Feb. 24, 1953 H. H. EAGER 2,629,441

MEANS FOR ENGAGING AND DISENGAGING ROTARY CUTTERS

Filed May 25, 1948 4 Sheets-Sheet 1

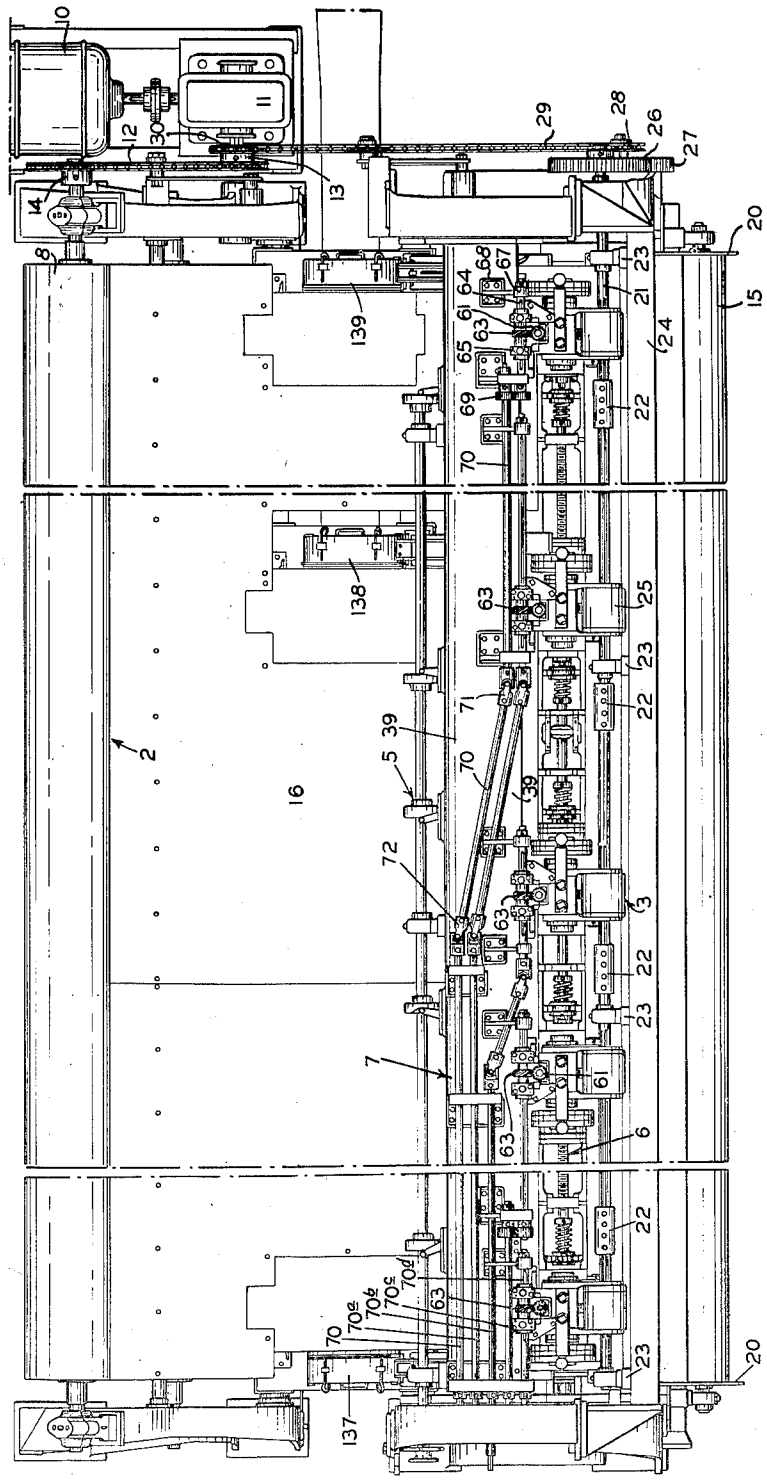

Fig. 1

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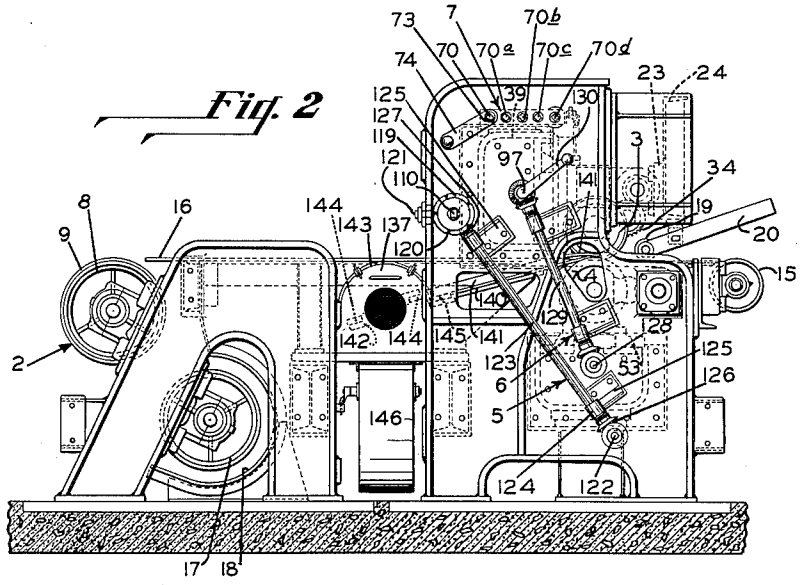
MEANS FOR ENGAGING AND DISENGAGING ROTARY CUTTERS

Filed May 25, 1948 4 Sheets-Sheet 2

Fig. 2



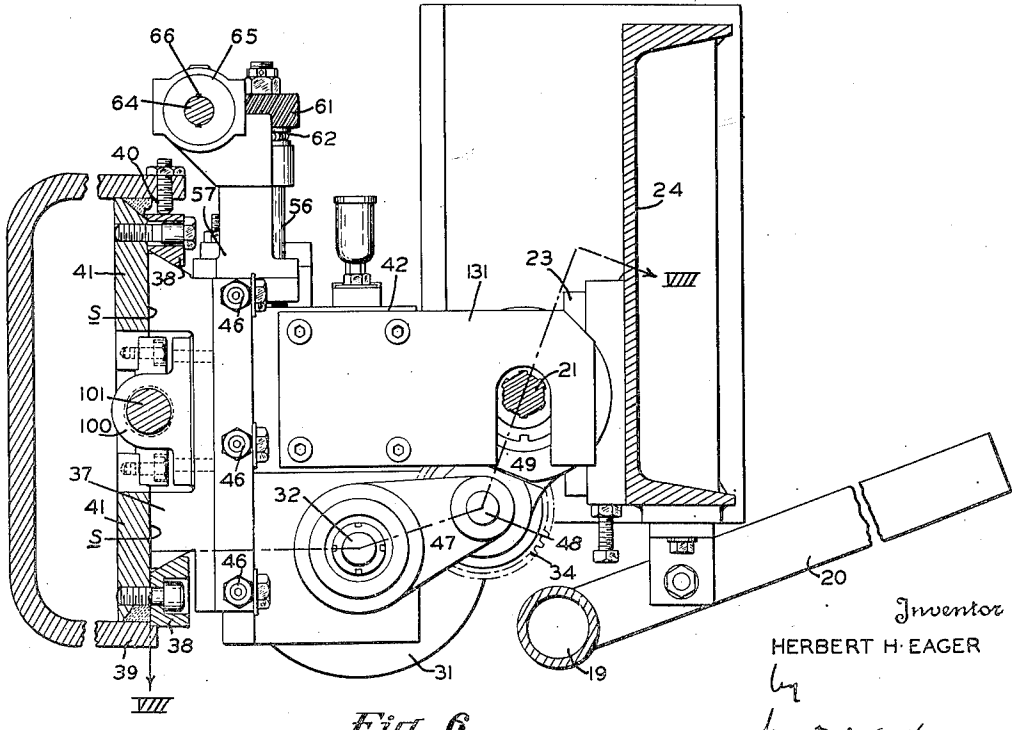


Fig. 6

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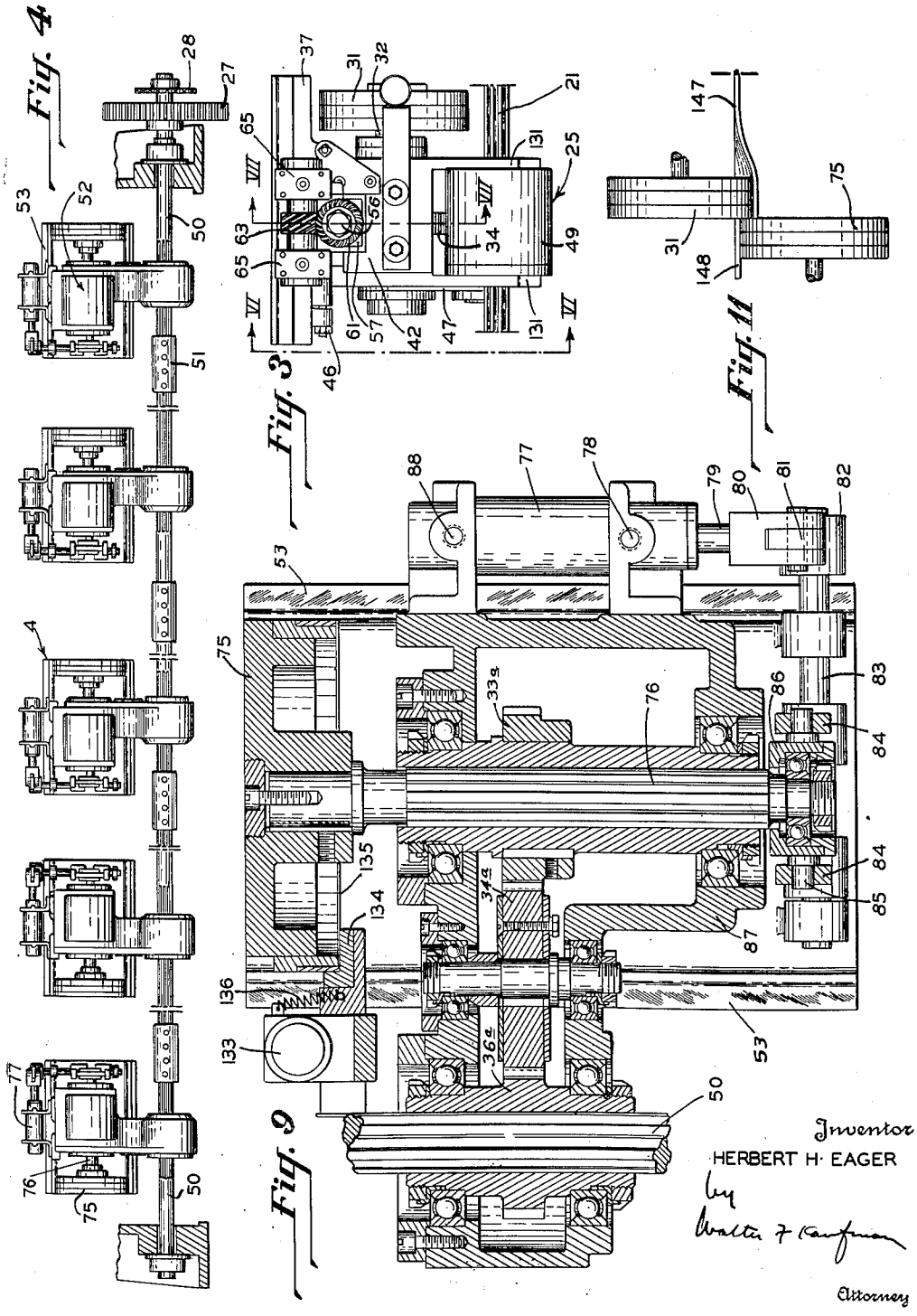
MEANS FOR ENGAGING AND DISENGAGING ROTARY CUTTERS

Filed May 25, 1948 4 Sheets-Sheet 3



Feb. 24, 1953 H. H. EAGER 2,629,441

MEANS FOR ENGAGING AND DISENGAGING ROTARY CUTTERS

Filed May 25, 1948 4 Sheets-Sheet 4

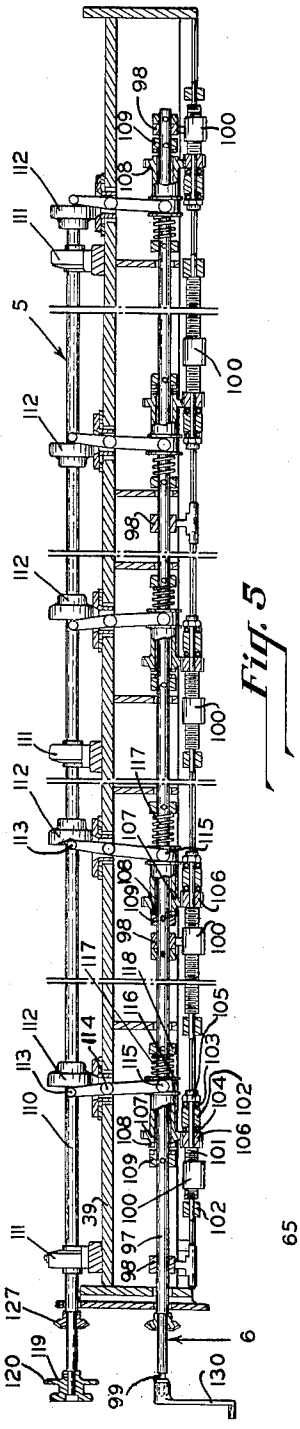


Fig. 5

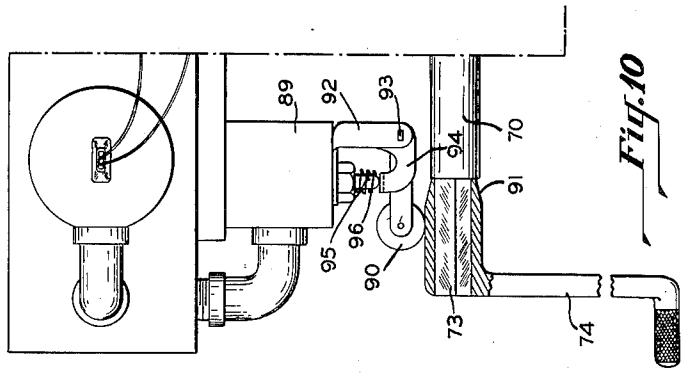


Fig. 10

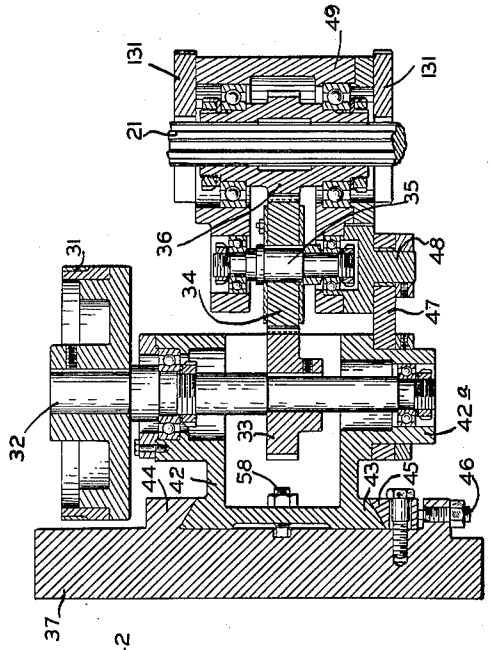


Fig. 8

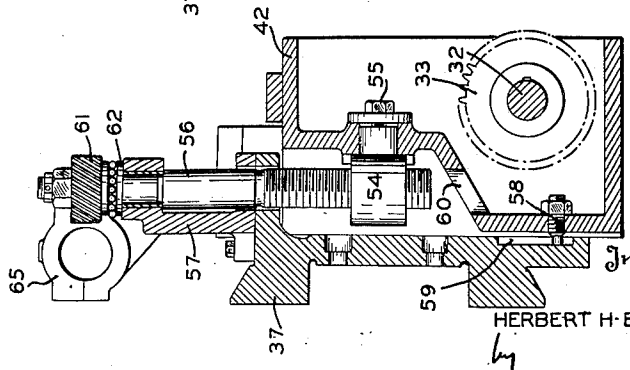


Fig. 7

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UNITED STATES PATENT OFFICE

2,629,441

MEANS FOR ENGAGING AND DISENGAGING ROTARY CUTTERS

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Application May 25, 1948, Serial No. 29,076

12 Claims. (Cl. 164—61)

1

My invention relates to a severing apparatus and more particularly to a cutting or trimming machine for operation upon webs of material such as linoleum, felt base, and the like. The invention finds particular usefulness in the floor and wall covering industry where coverings are produced as substantially continuous webs, the width of which may vary from about 4½ feet in width to 12 feet in width. Intermediate sizes or widths are 6 feet and 9 feet. In the trimming of such materials, it is desirable to have an apparatus which will be effective for operation upon web materials of the various widths and which will also be effective for operation upon material of one width for severing it into two or more strips. For instance, in the fabrication of a floor covering 12 feet wide, it sometimes is desirable to sever the material into two 6-foot wide strips. In other instances, a defect or damaged portion of the covering may appear in the material as it is inspected and fed to the trimming machine, and a portion of the material can be salvaged by severing the web into a narrower width than that intended; and the machine should be capable of rapid adjustment to effectuate such salvaging of defective or damaged materials.

It is an object of my invention to provide a severing machine of a type mentioned above provided with a multiplicity of cutters effective for severing and trimming materials of varying widths encountered in the floor and wall covering industry.

Another object of my invention is to provide a mechanism which may be conveniently and rapidly adjusted to accommodate sheet materials of different widths for severance or trimming.

A still further object of my invention is to provide an apparatus in which the cutting members may be continuously rotated and in which mechanism is provided for relatively moving one cutter with respect to the other in a vertical plane and a mechanism is provided for relatively moving the cutters in a horizontal plane, the latter mechanism being synchronized so that both cutters move simultaneously.

Other objects of the invention will become apparent from a consideration of the embodiment of the invention illustrated in the attached drawings in which:

Figure 1 is a top plan view showing the general assembly of one embodiment of my invention;

Figure 2 is a side elevation taken from the left-hand side of Figure 1;

2

Figure 3 is a top plan view of one of the upper cutter assembly units;

Figure 4 is a top plan view, partially in section, of the complete lower cutter assembly;

Figure 5 is a top plan view, partially in section, of the upper cutter selector mechanism;

Figure 6 is a view taken in the direction of the line VI—VI of Figure 3, showing the upper cutter elevating mechanism of one of the upper cutter units;

Figure 7 is a sectional view taken on the line VII—VII of Figure 3, also showing the upper cutter elevating mechanism;

Figure 8 is a sectional view taken on the line VIII—VIII of Figure 6 of the upper cutter elevating mechanism;

Figure 9 is a sectional view showing the lower cutter with the cutter retracting safety device;

Figure 10 is a side elevation showing the cutter retractor safety switch mechanism; and

Figure 11 is a diagrammatic detail view showing the upper and lower cutting members in cutting position.

The general arrangement

Referring to the drawings, the general arrangement consists of a sheet material conveying arrangement 2 for carrying the sheet material to be severed through the machine, an upper cutter assembly 3 which is shown in Figure 3 in some detail, a lower cutter assembly 4 which is illustrated particularly in Figure 4, a cutter selector mechanism 5 which is shown in Figure 5, one being provided for the upper cutter group and one for the lower cutter group, a cutter shifting mechanism 6 which is shown in Figures 1, 2, and 5 and is associated with each cutter selector, and a cutter elevating mechanism 7 which is shown in Figures 1, 3, 6, 7, and 8 and is associated with the upper cutter group.

The sheet material conveyor

The sheet material conveyor consists of a pull roll 8 which is preferably covered with cork composition 9 or other frictional material. This roll is driven by a motor 10 through a worm gear reduction unit 11 by a chain 12 which is trained about sprockets 13 and 14. The sheet material to be severed is fed from a roll, not shown, over idler roll 15 and table 16. The sheet is trained over a substantial portion of pull roll 8 and idler roll 17 (Figure 2). A guide shoe 18 is provided to facilitate the threading of the sheet over the roll 17. A pivoted hold down or smoothing roll 19 is provided to press the sheet into engagement

with the table 16 as it enters the cutting zone. The hold down roll 19 is pivoted as shown in Figure 2, and a pair of handles 20 is provided to elevate the roll during threading of the sheet through the machine.

The upper cutter assembly

The upper cutter assembly 3 is shown in Figure 1, and one of the individual units is shown in Figure 3. The arrangement includes a drive shaft 21 which is made up of a plurality of sections joined together by couplings 22. The shaft sections are mounted in bearings 23 secured to the frame member 24. The shaft sections 21 are splined as shown in Figure 1 and receive a plurality of cutter heads generally indicated at 25 which are mounted thereon and are capable of transverse adjustment along the splined shaft sections. Five heads are provided in the embodiment shown in Figure 1. A gear 26 (Figure 1) is secured to the shaft 21 and meshes with a gear 27 which is fixed to the shaft to which a sprocket 28 is attached. The sprocket 28 is driven from the motor 10 and the reduction unit 11 through a chain 29 which is trained around sprocket 28 and a sprocket 30 which is connected to the unit 11.

Each upper cutter head as shown in Figures 3 and 8 includes a rotary cutting element 31 fixed to a shaft 32. A gear 33 (Figure 8) is keyed to the shaft 32 and meshes with an intermediate gear 34 keyed to a shaft 35. This latter gear meshes with a gear 36 which is mounted on the spline shaft 21 to rotate therewith. The cutter 31 is of conventional type and needs no description.

In order that the individual cutters be capable of limited transverse movement to permit adjustment for the severance of materials of various widths, each cutter head unit as shown in Figure 6 is mounted upon a dove-tailed slide 37 which is received in gibs 38. The lower gib 38 is secured in fixed position to the cross beam 39 of the machine, and the upper gib 38 is adjustable, being provided with adjusting screws 40. The cross beam 39 is provided with guide plates 41, each having a finished face S thereon against which the dove-tailed slide 37 operates.

The unit shown in Figure 6 is, as mentioned above, one of the upper cutter units. The lower cutter units are similarly mounted for transverse adjustment. It will be noted from Figure 2, where the cross beam supports for both upper and lower cutters are shown in dotted lines, that the upper cutter slides are mounted in a vertical plane, whereas the lower cutter slides are mounted in a horizontal plane.

Each of the upper cutter units is also vertically adjustable to move each upper cutter unit from its complementary lower cutter unit and into an inoperative position. This is illustrated in Figures 7 and 8. It will be noted by reference first to Figure 8 that each cutter unit includes a housing 42 which receives the cutter shaft 32 and its bearings. The housing 42 is provided with a dove-tailed slide arrangement 43 operating in gibs 44 and 45. The gib 44 forms part of the slide member 37 shown in Figure 6. The gib member 45 is adjustable by means of screws 46 shown both in Figures 6 and 8.

In order to maintain the gears 33, 34, and 36 in proper mesh, regardless of the position of elevation of the individual cutter heads, the following mechanism is employed and is shown best in Figures 6 and 8. The housing 42 for the cutter shaft assembly is connected by means of a link 47 which encircles a hub 42*a* on the housing 42 and also a bearing cap 48 attached to the nousing 49 which surrounds the gear 36 and supports the shaft 35 and its bearings. By this linkage arrangement, the center distance from the shaft 32 to the shaft 35 is maintained constant, and the center distance from the spline shaft 21 to the shaft 35 is also maintained constant. The preferred mechanism for elevating the cutter units will be described later, but it will be noted from an examination of Figures 6 and 8 that, as the cutter head housing 42 is elevated, the gears 33, 34, and 36 will be maintained in proper meshing relationship through the link 47.

Lower cutter assembly

The lower cutter assembly is shown in Figure 4 and consists of a drive shaft 50 which, like the drive shaft 21 for the upper cutter assembly, is made up in sections connected by couplings 51. The cutting heads proper which have been designated at 52 in Figure 4 are generally the same as the upper cutters. They are shown in more detail in Figure 9. It will be noted that the method of mounting the cutter element differs somewhat from the mounting of the cutter 31 shown in Figure 8.

The arrangement for driving the lower cutters is shown in Figure 4. Gear 27 and sprocket 26 are connected to shaft 50 which is thus driven by motor 10. Like cutters 31, cutters 75 are continuously rotated by shaft 50 through gears 36*a*, 34*a* and 33*a*, the numbering corresponding to the numbering of the gears of the upper cutter units with the addition of the letter *a* in each instance. The link arrangement for the gearing in the upper cutter units is not provided in the lower units because they are not elevated with respect to the drive shaft 50.

The individual cutting heads of the lower cutter assembly are adjustable transversely of the machine as mentioned above in connection with the upper cutter assembly. The units are mounted upon dove-tailed slides 53 disposed in a horizontal plane and move in gibs similar to those provided in the upper cutter assembly. These are mechanical details which need not be specifically described, since they correspond generally to the mechanism of the upper cutter assembly. Generally stated, the individual cutter head units, both upper and lower, are capable of limited transverse movement, but only the upper units are arranged for elevation.

Cutter elevating mechanism

In the usual trimming operation, two of the five cutters shown will generally be in operation, although, on occasion, there may be three or more. It is necessary, therefore, to move the inoperative cutters away from each other. In the embodiment illustrated, the upper units are movable away from their corresponding lower cutters so as to permit the sheet material to move therebetween without severance at the inoperative cutters.

The cutter elevating mechanism is shown in Figures 1 and 2 as well as in the detailed views, Figures 6, 7, and 8.

Referring first to the detailed views of Figures 6, 7, and 8, it will be noted that the housing 42 (Figure 7) is provided with a threaded elevating nut 54 which is attached to the housing 42 by a machine screw 55. An elevating screw 56 passes through the elevating nut 54 and is re-

ceived for rotation in a bracket 57 which is secured to the slide member 37. As the screw 56 is rotated, the housing 42 is moved in a vertical plane, such movement being limited by a stopping screw 58 which is provided on the housing 42 and operates within a slot 59 which is milled into the slide 37. An opening 60 is provided in the housing 42 to permit the free passage of the lower end of the screw 56 as the housing 42 is elevated. It will be observed by reference to Figure 8 that the housing 42 is provided with a dove-tailed slide 43 and moves in the ways 44 and 45.

In order to effect rotation of the screw 56, a 45° spiral gear 61 is fixed to the screw 56, and a thrust bearing 62 is provided between the bracket 57 and the gear 61.

Referring now to Figures 1, 2, and 3, the specific mechanism for imparting motion to the gears 61 of each of the individual upper cutter heads will be described. Each cutter head is separately actuatable. Gears 61 mesh with corresponding gears 63 which are mounted upon a shafting arrangement clearly portrayed in Figure 1. Considering first the right-hand cutter, the gear 63 is mounted upon a shaft 64 and retained in bearings 65 which are an integral part of the bracket 57 of Figure 3. The shaft 64 is provided with a long double key which can be seen at 66 in Figure 6, and is mounted in bearings 67 which are secured to the cross frame of the machine by brackets 68. The shaft 64 is adapted to be rotated through a pair of gears 69, one of which is keyed to the shaft 64 and the other of which is keyed to a shaft 70 which extends to the side of the machine as shown in Figure 1 and is connected by universal joints 71 and 72. The shaft extends through the side frame of the machine and is provided with a squared end 73 adapted to receive a crank handle 74 (Figure 2). The operator, in order to move the right-hand cutter head, will position the handle 74 as shown in Figure 2 and will rotate the shaft 70 through the universal joints and thus impart a rotation to the pair of gears 69, transmitting motion to the shaft 64 and rotating the gear 63 which is meshed with the gear 61. This imparts a motion of rotation to the screw 56 (Figure 7) and raises or lowers the cutter head bracket 42, depending upon the direction of rotation of the crank 74.

By reference to Figure 1, it will be noted that each cutter head is provided with similar mechanism, although the second cutter head from the right and the third cutter head from the right do not have the transmission gears for the shafts but are directly connected through the corresponding universal joints to the driving shafts. The first cutter head from the left is directly connected and does not include a universal joint arrangement or any gearing for coupling. The actuating shafts have been numbered 70, 70*a*, 70*b*, 70*c*, and 70*d*.

From the foregoing, it will be clear that each of the individual cutter units in the upper bank may be elevated away from its corresponding lower unit by rotation of the shafts through which rotary motion is imparted to the gears 63. This elevation of the upper cutters is necessary in order to render any particular cutter or cutters inoperative. For example, if goods are being severed using the first cutter on the right and the last cutter on the left, the intermediate cutters would be elevated to an inoperative position. If it is desired to operate using the last cutter on the left and the second cutter from the right, the first cutter on the right should be rendered inoperative and the second cutter from the right lowered into operative cutting position. This would be effected through actuating shafts 70 and 70*a*.

Cutter disengaging safety device

In order to insure that the upper and lower cutters of any given unit in which the upper cutter is to be elevated will be properly separated prior to elevation, I provide the safety arrangement which is illustrated in Figure 10 in combination with the lower cutter retracting arrangement shown in Figure 9.

Referring first to Figure 9, the lower cutter head 75 is mounted upon a spline shaft 76 and the cutter 75 is capable, therefore, of limited movement in the direction of the axis of the spline shaft 76 and, when retracted, is effective for moving the cutter 75 away from the corresponding cutter 31 of the upper unit. Retraction of the cutter 75 may be effected by the arrangement shown in Figure 9, including an air cylinder 77 which, upon the entrance of air through the port 78, is effective for moving the piston rod 79 inwardly as shown in Figure 9. The rod 79 carries a clevis 80 which receives a link 81 integral with a boss 82 which is fixed to a cross shaft 83 which carries a pair of trunnion brackets 84 which encircle trunnions 85 attached to the bearing housing 86 and shaft 76. It will be observed that there is a small clearance between the bearing housing 86 and the main housing 87 for the lower cutter head unit. Therefore, upon the application of air pressure through the port 78, the shaft 76 is retracted moving the cutter 75 away from the cutter 31. Air pressure is supplied through the port 88 to bring the cutters 75 and 31 into proper cutting engagement and so maintain them. When air is admitted through port 78 to separate the cutters, the supply of air through port 88 is discontinued and vice versa. A conventional valving arrangement is provided for this purpose.

In order to automatically effectuate separation of the cutters, the mechanism shown in Figure 10 is provided. It has been omitted from Figure 2 for the sake of clarity of illustration. It consists essentially of a micro switch 89 which is provided with an actuating roller 90 mounted above the squared end 73 of the shaft 70. The crank 74 is provided with a tapered surface 91 which is adapted to engage the roller 90 upon the positioning of the crank onto the squared end 73 of the shaft 70. The roller 90 is mounted on a bracket 92 which is pivoted at 93 and has an elevating cam 94 thereon which is adapted to engage the pin 95 which actuates the switch 89. A return spring 96 is provided for maintaining the roller 90 in proper position. One such switching arrangement is provided for each of the shafts 70*a*–*d*.

It will be clear from the foregoing description that, upon the movement of the operating crank into position for rotation of the shaft 70, 70*a*, 70*b*, 70*c*, or 70*d*, its associated safety switch 89 will be actuated. Each switch 89 is interconnected with an air valve controlling the supply of air to the air cylinder 77 through the port 78 of the lower cutter unit complementary to the upper cutter to be elevated. Upon insertion of the handle and actuation of the switch, air is supplied to the appropriate air cylinder 77, thus separating the cutter 75 from its corresponding cutter 31. Thereupon, the handle may be rotated

to elevate the cutter 31 in the manner previously described. Until the handle has been removed from operative position, the cutters of the pair rendered inoperative will remain in such inoperative position, the switch 89 being effective for initiating the control valve which maintains a constant supply of air pressure through the cylinder 77. Immediately after removal of the handle, the roller 90 and its arm 92 move downwardly and the switch 89 is returned to its normal position and air enters the port 88, bringing the cutters into cutting position if the upper cutter has been lowered to operative position.

Cutter selector mechanism and cutter traverse

As previously mentioned, the individual pairs of cutters are adjustable transversely of the machine. The cutters adjacent the ends of the machine are capable of but limited movement in the order of 2½ inches to compensate for minor differences in the positioning of the web to be trimmed. The central unit is also capable of limited adjustment in the neighborhood of 5 inches, since it is frequently used to split a wide web, for example, a 12-foot section into two 6-foot widths. The intermediate units are capable of extensive movement in the order of 22 inches so as to accommodate different widths of material and in order to make it possible to sever the web to eliminate damaged or defective portions. The amount of adjustment is not limited but may be varied, depending upon the type of material for which the machine is designed. The structural arrangement will be capable of such modification.

Each individual head is separately adjustable with its corresponding head. It is necessary to the proper performance of the machine that each of the pairs of cutting units be shiftable in unison, and, in order to provide a simple arrangement for effecting such shifting movement, the selector mechanism shown in Figure 5 is provided. In that view, the upper unit selector arrangement is shown. A similar selector unit is provided for the lower cutter assembly and they are synchronized for simultaneous operation.

The selector mechanism consists of an operating shaft 97 which is mounted in bearings 98 attached to the cross beam 39 of the machine. It will be observed by reference to Figure 5 that the operating shaft 97 extends throughout substantially the whole length of the cross beam 39. The operating shaft 97 is provided with a squared end 99 adapted to receive a crank handle to effect rotation thereof. Each of the cutter heads is provided with a feed nut 100 (see Figure 6) which is bolted to the slide 37. Each feed nut 100 receives a lead screw 101 which is mounted in bearings 102. Thrust bearings 103 and 104 are provided on opposite sides of the bearing 102, and a castellated nut 105 secures the lead screw in proper position. A gear 106 is keyed to the lead screw 101. The gear 106 meshes with a gear 107 which is mounted in bronze bushings and rotates on the operating shaft 97. The front portion of the gear 107 is provided with a clutch face 108 which is interengageable with a clutch member 109 pinned to the operating shaft 97.

Each of the cutter heads is provided with a similar lead screw and gear arrangement as well as corresponding clutch members. In Figure 5, the second cutter selector from the left is shown in position with the clutch members in engagement. The remaining clutches are disengaged. The clutching arrangement consists of an operating shaft 110 which is mounted in bearings 111. Operating cams 112 are fixed to the operating shaft 110 and cam followers 113 engage the cams 112. Each of the followers is pivoted at 114 and is provided with a bifurcated end 115, each leg of which carries a shoe which operates in a guideway 116 provided on the end of the gear member 107. A spring 117 encircles the operating shaft 97 and lies under compression between the member 107 and a collar 118 pinned to the operating shaft 97.

A selector head dial 119, shown in Figure 2, is provided, attached to the operating shaft 110. This dial 119 is provided with detents 120 adapted to receive a spring urged plunger 121 shown in Figure 2. It will be observed by reference to that figure that there are five detents 120 on the dial 119, one detent being provided for each of the cutter head units. The arrangement of the cams 112 on the shaft 110 is such that, when a detent 120 is engaged by the plunger 121, a predetermined cutter head clutch will be in engagement and the remaining cutter head clutches will be in inoperative position. As will be noted by reference to the second cutter from the left in Figure 5, when the cam follower 113 enters the recess in the cam 112, the bifurcated shifting mechanism 115 will move to the left, being urged to that position by the spring 117, thus bringing the clutch elements 108 and 109 into operative position, the gear 107 sliding along the surface of gear 106 which is of a width approximately equal to twice the width of the gear 107. When the clutch elements 108 and 109 are in engagement, rotation of the shaft 97 will be effective for moving the feed nut 100 and its bracket upon which the cutter head is mounted to the right or to the left, depending upon the direction of rotation imparted to the shaft 97, the cutter head sliding in the ways 37 and 38 and along the splined shaft 21 (see Figure 6).

Since the upper and lower cutter units should be shifted in unison, the selector head dial 119 and its operating shaft 110 are connected to a corresponding shaft 122 through a connecting shaft 123 which is mounted in bearings 124 carried by brackets 125 mounted to the side frame of the machine (see Figure 2). The connecting shaft 123 is provided with bevelled gears 126 and 127 which mesh with corresponding gears connected to the shafts 110 and 122. Upon rotation of the selector head dial 119, a rotation of shaft 110 is effected and a corresponding rotation of the shaft 122 is likewise effected bringing the appropriate cams on the respective shafts into operating position. Also, the operating shaft 97 is connected to a corresponding operating shaft 128 for the lower unit through a connecting shaft 129 and bevelled gear arrangement similar to the connecting shaft 123. Thus, rotation of the shaft 97 through the crank 130 is effective for rotating not only shaft 97 but also shaft 128. Thus, the upper and lower cutter heads which have been selected through the selector dial 119 will be shifted in unison.

It will be observed by reference to Figure 6 that each cutter head is supported by a lead screw 101 and a splined shaft 21 for movement parallel to the axes of the screw and the splined shaft. The spline shaft section 21 is mounted in the bearings 23 attached to the cross frame 24 and the unit slides in the ways 37—38 which are provided on the housing for the cutter head unit and the cross beam 39. Thus, upon rotation of the screw 101, the entire unit moves

transversely of the machine, such movement being permitted along the spline shaft section 21. The elevating mechanism as heretofore mentioned includes the shaft 64 which is provided with a double key, permitting the elevating mechanism to move in unison with the cutter head, sliding along the shaft 64, so that rotation of the gears 61 and 63 will be possible to elevate the cutter, regardless of the adjusted position which the cutter head assumes by reason of rotation of the screw 101.

Since the gear 36 of each upper cutter head assembly and its gear housing 49 are freely movable along the spline shaft section 21, end plates 131 are provided and lie in engagement with the opposite sides of the gear housing 49. The end plates 131 are bolted to the cutter housing 42 and shown in Figure 6.

A suitable mechanism for lubricating the cutting edge of the cutters is illustrated in Figure 9 for the lower unit and in Figure 6 for the upper unit. They are generally the same. They consist essentially of an oil cup or reservoir 133 which may be filled with kerosene or other lubricant. A channel is provided connecting the cup 133 with a felt wick 134 which lies in engagement with the cutting edge 135 of the cutter 75 (Figure 9). A spring 136 is provided for firmly pressing the wick 134 into engagement with the cutting edge.

Selvage scrap breakers

There has been illustrated in the drawings a selvage scrap breaker which may be provided on the equipment if desired. In Fig. 1, three such breakers are shown, numbered 137, 138, and 139. The selvage breakers are effective for chipping the narrow band of selvage material which is normally severed from the web so that it may be readily conveyed to a point of discharge. In order to effect a proper guiding of the selvage material as a web as it is severed from the main sheet, guide chutes 140 and 141 are provided as shown in Figure 2 and they serve to direct the selvage edge into the selvage breaker 137—8—9, as the case may be. The breaker consists of a rotating arm 142 which is mounted upon a shaft of a motor not shown in the drawings. This breaker operates within a housing 143, and the cutters 144 which are mounted on the arm 142 shear the selvage material between the cutters 144 and a stationary cutter bar 145 positioned at the end of the chute. An exhaust fan arrangement 146 is effective for carrying away the chipped pieces of selvage. Each of the cutter selvage breakers is the same and only one will be described.

The cutters

The cutters, as previously mentioned, are of conventional form. Their cutting action is diagrammatically shown in Figure 11, where the sheet 147 is being trimmed between the cutters 31 and 75 and the selvage 148 is being discharged.

The operation of the mechanism

It will be assumed that the machine is about to be placed into operation for the first time and that each of the upper cutter units is in elevated position and that the cutter heads are not in position for severing any standard width of material. It shall be assumed that the mechanism is installed in a plant manufacturing linoleum and that it is first desired to trim a web of linoleum to a strip strip exactly 12 feet wide.

The operator will first position selector dial 119 to bring the cam 112 for the first cutter head set (upper and lower) on the left of the machine (Figure 1) into proper position to permit the clutch members 108 and 109 for that head to interengage. The operator will then rotate the crank 130 to bring the first cutter head set on the left into a desired position. The distance between the first cutter on the left hand and the first cutter on the right hand we shall assume to be about ½ inch less than 12 feet. The operator will next rotate the selector dial 119 to a position where the cam 112 for the right-hand cutter head is in such position that the clutch members 108 and 109 for that head are interengaged. He will thereupon rotate the crank 130 to move the right-hand cutter head set to the right ½ inch. He will measure the distance between the cutters to be sure that he has them spaced precisely 12 feet apart at the cutting edges, making any necessary adjustment with the crank 130.

Motor 10 will be started and this will effect rotation of all of the upper and lower cutter units and also the pull roll. The sheet to be severed will be fed over the roll 15 and under the hold down roll 19, the handles 20 being pressed down to elevate the roll 19 to permit insertion of the web, after which the roll 19 will be lowered into engagement with the goods. The upper cutters for the units on the extreme left and the extreme right which have been properly adjusted to sever a 12-foot strip will now be lowered into operating position. This will be effected by positioning of the handle 74 over the squared end of the shaft 70. This will initiate the electrical control for the lower cutter unit of the pair which is complemental to the right-hand cutter of Figure 1, causing the lower cutter to be retracted. The operator will turn the crank 74 in the appropriate direction to lower the upper cutter unit into proper position. Thereupon, he will remove the crank 74, and the electrical safety device will be effective for controlling the supply of air to the lower cutter unit to bring the cutters 31 and 75 into proper cutting relationship. The operator will then place the handle 74 on the shaft 70*d* which controls the left-hand upper cutter unit. The safety device for the lower cutter unit of that pair will be actuated retracting the lower cutter. The operator will rotate the crank to lower the upper cutter into proper relationship with the lower cutter and will thereupon remove the crank which will cause the safety device to actuate the air control for the lower cutter unit, bringing the cutters into proper cutting position. The two outermost cutter head units will now be in proper severing position, and the intermediate cutter units will be in inoperative position.

The web will be fed between the cutter elements 3 and 4 and over the table 16, around the pull roll 8 and behind the roll 17, being guided in its movement therearound by the guide shoe 18. The end of the web will then be attached to a mandrel on a wind-up machine, and severance of the web will be effected as the sheet is drawn through the machine. The pull roll 8 will be effective so long as there is tension applied to the web sufficient to bring the web into good frictional engagement with the cork covered pull roll. When a roll of the desired quantity

has been wound upon the mandrel, the mandrel is stopped and the sheet severed transversely. When the mandrel is stopped, the tension on the material at the pull roll is released and the pull roll idles under the material.

As the sheet 147 is severed, the selvage 148 is fed down the chute 140—141, and the selvage cutters 137 and 139 effectively chip the selvage into small pieces which the exhausts 146 convey to an appropriate disposal center.

We shall assume now that the operator wishes to sever the 12-foot web into two 6-foot sections. In order to do this, he must bring the central cutter unit set into proper transverse position and lower the central upper unit. The rotation of the cutters will be stopped by turning off motor 19, and transverse movement of the center cutter unit will be accomplished in the same manner as described above in connection with the right and left-hand units. The operator will first shift the central cutter to the right or to the left, as required to bring the cutting edge precisely 6 feet from the right and left-hand cutters at their cutting edges. This will be accomplished by moving the dial 119 to a position where the cams 112 for the central unit set are in a position where the clutch elements 108 and 109 for both the upper and lower cutter heads will be interengaged. The operator will then rotate the crank 130 to bring the cutter units into proper position. The cutter units are not rotating at this time, for, as previously mentioned, the cutters have been stopped. The motor 19 is now restarted. The operator will then place the crank 74 onto the end of the shaft 70b and rotate it to lower the upper cutter unit of the central pair into proper cutting relationship with its complemental lower cutter, the safety device insuring that the lower cutter is retracted during the lowering operation. Upon removal of the crank 74, the safety control will permit the cutters to come into proper cutting relationship. This adjustment can be effected while the sheet is disposed between the cutters, since both the upper and lower cutter units are rotated.

It sometimes occurs that, by severing a sheet into two sections in the manner described, it is possible to salvage a defective 12-foot width by merely discarding one-half section. For purposes of illustration, we shall assume that there is a bad section in the goods extending for about 30 feet along the length thereof, and it is desired to sever that 30-foot section into two pieces. This can be accomplished without shutting down the machine. As the material goes through the machine, the center cutter unit will be lowered; when the defective area is in the cutting zone, the crank handle 17 will be removed, thus bringing the upper and lower cutters into instantaneous cutting position. As the web is pulled through the machine for a distance of 30 feet, the cutters will be in operative position, but thereupon the operator will insert the crank thus rendering the cutters ineffective and immediately will elevate the upper cutter from the lower cutter of the central unit. When the crank 74 is inserted onto the shaft 70b, the safety device of Figure 10 comes into operation, moving the lower cutter 75 away from the upper cuter 31, and this, of course, immediately stops the cutting action. With this arrangement, it is thus possible to actually move the cutters from inoperative to operative position and vice versa while the material is moving through the machine. This is important, for it increases the productive capacity of the machine.

The operation of the various cutters is the same, and, if it were desired to bring the second cutter from the left or the second cutter from the right into operation, a procedure similar to that described above wuold be followed. For example, if it were desired to trim a web to a 9-foot width, the first cutter on the left and the second cutter from the right would be used.

If it were desired to split a 9-foot wide web into two sections and trim the edges at the same time, the machine would be set up so that the second cutter from the left and the second cutter from the right would be spaced 9 feet apart with the central cutter disposed at the midpoint therebetween.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that the same may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. In a trimming machine, the combination of a plurality of pairs of rotatable cutters shiftable laterally along their axes of rotation, each pair including an upper cutter and a complementary lower cutter, and means for selectively shifting said pairs of cutters laterally in complementary pairs and in unison comprising a rotatable operating shaft, independently rotatable traversing means for each pair of shiftable cutters, a selector shaft, and means carried by said selector shaft for selectively connecting said operating shaft and said independently rotatable traversing means for coincidental rotation to actuate said independently rotatable traversing means of the selected pair of cutters.

2. In a trimming machine, the combination of a plurality of pairs of cutters, each pair including an upper cutter and a complementary lower cutter, a driving shaft upon which the upper cutters are mounted, at least one of said cutters on said shaft being slidable laterally axially along said shaft, a driving shaft upon which the lower cutters are mounted, at least the lower cutter complementary to the slidable upper cutter being slidable laterally axially along its driving shaft, and means for moving at least said pair of slidable cutters transversely and in unison along their respective driving shafts comprising a pair of rotatable operating shafts, one for each slidable cutter, rotatable traversing means for each slidable cutter, a rotatable selector shaft, means carried by said selector shaft for connecting said operating shafts to said rotatable traversing means for coincidental rotation to selectively actuate said rotatable traversing means, and means connecting said rotatable operating shafts for coincidental rotation.

3. In a trimming machine, the combination including a plurality of rotary cutters which are shiftable laterally axially along a driving shaft upon which said cutters are mounted, means for selectively shifting said cutters comprising a selector shaft, a selector for each cutter, said selectors being secured to said selector shaft and rotatable therewith to bring said selectors sequentially into selecting position, an operating shaft, a clutch on said operating shaft for each cutter, means controlled by said selectors for selectively engaging said clutches, independent traversing means for each of said cutters, and means controlled by said clutches for selectively

actuating said traversing means upon rotation of said operating shaft.

4. In a trimming machine, a plurality of rotary cutters mounted upon a common driving shaft, means for selectively shifting said cutters comprising a selector shaft, a selector for each cutter, said selectors being secured to said selector shaft and being rotatable therewith to bring said selectors sequentially into selecting operation, a common operating shaft, traversing means for each of the said cutters, and means controlled by said selectors for selectively connecting said common operating shaft and a selected traversing means for movement of said selected traversing means upon rotation of said common operating shaft to shift said selected cutter laterally along the common driving shaft.

5. In a trimming machine, a plurality of rotary cutters mounted upon a driving shaft for simultaneous rotation and shiftable laterally axially along said driving shaft, means for selectively shifting said cutters comprising a selector shaft, a selector cam for each cutter, said cams being fixed to said selector shaft in spaced relationship for sequential selection upon rotation of said selector shaft, an operating shaft, a plurality of clutches on said operating shaft, one for each cutter, said clutches each including an element fixed to said operating shaft and an interengaging element slidable along said operating shaft, clutch actuating means for each clutch engageable with said slidable interengaging element and controlled by said selector cam, independent traversing means for each cutter comprising a lead screw to which the cutter is attached for movement along its driving shaft, and driving means for selectively actuating said traversing means upon rotation of said operating shaft comprising a gear attached to said lead screw and a meshing gear on said slidable interengaging element of said clutch, whereby when said selector shaft is rotated to a position where a selected cam is in actuation position, its corresponding clutch elements will be interengaged and rotation of the operating shaft will effect rotation of its complementary lead screw.

6. In a trimming machine, a plurality of pairs of rotary cutters, each including an upper cutter and a lower cutter, a common driving shaft for the upper cutters, a common driving shaft for the lower cutters, means for selectively shifting said cutters in complementary pairs and in unison along their respective driving shafts comprising an upper selector shaft and a lower selector shaft, means connecting said selector shafts for simultaneous rotation, a selector cam for each upper cutter affixed to the upper cutter selector shaft and a selector cam for each lower cutter affixed to the lower selector shaft, said cams being disposed in complementary pairs in spaced relationship along said selector shafts, an upper operating shaft and a lower operating shaft, means connecting said operating shafts for simultaneous rotation, traversing means for each upper and each lower cutter, and means controlled by said selector cams for connecting said operating shafts to said selected traversing means whereby said cutters may be traversed in pairs and in unison.

7. In a material severing machine, a pair of rotary cutters interengageable along their outer peripheries when disposed in overlapping relationship, means for imparting relative movement to said cutters in a direction at an angle to their axes, cutter separating means for relatively moving said cutters along the direction of their axes, and means controlled by said first-mentioned cutter moving means for actuating said cutter separating means comprising an actuating shaft for said moving means, separable means engageable with said actuating shaft by which said shaft may be rotated, and control means for said separating means actuated by said separable means.

8. In a material severing machine, a pair of rotary cutters interengageable at their peripheral ends in overlapping relationship during severing, means for relatively moving said cutters in a direction substantially parallel to the plane of the cutting edges, means for relatively moving said cutters in a direction at an angle to their axes to part said cutters, and means automatically controlled by said moving means for axially parting said cutters comprising an actuating shaft for said moving means, separable means engageable with said actuating shaft by which said shaft may be rotated, and means controlled by movement of said separable means into cooperative relationship with said actuating shaft for controlling said cutter parting means.

9. In a material severing machine, a pair of rotary cutters interengageable at their peripheral edges in overlapping relationship during severing, means for relatively moving said cutters along a direction substantially parallel to the plane of the cutting edges, and means for automatically axially separating said cutters prior to imparting relative movement along said direction substantially parallel to the plane of the cutting edges comprising means for relatively moving said cutters axially, fluid-operated actuating means for said last named means, control means for the fluid-operated actuating means, and means interconnecting said control means and said means for relatively moving said cutters along a direction substantially parallel to the plane of the cutting edges effective for initiating said control prior to movement of said means for relatively moving said cutters along a direction substantially parallel to the plane of the cutting edges.

10. In a material severing machine, a pair of rotary cutters, means for raising one cutter out of cutting relationship with respect to the other including a shaft carrying a gear, an elevating screw, and a gear attached thereto meshing with said first named gear; separable means for rotating said shaft insertable over the end of said shaft; and control means for retracting the lower cutter axially with respect to the upper cutter disposed for actuation upon insertion of said separable rotating means over said shaft.

11. In a material severing machine, a pair of rotary cutters interengageable at their peripheral ends in overlapping relationship during severing, means for relatively moving said cutters along a direction substantially parallel to their axes comprising a shaft carrying one of said cutters, a cylinder, a piston movable in the cylinder, and pivoted means connecting said piston and said shaft to impart motion to said cutter to move the same relative to the other cutter substantially parallel to its axis upon movement of said piston in said cylinder.

12. In a severing machine, the combination of a plurality of complementary pairs of severing cutters disposed one above the other for severing material fed therebetween, means for selectively elevating the upper cutters from the lower cutters of each complementary pair, and means for

automatically and selectively separating the upper and lower cutters in an axial direction prior to elevation comprising a piston attached to each lower cutter to impart a separating motion thereto and means controlled by said elevating means for said upper cutter for selectively actuating said piston to separate selected upper and lower cutters prior to elevation of said selected upper cutter.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
391,750	Koegel	Oct. 23, 1888
394,704	Lewis et al.	Dec. 18, 1888
507,074	Macy	Oct. 17, 1893
801,036	McCorkingdale	Oct. 3, 1905
840,698	Jungers et al.	Jan. 8, 1907
1,181,660	Gensheimer	May 2, 1916
1,319,497	Warner	Oct. 21, 1919
1,355,104	Cameron et al.	Oct. 5, 1920
1,521,376	Krag	Dec. 30, 1924
1,820,142	McJohnstone	Aug. 25, 1931
2,203,738	Nash	June 11, 1940
2,242,887	Holdgate et al.	May 20, 1941
2,352,816	Weightman	July 4, 1944
2,367,974	Stocker	Jan. 23, 1945
2,368,152	McWilliams et al.	Jan. 30, 1945

FOREIGN PATENTS

Number	Country	Date
3,912	Great Britain	of 1900