No. 897,142. PATENTED AUG. 25, 1908.

A. F. PRESTON.

CUTTING MACHINE.

APPLICATION FILED DEC. 9, 1907.

3 SHEETS—SHEET 1.

Fig. 2.

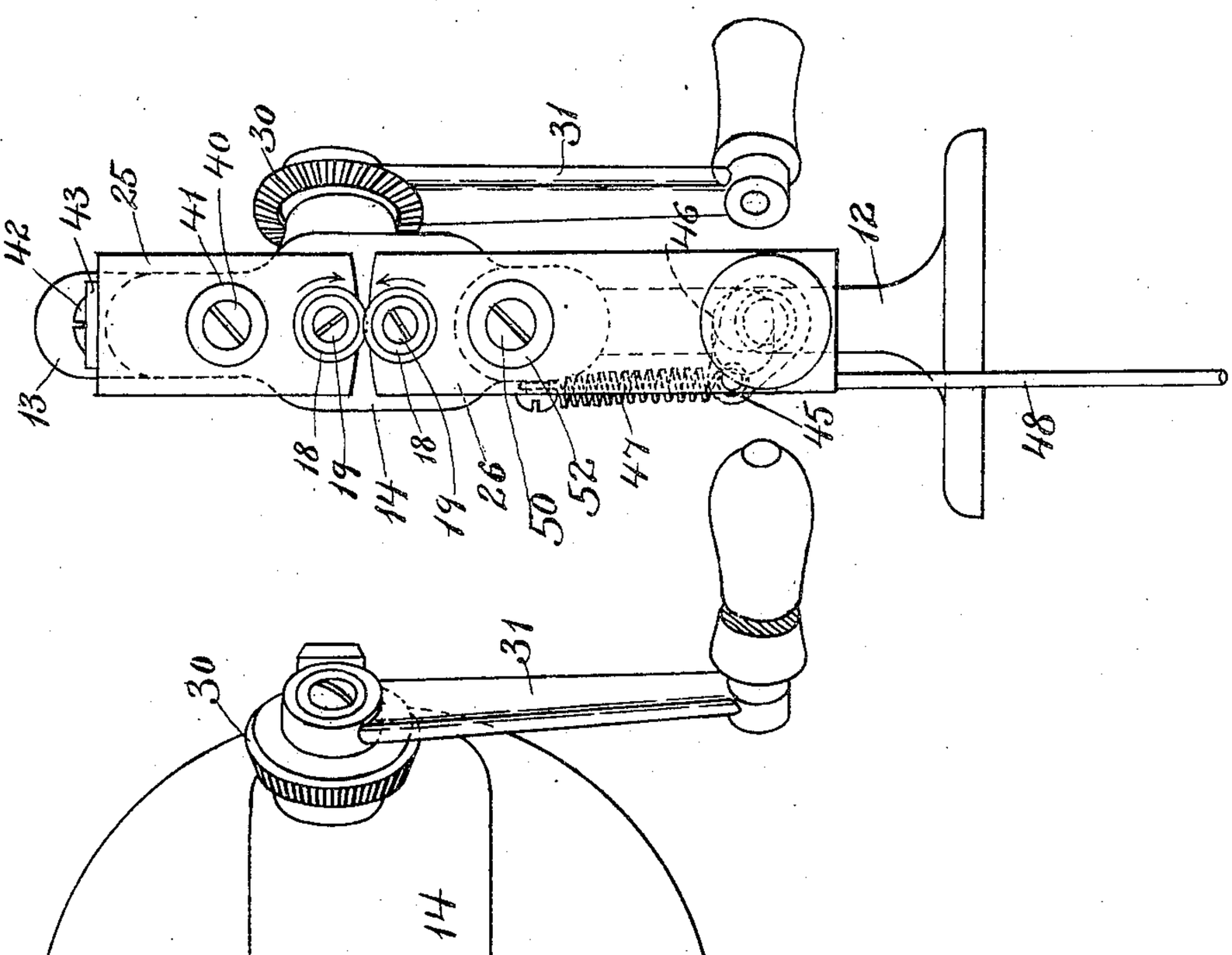
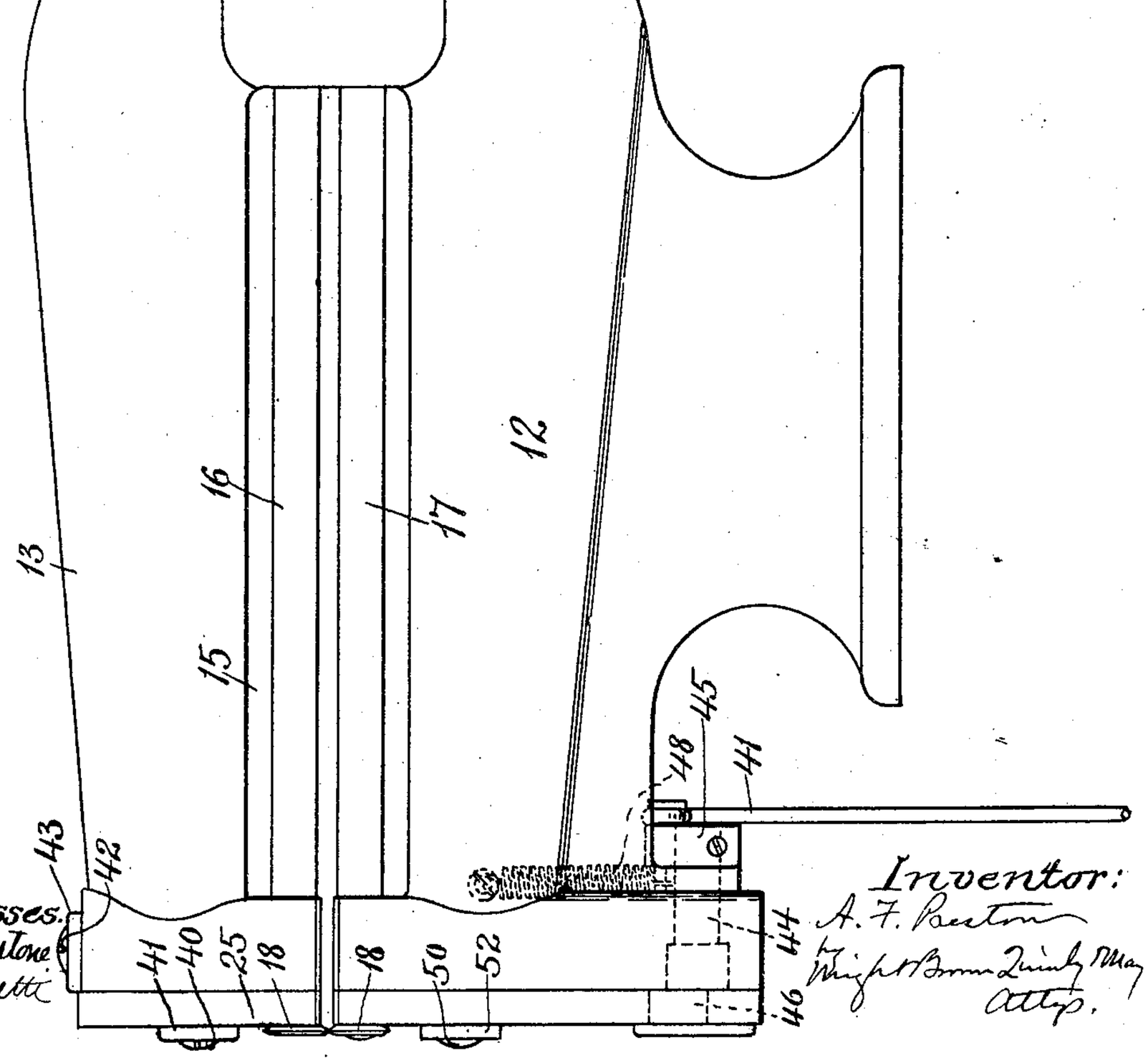


Fig. 1.



Witnesses.
F. R. Rodstone
P. N. Pezzetti

Inventor:
A. F. Preston
by Wright Brown Quinby & May
Attys.

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3 SHEETS—SHEET 2.

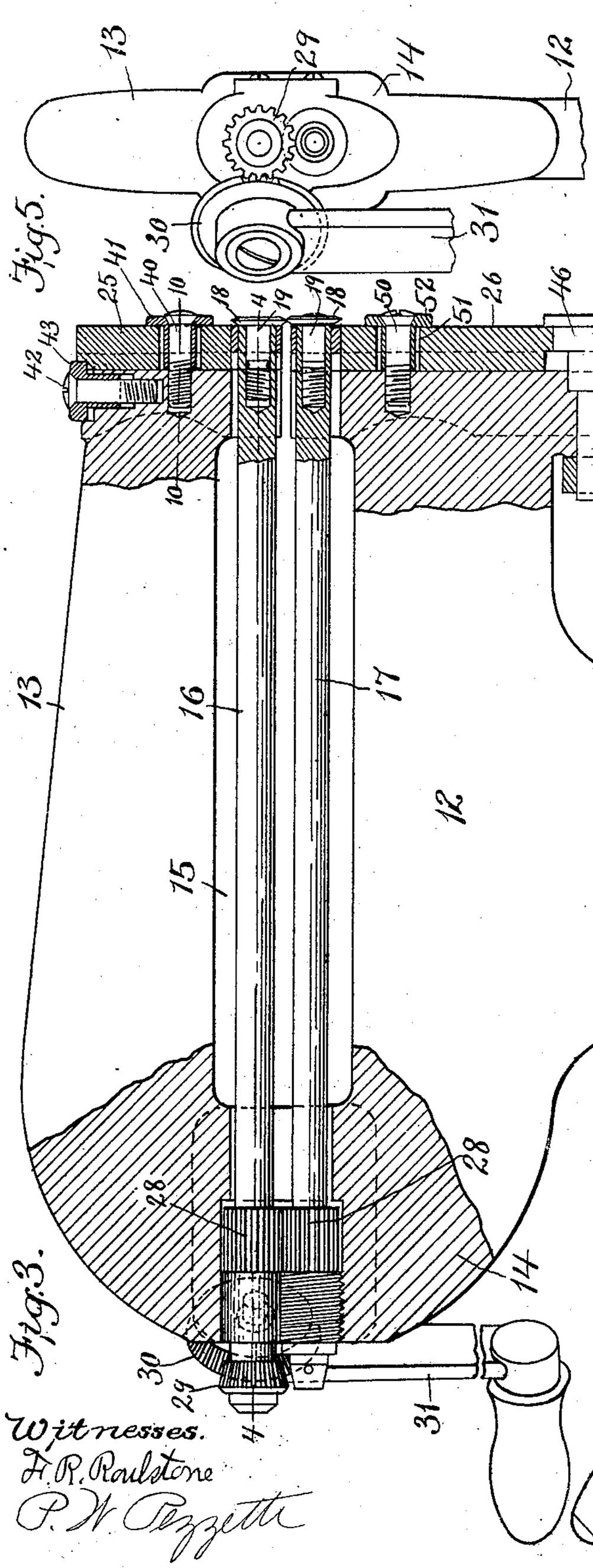

Fig. 5.

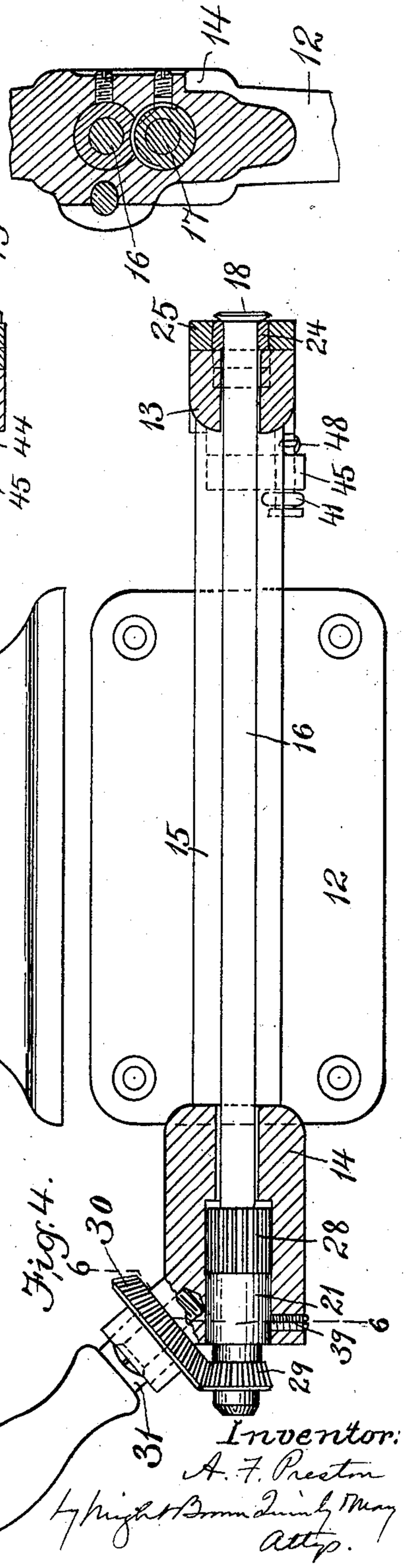

Fig. 6.

Fig. 3.

Fig. 4.

Witnesses.
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3 SHEETS—SHEET 3.

Fig. 7.

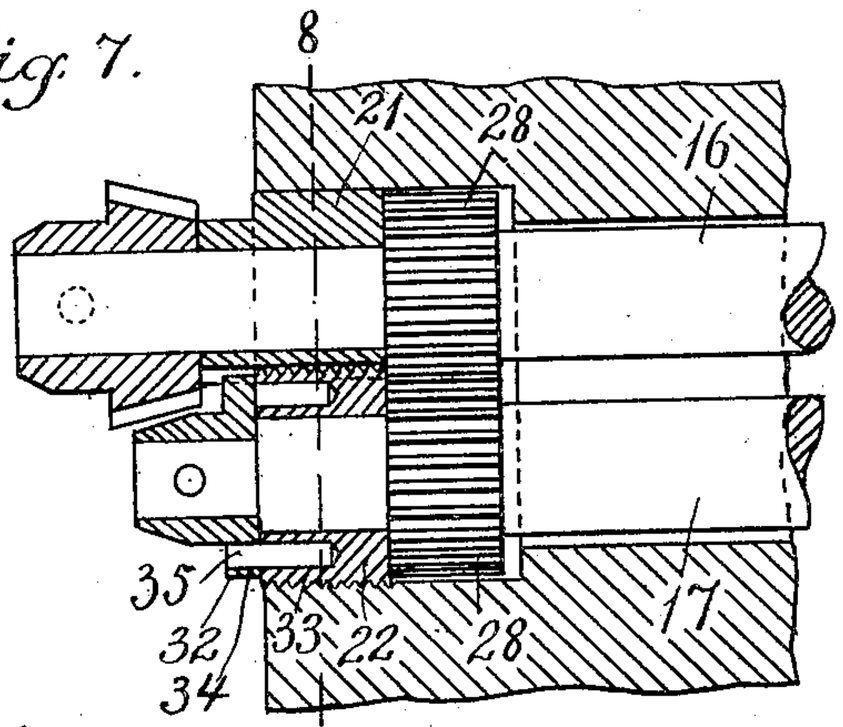


Fig. 8.

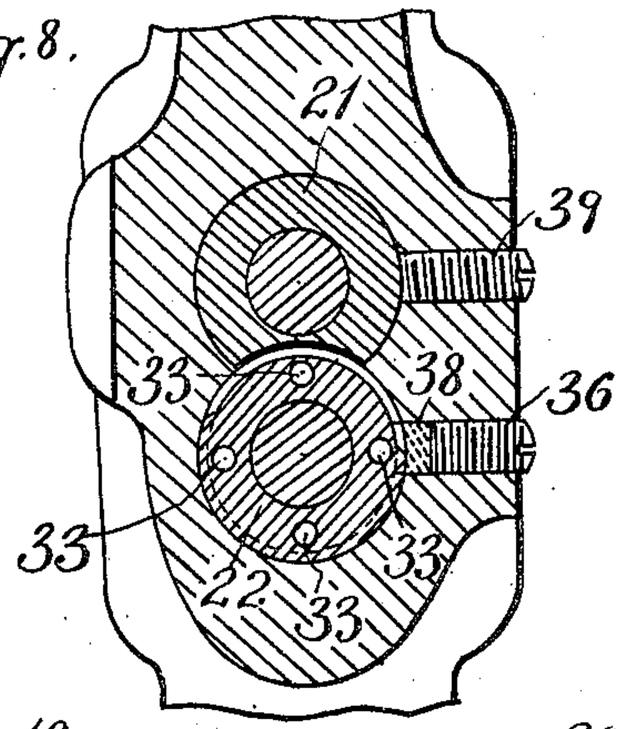


Fig. 9.

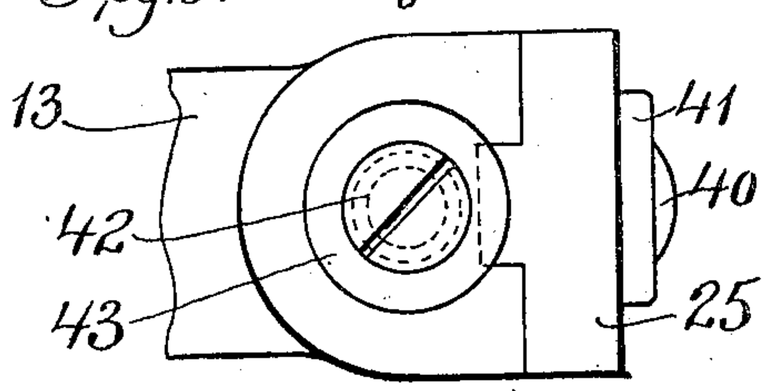


Fig. 10.

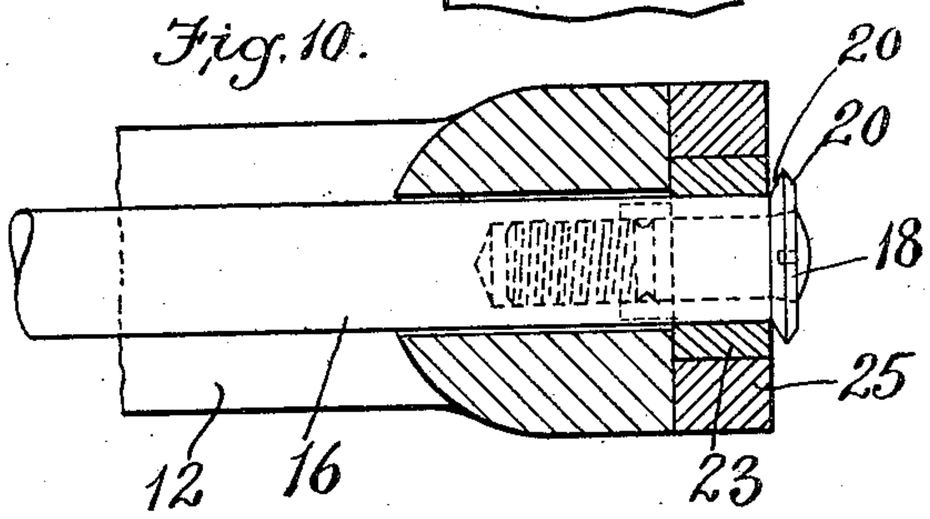


Fig. 12.

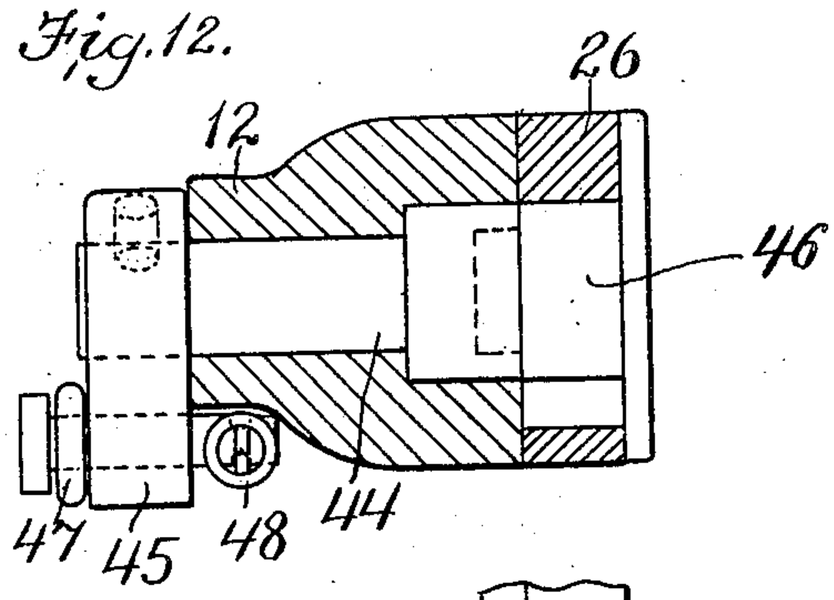
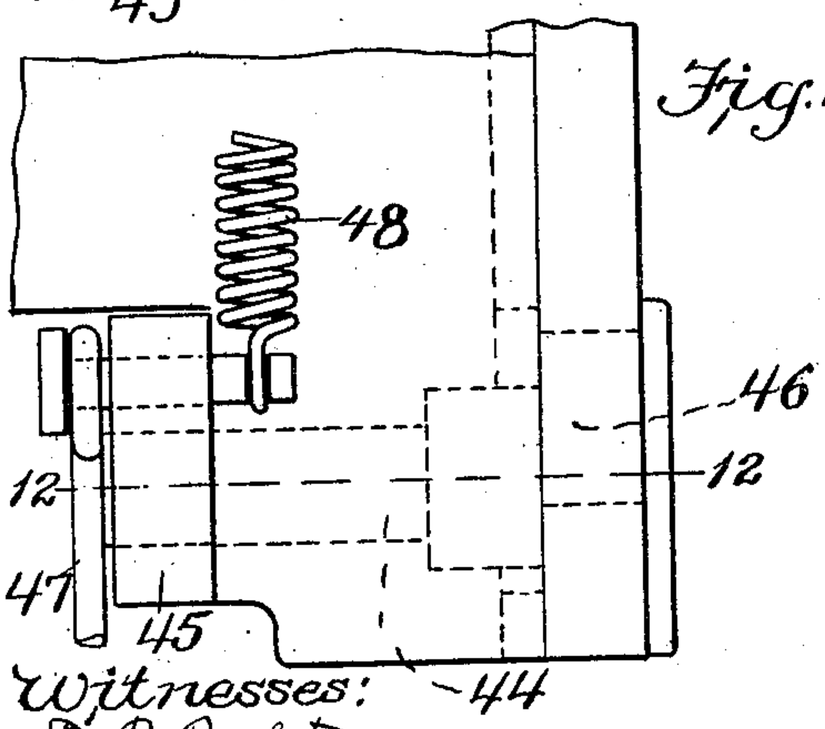
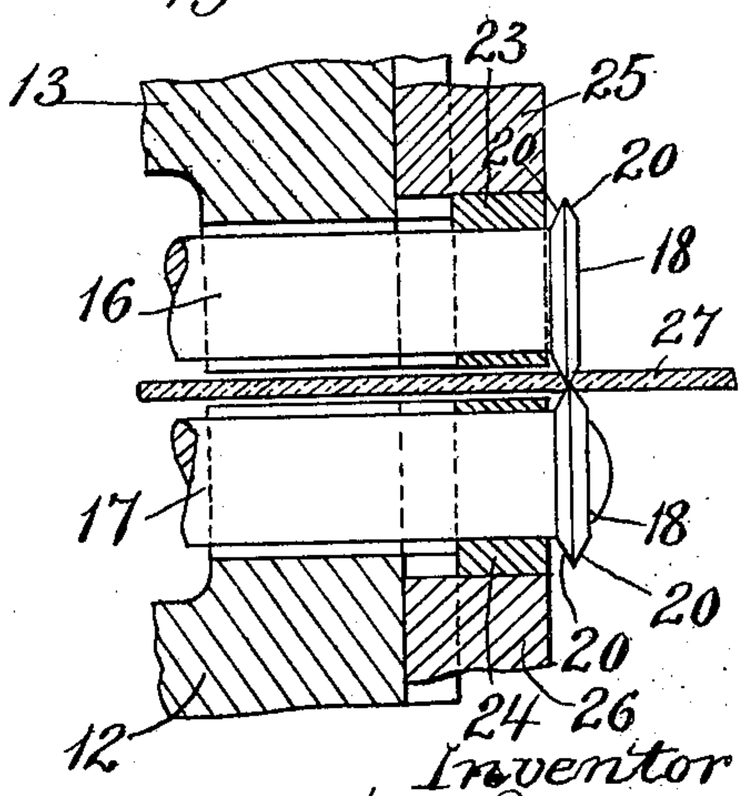


Fig. 11.



Witnesses:
F. R. Ronlstone.
P. W. Pezzetti.

Fig. 13.



Inventor
A. F. Preston
by Wright Brown Quinby & May
Attys.

UNITED STATES PATENT OFFICE.

ALBERT F. PRESTON, OF BOSTON, MASSACHUSETTS.

CUTTING-MACHINE.

No. 897,142. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed December 9, 1907. Serial No. 405,657.

To all whom it may concern:

Be it known that I, ALBERT F. PRESTON, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Cutting-Machines, of which the following is a specification.

This invention relates to machines for cutting relatively thick sheet material, such as thick heavy paperboard used for making patterns of parts of boot and shoe uppers.

The invention has for its object to provide a machine adapted to form two opposed grooves in opposite sides of a sheet of material, and to give said grooves any desired direction or curvature, so that a piece or part cut from the sheet of material by the formation of the said grooves, may have any desired outline, and will possess edges free from jagged projections or notches, the grooves coinciding with each other so that they collectively sever the material along the line of the grooves, although, if desired, the grooves instead of being formed to meet or run into each other, may be left separated by a portion of the material which is so thin that it may be readily broken to complete the severance.

The invention is embodied in a machine having two opposed disk knives, each of which is beveled on both sides to form a peripheral cutting edge, and means for supporting and rotating such knives, said means having provisions for moving one of the knives edgewise toward and from the other to permit the insertion and removal of the sheet of material, and in some cases to impart a reciprocating movement to one of the knives to facilitate the cutting operation, as hereinafter described. The acting portions of the knives are located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the sheet of material toward either side of the knives, in order that edges of any desired curvature may be formed, the beveled sides of the knives being intended and adapted especially to permit the free edgewise swinging movement of a sheet of material which is engaged with the knives. Means are also provided for adjusting one of the knives sidewise relatively to the other, so that their cutting edges may be located either in different planes or in the same plane, and for adjusting one of the knives edgewise relatively to the other, to vary the distance between the acting parts of their cutting edges, and to enable the knives to overlap and bear against each other to any extent desired.

Of the accompanying drawings, forming a part of this specification,—Figure 1 represents a side elevation of a cutting machine embodying my invention. Fig. 2 represents a front end elevation of the same. Fig. 3 represents an elevation of the opposite side of the machine from that shown in Fig. 1, portions being shown in section. Fig. 4 represents a section on line 4—4 of Fig. 3. Fig. 5 represents an elevation of a part of the rear end of the machine. Fig. 6 represents a section on line 6—6 of Fig. 4. Fig. 7 represents an enlargement of a portion of Fig. 3. Fig. 8 represents a section on line 8—8 of Fig. 7. Fig. 9 represents a top plan view of the outer end of the overhanging arm of the machine. Fig. 10 represents a section on line 10—10 of Fig. 3. Fig. 11 represents a side elevation of the lower portion of the outer end of the overhanging arm. Fig. 12 represents a section on line 12—12 of Fig. 11, the rock shaft and its arm and eccentric being shown in plane. Fig. 13 represents an enlargement of a portion of Fig. 3, the cutters and their shafts being shown in elevation, and a sheet of material being shown in section between the cutters.

The same letters of reference indicate the same parts in all the figures.

The supporting frame of the machine is preferably composed of a base portion 12, an arm 13 overhanging the base portion, and a neck 14 connecting the base portion and the arm at one end of the frame, the said parts forming an elongated, preferably horizontal, throat 15, which is closed at one end by the neck 14, and is open at the opposite end between the outer ends of the base portion 12 and arm 13.

16 and 17 represent elongated shafts, which extend side by side through the throat 15, and are provided at their outer ends with opposed disk cutters 18 18, which are rigidly attached to said shafts by screws 19, or other suitable means. Each cutter is provided on its opposite sides with beveled faces 20 (Fig. 13), these beveled faces meeting to form peripheral cutting edges, which are located between the planes of the opposite sides of the disks, and are concentric with the axes of the disks.

21 and 22 (Fig. 7) represent inner bearings for the shafts 16 and 17, said bearings being

located in the neck portion 14 of the frame. 23 and 24 (Fig. 13) represent outer bearings for the said shafts, said bearings being mounted respectively on slides 25 and 26, which are movable vertically in guides formed in the outer end of the arm 13 and the corresponding end of the base 12.

Means are provided for positively rotating the shafts 16 and 17 simultaneously in opposite directions, the disk knives being correspondingly rotated, as indicated by the arrows in Fig. 2, and caused to simultaneously cut and feed a sheet 27 of material inserted between them. The said bearings maintain a continuous cutting relation between the knives, excepting when one of the knives is moved edgewise relatively to the other by mechanism controlled by the operator for a special purpose, as hereinafter described. The knives are therefore adapted to cut continuous coinciding grooves in opposite sides of the sheet 27, said grooves resulting in the severance of the sheet. The means here shown for rotating the shafts comprise intermeshing gears 28 28 affixed to the shafts, a beveled gear 29 affixed to the shaft 16, and a driving gear 30 meshing with the gear 29, and mounted on a stud affixed to the supporting frame, said gear 30 being preferably driven by a crank 31 attached to its hub, and arranged to be rotated by one hand of the operator who tends the machine, the arrangement being such that the operator can turn the crank with one hand and use the other to control the sheet 27 which is being acted on by the knives.

The preferred relative arrangement of the disk knives is that shown in Figs. 2 and 13, the beveled inner face of the lower knife slightly overlapping the beveled outer face of the upper knife, and the said beveled faces being in close rubbing contact with each other. The extent of overlap is preferably very slight, and is just sufficient to prevent the cutting edges of the knives from being in identically the same plane and acting directly against each other. Means are provided for adjusting the knives relatively to each other, both edgewise and sidewise, so as to increase or decrease the extent of overlap of the meeting beveled sides of the knives, and to compensate for wear and grinding of the beveled sides of the knives. The sidewise adjustment is preferably confined to the lower cutter, and is effected by providing the bearing 22 of the shaft 17 carrying the lower cutter with an external screw thread 32, which engages an internal thread formed in the supporting frame, so that a rotary movement of the bearing 22 will cause said bearing and the shaft 17 to move endwise, the knife on said shaft being thus moved sidewise to regulate its pressure against the opposed knife. The rotation of the bearing 22 may be conveniently effected by means of a collar 32 (Fig. 7) affixed to the rear end of the shaft 17, said collar and the bearing 22 being provided with orifices 33 34 adapted to be brought into alinement with each other. When the said orifices are alined, a pin 35 inserted in them, as shown in Fig. 7, couples the bearing 22 to the shaft so that rotation of the shaft effected by the means above described, causes a corresponding rotation of the bearing 22 and its endwise adjustment. This adjustment will, of course, be very slight after the machine has once been put into operative condition. When the adjustment has been effected, the pin 35 is removed, and the bearing 22 secured against accidental rotation by means of a set screw 36 (Fig. 8) engaged with a tapped socket in the supporting frame, said screw pressing a compressible binding block 38 against the thread of the bearing 22. The bearing is preferably provided with a plurality of orifices 33, as shown in Fig. 8, either of said orifices being adapted to be brought into alinement with the orifice 34 in the collar 32. The inner bearing 21 of the upper shaft 16 is preferably cut away at its end side to accommodate the bearing 22, as shown in Fig. 8, said bearing 21 being secured in place by a set screw 39. The upper knife 18 is adjustable vertically by movements of the slide 25, the latter being secured to the arm 13 by a screw 40 engaged with the outer end of the arm 13, and a washer 41 pressed by the head of the screw against the outer face of the slide 25.

42 represents a stop screw engaged with the outer end of the arm 13, its head holding a washer 43 against a shoulder formed at the upper end of the slide 25. When the screw 42 is raised and the screw 40 is loosened, the slide 25 may be correspondingly raised as far as the adjustment of the screw 42 permits, the slide being then rigidly secured by tightening the screw 40. The slide 25 is therefore adapted to be adjusted either upwardly or downwardly, either of these movements causing a corresponding edgewise adjustment of the disk knife carried by the upper shaft 16.

The slide 26 carrying the outer bearing of the lower shaft 17 is adapted to be reciprocated toward and from the upper shaft, thus giving the lower disk knife a reciprocating edgewise movement toward and from the upper knife. This movement is sufficient to form an opening between the two knives for the insertion and removal of the sheet when the lower knife is depressed. The said movement may also be utilized in giving the lower knife a somewhat rapid edgewise reciprocating movement to facilitate the cutting operation when a sheet is being turned to form an abruptly curved line of cut. The means for reciprocating the slide 26, as here shown, comprise a rock shaft 44 journaled in a bearing in the lower portion of the outer

end of the base 12, an arm 45 affixed to one end of the rock shaft, an eccentric or eccentric wrist pin 46 affixed to the other end of the rock shaft, said wrist pin engaging a slot formed for its reception in the slide 26, a spring 48 connecting the outer end of the arm 45 with the supporting frame, and a rod 47 connecting the outer end of the arm 45 with a treadle, not shown. The spring exerts an upward pull on the arm 45, the arrangement being such that the spring normally holds the rock shaft, with the eccentric 46, in its highest position, and with its center in alinement with the centers of the disk knives, so that the eccentric is on a dead center, and cannot be depressed by downward pressure exerted on the lower disk knife. The said knife is therefore rigidly supported, unless the arm 45 is swung downwardly against the stress of the spring 48 by pressure applied to the treadle through the rod 47. When the arm 45 is swung downwardly, the eccentric is correspondingly depressed, and the lower disk cutter is given a downward edgewise movement. When the pressure on the treadle is released, the spring raises the eccentric, and imparts to the lower disk knife an edgewise upward movement.

The slide 26 is guided in its upward and downward movements by means of a screw 50 passing through a slot in the slide 26, and engaged with the base 12, said screw supporting a collar or bushing 51 and a washer 52. These edgewise movements of the lower disk knife are not required when the line of cut has a gradual curvature or is substantially straight, excepting to separate the cutters for the purpose of inserting or removing the work. When, however, the line of cut is abruptly curved, it is found advantageous to give the lower disk knife a series of upward and downward movements in somewhat rapid succession, the operator alternately depressing and releasing the treadle to cause these movements.

It will be observed that the shafts 16 and 17 are comparatively slender, and are so elongated that they are adapted to spring sufficiently to permit the described edgewise adjustments and movements of the disk knives.

The described provisions for adjusting the disk knives relatively to each other, one knife having a sidewise and the other an edgewise adjustment, not only enables the extent of overlap of the knives to be varied, and an overlapping contact maintained, but also enables the cutting edges of the knives to be separated and arranged exactly opposite each other when it is not desired to have the knives entirely sever the material, in which case the bottom of the groove or cut made by one knife will be slightly separated from the bottom of the groove or cut made by the other knife by a narrow neck of the uncut material, this neck being subsequently broken to complete the severance. The operation of the machine is therefore not limited to a shearing cut, which is produced when the knives overlap, although in relatively tough fibrous material, the shearing cut is preferable, while with more brittle materials the incomplete non-shearing cut above described may be advisable.

I find that the two opposed disk knives, act conjointly to form continuous coinciding cuts in opposite sides of a sheet of material, and have cutting edges which are formed and adapted to form very short or abrupt curves without nicking or distorting the edges, the abruptly curved edges being practically as smooth as relatively straight or gradually curved edges. This is due to the fact that only a short segment of each knife enters the material, and further to the fact that the beveled sides of the portion of each knife which enters the material, present a convex curvature which permits the free turning of the work edgewise, required to form shorter or abrupt curves.

It will be observed that the organization of the machine is such that there is a free unobstructed space on each side of the acting portions of the knives, this space permitting a sheet of material engaged with the knives, to swing edgewise in a plane parallel with the axes of the knives, and toward either side of the knives, in order that the work may be manipulated to cause the knives to form cutting edges of any desired curvature. The beveled sides of the disks which form the cutting edges, are very important features of my machine, because they permit the free turning of the material edgewise or in its own plane toward either side of the cutters, without causing the turning movement to distort the formed edge when the curvature is abrupt. While the cutting edges of the knives in indenting the sheet, crowd the material outwardly, and somewhat thicken the formed edges, the thickening is uniform, and is the same on straight as on curved edges, there being no exceptional thickening on curved edges. The overlapping relation between the cutters is also a feature of much importance, since this enables the cutters to entirely sever the material without having their cutting edges brought into direct opposition to each other and therefore liable to mutual injury. Provision for adjusting one of the cutters sidewise and the other edgewise is important for the maintenance of this overlapping relation, and its adjustment to make the overlap greater or less.

I claim:

1. A cutting machine comprising a pair of opposed disk knives, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a

space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, means for rotating the same, said means having provisions for maintaining a continuous cutting relation between the knives, and means controlled by the operator for reciprocating one knife edgewise toward and from the other.

2. A cutting machine, comprising a pair of opposed disk knives, each beveled on both sides to form a cutting edge, the outer side of one knife overlapping the inner side of the other knife, and means for rotating the knives simultaneously in opposite directions, the acting portions of the knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives.

3. A cutting machine comprising a pair of opposed disk knives, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, the outer side of one knife overlapping the inner side of the other knife, means for rotating the knives, said means having provisions for maintaining a continuous cutting relation between the knives, and means for adjusting one of the knives edgewise and the other sidewise to vary the extent of the overlap.

4. A cutting machine comprising a pair of elongated shafts, a supporting frame having outer and inner bearings for said shafts, opposed disk knives affixed to the shafts, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, said bearings maintaining a uniform cutting relation between the knives, the outer side of one knife overlapping the inner side of the other knife, and means for adjusting one of the inner bearings longitudinally to effect a sidewise adjustment of the cutter carried by the shaft journaled therein.

5. A cutting machine comprising a pair of elongated shafts, a supporting frame having outer and inner bearings for said shafts, opposed disk knives affixed to the shafts, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, said bearings maintaining a uniform cutting relation between the knives, means for adjusting one of the outer bearings laterally to effect an edgewise adjustment of one of the cutters, and means for adjusting one of the inner bearings longitudinally to effect a sidewise adjustment of the other cutter.

6. A cutting machine comprising a supporting frame having a throat which is open at one end of the frame, inner bearings at the closed end of the frame, outer bearings at opposite sides of the open end of the throat, shafts journaled in said bearings, and extending through the throat, opposed disk knives affixed to the outer ends of the shafts, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, said bearings maintaining a uniform cutting relation between the knives, the outer side of one knife overlapping the inner side of the other knife, one of the said outer bearings being movable by the operator toward and from the other to project and retract the knife supported by said bearing.

7. A cutting machine comprising a supporting frame having a base portion, a neck portion and an arm overhanging the base portion, inner bearings in the neck portion, outer bearings mounted on the outer ends of the base portion and arm, one of said outer bearings being movable toward and from the other, shafts journaled in said bearings, and having opposed disk knives at their outer ends, each beveled on both sides to form a cutting edge, which is concentric with the axis of the knife, the acting portions of said knives being located in a space which is laterally unobstructed to permit a free edgewise swinging movement of the work toward either side of the knives, said bearings maintaining a uniform cutting relation between the knives, and means for reciprocating the movable outer bearing to project and retract the knife supported by it, said means having provisions for rigidly supporting said bearing and knife when the knife is in its projected position.

8. A cutting machine comprising a supporting frame having a throat which is open at one end of the frame, inner bearings at the closed end of the frame, outer bearings at opposite sides of the open end of the throat, one of said bearings being movable toward and from the other, shafts journaled in said bearings, and having opposed disk knives at their outer ends, a rock shaft journaled in the frame, and having at one end an arm and at the other end an eccentric engaged with the movable outer bearing, a spring acting on said arm to normally hold the eccentric and the movable bearing in position to project the knife carried by said bearing, and means for moving the arm

against the stress of the spring to retract said knife.

9. A cutting machine comprising a supporting frame having a throat which is open at one end of the frame, inner bearings at the closed end of the frame, outer bearings at opposite sides of the open end of the throat, and shafts journaled in said bearings, and carrying opposed disk knives, one of said inner bearings having a screw thread engagement with the frame and adapted, when rotated, to impart a longitudinal adjustment to the shaft journaled therein, and a lateral adjustment of the knife carried by said shaft, means for simultaneously rotating said shafts, and means for coupling the said inner bearing to the shaft journaled in it to cause a rotation of the bearing.

In testimony whereof I have affixed my signature, in presence of two witnesses.

ALBERT F. PRESTON.

Witnesses:
F. R. ROULSTONE,
P. W. PEZZETTI.