F. E. BERTRAND.

CHANNELING MACHINE.

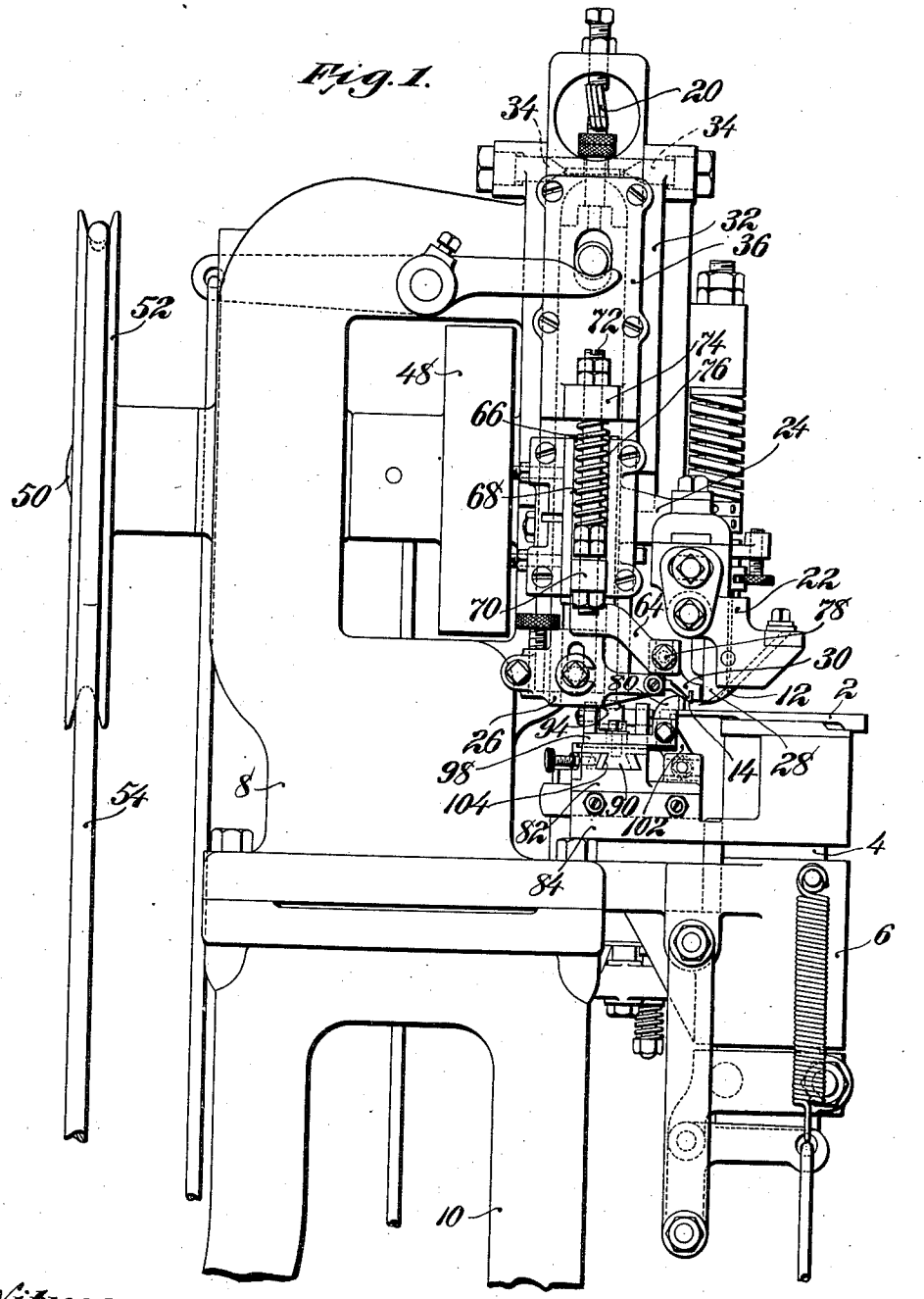
APPLICATION FILED MAY 10, 1909.

1,030,704.

Patented June 25, 1912.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

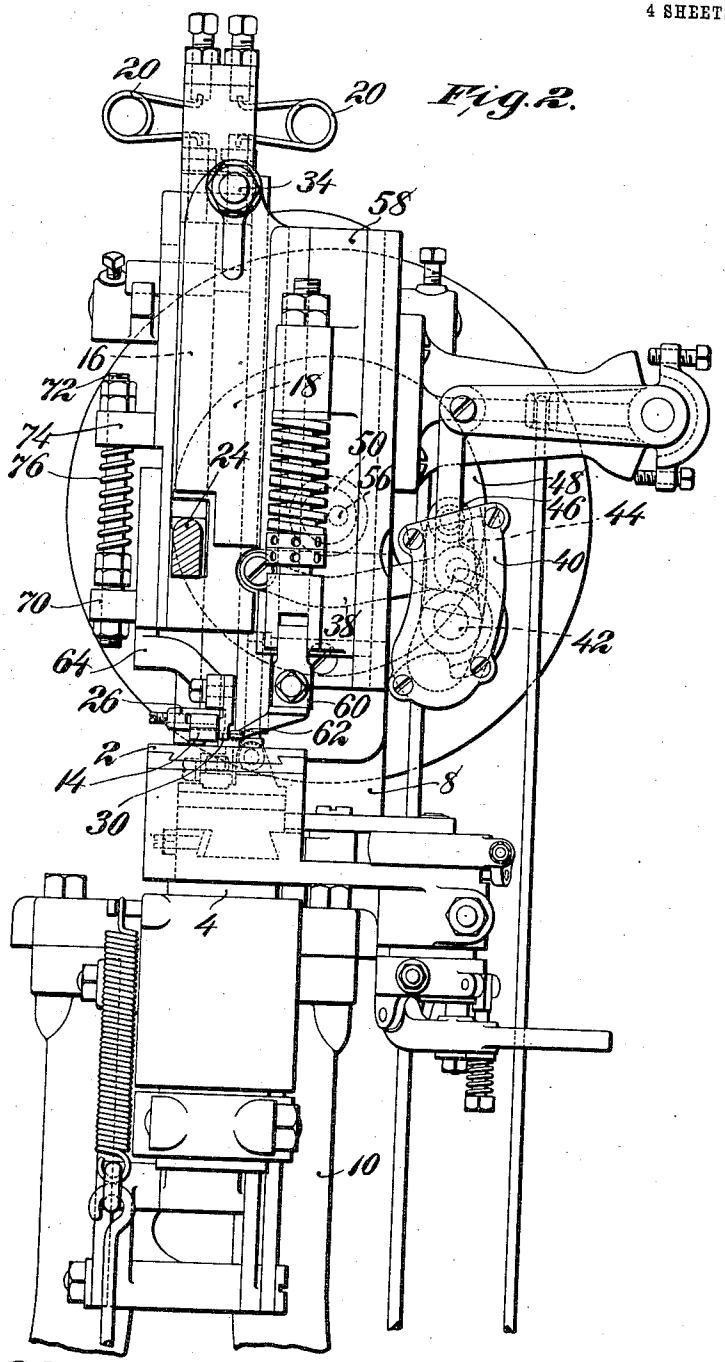

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3.

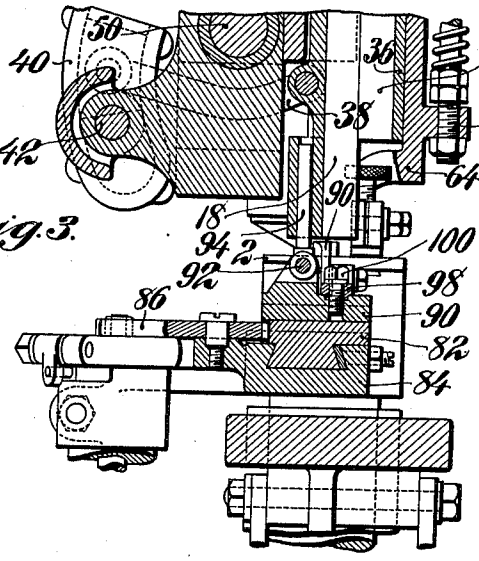


Fig. 4.

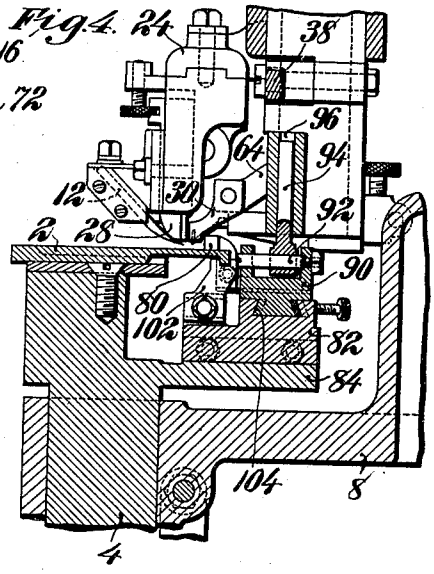
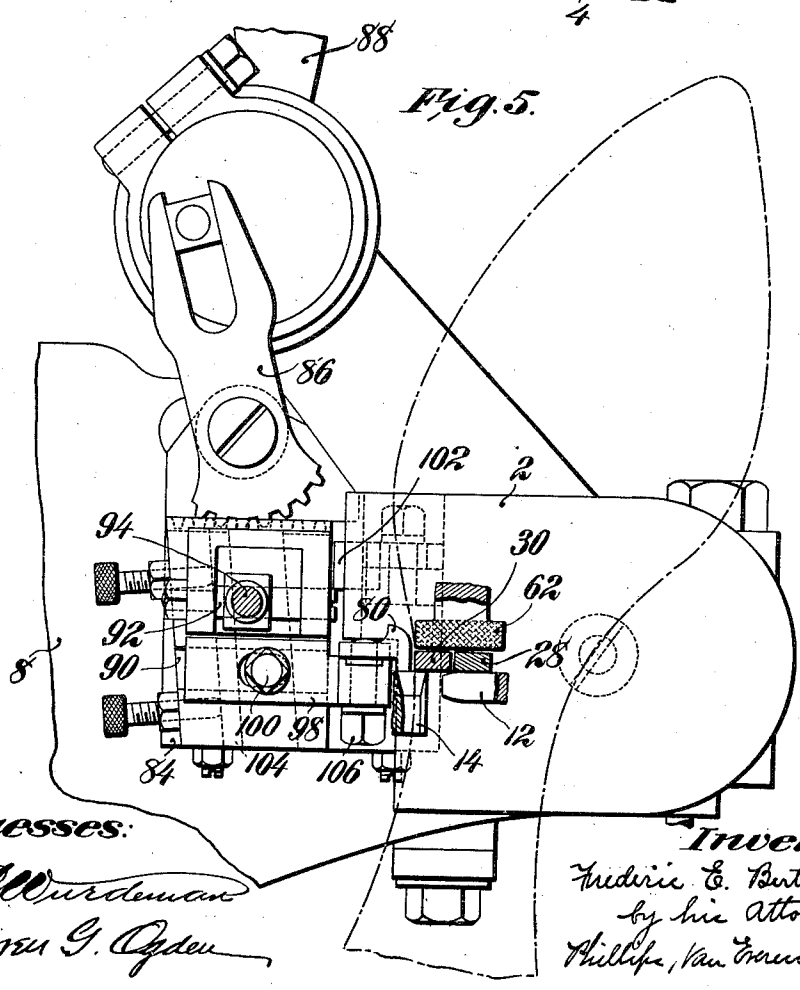


Fig. 5.



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4 SHEETS—SHEET 4.

Fig. 6.

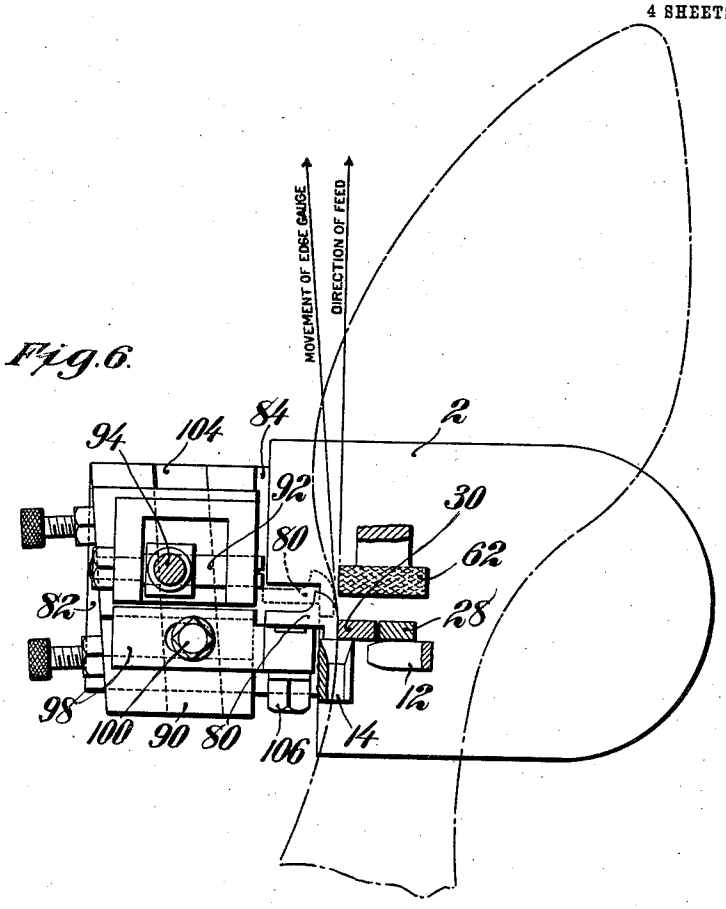


Fig. 7.

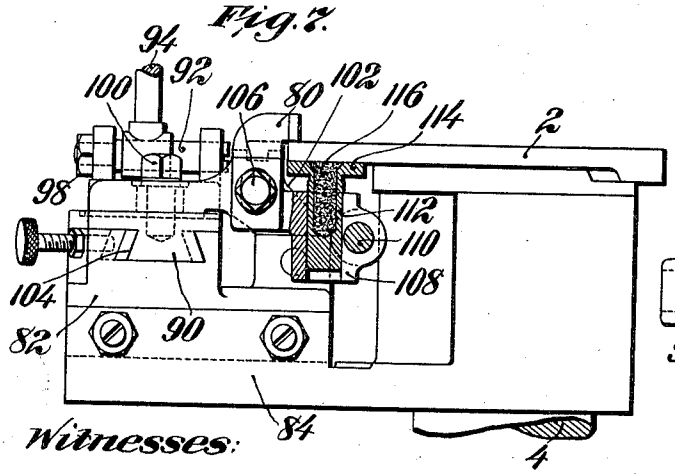
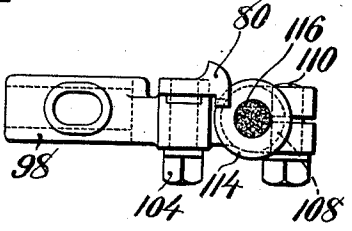


Fig. 8.



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FREDERIC ELI BERTRAND, OF SWAMPSCOTT, MASSACHUSETTS, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

CHANNELING-MACHINE.

1,030,704. Specification of Letters Patent. Patented June 25, 1912.

Application filed May 10, 1909. Serial No. 495,091.

To all whom it may concern:

Be it known that I, FREDERIC ELI BERTRAND, a citizen of the United States, residing at Swampscott, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Channeling-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to channeling machines and more particularly to channeling machines for turn work.

The invention is particularly adapted for use in coöperation with that type of channeling machine employing a step by step feed, in which the knives are constructed and arranged to make the cut by a movement in the line of feed while the sole is held from movement. As the angular movement imparted to the sole, in operating on the curved parts of the margin of the sole, takes place about the point of the channel knife as a center and during its movement in the line of feed, the edge gage should be retained at all times in a position substantially opposite the channel knife and close to the edge knife so that it will not hinder the turning of the sole and will not permit a variation in the margin of cut, as would be the case if the edge gage remained in a fixed position and it were attempted to turn the sole about the channel knife while the knives were at one point in the line of feed and the edge gage was at another point distant therefrom. In the type of channeling machine referred to, in order to maintain a proper relation between the gage and knives, the edge gage is mounted for a movement in the line of feed with the knives.

In a channeling machine employing a step by step feed and a channeling knife reciprocating in the line of feed and cutting on one of the strokes of its reciprocations, owing to the shape of a sole, the line of direction in which the cutter operates will not always be parallel to the edge of the sole. Where the curvature of the sole edge is pronounced, if the gage be given a movement parallel to the movement of the cutter the inclination of the sole edge to the line of feed will cause the gage to crowd against the sole on the cutting stroke with the result that, if the stock is hard, the sole will be forced across the line of feed by the pressure placed upon it thus roughing the flesh on the sole and interfering with, or wholly stopping, the feed of the machine, or, if the sole be rigidly held from movement, an undesirable strain will be placed upon the gage. In general the stock used for welt work insoles is soft and pliable, as these characteristics in this class of soles are desirable. When operating upon this class of soles with the type of machine referred to, it is ordinarily practicable to move the edge gage in a line parallel to the line of movement of the cutter as the stock will merely yield to the pressure of the gage as the gage crowds upon it and will thereafter resume its original shape. Where the stock is hard, however, the undesirable results above mentioned will be present if the parallel movement of the gage is used. This is true in operating upon stock for turn work which must necessarily be hard as it is used for outsoles.

One of the objects of the present invention is to provide a machine, of the type referred to, capable of operating on the hardest stock desired to be used without interfering with the proper operation of the knife or placing an undue strain upon the edge gage. With this object in view a feature of the invention contemplates the provision of a relative movement between the edge gage and the work retainer, across the line of feed in addition to their relative movement in the direction of feed. The construction and arrangement is such that the distance between the gage and retainer across the line of feed is increased at the time the relative movement in the direction of feed causes the gage to assume a position where it would crowd against the edge of the sole. In the preferred construction for securing this result, which construction is the simplest and most efficient which the inventor has yet devised, the edge gage is mounted for a movement toward and from the edge of the sole so timed that it assumes a position out of contact with the sole edge on the completion of the cutting stroke of the knife or knives. In accordance with this construction the means for guiding the edge gage in its movement with the cutter is arranged to impart a movement inclined to the line of feed. As the gage moves with the cutter on its cutting stroke it recedes from the edge of the sole, while on the other

stroke of the cutter it approaches the edge of the sole and assumes its correct gaging position. As the cutter moves in unison with sole feeding devices, the edge gage thus has imparted to it a movement toward and from the edge of the sole during each operation of the sole feeding devices. Such a movement withdraws the gage from a position where it can crowd the sole across the line of feed. It also relieves the gage and connected parts from any undue strain. The withdrawal of the gage takes place at a time when the sole is rigidly held from movement across the line of feed and when the presence of an edge gage is unnecessary.

Other features of the invention consist in an improved mounting for the edge gage, in an improved construction and arrangement of the work retainer, and in certain other combinations and arrangements of parts tending to improve the construction of channeling machines and enable them to operate with certainty at a high rate of speed and without liability of breakage of parts. The advantage of these devices, combinations and arrangements of parts will be obvious to those skilled in the art from the following description.

Broadly considered, the features of the invention are not limited to use with the particular type of channeling machine hereinbefore described, although such machine is the simplest and most efficient channeling machine at present known to the inventor. It should be distinctly understood, however, that, except as specifically defined in the claims, the features of the invention herein described are not limited in the scope of their use to that particular type of channeling machine, nor, in fact, to any particular type of channeling machine.

The invention will be further explained in the following description and particularly pointed out in the appended claims.

The preferred form of the invention is shown in the accompanying drawings, in which—

Figure 1 is a rear elevation of the machine; Fig. 2 is a left hand side elevation of the machine; Fig. 3 is a transverse section in elevation of certain parts of the machine, viewed from the right hand side of the machine; Fig. 4 is a longitudinal section in elevation of the parts shown in Fig. 3, viewed from the front of the machine; Fig. 5 is a full sized plan, partly in section, of the work table showing the edge gage and associated working parts at the completion of a cutting stroke of the knife carrier. Fig. 6 is a diagrammatic view of the work gage and associated parts showing in full lines the relation existing at the commencement of a cutting stroke and in dotted lines the position assumed by the edge gage at the completion of the cutting stroke. Fig. 7 is a detail in elevation of an amplification which includes an additional support for the gage; and Fig. 8 is a plan of the edge gage parts shown in Fig. 6 with the work table removed.

In the embodiment of the invention illustrated in the drawings, the work table 2 is mounted upon a vertically movable support 4. This support slides in a guideway 6 extending from the framework 8 of the head of the machine which rests upon a stand 10 of suitable height. The channel knife 12 and the edge, or shoulder, knife 14 are mounted in knife blocks which are sustained by slides 16 and 18 respectively (Figs. 2 and 4), which slides are yieldingly held pressed toward the work table by means of "grasshopper" springs 20. The channel knife block 22 is carried on a toe 24 which projects from the slide 16. The shoulder knife block 26 is mounted directly upon the lower end of the slide 18. The channel knife block 22 supports an adjustable channel knife presser foot 28. The shoulder knife is also provided with a presser foot 30 which, however, is mounted for independent yielding movement relatively to the knife in a manner and for a purpose to be described later. The slides 16 and 18 are contained within a carrier 32 which is provided at its upper end with a pair of cone bearings 34 arranged to permit a swinging movement of the carrier in the line of feed. The slides are held within the carrier by means of a removable cover plate 36. Toward the lower end of the carrier there is pivoted one end of a link 38, the other end of which is connected to a block within a chambered crank arm 40 mounted upon a rock shaft 42 (Fig. 2). In the rear (viewing Fig. 2) of the crank arm 40 is a second crank arm 44 (see dotted lines Fig. 2) provided with a cam roll 46 which engages a groove cam in a disk 48 mounted upon the driving shaft 50. This shaft is rotated by means of a sheave 52 at one end over which runs a rope belt 54 from a suitable source of power. The other end of the driving shaft 50 is provided with an eccentrically arranged pin 56 which operates in a horizontal slot in the back of a slide 58 mounted in guides on the frame causing said slide to move vertically toward and from the surface of the work table 2. The slide 58 carries a yieldingly mounted work retainer 60 provided with a foot 62 which has a serrated under surface for firmly engaging the surface of the work.

By means of the parts just described the work is fed and the cut is made in the following manner. As the driving shaft rotates the crank arm 44 is actuated to rock the shaft 42 and oscillate the carrier 32 with its knives and their presser feet above the work table 2. While the carrier 32 is at the right hand end (viewing Fig. 2) of its

stroke, the eccentric pin 56 on the driving shaft operates to move the work retaining foot 62 out of engagement with the work leaving it free upon the work table except that it is held in engagement therewith by the presser feet. The cam groove in the disk 48 then operates to rock the shaft 42 in a direction to move the carrier 32 to the left. Because of the pressure exerted upon the work by means of the presser feet 28 and 30 the work is fed by the carrier movement across the work table. When the carrier has reached the limit of its stroke to the left, the eccentric pin 56 operates to move the work retaining foot 62 downward into engagement with the work and to thus hold it firmly upon the work table preventing its movement while the carrier 32 moves backwardly to the right. The cutting edges of the knives 12 and 14 are so placed that the cut is formed during this backward stroke of the carrier.

All of the parts just described may be and substantially are the same as illustrated and described in Letters Patent of Great Britain to Alfred J. Boult, No. 13,052, dated June 18, 1908. The machine of said British Letters Patent, as illustrated, is arranged primarily for welt work whereas the present machine, as illustrated, is arranged primarily for turn work. Therefore, in place of the edge slitting knife of said British Letters Patent, there is found in the present machine a shoulder knife which is carried in a knife block similar in all respects to the knife block described in my co-pending application, Serial No. 485,486, filed March 24, 1909.

In turn work the channel which is cut is similar to the channel cut for welt work and in both instances it is cut a uniform depth from the surface of the sole upon which the knife acts. For this reason the channel knife and its presser foot are mounted so that they have no relative vertical movement and the channel cut must, therefore, necessarily be of the same depth from the surface of the sole throughout its length. In shouldering the margin of a sole for turn work it is desirable that the depth of cut be regulated from the surface of the sole which is in contact with the work support as the exposed edge of the sole after it is incorporated in a shoe should be of uniform thickness. To this end the slide which supports the shoulder knife is adjustable so that the knife may be placed at any desired distance above the surface of the work table and the shoulder knife presser foot is mounted to have a vertical movement relative to the shoulder knife so that it may ride over any irregularities on the surface of the sole in which the shoulder is being formed without disturbing the predetermined vertical adjustment of the shoulder knife. This relation is preferably secured by mounting the shoulder knife presser foot 30 upon a toe 64 (Fig. 1) projecting from the lower end of a vertically movable slide 66 guided beneath gibs 68 secured to the lower portion of the carrier face plate 36. The slide 66 is provided with a lug 70 through which is passed the lower end of a pin 72 the upper end of which is passed through a second lug 74 extending from the carrier face plate 36. The pin 72 is held in place by nuts threaded upon its ends and bearing upon the lugs and is provided between the lugs with a coiled spring 76. With this construction, the coiled spring 76 will permit the presser foot to yield vertically independently of the shoulder knife although the presser foot and knife are both mounted on the oscillating carrier. The edge presser foot 30 may be adjusted vertically toward and from the surface of the work by loosening a set screw 78 which clamps it to the toe 64.

The edge gage 80 (Figs. 1 and 4) is mounted, indirectly, upon a slide 82 movable in and out, or across the line of feed, in suitable ways formed in a shelf 84 carried by the work table supporting slide 4. An adjustment of the slide 82 in and out is secured by operating a lever 86, which is geared to the slide 82. A suitable handle 88 is provided for this purpose. Mounted on the slide 82 is a second slide 90 moving in suitable ways extending in the general direction of the line of feed. This slide 90 is provided with a horizontal pin 92 (Figs. 3 to 5) which passes through an eye in the lower end of a vertical pin 94 which in turn extends within a socket 96 formed for its reception in the lower end of the knife carrier 32. The pin 92 is of sufficient length to permit adjustment of the block 82 and edge gage 80 across the line of feed and the sliding connection 94 and 96 permits the slide 90 to be moved with the knife carrier in its oscillations in the direction of feed. The connection of the edge gage 80 to the slide 82 is through the intermediate slide 90.

The parts described in the preceding paragraph all may be and substantially are the same as shown and described in British Letters Patent, hereinbefore referred to. The mounting of the edge gage is, however, slightly different. As herein shown, it is mounted upon a shank 98 (Figs. 3 and 5) moving in a guideway upon the upper face of the intermediate slide 90 and held in any position of adjustment across the line of feed by means of the vertically arranged set screw 100. In the machine of said British Letters Patent, the work table is provided with a tongue at its inner edge which projects downwardly into a groove upon an independently adjustable block mounted on the intermediate slide. When so arranged the work table, which is mounted in guide-

ways upon its support for movement across the line of feed, can be adjusted across the line of feed relatively to the edge gage. By mounting the block containing the groove upon the intermediate slide the work table is permitted to move with the edge gage whenever the lower slide is moved by its operating handle. Because of its position on the intermediate slide, the block containing the groove in the machine of said British Letters Patent moved in the direction of feed with the oscillating knife carrier while the work table remained stationary and, therefore, there was a constant wear of the parts forming the tongue and groove connection. In the present embodiment of the machine, the work table is provided with a tongue which fits into a groove upon a block 102 (Fig. 4) which is adjustably mounted for in and out movement upon the lower slide 82. With this construction the work table can be adjusted across the line of feed relatively to the edge gage as readily as heretofore. The block 102 being mounted upon the slide 82, however, instead of upon the intermediate slide 90, remains stationary during the oscillations of the knife carrier and, therefore, wear of the tongue and groove connection, between the block 102 and the work table, is prevented.

Referring now more particularly to Fig. 5, it will be seen that while the knife carrier oscillates in a direction which is at substantial right angles to the front and rear edges of the work table 2, the guideways 104 in the slide 82, which determine the direction of movement of the intermediate slide 90, are placed at an oblique angle to said edges of the work table and, therefore, are inclined to the line of feed. With this construction when the knife carrier is oscillated, while it moves the knives and presser feet in one line of direction, it moves the edge gage in a line of direction which is at an angle to that of the knives and presser feet. The guideways 104 are so directed that the gage moves toward the work retainer, work feeding devices, and other parts immovable across the line of feed during the forward, or feeding, stroke of the knife carrier and away from said parts during the backward, or cutting, stroke of the carrier. Or, referring the gage to the sole, which moves in the line of feed but not across it, there is a movement of the gage toward and from the edge of the sole during the operation of the work feeding means. The reason for this will be apparent from an inspection of Figs. 5 and 6, which show a sole (see dot and dash lines) in working position in the machine. When forming the cut at the shank of the sole, the curvature is such that the edge of the sole is not parallel to the line of feed but projects at an angle thereto and beyond the face of the edge gage. If the edge gage moves parallel to the line of feed, it will, on the back stroke, crowd against the edge of the sole and will either force the sole outward beneath the work retaining foot, or, if the sole is so rigidly held that an outward movement cannot occur, place an undesirable strain upon the edge gage. In welt work the stock will yield to the crowding of the edge gage but the stock used for turn work is so hard that there is not sufficient yield to overcome the difficulties just referred to. By making the edge gage move at an angle to the direction of feed and by giving such direction to the line of movement of the edge gage that it moves away from the edge of the sole on the backward stroke of the knife carrier, the gage always assumes a position out of contact with the sole edge on the completion of the cutting stroke and the crowding of the gage against the sole is thus entirely overcome.

Owing to the extreme hardness of the stock which is used for turn work, this stock is ordinarily placed in temper before it is operated upon. When in temper sole stock has a tendency to be drawn or to crowd itself into any small interstice if pressed toward the interstice. Owing to the constant friction exerted between the lower face of the edge gage and the surface of the work table, these surfaces gradually wear until there is a perceptible opening between them. Because of the pressure of the sole against the edge gage and the tendency of sole stock, when in temper, to squeeze into the worn space between the gage and the table, difficulty has been found in feeding soles through the machine. To overcome this difficulty, the edge gage 80 has been provided with a vertical adjustment upon its shank 98 by means of a tongue and groove connection (Fig. 5), the gage being held in any desired position of vertical adjustment by means of the set screw 106. With this adjustment the lower surface of the edge gage can be kept constantly in intimate contact with the surface of the work table. With this construction, as there is no space for the stock to squeeze into as it is fed through the machine the difficulty in feeding stock in temper is overcome.

In shouldering soles for turn work, a comparatively large portion of the margin of the sole is removed and it is necessary, in order to make such a large cut, that the sole be held rigidly from movement during the oscillation of the carrier on its backward or cutting stroke. The pressure on the sole to hold it from movement must be not only upon the between substance but also upon the portion of the sole in which the cut is to be made, as, if the sole were not rigidly held at this point, the force exerted in making the cut would tend to pull the sole out of position and spoil the cut. To

gain this end, the work retaining foot 62 is formed not only to bear upon the between substance but also to bear upon the marginal portion of the sole in which the shoulder is to be formed. As shown in Fig. 5, the bearing portion of the work retaining foot extends wholly across the operative portion of the cutting edge of the shoulder knife, thus bearing upon and rigidly holding the sole from movement at the particular point where the cut is to be made.

Because of the loose play which is generally present or which soon works into the guideways for the slides 82 and 90, and of the location of the edge gage relative to these slides, a substantial leverage is acquired when pressure from the work is applied to the face of the edge gage. This results in a movement of the gage upward away from the work table thus forming an objectionable interstice between the gage and table and negativing the effect of the prior vertical adjustment of the gage into intimate contact with the work table. To obviate this the edge gage may be mounted as is shown in Figs. 7 and 8. In the construction there shown the shank 98 of the gage is provided with a forwardly projecting, vertically arranged split ring 108 the ends of which are clamped by a collar screw 110. The split ring holds the shank 112 of a bearing plate, or rest, 114 which engages the under side of the work table 2. After setting the bearing plate in intimate contact with the under side of the table and the gage in intimate contact with the upper side of the table, the gage is firmly held from vertical movement relative to the work table during the operation of the machine. This is for the reason that any tendency for the gage to move upward under the pressure applied to it by the work during the work feeding operation is counterbalanced by pressure of the bearing plate on the under side of the work table. This arrangement, therefore, prevents any vertical loose play of the gage in the guideways of the two slides 82 and 90. The work bearing portion of the gage and the bearing plate may be described as the two arms of a forked end on the gage shank 98. As these arms project above and below the table and engage its upper and lower surfaces, a tongue and groove connection is formed between the gage and the edge of the table. It is obvious that such a connection will effectually prevent any vertical movement of the gage relatively to the table. As either the bearing plate or work table wear, the plate is adjusted in its holder toward the table. By this means a proper opening between the two arms of the forked end of the gage is provided and a tight fit of the tongue, formed by the edge of the table 2, in its groove, formed by the gage 80 and plate 14, is constantly maintained. The shank 112 of the bearing plate may be bored out and supplied with an oiled wick 116. The frictional contact of the bearing plate on the work table will heat the wick and cause the oil to rise thus maintaining the contacting parts constantly lubricated.

The operation of the machine is substantially the same as the operation of the machine of said British Letters Patent, hereinbefore referred to. Fig. 5 shows the knives, edge gage, presser feet and work retainer in the relation which they assume at the completion of the backward or cutting stroke of the knife carrier. This is the position of the parts at the time a sole is placed in the machine. The sole is fed forward on the movement of the knife carrier to the left, in Fig. 2, the knives at this time riding over the surface of the sole and when the limit of the stroke of the carrier to the left is reached, the edge gage has been moved forward so that it is then in contact with the edge of the sole. The work retaining foot 62 is then moved down into contact with the sole to hold it rigidly from movement. As the knife carrier moves backward or to the right, Fig. 2, the knives dig into the work and move toward the work retainer. Although the edge gage moves with the carrier it does not move in a direction parallel to the line of feed but its slide 90 is guided by means of the guideways 104 in a line of direction at an angle to the direction of feed. Thus the edge gage continually recedes from the edge of the sole during this stroke of the knife carrier. As the sole is held rigidly from any movement across the line of feed, as well as in the direction of feed, the services of an edge gage at this time are unnecessary and, therefore, the movement of the gage away from the edge of the sole can be permitted while preserving the proportions of the incision made by the cutter as determined by the original setting of the edge gage. The work retaining foot is then raised and the described cycle of operations is repeated. The edge gage is moved toward and from the edge of the sole during each operation of the sole feeding devices and the sole feeding devices and edge gage all operate and perform their functions during each revolution of the driving shaft.

The invention is not limited to the details of construction and operation herein described and illustrated, nor to the conjoint use of all its features, as it will be clear to those skilled in this class of machines and with the general objects of the present invention in view, that changes may be made in the details of structure and the invention be embodied in other forms within the terms and spirit of the appended claims.

Having thus described the invention, what is claimed as new, is:—

1. A channeling machine, having, in com-

bination, work feeding means including a work retainer movable into and out of engagement with the sole face, a sole edge gage, and means for imparting a relative movement to the gage and retainer both in the direction of feed and across the line of feed, substantially as described.

2. A channeling machine, having, in combination, work feeding means including a work retainer movable toward and from the sole, a channeling cutter, an edge gage, means for reciprocating said cutter and gage toward and from the work retainer in the direction of feed, and means permitting a relative movement, across the line of feed, between the edge gage and retainer during the movement of the gage toward the retainer, substantially as described.

3. A channeling machine, having, in combination, a reciprocatory channeling cutter, a reciprocatory sole edge gage, and provision for reciprocating said cutter and gage in unison but in paths at an angle to each other, substantially as described.

4. A channeling machine, having, in combination, a reciprocatory channeling cutter, a reciprocatory sole edge gage, provision for reciprocating said cutter and gage in unison, and means for causing said gage to move toward and from the sole edge during its reciprocations, substantially as described.

5. A channeling machine, having, in combination, a reciprocating channeling cutter, operating means therefor, a sole edge gage mounted for movement with the cutter, and means for causing the gage to move in a path inclined to the path of movement of the cutter, substantially as described.

6. A channeling machine, having, in combination, a reciprocatory channeling cutter arranged to form a cut on its backward stroke, a sole edge gage mounted for movement with the cutter, and provision for causing the gage to assume a position out of contact with the sole edge on the completion of the cutting stroke, substantially as described.

7. A channeling machine, having, in combination, a channeling cutter, means for reciprocating said cutter in the line of feed, a sole edge gage having a gage block slidably mounted on a guideway inclined to the line of feed, and provision for connecting said gage block and cutter actuating means whereby the gage moves with the cutter but in an angular direction relative to the line of feed, substantially as described.

8. A channeling machine, having, in combination, a support for a flat sole, work feeding devices for engaging the face of the sole, an edge gage, and automatic means for imparting a relative separating movement to said gage and devices across the line of feed to relieve the pressure of the sole on the gage, substantially as described.

9. A channeling machine, having, in combination, a support for a flat sole, an edge gage and work feeding devices relatively movable across the line of feed to relieve the pressure of the sole on the gage, and operating mechanism for the work feeding devices, said relative movement being controlled by said operating mechanism, substantially as described.

10. A channeling machine, having, in combination, sole feeding devices, an edge gage, and means for moving the gage toward and from the edge of the sole during successive operations of the sole feeding devices, substantially as described.

11. A channeling machine, having, in combination, a support for the sole, means to hold the sole on its support from movement across the line of feed, an edge gage, and means to move the gage toward and from the edge of the sole while it is thus held from movement, substantially as described.

12. A channeling machine, having, in combination, a driving shaft, step by step sole feeding devices, means for operating the feeding devices at each revolution of the shaft, an edge gage, and means for reciprocating the edge gage across the line of feed in unison with the operations of the sole feeding devices, substantially as described.

13. A channeling machine, having, in combination, a horizontally arranged work table, an edge gage overlapping the work table, means for moving the gage across the table in the line of feed, and means for effecting a relative vertical adjustment of the work table and gage to take up the wear caused by the gage movement, substantially as described.

14. A channeling machine, having, in combination, a work table, an edge gage overlapping and continuously engaging the upper surface of the work table, and means operating continuously at the lower side of said work table constructed and arranged to transform an inward pressure on the edge gage into an upward pressure on the work table and prevent a withdrawal of the gage from the table, substantially as described.

15. A channeling machine, having, in combination, a work table, a movable edge gage overlapping the upper surface of the table, a guideway in which said gage is mounted for movement in the line of feed relatively to the table, and means to prevent a vertical loose play of the gage in said guideway whereby it is held in fixed vertical relation to the table, substantially as described.

16. A channeling machine, having, in combination, a work table and an edge gage having a forked end, the two arms of which simultaneously engage both the upper and lower surfaces of the table whereby a tongue

and groove connection is formed between the gage and the edge of the table to prevent vertical movement of the gage, substantially as described.

17. A channeling machine, having, in combination, a work table, an edge gage having a shank provided with two arms adapted to extend above and below and to simultaneously engage both sides of the table, and means for adjusting the amount of opening between said arms, substantially as described.

18. A channeling machine, having, in combination, a reciprocatory shoulder knife constructed and arranged to cut on the backward stroke, and a work retainer movable toward and from the sole face, timed to be in engagement with the sole during the cutting operation of the knife and having a bearing foot extending across the cutting edge of the knife and to the edge of the sole, substantially as described.

19. A channeling machine, having, in combination, a support for a flat sole, a sole edge gage, a channeling cutter, means to hold the sole on said support for the operation of said cutter, means for feeding the sole, and means permitting a relative bodily movement of the edge gage and sole holding means while successive cuts are being made, to relieve the pressure between the edge gage and sole while preserving the proportions of the incision made by the cutter as determined by the original setting of the edge gage, substantially as described.

20. A channeling machine, having, in combination, work feeding means including a work retainer movable into and out of engagement with the sole face, and a sole edge gage, said work retainer and gage being mounted to permit successive relative movements across the line of feed during successive engagements of the work retainer with the sole in the operation of the machine to relieve pressure on the gage, substantially as described.

21. A turn work channeling machine, having, in combination, a table for supporting a flat sole, two vertically arranged slide bars above the table, a channeling knife supported above the table at the lower end of one slide bar, a shoulder knife supported above the table at the lower end of the other slide bar, a channeling knife presser foot mounted on the channeling knife supporting slide bar, and a shoulder knife presser foot yieldingly mounted independently of the shoulder knife supporting slide bar, whereby the channel cut is gaged from the upper face of the sole and the shoulder cut is gaged from the under face of the sole, substantially as described.

22. A turn work channeling machine, having in combination, a table for supporting a flat sole, a yieldingly supported slide bar above the table having at its lower end a channeling knife and a presser foot adjustable to a predetermined vertical position relative thereto, a second slide bar adjustable to a predetermined vertical position relative to the face of the table, and a third slide bar, yieldingly supported and carrying a shoulder knife presser foot, whereby the channel and shoulder cuts may be adjustably gaged from the upper and lower faces respectively of the sole, substantially as described.

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

FREDERIC ELI BERTRAND.

Witnesses:
WARREN G. OGDEN,
RUTH A. SIMONDS.