

Aug. 22, 1950

L. ELLER
CUTTING MACHINE

2,519,552

Filed Jan. 16, 1947

3 Sheets-Sheet 1

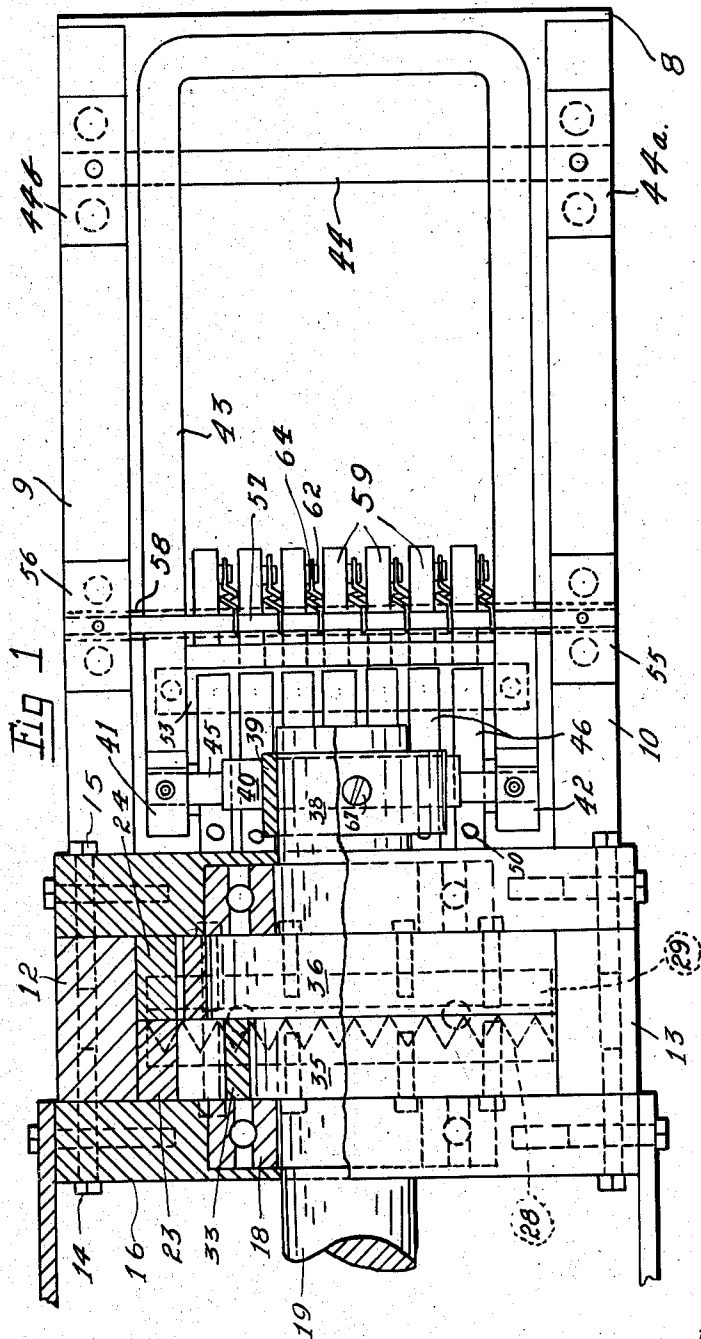
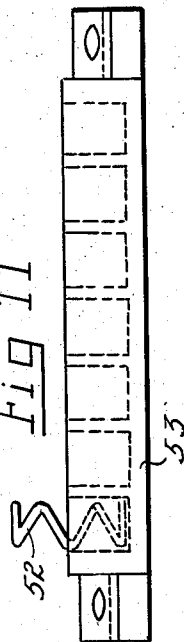


Fig. 12



Fig. 11



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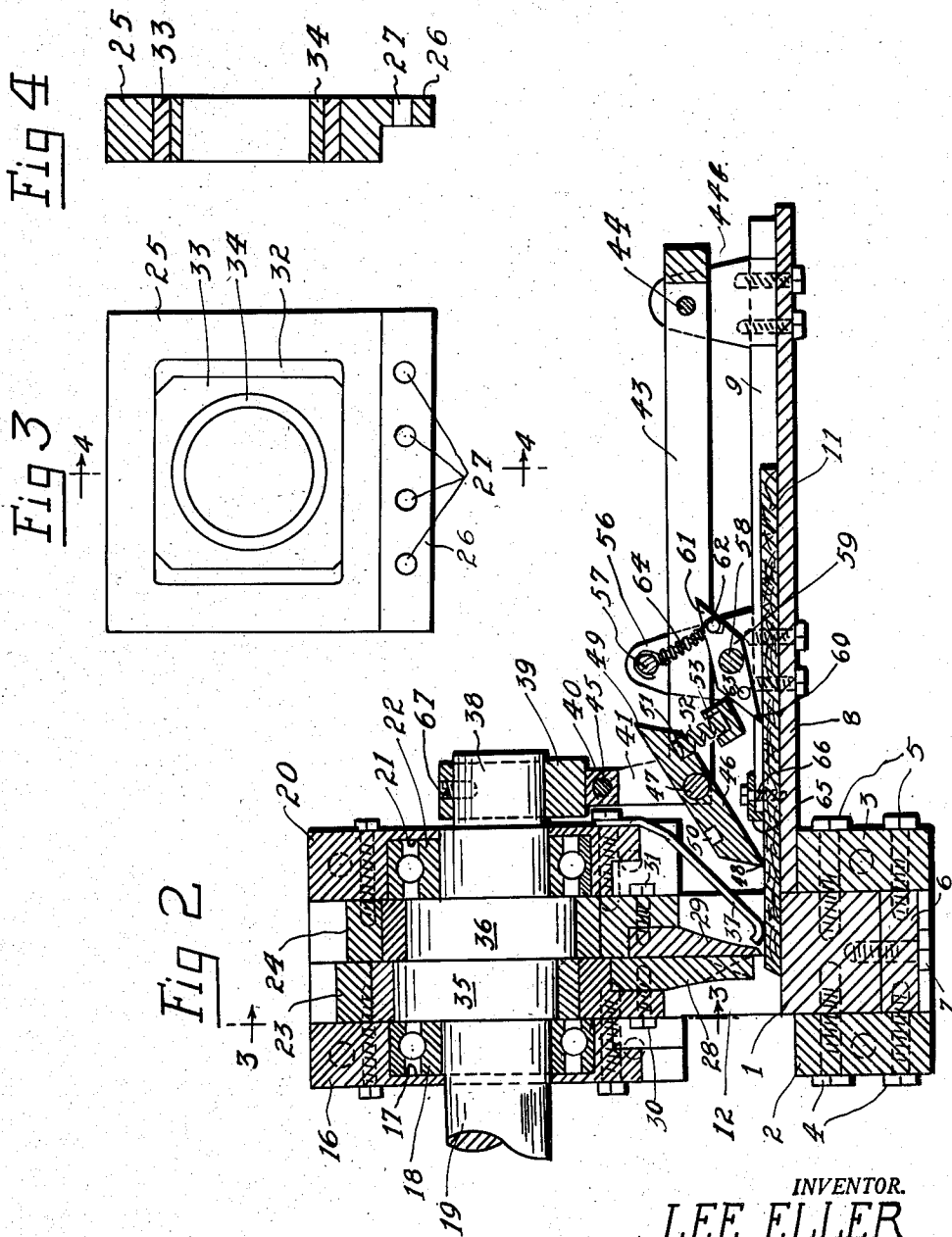
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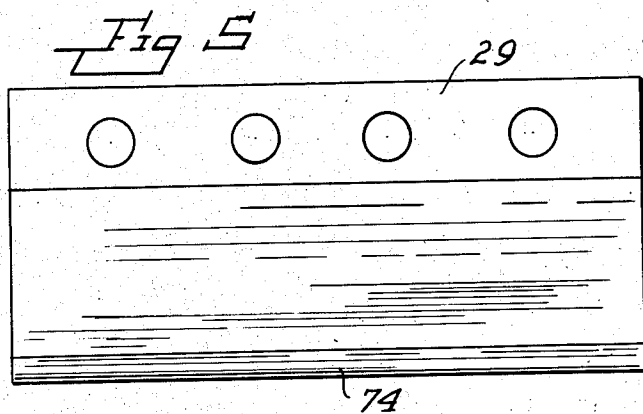
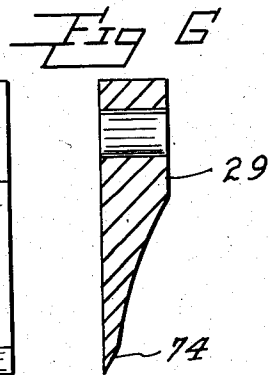
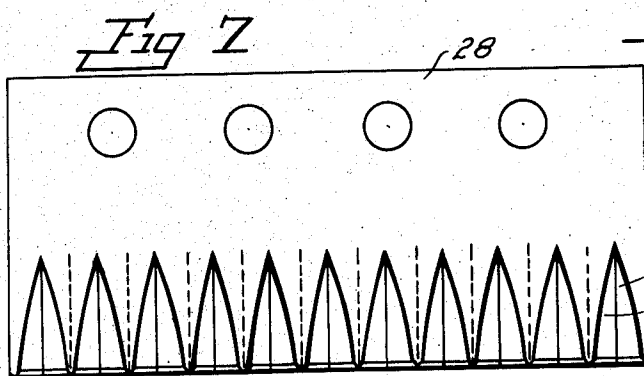
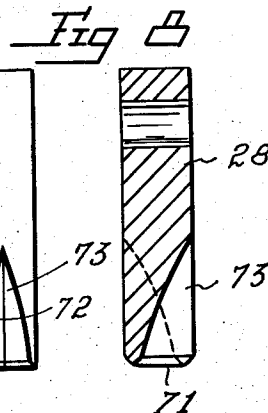
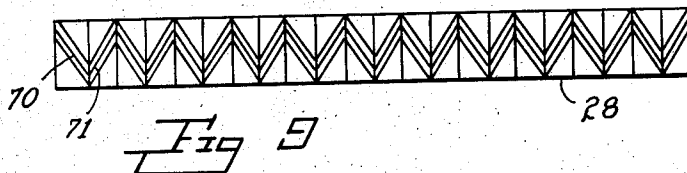
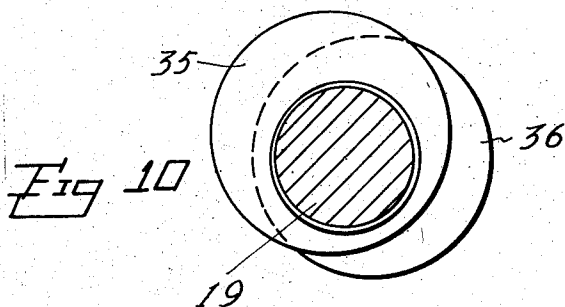
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2,519,552

CUTTING MACHINE

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Application January 16, 1947, Serial No. 722,413

9 Claims. (Cl. 164—50)

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The present invention relates to improvements in a cutting machine.

The machine embodying my invention is particularly adapted for the cutting of such materials as wood, asbestos, rubber, plastic, and relatively soft metals into small particles for use in the making of packing material such as that disclosed in United States Patent No. 2,363,688 to Pollard. These small particles are utilized as packing around shafting. The demand for soft packing is relatively great and it is essential to have equipment that can cut up the small pyramidal particles out of flat sheet material of the proper thickness at a rapid rate. Otherwise the cost of cutting the material becomes prohibitive. It is the principal purpose of the present invention to provide a cutting machine for this purpose wherein the operation is simple and requires little or no attention other than to see that the sheet material is supplied to it.

It is a further purpose of my invention to provide a machine of this character wherein a plurality of cutting knives and a feeding device are operated in timed relation to each other from a single drive shaft so that the sheet material is advanced, then cut by a forming knife having angularly faced cutting edges, the formed portions are severed from the sheet by a straight edged knife while the forming knife is making its initial cutting movement and the process is repeated without the necessity of any manual control whatsoever, other than to bring fresh sheets of material into the feeding device as they are needed.

My invention contemplates a construction wherein an anvil forms part of the base having an upright frame in which a drive shaft is supported. A guide table and feed mechanism are mounted on the base. The drive for the cutting mechanism comprises a pair of eccentrics on the drive shaft. Cutter carrying frames are mounted for vertical reciprocation in the upright frame. An eccentric shoe in each cutter carrying frame has a bearing for the eccentric on the shaft. The frames are guided by the shaft support frame for reciprocation toward and away from the anvil. Cutter knives are removably secured in place on the frame so that different sizes of material may be cut and formed by merely changing the knives. In most instances, it is only necessary to change the forming knives. The feeding is accomplished by a readily replaceable cam which is mounted on the shaft and which operates a feeder shoe to depress a pivoted feeding frame each time the shaft rotates. The feeding frame

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carries reversible feeding ratchet teeth which are spring mounted to supply the necessary lift for the feeding frame after it has been depressed. In addition the sheet guide, which guides the sheets to the cutters, carries a series of reversible holding ratchet teeth to prevent the sheet from moving backward after it has advanced.

It is also a purpose of my invention to provide in a cutter of the character described a novel mechanism whereby the sheet material may be fed forward automatically at a rate that varies with the thickness of the sheet.

The novel features that I consider characteristic of my invention are set forth with particularity in the claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will be understood from the description of a specific embodiment when read in connection with the accompanying drawings, in which:

Figure 1 is a plan view partly in section of the cutting machine;

Figure 2 is a vertical sectional view through the machine;

Figure 3 is a fragmentary section of the view taken on the line 3—3 of Figure 2 showing the knife supporting frame and associated parts;

Figure 4 is a section on the line 4—4 of Figure 3 showing only the knife carrying frame;

Figure 5 is a view in side elevation of the straight edged knife;

Figure 6 is a sectional view through the straight edged knife;

Figure 7 is a side view of the forming knife;

Figure 8 is a sectional view through the forming knife;

Figure 9 is a bottom face view of the cutter knife shown in Figures 7 and 8;

Figure 10 is a detail view showing the knife operating eccentrics on the drive shaft;

Figure 11 is a view in side elevation of the feed ratchet spring stirrup; and

Figure 12 is an end view of the stirrup.

Referring now in detail to the drawings, my invention is embodied in a cutting machine wherein the main frame of the machine comprises an anvil 1 which has two side plates 2 and 3 fastened thereto by suitable screws 4 and 5. A base plate 6 is also fastened to the anvil 1 by suitable screws 7. A sheet guide 8 is mounted on the side plate 3 that extends horizontally from the anvil, the top of the guide being substantially flush with the anvil itself. The anvil desirably is made of bronze and the other parts thus far described are

generally constructed of steel. Side rails 9 and 10 are provided on the guide 8 and utilized to mount the feeding mechanism by which sheets such as the sheet 11 are advanced.

The side plates 2 and 3 are longer than the anvil and serve as a mounting means for two cutter frame guides 12 and 13 which project upwardly at the opposite ends of the anvil. Suitable screw bolts 14 and 15 secure the guides to the side plates. The guides in turn serve as a supporting means for a cutter head bearing plate 16 which is recessed as shown at 17 to receive a ball bearing assembly 18 that mounts a drive shaft 19. A similar cutter head supporting plate 20 is mounted on the guides 12 and 13 on the side opposite the bearing plate 16. The plates 16 and 20 are identical in construction, the plate 20 being recessed at 21 to receive a ball bearing assembly 22 so that the shaft 19 is supported at two spaced points.

The guides 12 and 13 and the plates 16 and 20 serve to guide two cutting knife frames 23 and 24 for vertical reciprocation. These cutting knife frames are identical in construction and are illustrated more clearly in Figures 3 and 4 of the drawings. Each frame consists of a rectangular portion 25 and a knife mounting portion 26 at the lower side edge of the portion 25. This knife mounting portion is provided with a series of apertures 27 so that a knife such as the knife 28 or the knife 29 may be fastened thereto by screw bolts 30 and 31. The portion 25 has a rectangular aperture 32 cut therein to receive a shoe 33 which preferably is constructed of bronze and which has a bearing ring 34 secured therein. The shoe 33 has a sliding fit with the upper and lower surfaces of the aperture 32 and can move to the right or left as shown in Figure 3 within the aperture. The shaft 19 has an eccentric portion 35 which fits in the bearing 34 of the frame 23. The shaft 19 also has an eccentric portion 36 off set angularly with respect to the portion 35 as shown in Figure 10. The eccentric portion 36 rides in the bearing 34a of the frame 24. Rotation of the shaft 19 causes vertical reciprocation of the frames 23 and 24 so as to cause the knives 28 and 29 to move up and down, the knife 28 engaging in the material first and forming it after which the knife 29 cuts the material from the sheet. I have found that this method of cutting the material works quite satisfactorily with wood and asbestos sheet material where the asbestos is bound together with a suitable binder such as an asphalt. It can also be used to cut rubber or the soft metals and to form the particles cut from the sheet into the desired shape. This shape is somewhat of a pyramid shape so that the particles do not present two sides parallel to each other. There is some considerable variation, of course, and in the case of wood some of the particles crack or break, but the formation is sufficient for the purpose intended and the knives can be operated at a relatively rapid rate so that the production is quite high. Note that the construction is such that the machine can be built in different widths to take different sheets and of course the wider the sheet, the greater the amount of production for each rotation of the drive shaft.

The plate 20 has spring fingers 37 which extend downwardly and toward the knives 28 and 29 so as to engage the sheet 11 in advance of the knife. These spring fingers 37 are secured to the plate 20 by screw bolts and are provided at spaced intervals across the sheet. They hold the sheet 11

against the anvil so that the knives can be readily stripped from the material without lifting the sheet.

The shaft 19 has a reduced end portion 38 which mounts an eccentric cam 39 for operating the sheet feeding mechanism. This cam 39 rides upon a cam shoe 40 which preferably is made of bronze and which extends horizontally between two upstanding end portions 41 and 42 of a feeder frame 43. The feeder frame 43 is in the form of a U-shaped yoke which is pivoted by a shaft 44 on two pedestals 44a and 44b which are mounted near the rear end of the guide 8 on the side rails 9 and 10. The shoe 40 is carried by a shaft 45 that is mounted in the portions 41 and 42 of the frame 43.

The feeding mechanism comprises reversible pawls 46 which are pivotally mounted in a shaft 47 that connects the end portions 41 and 42 of the frame 43. These pawls are spaced apart on the shaft 47 and are free to pivot thereon. The pawls have the shape of a parallelogram in lengthwise section so as to present feeding tips 48 and 49 at their opposite ends. They are symmetrical with respect to the shaft 47 in order that they may be reversed when one of the feeding tips becomes worn until it is no longer serviceable. Each of the pawls 46 has two sockets 50 and 51 only one of which is used at a time to receive a compression spring 52 that urges the pawls into engagement with the sheet 11. These springs are fitted in a spring stirrup 53 which is bolted to the frame 43.

The operation of the pawls 46 is as follows: When the cam 39 moves the shoe 40 downwardly the frame 43 swings about the pivot of the shaft 44 and causes the pawls 46 to swing in a clockwise direction as shown in Figure 2 on the shaft 47. This causes the feeding tips 48 to move to the left as shown in Figure 2 and to shove the sheet 11 along the guide 8 an amount which is determined by the extent to which the cam shoe 40 is depressed by the cam 39. When the cam 39 moves so that its thickest portion is above the shaft 38, the springs 52 lift up all the pawls and in doing so, lift the frame 43 so that the shoe 40 follows the cam surface and remains in contact therewith at all times. The feeding tips 48 on the pawls 46 will slide back along the sheet 11 which is held against sliding backward by a mechanism which will now be described.

On the opposite sides of the frame 43 two pedestals 55 and 56 are mounted near the stirrup 53. These pedestals are mounted on the side rails 9 and 10 and project up above the frame 43 where a cross bar 57 connects them. Below the lower limit of movement of the frame 43 the pedestals are interconnected by a shaft 58 which serves to pivotally mount a plurality of checking or holding pawls 59. These pawls 59 like the pawls 46 are so constructed as to be reversible. They have holding tips 60 and 61 at their opposite ends. Each pawl also carries two mounting pins 62 and 63 which are used to secure springs 64. The springs 64 are hooked over the cross bar 57 and are under tension so that they tend to press the pawls 59 against a sheet 11 in order that the tips thereon will bite into the sheet and prevent it from being pulled backwards.

It is of advantage to have some means by which the sheet thickness is gaged and the sheet is prevented from rising above the guide 8. In order to accomplish this, I provide a gage bar 65 which extends across the sheet between the pawls 46 and 59 and which is removably mounted by screw

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bolts 66 on the side rails 9 and 10. The gage bar 65 can be replaced when different thicknesses of sheet are used so that it is of the proper height above the guide 8.

The feed of the sheet can be varied in a number of ways. The throw of the cam 46 as the bar 43 is depressed determines the amount of feed given to the sheet 11. Thus, by changing the cam 39, which is secured to the shaft portion 38 by a set screw 67, the throw of the pawls 46 can be changed. Likewise, the throw can be changed by means of the cam shoe 40 within a certain range. If the cam shoe is turned so as to increase the distance from the shaft 45 to the surface of the eccentric cam 39 this will normally depress the frame 43 to a lower level and cause a lesser amount of feed by the pawls 45, since, with a given eccentric cam 39 the horizontal travel of the point 48 on the pawl 46 will be less for the same angular turn of the pawl as the pawl approaches horizontal position. This provides ample control for taking care of different thicknesses of sheets and different amounts of feed desired in moving the sheet to the cutters 28 and 29.

Referring now particularly to Figures 5 to 8 inclusive, these figures show the cutting knives in detail. The knife 28 has its cutting edge formed so as to present angularly disposed sections 70 and 71 alternating through the length of the knife. The edges are bevelled as shown, and the angular disposition of the edges 70 and 71 is accomplished by grinding or cutting out the stock of the knife from the edges 70 and 71 upwardly along curved surfaces indicated at 72 and 73, these surfaces meeting at the apex of the angle between the two edges 70 and 71. The surfaces 72 and 73 are alternately formed on opposite sides of the knives as shown in Figures 7, 8 and 9.

The knife 29 is a straight bar of the same length as the knife 28 and has its cutting edge bevelled as indicated at 74. The function of this knife is to cut off the sheet while it is being formed by the knife 28.

It is believed to be evident from the foregoing description that in the operation of this device, once a sheet is placed in position, rotation of the shaft 19 will thereafter advance the sheet and cut it into particles of predetermined size and shape. The eccentrics 35 and 36 are so disposed on the shaft 19 that the straight knife 29 is lowered first and then the angular knife is brought down on the material to start forming it before the straight knife has completely severed it. The material is thus grasped by the angular knife and partially formed before it is completely severed by the straight knife. After the severance the angular knife completes its stroke so as to form two groups of severed particles, one group on each side of the angular knife, from the piece cut off by the straight knife. The angular positions of the cams 35 and 36 are illustrated in Figure 10 of the drawings where it will be seen that the eccentric which operates the angular knife trails the eccentric which operates the straight edged knife by about 120 degrees. Both of the knives are raised substantially clear of the material by the time the cam 39 starts to lower the frame 33 to advance the sheet for the next cut.

From the foregoing description it is believed that the nature and advantages of my invention will be clear to those skilled in this art. Having thus described my invention, I claim:

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comprising a base including an anvil, a guide plate for guiding a sheet to the anvil, an upright frame above the anvil, a cutting knife frame and a forming knife frame mounted for vertical reciprocation in said upright frame, a drive shaft supported by said upright frame, eccentric cams on said shaft, cam shoes in said knife frames having bearings for said cams, a sheet feeding frame on said base pivoted at a point remote from the anvil for angular movement toward and away from the sheet guiding plate, spring pressed feeding pawls on said sheet feeding frame, and means on the shaft for depressing the sheet feeding frame in timed relation to the lowering of said knife frames.

2. A machine for cutting and forming sheets of wood, rubber, asphalt asbestos composition and the like into small pieces comprising a frame, an anvil thereon, a cutting knife and a forming knife mounted in said frame for reciprocation toward and away from the anvil, drive means to reciprocate said knives, a sheet guide for directing a sheet across said anvil, and sheet feeding means for advancing a sheet along said guide comprising a pawl supporting shaft movable toward and away from a sheet on said guide, pawls pivoted on said bar to rock in planes perpendicular to the shaft and to the sheet and extending diagonally toward the anvil from the shaft, spring means mounted on the frame urging the pawls to rock in one direction tending to move the shaft away from the sheet and drive means for moving the shaft toward the sheet to rock the pawls in the opposite direction and effect feeding of the sheet.

3. A machine for cutting and forming sheets of wood, rubber, asphalt, asbestos composition and the like into small pieces comprising a frame, an anvil thereon, a cutting knife and a forming knife mounted in said frame for reciprocation toward and away from the anvil, drive means to reciprocate said knives, a sheet guide for directing a sheet across said anvil, and sheet feeding means for advancing a sheet along said guide comprising a pawl supporting shaft movable toward and away from a sheet on said guide, pawls pivoted on said bar to rock in planes perpendicular to the shaft and to the sheet and extending diagonally toward the anvil from the shaft, spring means mounted on the frame urging the pawls to rock in one direction tending to move the shaft away from the sheet and drive means for moving the shaft toward the sheet to rock the pawls in the opposite direction and effect feeding of the sheet, the said drive means comprising a shaft having a cam thereon for operating each knife and a cam for operating the pawl shaft.

4. A cutting machine of the character described comprising a base including an anvil, a guide plate for guiding a sheet to the anvil, an upright frame above the anvil, a cutting knife frame and a forming knife frame mounted for vertical reciprocation in said upright frame, said knife frame comprising rectangular plates arranged side by side and having knives removably secured thereon, a drive shaft supported by said upright frame, eccentric cams on said shaft, cam shoes in said knife frames having bearings for said cams, a sheet feeding frame on said base pivoted at a point remote from the anvil for angular movement toward and away from the sheet guiding plate, spring pressed feeding pawls on said sheet feeding frame, and means on the shaft for depressing the sheet feeding frame in

1. A cutting machine of the character described

timed relation to the lowering of said knife frames.

5. A cutting machine of the character described comprising a base including an anvil, a guide plate for guiding a sheet to the anvil, an upright frame above the anvil, a cutting knife frame and a forming knife frame mounted for vertical reciprocation in said upright frame, said knife frame comprising rectangular plates carrying cutting and forming knives, each plate having a rectangular window therein, a drive shaft supported by said upright frame, eccentric cams on said shaft, cam shoes mounted for horizontal sliding movement in the windows in said knife frames having bearings for said cams, a sheet feeding frame on said base pivoted at a point remote from the anvil for angular movement toward and away from the sheet guiding plate, spring pressed feeding pawls on said sheet feeding frame, and means on the shaft for depressing the sheet feeding frame in timed relation to the lowering of said knife frames.

6. A cutting machine of the character described comprising a base including an anvil, a guide plate for guiding a sheet to the anvil, an upright frame above the anvil, a cutting knife frame and a forming knife frame mounted for vertical reciprocation in said upright frame, a drive shaft supported by said upright frame, eccentric cams on said shaft, cam shoes in said knife frames having bearings for said cams, a sheet feeding frame on said base pivoted at a point remote from the anvil for angular movement toward and away from the sheet guiding plate, spring pressed feeding pawls on said sheet feeding frame, holding pawl means positioned to engage a sheet on said guide plate and prevent reverse movement thereof by the feeding pawls, and means on the shaft for depressing the sheet feeding frame in timed relation to the lowering of said knife frame.

7. A cutting machine of the character described comprising a base including an anvil, a guide plate for guiding a sheet to the anvil, an upright frame above the anvil, a cutting knife frame and a forming knife frame mounted for vertical reciprocation in said upright frame, a drive shaft supported by said upright frame, eccentric cams on said shaft, cam shoes in said knife frames having bearings for said cams, a sheet feeding frame on said base pivoted at a point remote from the anvil for angular movement toward and away from the sheet guiding

plate, spring pressed feeding pawls on said sheet feeding frame, a cam engaging bar on said sheet feeding frame and a cam on said shaft engaging the bar to depress the sheet feeding frame in timed relation to the lowering of the knife frames.

8. In a cutting machine of the character described, a frame, an anvil thereon, guide means for guiding a sheet to be cut to the anvil, a cutting knife mounted in said frame for reciprocation toward and away from the anvil, for severing a portion of the sheet from the advancing end of a sheet on said anvil, a forming knife alongside the cutting knife also mounted in said frame for reciprocation toward and away from the anvil, having its edge shaped to divide said portion of the sheet into small particles, and means to reciprocate said knives.

9. In a cutting machine of the character described, a frame, an anvil thereon, guide means for guiding a sheet to be cut to the anvil, a cutting knife mounted in said frame for reciprocation toward and away from the anvil for severing a portion of the sheet from the advancing end of a sheet on said anvil, a forming knife alongside the cutting knife also mounted in said frame for reciprocation toward and away from the anvil, having its edge shaped to divide said portion of the sheet into small particles, means operable to press the cutting knife into the sheet and means operable to press the forming knife into the portion of the sheet about to be severed before the cutting knife completely severs it from the sheet.

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