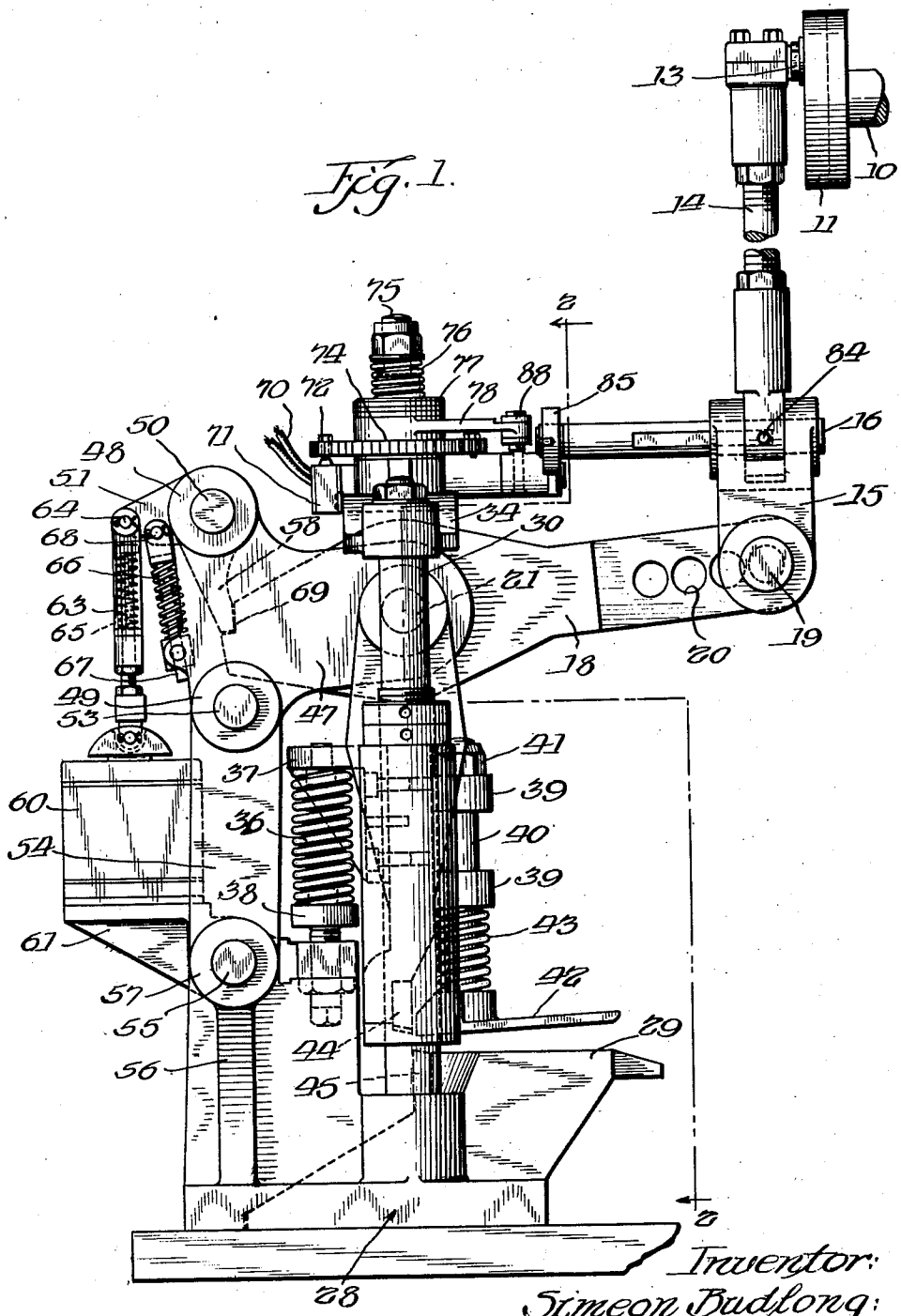
Jan. 18, 1944. S. BUDLONG 2,339,456

CUTTING APPARATUS

Filed June 19, 1942 4 Sheets-Sheet 1

Fig. 1.



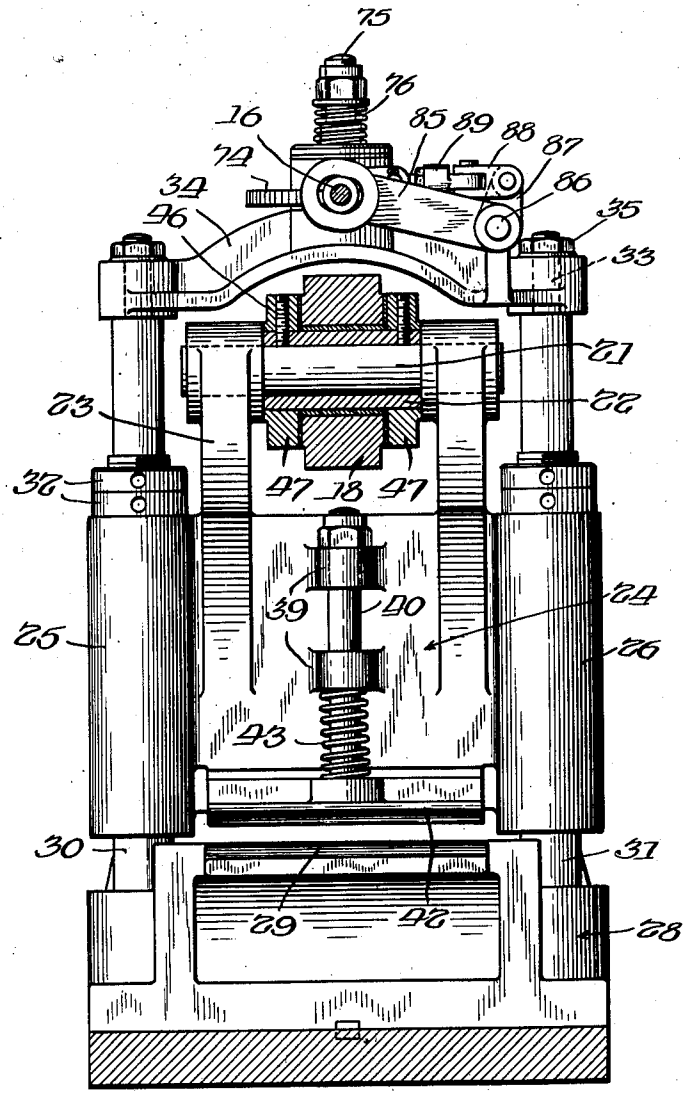
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Jan. 18, 1944. S. BUDLONG 2,339,456

CUTTING APPARATUS

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Fig. 2.



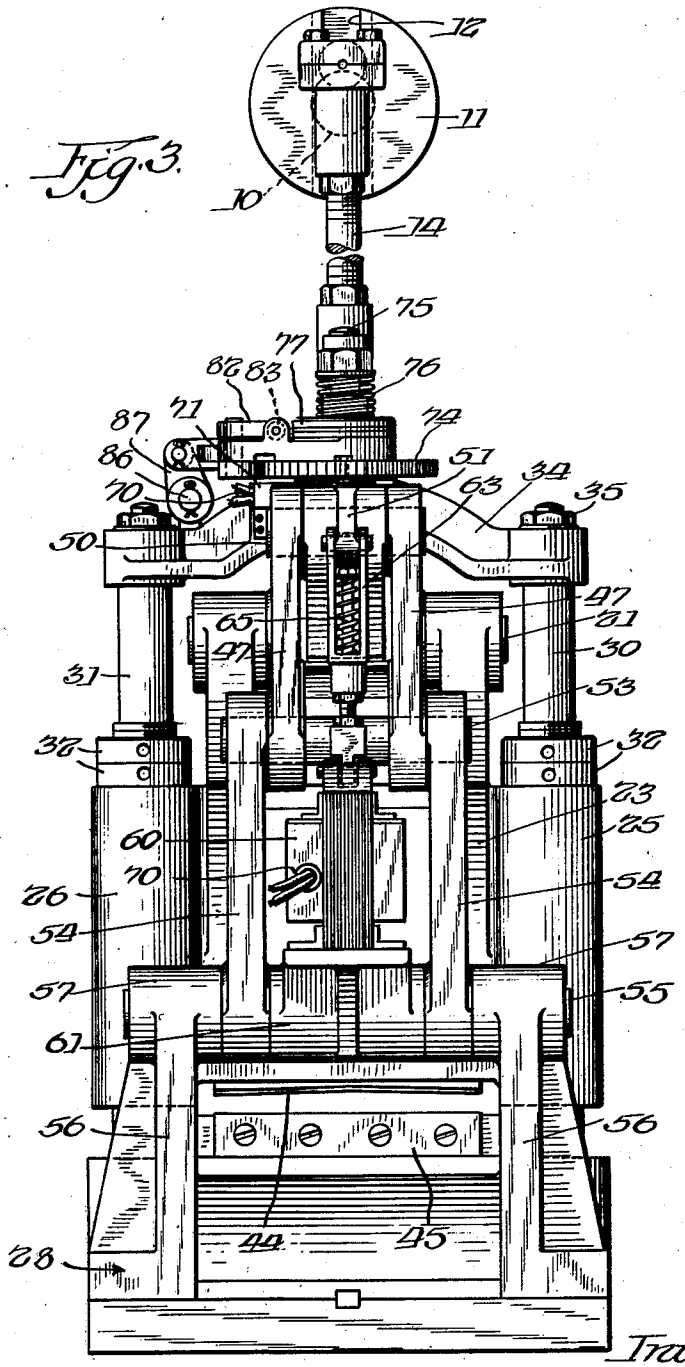
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CUTTING APPARATUS

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Fig. 3.



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CUTTING APPARATUS

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Fig. 4.

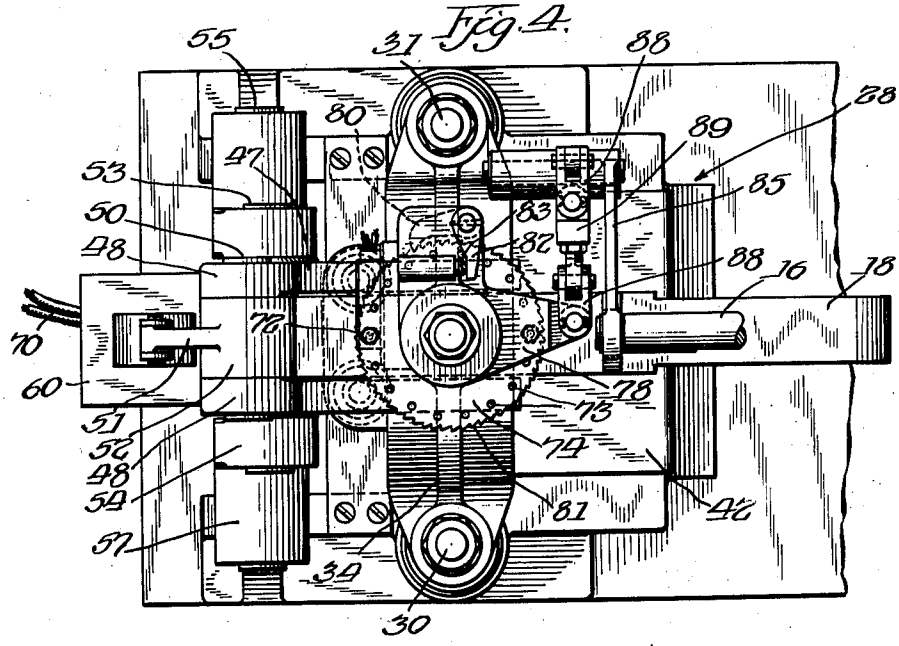


Fig. 5.

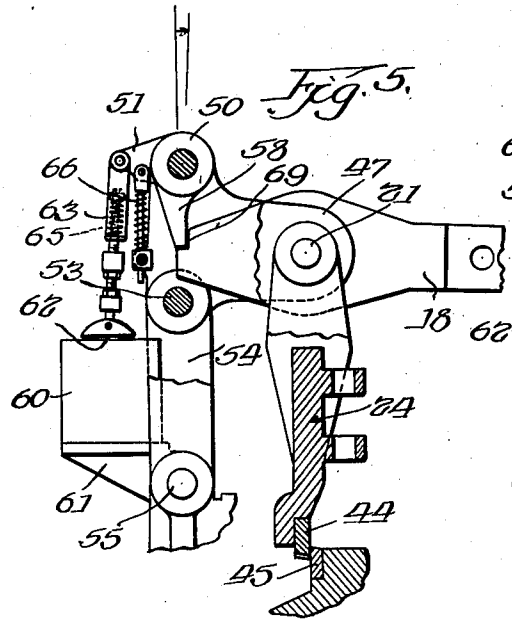
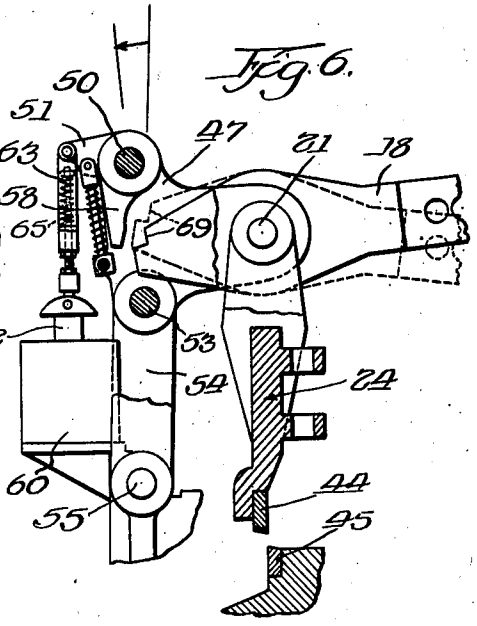


Fig. 6.



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Patented Jan. 18, 1944

2,339,456

UNITED STATES PATENT OFFICE

2,339,456

CUTTING APPARATUS

Simeon Budlong, Chicago, Ill., assignor to F. J. Littell Machine Company, Chicago, Ill., a corporation of Illinois

Application June 19, 1942, Serial No. 447,639

7 Claims. (Cl. 164—47)

The invention relates to improvements in cutting apparatus and has reference particularly to apparatus of this type for cutting metal stock material, scrap material, and the like.

A primary object of the invention is to improve the apparatus shown in the basic patent to Edgar R. Miller, No. 2,268,052, granted December 30, 1941. In said patent the cutter is shown as comprising auxiliary equipment for use with punch presses or similar machines and wherein the control for the oscillating member is mounted on the upright frame of the press in position to receive actuations from the main operating shaft. The present cutting apparatus comprises a fully assembled device wherein the several elements are supported by the apparatus itself and which may be applied and removed from a press or the like as a unitary device.

Another object of the invention is to provide an improved reciprocating type of cutting apparatus having an oscillating member pivotally fulcrumed intermediate its ends to a reciprocating cutting member and wherein the parts are constructed and arranged to effect a cutting operation by latching the normally free oscillating end of the member to thereby shift the fulcrum point of the member from an intermediate position to an end position.

Another object resides in the provision of improved supporting means having association with the normally free end of the oscillating member and which will support a latch and electric actuating means for biasing said latch into a holding position with the free end of the member whereby to lock said end against movement.

A more specific object is to provide improved supporting means as above described which will include a toggle arrangement whereby as a result of said toggle the latch can be maintained in solid and secure holding relation with the normally free end of the oscillating member to eliminate all relative movement between the latch and said end of the member. Therefore in the present cutting device the latch engages the end of the oscillating member in a manner to prevent movement between the parts, and since said end of the member can not move independently of the support the fulcrum point is shifted to the toggle.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawings and claims appended hereto.

In the drawings which illustrate an embodiment of the invention and wherein like reference characters are used to designate like parts—

Figure 1 is an elevational view showing the cutting apparatus of the invention;

Figure 2 is a sectional view taken substantially along line 2—2 of Figure 1 and looking in the direction of the arrows;

Figure 3 is an end elevational view of the cutting apparatus shown in Figure 1 looking toward that end of the device provided with the solenoid and latching means for the oscillating arm;

Figure 4 is a top plan view;

Figure 5 is a fragmentary detail view showing the latching means in contact with the normally free end of the oscillating arm to thereby cause the cutter to perform a cutting operation; and

Figure 6 is a fragmentary detail view similar to Figure 5 but showing the latching means in released position.

The cutting apparatus of the invention essentially comprises equipment for use with punch presses or similar machines wherein the oscillating member or arm is actuated by rotary movement of the main shaft of the press. In Figure 1 said main shaft is indicated by numeral 10 and which shaft may be rotated continuously or at intervals, depending on the function to be performed by the shaft. In addition said shaft drives the cutting apparatus of the invention for which purpose the end of the shaft is provided with the disc 11 having the diagonally extending race 12 for receiving the pivot stud 13 which is fixedly secured in adjusted position within the race to provide an eccentric or crank connecting with the upper end of the connecting rod 14. Said rod at its lower end is pivotally joined to the clevis 15 by the pin 16 and said clevis has adjustable connection with the right hand end of the oscillating arm or member 18. The clevis connecting pin 19 may be inserted in any one of the openings 20 formed on the right hand end of the oscillating member. The openings provide for adjustability of the apparatus along the base of the press so that the material will be cut at the desired point.

Except when the oscillating member 18 is performing a cutting operation the said member has pivotal movement about a fulcrum point located substantially centrally thereof. This intermediate fulcrum of the member is best shown in Figures 1 and 2, the same including a fulcrum pin 21 which passes through the bearing 22 on

which is directly mounted the oscillating member 18 so that the same may have free pivotal movement thereon. It will be observed that the pin 21 extends beyond the bearing 22 on each side thereof and these extending portions of the pin have securement to the bifurcated arms 23 projecting upwardly from the reciprocating cutter slide indicated in its entirety by numeral 24.

The cutter slide as shown in Figure 2 is integral with tubular portions 25 and 26 formed on the respective sides thereof by means of which the cutter slide is mounted for reciprocating movement in a vertical direction. The base 28, which provides the support 29 for the material to be cut, has suitably fixed thereto a pair of spaced upright supports 30 and 31, the post 30 extending through tubular portion 25 and post 31 extending through tubular portion 26. Above the tubular portions each post is provided with threaded nuts 32 each adjustably secured thereto, which form adjustable stops limiting movement of the cutter slide in an upward direction. The extreme upper end of each post is provided with a portion 33 of reduced diameter suitably threaded and receiving the respective ends of a supporting bridge 34. Said supporting bridge is securely mounted on the upright posts 30 and 31 since securing nuts 35 firmly retain the bridge in position on said posts. The reciprocating cutter slide is resiliently biased in an upward direction into contact with the stop members 32 by one or more coil springs 36 held under compression between a laterally extending ledge 37 forming part of the cutter slide and the adjustable base 38. Said base is adjustable with respect to support 28 and both said base and latch 37 provide centering pins which extend within the spring to centrally position the same with respect thereto. The tension of the spring 36 is imparted to the extending ledge 37 which is suitably secured to the cutter slide and thus the slide is held in elevated position in contact with stop members 32.

On the side of the cutter slide opposite spring 36 said slide has spaced bosses 39 formed integral therewith. These bosses receive the shaft 40 and mount the same for limited reciprocating movement in a vertical direction. Downward movement of shaft 40 is limited by nut 41 and since the said shaft carries the stripper plate 42 at its lower end, movement in an upward direction is imparted thereto against the tension of coil spring 43. The slide carries the cutting blade 44, Figures 5 and 6, suitably secured thereto at its lower end, and said blade forms the movable element of the present cutting apparatus, the same cooperating with the stationary blade comprising part of base 28. The material is fed between the support 29 and the stripper plate 42 and the same is cut by downward movement of the reciprocating cutter slide. In actual practice there is a tendency for the material to travel upwardly as the cutter slide moves upwardly. This may be prevented by the stripper plate 42 which is shown as resiliently mounted on the slide for a limited reciprocating movement in a direction parallel thereto.

The movement imparted to the oscillating member 18 by means of connecting rod 14 which is actuated by rotary shaft 10 will normally take place on the fulcrum pin 21 provided by the reciprocable cutter slide. The invention provides novel latching means and supporting structure therefor whereby the end of the oscillating member opposite clevis 15 may be latched and held against movement so that the fulcrum point of the member will be shifted from an intermediate position, represented by pin 21, to an end position. As a result the cutter slide 24 will be caused to reciprocate to perform a cutting operation. The cutter slide will move downwardly and then return to its initial elevated position for each revolution of the shaft 10, and the cutting operations will continue as long as the latching means is held in latching engagement with the normally free end of the oscillating member. However, the invention contemplates that the latching means will be released at the end of a cutting operation and that latching will not again take place until another cutting operation is desired. The improved features of the invention which accomplish the above operations will now be described.

Referring again to Figure 2, it will be observed that the bearing 22 is secured by means of set screws 46 to the supporting arms 47 positioned on said bearing in spaced relation and which receive the oscillating member 18 therebetween. Therefore the member 18 is actually mounted for oscillating movement on bearing 22 which in turn is journalled by the fulcrum pin 21. The supporting arms 47 are likewise journalled by the fulcrum pin 21 since they have securement to the said bearing. Each arm 47 is provided with a journalling boss 48 located at the upper end of the outer extremity of the arm and with a journalling boss 49 forming the lower portion of the arm. The spaced bosses 48 thus provided are disposed in alignment and the same receive the pin 50 for pivotally connecting the latching lever 51 to said arms. Said lever has a journalling portion 52 supported by said pin and located between bosses 48 of the arms. In a similar manner the bosses 49 receive the pivot pin 53, which pin projects outwardly beyond each boss and receives the toggle arms 54 which are thereby pivotally connected to the supporting arms 47. Each toggle arm has connection with base 28 by the pivot pin 55 which pivotally connects the arms to the spaced uprights 56 providing journalling portions 57 which receive the pin 55. The supporting arms 47 and toggle arms 54 thus form a toggle arrangement wherein the supporting arms comprise the movable element of the same, the arms having movement on pivot pin 53 as an axis, and the toggle arms comprising the pivotal element having movement on pin 55 as the axis. The structure above described is shown in Figure 3 in elevation, wherein spaced uprights 56 provide the journalling portions 57 which are located outwardly of the toggle arms 54. Said toggle arms at their upper ends are positioned outwardly of the supporting arms 47 which in a similar manner provide the journalling bosses 48 at their upper end, located on the respective sides of lever 51 having a journalling portion 52.

Referring more particularly to the detail views, Figures 5 and 6, it will be observed that the journalling portion 52 additionally provides a depending latch or gag 58 which is actuated as a result of movement imparted to the latching lever 51. Said latching lever is controlled by electric means in the form of a solenoid 60 supported by member 61 having location between the toggle arms 54 and which is in turn supported by the pivot pin 55. The solenoid is provided with an armature 62 depending within the same and which armature is pivotally connected by means

of link 63 with the latching lever 51. The link 63, as best shown in Figures 1 and 3, comprises bifurcated arms pivoted to the lever at 64. The coil spring 65, Figure 3, located between the bifurcated arms provides resilient means by which the link is connected to the solenoid. Movement of the solenoid in a downward direction is thereby imparted to the link 63 through the resilient coil spring 65 and the latching lever 51 is yieldingly actuated and its degree of actuation is not necessarily dependent on the extent of movement of the armature 62. The lever 51 is normally maintained in a released or inoperative position by means of coil spring 66 supported by rod 67, which rod is pivotally connected at its upper end to said lever as at 68. The action of the coil spring 66 is to urge the lever in a clockwise direction, which functions to maintain the depending latch or gag 58 in a position where the same is withdrawn and out of contact with the recessed end 69 of the oscillating member. It is possible for the gag 58 to enter the recess only when this end of the oscillating member is in its lowermost position. When said gag does enter the recess on the normally free end of the member the fulcrum point of the member is thereby shifted from an intermediate to an end position with the result that reciprocating movement is imparted to the cutter slide 24 to perform a cutting operation.

As previously described, solenoid 60 provides electrical means for controlling the actuation of latching lever 51 and in accordance with the invention the solenoid is energized at intervals measured by the strokes imparted to the oscillating member 18. When thus energized the armature 62 is caused to move downwardly, which yieldingly moves lever 51 in a counter-clockwise direction, causing movement of gag 58 toward its end of member 18. Of course the gag will enter recess 69 only when said end of the member assumes its lowermost position of movement which requires that the clevis 15 be in elevated position. When this takes place the gag in effect locks its end of the oscillating member to the supporting arms 47. With this end of the member locked to the supporting arms and with downward movement of the clevis end of the arm about to take place it will be understood that the toggle arrangement must therefore function in a manner to fulcrum the latched end of the oscillating member. In fact, the toggle arrangement supports the arms 47, permitting pivotal movement and bodily movement of said arms with respect to pin 53. This is clearly evident from Figure 5 wherein the arms 47 are shown in a position that locates the pivot pins of the toggle arrangement in a substantially straight line. The line joining pins 50, 53 and 55 is approximately straight and vertical.

The operative position of the toggle arrangement shown in Figure 5 can be contrasted with that shown in Figure 6, which is the inoperative position since the gag is released in Figure 6 and the oscillating member 18 fulcrums on pin 21. In Figure 6 the pin 50 has moved to the left, whereas, pivot pin 53 has moved to the right. The toggle action of the arms 47 makes possible the latching of the member 18 by the gag 58 in a manner whereby all relative movement between these parts is eliminated. The member 18 when latched is securely joined to the arms 47 and if the latched end of the member is to fulcrum it must do so through the arms. The fulcruming therefore takes place on the pin 53 and it will be observed that the fulcrum point of the member is shifted from the pin 21 to the said pivot pin 53 as a result of the latching action of gag 58 to produce a cutting operation.

The solenoid 60 is electrically connected by means of conductor wires 70 to the micro-switch 71 suitably supported by the bridge 34. The micro-switch is provided with a movable contact member which is depressed to close the switch as a result of contact with the depending ends of the studs 72 located in certain openings 73 of an indexing plate 74. The plate is suitably mounted for rotation on the shaft 75 projecting upwardly from the bridge 34 and by means of the coil spring 76 and washers 77 a yielding brake is provided whereby rotation of the indexing plate 74 may take place although overrun is effectively prevented. The shaft 75 also carries an actuating member in the form of a bell crank 78 which is mounted over the indexing plate and has rotation independently of said plate. One leg of the bell crank lever 78 carries an indexing pawl 80 adapted to engage the ratchet teeth 81 provided on the periphery of the indexing plate. The pawl 80 is held in contact with the ratchet teeth 81 by means of the arm 82 and spring pressed detent 83 which are located on the top side of the bell crank lever, whereas, the pawl 80 is positioned adjacent the underside of the same. It will be observed, Figure 4, that when counter-clockwise rotation is imparted to the bell crank 78 the actuating pawl 80 will be caused to transmit said movement to the indexing plate 74. However, clockwise rotation of the bell crank lever is not imparted to the indexing plate since the actuating pawl 80 in this direction will ride over the ratchet teeth.

Means are provided for oscillating the bell crank lever 78 whereby intermittent rotation is imparted to the indexing plate 74, as best shown in Figures 3 and 4. Said means in the form of linkage is operatively connected with the clevis 15 through pin 16 adjustably secured in position by set screw 84. The said pin at its left hand end has location within an oblong opening provided in arm 85 pivotally mounted to the bridge 34 by pin 86. The end of the arm mounted by pin 86 provides an upstanding lever 87 materially reduced in length compared to arm 85. The lever 87 is connected to the bell crank lever by the clevis connections 88 and by the intermediate link 89. Although the motion of pin 16 is reciprocable in a substantially vertical plane it is transformed by the action of said pin with respect to arm 85 into oscillating motion of the bell crank 78. The intermittent rotation thus imparted to the indexing plate 74 is sufficient to index the same one notch for each complete rotation of shaft 10. It will be observed that the openings 73 are located in spaced relation and that said openings retain the studs 72. It is, of course, understood that the number of openings in the indexing plate is discretionary and for the particular cutting job to be performed one or more studs 72 will be positioned in said plate. When the studs move into alignment with the contact member of the micro-switch 71 the circuit to the solenoid 60 is closed and the gag 58 is actuated into latching position with the oscillating member 18. A cutting operation therefore results from this energization of the solenoid. The cutting operations may be caused to take place at desired intervals depending on the particular spacing between the studs 72 fixed to the indexing plate 74.

Following each cutting operation initiated by

contact of a stud 72 with the micro-switch 71, the indexing plate 74 will be rotated one notch on the next stroke of the connecting rod 14 and the micro-switch will therefore be released to deenergize the solenoid switch 60. The gag 58 is yieldingly biased into a released position by the coil spring 66 and the oscillating member 18 is accordingly released with respect to the arms 47. Whereas, the member 18 fulcrumed on pin 53 during the cutting operation, said member will fulcrum on pin 21 during the time the gag 58 remains released. A positive act is therefore necessary to shift the fulcruming of the member 18 back to pin 53 which is initiated by the indexing plate 74, causing energization of solenoid 60 and a latching by means of the gag 58 to take place.

The present cutting apparatus comprises a complete and unitary device including the indexing plate, micro-switch and related elements which are supported in position by the bridge 34. A feature of said cutting apparatus resides in the novel arrangement of arms providing the toggle as a result of which the oscillating member can be securely latched by gag 58 and locked to the supporting arms 47 in a manner to eliminate all relative movement between the parts.

What is claimed is:

1. In apparatus of the character described, a reciprocable cutting slide, an oscillating member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, a supporting arm also having a pivotal mounting on said cutting slide with said fulcrum as an axis, a toggle arm pivotally connecting with the supporting arm and having its opposite end pivotally anchored to a base, whereby said supporting and toggle arms comprise a toggle arrangement, means connecting with one end of the oscillating member for oscillating the same, and a latch pivotally carried by the supporting arm and adapted to have latching engagement with the opposite end of the oscillating member.

2. In apparatus of the character described, a reciprocable cutting slide, an oscillating member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, a supporting arm also having a pivotal mounting on said cutting slide with said fulcrum as an axis, a toggle arm pivotally connecting with the supporting arm and having its opposite end pivotally anchored to a base, whereby said supporting and toggle arms comprise a toggle arrangement, means connecting with one end of the oscillating member for oscillating the same, a latch pivotally carried by the supporting arm and having a latched and a released position with the opposite end of the oscillating member, and means for actuating said latch having a resilient connection therewith.

3. In apparatus of the character described, a reciprocable cutting slide supported for coaction with a stationary blade to perform a cutting operation, an ocillating member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, a supporting arm also having a pivotal mounting on said cutting slide with said fulcrum as an axis, a toggle arm pivotally connecting with the supporting arm and having its opposite end pivotally anchored to a base, whereby said supporting arm and toggle arm comprise a toggle arrangement, means connecting with one end of the oscillating member for oscillating the same, a latch carried by the supporting arm and normally assuming a related position with the opposite end of the oscillating member so that said member normally fulcrums on the cutting slide, and means for actuating the latch into engaged position with said opposite end of the member to lock the same to the supporting arm, whereby oscillation of the member takes place with the toggle arrangement providing the fulcruming axis and which thereby imparts reciprocating movement to the cutting slide to perform a cutting operation.

4. In cutting apparatus, a base providing spaced projecting posts and mounting between the posts a stationary cutting blade, a slide supported by said projecting posts for reciprocation and providing a cutting blade for coaction with the stationary blade, resilient means maintaining the slide in position with the cutting blades separated, an oscillating member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, toggle means associated with one end of the member and having pivotal connection with the base and pivotal connection with the cutting slide on the same fulcrum axis as the member, and latching means carried by said toggle means for latching said end of the member, whereby said oscillating member when latched will impart movement to the slide to cause the blades to coact and the toggle means will provide for pivotal movement of the latched end of the member.

5. In cutting apparatus, a base providing spaced projecting posts and mounting between the posts a stationary cutting blade, a slide supported by said projecting posts for reciprocation and providing a cutting blade for coaction with the stationary blade, resilient means maintaining the slide in a position with the cutting blades separated, an oscillating member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, toggle means associated with one end of the member and including a toggle arm pivotally anchored to the base and a supporting arm pivotally connected to the cutting slide with said fulcrum as an axis, and latching means carried by the supporting arm for latching said end of the member, whereby said oscillating member when latched will impart movement to the slide to cause the blades to coact and the toggle means will provide for pivotal movement of the latched end of the member.

6. In cutting apparatus, a base providing spaced upright posts and mounting between the posts a stationary cutting blade, a slide supported by said upright posts for reciprocation and providing a cutting blade for coaction with the stationary blade, resilient means maintaining the slide elevated with the cutting blades separated, a member having a pivotal mounting intermediate its ends on the cutting slide and which thereby provides a fulcrum for the member, means at one end of the member for oscillating the same, toggle means associated with the opposite end of the member, said toggle means including arms pivoted to each other to form the center pivot of the toggle and also having pivotal connection with the base and with the cutting slide on the same fulcrum axis as the member, and a latch carried by the toggle means for latching the opposite end of the member when said end is located in its extreme down posi-

tion, whereby oscillation of the member will then take place with respect to the center pivot as the fulcrum and which thereby imparts reciprocating movement to the slide.

7. In cutting apparatus, a cutting slide mounted for vertical reciprocating movement and yieldingly held in an elevated position, an oscillating member fulcrumed at a point intermediate its ends on said cutting slide, means connecting with one end of the member for oscillating the same, a latch having an engaged and a released position with the opposite end of the member, toggle means in associated relation with said opposite end of the member and providing a pivotal support for the latch, said latch in engaged position locking said opposite end of the member to the toggle means so that said member can fulcrum only through said toggle means, whereby said member upon oscillating movement will impart reciprocating movement to the cutting blade, and a solenoid providing an armature having resilient connection with the latch for actuating the latch into an engaged position when energized.

SIMEON BUDLONG.

CERTIFICATE OF CORRECTION.

Patent No. 2,339,456. January 18, 1944.

SIMEON BUDLONG.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, line 66, claim 5, for "ocillating" read --oscillating--; and second column, line 3, same calim, for "related" read --released--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 11th day of April, A. D. 1944.

(Seal)

Leslie Frazer

Acting Commissioner of Patents.