No. 685,991. Patented Nov. 5, 1901.

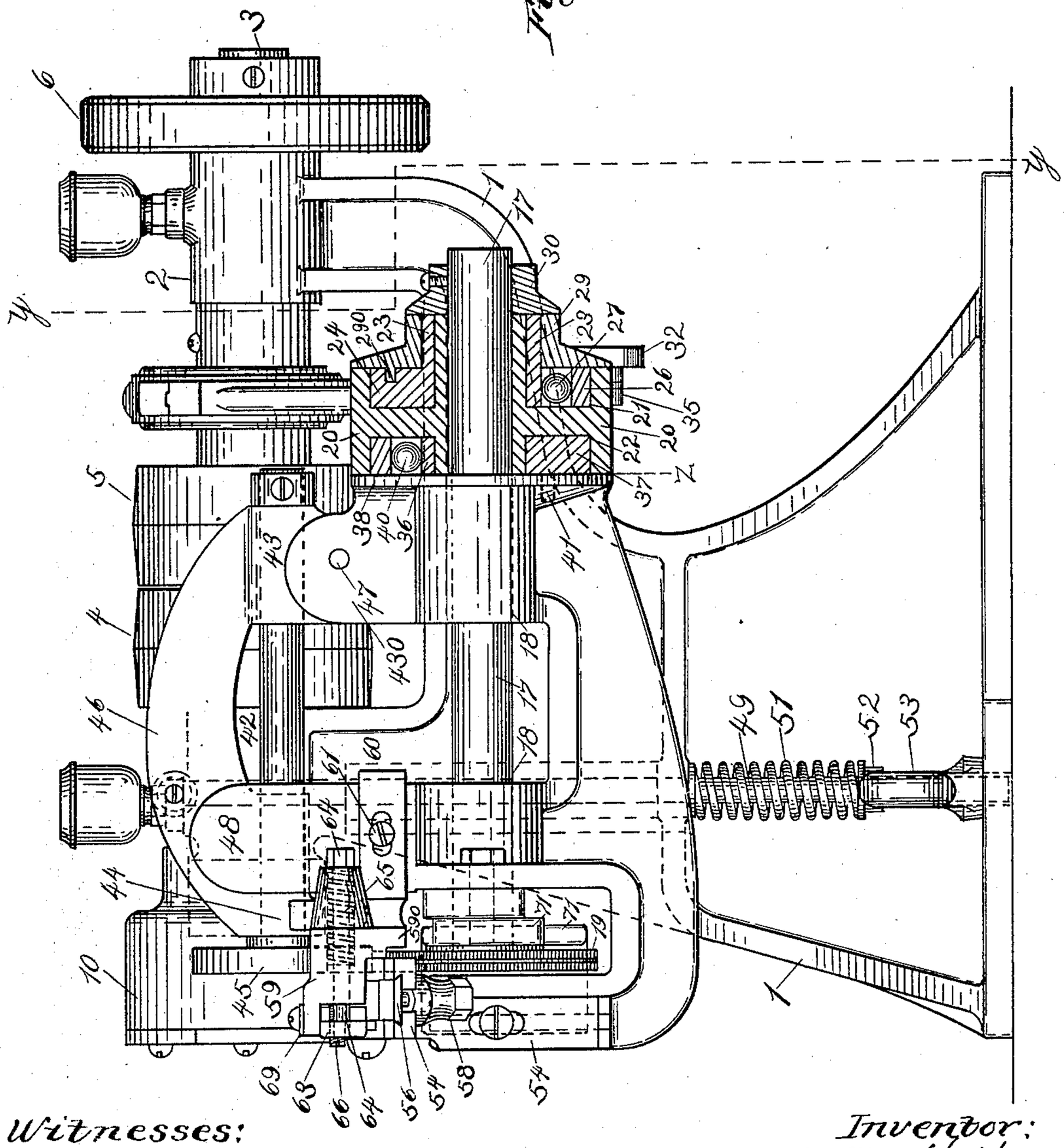
W. A. KNIPE.

WELT SLITTING MACHINE.

(Application filed May 8, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
H. B. Davis.
G. E. Ucker.

Inventor:
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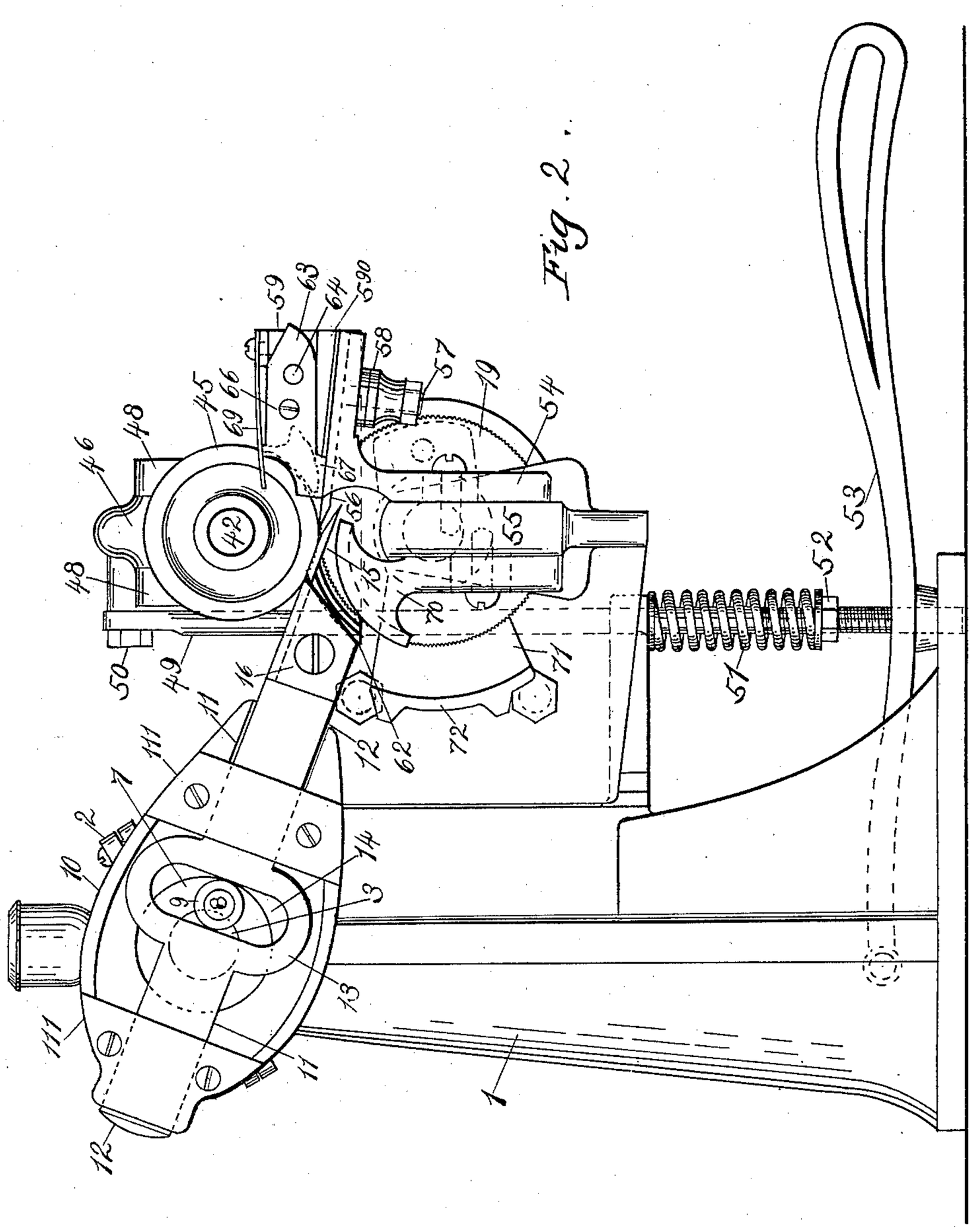
(No Model.) 3 Sheets—Sheet 2.

Fig. 2.



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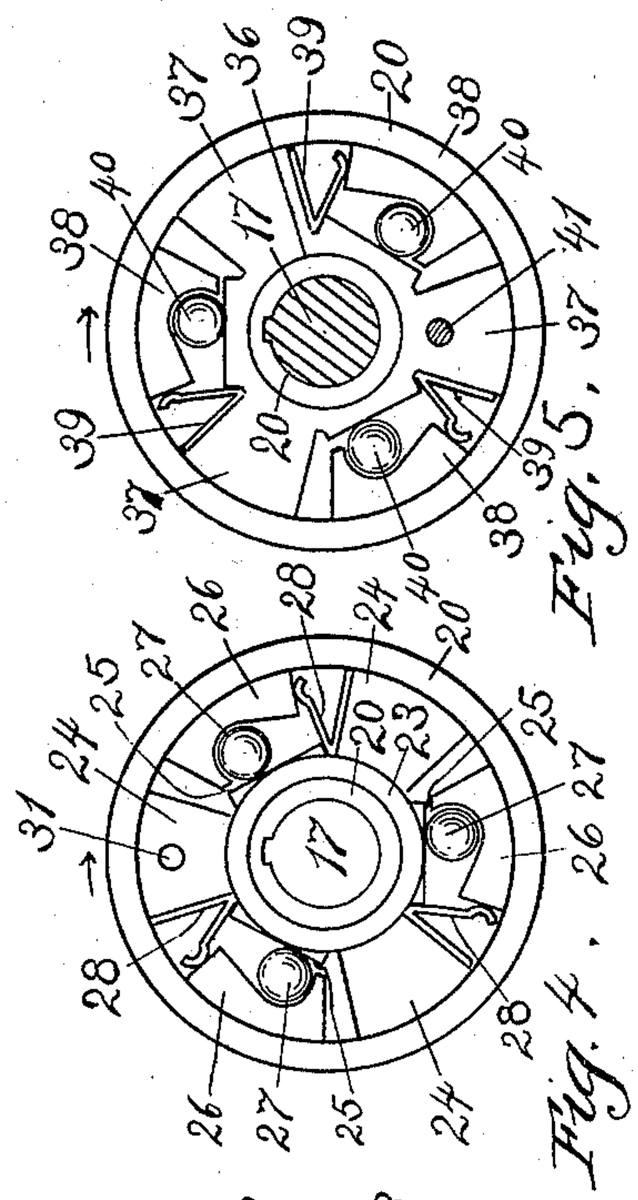

Fig. 5.

Fig. 4.

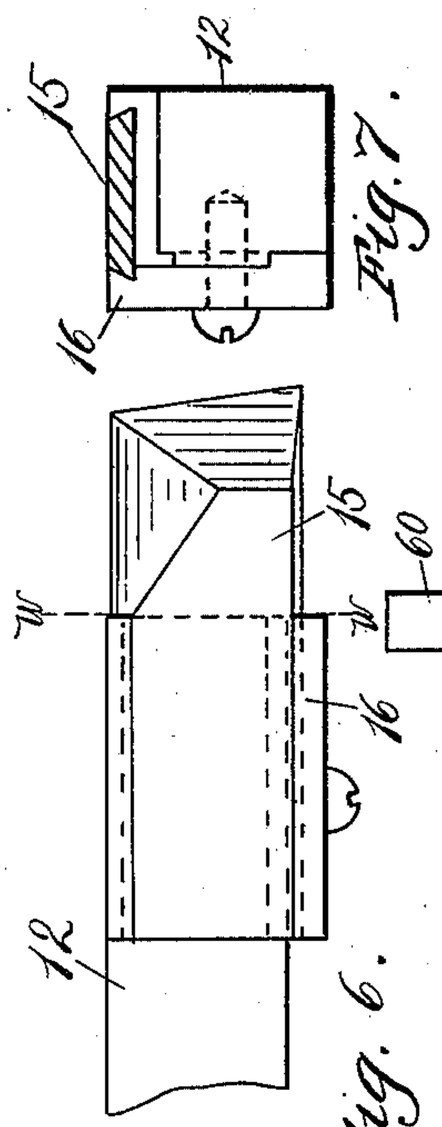

Fig. 7.

Fig. 6.

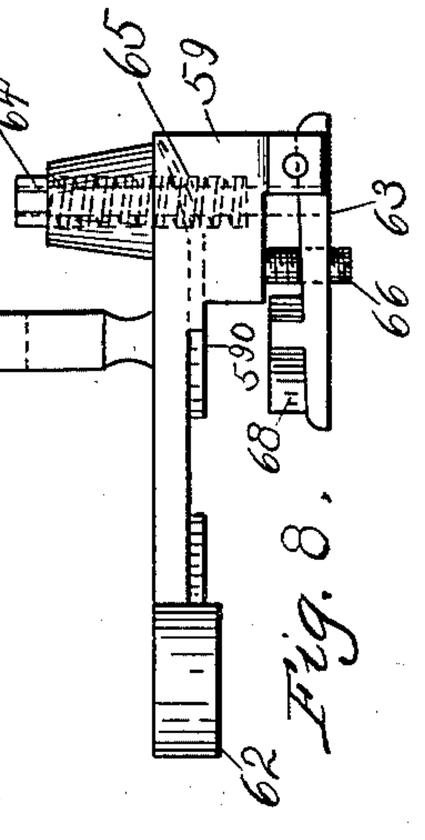

Fig. 8.

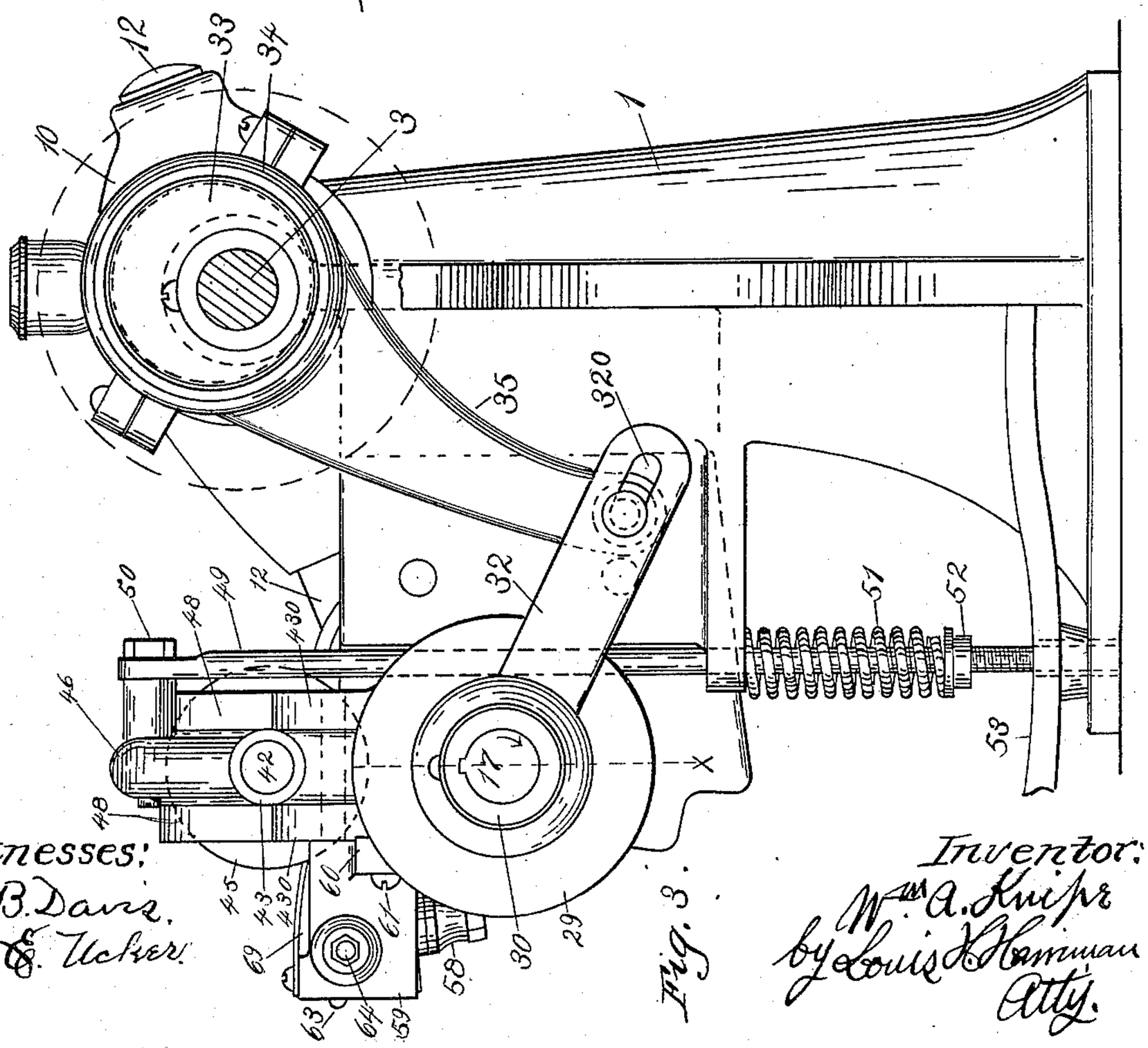

Fig. 3.

Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM A. KNIPE, OF HAVERHILL, MASSACHUSETTS.

WELT-SLITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 685,991, dated November 5, 1901.

Application filed May 8, 1901. Serial No. 59,241. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. KNIPE, a citizen of the United States, and a resident of Haverhill, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Welt-Slitting Machines, of which the following is a specification.

This invention relates to a machine for cutting an inclined slit in the edge of a welt, as described in my prior patent, dated November 20, 1900, and numbered 662,378.

The machine herein described is the result of a series of experiments with machines which I have designed for this purpose and in which I have employed various devices for slitting the welt, comprising several forms of rotating knives. In experimenting with these machines I found that it was practically impossible to force a knife through the stock if the relative positions of the welt and knife were changed while the knife was passing therethrough, and also that it was extremely difficult to force a knife through the stock if its cutting edge was not also drawn laterally to its path or held in a diagonal position thereto while the knife was in the act of cutting the stock. The rotating knives above referred to were found to be unsatisfactory principally because it was difficult to hold the welt with sufficient firmness to enable the knife to make the cut and because there was a strong tendency to cause the knife to bind and tear the stock. Moreover, a machine employing a rotating knife or knives must be somewhat more complicated than the machine hereinafter described in order to comply with the conditions above referred to.

The result of my experiments have led me to believe that the only practical manner of slitting the welt is by drawing or forcing a knife-blade through the edge of the welt in a straight path and in such a way that its edge will be inclined to the surface of the welt and will pass through the leather and out of engagement therewith without changing the relative positions of the path of the knife and the slit in the welt which is cut thereby.

In carrying out the above-described method in practice I provide a knife which is reciprocated at an acute angle to the surface of the welt, arranging the cutting edge of the knife at such an angle to the surface of the welt that it will first engage the edge of the welt which is to be cut, and I provide in connection therewith a means for feeding the welt intermittently, which acts so that it will hold the welt stationary while the knife is passing therethrough and which will feed it along to the next position before the knife again engages the welt to make the next slit.

For a complete understanding of the mechanism which I preferably employ in carrying out the above-described operation reference is made to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of the entire machine, partly in cross-section, on line X of Fig. 3. Fig. 2 is an elevation of the left-hand end of the machine. Fig. 3 is an elevation of the right-hand end thereof, partly in section, on line *y y* of Fig. 1. Fig. 4 is a detail view of the driving-clutch with the cap removed. Fig. 5 is a detail view of the holding-clutch, taken on section-line Z of Fig. 1. Fig. 6 is a detail plan view of the cutting-knife and holder. Fig. 7 is a view thereof on line W of Fig. 6. Fig. 8 is a detail plan view of the welt-guide.

The same numerals refer to the same parts throughout the drawings.

The frame 1 is provided with bearings 2, in which the main shaft 3 is journaled, and said shaft is provided with a driving-pulley 4, loose pulley 5, and balance-wheel 6. The left-hand end of said shaft is provided with a head 7, which carries a crank-pin 8 and roller 9, which are inclosed in a chamber 10 on the frame. Guideways 11 are provided in the walls of said chamber, being arranged so that their center lines are continuous and pass through the center of said shaft 3, and said guideways are inclined to a suitable angle to the surface of the welt at the point where it is held by the feed mechanism, as hereinafter explained. A knife-holder 12, having parallel sides at each end, is arranged to slide in said guideways 11 and is held therein by plates 111, or a single plate which covers the whole end of chamber 10. Said holder is provided with an intermediate enlargement 13, having a slot 14 therein which is arranged at right angles to the sides of the holder and in which the roll 9 is located and

fitted to move freely. The end of the holder is provided with a dovetailed recess (see Fig. 7) in which the knife 15 is fitted and adapted to be clamped by the clip 16, as shown in Figs. 6 and 7. The front or cutting edge of said knife is inclined at an acute angle to the outer side thereof, as shown in Fig. 6, for the purpose hereinafter explained. The knife is also nearly reduced to an edge on its inner side from the cutting edge back a suitable distance, (see Fig. 6,) so as to afford a better clearance as it passes through the welt.

A shaft 17 is journaled in bearings 18 in the frame and carries a corrugated or toothed feed-wheel 19 at its extreme left-hand end. The opposite end of said shaft 17 is provided with a clutch mechanism, which may be described as follows: A sleeve 20 is keyed onto shaft 17 and is provided with an annular cup 21 and 22 in each end thereof. A sleeve 23 is carried and turns freely on the right-hand end of sleeve 20 and is provided with three arms 24, the outer ends of each of which are turned down and fitted so that they turn freely in the cup 21 and come flush with the edge thereof. (See Figs. 1 and 4.) Three flat faces 25 are also formed on sleeve 23, being arranged between said arms 24. Shoes 26 are arranged directly beyond faces 25, and their outer surfaces are curved to correspond exactly to the curve of the inner wall of cup 21, and their inner surfaces are provided with recesses, in which balls 27 are located. An inclined surface extends inwardly from the bottom of each recess, as shown in Fig. 4. V-shaped springs 28 are arranged between each arm 24 and the ends of the shoes 26, at which the inwardly-inclined surfaces thereof terminate, so that said springs act constantly to hold said shoes away from the arms 24, which they engage. The balls 27 also rest on the surfaces 25, to which they are adjacent. When the sleeve 23 is rotated in the direction opposite the arrow in Fig. 4, the shoes will simply be held loosely between the balls and the outer rim of the cup; but when it is rotated in the direction of the arrow the projections on which the flat surfaces 25 are formed will cause the balls to roll up the inwardly-inclined inner surfaces of the shoes, so that the balls become wedged between these surfaces and press the outer surfaces of the shoes into a firm frictional engagement with the outer rim of cup 21, causing the sleeve 20 and shaft 17 to rotate in the direction of the arrow in Fig. 4.

In order to impart movement to the sleeve 23, a cap 29 is located thereon, (see Fig. 1,) which closes the whole outer face of cup 21, said cap being held in place by nut 30. Said cap 29 is provided with a pin 290, which engages an aperture 31 in one of arms 24, and is also provided with an arm 32, having a slot 320. The main shaft 3 has an eccentric 33 secured thereto, and the latter is provided with an eccentric-strap 34, the arm 35 of which is pivoted to arm 32 by a pivot-bolt, which passes through the slot of the latter. When shaft 3 is rotated, arm 32 will be oscillated, and the amplitude of the oscillations may be varied by adjusting said pivot-bolt in the slot 320. The oscillations of arms 32 will cause cap 29 and sleeve 23 to rotate back and forth, these in turn causing shaft 17 to rotate intermittently in the direction of the arrows in Figs. 3 and 4. In order to prevent the rotation of shaft 17 in the opposite direction when the arm 32 is lifted to rotate the sleeve 23 back after driving forward the shaft, the cup 22 is provided with a sleeve 36, having arms 37, shoes 38, springs 39, and balls 40 identical in every respect to those previously described, except that they are oppositely arranged and that the sleeve 36 is connected to the frame 1 by a pin 41, (see Fig. 5 and dotted lines, Fig. 1,) so that it cannot rotate in either direction. It will follow that this mechanism will not in the least interfere with the rotation of sleeve 20 in the direction of the arrow in Fig. 4, but any tendency to rotate said sleeve 20 in the direction of the arrow in Fig. 5 will immediately act to wedge the shoes 38 against the rim of the cup 22, locking sleeve 20 and shaft 17 to the frame. The operations of the driving and holding clutches are practically identical, as will be obvious, and the clutches will prevent any perceptible lost motion on either movement of arm 32.

An idle shaft 42 is journaled in bearings 43 and 44 and carries a smooth-faced wheel 45 at its end, which is supported directly above and just out of engagement with said corrugated wheel 19. Said bearings 43 and 44 are connected by an arm 46, and bearing 43 is pivoted on pin 47 between the upwardly-projecting lugs 430, and the bearing 44 is formed independently of the frame and is supported thereby between the upright guides 48, so that any tendency to swing the shaft laterally is overcome. A rod 49 is pivoted to arm 46 by bolt 50 and passes vertically down through frame 1 to the base thereof. A spring 51 is located on said rod between the under side of the frame and a nut 52, so that said spring acts constantly to draw the wheel 45 downwardly with a force in proportion to the tension of spring 51, which may be suitably adjusted by nut 52. Said rod passes through an aperture in a hand-lever 53 below nut 52, so that upon lifting said lever the rod 49 may be lifted, also lifting wheel 45. It is sometimes necessary to lift the latter when entering a welt between the wheels 19 and 45 or when the welt becomes caught between them.

A table 54, having a flat upper surface, is adjustably secured to a flat-sided projection 55 on the frame, and a blade 56, having a knife-edge at its inner end, is adjustably secured in a dovetailed groove in the surface of said table by a bolt 57, which passes through a slot in the table, and a nut 58 on said bolt. The surface of said blade 56 is flush with the

table, and the bevel which forms the sharp edge on its inner end is on the under side thereof and opposite the bevel which forms the edge on knife 15. The edge of said blade 56 is adjusted as close as possible to the path of knife 15.

A welt-guide 59, having a depending flange 590, is secured to the frame 1 by a shank 60, which is formed integrally therewith, said shank being arranged in a groove in the frame and adjustably secured therein by a bolt 61, which passes through an elongated slot in said shank. The inner end of guide 59 is provided with laterally-extending curved guide-flanges 62. (See Figs. 2 and 8.) An edge-guide 63 is secured to and pivoted on a bolt 64, which passes through the guide 59. The bolt in guide 59, through which bolt 64 passes, is chambered out, and a spring 65 is located therein between the head of said bolt and the bottom of the chamber. (See dotted lines, Figs. 1 and 8.) Said spring 65 therefore acts constantly to draw said guide 63 toward the face of guide 59; but is prevented from so doing by set-screw 66, which passes through said guide 63 and engages the surface of guide 59. If it is desired to adjust the guide 63 with respect to guide 59, it is simply necessary to loosen or tighten set-screw 66. Guide 63 is provided with a depending flange 67 at its outer edge, which rests on the table 54, and with a lateral projection 68 on its inner side, the under side of which is supported above the table a distance equal to about the ordinary thickness of a welt. A spring 69 constantly acts to press flange 67 onto table 54. A guide-piece 70, having a curved upper face, is adjustably secured to the projection 55 and arranged so that said face is slightly below the knife 15 and blade 56 and in the rear of the edge of the latter. A plate 71, having a curved guide-flange 72, is carried by a hub on the frame, which is concentric with shaft 17. Flange 72 projects laterally, as shown in dotted lines, Fig. 1, a distance equal to the widest welt which may be cut, and the face of plate 71 is arranged near to the inner side of the feed-wheel 19. The precise position of the guide 59, and therefore its flange 590 is determined by the width of the welt and corresponding depth of cut desired—that is, if a wide welt is to be gashed the guide 59 will be moved to the right to such a position that the distance from the plane of the face of flange 590 to the right-hand end of the edge of knife 15 will be equal to about half the width of the welt. The guide 63 will also be adjusted so that the distance between the faces of flanges 67 and 590 will be substantially the same as the width of the welt. If the welt should happen to be wider than the distance between the faces 590 and 67, the spring 65 will permit guide 63 to slide laterally, and if the pressure of wheels 19 and 45 on the welt should cause the edge which is beyond them to rise up the spring 69 will cause projection 68 to hold it down.

In operation the welt is fed between the wheels 19 and 45 and is carried down between the guides 70 and 62 and further deflected by guide 72. As the main shaft 3 is rotated the knife 15 will be reciprocated, and as the cutting edge of said knife is inclined to the surface of the welt, so that it diverges from the edge which is slit, it therefore follows that the leather will receive a slashing cut, practically the same as if a knife were drawn across its edge. The eccentric 33 is set so that it will draw up arm 32 while the knife is in the act of cutting the leather, so that the welt will be held stationary during that time, while the arm 32 will be carried downward, rotating shaft 17 and feeding along the welt the desired distance while the knife is receding and returning to cut the next slit. The welt must be held stationary while the knife is actually cutting it. The distance which the welt is fed along at each reciprocation of the knife obviously corresponds to the desired distance between the cuts, which may be adjusted to a sufficient extent by moving the pivotal point between arms 32 and 35.

It will be apparent that I employ various well-known mechanical devices for carrying out the various functions herein described for which various other mechanical devices equally well known may be substituted; but I do not claim these elements specifically, but only in combination.

It will be obvious that the knife may be arranged to cut the slit at the opposite inclination; but the article itself is more desirable when the slit is cut as herein described.

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

1. A machine for cutting a series of inclined slits through one edge portion of a welt comprising a knife, means for feeding the welt in one direction, means for moving the knife in a predetermined path so that its cutting edge advances toward one side of the welt at an acute angle thereto and passes completely through the edge portion of the welt to the opposite side thereof, and means for holding the welt stationary with respect to the path of the knife while the latter is passing through the welt, whereby a series of rhomboidal-shaped tongues may be formed along the edge of the welt.

2. A machine for cutting a series of inclined slits through a strip of leather from one side to the other thereof comprising a knife, means for feeding the welt in one direction, means for reciprocating the knife so that its cutting edge advances toward one side of the welt at an acute angle thereto and passes entirely through a portion of the welt to the other side thereof, and means for holding the welt stationary while the knife is passing through the welt.

3. A machine for cutting a series of inclined slits entirely through one edge portion of a leather welt so as to form a series of overlap-

ping tongues on said edge, comprising a knife, means for reciprocating the same in a predetermined path, means for feeding the welt so that its entire edge portion intersects the path of the knife from one side to the other thereof to an intermediate point transversely of the welt, and the plane of each side is at an acute angle to the plane in which the knife-blade reciprocates so that when the knife is advanced toward the welt it will cut a transverse slit entirely through the edge portion thereof which is inclined to the sides of the welt, and means for holding the welt stationary with respect to the path of the knife while the latter is passing through the welt.

4. A machine for cutting a series of inclined slits through a leather strip from one side to the other thereof comprising a knife, means for moving the same in a predetermined path, a feed-roll, means for rotating the roll and guiding the strip so as to feed it across the path of the knife at an acute angle thereto, and means for arresting the rotation of said roll while the knife is cutting each slit.

5. A machine for cutting a series of inclined slits in the edge of a welt, comprising a knife, means for reciprocating the same, a feed-roll, means for rotating the same to feed the welt across the path of the knife at an acute angle thereto, and means for arresting the rotation of said feed-roll while the knife is cutting each slit.

6. A machine for cutting a series of inclined slits in the edge of a welt, comprising a knife, means for reciprocating the same, a table having a thin edge which is located closely adjacent to the path of the cutting edge of said knife, means for feeding said welt over said edge and across the path of the knife at an acute angle thereto, and means for holding the welt stationary while the knife is cutting each slit.

7. A machine for cutting a series of slits through the edge of a welt, comprising a knife, means for moving the same in a predetermined path, means for feeding one edge portion of the welt across said path, a shaft, a feed-roll connected thereto having a corrugated surface, an arm, means for oscillating the same, a clutch which is interposed between said arm and shaft, said clutch being adapted to rotate said shaft forward when the arm is swung in one direction, means for locking said shaft against backward rotation when said arm is swung in the opposite direction, the respective movements of said knife and said arm being timed so that the shaft will be locked when the knife is passing through the stock.

8. A machine for cutting a series of slits through the edge of a strip of leather, comprising a knife, means for moving the same in a predetermined path, means for feeding said strip across the path of said knife, comprising a corrugated roll, means for rotating said roll forwardly at regular intervals, and for stopping the rotation thereof while the knife is passing through the strip, an idle roll which is arranged with its surface in proximity to said corrugated roll, and a spring which acts constantly to press said idle roll toward said corrugated roll, and a hand-lever which is arranged to move said idle roll against the action of said spring.

9. A machine for cutting a series of slits through the edge of a strip of leather, comprising a knife, means for moving the same in a predetermined path, means for feeding said strip so that one edge portion of said strip passes across the path of said knife, comprising a corrugated feed-roll, means for rotating said roll forwardly, means for preventing forward rotation of said roll while the knife is passing through the strip, a guiding device for said strip comprising an adjustable face which is arranged adjacent one side of said feed-roll and is adapted to engage the edge of the strip which passes at one side of the knife, a guide-piece which is adapted to engage the opposite end of said strip, and means for adjusting said guide-piece with respect to said adjustable face.

10. A machine for cutting a series of slits through the edge of a strip of leather, comprising a knife, means for moving the same in a predetermined path, means for feeding said strip so that one edge portion of said strip passes across said path, comprising a corrugated feed-roll, means for rotating said roll forwardly, means for preventing forward rotation of said roll while the knife is passing through the strip, a guiding device for said strip comprising an adjustable face which is arranged adjacent one side of said feed-roll and is adapted to engage the edge of the strip which passes at one side of the knife, a pivoted guide which is adapted to engage the opposite edge of the strip, a lateral projection thereon which is adapted to engage the surface of the portion of the strip which crosses the path of the knife a short distance in front thereof, a spring for pressing said projection on said strip, and means for adjusting said guide-piece with respect to said adjustable face.

11. A machine for cutting a series of inclined slits in the edge of a welt, comprising a knife, means for reciprocating the same, a table having a blade with a thin edge which is adjustably secured to said table with its surface at an acute angle to, and its edge closely adjacent the path of the knife, a feed-roll at one side of said blade, and means for rotating said roll and for preventing rotation thereof when the knife is passing through the welt.

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

WILLIAM A. KNIPE.

Witnesses:

LOUIS H. HARRIMAN,

G. E. UCKER.