

May 9, 1944.

K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 1

FIG. 1.

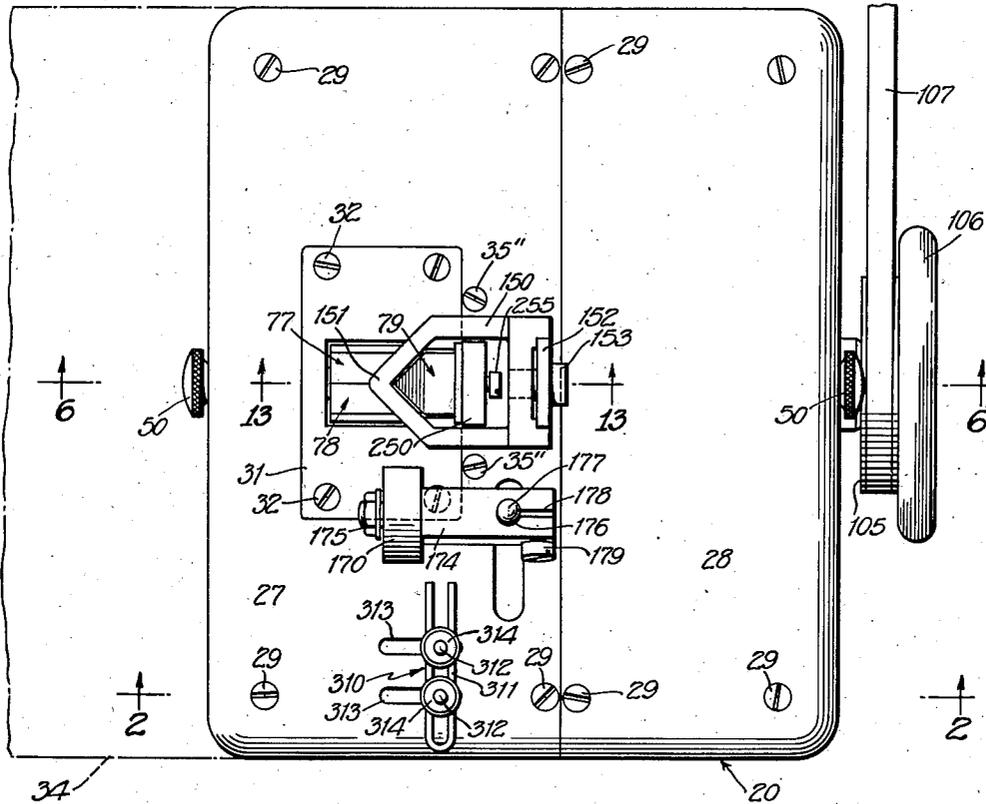
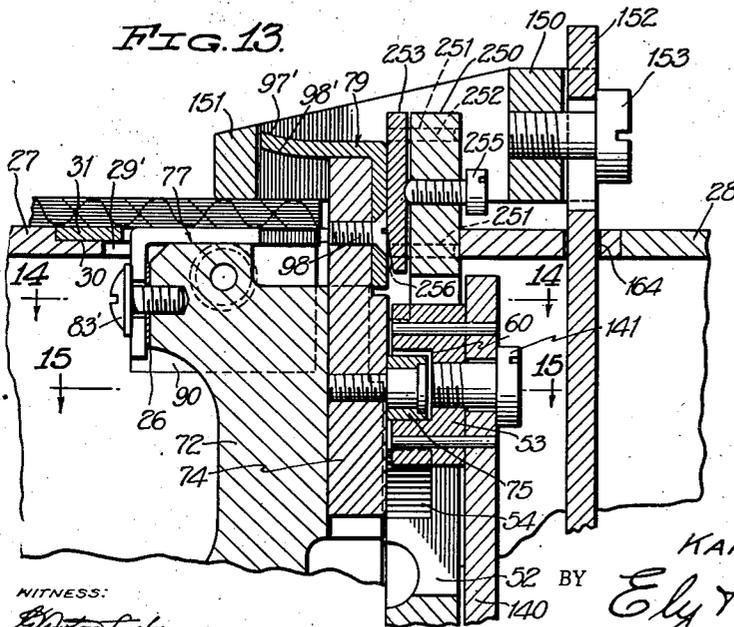


FIG. 13.



WITNESS:

E. H. Johnson
2162

INVENTOR.
KARL A. DOEHM.
BY *Ely Pattison.*
ATTORNEYS.

May 9, 1944.

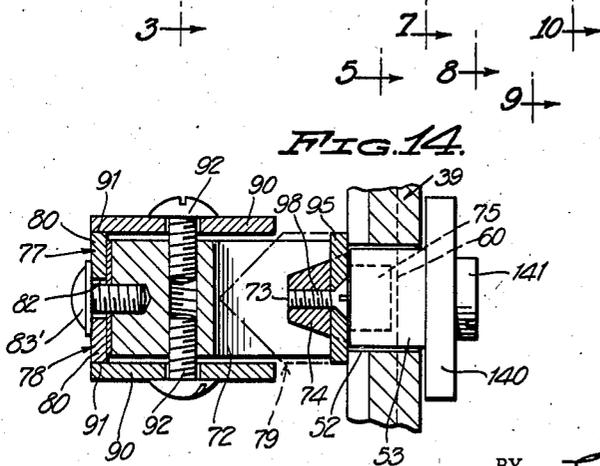
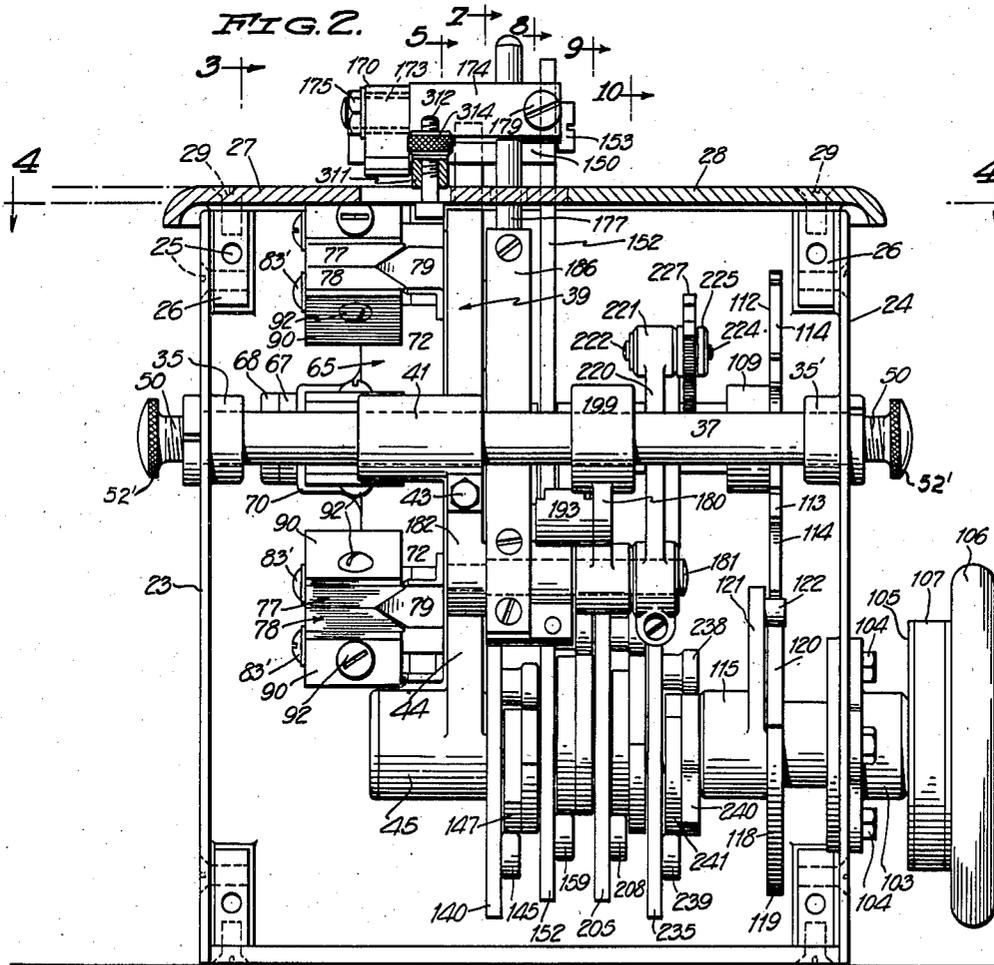
K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 2



WITNESS:
E. J. [Signature]
1944

INVENTOR.
KARL A. DOEHM.
BY *Ely Patterson.*
ATTORNEYS.

May 9, 1944.

K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 3

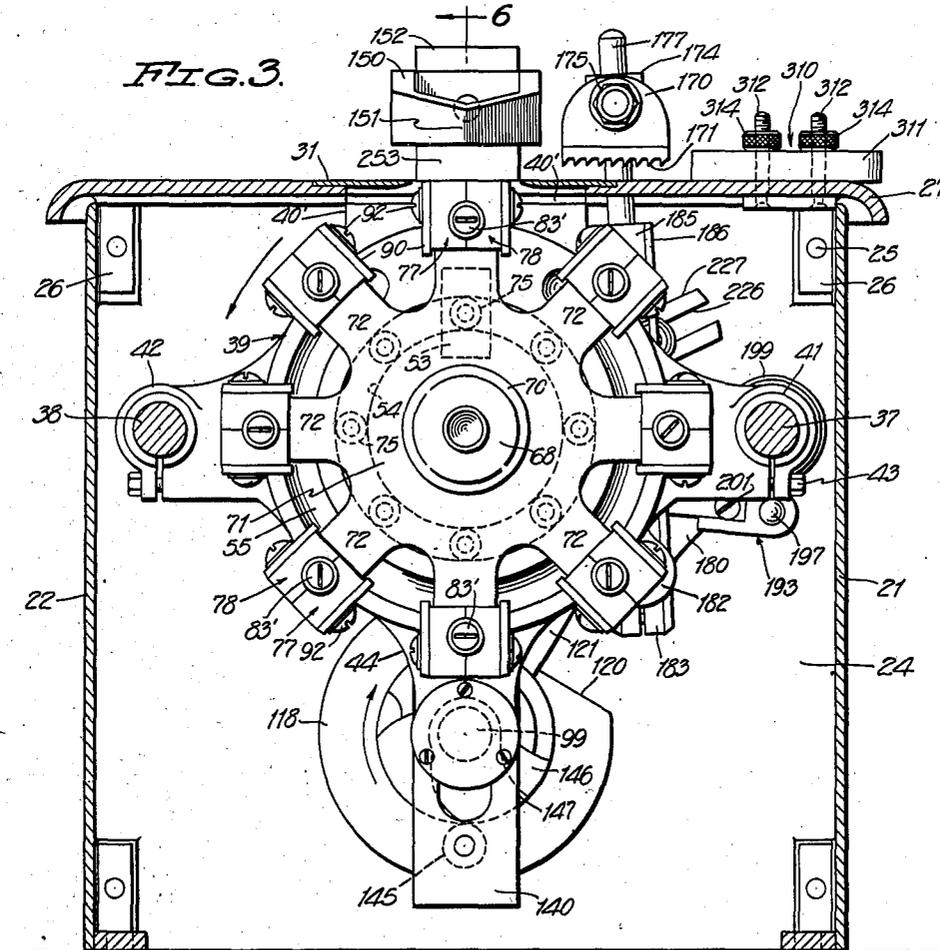
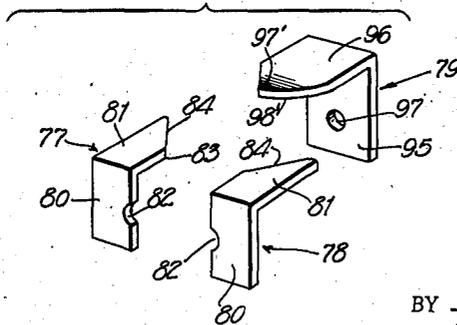


FIG. 3.

FIG. 16.



WITNESS:
E. J. Patterson

INVENTOR
KARL A. DOEHM.
BY *Ely Patterson*
ATTORNEYS.

May 9, 1944.

K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 4

FIG. 4.

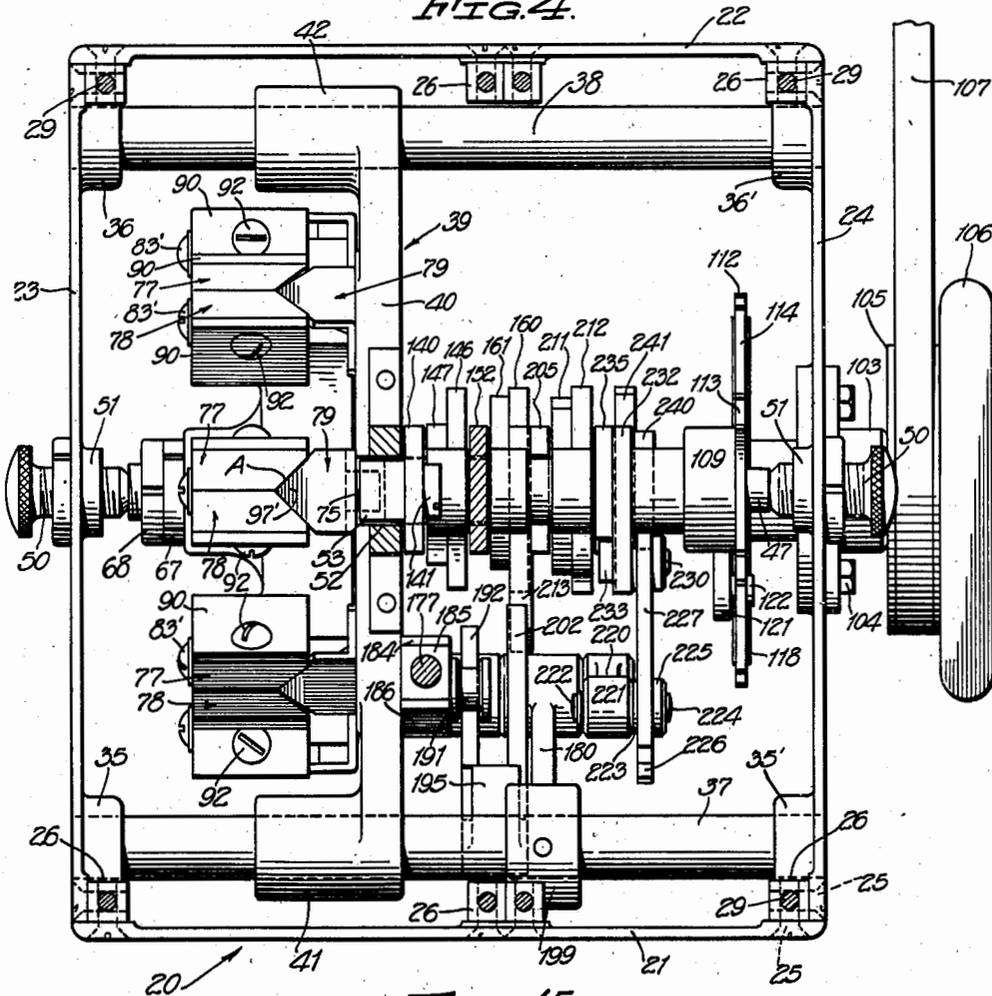
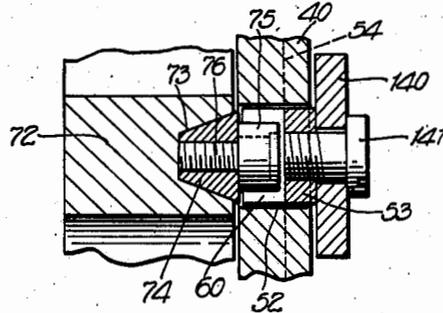


FIG. 15.



WITNESS:

E. A. Patterson

INVENTOR.
KARL A. DOEHM.
BY *Ely Patterson*
ATTORNEYS.

May 9, 1944.

K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 5

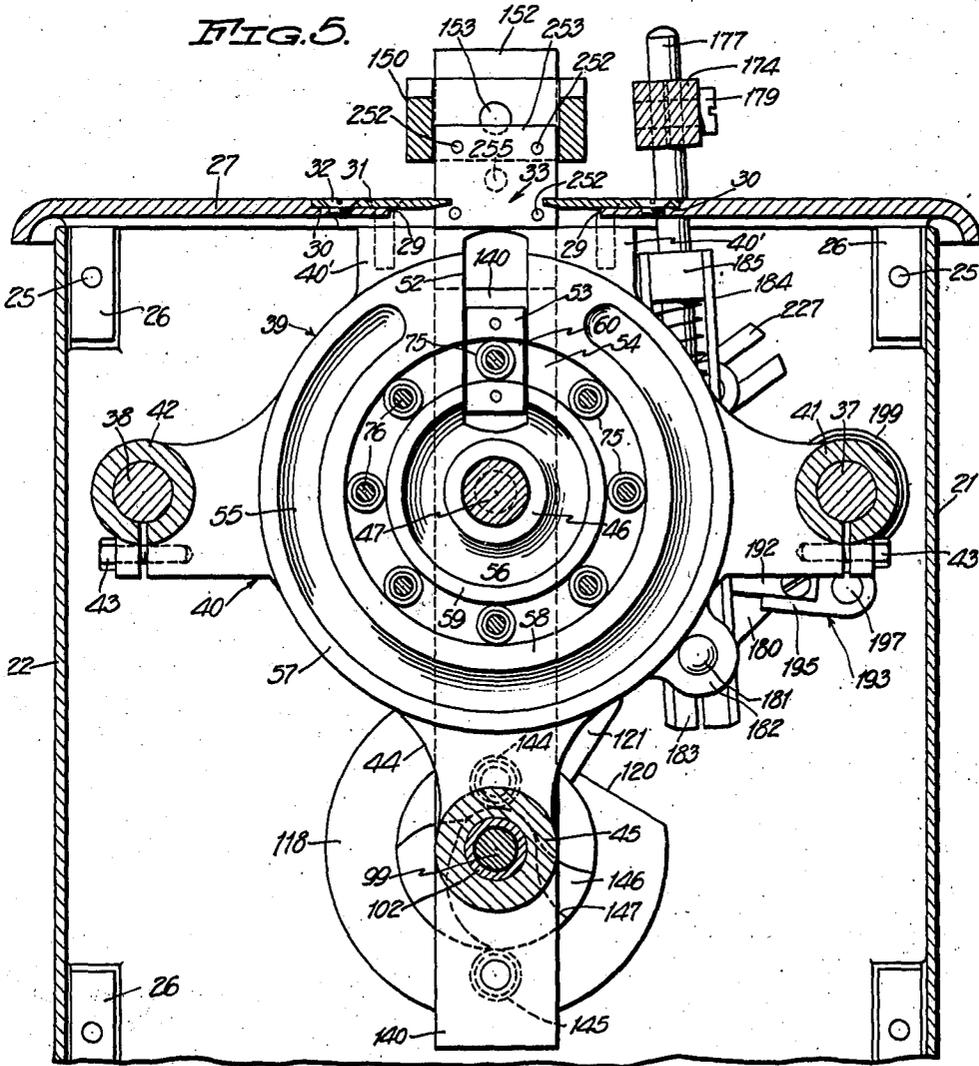


FIG. 5a



WITNESS:

Ely & Pattison

INVENTOR.

KARL A. DOEHM.

BY

Ely & Pattison

ATTORNEYS.

May 9, 1944.

K. A. DOEHM

2,348,529

PINKING MACHINE

Filed Nov. 13, 1942

9 Sheets-Sheet 8

FIG. 8.

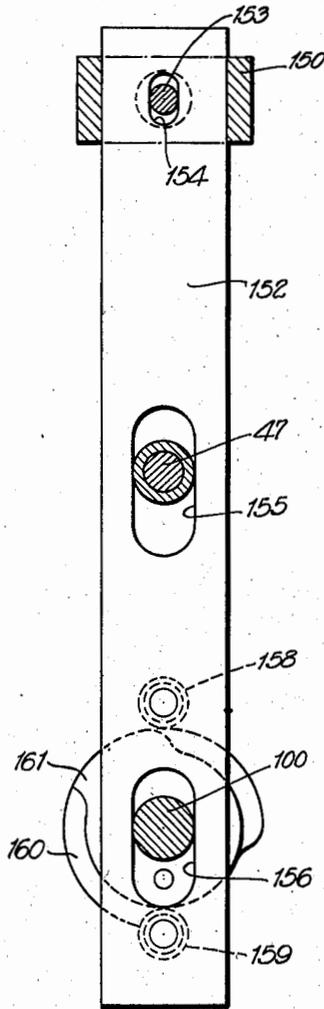
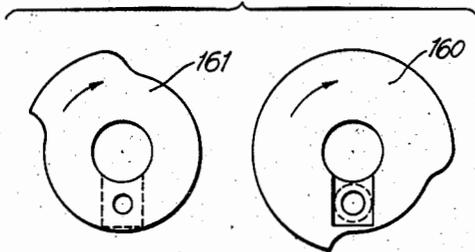


FIG. 8a



WITNESS:
E. J. ...

FIG. 12.

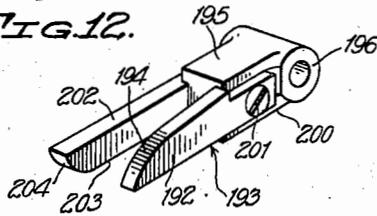


FIG. 9.

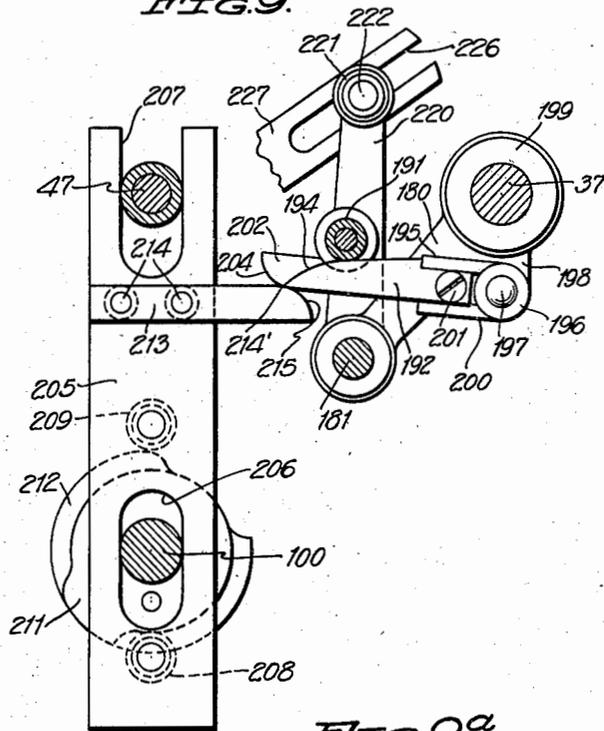
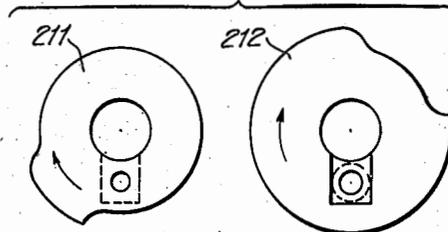


FIG. 9a



INVENTOR.
KARL A. DOEHM.

BY
Ely Patterson
ATTORNEYS

UNITED STATES PATENT OFFICE

2,348,529

PINKING MACHINE

Karl A. Doehm, West New York, N. J., assignor to
Samuel Briskman, New York, N. Y.

Application November 13, 1942, Serial No. 465,477

24 Claims. (Cl. 164—50)

The present invention relates to machines for cutting sheet material and more particularly it relates to machines which cut the material in such a manner as to leave an ornamental edge thereon.

Such machines are generally known as pinking machines, and it is one object of the invention to improve the construction and mode of operation of pinking machines and to provide such machines with a mechanism which will effect a better pinking operation than prior machines.

A feature of the present invention, consists in the provision, in a machine of the character above outlined, of a plurality of separate cutting knives which are successively brought into an operative position and singly operated to perform a pinked edge upon the material being operated upon.

This feature is considered important since it results in advantages which are not, to my knowledge, present in pinking machines as generally constructed.

One of the advantages resulting from the use of multiple knives is that such construction permits of longer periods of operation between necessary changes or sharpening of the cutting knives than is possible in machines which employ but one cutting knife.

A further feature of the invention resides in a machine of the kind aforementioned, in which the use of a plurality of successively operated separate cutting knives prevents overheating of the said knives due to a cooling period which occurs during their respective use.

Another advantage resulting from the use of multiple knives is that such construction permits of the production of varied designs of pinked edges. For example, by proper proportioning of the cutting knives, one set of alternate knives may make a V-shaped cut, while the intervening knives may produce a curved or scalloped cut, thus, resulting in an ornamental edge consisting of connected V-shaped and scalloped cuts upon the edge formed by the machine. Thus, it will be apparent that merely by selection and arrangement of cutting knives, a wide variation of ornamental edges is possible.

Another feature of the invention resides in a novel mechanism for operating the several knives independently as they are brought successively to the operating position in the machine.

Still other features of the invention reside in a novel material feeding mechanism and a novel operating mechanism therefor.

Still other features of the invention reside in a novel material holding means and a novel operating means therefor.

Other features of the invention relate to certain novel and improved constructions, arrangements and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention will be clearly understood from the accompanying drawings, illustrating the invention in its preferred form and the following detailed description of the constructions therein shown.

Figure 1 is a top plan view of a pinking machine constructed in accordance with the present invention,

Figure 2 is a vertical sectional view on an enlarged scale taken substantially on the line 2—2 of Figure 1, the view illustrating the general arrangement of the mechanism of the machine,

Figure 3 is a vertical sectional view on an enlarged scale taken at right angles to Figure 2, substantially on the line 3—3 thereof,

Figure 4 is a horizontal sectional view on an enlarged scale taken substantially on the line 4—4 of Figure 2,

Figure 5 is a vertical sectional view on an enlarged scale, partly broken away, and taken substantially on the line 5—5 of Figure 2, illustrating the mechanism by which the knives are operated,

Figure 5^a is a detail view illustrating the cams by which the knife operating means is operated,

Figure 6 is a vertical sectional view on an enlarged scale taken substantially on the line 6—6 of Figure 3, the view illustrating the knife carrier, various operating elements of the machine and a cam assembly for operating said elements,

Figure 6^a is a detail sectional view illustrating the manner in which the several cams of the cam assembly are operably connected with the shaft upon which they are mounted,

Figure 7 is a vertical sectional view on an enlarged scale partly broken away, the same being taken substantially on the line 7—7 of Figure 2 and illustrating the material feeding mechanism in one of its positions,

Figure 8 is a detail view on an enlarged scale substantially on the line 8—8 of Figure 2, illustrating the operating means of the material holding means,

Figure 8^a is a detail view illustrating the cams

for operating the operating means of the material holding means,

Figure 9 is a view on an enlarged scale partly in section and with parts broken away, the view illustrating a portion of the material feeding mechanism, the view being taken substantially on the line 9—9 of Figure 2,

Figure 9^a is a detail view illustrating the cams by which the material feeding mechanism is raised and lowered relative to the material operated upon,

Figure 10 is a detail sectional view on an enlarged scale illustrating the material feeding mechanism in one of its positions of operation,

Figure 11 is a view similar to Figure 10 illustrating still another operative position of the material feeding mechanism,

Figure 11^a is a detail view of the cams employed for imparting the feeding motion to the material feeding mechanism,

Figure 12 is a detail perspective view of a portion of the material feeding mechanism,

Figure 13 is a detail vertical sectional view on an enlarged scale taken substantially on the line 13—13 of Figure 1, the view illustrating one of the cutting knives in its elevated position,

Figure 14 is a detail horizontal sectional view on an enlarged scale taken substantially on the line 14—14 of Figure 13,

Figure 15 is a detail horizontal sectional view on an enlarged scale taken substantially on the line 15—15 of Figure 13,

Figure 16 is a distended perspective view illustrating the shearing blades of the knives, and

Figures 17 and 18 are detail plan views illustrating different types of blades.

Referring to the drawings by reference character, and particularly to Figures 1 and 4, the machine includes a housing 20, which is preferably rectangular in form.

The housing comprises a front wall 21, a rear wall 22, and two side walls 23 and 24. These walls are preferably secured together by means of screws 25 which have threaded engagement with lugs 26 at each corner of the housing as best illustrated in Figures 1, 4 and 5 of the drawings.

The top wall of the housing preferably consists of two sections 27 and 28, and these sections are removably secured in place by screws 29 which also have threaded engagement with the uppermost lugs 26, heretofore mentioned.

As best illustrated in Figure 5 of the drawings, the meeting edges of these sections 27 and 28 are cut away as at 29' to provide an opening, and also as at 30 to provide a seat for a cover plate 31, which is removably secured in position by means of screws 32 and this cover plate is also provided with an opening 33 which opening will also be hereinafter referred to as the operating position of the machine.

The housing, heretofore described, is preferably mounted within a suitable opening in an operating table 34, illustrated in dot and dash lines in Figure 1 of the drawings.

By reference to Figure 4 of the drawings, it will be seen that the side wall 23 of the housing, has two lugs 35 and 36 and that the side wall 24 has two corresponding lugs 35' and 36', the former being disposed respectively opposite to the latter as illustrated in said figure.

These lugs are recessed for the reception of the ends of a pair of rods or shafts, the lugs 35 and 35' receiving the opposite ends of a rod or shaft 37 while the lugs 36 and 36' receive the

ends of a rod or shaft 38. Thus, these lugs 35 and 35' and 36 and 36' support their respective rods or shafts 37 and 38 which latter extend entirely across the interior of the housing 20.

Adjustably mounted on these rods 37 and 38, there is a plate 39, the main body portion of which is substantially circular in form. At diametrically opposite points, the plate 39 has two split sleeve bearings 41 and 42, which receive respectively the rods or shafts 37 and 38 and form the means by which the plate 39 may be slidably mounted upon the rods or shafts 37 and 38 and thus provide for its adjustment therealong. The plate 39 may be secured in an adjusted position upon the rods or shafts 37 and 38 by a tightening of the bolts 43, see Figure 5, to contract the split sleeve bearings 41 and 42 into holding engagement with their respective rods or shafts 37 and 38.

Upon its upper edge, the plate 39 is provided with two shoulders 40' which shoulders provide support for the central portion of the plate 27 and these shoulders are provided with threaded openings for the reception of screws 35'', see Figure 1, by which the central portion of the plate 27 may be secured to the plate 39.

Depending from the lower portion of the main body 40, of the plate 39, see Figures 2 and 5, there is an arm 44 which carries a bearing 45, the purpose of which will be hereinafter described and at a point substantially central of its circular body portion 40, this plate is provided with a bearing 46. This bearing 46, see Figure 6, forms a partial support for a shaft 47, which has an enlarged portion 48 at one end thereof. The shaft 47 is supported at its ends by means of pinion bearings 49, the bolts 50 of which have threaded engagement with the lugs 51 on the inner faces of the side walls 23 and 24 of the housing 20. Lock nuts 52' are employed to secure the threaded bolts 50 in their adjusted positions. This construction provides for longitudinal adjustment of the shaft 47 relative to the plate 39 for a purpose which will hereinafter become apparent.

As best illustrated in Figure 5 of the drawings, the circular body portion 40 of the plate 39 is provided with a radially extending cut out portion 52 which extends from a point closely adjacent the bearing 46 through the outer upper edge of the said circular body portion 40 of the plate 39. Slidably mounted in the cut out portion 52, there is a block 53, the purpose of which will be hereinafter specifically described.

By reference to Figure 6, it will be seen that the plate 39 is provided upon its left hand face with a channel 54 which channel, as illustrated in Figure 5, is concentric with the axis of the shaft 47 and has its ends oppositely disposed at opposite sides of the cut out portion 52 of the plate 39. The plate 39 is also cut away on this same face as at 55 and 56 to provide relatively narrow substantially concentric bearing surfaces 57, 58 and 59.

The sliding block 53, heretofore mentioned, is provided with an arcuate slot 60, the ends of which, when the block is in its innermost position in the slot 52, register with their respective ends of the channel 54 to form a complete circular channel as illustrated in Figure 5 of the drawings.

The reference numeral 65 designates a knife carrier and as illustrated in Figure 6 of the drawings, this knife carrier is keyed as at 66 to the shaft 47 heretofore mentioned, it being secured thereon by a nut 67 and a lock nut 68 which have

threaded engagement with the threaded end 69 of the shaft 47.

As best illustrated in Figures 3 and 6, the knife carrier has a central hub portion 70, a main body portion 71 which is substantially circular in form and from which extend a plurality of spaced, relatively short radial arms 72.

Each of the radial arms is formed upon its right hand face, see Figure 6, with a groove or channel 73 and slidably mounted in each of these channels 73, there is a block 74. Each of these sliding blocks has a roller 75, which is carried by a bolt 76 removably threaded into the block and the several rollers traverse the channel 54 of the plate 39 and the arcuate slot 60 of the sliding block 53, heretofore described, as best illustrated in Figure 5, upon rotary movement being imparted to the knife carrier 65.

The cutting knives are mounted upon the outer end faces of the radial arms 72 of the knife carrier which faces constitute the periphery of the knife carrier, referred to in the claims.

Each of the cutting knives comprises three cutting elements 77, 78 and 79 and since they are all of the same mechanical structure, the detailed description of one will be deemed to be sufficient.

The two cutting elements 77 and 78 are of substantially the same construction, each consisting of two right angularly disposed portions 80 and 81. The portion 80 of each of these elements is provided on its inner edge with a notch or the like 82 which notches, when the members are placed together upon the peripheral edge of the knife carrier, provide an opening for the reception of a securing screw or bolt 83', see Figures 13 and 14. As also illustrated in said figures, the opening formed by the notches 82 is slightly larger in diameter than the diameter of the bolt or screw 83', which construction allows for relative adjustment of the cutting elements 77 and 78. After the cutting elements 77 and 78 have been adjusted, they are maintained in position by side plates 90, see Figure 14, which engage their respective cutting elements as at 91, these side plates being secured in position by means of screws or bolts 92.

Each of the cutting elements 77 and 78 is formed upon the inner edge of its portion 81 with an angular face 83 which is slightly undercut to form a shearing edge 84.

As best illustrated in Figure 4, when these two cutting elements are secured in their proper positions on the periphery of the knife carrier, they form a V-shaped cutting notch A. However, as illustrated in Figure 17, the cutting elements may be so shaped as to provide a curved cutting notch B, or as in Figure 18, a modified curved and V notch C, from which it will be readily apparent that various forms of notches as well as combinations of cutting notches of various forms may be employed.

The cutting element 79, hereinafter referred to as the slidable knife, has two right angularly disposed portions 95 and 96. The portion 95 has an opening 97 for the reception of a bolt or screw 98 by means of which the cutting element 79 may be secured to a sliding block 74 heretofore described, see Figure 13. The portion 96 of the cutting element 79 has its outer end shaped to conform to the cutting notch formed by the cutting elements 77 and 78 and as best illustrated in Figures 13 and 16, this portion of the cutting element 79 is bent or rolled slightly outwardly as at 97' to form two shearing edges 98' which cooperate with the shearing edges 84 of the cut-

ting elements 77 and 78 to perform a cutting operation.

In the present embodiment of the invention, the knife carrier is illustrated as having eight cutting knives and it is to be understood that each is constructed in the manner just described.

The several cutting knives are successively brought to their operative position in the opening 33 in the table by imparting an intermittent or step by step rotary movement or motion to the knife carrier 65 and the manner in which this is accomplished will be hereinafter specifically described.

The bearing 45, see Figure 6, which depends from the lower portion of the plate 39, forms the support for the reduced inner end 99 of a shaft 100. The opposite end of this shaft 100 is also reduced as at 101 and it extends beyond the side wall 24 of the housing 20.

The reduced end 99 of the shaft 100 operates in a bushing 102 in the bearing 45 while the reduced end 101 of said shaft operates in a bushing 103 secured to the outer face of the side wall 24 of the housing 20 by means of bolts 104.

Keyed to the outer end of the reduced portion 101 of the shaft 100, there is a driving pulley 105 and a balance or fly wheel 106 which may also serve as a hand wheel for manual operation of the shaft 100. The key, which is designated 108, is of special construction and will be hereinafter specifically described. A driving belt 107, which may be operated by a suitable prime mover not here illustrated, passes around the driving pulley 105.

Secured to the shaft 47, see Figure 6, by means of a set screw 110, there is a collar 109 and secured to this collar as by a screw or bolt 111, there is a star wheel 112 of a conventional Geneva movement, the notches of the star wheel being designated 113, the intervening curved seats of the star wheel 112 being designated 114, see Figures 2, 4 and 7.

Referring again to Figure 6 of the drawings, the reference character 115 designates a collar which is operably connected with the shaft 100 by a set screw 116. Secured to the collar 115 by a screw or bolt 117, there is a star wheel lock 118 of the Geneva movement heretofore mentioned. This star wheel lock, see Figure 7, has its outer edge curved throughout its major portion as at 119, the ends of the curved portion being connected by a straight portion 120.

Referring again to Figure 7, an arm 121 extends radially from the collar 115 and upon its outer end, the arm 121 carries a roller 122 which, as the shaft 100 is rotated, successively engages the notches 113 of the star wheel 112 to impart an intermittent, or step by step rotary movement thereto and to the shaft 47 by which it is carried.

The arm 121 is so positioned that as its roller 122 leaves a notch 113 in the star wheel, the curved portion 119 of the star wheel lock will engage that curved seat 114 of the star wheel immediately following the notch from which the roller 122 of the arm 121 just passed, thus locking the star wheel 112 against movement until the arm 121 nearly completes a revolution and its roller 122 engages the next succeeding slot 113 of the star wheel 112 whereupon the star wheel will be free for movement again to make another step in its rotary movement.

From the foregoing, it will be apparent that the Geneva movement just described provides an

indexing mechanism for the knife carrier 65 which indexing mechanism serves to bring the several knives of the knife carrier successively to operative position in the opening 33 in the table and to hold the knife carrier against movement until a knife has performed a cutting operation.

The cutting operation of each of the cutting knives is performed by advancement of the slidable knife thereof through the opening in the table and then retracting the slidable knife through said opening during which movement it passes into and through the notch formed by the stationary cutting elements 77 and 78. During this retracting movement of the slidable knife, its shearing edges 93 cooperate with the shearing edges 84 of the stationary cutting elements to effect the cutting operation.

Operation of the slidable knife of each of the cutting knives is accomplished in the following manner.

As heretofore stated, the cutting knives are brought successively to the operating position in the opening 33 of the table by an intermittent or step by step movement of the knife carrier.

In Figures 5 and 6, a slidable knife is shown in the operative position and for the purpose of illustration, it will be assumed that this knife has not as yet performed its cutting operation.

When a cutting knife arrives at its operative position, the roller 75 which is carried by the sliding block 74 which block carries the slidable knife, passes from the channel 54 into the arcuate slot 60 of the sliding block 53.

If with the parts in the aforementioned positions, the sliding block 53 be operated, the slidable knife will be advanced through the opening 33 in the table to the position in which it is illustrated in Figure 13 from which position it will be retracted through the opening to the position in which it is shown in Figure 6 in which latter position it has completed the cutting operation.

Referring to Figure 6, the block 53 which is slidably mounted in the cut out portion 52 of the plate 39, is carried by a bar 140, it being secured to the upper end of the bar by a screw or bolt 141. The bar 140 is cut out as at 142 to straddle the shaft 47 and also as at 143 to straddle the shaft 100.

Near its lower end, the bar 140 is provided with two spaced rollers 144 and 145, and these rollers 144 and 145, are operated respectively by cams 146 and 147 which are keyed to the shaft 100 as at 148.

These cams 146 and 147 are illustrated in detail in Figure 5^a and by reference to said figure, it will be noted that the high point 149 of the cam 146 is of greater length than is the high point 150 of the cam 147. The cam 146 is the one which serves to move the bar 140 upwardly in said Figure 6, to advance the slidable knife while the cam 147 serves to move the bar downwardly to retract the slidable knife to perform the cutting operation. The contours of these cams is such that when the cams are properly positioned relative to each other they will positively reciprocate the bar 140 in each of its directions of movement.

Thus, as the shaft 100 is driven, the cams 146 and 147 will reciprocate the bar 140 to advance and retract that particular slidable knife which is in the operative position in the opening 33 of the table.

Means is provided to hold the material being operated upon during the cutting operation and

also during the movement of the slidable knife to its advanced position.

The material holding means is best illustrated in Figures 1, 6, 8 and 13.

In the present embodiment of the invention, it consists of a substantially rectangular frame 150 having a nose portion 151 of V shape. As best illustrated in Figures 6 and 13, it is adjustably secured to the upper end of a reciprocating bar 152 by means of a bolt 153 which passes through an elongated slot 154 in the bar 152.

The bar 152 passes through an opening 164 in the table, see Figure 6, and by reference to Figure 8 it will be noted that the bar 152 has two elongated slots 155 and 156 through which the shafts 47 and 100 pass respectively. The bar 152 also has two spaced rollers 158 and 159 which, cooperate respectively with two cams 160 and 161 which cams are illustrated in detail in Figure 8^a.

The cams 160 and 161 are keyed to the shaft 100 as at 165 and are operated thereby to positively operate the bar 152 in both of its directions of movement thereby to raise and lower the material holding means 150.

Means is also provided to feed the material operated upon relative to the cutting knives and this means and its operation will now be described.

Referring to Figures 1, 2, 3 and 7 of the drawings, the reference numeral 170 designates a material engaging foot or the like which has a roughened face 171 which provides for firm engagement with the material being operated upon.

As illustrated in Figure 2, the foot 170 is mounted upon the reduced extension 173 of a block 174 and it is loosely retained upon the extension for rocking movement thereon by means of a nut 175.

The block 174, see Figure 1, has an opening 176 in which is received a rod 177. The block 174 is provided with a kerf 178 which extends from the opening 176 to the end of the block. This kerf, 178, together with the screw or bolt 179, provides means for adjustably securing the block upon the rod 177.

The rod 177 extends downwardly through an opening in the table and the block 174 is secured to the upper end portion thereof in such a manner that the block extends across the table in a direction substantially at right angles to the direction of travel of the material being operated upon with the length of the foot 170 disposed in the direction of travel of the material being operated upon.

In addition to the rocking movement of the foot, it also has a vertical reciprocating movement to move it into and out of feeding engagement with the material operated upon and a horizontal reciprocating movement to effect feeding of the material operated upon relative to the operating position and the cutting knives.

Rigidly secured to and depending angularly from the rod or shaft 37, see Figures 2 and 7, there is an arm 180 and mounted in the lower end of this arm 180, there is a shaft 181 which also has a bearing in a lug 182 which projects from the lower edge of the plate 39, see Figure 5.

Referring to Figure 7, a block 183 is rigidly attached to one end of the shaft 181 and extending upwardly from opposite sides of said block, there are two plates 184 between the upper ends of which is interposed a block 185 to which the plates 184 are secured. The upper block 185 has an opening 186 through which the rod 177 extends, the lower end of said rod being connected to a block 187 which is slidably mounted between the plates 184. The lower end of the rod 177 is

threaded as at 188 and carried by said threaded portion there is a nut 189. Interposed between the block 185 and the nut 189, there is a coil spring 190, the tension of which may be adjusted by the nut 189.

The force of the coil spring is expended downwardly against the sliding block 187 tending at all times to force downwardly the rod 177 and move the foot 170 into engagement with the material.

The sliding block 187 carries upon its right hand face, see Figure 4, a roller 191 which rests upon the arm 192 of a forked member 193, better illustrated in Figures 9 and 12. The upper face of the arm 192 is curved downwardly as at 194 near its free outer end, the purpose of which will hereinafter appear.

The forked member 193, heretofore mentioned, comprises a block-like body portion 195 which has a bearing portion 196 for the reception of a shaft 197 carried by a lug 198 which depends from the sleeve 199 which also forms the means for attaching the arm 180, heretofore mentioned, to the rod or bar 37.

The arm 192 of the forked member 193 is removably secured to the side face 200 of the block 195 by means of a screw 201 and secured to the opposite side face of the block 195 in a similar manner, there is an arm 202. This arm differs from the arm 192, in that its lower edge 203 has its outer end portion curved as at 204 in a direction opposite to the direction of the curved portion 194 of the upper edge of the arm 192.

As best illustrated in Figures 7 and 9 of the drawings, the roller 191 of the block 187 on the lower end of the rod 177, rests directly upon the arm 192 of the forked member 193. By this construction, it will be obvious that as the forked member 193 is rocked about its pivotal point in an upward direction, the rod 177 will be moved in an upward direction, against the action of the spring 190, to move the foot 170 out of engagement with the material operated upon to permit of its being moved relative to the operating position and the cutting knives in order that one of said knives may perform a cutting operation thereon.

In Figures 6, 7 and 9, the mechanism which is employed to rock the forked member 193 about its pivotal point is illustrated and this mechanism and its operation will now be described.

A reciprocating bar 205 has an elongated slot 206 for the reception of the shaft 100 and a forked upper end for straddling the shaft 47, see Figure 9 of the drawings.

As illustrated in Figure 6 of the drawings, this reciprocating bar is positioned adjacent to the cam 160, heretofore mentioned. Projecting from the right hand face of the bar 205, in said figure, there are two spaced rollers 208 and 209, they being located respectively adjacent to the lower and upper ends of the elongated slot 206.

Carried by the shaft 100 and keyed thereto as at 210, there are two cams 211 and 212 illustrated in detail in Figure 9^a of the drawings.

The contours of the cams 211 and 212 are of such form and the relative positions of the cams upon the shaft 100 are such that as the shaft is rotated, the cams will act positively upon the bar 205 in both of its directions of movement, the cam 212 acting upon the roller 209 to elevate the bar while the cam 211 acts upon the roller 208 to move the bar 205 in the opposite direction.

An arm 213, see Figure 9, is rigidly secured to the bar as at 214 and extends to a point beneath

and supports the arm 192 of the forked member 193 as at 214' and the upper edge of the arm 213 has a curved face 215 at the end thereof.

From the foregoing, it will be apparent that as the shaft 100 is rotated and the cam 212 moves the bar 205 upwardly, the rigid arm 213 will act to rock the forked member 193 upwardly and that when the cam 211 moves the bar downwardly, the forked member 193 will be rocked downwardly under the influence of the spring 190 through the medium of the block 187 and the roller 191 which latter, it will be remembered, rests upon the upper edge of the arm 192 of the forked member 193.

From the foregoing description, it will be apparent that so long as the shaft 100 is rotated the material feeding foot 170 will be moved into and out of engagement with the material to be operated upon.

Means is also provided for imparting a to and fro movement to the material feeding foot relative to the operating position and this means and its operation will now be specifically described.

Operatively connected to the shaft 181, see Figures 4 and 9, there is an upstanding lever 220 and pivotally mounted in the upper end 221, of said lever, there is a pin 222. This pin has a shoulder or seat 223, and a threaded end 224 for the reception of a nut 225 by means of which it may be adjustably fixed in the open slot 226 in one end of a link 227.

The opposite end of the link 227 is pivotally connected to a pin 230, see Figures 10 and 11, which pin is adjustably mounted in an elongated slot 231 in a plate 232, by means of a nut 233. The plate 232 is carried by and extends slightly beyond the edge of a reciprocating bar 235.

The reciprocating bar 235 is provided near its upper end with an elongated slot 236 through which the shaft 47 passes and near its lower end with a similar slot 237 through which the shaft 100 passes. Carried by this reciprocating bar near the upper end of the slot 237 there is a roller 238 and near the lower end of the slot 237 there is a roller 239.

As illustrated in Figure 6, the reciprocating bar 235 is mounted next to the cam 212 and reciprocating movement is imparted thereto by two cams 240 and 241 which are keyed to the shaft 100 as at 242 and which are illustrated in detail in Figure 11^a.

The cam 240 operates upon the roller 238 to move the reciprocating bar 235 in the up direction while the cam 241 acts upon the roller 239 to move the bar 235 in the opposite or down direction.

By reference to Figures 10 and 11, it will be obvious that as the reciprocating bar 235 is moved in the up direction, the pin 230 will likewise move upwardly and through the medium of the link 227 the lever 220 and the shaft 181 will be rocked in a clockwise direction.

Referring now to Figure 7, it will be apparent that movement of the shaft 181 in the clockwise direction will move the structure which supports or carries the material feeding foot 170 to the right in said figure as indicated by the arrow A and that upon the downward movement of the reciprocating bar 235, the shaft 181 will be rocked in the counterclockwise direction resulting in a movement of the material feeding foot 170 to the left in Figure 7.

The mechanism just described imparts the to

and fro movement, heretofore mentioned, to the material feeding foot 170 and it will be obvious that the extent of this movement may be varied by adjustment of the pins 222 and 230 in their respective slots 226 and 231.

Means is also provided to back up the slidable knives to maintain them in proper cutting relation to the stationary knives during an actual cutting operation and this means will now be described.

Projecting from the upper edge of the plate 39 through the opening 33 to a point above the table, there is a rectangular extension 250, see Figures 5 and 6 of the drawings.

This extension has four passages 251 therein, see Figures 5 and 13. The passages 251 receive pins 252 carried by a plate 253 which is mounted in front of the extension 250 and the pins 252 have a friction fit in their respective passages 251. A screw 255, see Figure 13, is threaded into the extension 250 and the inner end of this screw engages the plate 253. By this means, adjustment of the plate to back up the slidable knives while they are in the operative position, may be obtained. The approach edge as well as the bottom edge of the plate 253 is preferably slightly beveled as at 256 to insure proper engagement of the knives with the front face thereof as they come to the operative position.

The construction just described also permits of adjusting the cutting edges of the cutting elements of the slidable knives relative to the cutting edges of the stationary knives after they have been reduced in size by sharpening.

Further referring to Figure 13, it will be apparent that one or more shims 260 may be inserted between the portions 80 of the stationary knives, the thickness of which shims will permit of proper adjustment of these cutting elements relative to those of the slidable knives as they become reduced in size as a result of sharpening.

Having described the construction and operation of the several mechanisms embodied in the machine, a complete sequence of operation of the machine will now be recited.

In each of the figures of the drawings with the exception of Figure 6, the several parts are shown in the positions which they attain just prior to the descent of a slidable knife to perform a cutting operation and these positions may be specifically described as follows: a cutting knife is located at the operative position of the machine with the slidable knife thereof in the raised position; the material holding means is also in its elevated position and the material feeding foot is elevated to a point where it is out of engagement with the material operated upon.

The several cams which operate the different mechanisms, it will be understood, are so positioned that as the machine starts to operate the several mechanisms will be operated in the following sequence.

As illustrated by the arrow B, the shaft 100 is rotated in a clockwise direction and upon movement of the shaft, the material holding means descends immediately into engagement with the material operated upon to hold it during a cutting operation.

Upon continued movement of the shaft 100, the sliding knife of that cutting knife located at the operating position of the machine is moved downwardly to perform the cutting operation.

During the performance of the two operations just described, the material feeding foot 170 is

moving slowly from left to right in the drawings preparatory to its being lowered into feeding engagement with the material.

Upon completion of the cutting operation by the sliding knife, the indexing mechanism moved the knife carrier one step in the counterclockwise direction to bring the next succeeding cutting knife into the operating position.

Upon arrival of the last mentioned cutting knife at the operative position, its slidable knife is advanced, it passing through the notch formed in the material by the preceding knife.

When the said slidable knife reaches its fully advanced position it rests therein momentarily to permit of elevation of the material holding means to a point where it frees itself from engagement with the material.

During these operations, the material feeding foot 170 has reached the end of its movement to the right in the drawings and as the material holding means is in its advanced position, the material feeding foot 170 is moved to the left in the drawings to position an uncut portion of the material at the operating position of the machine.

The foregoing is a description of one complete sequence of operation of the machine and it is to be understood that such sequence is performed by each of the cutting knives as they are successively brought to the operating position.

As heretofore stated, the several keys by which the several cams as well as the hand wheel and the driving pulley are operatively connected with the shaft 100, are of special construction and this construction will now be described.

By reference to Figure 6, it will be noted that in each instance, two elements are operatively connected with the shaft 100 by a single key and that in each instance, the construction is the same. Therefore, the description of one pair of cams, for example, the cams 240 and 241 will suffice.

Referring to Figure 6, it will be noted that the shaft 100 has a slot 300 in its peripheral surface and that the cams 240 and 241 are recessed as at 301 to form seats for the key 302. The depth of the key seat is such that when the key is positioned in the seats, the adjacent or abutting faces of the cams will contact each other.

As illustrated in Figure 6a, the key 302 is of sufficient length to extend to the bottom of the slot as at 303.

The cams are secured together by a screw 304 which also passes through the key 302 serving to secure the cams together and to lock the key in position therebetween and in engagement with the shaft.

The foregoing construction provides a compact structure and also permits of staggering of the keys around the shaft in cam assemblies where such practice is necessary or even desirable.

In Figures 1 and 6, there is illustrated a material guide 310 which consists of an elongated U-shaped member 311, between the legs of which two bolts 312 pass. Each of the bolts 312 also passes through a slot 313 in the table and each is provided with a thumb nut which engages the upper edges of the legs of the elongated U-shaped member.

The elongated U-shaped member 311 occupies a position substantially at right angles to that of the slots 313 which construction provides for universal adjustment of the U-shaped member

311 relative to the operative position of the machine.

From the foregoing it will be apparent that the present invention provides a machine, the constructions and arrangements of which result in the accomplishments of the objects recited therefor.

Having thus described the invention what is claimed as new is:

1. In a pinking machine, a revoluble knife carrier, a plurality of complete cutting units carried by and movable radially of the knife carrier, means for imparting an intermittent rotary movement to the knife carrier to move the cutting units successively to and from an operating position, means for operating the cutting units while in the said operating position to effect a cutting operation thereof, and means for feeding a material to be cut in a straight line in the path of the cutting units when the latter are in operating position.

2. In a pinking machine, a revoluble knife carrier, a plurality of complete cutting units carried by and movable radially of the knife carrier, means for imparting an intermittent rotary movement to the knife carrier to move the cutting units successively to and from an operating position, means for retaining the cutting units against movement relative to the knife carrier when they are in their inoperative positions, means for retaining the knife carrier against movement during an operation of a cutting unit carried thereby, and means for operating the cutting unit when in the operating position to effect a cutting operation thereby.

3. In a pinking machine, a rotatable knife carrier, a plurality of complete cutting units carried by and movable radially of the knife carrier, means for imparting an intermittent rotary movement to the knife carrier to move the cutting units successively to and from an operating position, means for retaining the cutting units against movement relative to the knife carrier during their movement to and from said operating position, and a single means for successively operating said cutting units when in their operating position to effect a cutting operation thereof.

4. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of cutting knives carried by and movable radially of the knife carrier, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operative position at the opening in the table, and means for operating said knives when in their operative position to advance and retract them through the opening in the table to effect a cutting operation of the knives.

5. In a pinking machine, a rotatable carrier, a plurality of stationary cutting knives mounted on the periphery of the carrier, a corresponding number of cutting knives slidably mounted on the carrier for movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to said knife carrier to move the knives successively to and from an operating position, means for operating the movable cutting knives when in said operating position to effect the aforesaid cutting operation, and means for feeding a material to be cut in a straight line in the

path of the cutting knives when they are in operating position.

6. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted on the periphery of the carrier, a corresponding number of slidable cutting knives mounted on the carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to said knife carrier to move the knives successively to and from an operating position at the opening in the table, means for operating said slidable knives when in their operative position to advance and retract them through the opening in the table to effect a cutting operation of the knives, means for feeding material to be operated upon across the table and over the opening therein while a slidable knife is in its advanced position, means for holding said material against movement during the advancing and retracting movements of a slidable knife to perform a cutting operation, and means for releasing said material holding means when any one of the slidable knives is in its advanced position.

7. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the carrier, a corresponding number of slidable cutting knives mounted on the carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, means for advancing each of the knives through the opening in the table as they come successively to the operating position, material feeding means for moving material to be operated upon across the table and over the opening therein, means for operating the material feeding means subsequently to the movement of each of the slidable knives to its advanced position, means for holding the material operated upon against movement relative to the table during a cutting operation, means for moving the material holding means out of engagement with the material prior to each operation of the material feeding means, means for moving the material holding means into holding relation with the material subsequent to each operation of the material feeding means, and means for retracting an advanced knife through the material and the opening in the table to effect the aforementioned cutting operation.

8. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, reciprocating means for

advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position, to effect the aforementioned cutting operation, a cam for operating said reciprocating means to advance a knife through the opening in the table, a second cam for operating said reciprocating means to retract the knife from its advanced position through the opening in the table, to perform the aforementioned cutting operation, means for operating said cams, means for feeding the material to be operated upon over the opening in the table and means for holding the material against movement during the advancing and retracting movements of a reciprocating knife.

9. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, means for advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position, to effect the aforementioned cutting operation, means for feeding the material to be operated upon over the opening in the table, means for holding the material against movement during the advancing and retracting movements of a reciprocating knife, reciprocating means for moving the material holding means into and out of engagement with the material, a cam for moving said reciprocating means in one direction, a second cam for operating said reciprocating means in the opposite direction, and means for operating said cams.

10. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operative position at the opening in the table, means for advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position, to effect the aforementioned cutting operation, means for holding the material to be operated upon against movement during the advancing and retracting movements of a reciprocating knife, means for feeding the material to be operated upon over the table and the opening therein, said means including a material engaging foot, reciprocating means for moving said material engaging foot into and out of engagement with the material to be operated upon, a cam for operating said reciprocating means in one direction, a second cam for operat-

ing said reciprocating means in opposite direction and means for operating said cams.

11. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, means for advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position to effect the aforementioned cutting operation, means for holding the material to be operated upon against movement during the advancing and retracting movements of a reciprocating knife, means for feeding the material operated upon over the table and the opening therein, said means including a material engaging foot, means for moving said material engaging foot into and out of engagement with the material to be operated upon, means for imparting feeding movement to the material engaging foot while in engagement with the material to be operated upon, and separate means for imparting retracting movement to the material feeding foot when it is disengaged with the material to be operated upon.

12. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the periphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, means for advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position to effect the aforementioned cutting operation, means for holding the material to be operated upon against movement during the advancing and retracting movements of a reciprocating knife, means for feeding the material operated upon over the table and opening therein, said means including a material engaging foot, reciprocating means for moving said material engaging foot into and out of engagement with the material to be operated upon, separate cams for positively operating said reciprocating means in opposite directions, means for imparting feeding movement to the material engaging foot while in engagement with the material to be operated upon, reciprocating means for operating said last mentioned means, separate cams for positively operating said last mentioned reciprocating means in opposite directions and a single shaft for operating the cams of the material holding means and the material feeding means.

13. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of stationary cutting knives mounted upon the pe-

riphery of the rotatable knife carrier, a corresponding number of slidable cutting knives mounted upon the knife carrier for reciprocative movement radially thereof into cooperative cutting relation with their respective stationary cutting knives to effect a cutting operation, means for imparting an intermittent rotary movement to the knife carrier to move the knives successively to and from an operating position at the opening in the table, means for advancing and retracting each of the reciprocating knives through the opening in the table as they come successively to the operating position to effect the aforementioned cutting operation, means for holding the material to be operated upon against movement during the advancing and retracting movements of a reciprocating knife, means for feeding the material operated upon over the table and the opening therein, said means including a material engaging foot, reciprocating means for moving said material engaging foot into and out of engagement with the material to be operated upon, separate cams for positively operating said reciprocating means in opposite directions, means for imparting feeding movement to the material engaging foot while in engagement with the material to be operated upon, reciprocating means for operating said last mentioned means, separate cams for positively operating said last mentioned reciprocating means in opposite directions, and a single shaft for operating the reciprocating knife advancing and retracting means, the cams for operating the material holding means and the cams of the material feeding means.

14. In a pinking machine in combination, a table having an opening therein forming the operating position of the machine, an intermittently operated rotating member mounted beneath the operating position of the table, a plurality of spaced cutting mechanisms carried by the rotating member, a cutting mechanism operating means, means for operating the rotating member to bring the cutting mechanisms successively to the operating position and into operative relation with the cutting mechanism operating means, means for operating the cutting mechanism operating means, means for feeding a material to be operated upon to the operating position of the table, and means for holding the material during an operation of the cutting mechanism.

15. In a pinking machine in combination, a table having an opening therein forming the operating position of the machine, an intermittently operated rotating member mounted beneath the operating position of the table, a plurality of spaced cutting mechanisms carried by the rotating member, each of said cutting mechanisms including a stationary knife and a cooperating reciprocating knife, a cutting mechanism operating means, means for operating the rotating member to bring the cutting mechanisms successively to the operating position and to operatively connect the reciprocating knives thereof with the cutting mechanism operating means, means for operating the cutting mechanism operating means, and means for feeding a material to be operated upon to the operating position of the machine.

16. In a pinking machine in combination, a table having an opening therein forming the operating position of the machine, a rotating member mounted beneath the operating position of the machine, a plurality of cutting mechanisms carried by the periphery of the rotating member

in spaced relation to each other, each of said mechanisms including a stationary knife and a cooperating reciprocating knife, means at the operating position of the machine for operating the reciprocating knife of each of the cutting mechanisms as they are brought successively to the operating position of the machine, means for intermittently operating the rotating member to bring the cutting mechanisms successively to the operating position of the machine and their reciprocating knives successively into operative connection with said reciprocating knife operating means, and means for operating the reciprocating knife operating means.

17. In a pinking machine in combination, a table having an opening therein forming the operating position of the machine, a rotating member mounted beneath the operating position of the machine, a plurality of cutting mechanisms carried by the periphery of the rotating member in spaced relation to each other, each of said mechanisms including a stationary knife and a co-operating reciprocating knife, means at the operating position of the machine for operating the reciprocating knife of each of the cutting mechanisms as they are brought successively to the operating position of the machine, a driving shaft, means for operating said driving shaft, means operated by the driving shaft for imparting an intermittent rotary movement to the rotating member to bring the cutting mechanisms successively to the operating position and their reciprocating knives into operative relation with said reciprocating knife operating means, means operated by the driving shaft for operating the reciprocating knife operating means, means operated by the driving shaft for feeding material to be operated upon relative to the operating position of the machine, and separate means operated by the driving shaft for holding a material to be operated upon during a cutting operation of a cutting mechanism.

18. In a pinking machine in combination, a table having an opening therein forming the operating position of the machine, a rotating member mounted beneath the operating position of the machine, a plurality of cutting mechanisms carried by the periphery of the rotating member in spaced relation to each other, each of said mechanisms including a stationary knife and a co-operating reciprocating knife, means at the operating position of the machine for operating the reciprocating knife of each of the cutting mechanisms as they are brought successively to the operating position of the machine, a driving shaft, means for operating said driving shaft, means operated by the driving shaft for imparting an intermittent rotary movement to the rotating member to bring the cutting mechanisms successively to the operating position and their reciprocating knives into operative relation with said reciprocating knife operating means, means operated by the driving shaft for operating the reciprocating knife operating means, means operated by the driving shaft for feeding material to be operated upon relative to the operating position of the machine, and separate means operated by the driving shaft for holding a material to be operated upon during a cutting operation of a cutting mechanism, and during a movement of the rotating member to position a subsequent cutting mechanism at the operating position of the machine with its reciprocating knife in position to start a cutting operation.

19. In a machine of the type described in com-

combination, a table having an opening therein constituting the operation position of the machine, a cam shaft mounted beneath the table, means for rotating said cam shaft, an intermittently operated rotating member mounted beneath the operating position of the table, a plurality of spaced cutting mechanisms carried by the rotating member, each of said cutting mechanisms including a stationary knife and a cooperating reciprocating knife, means at the operating position of the machine for operating the reciprocating knife of each of the cutting mechanisms as the cutting mechanisms are brought successively to the operating position of the machine, an indexing mechanism operated by the cam shaft for imparting intermittent rotary movement to the rotating member to bring the cutting mechanisms successively to the operating position of the machine and their reciprocating knives into operative relation with said reciprocating knife operating means, said indexing mechanism also serving to lock the rotating member against movement during its periods of rest, a pair of cams carried by the cam shaft for operating the reciprocating knife operating mechanism, means for feeding material to be operated upon relative to the operating position of the machine, a pair of cams carried by the cam shaft for operating the material feeding means, and means for holding the material operated upon during a cutting operation and during a movement of the rotating member to position a subsequent cutting mechanism at the operating position of the machine and to position its respective reciprocating knife in position to start a cutting operation.

20. In a machine of the type described in combination, a table, means for performing a series of operations upon a material fed over said table, and means for advancing the material to be operated upon in a direction towards the means for performing said series of operations, said means including a slidably mounted rod, a material engaging foot pivotally carried by said rod, means for moving said rod to cause said material engaging foot to move in a direction away from the table, spring means acting upon said rod for moving the material engaging foot in a direction towards the table into yielding engagement with the material to be fed thereover, means operatively associated with said rod for rocking said material engaging foot in one direction when it is in feeding engagement with the material upon the table and in the opposite direction when it is disengaged with said material, and means for adjusting the extent of rocking movement imparted to the material engaging foot.

21. In a machine of the type described in combination, a table, means for performing a series of operations upon a material fed over said table, and means for advancing the material to be operated upon in a direction towards the means for performing said series of operations, said means including a slidable rod, a material engaging foot pivotally carried by said rod, means for moving said rod to cause said material engaging foot to move in a direction away from the table, adjustable means for varying the extent of movement of the material engaging foot in the direction away from the table, spring means acting upon said rod for moving the material engaging foot in a direction towards the table into yielding engagement with the material to be fed thereover, means for adjusting the tension of

said spring means, and means for rocking the material engaging foot in one direction when it is in feeding engagement with the material upon the table and in the opposite direction when it is disengaged with said material.

22. In a machine of the type described in combination, a table, means for performing a series of operations upon a material fed over said table, and means for advancing the material to be operated upon in a direction towards the means for performing said series of operations said means including a slidable rod, a material engaging foot pivotally carried by said rod, means for moving said rod to cause said material engaging foot to move in a direction away from the table, adjustable means for varying the extent of movement of the material engaging foot in the direction away from the table, spring means acting upon said rod for moving the material engaging foot in a direction towards the table into yielding engagement with the material to be fed thereover, means for adjusting the tension of said spring means, means operatively associated with said rod for rocking the material engaging foot in one direction when it is in feeding engagement with the material upon the table and in the opposite direction when it is disengaged with said material, and means for adjusting the extent of rocking movement imparted to the material engaging foot.

23. In a machine of the character described in combination, a table having an opening therein providing the operating position of the machine, a cutting mechanism including a reciprocating knife for performing a cutting operation at the opening in the table, means for moving the reciprocating knife to, and for holding it momentarily at rest in an advanced position prior to a cutting operation, means for holding a material to be operated upon against movement relative to the table during movement of the reciprocating knife to its advanced position, means for releasing the material holding means while the reciprocating knife is in the advanced position, means for feeding the material relative to the table while the material holding means is in its released position, means for moving the material feeding means into engagement with the material, means for imparting feeding motion to the material feeding means, means for disengaging the material feeding means from the material and for retaining it in said disengaged position until after a cutting operation by the knife, means for moving the material holding means into holding engagement with the material while the knife is in its advanced position of rest, and means for operating the knife to perform a cutting operation subsequent to the engagement of the material by the material holding means.

24. In a pinking machine in combination, a table having an opening therein, a rotatable knife carrier mounted beneath the table, a plurality of cutting mechanisms carried by the knife carrier, each of which includes a reciprocating knife, means for imparting intermittent rotary motion to the knife carrier to bring the cutting mechanisms successively to an operating position beneath the opening in the table, means for advancing the reciprocating knife of each cutting mechanism through the opening in the table as the cutting mechanisms arrive successively at the operating position, means for retracting the advanced knife of a cutting mechanism through the material operated upon and

the opening of the table to effect a cutting operation, means for holding the material operated upon against movement during the retraction of the advanced knife of a cutting mechanism in the performance of its cutting operation and subsequent thereto until the knife carrier has been rotated to position the next successive cutting mechanism at the operating position and its respective knife has been advanced through the opening in the table and the void formed in the material operated upon by the cutting operation of the preceeding cutting mechanism, means

5 for releasing the material holding means after the knife of the second mentioned cutting mechanism has been moved to its advanced position, means for feeding the material along the table subsequent to the release of the material holding means, and means for moving the material holding means into holding engagement with the material operated upon, both of said last mentioned operations being performed prior to the retraction of the advanced knife of the second mentioned cutting mechanism.

KARL A. DOEHM.