July 31, 1923. 1,463,229

R. C. SIMMONS

CUTTING MACHINE

Filed July 15, 1920 2 Sheets-Sheet 1

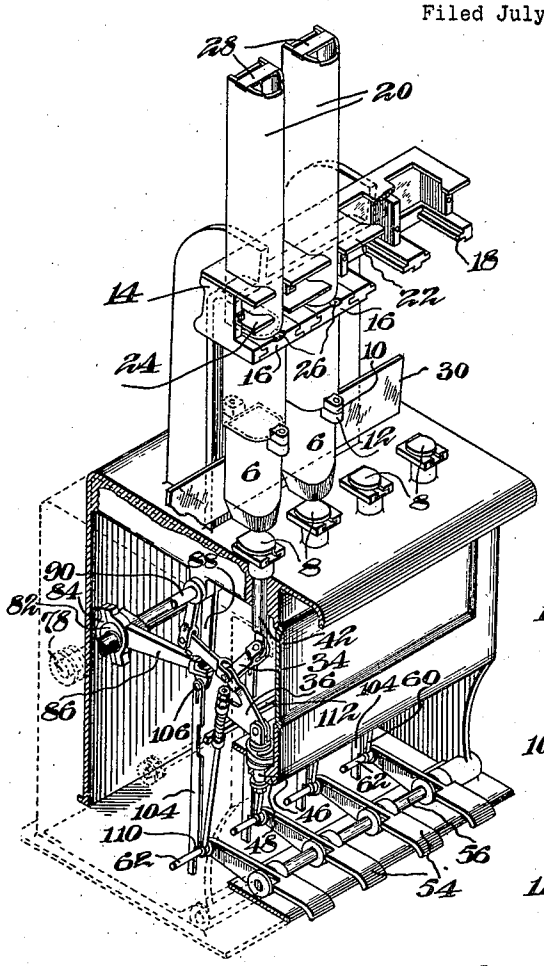


Fig.1.

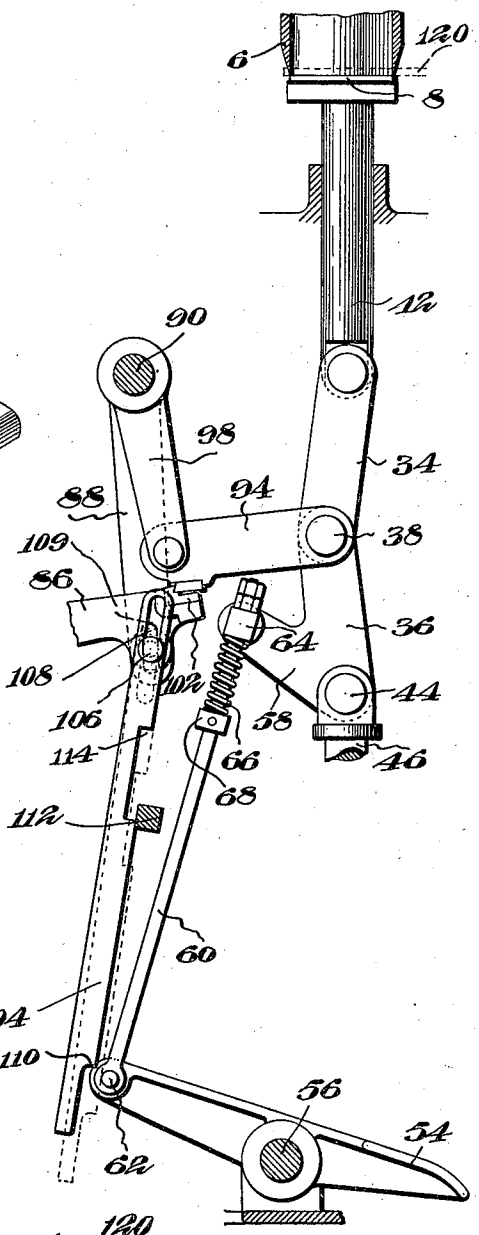


Fig.3.

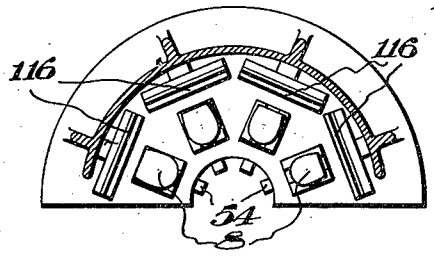


Fig.4.

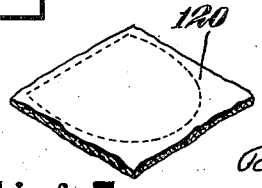


Fig.5.

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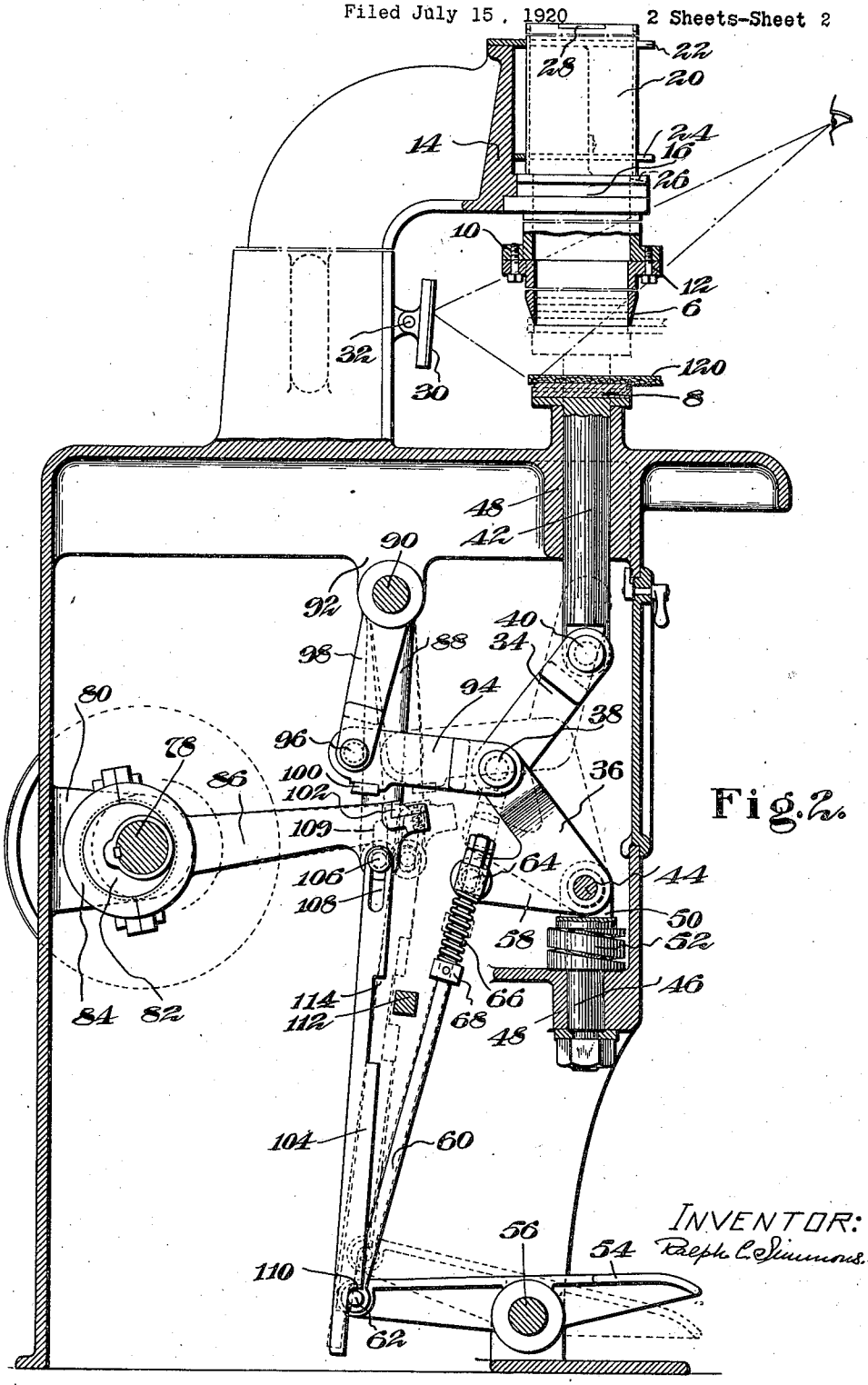


Fig. 2.

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Patented July 31, 1923. 1,463,229

UNITED STATES PATENT OFFICE.

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

CUTTING MACHINE.

Application filed July 15, 1920. Serial No. 396,435.

To all whom it may concern:

Be it known that I, RALPH C. SIMMONS, 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 machines for cutting blanks from sheet material.

According to one of the methods heretofore practised sheet material is placed upon the cutting bed of a beam dinker and a freely movable die positioned successively over various portions of the material and forced therethrough by the beam during the reciprocation of the latter. The most serious objection to this apparatus resides in the danger which attends the operation of placing the die by hand and holding it during the operation of the machine. Furthermore, the work is slow and laborious since the die must be emptied by the operator when it becomes full of blanks and these blanks placed by hand in a magazine or otherwise in stacked relation. Another well known type of machine for cutting blanks from scrap or waste sheet material comprises one or a plurality of dies fixed in a support with cutting edges facing upwardly and through which the blanks are discharged downwardly into receptacles or magazines placed below the dies. If the blanks are discharged loosely into receptacles they must be reassembled in stacked relation before being operated upon in other machines. If, on the other hand, magazines are provided below the dies, such magazines must have provision at each end for detachably retaining them in position so that they may be emptied when full and also means such as a follower must be provided with each magazine so that the blanks will be properly received therein and maintained in stacked relation and hence the magazine is more or less complicated in construction and is not adapted for use with other machines designed to utilize the blanks in manufacturing operations.

It is an object of this invention to provide improved means for cutting and magazining blanks which will be simple in construction, especially efficient in operation and free from the disadvantages which have restricted the usefulness of prior constructions. The invention is shown by way of illustration as embodied in a machine for cutting blanks from scrap or waste sheet material but it will be understood that various important features of the invention may have other uses and applications.

In one aspect the invention contemplates the provision of a die having its cutting edge facing downwardly and through which the blanks are forced upwardly by means of a cutting block reciprocable relatively to the die so that the blanks pass in properly stacked relation through the die and into a detachable magazine above the die and in alinement therewith. Such a magazine may be of the simplest construction adapted for removal with its contents from the machine and for insertion into another machine designed to perform other operations on the blanks.

In another aspect the invention resides in an organization comprising a cutting block which approximates closely in size and shape to the area defined by the cutting edge of the die whereby the work supporting surface of the cutting block serves as a gage for positioning the work so that the blank may be cut from the sheet material with the minimum of waste.

In still another aspect the invention comprises a die and cutting block which are relatively movable to cut blanks from sheet material and improved means for causing such relative movement of the die and block which may be manually operated to bring the material on the cutting block into contact with the cutting edge of the die in such manner as to ensure against all danger of serious injury to the operator before the application of power to cause a cutting operation, the power means being conveniently controlled by the same manually operable means utilized in causing the preliminary approaching movement of the die and block. Preferably the connection between the man-

ually operable controlling means and the power means is such that no repetition of the power operation of the machine can take place upon a single actuation of the controlling means.

In order that scrap or waste sheet material may be utilized to the best advantage, it is desirable that a plurality of cutting devices be provided each consisting of a die and cutting block differing in size from that next adjacent thereto and arranged so that the largest die and block are at one end of a row of cutting devices which decrease in size progressively from one end of the row to the other. Important features of the described organization reside in the provision of means for mounting the cutting blocks and the dies and their corresponding magazines in such manner that all are readily detachable from the machine so that others of a different size may be readily substituted when the conditions of the work make such substitution either necessary or desirable. Other features of importance in the organized machine relate to a single actuator for operating the various cutting devices selectively at the will of the operator and improved connections between each cutting device and the actuator designed to insure against repeating movements of the parts of the device upon a single actuation of the manually operable controlling means.

Other features of importance and other combinations of the parts of the machine will be described in the specification and pointed out in the appended claims.

In the drawings:—

Figure 1 is a view in perspective, and partly in section, of the illustrative machine;

Fig. 2 is a view in side elevation and partly in section of the machine shown in Figure 1;

Fig. 3 is a detail view of a part of the toggle operating mechanism showing it in a different position from that disclosed in Figure 2;

Fig. 4 is a more or less diagrammatic representation of a modified arrangement of the cutting devices looking down on the machine from above; and

Fig. 5 shows a piece of sheet material with a blank outlined thereon.

In the illustrative machine there is disclosed a plurality of blank cutting devices arranged in a row and comprising each a die 6 and a cutting block 8, the said devices being preferably so arranged that the largest blanks will be cut at one end of the row and the smallest at the opposite end of the row and with the intermediate devices arranged in gradation in accordance with the sizes of blanks formed thereby. The arrangement is such that the operator who sits in front of the machine may readily present the pieces of sheet material to the cutting devices, first to one and then to another as may be necessary in utilizing the material to the best advantage. During a cutting operation there is relative movement between the cutting block and the die to effect a cutting operation and, in the construction shown, the block moves upwardly to force the sheet material upon the cutting edge of the die and the blank completely into the die which is held stationary in the machine. Conveniently the holding means for the die comprises a carrier 10 constructed to present a chamber for receiving the blanks from the hollow die, the die being bolted to the carrier as indicated at 12 in Fig. 2 of the drawings. Preferably the carrier and overhanging portion 14 of the machine frame are provided with co-operating grooved and ribbed portions so that the carrier may be attached to the frame through a sliding connection which permits of its being readily assembled with the machine in proper position and removed when it is desired to substitute a die and carrier of another size. As shown, the carrier is provided with grooves 16 (Fig. 2) at each side of its upper end which receives the ribs 18 (Fig. 1) on the frame part 14, any well known means being provided for retaining the carrier against displacement forwardly during the operations of the machine. Means is also provided for receiving the blanks from the carrier, the said means being preferably in the form of a detachable magazine 20 which is of the same shape in cross section as the carrier, but slightly larger to rest securely on the upper end of the carrier, and which is held in vertical alinement with the carrier by means of spaced upper and lower holding members 22 and 24 respectively. It is obvious that the magazines are introduced from above and passed downwardly into contact with the upper end of the carrier and that when filled they may be easily removed and either emptied or introduced into a machine designed to perform some other operation or operations on the blanks. As shown, the upper end of the carrier is grooved or slotted at 26 so that a finger of the operator's hand may be introduced beneath the lower edge of the magazine to retain the blanks therein while the magazine is being lifted from its receiving position. Means in the form of a cross bar 28 is provided at the other end of the magazine for retaining the blanks therein when the magazine is inverted.

An important feature of the invention relates to the construction of the cutting block 8 and especially in so relating it in size with respect to the die that the block serves as a gage in positioning the work. As shown, the block or at least the work supporting surface thereof approximates closely in size to

the area defined by the cutting edge of the die and hence a piece of sheet material if placed so that one or more edges thereof line up closely with the edge of the block will be properly positioned for an economical cutting operation and there will remain the very minimum of scrap or waste at the termination of the cutting operation. Furthermore, when blanks are being cut from pieces of leather or other material having perforations or defective portions or ragged edges, the block serves as a very efficient gaging means to determine whether a perfect blank can be cut from the said piece, a perfect blank being inserted if no perforation or other imperfection in the sheet material be located inside of the periphery of the cutting block when the material is placed on the block preliminary to a cutting operation. Moreover, as the cutting blocks under the different dies differ in size progressively from one end of the row of cutting devices to the other end, it is possible by testing the piece of material by placing it on different cutting blocks to determine readily the largest perfect blank that can be cut from the said piece. The operator soon becomes expert in deciding such a question with the aid of the cutting blocks in this machine and then the cutting block which served as the final gage is operated to effect a cutting operation. To assist the operator in viewing that edge of the piece of material which is farthest from him, a mirror 30 is provided pivoted at 32 to the machine frame so that it may be adjusted as desired.

The operating means for the cutting block comprises, in the illustrative machine, a toggle consisting of two links 34 and 36 pivoted together at 38, the upper link 34 being pivoted at 40 to the lower end of a plunger 42 which carries detachably the cutting block 8. Pivoted at 44 at the lower end of the other toggle link 36 is a heavy bolt 46 which passes through an opening in a rather thick shelf 48 extending along the front wall of the machine frame on the inside thereof. Lying between a collar 50 on the bolt 46 and the upper surface of the shelf 48 and surrounding the bolt is a spring 52 which is under tension and strong enough to take the thrust of the toggle during cutting operations. For operating the toggle to lift the cutting block toward the die there is provided a lever in the form of a treadle 54 pivoted at 56 in the frame of the machine, connection being made between the treadle at the rear end thereof and an arm 58 on the lower toggle link 36 by means of a rod 60 which is pivoted on a pin 62 extending laterally from the rear end of the treadle and has its upper end passing slidably through a stud 64 extending laterally from and swiveled in the end of the arm 58. A spring 66 surrounds the upper end of the connecting rod 60 between a collar 68 on the rod and a surface on the stud 64 and provides a yielding connection between the treadle and the lower toggle link whereby depression of the treadle 54 results in a yielding actuation of the cutting block through the toggle mechanism. This is especially desirable since it permits the operator to position the piece of material on the cutting block and by actuation of the treadle lift the cutting block toward the die while maintaining the piece in proper position on the block without danger of injury to the hand. Should one of the fingers of the hand employed in holding the piece of work in position be inadvertently positioned so as to contact with the die, it would not be seriously injured since the block is elevated through foot pressure, transmitted moreover through a spring such as that shown at 66. Furthermore, the operator is in control of the machine and has opportunity to remove his finger or other portion of the hand before power actuation of the cutting block can take place. In other words, the power means for operating the toggle which will now be described is so constructed and arranged that it cannot be operatively connected to the toggle while the block is spaced sufficiently from the die to admit of the interposition of the finger or other part of the hand.

Power means is provided as above stated for causing such an operation of the toggle mechanism as will effect cutting operations on material interposed between the cutting block and the die, the said means, in the illustrative machine, comprising a shaft 78 which is driven continuously from a source of power, not shown, the said shaft being supported at intervals by brackets 80 extending inwardly from the rear wall of the frame of the machine. Located at regular intervals on the shaft and fixed thereto is a plurality of eccentrics of which one is shown at 82 (Fig. 2 of the drawings). Surrounding the eccentric 82 is an ecentric strap 84 rigid with a pitman or connecting rod 86, the outer end of which is supported movably by a link 88 pivoted upon a shaft 90 extending lengthwise of the machine and parallel with the shaft 78 and supported in a plurality of bearings 92 extending downwardly from flanges integral with the frame of the machine. Since the shaft 78 is running continuously it follows that the pitman or connecting rod 86 is constantly reciprocated and, when connected operatively with the toggle mechanism, it causes power operation of the toggle and of the cutting block to effect a cutting operation on the sheet material. Connected to the pivot 38 of the toggle is a link 94, the other end of which is pivoted at 96 to a link 98 pivotally suspended from the shaft 90. Fixed to the under surface of the link 94 near one end

thereof is a hardened block 100 which presents a shoulder adapted to engage and interlock with a similar shoulder on a second hardened block 102 secured in the end of the pitman or connecting rod 86. For lifting the pitman 86 so that the plate 102 on its outer end will engage with the plate 100, there is provided a connecting bar 104 extending between the pitman and the rear end of the treadle. In the illustrative construction, this bar 104 engages a pin 106 on the end of the pitman 86, the pin riding in a slot 108 in the bar 104 and in a slot 109 in the lower end of the link 88. The connection between the lower end of the bar 104 and the treadle is formed by means of a shouldered portion 110 spaced from the lower end of the connecting bar and arranged to engage over the pin 62 which extends laterally from the end of the treadle lever. Mounted in the frame of the machine at its ends is a rod or bar 112 which operates to prevent the lower end of the connecting bar 104 from contacting with the treadle lever at a certain period in the operation of the machine as will be hereinafter described. In order that the bar 112 may not interfere with the proper operation of the connecting bar 104, the latter is cut away along a certain portion of its length as at 114. The operation of this part of the mechanism may be briefly described as follows: Depression of the treadle lever 54 results first in a movement of the toggle toward straightened position because of the connecting rod 60 between the treadle and the arm 58 on the lower toggle link 36 and during this part of the movement of the toggle, the pitman or connecting rod 86 is unaffected since there is a lost motion connection between the treadle and the said pitman provided by the slot 108 in the connecting bar 104. The upward movement of the cutting block 8 under direct control of the treadle 54 brings the cutting block close to the edge of the die so that the piece of work on the block contacts with the die and thus there is no room or space for the finger of the operator between the work and the die. Continued depression of the treadle 54 finally lifts the pitman or connecting rod 86 to a position where the block 102 thereon is in a plane with the block 100 on the link 94 which, in the meantime, is moved slightly downwardly and to the right (see dotted lines in Fig. 2) whereupon engagement of the blocks takes place upon movement of the pitman to the right with the result that the toggle is power-operated and the cutting block is forced upwardly causing a cutting of the blank and the introduction of the cut blank into the hollow die 6. Preferably, the toggle is not completely straightened to effect a cutting operation but stops short of such a position as shown in Fig. 3 so that as the pitman 86 moves in the reverse direction, the toggle at once breaks under the weight of the parts and permits the cutting block to drop away from the die.

As a safety feature of the construction, the power means is disconnected from the treadle near the termination of the forward movement of the pitman 86. Conveniently the construction is such that the connecting bar 104 comes into contact with the stationary bar 112 so that its lower end is moved relatively away from the pin 62 at the end of the treadle (Fig. 3) and hence the connecting bar 104 may drop freely, sliding on the rear surface of the bar 112 and on the pin 106. Hence at the termination of the forward movement of the pitman the bar 104 drops to dotted line position in Fig. 3, in which position it is free of the treadle and cannot be actuated by the treadle until the latter has been allowed to return to initial position. It will be clear that as soon as the pitman 86 releases itself from engagement with the block 100 on the link 94 it will drop and cannot again engage with the said block to effect a power operation of the toggle mechanism until the treadle has been released and the pin 62 thereon lowered to engage beneath the shoulder 110 on the connecting bar 104. It is to be understood that a toggle mechanism and operating means therefor is provided for each cutting device and operated from the independently pivoted treadles 54.

In Figure 4 of the drawings there is shown diagrammatically a representation of the cutting devices arranged in a semi-circle, thus bringing the end cutting devices nearer to the operator than is possible in the arrangement shown in Figure 1 where all the cutting devices are arranged in a straight line. This figure shows very clearly the difference in the size of the adjacent cutting blocks from one end of the machine to the other. Conveniently, the mirror 30 of Figure 2 is replaced by a plurality of mirrors 116 in Figure 4. It will be clear, moreover, that the shaft 78 shown in Figures 1 and 2 as furnishing the power for all of the toggle mechanisms must be replaced in Figure 4 by a plurality of shafts which can be driven by means easily provided by the skilled mechanic.

In operating with this machine to cut blanks from sheet material the operator will sit at the front of the machine intermediate of the ends of the line of cutting devices and will present pieces of work in proper position on the cutting blocks, selecting the cutting block which will give the best results with the piece of material in hand. After positioning a piece of work, such as shown at 120 (Fig. 5), on the block by the aid of the block as a gage, the proper treadle is depressed and the machine caused

to separate a blank from the material resting on the cutting block. These operations are repeated, having regard to the best utilization of the material, until one or more of the magazines 20 have been filled. When this occurs the filled magazine may be readily removed as above described and an empty magazine substituted therefor. As indicated above, both the die and the cutting block at any particular station may be removed and a die and cutting block of another size substituted therefor so that blanks of a desired size may be provided in quantity from the material or the material on hand cut to better advantage.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent of the United States is:—

1. In a machine of the class described, a die member and a cutting block member relatively movable toward and from each other during cutting operations, manually operable means for causing relative approaching movement of the die and cutting block members, an operating connection between said means and one of the members, and power means for completing the movement of the operating connection to effect a cutting operation.

2. In a machine of the class described, a die, a cutting block movable toward and from the die during cutting operations, a manually operable member for causing relative approaching movement of the die and cutting block, a power transmitting member between the manually operable member and the block, and a constantly moving power means arranged to be under the control of the operator to be connected operatively to the power transmitting member for completing the movement to effect a cutting operation.

3. In a machine of the character described, a die and a cutting block relatively movable toward and from each other in cutting operations, manually operable means for causing relative approaching movement of the die and cutting block, and a continuously moving power means under the control of the operator and arranged to be connected operatively directly to the first mentioned means to effect a cutting operation.

4. In a machine of the class described, a die and a cutting block relatively movable toward and from each other during cutting operations, manually operable means for causing relative approaching movement of the die and cutting block comprising a toggle, and power means for completing the movement of the toggle to effect a cutting operation.

5. In a machine of the class described, a die and a cutting block relatively movable toward and from each other during cutting operations, manually operable means for causing relative approaching movement of the die and cutting block comprising a toggle, and a constantly moving power means arranged to be under the control of the operator to be connected operatively to the toggle for completing the movement to effect a cutting operation.

6. In a machine of the character described, a die and a cutting block relatively movable toward and from each other in cutting operations, manually operable means for causing relative approaching movement of the die and cutting block, and a continuously reciprocable power member under the control of the operator and arranged to be connected operatively to the first mentioned means to effect a cutting operation.

7. In a machine of the character described, a die and a cutting block relatively movable toward and from each other in cutting operations, manually operable means for causing relative approaching movements of the die and block comprising a toggle, and power means comprising a constantly reciprocating member arranged to be operatively connected with the toggle for causing such relative movement of the die and block as will effect a cutting operation.

8. In a machine of the class described, a hollow die for cutting and receiving cut blanks, and a cutting block for co-operation with the die having an upwardly-facing work supporting surface of approximately the same size and shape as the area outlined by the cutting edge of the die whereby the cutting block serves as a gage in positioning the work for cutting operations.

9. In a machine of the class described, a hollow die, a carrier for the die constructed to provide an extension chamber for receiving the blanks from the die, means for detachably supporting the carrier and the die as a unit in proper position in the machine frame, a plunger movable toward and from the die, and a cutting block detachably carried by said plunger, the construction being such that both the die and the cutting block may be removed and co-operating dies and cutting blocks of different sizes may be introduced selectively into the machine.

10. In a machine of the class described, a plurality of sets of dies and cutting blocks arranged in side-by-side relationship, each cutting block approximating closely in size to the size of its co-operating die, and means comprising a single power shaft for effecting the co-operation of each die and block independently of the other sets.

11. In a machine of the class described, a plurality of cutting devices each comprising a die and a block relatively movable toward and from each other in cutting operations, power means comprising a single shaft for

operating the cutting devices, and manually operable means for controlling the power means so as to effect a cutting operation selectively by any one of the cutting devices.

12. In a machine of the character described, a plurality of cutting devices arranged in side-by-side relationship each comprising a die and a cutting block having a work supporting surface approximating closely to the size of the area defined by the cutting edge of its co-operating die, a power shaft for operating the cutting devices, and manually operable means for connecting the cutting devices selectively to said power shaft.

13. In a machine of the character described, a plurality of cutting devices for cutting blanks of different sizes from sheet material, the said devices being arranged in a row and each comprising a die and a cutting block having a work supporting surface approximating closely to the area defined by the cutting edge of its co-operating die, power means for operating the cutting devices, and manually operable means for selectively connecting the power means to the cutting devices to operate them independently of each other.

14. In a machine of the class described, a cutting block and a die relatively movable toward and from each other to cut blanks from sheet material, a carrier for the die having a blank receiving chamber arranged in alignment with the blank receiving portion of the die, a magazine for receiving the blanks from the die carrier, and means for detachably holding the die carrier and the magazine in the machine frame and in alinement with each other, so that both the die carrier and the magazine may be removed and like parts of another size substituted therefor.

15. In a machine of the class described, a die and a cutting block relatively movable toward and from each other in cutting operations, said block having a work supporting surface approximating closely in size to the area defined by the cutting edge of the die, and a mirror located in the rear of the block to enable the operator to place the material properly with respect to the rear edge of the block.

16. In a machine of the class described, a die and cutting block relatively movable toward and from each other in cutting operations, manually operable means comprising a toggle for causing relative approaching movements of the die and block, and power means controlled by the manually operable means for causing power operation of the toggle to effect cutting operations.

17. In a machine of the character described, a die and a cutting block relatively movable toward and from each other in cutting operations, a toggle for causing said relative movements, manually operable means for operating the toggle directly to cause relative approaching movement of the die and block, constantly moving power means, and connections between said power means and the manually operable means for causing an operative connection between the power means and the toggle to cause power operation of the latter.

18. In a machine of the class described, a die, a block movable toward and from the die, a toggle for moving the block, a manually operable lever connected to the toggle for moving the toggle to cause relative approaching movements of the die and block, a continuously rotating power shaft, a pitman constantly operated from said shaft, and connections between said pitman and said lever for causing an operative connection between the pitman and the toggle to cause power operation of the latter for cutting blanks from sheet material.

19. In a machine of the class described, a die and a block relatively movable toward and from each other in cutting operations, a toggle for causing such relative movements, manually operable means for moving the toggle to cause relative approaching movements of the die and block, and power means for moving the toggle toward straightened position to effect a cutting operation, the construction being such that the toggle is not completely straightened during the cutting operation so that the toggle breaks of its own weight at the end of a cutting operation.

20. In a machine of the class described, a die and a cutting block relatively movable toward and from each other in cutting operations, manually operable means comprising a toggle for causing relative approaching movements of the die and block, continuously operating power means, and connections between the said power means and the manually operable means for connecting the power means with the toggle.

21. In a machine of the class described, a die and a cutting block relatively movable toward and from each other in cutting operations, a toggle for moving the block toward the die, a manually operable lever for operating the toggle, power means for moving the toggle toward straightened position to effect a cutting operation, and a spring for taking the thrust of the toggle and for assisting in the breaking of the toggle after a cutting operation.

22. In a machine of the class described, a die and a cutting block relatively movable to effect cutting operations, a toggle for moving the cutting block, a lever for operating the toggle to cause relative approaching movement of the die and cutting block, a continuously reciprocable

member for causing power operation of the toggle when connected thereto, a connecting member between said reciprocable member and the lever so arranged that an operating connection may be made between the continuously reciprocable member and the toggle at the will of the operator, and means for causing a disconnection of said connecting member from said lever whereby a repetition of the power operation of the toggle upon a single actuation of said lever is prevented.

23. In a machine of the class described, a stationary die for cutting and receiving the cut blanks, and a cutting block movable upwardly toward the die and having an upwardly-facing work supporting surface of approximately the same size as the area outlined by the cutting edge of the die whereby the cutting block serves as a gage in positioning the work for cutting operations.

24. In a machine of the class described, a cutting block arranged to serve as a work support having a sharply defined boundary, a stationary die having its cutting edge facing downwardly to cut blanks from sheet material forced into the die by the cutting block, said cutting block being constructed to be approximately of the same size as the die to serve as a gage for the work, and a magazine above the die for receiving the blanks therefrom.

25. In a machine of the class described, a plurality of dies arranged in side-by-side relationship, a plurality of cutting blocks each mounted for movement toward its co-operative die independently of the others and each approximating closely to the size of its co-operating die, and means for effecting at the will of the operator a co-operative movement of any selected die and block independently of the others.

26. In a machine of the class described, a plurality of cutting devices, each comprising a die and a block relatively movable toward and from each other in cutting operations, power means comprising a shaft for operating the cutting devices, an individual connection between each cutting device and the shaft, and manually operable means for controlling each connection to the shaft so as to effect selectively cutting operations by said cutting devices, the construction and arrangement being such that the cutting devices not operating remain stationary.

27. In a machine of the character described, a plurality of cutting devices, a single actuator for operating the cutting devices selectively at the will of the operator, a connection between each cutting device and the actuator designed to insure against a repetition of a cutting operation by the cutting device, and a manually operable member for controlling the connection arranged to be automatically disconnected from the connection during each cycle of operations so that the member must be moved to initial position to gain control of the connection.

28. In a machine of the character described, a cutting die member, a cutting block member, manually operable means for causing relative approaching movement of the die and block members, power means and connections between the power means and one of said members under the control of the manually operable means for completing operative movement of the die and block member.

29. In a machine of the class described, a die having a downwardly facing cutting edge, a cutting block for co-operation with the die, a plunger for moving the cutting block upwardly to force material upon the cutting edge of the die and to cause the cut blanks to move upwardly through the die, and a magazine for receiving the blanks from the upper end of the die, said die, cutting block and magazine being all detachably mounted so that others of another size throughout may be substituted therefor.

30. In a machine of the character described, a cutting block arranged to project beyond its supporting structure so that the boundaries of the block are sharply defined, a die for co-operation with the cutting block, and means for causing relative movement between the die and block to effect cutting operations upon material interposed therebetween, said cutting block being constructed to be approximately of the same size and shape as the die to serve as a gage for the work.

31. In a machine of the character described, a cutting die for cutting blanks from sheet material, a cutting block having a surface which co-operates with the die in the cutting operations of an area of approximately the same size and shape as the area defined by the cutting edge of the die, and having its boundaries sharply defined so as to serve as a gage for the work, and means for causing relative movement between the die and block to effect cutting operations on the material interposed therebetween.

32. In a machine of the character described, a plurality of cutting devices of a graduated range of sizes adapted to cut blanks of different sizes from sheet material, said devices comprising each a die and a cutting block of approximately the same size and shape as its co-operating die, and means for causing relative movement between the dies and cutting blocks to effect cutting operations on the sheet material.

33. In a machine of the character described, a plurality of cutting devices of a graduated range of sizes with the largest

cutting device at one end of a row in which the cutting devices are so disposed as to decrease progressively in size from one end of the row to the other, each cutting device comprising a die and a cutting block of substantially the same size and shape as its cooperating die, and means for causing relative movement between each die and its cutting block to effect cutting operations upon material interposed therebetween.

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

RALPH C. SIMMONS.