Jan. 2, 1923. 1,440,581

I. C. BUCKMINSTER.
CUTTING MACHINE.
FILED MAR. 29, 1920.

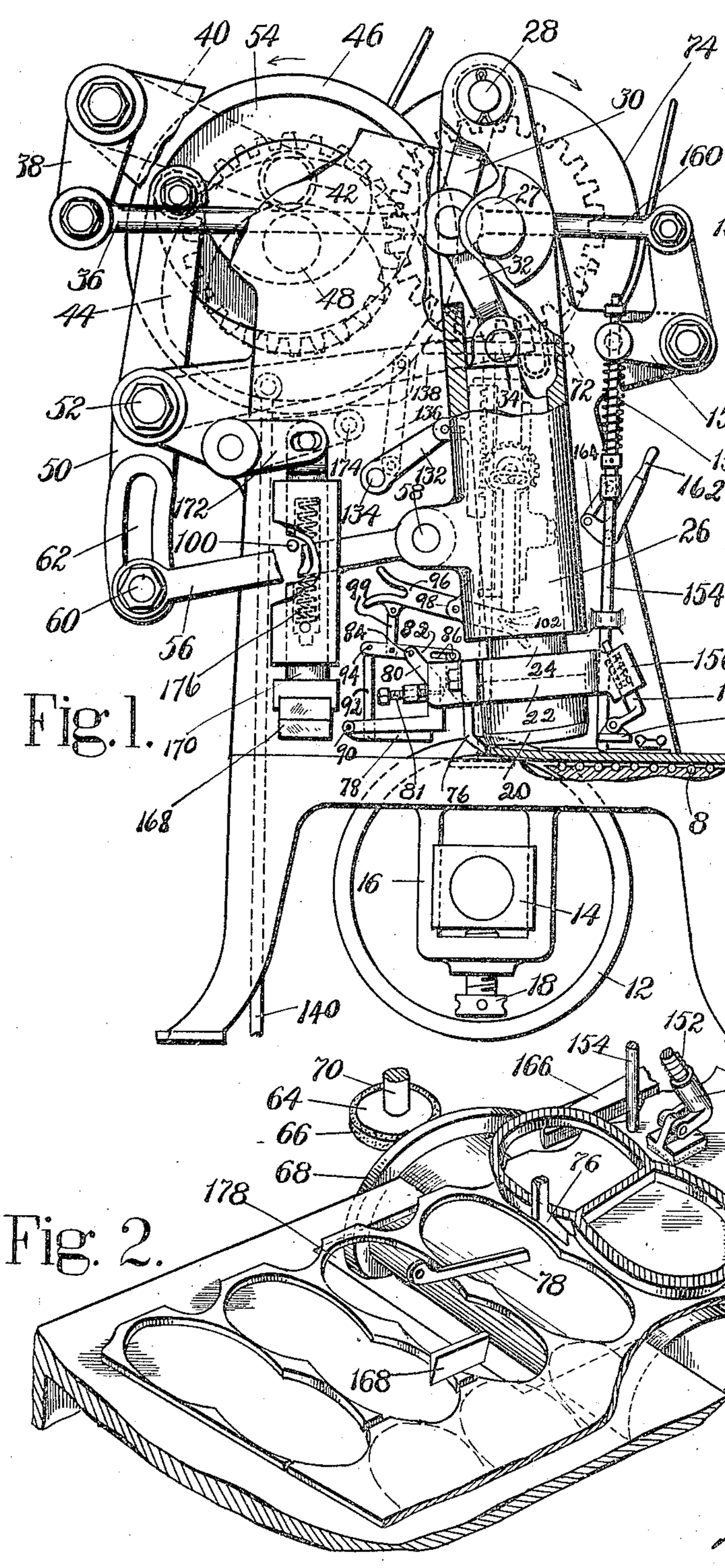

Fig. 1.

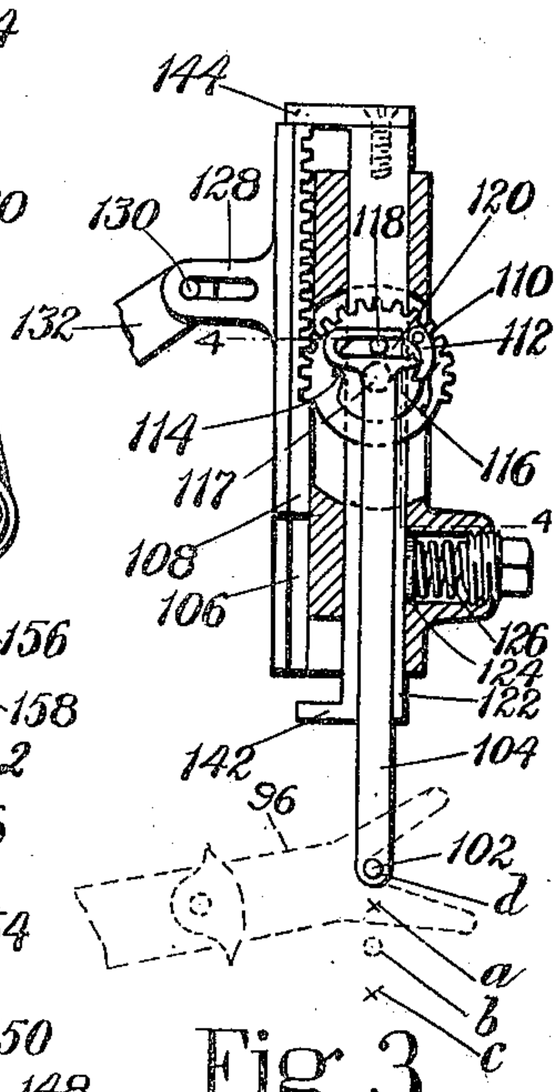

Fig. 3

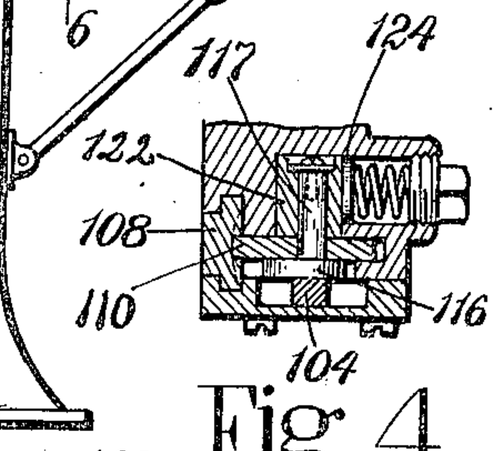

Fig. 4.

Fig. 2.

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UNITED STATES PATENT OFFICE.

IRA C. BUCKMINSTER, OF BEVERLY, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY CORPORATION, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CUTTING MACHINE.

Application filed March 29, 1920. Serial No. 369,558.

To all whom it may concern:

Be it known that I, IRA C. BUCKMINSTER, a citizen of the United States, residing at Beverly, in the county of Essex and State of Massachusetts, have invented certain Improvements in Cutting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates to cutting machines and more particularly to machines for dieing out blanks, such as shoe parts, from leather or other material utilized in the manufacture of shoes.

It is an object of the invention to provide a satisfactory machine for cutting blanks from sheet material which will be especially simple in construction, and economical as well as convenient and rapid in operation.

In one aspect the invention comprises a die for cutting blanks from material on a support and means for oscillating the die so that it travels with the work during the cutting operation and returns to initial position preliminary to a second cutting operation.

In another aspect the invention comprises a die which is reciprocated to cause it to penetrate the sheet material to cut blanks therefrom and is at the same time oscillated to feed the work, the construction and arrangement being such that the blanks are cut during the feeding movement of the work.

It has long been the custom in cutting blanks from sheet material, in attempting to reduce the waste to a minimum, to cut the blanks from the sheet in rows wherein the blanks of adjacent rows occupy what may be termed a staggered arrangement relatively to each other. Thus in positioning the sheet material for the first row of blanks the gage positions the leading end of the sheet very close to the corresponding edge of the die and for the second row of blanks the leading edge of the sheet is positioned at a considerably greater distance from the corresponding edge of the die. Preferably, two gages are provided which are alternately projected into operative position with respect to the die at the beginning of cutting operations along different rows of blanks.

In the illustrative construction, these gages are mounted to move with the die and are automatically projected into operative position when the machine comes to rest so that sheet material may be positioned for another series of cutting operations.

In one aspect the invention comprises a die which cuts blanks from sheet material and moves with the sheet material as the latter is fed during the cutting operations, and a gage for positioning the work preliminary to cutting operations controlled by the movements of the die so as to be projected into and withdrawn from operative position with respect to the sheet material to be cut.

In another aspect the invention comprises a die constructed and arranged to cut blanks from sheet material and to feed the sheet material into cutting position, and a plurality of gages mounted to move with the die and to be projected automatically one at a time into position to gage the work preliminary to a series of cutting operations.

In still another aspect the invention comprises a combination in which a die is reciprocated toward and from a work support to cut blanks from sheet material on the support and oscillated to feed the sheet material which is initially positioned by means of gages mounted to move with the die and arranged to be projected alternately into operative position by means automatically controlled during the swinging movement of the die.

In the illustrative machine the die which is reciprocated to cut blanks from the sheet material is also oscillated to feed the sheet material in co-operation with a cylinder having a curved surface which co-operates with the die in blank cutting operations and which is so mounted as to move with the die during feeding operations. Preferably, there is also provided additional means for rotating the cylinder during the dieing out operation and in the preferred illustrative construction this additional means drives the cylinder yieldingly through a friction member.

Other features of the invention and novel

combinations of elements will be described in the detailed specification and pointed out in the claims.

In the drawings:

Fig. 1 is a view in side elevation and partly in section of the illustrative embodiment of the invention;

Fig. 2 is a perspective partly in section showing the work supporting and feeding means;

Fig. 3 is a detail of the gage setting mechanism; and

Fig. 4 is a section along the line 4—4 of Fig. 3.

In the illustrative machine there is provided a work support comprising a table 6 having rollers 8 mounted on its work supporting surface and serving to lessen the friction between the work 10 and the table as it passes over the table in the feeding direction. Co-operating with the table as a work support is a cylinder 12 which may be of wood or of metal covered with rubber composition, since it is designed to take the thrust of the cutting edge of the cutter during co-operation with the cutting means throughout cutting operations. In order that the cylinder may co-operate with the cutting means it is mounted to project through an opening in the table 6 and means is provided for adjusting the cylinder in a direction toward and from the cutting means, the said construction comprising, in the illustrative machine, bearings 14 for the shaft of the cylinder mounted in guides 16 in the frame of the machine and adjustable through screw members 18. The cylinder 12 serves not only as a cutting bed during the cutting operations on the sheet material but also as part of the feeding means as will be hereinafter set forth.

In the illustrative construction the blank cutting means is shown to comprise a die 20 mounted by means of a collar 22 upon the lower end of a plunger 24 which is reciprocable within a casing or housing 26 pivoted at 27 upon the frame of the machine. Means is provided for reciprocating the plunger 24, that shown comprising a toggle mechanism of which one link 30 is pivoted to the casing at 28 and the other link 32 pivotally connected at 34 to the upper end of the plunger 24. It will be clear that upon making and breaking the toggle constituted by the links 30 and 32, plunger 24 will be reciprocated to operate the die 20 to cut the sheet material, and such making and breaking of the toggle is accomplished through the rod 36 pivotally attached to adjacent ends of the toggle links 30 and 32 and at its other end to an arm 38 of a bell crank lever, the other arm 40 of which carries a roll 42 for movement along the cam groove 44 in the cam member 46 mounted on the counter shaft 48. Means is provided also for moving the die along with the work so that the cutting takes place during the movement of the work in the feeding direction. In the preferred construction the die assists in feeding the work, the arrangement being such that as the die is oscillated about the center of the pivot 28 it co-operates with the cylinder 12 in feeding the work forwardly substantially the width of a single blank. At the end of this forward feeding movement the die is raised through the breaking of the toggle mechanism 30, 32 and then oscillated back to its starting point preliminary to another cutting and feeding operation. It should be noted that this machine requires less power, than prior constructions, to operate it since the cutting of each blank is done progressively along successively adjacent cutting portions of the die. The means for oscillating the die comprises a lever 50 pivoted at 52 on the bracket projecting from the frame of the machine and carrying at its upper end a roll which moves along the cam groove 54 in the cam member 46. Extending between the lever 50 and the housing or casing 26 is a link 56 pivoted at 58 to the casing and at 60 to said lever, the latter pivot point being adjustable in a slot 62 in the lever so that the throw of the casing 36 may be regulated in accordance with the size of the die 20, it being clear that the smaller the die the less will be the extent of the oscillatory movement communicated to the die through connections from the lever 50. As before stated the length of the feeding movement of the die through the oscillation of the casing 26 is substantially equal to the width of a blank, or in other words, to the width of the die being used. With care the feeding step of the die can be so adjusted that there is left between the blanks the very minimum of waste or scrap material.

As heretofore stated the cylinder 12 co-operates with the die in feeding the work, it being clear that pressure of the die upon the material in cutting therethrough and its movement in the direction of feed causes or tends to cause rotation of the cylinder in the same direction. To assist in this movement of the cylinder there is provided a friction wheel 64 having a friction surface 66 arranged to engage frictionally with one end portion 68 of the cylinder, at a considerable distance from the axis of the cylinder, to drive the cylinder yieldingly in the desired direction. It will be understood that other means than that shown may be utilized for driving the cylinder yieldingly, so that it may co-operate properly with the die to feed the work. As shown, the friction wheel 64 is mounted at the lower end of a shaft 70 at the upper end of which is another friction wheel 72 engaged at its periphery to be frictionally driven from one face of the wheel or disk 74 on the main shaft of the machine.

In Fig. 2 of the drawings there is indicated an economical method of cutting blanks from sheet material which consists in cutting one row of blanks and in cutting the succeeding row in such manner that the blanks of the first row are in staggered relation to the blanks of the succeeding row. Accordingly, it is desirable to provide two gages one of which will position the work for a given row of blanks and the other for the succeeding row of blanks which obviously will begin at a different distance from the edge of the sheet than the preceding row. Inasmuch as the die moves along with the work during cutting operations and is positioned at one extreme of its movement when the machine is brought to rest after a series of cutting operations, the gage may most conveniently be mounted on the die so as to position the work preliminary to cutting operations along a succeeding row of blanks.

As illustrated, the gages 76 and 78 are mounted on the collar 22 which carries the die 20 by means which provides for projecting the gages alternately into operative position, the said means comprising a bracket 80 mounted adjustably on the collar 22 and providing support for a lever 82 which is pivoted at 84 on the bracket. At one end of the lever 82 is the gage 76 to which it is connected by a pin and slot connection as indicated at 86, Fig. 1, of the drawings, the gage being guided for sliding movement vertically in the bracket 80. Gage 78 is pivoted to the bracket 80 at 90 and has pivotally connected thereto intermediate its ends a link 92, the other end of which is pivoted at 94 to an end of the lever 82. It will be clear from inspection of the drawing that the gages 76 and 78 may be alternately projected and retracted upon rocking the lever 82 and that the lever may be so positioned as to hold both of the gages in inoperative position. From an inspection of Fig. 1 it will be clear also that the gage 76 will position the leading end of the sheet very close to the forward cutting edge of the die and that the gage 78 will position the same sheet with the leading end thereof a considerably greater distance from the same forward cutting edge of the die so that the blanks in this second row will be individually staggered with relation to the blanks in the preceding row.

Preferably each gage is moved to operative position by automatically operating means which also removes the gage in time to permit unobstructed feeding of the work. In the illustrative construction this automatic means is controlled by the swinging movement of the die so that as the die comes to rest at the end of a series of cutting operations the proper gage will be projected into operative position for positioning the sheet preliminary to the cutting of blanks from a succeeding portion of the sheet. As shown the automatic means for positioning the gages comprises a lever 96 pivoted at 98 to a bracket extending laterally from one side of the casing 26, the said lever having forked ends which provide cam surfaces arranged to engage relatively stationary members positioned in the path of movement of the lever, the arrangement being such that the lever is operated upon contact with the relatively stationary members to project one or the other of said gages or to move them both to inoperative position. As shown the lever 96 is connected to lever 82 by a link 99. In the illustrative machine, the member 100 cooperates with the lever 96 to move the latter in such manner as to position the gages both in inoperative position while the corresponding member 102 is adjustable on the frame of the machine and arranged to engage the other end of the lever 96 to operate the lever so as to project one or the other of said gages into operative position. As shown the members 100, 102 are in the form of pins which project into the path of the forked ends of the lever 96 and by contact with the cam surfaces of these forked ends shift the lever for the purpose described.

In Figure 3 of the drawings there is illustrated one means for adjusting the member 102 automatically and in accordance with the requirements of the work, the said means comprising a bar 104 which carries at its lower end the pin member 102 and at its upper end is provided with means for connecting it with a rack and pinion mechanism by which the bar is reciprocated at the proper intervals. Mounted in a guideway 106 in the frame of the machine is a rack bar 108 which is constantly in mesh with the pinion or gear wheel 110, the latter carrying a pawl 112 adapted to engage alternately with two teeth 114 on a rotatable member 116 mounted loosely on the pivot pin 117 of the gear 110. Extending from one face of the rotatable member 116 is a pin 118 which is receivable in a slot 120 in the upper end of the bar 104. As shown the pivot pin 117 is carried by a slide 122 mounted in a guideway in the frame and held frictionally against too free movement by means of a friction plate 124 which is pressed against the side of the slide by means of a spring 126, the tension of which can be adjusted as indicated in the drawing. Extending from one side of the rack bar 108 is a projection 128 which is slotted to receive a connecting pin 130 at the end of a lever 132 pivoted at 134 on the frame of the machine and connected by a link 136 with the lever 138 which is the starting lever of the machine and which is connected by means of a rod 140 with a treadle (not shown). In Figure

3 the parts are shown with the machine at rest and the pin member 102 in position to lift the adjacent end of the lever 96 as the member moves toward and upon the said pin member so that when the machine comes to rest the gage 78 will be projected into operative position and the gage 76 moved further away from operative position. Now when the operator steps on the treadle to start the machine the rack bar 108 will be moved downwardly, thus rotating the gear wheel 110 and carrying with it the pawl 112 around into position to engage the other tooth 114, continued movement of the rack bar carrying its lower end into engagement with a projection 142 on the slide 122 and thus moving the slide downwardly until the pin member 102 reaches the position *a*, this taking place, however, after the machine has started in operation and after the lever 96 has moved away from engagement with the pin 102. The purpose for thus moving the pin member 102 to the position *a* which is what may be called the neutral position of the pin member 102 will be clear when it is remembered that the lever 96 is moved to neutral position on the first swing of the casing 26 toward the left in Figure 1, this swing of the casing bringing the forked lever 96 into contact with the pin member 100, thus moving the lever to an intermediate position in which both gages are retracted so that there is no interference with the feeding of the work. Hence the arrangement is such that when the casing swings back to the position shown in Fig. 1 preliminary to the cutting out of the blank second from the edge of the sheet, the pin member 102 will be in position *a* and thus will not effect any movement of the lever 96. Hence the lever 96 will oscillate with the casing and come into contact with the pin members 100 and 102 at each end of its oscillation but will not be operated by the said pin members. While the last blank in the row is being cut the operator removes his foot from the treadle which is promptly raised by a spring (not shown) whereupon the rack bar 108 moves upwardly, thus carrying the gear wheel 110 and with it the rotatable member 116 around to the right in Fig. 3 by which motion the pin 118 is transferred from position directly over the pivot pin 117 to a position directly under said pivot pin and in this movement of the pin 118 the bar 104 is projected downwardly carrying the pin member 102 to the position *c*. Continued upward movement of the rack bar 108 finally carries it into contact with the projection 144 on the slide 122 whereby the slide is lifted carrying with it the bar 104 so that pin member 102 is moved from position *c* to position *b*. Thus when the lever member 96 is moved with the casing 26 to its position of rest at the extreme right in Fig. 1, it will engage with its forked end the pin member 102 in position *b* and will be tipped so as to project the gage 76 into operative position. After the work has been positioned against this gage the operator again steps on the treadle to start the machine and in doing so moves the rack bar 108 downwardly its full distance and by engagement with the projection 142 on the slide 122 the said slide, together with the rack bar 104, are carried downwardly whereby the pin member 102 is moved to position *c*, this occurring after the lever 96 is moved away from engagement with the pin member. Hence, when the lever 96 returns in neutral position after engagement with the pin member 100, its neutral position will not be obstructed by engagement with the pin 102, which in position *c* is so low as not to operate the lever. After the series of operations for which the work was initially positioned by the gage 76 have been performed the operator removes his foot from the treadle as before described and the rack bar 108 is carried upwardly, thus moving the pin 118 from its lowermost to its uppermost position, whereby the pin member 102 is carried from position *c* to position *a* but continued upward movement of the rack bar 108 finally carries it into contact with the extension 144 on the slide 122, thus carrying the slide and the bar 104 upwardly until the pin member 102 comes to rest with the latter in position *d*. In this position of the pin member the lever 96 is actuated just as the machine comes to rest to move the gage 78 into operative position.

In the illustrative construction means is provided for assisting the die in feeding the work over the table, the said means comprising a block 146 having a lower friction surface to engage the sheet material to assist in feeding the sheet as the die and the block swing toward the left in Figure 1. Since the die and the blocks 146 are turning about the pivot 28, the said block must be mounted yieldingly and this is accomplished in the construction shown by pivoting the block to a rod 148 which is slidingly received in an extension or bracket 150 on the collar 22, a spring 152 being provided for projecting the rod 148 yieldingly in a downward direction.

In order that the sheet material may not be displaced to the right as the die swings to position preparatory to a cutting operation there is provided a presser foot 154 arranged to be operated from the bell-crank lever 156, a spring 158 being introduced between the presser foot and the bell-crank so that the former is pressed down yieldingly on the work. Upon inspection of Fig. 1 it will be seen that the bell-crank 156 is operated from the same toggle which operates the die, connection being made by a

link 160 and the arrangement being such that as the toggle is broken to raise the die the bell-crank is operated to depress the presser foot and cause its engagement with the work to hold the same from displacement. It should be noted that this downward pressure of the presser foot is not sufficient to prevent the sheet material from being introduced into the machine preliminary to each series of cutting operations since the presser foot can be readily raised through the handle 162 which operates a toggle 164 operably connected to the presser foot.

Means is preferably provided for cutting away the scrap so that a straight edge will be provided on the sheet material, thus making it possible to locate the sheet for fresh-cutting operations by positioning the straight edge thus formed against a side gage indicated at 166. In the construction shown, the scrap cutting means comprises a knife 168 at the lower end of a plunger 170 which is operated by a bell-crank 172, the latter carrying a roll 174 in contact with a face cam on the cam member 46. A spring 176 serves to hold the cam roll 174 in contact with the cam member 46. The blade or cutter 168 is long enough to cut the scrap between blanks of the various sizes for which any particular machine is designed to operate. The die is preferably provided with means for ejecting the blank from the die such as a block backed by spring means which permits the block to recede into the die during the cutting of a blank. Such a construction of a blank ejecting means is old and well-known as shown, for example, in the patent to Whittlesey et al. No. 426,577, granted April 29, 1890, for a rubber cutting machine. Thus the blank is left in the plane of the sheet and is moved along therewith until it drops through the opening 178 in the table 6.

The bracket 80, as before stated, is mounted adjustably on the collar 22, so that the gages 76 and 78 carried by the bracket may be positioned properly with respect to each different size of die 20 that may be used in the machine, adjustment of the bracket being accomplished through proper manipulation of the adjusting member 81. Corresponding adjustments (not shown) are provided in the mounting for the lever 82 on the bracket 80 and in the attachment of the link 99 with said lever 82. It will be understood that the amount of adjustment of the gages is not great and corresponds approximately to one-half the difference in the transverse dimensions of the dies which are, at any given time, interchanged on the machine.

In operation with the machine to cut blanks from sheet material the sheet is introduced by positioning its straight edge against the gage 166 and then moving it in the feeding direction until its leading edge is under the die and in engagement with one of the two gages 76 and 78, one of which is in operative position when the machine is at rest. As before stated the presser foot is raised so that it does not obstruct introduction of the work and is released as soon as the sheet material has been introduced beneath it. With the work in position the operator steps on the treadle to start the machine whereupon the die enters the work and moves to the left (Fig. 1) to feed the work, the gage moving with the die and being retracted from gaging position as the die reaches its furthest point to the extreme left. Thus the gage will not contact with the scrap on the return swing of the die and will remain out of position until the machine is once more brought to rest when the other gage will be projected into operative position to gage the work for a fresh series of blanks beginning at a different distance from the leading edge of the sheet.

Having described my invention what I claim as new and desire to secure by Letters Patent of the United States is:—

1. In a machine of the class described, a work support, a die for cutting blanks from sheet material positioned on the support, and means for reciprocating the die to force it through the work and for moving it to feed the work constructed and arranged to cut blanks from the sheet material during feeding movement of the latter.

2. In a machine of the class described, a work support, a die for cutting blanks from sheet material positioned on the support, means for reciprocating the die to cause it to penetrate the sheet material, means for feeding the work, and means for moving the die at the rate of feeding movement of the work, the said means being so related to each other that the die cuts progressively through the material and completes the cutting operation during the feeding movement of the work.

3. In a machine of the class described, a work support, a die for cutting sheet material positioned on the work support, means for forcing the die through the work, means for feeding the work, and means for oscillating the die in timed relation to the cutting movement thereof so that it travels with the work during the cutting operation and is returned to initial position preliminary to the second cutting operation.

4. In a machine of the class described, a work support comprising a cylinder mounted so that a portion of its cylindrical surface serves as a work support during cutting operations, a die reciprocable towards and from the work support for cutting blanks from sheet material positioned on the work support, and means for operating

the die to cause co-operation between the die and the cylinder to cut blanks from the sheet material and simultaneously feed the work.

5. In a machine of the class described, a work support comprising a cylinder having a cylindrical surface disposed to furnish a supporting surface for the work, a die reciprocable towards and from the cylinder for cutting blanks from sheet material, and means for causing co-operation between the die and the cylinder to feed the work and simultaneously cut blanks therefrom.

6. In a machine of the class described, a work support comprising a cylinder mounted to rotate about a horizontal axis, a die for cutting blanks from sheet material, and means to oscillate the die and force it into the sheet material to cut blanks therefrom and to feed the work in co-operation with said cylinder.

7. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder having a cylindrical surface for co-operating with the die in dieing out the blanks, and means for reciprocating the die toward and from said cylinder during blank cutting operations.

8. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder for supporting the sheet material against the thrust of the die, and means for reciprocating the die toward and from the cylinder and for oscillating it in timed relation to the rotation of the cylinder.

9. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder having a cylindrical surface for supporting the sheet material against the thrust of the die, means for reciprocating the die toward and from the cylinder to cut the sheet material, means for oscillating the die to feed the sheet material simultaneously with the cutting thereof, the construction and arrangement being such that the cylinder rotates with the sheet material as the latter is fed by the die, and additional means for rotating the cylinder in the direction of feed of the material.

10. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder having a curved surface for supporting the sheet material against the thrust of the die, means for reciprocating the die toward and from the cylinder in cutting operations, and means for oscillating the die and rotating the cylinder so as to feed the sheet material during the cutting of blanks therefrom.

11. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder having a curved surface for supporting the work and for taking the thrust of the die during cutting operations, means for reciprocating the die toward and from the cylinder in cutting blanks from sheet material, means for oscillating the die so as to cut the sheet material while it is being fed, and means for rotating the cylinder to feed the sheet material.

12. In a machine of the class described, a die for cutting blanks from sheet material, a cylinder having a curved surface for supporting the work against the thrust of the die during cutting operations, means for reciprocating the die toward and from the cylinder to cut the material, means for yieldingly driving a cylinder in the direction of feed, and means for moving the die to cooperate with the cylinder in feeding the sheet material during the cutting of each individual blank.

13. In a machine of the class described, a work support, a die for cutting sheet material, a gage for positioning the material on the work support, means for moving the die to feed the work, and means controlled by the movement of the die for moving the gage to operative position.

14. In a machine of the class described, a work support, a die for cutting sheet material, a gage for positioning the material on the work support, means for moving the die to feed the work, and means controlled by the movement of the die for moving the gage into and out of operative position.

15. In a machine of the class described, a work support, a die for cutting sheet material, gages for positioning the work alternately at certain predetermined distances with respect to the die, means for moving the die to feed the work, and means controlled by the movement of the die for alternately moving the gages into and out of operative position.

16. In a machine of the class described, a work support, a die for cutting sheet material on the work support, means for oscillating the die to feed the sheet material, a gage connected to the die to move therewith during oscillation of the die, means for moving the gage to operative position so as to locate the work with respect to the die for the first cutting operation, and means for thereafter withdrawing the gage so that it will not interfere with the feeding of the work.

17. In a machine of the class described, a work support, a die for cutting sheet material located on the work support, means for moving the die to feed the work, gages connected to the die to move therewith during its work feeding movements, and means for moving the gages alternately into operative position for positioning the work with respect to the die.

18. In a machine of the class described, a work support, a die for cutting sheet material supported on the work support, means for moving the die to feed the sheet material,

gages mounted to move with the die in its work feeding movements, means for alternately moving the gages to operative position for the purpose of locating the leading end of the work at predetermined distances with respect to the die, and means for moving the operative gage to inoperative position and at the same time retaining the other gage in inoperative position so that the work is free to be fed during a plurality of cutting operations.

19. In a machine of the class described, a work support, a die for cutting sheet material, a gage mounted to move with the die for positioning the material on the work support, means for moving the die to feed the work, and means for automatically moving the gage to operative position.

20. In a machine of the class described, a work support, a die for cutting sheet material, a gage mounted to move with the die for positioning the material on the work support, means for moving the die to feed the work, and means for automatically moving the gage into operative position as the machine comes to rest so that the material may be positioned properly with respect to the die at the beginning of fresh cutting operations.

21. In a machine of the class described, a work support, a die for cutting sheet material, gages mounted to move with the die for positioning the work alternately at certain predetermined distances with respect to the die, means for moving the die to feed the work, and automatic means for alternately moving the gages into and out of operative position as the machine comes to rest so that the material may be positioned alternately at certain predetermined distances with respect to the cutting edge of the die at the beginning of fresh cutting operations.

22. In a machine of the class described, a work support, a die for cutting sheet material on the work support, means for moving the die to feed the work, a device mounted to move with the die in its work feeding movements to assist in feeding the work, a presser foot operative to hold the work during return movement of the die, means for reciprocating the die toward and from the work to cut blanks therefrom comprising a toggle, and means connecting the presser foot with the toggle for operating the former in timed relation with the operation of the die.

23. In a machine of the class described, a work support, a die for cutting blanks from sheet material positioned on the support, means for reciprocating the die to cause it to penetrate the sheet material, and means for moving the die at the rate of feeding movement of the work, the said means being so related to each other that one side portion of the cutting edge of the die enters the material first and thereafter other edge portions of the die enter the material progressively from one side portion of the cutting edge to the other side portion and finally the side portion opposite the first mentioned side portion enters the material and completes the cutting of the blank.

24. In a machine of the character described, a support for the work, a die, a toggle for operating the die to cut blanks from the work, means for moving the die to feed the work, a presser foot, and connections to the toggle for operating the presser foot in timed relation with the feeding movements of the die to hold the work while the die is returning to initial position preliminary to each blank cutting operation.

25. In a machine of the character described, a table for supporting sheet material, a die, means for reciprocating the die to cut blanks from sheet material and to feed the sheet material, a presser foot for holding the sheet material against displacement while the die is returning to initial position, and means connected to the die operating means for moving the presser foot to release the work while it is being fed by the die.

26. In a machine of the character described, a support for sheet material, a die, means for reciprocating the die to cut blanks from the material, a presser foot, means for automatically operating the presser foot to hold the sheet material while the die is returning to initial position and for causing the presser foot to release the sheet material while the work is being fed, and manually controlled means for moving the presser foot to inoperative position and holding it there while the work is being introduced into the machine.

27. In a machine of the character described, a support for sheet material, a die for cutting blanks from the material, a gage mounted to move with the die as the latter moves with the work in the direction of feed, means for automatically positioning the gage and for automatically withdrawing it from operative position comprising a cam member, means for positioning the cam member comprising a slide and a rack bar having lost motion connections with each other, and a treadle for controlling said rack bar.

28. In a machine of the character described, a support for sheet material, a die for cutting blanks from sheet material, means for operating the die to cut the blanks and to move the die in the direction of feed of the work, a gage mounted to move with the die to position the work preliminary to a series of cutting operations, starting means for the machine comprising a treadle, and means controlled from the treadle and automatically operative to position the gage at

the end of said series of cutting operations so that the sheet material may be correctly positioned for the succeeding series of cutting operations.

29. In a machine of the class described, a work support, a die for cutting sheet material located on the work support, means for moving the die to feed the work, gages connected to the die to move therewith during its work feeding movements, and means for moving the gages automatically one at a time into operative position for positioning the work with respect to the die.

30. In a machine of the class described, a work support, a die for cutting sheet material positioned on the work support, means for supporting the die for oscillation into and out of the plane of the work and means for forcing the die into the work and simultaneously moving the die along with the work to feed the same a distance corresponding to one dimension of the blanks being cut from the material, the die being subsequently returned to initial position preliminary to a second cutting operation.

31. In a machine of the class described, a work support, a die for cutting sheet material in co-operation with the work support, the said die being supported to turn about a pivot spaced from the work support, and means for simultaneously forcing the die through the work and for moving it along in a given direction to feed the work after which the die is returned to initial position preliminary to a second cutting operation.

32. In a machine of the class described, a work support having a slot therein, a cylinder mounted below the work support and having a portion of its cylindrical surface positioned in the slot in the work support so as to furnish part of the support for the work, and means for adjusting the cylinder with respect to the plane of the upper surface of the work support.

33. In a machine of the class described, a work supporting table having a slot extending transversely thereof, a cylinder having a portion of its cylindrical surface positioned in the slot, a shaft or axle for the cylinder, and bearings adjustable in the frame of the machine for receiving the ends of the shaft or axle, the arrangement being such that the cylinder may be adjusted to locate a portion of its cylindrical surface in proper position with respect to the plane of the upper surface of the work supporting table.

34. In a machine of the class described, a work support having a slot therein, and a cylinder mounted below the work support and having a portion of its cylindrical surface positioned in the slot in the work support to serve as a cutting block during cutting operations, said cylinder being adjustable about its axis to bring successively different portions of its cylindrical surface in position to take the thrust of the cutter during cutting operations.

35. In a machine of the class described, a cylinder having a cylindrical surface disposed to furnish a supporting surface for sheet material during cutting operations, a cutter reciprocable toward and from the cylinder for cutting the sheet material, and means for causing co-operation between the cutter and the cylinder to feed the work and simultaneously with the feeding movement to cut blanks therefrom.

36. In a machine of the class described, a cylinder mounted to rotate about a horizontal axis, a cutter for cutting blanks from sheet material passing over the cylinder, and means for moving the cutter toward the cylinder and simultaneously therewith to oscillate the cutter so that the cutter moves with the sheet material in the feeding direction during the operation of cutting blanks therefrom.

37. In a machine of the class described, a cutter for cutting blanks from sheet material, a cylinder having a cylindrical surface for co-operating with the cutter during cutting operations, means for rotating the cylinder, and means for reciprocating the cutter toward and from the cylinder to co-operate with the latter in cutting blanks from sheet material.

38. In a machine of the class described, a cutter for cutting blanks from sheet material, a cylinder having a cylindrical surface for co-operating with the cutter during the operation of cutting blanks from the material, means for rotating the cylinder in a direction to feed the sheet material through the plane of cutting operations, and means for reciprocating the cutter toward the cylinder during rotative movement of the latter whereby blanks are cut simultaneously with the feeding movement of the sheet material.

39. In a machine of the class described, a cutter, a cylinder having a cylindrical surface for supporting sheet material against the thrust of the cutter, means for oscillating the cutter to feed the sheet material simultaneously with the cutting thereof, the construction and arrangement being such that the cylinder rotates with the sheet material as the latter is fed by the cutter, and additional means for rotating the cylinder in the direction of feed of the material.

In testimony whereof I have signed my name to this specification.

IRA C. BUCKMINSTER.