March 6, 1934. A. H. WOODWARD 1,949,510

CUTTING MEANS

Original Filed July 27, 1929 3 Sheets-Sheet 1

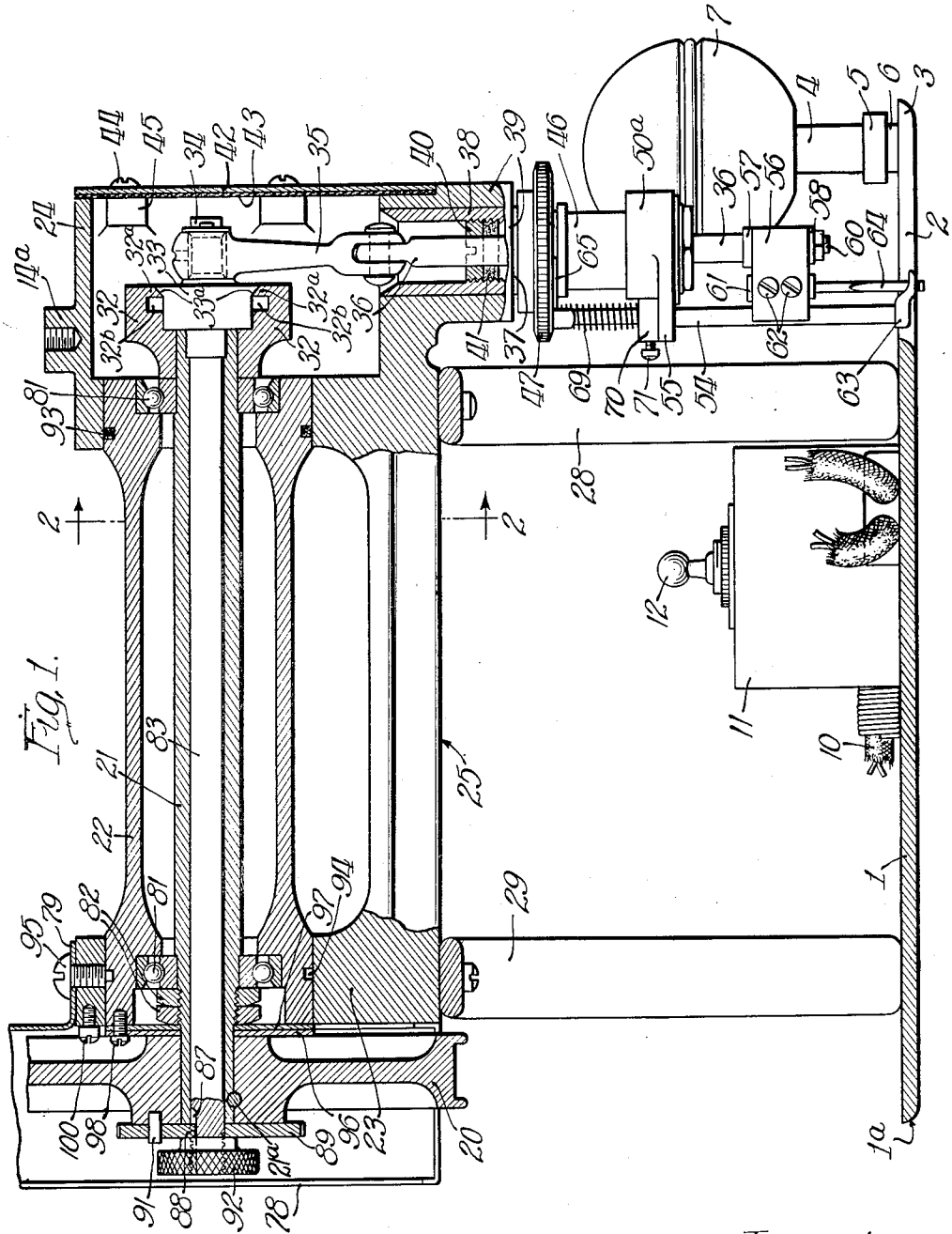


Fig. 1.

Inventor:
Arthur H. Woodward
By: Brown, Jackson, Boettcher & Dienner.
Attys.

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Fig. 9.

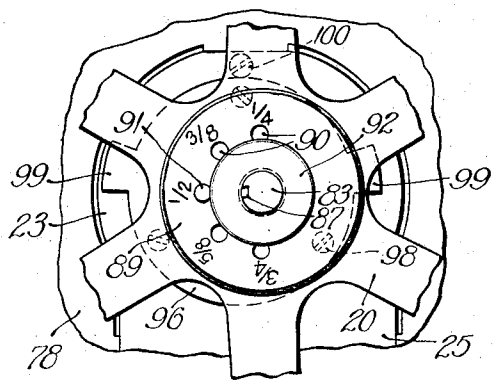


Fig. 2.

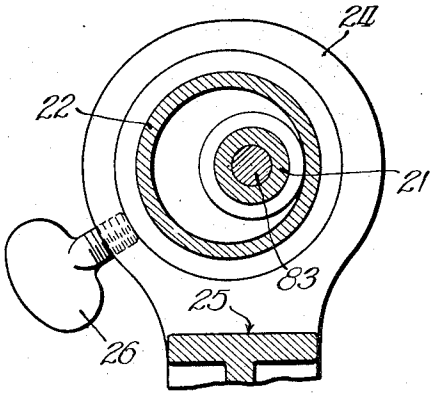


Fig. 3.

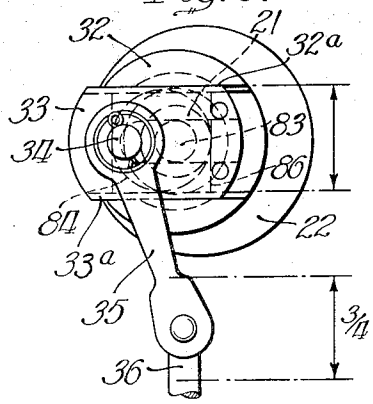


Fig. 4.

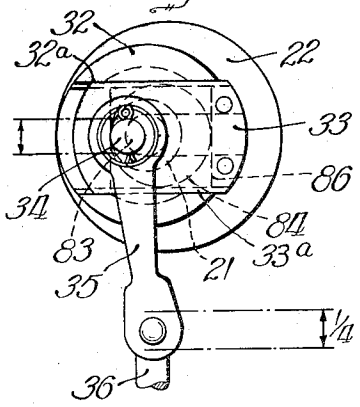


Fig. 5.

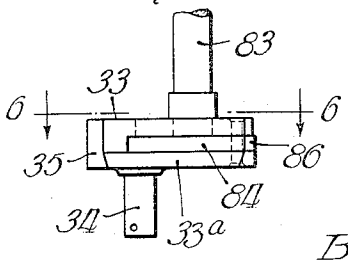
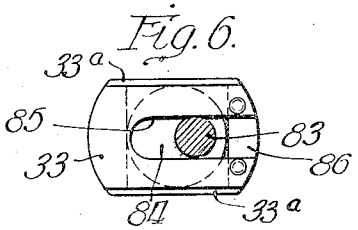


Fig. 6.



Inventor:
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By: Brown, Jackson, Boettcher & Dienner.
Atty's.

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Fig. 7.

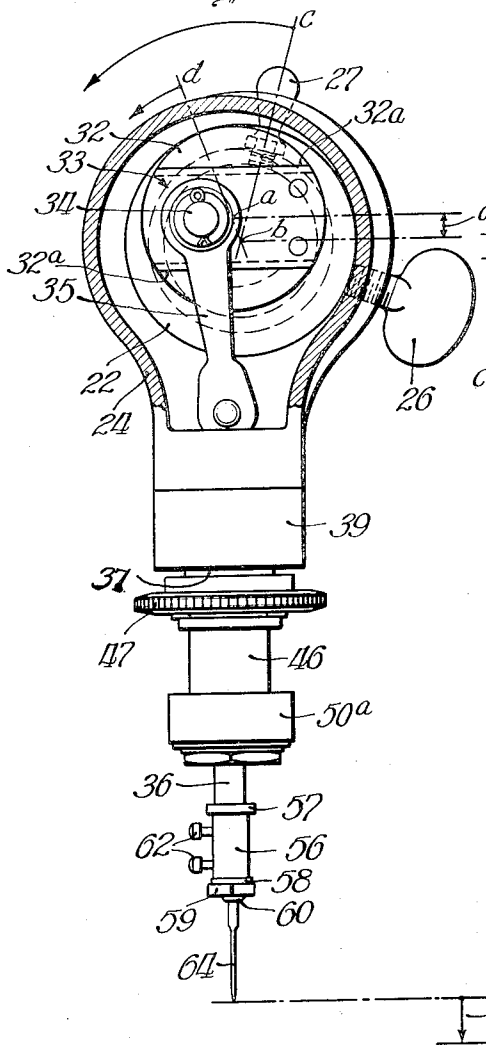
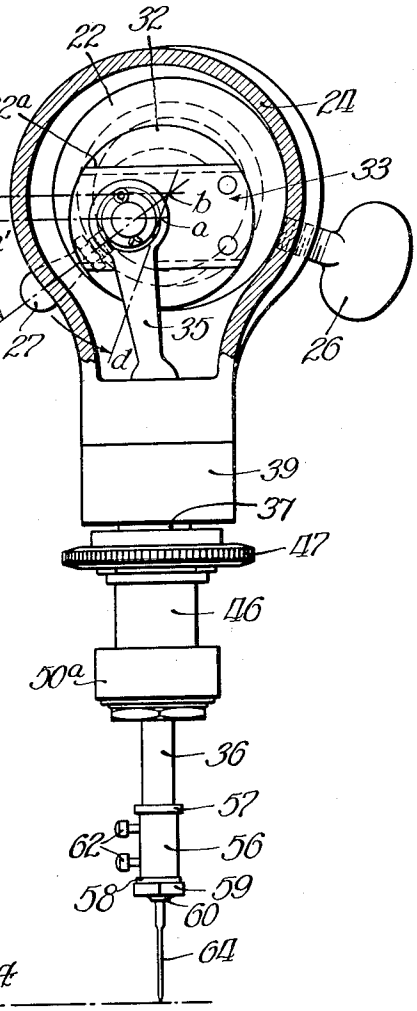


Fig. 8.



Inventor:
Arthur H. Woodward

By: Brown, Jackson, Boettcher & Dienner.

Attys.

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UNITED STATES PATENT OFFICE

1,949,510

CUTTING MEANS

Arthur H. Woodward, Winnetka, Ill., assignor to International Register Company, Chicago, Ill., a corporation of Illinois

Original application July 27, 1929, Serial No. 381,524. Divided and this application February 5, 1931, Serial No. 513,465

5 Claims. (Cl. 74—38)

This invention relates to cutting machines, and more particularly to machines employing a reciprocating cutter which is mounted for movement about an axis eccentric to the cutting tool.

Machines of this character are used for cutting sheet material of various sorts, such as cloth, boards, composition boards, and numerous other materials in sheet form. It is the common practice to suspend these machines from a fixed support in such manner as to permit movement of the cutting tool along the line of the pattern to be cut, the supporting means being so disposed as to take the greater part of the weight of the machine off of a presser-foot or equivalent member disposed adjacent the cutting tool and moving over the material being cut.

In the movement of the presser-foot over the material, this foot trails the tool, due to its eccentric mounting relative to the plunger, and holds the tool in proper position to cut along the line of the pattern. These machines are also provided with a material engaging shoe adjacent the cutting tool which travels upon the material and, in the case of cloth or similar relatively thin material, serves to maintain such material smooth and unwrinkled, facilitating the cutting operation. It has been commonly accepted that the member contacting the material being cut should support but little weight, as this member, due to its small area of contact, if subjected to appreciable weight, would be apt to cause movement and wrinkling of the material, thus defeating the purpose of providing such member.

I have found that, while the presser-foot follows the line of the pattern with sufficient accuracy when it is permitted to trail freely, it is desirable that means be provided whereby the presser-foot and the tool can be adjusted manually to position the tool accurately on the line at the start of the cutting operation.

It is possible, by providing a supporting member or base of relatively great area, to mount the motor and the entire machine upon such base, this base being moved over the material being cut and facilitating ease and accuracy in the cutting operation. This arrangement has numerous advantages over the cutting machines now in use, above referred to.

By mounting the entire machine upon the base plate, this machine can be used in any position desired and the machine can be carried to the work, avoiding the necessity of carrying the work to the machine, and the range or field of movement of the machine is unlimited except by the electric cord or cable by means of which the electric motor is connected into an electric circuit by means of a plug member in a known manner.

Obviously, this electric cord or cable can be of any desired length, so that, for all practical purposes, the machine has unlimited movement over the work. A further advantage of this construction is that the cutting tool is at all times disposed perpendicular to the work assuring ease and accuracy in the cutting operation.

My invention has to do more particularly with the means for controlling the operation of the machine, and adjusting and controlling the cutting tool. I provide means whereby the length of the stroke of the tool can be varied to suit the material being operated upon, and means for adjusting the tool vertically to vary the depth of the cut to suit conditions.

I also provide hand grips or handles associated with the base plate for moving the machine over the work, in conjunction with means for adjusting the cutting tool about the plunger and means for controlling the motor circuit, both of these means being disposed and adapted to be operated by the hands while grasping the handles. This gives complete control over the operation of the machine and the cutting tool, rendering it possible to cut with ease and accuracy along the lines of the selected patterns or designs.

Further objects and advantages of my invention will appear from the detailed description.

In the drawings:—

Figure 1 is a longitudinal vertical sectional view of a machine in accordance with my invention, the motor being omitted and parts being shown in elevation;

Figure 2 is a section taken substantially on line 2—2 of Figure 1;

Figure 3 is a front view of the drive shaft and associated parts, showing the crank pin block in one extreme position for a long cutting stroke;

Figure 4 is a view similar to Figure 3 with the crank pin block in its other extreme position for a short cutting stroke;

Figure 5 is a detail of the crank pin block and the adjusting rod therefor and associated parts;

Figure 6 is a section taken substantially on line 6—6 of Figure 5;

Figure 7 is a front view of the crank housing and associated parts, partly broken away and in section, showing the position of the drive shaft when the supporting sleeve therefor is in one extreme position, to raise the crank shaft;

Figure 8 is a view similar to Figure 7 with the crank shaft in its lowermost position; and

Figure 9 is a detail rear end view of the adjusting disc and associated parts for adjusting the length of the stroke of the plunger.

This application is a division of my copending application for Cutting means, Serial No. 381,524, filed July 27, 1929.

In constructing my machine I provide a base 1 in the form of a flat and substantially rectangular

plate, the edges of which are rounded upwardly and outwardly at 1a. This plate is provided, in its forward end, with a cut-out or recess 2 of substantially V shape, forming projections 3 which extend forwardly from the body of the plate. A post 4 is suitably secured in the forward end of each of the projections 3 and this post is provided with an annular collar or shoulder 5 spaced away from the plate. This provides a groove or space 6 between the shoulder and the plate for reception of a suitable member for securing the plate to an associated supporting plate with the machine in inverted position when desired or as conditions may require. A knob 7 in the form of a sphere is suitably secured on the upper end of each post 4, these knobs providing hand grips or handles for moving the machine over the material being cut. It will be noted that these handles are disposed at the forward end of the machine and adjacent each side thereof, thus giving accurate control of the machine in manipulation thereof.

An electric motor (not shown) of suitable type is mounted upon the upper face of base plate 1 centrally thereof, the axis of this motor being preferably in the vertical plane of the longitudinal axis of the plate. The motor is secured to the plate in a suitable manner. Current is supplied to the motor by means of a suitable cord or cable 10 provides at its free end with a plug member (not shown) for connecting the motor into an electric circuit in a known manner. The cord or cable 10 is connected to the motor through a switch 11 of known type which is controlled by a finger lever 12. This finger lever is adapted and disposed to be readily operated by the forefinger of a hand grasping the right hand handle 7, as shown in Figure 1. Preferably the switch 11 is of a known type which permits two or more speeds of operation of the motor, the motor circuit being opened when the finger lever 12 is in vertical position. I also preferably provide a lamp of suitable type suitably secured to a boss 14a of the frame supporting the cutting tool operating means.

A suitable drive, as belt and pulley means, is provided between the motor and a pulley 20 fixedly secured on a drive shaft 21 (Figure 1) which is mounted for rotation in a cylindrical casing 22. Pulley 20 may be secured on shaft 21 in any suitable and known manner, as by means of a pin 21a engaging into a groove in the shaft and secured in the pulley, as is known in the art. This casing is mounted at its ends for turning movement in housings 23 and 24 provided at the ends of a U-shaped frame 25. The casing 22 is held in adjustment by a thumb screw 26 (Figures 7 and 8) which screws into the housing 24, and a suitable knob or handle 27 is secured to the casing 22 for effecting adjustment thereof.

The frame 25 is supported by front and back bows 28 and 29, respectively, which are secured to the housing in a suitable manner, as by screw means. These bows are suitably secured at their lower ends to base plate 1. The bows are preferably disposed adjacent the ends of the motor and support the frame 25 above the motor, the axis of casing 22 being in a common vertical plane with the longitudinal axis of the motor and the longitudinal axis of the plate 1. This provides a very compact arrangement in which the weight of the machine is distributed in such manner as to facilitate movement of plate 1 over the material, the center of gravity being low, assuring ease in manipulation of the machine.

Shaft 21 extends into housing 24 and is provided at its forward end with a flanged head 32. A block 33 is supported in the head 32 for movement diametrically thereof and is secured to the head for rotation therewith, in a suitable manner. This block carries a crank pin 34 which is disposed eccentrically to head 32. This pin is connected by a connecting rod 35 to a plunger 36 which is mounted for reciprocation through a suitable ferrule 38 secured in a downwardly extending collar 39 of the housing 24. This ferrule is interiorly threaded, at its lower portion, for reception of a follower 40 for compressing suitable packing material 41 between the follower and the lower end of the ferrule about the plunger 36 to prevent escape of an excessive amount of lubricant about the plunger. The housing 24 is adapted to receive and retain a suitable lubricant, such as a light grease, and is normally closed by a plate 42 and a gasket 43 secured to the front of the housing by screws 44 passing through the plate and the gasket and threading into suitable lugs 45 projecting inwardly from the sides of the housing.

A sleeve 46 is suitably mounted for turning movement upon the depending neck 37 of ferrule 38. A disc 47 is secured upon the upper end of this sleeve and provides, in effect, a relatively wide annular flange extending completely above the sleeve. The periphery of this disc is suitably roughened, as by being knurled or serrated, to facilitate manipulation of the disc.

A presser-bar 54 has its upper end portion mounted for sliding movement through disc 47. This bar is slidable through an arm 55 at the lower end of sleeve 46 and projecting radially therefrom. The bar 54 is also slidable through a tool holder in the form of a block 56 which is mounted upon the lower end of plunger 36 for free turning movement thereon and is confined against movement axially of the plunger between a collar 57 at the upper face of the holder and a washer 58 at the lower face of the holder held in position by a nut 59 threaded upon a screw stud 60 at the lower end of the plunger.

This holder 56 is provided with a suitable socket member 61 shaped for reception of the shank of the tool, securing screws 62 threading through the holder 56 and the socket member 61 for contact with the tool shank for releasably securing the tool in the holder. A presser-foot 63 is secured upon the lower end of the presser-rod or bar 54, this foot being bifurcated to accommodate the cutting tool. When the machine is moved over the work a chisel 64 may be used, the blade of this chisel operating between the fingers of the presser-foot 63, and the shank of the chisel being secured in the member 61 by screws 62. I also contemplate using any other suitable tool in place of the chisel.

As will be noted more clearly from Figure 1, the cutting tool or chisel and the presser-foot are disposed in the vertex portion of recess 2, at the transverse center of the base plate 1. In using the machine, when cutting with the chisel, it is supported upon the material to be cut by means of the base plate 1, the front portion being held raised to hold the chisel out of contact with the work, by grasping knobs 7.

Disc 47 is grasped between the thumb and the forefinger of the left hand and the switch is closed by the forefinger of the right hand. This closes the motor circuit and causes the chisel to be reciprocated at high speed. The forward portion of the machine is then lowered so as to bring

the chisel into cutting relation to the work. As the machine is thus lowered, the chisel is adjusted, by means of disc 47, so as to start the cut accurately on the line of the pattern. In this manner the chisel is inserted into the work accurately at the initiation of the cutting operation. The machine is then slid over the work by means of knobs 7, so as to cause the tool to cut along the line of the pattern. The presser-foot 63 contacts the work or sheet of material and trails the tool holding it accurately to the line. It is to be noted that the under face of base plate 1 is flat or planar and smooth, and is of great area relative to the base of the motor and the cutting mechanism so that the weight of the machine is distributed over a relatively great area permitting the plate to be slid over the work. The sheet being cut, is preferably supported upon a lower, thicker layer or sheet of suitable material, such as composition board or thick cardboard, into which the cutting edge of the chisel enters after it passes through the upper sheet.

Suitable means is provided for releasably securing bar 54 in raised position, when necessary or desired, such means including a holding plate 65. Normally, in the operation of the machine, the bar 54 is released and the presser-foot 63 is yieldingly held against the upper face of the material by an expansion coil spring 69 mounted about bar 54 and confined between plate 65 and a collar 70 mounted about the bar and held against movement thereon by a set screw 71. Collar 70 has a flat face which coacts with a flat portion of collar 50*a* of sleeve 46 to hold bar 54 against turning in arm 55. This assures proper disposition of bar 54 relative to plate 65.

When using the machine for cutting sheet material with a chisel or other suitable tool, by movement of the machine over the material, the presser-foot 63 is yieldingly held in contact with the upper face of the material to guide the cutting tool and to hold the material down adjacent such tool facilitating the cutting operation. It is sometimes desirable, however, to hold the presser-foot 63 in inoperative position out of contact with the work. This is true, for example, when the machine is secured in inverted position and is held stationary, a saw blade being secured in the holder 56 and the material being sawed being moved relative to the saw blade or tool.

I provide a hood or guard 78 about pulley 20. This guard is formed of sheet metal and is provided with integral tabs 79. These tabs receive securing screws which thread into the housing 23 and secure the hood to the housing.

The materials operated upon by this machine vary greatly in thickness and for this reason, I provide means whereby the length of the stroke of the cutting tool can be adjusted with facility. The operating shaft 21 is rotatably mounted in ball bearings 81 in the ends of the sleeve 22. Nuts 82 screw onto the shaft and contact the outer face of the inner ring or race of the rear bearing. The terminal portions of the shaft are reduced in diameter providing shoulders which contact the inner faces of the inner rings or races of the bearings and cooperate with head 32 and nuts 82 to hold the shaft against endwise movement.

Shaft 21 is tubular and receives an adjusting and securing rod 83. This rod is provided, at its forward end, with an eccentric 84. This eccentric is disposed between the arms of block 33 which is of substantially elongated U-shape in longitudinal section (Figures 5 and 6). The inner arm of the block is provided with a slot 85 which accommodates rod 83 and the eccentric is of a diameter to fit snugly between the end wall of the block and a spacer 86 riveted or otherwise suitably secured between the ends of the arms of the block. The eccentric also fits snugly between the arms of the block. In this manner any undesirable looseness or play between the eccentric and the block is eliminated.

Rod 83 projects rearwardly beyond the hub of pulley 20 and has a groove or keyway 87 extending from its rearward end. This keyway receives a stud 88 of an adjusting disc 89 disposed about the rod. Disc 89 is provided with a series of openings 90 (Figure 9) suitably marked to indicate the length of the stroke of the tool for a given setting of the disc. These openings are adapted for reception of a pin 91 secured in the hub of pulley 20. A knurled thumb nut 92 screws upon rod 83 and normally holds disc 89 in operative position. The rod 83 is thus connected to pulley 20 for rotation therewith, this rod and the shaft 21 rotating as a unit, and block 33 is clamped to head 32.

Referring more particularly to Figure 1, it will be noted that block 33 is provided, at each side thereof, with a shoulder 33*a*, the outer face of which is flush with the outer face of the block. The rearward face of this shoulder is inclined rearwardly and inwardly toward the block and seats upon a correspondingly shaped surface of an element 32*a* of head 32. When the thumb-nut 92 is turned tightly upon rod 83, and bears against disc 89, the inclined surfaces of shoulders 33*a* are forced into wedging contact with the co-operating inclined surfaces of elements 32*a*. This provides a wedging action which is highly efficient and serves to lock the block tightly in the head in such manner as to eliminate possibility of the block working loose due to vibration in the use of the machine.

As will be noted more clearly from Figure 6, the diameter of eccentric 84 corresponds to the width of the body of block 33, and this eccentric is disposed within the outlines of the body of the block when the eccentric pin 34 is in either of its extreme positions. To permit of the eccentric projecting beyond the sides of block 33, for moving the pin 34 into any selected intermediate position, the head is provided with arcuate grooves 32*b* (Figure 1) opening into the groove of the head in which the block operates, these arcuate grooves being disposed to receive the projecting portion of eccentric 84 when it is turned into position to project beyond the block laterally thereof.

When it is desired to adjust the stroke of the tool, nut 92 is threaded off of the rod 83 sufficiently to permit of disengagement of disc 89 from pin 91. The disc is then turned, thus turning rod 83 independently of the operating shaft. This serves to shift block 33 toward or away from the axis of shaft 21, thus adjusting the distance of pin 34 relative to the axis of the operating shaft and correspondingly varying the length of the stroke of the tool. The openings of the disc 89 are marked from "¼" to "¾", there being five such openings and the value of the markings thereof increasing by ⅛ inch. When the pin 91 is in the ¼ opening, the length of the stroke of the tool is ¼ of an inch. The length of the stroke is increased ⅛ of an inch for each successive opening of the disc, from ¼, which is brought into engagement with the pin. The maximum length of the working stroke of the

tool is ¾ of an inch. In Figures 3 and 4 the adjusting disc is set to give the maximum and the minimum, respectively, length of stroke.

The casing or sleeve 22 is mounted to turn in housings 23 and 24 (Figure 1) as previously noted. A packing ring 93 is mounted in a groove in the end of sleeve 22 within housing 24 to prevent leakage of lubricant from this housing about the sleeve. At its other end, sleeve 32 is provided with a circumferential groove 94 which receives the point of a dog pointed screw 95 passing through the top tab of guard 78 and screwing into housing 23. This screw serves to hold the sleeve 22 against endwise movement.

The rearward end of sleeve 22 is closed by a plate 96, and a gasket 97 secured to the sleeve by screws 98. This plate has two stop elements or fingers 99 (Figure 9) disposed to contact a screw 100 secured in housing 23. This serves to limit turning of sleeve 22 in either direction.

Shaft 21 is disposed eccentric to sleeve 22 (Figure 2) so that by turning the sleeve in proper direction, the cutting tool can be adjusted toward or away from the work so as to vary the depth of the cut as required. This adjusting of the shaft 21, and consequently of the tool, will be understood more clearly from Figures 7 and 8. In Figure 7 the shaft 21 is in its highest position, the center of this shaft being at *a* and the center of sleeve 22 being at *b*, the vertical distance between these two centers being *a'*. If the sleeve be turned in a counterclockwise direction, as indicated in Figure 7, so as to move the radius *b*—*c* of sleeve 22 into the position of Figure 8, the radius *b*—*d* of the sleeve which intersects the axis of shaft 21 will occupy the position illustrated in Figure 8. The axis *a* of shaft 21 will now be below center *b* of sleeve 22 a distance equal to *a'*, so that the shaft 21, and consequently the cutting tool, has been lowered through a distance equal to 2*a'*, this distance being indicated by A. This represents the extreme distance through which the cutting tool can be adjusted vertically in either direction. The tool can be adjusted to any desired extent between these two extremes by proper turning of sleeve 22. This adjustability of the tool for depth of cut, in conjunction with the means for varying the length of the stroke of the tool, permits materials of a great variety of thicknesses to be cut to advantage, as well as enabling the tool to be adjusted to cut accurately to a desired depth for a given length of stroke.

What I claim is:—

1. In combination, a tubular drive shaft provided at one end with a head having a transverse groove therein, a pulley secured on the shaft at the other end thereof, a rod mounted through the shaft and adjustable on the axis thereof, a block slidably mounted in the groove, said block being of approximately U-shape in longitudinal section and closed at both ends, an eccentric secured on the forward end of the rod and disposed between the arms of the block in contact with the end walls thereof, means for adjusting the rod about its axis relative to the shaft and for establishing a direct driving connection between the rod and the pulley, and means cooperating with said adjusting means for forcing the rod through the shaft in the direction of the pulley.

2. In combination, a tubular drive shaft provided at one end with a head having a transverse groove therein, a pulley secured on the shaft at the other end thereof, a rod mounted through the shaft and adjustable on the axis thereof, a block slidably mounted in the groove, said block being of approximately U-shape in longitudinal section and closed at both ends, an eccentric secured on the forward end of the rod and disposed between the arms of the block in contact with the end walls thereof, means for adjusting the rod about its axis relative to the shaft and for establishing a direct driving connection between the rod and the pulley, and means cooperating with said adjusting means for forcing the rod through the shaft in the direction of the pulley, the block and the shaft head having cooperating inclined surfaces exerting a wedging effect for clamping the block to the head and preventing relative movement therebetween when said rod is forced through the shaft in said direction.

3. In combination, a tubular drive shaft having a head at one end, a block slidably mounted in the head for movement transversely thereof and for rotation with the shaft, a pulley secured on the other end of the shaft, a rod extending through the shaft and adjustable on the axis thereof, said rod and the block having cooperating means for adjusting the latter transversely of the head by turning of the rod, an adjusting member mounted on the rod and having positive connection therewith for turning the rod, and means for releasably securing said member to the pulley and the shaft for causing rotation of the adjusting member and the rod with the pulley and the shaft as a unit.

4. In combination, a tubular drive shaft having a head at one end, a block slidably mounted in the head for movement transversely thereof and for rotation with the shaft, a pulley secured on the other end of the shaft, a rod extending through the shaft and adjustable about the axis thereof, said rod and the block having cooperating means for adjusting the latter transversely of the head by turning of the rod, an adjusting member mounted on the rod and having positive connection therewith for turning the rod, said connection holding the rod against turning movement relative to the adjusting member, and means for releasably and positively securing the adjusting member to the pulley for rotation therewith.

5. In combination, a tubular drive shaft having a head at one end, a block slidably mounted in the head for movement transversely thereof and for rotation with the shaft, a pulley secured on the other end of the shaft, a rod extending through the shaft and adjustable about the axis thereof, said rod and the block having cooperating means for adjusting the latter transversely of the head by turning of the rod, an adjusting member mounted on the rod and having a tongue and slot connection therewith, means for securing said member in adjustment about the axis of the shaft and relative thereto, said means establishing a positive driving connection between the adjusting member and the pulley, the means for adjusting the block including means for clamping the block to the shaft head when the rod is urged through the shaft in a direction away from said head, and a nut screwing onto said other end of the rod and bearing against the adjusting member.

ARTHUR H. WOODWARD.