatably journalled one end of substantially vertical connecting rods 168. The upper end of each of the connecting rods is pivoted to an arm 170 rotatably supported, in a manner soon to be described, in the paper clamp actuating mechanism 24.

The forward ends of the arms 170 are formed into a ball 172 which is received in split-socket shoe 174 slidably disposed in slots 176 and 178 in the knife stock 180. One slot 176 is horizontal and the other slot 178 inclined downwardly towards the center of the knife stock for a reason which will soon be apparent.

At the end of the knife stock 180 in which the inclined slot 178 is positioned there is also provided a pin 182 which pivotally carries a shoe 184 slidably disposed in an inclined channel 186 cut in a projection 188 extending from the side piece 34. The knife 23, which is supported at the lower edge of the knife stock 180, is slightly inclined in its uppermost position (shown in Fig. 1) so that the left hand end is lower than its right hand end. When the shaft 42 is rotated in a cutting cycle both connecting rods 168 will move downwardly at the same rate of speed. The left hand side of the knife blade will descend at the same rate of travel as the upper end of the left hand connecting rod 168. However, when the right hand side of the knife stock is caused to move down, due to cooperation between the shoe 184 and channel 186, said knife stock will be shifted towards the left. At the same time the knife stock will be shifted downwardly because of cooperation between the right hand shoe 174 and inclined slot 178. This will cause the right hand side of the knife stock to move down more rapidly than the left hand side of the knife stock, and thus change the angular inclination of the knife blade 23 during cutting, as is desirable in this field.

It will be noted that the shoes 174 are slidable both laterally and in a front-to-back direction in the slots 176 and 178; so that the only resultant pressure on the knife stock 180 during movement of the lever 170 is in a downward or upward direction, and no pressure will be exerted upon the guide channels 192 in the side pieces 34. By virtue of this construction once the side pieces 34 have been properly aligned to place the knife stock 180 and knife blade 23 in square with the paper bed, no deviation in squareness will result from wear of the channels 192 or adjacent surface of the knife stock 180.

It will also be seen that the shifting and oscillating movement of the knife stock 180 is imparted by connecting rods 168 having identical rates of travel. This is of considerable importance, since, as will soon be apparent, such uniform movement of the connecting rods is necessary to uniformly drive both ends of the paper clamp.

The paper clamp and actuating mechanism

The paper clamp 25 is disposed immediately behind the knife stock 180, being slidably received in channels 196 in the side pieces 34 (see Figs. 2 and 3). Each end of the clamp has extending therefrom a pin 198 which is journalled in a shoe 200 slidingly disposed in a yoke 202 extending from the paper clamp actuating mechanism 24. Said yoke forms an integral extension of a friction drum 204 which is keyed to a clamp counter-shaft 206 rotatably mounted on the side pieces 34. The friction drum 204 is provided with a central hub 208 which surrounds the counter-shaft 206 and which rotatably receives a collar 210 integral with and projecting from the arm 170 so as to journal said arm on the paper clamp actuating mechanism.

Extending out from the collar 210 is a circular flat 212 having a peripheral flange 214 provided with a pair of oppositely disposed grooves 216. The flange 214 is spaced from the inner surface of the friction drum 204 and in the annulus thus provided there are disposed a pair of resilient friction shoes 218. Legs 219 integrally formed at the ends of the shoes 218 project into the grooves 216, said grooves and legs being so proportioned that a slight clearance exists (exaggerated in Figs. 4 and 4*a*) between the said legs and grooves. The shoes 218 are always maintained in frictional engagement with the inner periphery of the brake drum 204 by spring clips 220 inserted between the flange 214 and the shoes 218. The pressure under which the shoes 218 and brake drum 204 are maintained may be varied by manipulation of bolts 222 threadedly received in the flange 214. The spring members 218 are kept in place and dust and foreign matter prevented from entering into the clutch actuating mechanism 24 by a cover 223 which is hingedly supported on the lever 170 and abuts against the outer edge of the circular peripheral flange on the friction drum 204. If desired, paper clamp actuating mechanisms 24 may be disposed at both ends of the counter-shaft 206 as shown.

A counterweight 224 balances all but a few pounds of the weight of the paper clamp 25 and the driving mechanism therefor.

In the operation of the clamp actuating device 24 when the paper clamp 25 is disposed at its uppermost position (as shown in Figs. 1 and 4) and the connecting rods 168 start to descend, the lever 170 will move in a clockwise direction (as viewed from Figs. 2, 4 and 4*a*), transmitting a similar movement to the yoke through the flange 214, spring 220, shoes 218 and friction drum 204. At such time the friction drum 204 will move at the same rate of rotation as the arm 170, or possibly slightly faster, under the influence of the weight of the clamp. This will continue until the clamp has reached the uppermost web of paper to be cut. As the lever arm 170 then continues to move downwardly the paper stock will first compress slightly under the driving action derived only through frictional engagement between the shoes 218 and the friction drum 204 caused by the spring clips 220. When, however, as the lever 170 moves further downwardly the shoes 218 begin to slip against the friction drum 204, the legs 219 thereof will engage one side of the recess 216 (as shown in Fig. 4*a*) to cause the adjacent surface of the resilient shoes 218 to tend to expand and be strongly urged against the friction drum 204. This increased pressure will cause the paper clamp to be more tightly pressed against the paper stock. When the paper has been compressed the full amount permissible by frictional engagement between the shoes 218 and friction drum 204 under the influence of the legs 219, the shoes 218 will slide relative to the drum throughout the remaining stroke of the connecting rods 168, during which cutting is performed. On the return movement of the knife blade and connecting rods the frictional engagement between the shoes 218 and the friction drum 204 will suffice to raise the paper clamp.

A stationary stop 230 (shown only schematically in Figs. 12–15) may be provided to limit the upward movement of the paper clamp and allow repositioning of the elements of the paper clamp actuating mechanism 24 to their relative positions shown in Fig. 4, where they are ready for initiation of another cutting cycle.

The paper bed and other auxiliary devices

The paper bed 26 is bolted to the supporting frame 21 and may be supplementally supported, as is usual, by braces at the rear thereof. Any auxiliary equipment, such as is usually found in machines of this character, may be provided, as for example the hand wheel 226 and scale 228 for moving and determining the position of the paper back stop 225. The said paper bed, however, and any device or equipment associated therewith which do not lie within the confines of the base 28, may be readily detached without affecting the support or operation of the driving and actuating mechanisms hereinabove described, thus permitting the machine to be quickly readied for passage through a narrow doorway at least the width of the smallest dimension of the base 28.

Correlated operation of the knife blade and paper clamp

In Figs. 12 through 18 there are schematically illustrated in line drawings the relative positions of the knife blade, paper clamp and actuating mechanisms therefor at certain stages of their operation. Figs. 12 through 15 show such elements from the side, and Figs. 16 through 18 show such elements from the front. The latter group of figures is employed to illustrate the laterally shiftable and swinging motion of the knife blade. In all these figures the same reference numerals which were employed to describe parts in Figs. 1 through 11 will be used in referring to the line representations of the same elements.

In Fig. 12 the parts are illustrated at the beginning of a cutting cycle. It will be noted that

the yoke 202 leads the lever 170 by a few degrees. This is to insure that the clamp 25 will strike the paper stock P before the knife blade 23 regardless of the height of the said paper stock. It will also be noted that the lowermost point of the knife blade 23 corresponding to the portion of the blade at the extreme left of the machine (as viewed from Fig. 1) is slightly higher, on the order of approximately one-half an inch, than the lowermost surface of the paper clamp.

In Fig. 13 the parts are shown after the paper clamp has moved down to engage the uppermost piece of paper stock P, and has compressed the paper stock to the limit of its capacity at the existing setting of the bolts 220. At such time it will be seen that the yoke 202 is still leading the arm 170 by the same amount as at the beginning of the cutting cycle. Also the end of the arm 170 which corresponds to the shoe 174 has moved forward relative to the knife stock and thereby prevented exertion of lateral pressure on the channels in which the knife stock slides.

Fig. 14 illustrates the parts after the knife has completed its cutting stroke but before the return thereof. It will be seen that between the position illustrated in Figs. 13 to 14 the paper clamp 25 and yoke 202 have retained their relative positioning with respect to the paper stock P, paper bed 26 and paper clamp actuating mechanism 24, while the lever 170 and connecting rod 166 continued to move throughout their full stroke to bring the knife blade 23 down to the level of the paper bed 26. At such time the lower edge of the knife blade has moved past the lower surface of the paper clamp and the lever 170 has moved towards, and, according to the design of parts as illustrated herein, angularly past the yoke 202.

After the cutting stroke is completed the crank pin 166 will rotate back towards its starting position and in so doing urge the paper clamp 25 and knife blade 23 upwardly. During its return stroke the yoke 202 will angularly lead the lever 170 due to the relative positioning of the said parts at the end of the cutting stroke (as shown in Fig. 14). However, when the paper clamp 25 reaches the upper limit of its stroke, as shown in Fig. 12, it will abut against the stop 230 (Fig. 15). As the connecting rod 168 continues to move upwardly the lever 170 and knife blade 23 will be raised while the paper clamp remains stationary until the various parts of the clamp actuating mechanism 24 are repositioned and are ready to commence another cutting cycle.

Figs. 16 through 18 show the knife stock 180 and knife blade 23 in positions corresponding approximately to those illustrated in Figs. 12 through 14.

In Fig. 16 the drive shaft 42, cranks 166 and connecting rods 168 have positioned the knife stock 180 at the uppermost part of its stroke. At such time the left hand shoe 174 will be at the extreme left hand end of the left hand slot 176 while the right hand shoe 174 will be at the extreme left hand end of the right hand slot 178. Also, the shoe 184 which is pivoted on stud 182 attached to the knife stock 180 will be at the upper end of the inclined channel 186. The cutting edge of the knife blade at this time is inclined downwardly from right to left. When the drive shaft 42 has moved the cranks and connecting rods downwardly to position the knife stock 180 approximately half way along its cutting stroke, the downward movement of the shoe 184 in the channel 186 will have caused the knife stock to shift towards the left. Moreover, this leftward shift by positioning the right hand shoe 174 on a higher portion of the inclined channel 178 than it was at the start of the knife stock, will have moved the right hand end of the knife stock down a slightly greater distance than the left hand end of the knife stock, so that the knife blade will now be less steeply inclined upwardly from left to right.

At the end of the cutting stroke of the knife stock all the shoes will be moved to the end of the channels opposite that in which they were positioned in Fig. 16, and the right hand end of the knife stock will have traveled a distance sufficiently greater than the left hand end of the knife stock to make the knife blade lie parallel to the paper bed 26. It will be apparent, therefore, that the swinging and lateral shifting motion which is known to be desirable in this field has been imparted to the knife stock by connecting rods moving at the same rate of speeds and the said connecting rods may therefor be used to actuate both ends of the paper clamp 25.

General attributes

It will be seen that by driving the paper clamp actuating mechanisms from the connecting rods, I am able to place such mechanisms at the sides of the paper cutter where they are readily accessible for inspection, replacement or repair, or for adjustment of the bolts 222 in the event that the degree of pressure of the paper clamp is desired to be varied. In this manner I have also been able to minimize the number of parts employed for driving the paper clamp and to reduce their size.

It will also be appreciated that the driving mechanism, including the one-revolution driving device, is disposed in the base of the machine, and being free from the paper clamp actuating mechanism is accessible from both sides for inspection, replacement or repair. Moreover, said driving mechanism is disposed wholly within the confines of the base 28 so that when the paper bed and any other auxiliary mechanism which is disposed without the confines of the base is removed from the paper cutter, the same may be brought into a building by passing the same through an ordinary size door thereof without the necessity of breaking down the wall of the building or disassembling the driving mechanism on the street. Due also to the positioning of the driving mechanism wholly within the supporting frame, a mechanic fixing the machine will not be required to work in cramped or dangerous positions as was heretofore the case when portions of the driving mechanism were disposed behind the base and below the paper bed.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

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

1. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a driving member for

said knife blade journalled on said frame above said bed, means to actuate said driving member, a driving member for said paper clamp journalled on said frame above said bed, an impositive driving train directly interconnecting said driving members, a drive shaft, and means to actuate one of said driving members from said drive shaft.

2. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a driving member for said knife blade journalled on said frame above said bed, means to actuate said driving member, a driving member for said paper clamp journalled coaxially with said knife blade driving member, an impositive driving train directly interconnecting said driving members, a drive shaft, and means to actuate one of said driving members from said drive shaft.

3. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a driving member for said knife blade journalled on said frame above said bed, means to actuate said driving member, a driving member for said paper clamp journalled coaxially with said knife blade driving member, a friction slip drive directly interconnecting said driving members, a drive shaft, and means to actuate one of said driving members from said drive shaft.

4. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a driving member for said knife blade journalled on said frame above said bed, means to actuate said driving member, a driving member for said paper clamp journalled coaxially with said knife blade driving member, a friction slip drive interconnecting said driving members, a drive shaft, and means to actuate one of said driving members from said drive shaft said friction slip drive comprising a friction drum rotatable with one of said members, a friction shoe rotatable with the other of said members and coacting with said friction drum, means to press said friction drum and friction shoe together and means to increase the pressure between said friction drum and said friction shoe when the downward progress of said paper clamp is impeded.

5. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a driving member for said knife blade journalled on said frame above said bed, means to actuate said driving member, a driving member for said paper clamp journalled coaxially with said knife blade driving member, a drive shaft, and means to actuate one of said driving members from said drive shaft a friction slip drive interconnecting said driving members, said friction slip drive comprising a friction drum rotatable with one of said members, a pair of spaced walls rotatable with said other member, a friction shoe having a leg angularly disposed relative to the frictional surface of said shoe and loosely received between said walls and means to press said friction shoe and friction drum together.

6. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of driving members for said knife blade journalled on opposite sides of said frame above said bed, a pair of identically operating means to separately actuate said driving members, a pair of driving members for said paper clamp each of which is associated and journalled coaxially with knife blade driving members on opposite sides of said frame, a shaft interconnecting said paper clamp driving members for common rotatable movement, a pair of driving trains disposed on opposite sides of said frame for directly interconnecting each of said knife blade driving members with its associated paper clamp driving member, said driving trains including means to permit relative angular movement between each of said knife blade driving members and associated paper clamp driving member, and means to set the said paper clamp driving members and said knife blade driving members in predetermined relative position at the beginning of each working stroke of said paper cutter.

7. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of driving members for said knife blade journalled on opposite sides of said frame above said bed, a pair of identically operating means to separately actuate said driving members, a pair of driving members for said paper clamp each of which is associated and journalled coaxially with knife blade driving members on opposite sides of said frame, a shaft interconnecting said paper clamp driving members for common rotatable movement, and a pair of driving trains disposed on opposite sides of said frame for interconnecting each of said knife blade driving members with its associated paper clamp driving member, said driving trains including means to permit relative angular movement between each of said knife blade driving members and its associated paper clamp driving member.

8. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife stock slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of driving members for said knife stock journalled on opposite sides of said frame above said bed, a pair of identically operating means to separately actuate said driving members, a pair of driving members for said paper clamp each of which is associated and journalled coaxially with knife stock driving members on opposite sides of said frame, a shaft interconnecting said paper clamp driving members for common rotatable movement, a pair of driving trains disposed on opposite sides of said frame for interconnecting each of said knife stock driving members with its associated paper clamp driving member, one of said knife stock driving members being slidably received in a substantially horizontal elongated slot in said knife stock, the other of said driving members being slidably received in an inclined elongated slot in said knife stock, and means to shift said knife stock laterally as said knife stock is vertically reciprocated whereby said knife stock is both laterally shifted and swung as it is vertically reciprocated.

9. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife stock slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of driving members for said knife stock journalled on opposite sides of said frame above said bed, a pair of identically operating means to separately actuate said driving members, a pair of driving members for said paper clamp each of which is associated and journalled coaxially with knife stock driving members on opposite sides of said frame, a shaft interconnecting said paper clamp driving members for common rotatable movement, a pair of driving trains disposed on opposite sides of said frame for interconnecting each of said knife stock driving members with its associated paper clamp driving member, one of said knife stock driving members being slidably received in a substantially horizontal elongated slot in said knife stock, the other of said driving members being slidably received in an inclined elongated slot in said knife stock, and means to shift said knife stock laterally as said knife stock is vertically reciprocated, said last named means comprising a pair of relatively slidable members, one of said last named pair of members being associated with said knife stock and the other of said last named members being associated with said supporting frame whereby said knife stock is both laterally shifted and swung as it is vertically reciprocated, one of said last named pair of members being inclined to the vertical and horizontal.

10. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife stock slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of driving members for said knife stock journalled on opposite sides of said frame above said bed, a pair of identically operating means to separately actuate said driving members, a pair of driving members for said paper clamp each of which is associated and journalled coaxially with knife stock driving members on opposite sides of said frame, a shaft interconnecting said paper clamp driving members for common rotatable movement, and a pair of driving trains disposed on opposite sides of said frame for interconnecting each of said knife stock driving members with its associated paper clamp driving member, said driving members for said knife stock being slidably received in a front-to-back direction in openings in said knife stock.

11. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife stock slidingly supported on said frame, a pair of driving members for said knife stock journalled on opposite sides of said frame above said bed for rotation about an axis perpendicular to the direction of movement of said knife stock, and means to actuate said driving members, said driving members being slidably received in a front-to-back direction in openings in said knife stock.

12. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, means supported on said frame above said bed to actuate said paper clamp, and means supported on said frame below said bed to drive said knife blade and said paper clamp actuating means, said last named means comprising a drive shaft, means to receive motive power, said last named means being rotatably mounted on said drive shaft, and a clutch intermediate said drive shaft and said power receiving means to optionally cause said drive shaft and said power receiving means to simultaneously rotate.

13. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, means supported on said frame above said bed to actuate said paper clamp, and means supported on said frame below said bed to drive said knife blade and said paper clamp actuating means, said last named means including a drive shaft on which is rotatably mounted means to receive motive power, a countershaft operatively connected to said drive shaft and said power receiving means, and a clutch intermediate said drive shaft and said power receiving means.

14. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a single means to actuate both said paper clamp and said knife blade, means to drive said actuating means, and a resettable overload device kinematically intermediate said actuating means and said driving means.

15. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable knife blade slidingly supported on said frame, means to actuate said knife blade, means to drive said actuating means, and a resettable overload device kinematically intermediate said actuating means and said driving means.

16. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, means to actuate said paper clamp and said knife blade, means to drive said actuating means, said last named means comprising a gear train and a clutch member, one of the gears in said train being recessed, the recess thus provided being coaxial with said gear, said clutch being disposed in said recess and cooperating with a wall thereof.

17. In combination in a power-driven paper cutter of the character described, a supporting frame, a drive shaft journalled in said frame, a pair of spaced cranks fixed for rotation with said drive shaft, a reciprocable knife blade slidingly supported on said frame, connecting rods interconnecting said cranks and the opposite ends of said knife blade, power receiving means mounted for rotation about said shaft between said cranks, and a power transmitting train, including a clutch, intermediate said power receiving means and said drive shaft.

18. In combination in a power-driven paper cutter of the character described, a supporting frame, a drive shaft journalled in said frame, a pair of spaced cranks fixed for rotation with said drive shaft, a reciprocable knife blade slidingly supported on said frame, connecting rods interconnecting said cranks and the opposite ends of said knife blade, a circular member mounted for rotation about said drive shaft between said cranks and adapted to be actuated by a belt, and

a gear train, including a clutch, intermediate said circular member and said drive shaft.

19. In combination in a power-driven paper cutter having a bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a pair of similar means supported on said frame above said bed to actuate said paper clamp, a drive shaft journalled in said frame, a pair of spaced cranks fixed to said drive shaft for rotation therewith, a connecting rod interconnecting each of said cranks with one end of said knife blade and with one of said paper clamp actuating means, power receiving means mounted on said shaft between said cranks for rotation thereabout, and a power transmitting train, including a clutch, intermediate said power receiving means and said drive shaft.

20. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable paper clamp slidingly supported on said frame, means to actuate said paper clamp, said means including a driven frictional motion transmitting device, said device including a pair of elements in frictional contact and means for causing a greater or lesser degree of engagement between said elements depending upon the force opposing motion of said paper clamp, the lesser degree of engagement being effective while said clamp is moving downward on a work holding stroke before engagement of the clamp with paper to be cut, and the greater degree of engagement being effective when contact with said paper prevents movement of said clamp.

21. In combination in a power-driven paper cutter having a paper bed, a supporting frame, a reciprocable paper clamp slidingly supported on said frame, and frictional, automatic, pressure changing means rotatably supported on said frame above said bed to actuate said clamp.

22. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable knife stock slidingly supported on said frame, a pair of driving members for said knife stock reciprocably mounted on opposite sides of said frame, means to identically reciprocate said driving members, one of said driving members being connected to said knife blade in such manner as to permit horizontal movement of said knife blade relative thereto, the other of said driving members being connected to said knife blade in such manner as to permit movement of said knife blade relative to said other member in a direction slightly inclined to the horizontal and means to shift said knife blade laterally as said knife driving members are reciprocated vertically.

23. In combination in a power-driven paper cutter, a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, means to rotate said drive shaft, a power transmitting train actuated by said drive shaft, said train having a reciprocably driven member disposed above said paper bed and at a side of said cutter, means actuated by said member to drive said blade, and separate means also actuated by said member to drive said paper clamp.

24. In combination in a power-driven paper cutter a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, means to rotate said drive shaft, a pair of power transmitting trains actuated by said drive shaft, said trains being spaced laterally of said cutter, each of said trains having a reciprocably driven member disposed above said bed, said members being located on opposite sides of said machine, a pair of means for driving said knife blade, each of said knife blade driving means being actuated by one of said members and being operatively connected to an end of said knife blade, and a pair of means for driving said paper clamps, each of said paper clamp driving means being actuated by one of said members and being operatively connected to an end of said paper clamp.

25. In combination in a power-driven paper cutter, a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, coaxial means to rotate said drive shaft through a transmission train, a pair of power transmitting trains actuated by said drive shaft, said trains being spaced laterally of said cutter, each of said trains having a reciprocably driven member disposed above said bed, said members being located on opposite sides of said machine, a pair of means for driving said knife blade, each of said knife blade driving means being actuated by one of said members and being operatively connected to an end of said knife blade, a pair of means for driving said paper clamps, each of said paper clamp driving means being actuated by one of said members and being operatively connected to an end of said paper clamp, said knife blade driving means and said paper clamp driving means being simultaneously actuated by the said members of the said power trains.

26. In combination in a power-driven paper cutter, a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, coaxial means to rotate said drive shaft, a pair of power transmitting trains actuated by said drive shaft, said trains being spaced laterally of said cutter, each of said trains having an oscillatably driven member disposed above said bed, said members being located on opposite sides of said machine, a pair of means for driving said knife blade, each of said knife blade driving means being actuated by one of said members and being operatively connected to an end of said knife blade, a pair of means for driving said paper clamps, each of said paper clamp driving means being actuated by one of said members and being operatively connected to an end of said paper clamp, said knife blade driving means and said paper clamp driving means being simultaneously actuated by the said members of the said power trains.

27. In combination in a power-driven paper cutter, a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, means to rotate said drive shaft, a power transmitting train actuated by said drive shaft, said train having two reciprocably driven members disposed above the paper bed and at the side of the cutter, an impositive power transmitting mechanism intermediate said members, means actuated by the member on the driving side of said impositive means for driving said knife blade, and means actuated by the member on the driven side of

said impositive means for driving said paper clamp.

28. In combination in a power-driven paper cutter, a paper bed, a supporting frame, a reciprocable knife blade slidingly supported on said frame, a reciprocable paper clamp slidingly supported on said frame, a drive shaft, means to rotate said drive shaft, a driving member for said paper clamp, said member being disposed above said bed and at a side of the cutter, a driving member for said knife blade, said knife blade driving member being disposed above said bed and at a side of the cutter, means kinematically interconnecting said paper clamp driving member and knife blade driving member whereby said paper clamp driving member derives its power from said knife blade driving member, said interconnecting means including an impositive driving means and comprising a power transmitting mechanism that reduces the amount of power transmitted when the clamp is halted on its return stroke to that required to control the weight of the clamp.

29. In combination in a power-driven paper cutter of the character described, a supporting frame, a reciprocable knife stock slidingly supported in said frame, a pair of driving members for said knife stock reciprocably mounted on opposite sides of said fame, and means to identically reciprocate said driving members, one of said driving members being slidably received in a horizontal slot which is disposed adjacent an end of said knife stock and extends partially thereacross, the other of said driving members being slidingly received in an oblique slot which is adjacent to the other end of said knife stock and extends partially thereacross, and means to shift said knife blade laterally as said driving members are reciprocated.

30. In combination in a power-driven paper cutter of the character described, a knife, a pair of spaced members of even throw to vertically reciprocate said knife, and means to swing said knife about a horizontal axis perpendicular thereto and adjacent an end thereof as it vertically reciprocates.

31. In combination in a power-driven paper cutter of the character described, a supporting frame, a drive shaft, a pair of spaced cranks of even throw fixed for rotation with said drive shaft, a reciprocable knife blade slidingly supported on said frame, means driven by said cranks for reciprocating said knife blade, power receiving means coaxial with and mounted for rotation about said shaft between said cranks, and a power transmitting train kinematically intermediate said power receiving means and said drive shaft, said train including an automatic overload release clutch.

32. In combination in a power-driven paper cutter of the character described, a supporting frame, a drive shaft, a pair of spaced cranks of even throw fixed for rotation with said drive shaft, a reciprocable knife blade slidingly supported on said frame, means driven by said cranks for reciprocating said knife blade, power receiving means coaxial with and mounted for rotation about said shaft between said cranks, and a power transmitting train kinematically intermediate said power receiving means and said drive shaft, said train including a reduction gear drive, an automatic resettable overload release and a clutch.

33. In combination in a power-driven paper cutter of the character described, a knife stock mounted for reciprocation, a paper clamp mounted for reciprocation parallel to the knife stock, a pair of members, and an impositive power transmitting mechanism directly connecting said members, one of said members driving said mechanism and the other of said members being driven by said mechanism, said knife stock being actuated by said driving member, and said clamp being actuated by said driven member.

34. In combination in a power-driven paper cutter of the character described, a knife stock mounted for reciprocation, a paper clamp mounted for reciprocation parallel to the knife stock, and an impositive power transmitting mechanism comprising a pair of coaxially rotatable members and friction means tending to prevent relative rotation thereof, each of said members rigidly carrying an arm, one of said arms being adapted to drive said impositive means from a source of power and the other of said arms being adapted to be driven by said impositive means, said knife stock being actuated by said driving arm, and said paper clamp being actuated by said driven arm.

OSCAR BELLAR.