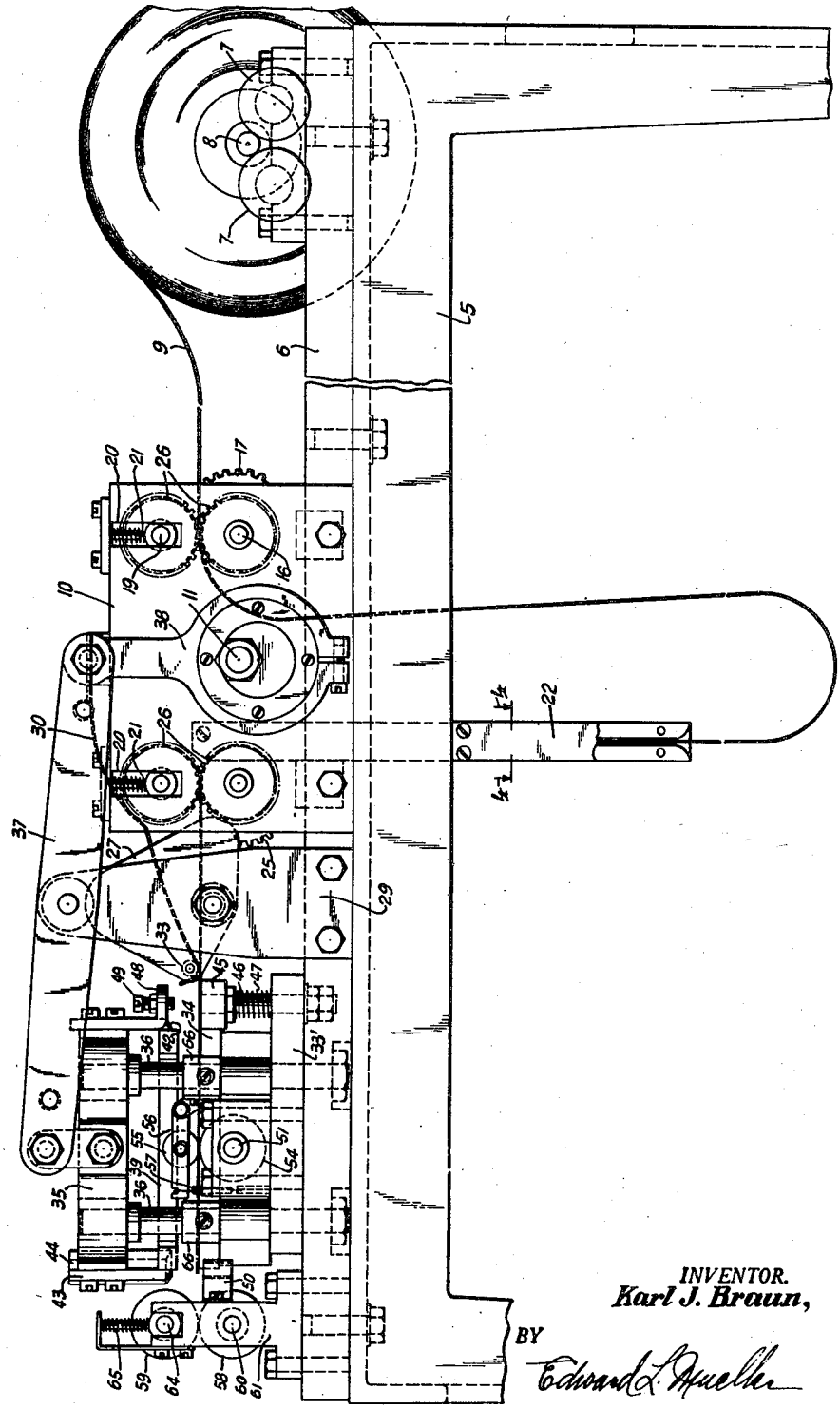
Feb. 17, 1948. K. J. BRAUN 2,436,192

CARD CUTTING MACHINE

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Fig. 1



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CARD CUTTING MACHINE

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Fig. 2

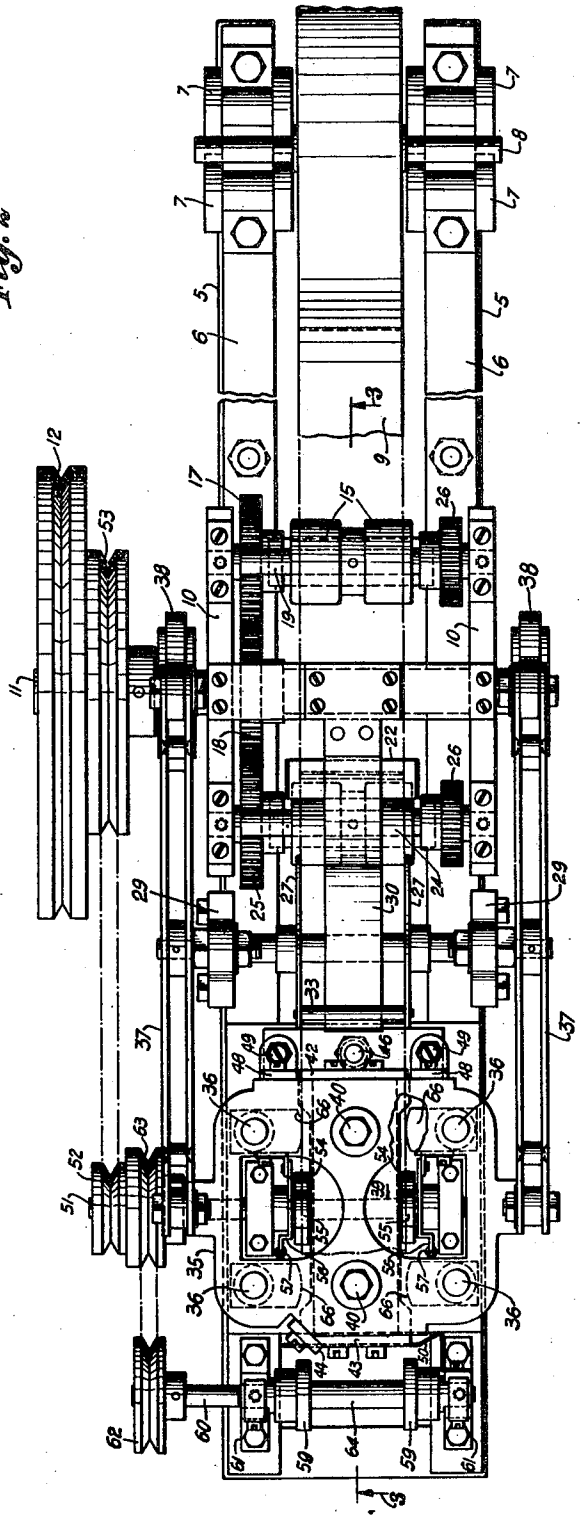
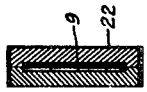


Fig. 4



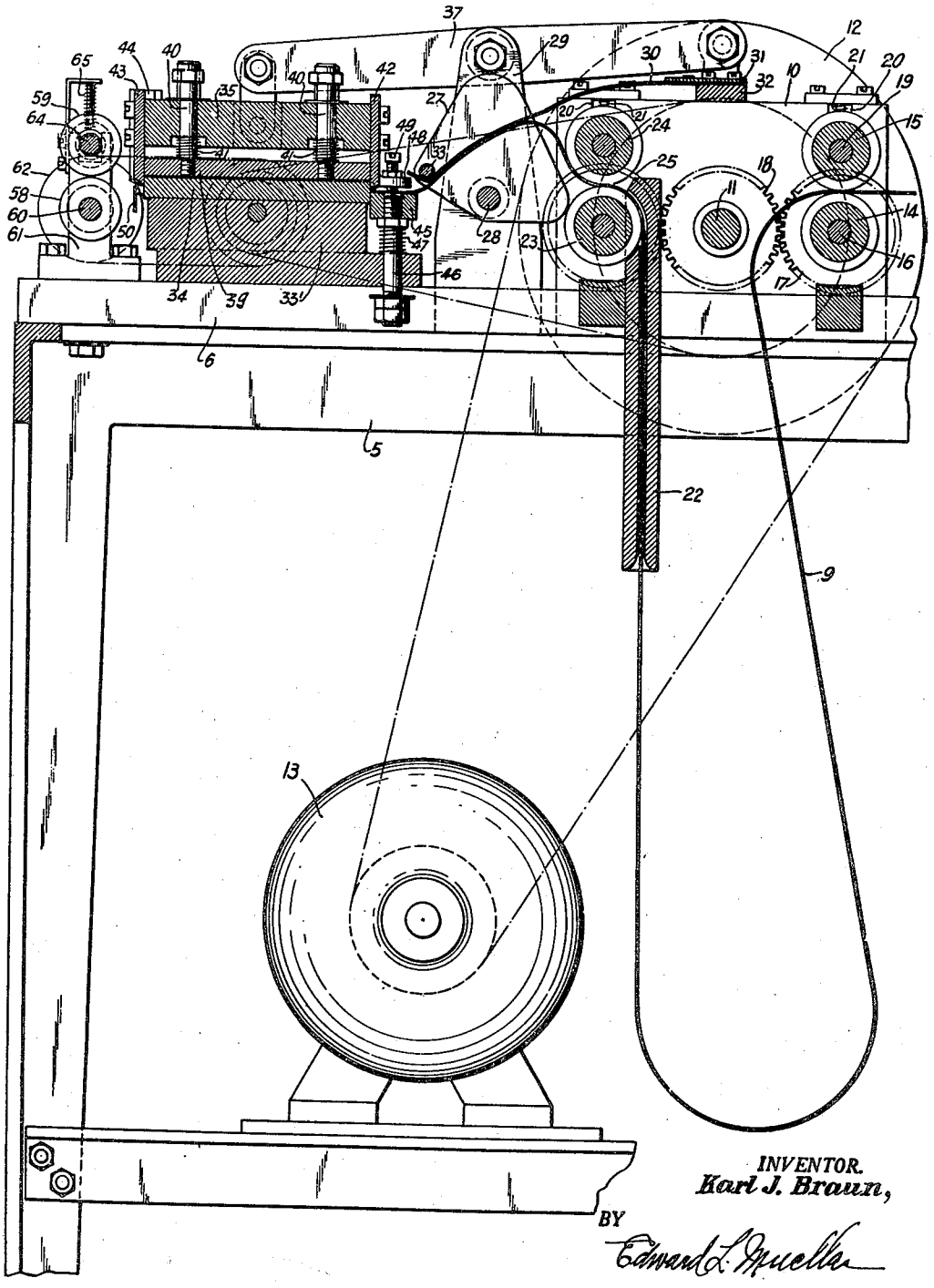
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CARD CUTTING MACHINE

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Fig. 3



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CARD CUTTING MACHINE

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Application January 5, 1945, Serial No. 571,458

10 Claims. (Cl. 164—49)

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This invention relates to improvements in cutting machines and has particular reference to a machine for severing predetermined lengths from a continuous strip of material.

An object of the invention is to provide an improved machine of practical construction which will operate to accurately sever uniform lengths from a strip of material, and wherein said strip is continuously fed toward a cutting mechanism which intermittently stops the portion of the strip therein while it is being severed and during the continuance of the feed of the strip toward said mechanism.

Another object is to utilize the formation of an excess of material of the strip created by its continuous feed and the intermittent stopping thereof at the cutting mechanism, to control means for feeding said excess into said mechanism after the completion of each severing operation.

The above and other objects will appear more clearly from the following detailed description when taken in connection with the accompanying drawings which illustrate a preferred embodiment of the inventive idea; but it is to be expressly understood that said drawings are used only for facilitating the description of the invention as a whole and not to define the limits thereof, reference being had to the appended claims for this purpose.

In the drawings:

Fig. 1 is a fragmentary side elevation of a cutting machine constructed in accordance with the invention.

Fig. 2 is a fragmentary top plan view thereof.

Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 2 showing the cutting mechanism in severing position, and

Fig. 4 is a section on the line 4—4 of Fig. 1.

The invention is designed for severing uniform lengths of paper from a continuous strip for use as statistical punch cards which must be extremely accurate in size.

As shown in its preferred form, the machine comprises an elongated frame 5 upon which is supported the rails 6. Pairs of opposed roller bearings 7 are mounted upon the rails 6 at one end thereof and receive therebetween the shaft 8 of a reel of paper formed as a continuous strip 9 of uniform width throughout.

Said strip 9 is unwound from the reel by a feeding means mounted intermediate the ends of the frame 5. Said means comprises the opposed plates 10 secured to the rail 6, and said plates have journaled therein the drive shaft 11 carrying a

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large pulley 12 at one end to which is connected the motor 13 utilized to continuously operate said feeding means, and also the reciprocatory cutting mechanism later to be described. The strip 9 is drawn from its reel by a pair of superposed feed rollers 14 and 15, the lower roller 14 having its shaft 16 journaled in the plates 10 and carrying a gear 17 thereon which meshes with and is driven by a similar gear 18 on the main drive shaft 11. The upper roller 15 has its shaft 19 mounted in vertical slots 20 in the plates 10 and has constant downward pressure exerted thereon by the springs 21. From the set of rollers 14, 15, the strip 9 is extended downwardly in a long loop and thence upwardly through a rigid guide 22 having its upper or outlet end arranged in juxtaposed position to a second set of feed rollers 23, 24 supported in the plates 10 in the same manner described in connection with rollers 14, 15, and driven from the shaft 11 by the gear 18 meshing with the gear 25 on the shaft of the lower roller 23. The channel in the guide 22 has approximately the same dimensions as the strip 9 and is effective in accurately guiding the strip to the rollers 23, 24 to thereby avoid any possible lateral shifting of the strip while passing between said rollers. The upper rollers 15 and 24 of the two pairs are positively driven by the upper and lower intermeshing gears 26 carried on the shafts of the respective pairs.

The strip 9, as it is continuously fed from the rollers 23, 24, moves between two vertical guide plates 27 which may be spaced a distance apart substantially equal to the width of the strip so as to further avoid lateral shifting thereof as it advances towards the cutting mechanism. In Fig. 3, this mechanism is shown in the position it assumes at the instant of severing a portion of the strip and, as will be noted and hereinafter described in more detail, at said instant the movement of the strip through said mechanism is stopped while the feeding means continues to operate. This condition creates a temporary excess of the material of the strip between the feeding means and the cutting mechanism. When moving through said mechanism, the strip extends horizontally from the feed rollers 23, 24 and into said mechanism, and is supported between these points by a rod 28 extending between two opposed standards 29 mounted on the rails 6, said rod also extending through the guide plates 27. However, when stoppage of the strip at the cutting mechanism occurs for the instant necessary to sever the same, the strip 9 will buckle upwardly and tend to form a loop between the feed

rollers 23, 24 and the cutting mechanism, as shown in Fig. 3. The creation of this temporary excess of material is utilized to activate a means which, subsequent to a severing operation, operates to straighten out the temporary loop formed in the strip and thus feed the free end of the strip into the cutting mechanism preparatory to another severing operation. Said means is shown in the form of an elongated leaf spring 30 having one end fixed at 31 to a bar 32 mounted upon the upper edges of the side plates 10. Said spring is bowed downwardly toward the cutting mechanism and has its free end extended beneath and contacted with a roller 33 supported by the plates 27, said roller acting to reduce friction between it and the spring as the latter flexes upwardly and downwardly. During the accumulation of the excess material and the formation of said loop, the latter flexes the spring 30 upwardly and thus places it under tension so that when the free end of the strip 9 is again ready to enter the cutting mechanism after a severing operation, as will later be described, the spring 30 becomes effective to exert a downward pressure upon the temporary loop which straightens it out and thus feeds said free end of the strip into the cutting mechanism.

The cutting mechanism is of the reciprocating type and comprises a base 33' suitably secured upon the rails 6 at the delivery end of the machine and supporting the stationary die plate 34 thereon. A vertically reciprocating head 35 guided in its movements relative to said plate 34 by four posts 36 which extend upwardly from the rails 6 and into apertures formed in said head. To reciprocate said head, the same is connected to a pair of rocker arms 37 pivoted intermediate their ends and the standards 29 and, at their ends remote from the head 35, are joined to pitmans 38 driven from the main shaft 11. A movable die plate 39 cooperates with the plate 34 to intermittently stop the movement of the strip 9, through the cutting mechanism and hold the same while it is being severed, and said plate 39 is supported in spaced relation to the head 35 by means of screw bolts 40. Coiled about said bolts and interposed between the head and die plate are the springs 41 which yieldingly separate said members and permit of a downward movement of said head 35 relative to said plate while the latter is engaged with the strip 9 during the severing of the latter. This operation is accomplished by two cutting blades 42 and 43 secured to the middle of opposite ends of the head 35 and a third blade 44 associated with the blade 43 and disposed diagonally relative thereto so as to sever one corner of the strip, as customary in making statistical punch cards. The portion of the strip 9 immediately in advance of the cutting mechanism passes over a depressible support 45 which, immediately before and after the severing operation, has its supporting surface on the same horizontal plane as the upper surface of the stationary die plate 34, but which is lowered to the position of Fig. 3 during said operation. Said support 45 is mounted upon a screw bolt 46 extending upwardly from an extension of the base 33' and interposed between the latter and said support and coiled about said bolt is the compression spring 47 which returns the support to the level of the plate 34 during the upward stroke of the head 35. To depress the support 45 during the down stroke of said head, the latter has secured thereto the brackets 48 each of which carries a set screw 49 adapted to contact one end of said support at the instant that the movable die plate 39 engages the strip 9, and continued downward movement of the head 35 relative to said plate then depresses said support to place the spring 47 under compression. As the strip is severed by a shearing action of the blades 42, 43 and 44 in cooperation with the ends of the plate 34, said blade 42 will force the free end of said strip downwardly with said support and said end will thus engage the adjacent extremity of said die plate 34 so that further movement of the strip into the cutting mechanism is temporarily stopped, thereby causing the formation of the excess of material of said strip, as previously described. At the opposite end of the mechanism, the blades 43, 44 will sever chips from the projecting end of the strip 9 and these chips will be deflected downwardly by a horizontally disposed plate 50 mounted directly below said blades.

Extending transversely through the base 33' is a shaft 51 carrying a pulley 52 at one end which is continuously driven from the main shaft 11 by a pulley 53 thereon. Feed rollers 54 are secured to said shaft 51 and engage the under surface of the strip 9 to aid in feeding the same through the cutting mechanism. Cooperating with said rollers 54 are the upper rollers 55 each carried by an arm 56 pivoted to a stationary part of the mechanism pulled downwardly by a spring 57 so that the roller will exert pressure upon the upper surface of the strip 9. When the latter is temporarily held stationary in the cutting mechanism, the lower rollers 54 will continue to rotate but will not feed the severed portion of the strip until the head 35 and upper die plate 39 recede upwardly, whereupon the rollers 54, 55 become effective to move said severed portion or card outwardly toward the discharge rollers 58 and 59. The lower rollers 58 are carried by a shaft 60 journaled in the standards 61 on the rails 6 and having a pulley 62 thereon driven by a pulley 63 on the shaft 51. A shaft 64 carries the upper pressure rollers 59 and springs 65 are utilized to exert downward pressure upon said shaft to frictionally engage said rollers with the severed card as it is fed from the cutting mechanism and into a suitable receptacle not shown. To assist in guiding the strip 9 through said mechanism and prevent any lateral shifting thereof, stationary guide blocks 66 are arranged on opposite sides of the strip for contact with its edges.

Briefly, the operation of the mechanism is as follows. As the head 35 descends from the position shown in Fig. 1 the die plate 39 moves in unison therewith until said plate contacts the portion of the strip 9 which has previously been fed into position between the plates 34 and 39, thus stopping further movement of the strip through the mechanism. Continued downward movement of the head 35 is now relative to the plate 39 and results in the severing of the strip by the blades 42, 43 and 44. At the same time that this severing action is taking place, the set screws 49 engage and depress the support 45 and the free end of the strip 9 is moved downwardly along with said support so that the extremity of the strip will engage the adjacent end of the stationary plate 34, whereupon the previously mentioned excess of material will start to accumulate between the feed rollers 23, 24 and the cutting mechanism so as to activate the spring 30. Following completion of the severing operation, the head 35 starts to move upwardly with the cutting blades and during the initial stage of this movement, the coil springs 41 will retain the upper die plate 39 in contact with the severed

portion of the strip. This contact is maintained until the cutting edges of the blades have cleared said severed portion and the support 45 has approached the level of the upper surface of the stationary plate 34, whereupon the plate 39 moves upwardly with the head 35 to release the severed portion of the strip which is immediately fed outwardly by the rollers 54, 55 toward the discharge rollers 58, 59. Thereupon, the free end of the strip, which has been abutting against the end of the lower plate 34 while being carried upwardly by the support 45, passes beyond the level of the upper edge of the stationary plate 34, and the spring 30, which is now exerting pressure upon the accumulated loop in the strip 9, at once becomes effective to straighten out said loop with the result that the free end of said strip then enters the space between the plates 34, 39. It is then picked up by the rollers 54, 55 which continue to feed the strip into the mechanism until said end projects slightly beyond the left hand ends of said plates 34, 39, whereupon the latter plate again descends to clamp the portion of the strip in the mechanism preliminary to the next severing operation.

What is claimed is:

1. In a cutting machine for severing predetermined lengths from a continuous strip of material, a cutting mechanism, means to continuously feed said strip toward said mechanism, means to operate said mechanism to periodically stop the continuous feed of said strip therethrough while said feeding means continues to operate, and to sever said strip while it is stopped, means controlled by and, in turn, controlling the temporary excess of material formed in said strip between said feeding means and cutting mechanism by the stopping of the strip while being severed, to feed said excess into said mechanism following the severing operation, and means to discharge the severed portion of said strip from said mechanism in advance of the feed of said excess thereinto.

2. In a cutting machine for severing predetermined lengths from a continuous strip of material, a cutting mechanism, means to continuously feed said strip toward said mechanism, means to operate said mechanism to periodically stop the continuous feed of said strip therethrough while said feeding means continues to operate, and to sever said strip while it is stopped, the stopping of said strip creating a temporary excess of material in advance of said mechanism, means activated by the formation of said excess to exert pressure thereon to feed the same into said mechanism upon completion of the severing operation, and means to discharge the severed portion of said strip from said mechanism in advance of the feed of said excess thereinto.

3. In a cutting machine for severing predetermined lengths from a continuous strip of material, a cutting mechanism, means to continuously feed said strip toward said mechanism, means to operate said mechanism to periodically stop the continuous feed of said strip therethrough while said feeding means continues to operate, and to sever said strip while it is stopped, the stopping of said strip creating a temporary excess of material in advance of said mechanism, a stationary support, a spring member secured to said support in juxtaposed relation to said strip and tensioned by said excess as it is being formed so as to exert pressure thereon and thereby feed it into said cutting mechanism upon completion of the severing operation, and means to remove the severed portion of said strip from said mechanism prior to the feeding of said excess thereinto.

4. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a reciprocatory cutting mechanism toward which said strip is fed and including means to hold stationary that portion of said strip in said mechanism while severing the same from the strip, and means activated by the continuous movement of said strip toward said cutting mechanism during the severing operation to positively feed the free end of the strip into said mechanism after completion of said operation.

5. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a cutting mechanism toward which said strip is fed and including stationary and movable die plates between which said strip is fed and operable to intermittently stop the feed of said strip through said mechanism, means to sever the strip while it is stopped, means operable during the severing of said strip to abut the severed end thereof against said stationary plate to create a temporary excess of material between said plate and said continuous feeding means, and means controlled by said excess as it is being created and, in turn, controlling the same to feed it between said plates after the severing operation is completed.

6. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a cutting mechanism toward which said strip is fed and including stationary and movable die plates between which said strip is fed and operable to intermittently stop the feed of said strip through said mechanism, means to sever the strip while it is stopped, means operable during the severing of said strip to abut the severed end thereof against said stationary plate to create a temporary excess of material between said plate and said continuous feeding means, and a resilient member positioned between said feeding means and cutting mechanism and tensioned by said excess of material to create pressure thereon and thereby feed it into said cutting mechanism upon completion of the severing operation.

7. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a cutting mechanism toward which said strip is fed and including stationary and movable die plates between which said strip is fed and operable to intermittently stop the feed of said strip through said mechanism, means to sever the strip while it is stopped, a yieldable support for said strip in juxtaposed relation to said die plates, means operable during the severing operation to depress said support to thereby abut the severed end of said strip against said stationary plate so that the continued feed of said strip will create a temporary excess of material in advance of said cutting mechanism, means to restore said support after the severing operation, and means activated by the formation of said excess for exerting pressure thereon to feed the same between said plates after restoration of said support.

8. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a cutting mechanism toward which said strip is fed and including stationary and movable die plates be-

tween which said strip is fed and operable to intermittently stop the feed of said strip through said mechanism, means to sever the strip while it is stopped, a yieldable support for said strip in juxtaposed relation to said die plates, means operable during the severing operation to depress said support to thereby abut the severed end of said strip against said stationary plate so that the continued feed of said strip will create a temporary excess of material in advance of said cutting mechanism, means to restore said support after the severing operation, and a resilient member positioned between said feeding means and cutting mechanism and tensioned by the formation of said excess for exerting pressure thereon to feed it between said die plates after restoration of said support.

9. In a cutting machine for severing predetermined lengths from a continuous strip of material, means to continuously feed said strip, a cutting mechanism including relatively movable die elements toward and between which said strip is fed and which are coextensive with the lengths to be cut from said strip, means controlling said die elements to clamp said strip between them and hold the same stationary while being severed, means to sever the length of the strip being held between said die elements, means cooperating with one of said die elements during the severing operation to temporarily stop the feed of said strip into said cutting mechanism while permitting the continuous movement of the strip toward said mechanism, and means activated by the continuous movement of said strip toward said cutting mechanism during the severing operation to positively feed the free end of the strip into position between said die elements after completion of the severing operation.

10. In a cutting machine for severing predetermined lengths from a strip of material, means to continuously feed said strip, a cutting mechanism including stationary and movable die plates toward and between which said strip is fed, cutting members cooperating with said die plates to sever predetermined lengths from said strip, a movable element having a supporting surface for said strip aligned with a surface of said stationary plate while the strip is being fed between said plates and cooperating, during the cutting operation, with one of said cutting members to offset the portion of said strip on said supporting surface relative to the predetermined length of the strip being severed in such manner that further feed of the strip between said plates during the cutting operation is halted while the continuous movement thereof toward said plates is uninterrupted, means to move said movable member to realign its supporting surface with said surface of said stationary plate at the conclusion of a cutting operation so as to position the strip for further movement between said plates, and means activated by the continuous feed of the strip toward said cutting mechanism for again feeding the strip between said plates preparatory to another cutting operation.

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