May 27, 1930. J. A. BROGAN 1,760,112

LINING TRIMMING MACHINE

Filed Aug. 24, 1923

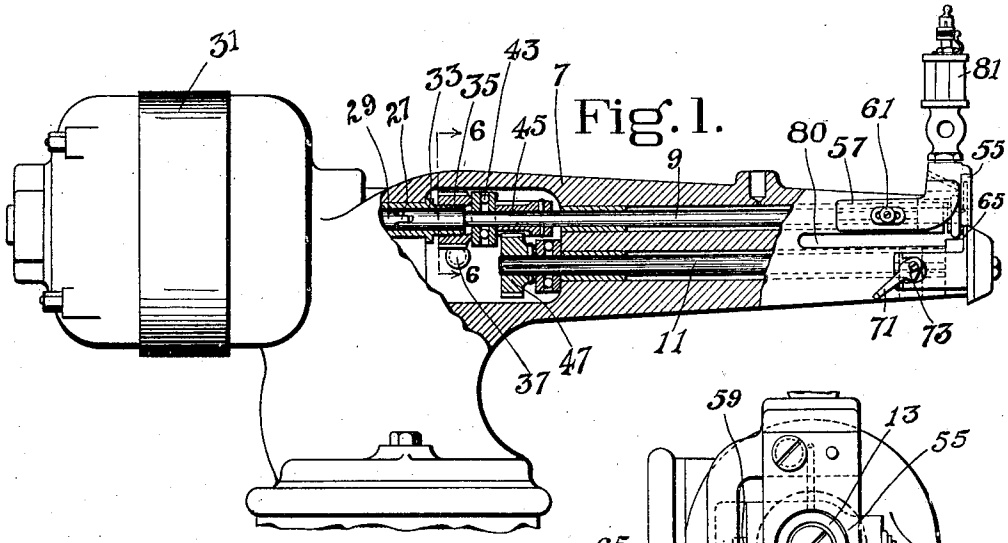


Fig. 1.

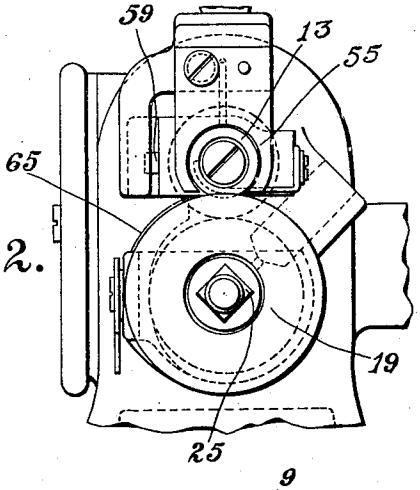


Fig. 2.

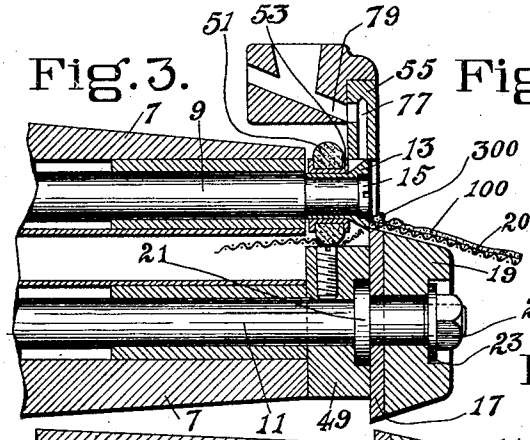


Fig. 3.

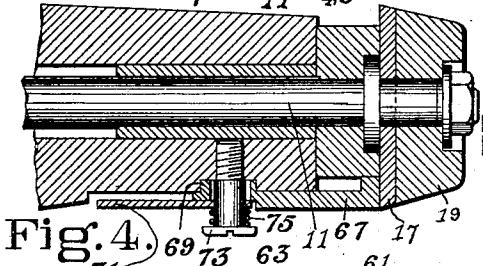


Fig. 4.

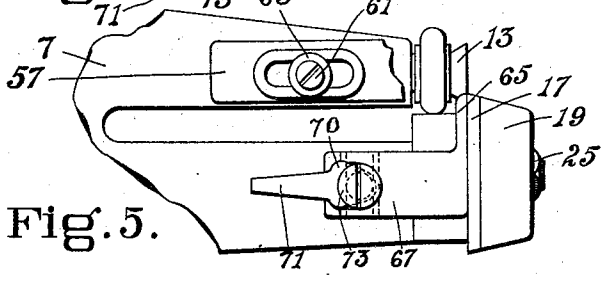


Fig. 5.

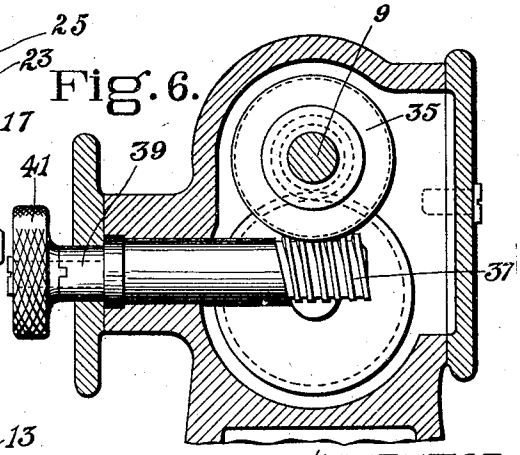


Fig. 6.

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UNITED STATES PATENT OFFICE

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LINING-TRIMMING MACHINE

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This invention relates to cutting machines and is herein illustrated as embodied in a machine designed to trim the linings of shoes.

In the manufacture of rubber overshoes, it is customary first to place the lining upon a last or form and then to build the rest of the overshoe, piece by piece, over the lining. After the overshoe has been built and vulcanized, the surplus lining which projects above its upper edge is slit so that the overshoe may be removed from the form. In order to complete the overshoe it is necessary to cut off this projecting lining close to the edge of the top of the upper. Hitherto, this trimming operation has been commonly performed manually by the use of scissors; and the general object of the present invention is to provide a machine for performing this and similar operations.

One novel feature of the present invention consists in a combination comprising two rotary shearing cutters arranged to operate one inside and the other outside a shoe to sever the surplus lining flush with an edge of the upper, continuously driven shafts by which said cutters are carried, and a pair of rolls, one driven and the other idle, supported by said shafts respectively and arranged to grip the surplus lining. Preferably the peripheral speed of the driven roll is slower than that of the cutter supported by the same shaft, to insure a drawing cut in addition to a shearing cut, and when, as shown, the driven roll is fixed to its supporting shaft and driven at the same angular speed as the cutter, its diameter is preferably smaller than that of the cutter to provide a differential in their peripheral speeds.

According to another feature of the invention, improved means are provided for guiding the work to the cutting mechanism in such manner that only the lining can be operated upon and no cutting of the upper can occur. In the illustrated machine, a guide mechanism is provided having a passageway leading to the bite of the cutters, the height of which is slightly greater than the thickness of the lining but less than the combined thickness of the lining and upper. With this construction, the liability of cutting into the upper and thereby injuring the shoe is obviated.

These and other features of the invention including certain details of construction and combinations of parts, will be described as embodied in an illustrative machine and pointed out in the appended claims.

Referring now to the accompanying drawings,

Figure 1 is a front elevation of a machine in which the present invention is embodied.

Fig. 2 is an end elevation of a portion of the machine.

Fig. 3 is a vertical longitudinal section through the cutters and feed mechanism.

Fig. 4 is a horizontal section through the lower cutter.

Fig. 5 is a front elevation of the cutters and feed mechanism, the guard for the upper cutter having been broken away, and

Fig. 6 is a section on the line 6—6 of Fig. 1.

The frame of the machine has an overhanging arm 7 the outer end of which has a fork to provide a space for the reception of the projecting portion of the lining of a shoe. Shafts 9 and 11 are journaled in the branches respectively of said fork and in the rear part of said arm. Fast to the outer end of the upper shaft is a rotary cutter 13 of small diameter. This cutter has a hollow stem, the hole in which is countersunk at its outer end; and a screw 15, the head of which fits into the countersink and the smooth portion of the stem of which extends through the hollow stem of the cutter, is threaded into the end of the shaft 9 to hold the cutter in place. Co-operating with the small rotary cutter 13 is a frusto-conical member herein shown as consisting of two parts, a shear member portion 17, which co-operates with the cutter 13, and a supplemental work-supporting portion 19. These two members are practically one, being held rigidly together and to the shaft 11 by means of a collar 21 on the shaft, a washer 23, and a nut 25 which is threaded upon a reduced portion on the outer end of the shaft. When the nut is tightened, the members 17, 19 are clamped rigidly together and to the shaft. The two members

together may be regarded as a combined shear member and work-support and may be made integral if desired. The cutter 13, it will be noted, is also frusto-conical; and the two flat faces of the frusto-conical shear members overlap slightly and are in light contact with each other, the cutter 17 being in front of the cutter 13 where they overlap.

In order to permit adjustment of the upper cutter in a direction parallel to the axis of its shaft 9 so as to bring the flat faces of the cutters into the desired relation to each other, the shaft 9 is longitudinally adjustable in its bearings one of which is provided by a bushing 33. This shaft is connected at its inner end by means of a slide-coupling 27 to the shaft 29 of an electric motor 31. Threaded on the forward end of the bushing 33 is a gear 35 with which meshes a worm 37, the worm being formed upon the inner end of a rod 39 upon the outer end of which a thumb-hold 41 is mounted so that, by manipulating the thumb-hold, the gear 35 may be caused to move to the right or left as viewed in Figure 1. The right-hand end of the gear 35 abuts against a ball thrust bearing 43 which in turn abuts against a gear 45 pinned to the shaft 9. When, therefore, the gear 35 is rotated in a direction to cause it to move toward the right, the flat face of the small cutter 13 is moved toward the flat face of the lower cutter 17. The lower shaft 11 is driven by the upper shaft through the gear 45 and a gear 47 which is pinned to the lower shaft. These two gears are of such diameters that the peripheral velocities of the two cutters 13, 15 are substantially the same; and the teeth of the gear 45 are of sufficient length to permit the longitudinal adjustment of the shaft 9 in the manner which has been described.

In Fig. 3 a portion of an overshoe comprising a rubber upper 100 and a textile fabric lining 200 is shown in process of being operated upon. These two layers 100 and 200 of sheet material have been firmly fastened together by vulcanization; and a considerable amount of lining projects beyond the bead 300 formed on the top margin of the upper. Feeding means for such a piece of work should be so constructed that the work can be held back when desired, for example when a sharply curved edge is encountered; and should act in such manner as to feed away from the cutting locality the considerable amount of waste material which results from the cutting operation. The cutters themselves, of course, have a feeding action upon the work; but in order to aid this feed as well as to take care of the waste material, feed mechanism is provided for engaging the lining which projects into the space between the arms of the fork at the outer end of the overhanging arm 7. Fast to the shaft 11 is a rigid feed roll 49 against which the projecting portion of the lining is pressed by an idle resilient rubber roll 51. This rubber presser roll is held between two flanges at the opposite ends of a hub 53 which is arranged on the hollow stem of the upper cutter 13 and is rotated relatively thereto. With this construction a sufficiently powerful feed of the work is secured, the work may be held back when desired, and at all times the severed portion of the lining is carried away from the cutting locality and thus prevented from interfering in any way with the operation of the machine. Moreover, a drawing cut is obtained by driving the cutter 17 at a faster peripheral speed than that of the feed roll 49. The differential in peripheral speeds is due to the smaller diameter of the feed roll.

In order to guide the work properly to the cutters and at the same time to prevent accidental injury to the upper, as well as to secure further desirable results to be explained later, two stationary guards are arranged adjacent to the cutters respectively. The guard 55 encircles practically all of the periphery of the upper cutter 13 except that portion which laps the margin of the lower cutter. This guard is carried by a bracket 57 in which a groove is formed to receive a horizontal rib 59 (Fig. 2) formed on a flat surface of the overhanging arm 7. The bracket 57 is slotted, as shown in Figs. 1 and 5, to receive the stem of a clamping screw 61 which is threaded into the rib 59, a washer 63 being located between the head of the screw and the bracket. When the screw is loosened, the guard 55 may be adjusted to bring it into proper position with respect to the cutter 13. When in this position, the front face of the guard is slightly in front of the plane of the shearing faces of the cutters, the purpose being both to prevent accidental cutting of the upper 100 and to prevent the bead thereof from being rubbed excessively by the upper cutter.

Confronting the shearing face of the lower cutter is a stationary guard 65 of generally segmental shape the outer edge of which extends slightly beyond the periphery of said cutter as shown in Fig. 2. This guard has integral with it a horizontal stem 67 and is vertically adjustable. To this end, the stem has a vertical rib 69 which projects from its inner face into a vertical groove formed in the overhanging arm 7. The left-hand end of the stem 67 is forked, and located between the arms of the fork is a cam 70 having a handle 71 by which it may be turned to raise and lower the guard 65. The cam is pivoted on the smooth portion of the stem of a screw 73 which passes through a vertical slot in the guide 69 and has a reduced end threaded into the arm 7. A coiled spring 75 which encircles the stem of the screw between the head thereof and the cam holds the parts in any position to which they may be adjusted. The

right-hand face of the guard 65 contacts with the flat face of the shear cutter 17 and thus aids in guiding the guard in its vertical adjustment. By referring to Fig. 2, it will be seen that there is formed between the two guards 55 and 65 a passageway in advance of the cutters—to the left of their co-operating edges in that figure—and in the operation of the machine the guard 65 is adjusted into such a vertical position that this passageway is of sufficient height to permit the lining, but not the combined upper and lining to pass through it. The lower guard 65, therefore, not only protects the work from injury by the lower cutter but by its position determines the depth of the passageway through which the lining is fed.

In order to facilitate the cutting operation, means are provided for supplying lubricant to the upper cutter through a port 77 in the upper guard 55, this port communicating with a port 79 formed in the bracket 57 which carries the guard. If desired, an oil cup 81 may be mounted on the bracket 57.

As hereinbefore stated, the overhanging arm 7 is divided or forked at its outer end to provide a space 80 adapted to receive the surplus lining material. By reason of this space and the shape and mounting of the work-support, said work-support is adapted to enter a shoe and support the marginal portion of the top of the shoe. In the operation of the machine, the top of the shoe is placed over the support with a portion of the projecting lining extending through the passageway between the guards 55, 65. The guards cooperate to prevent cutting the upper; and the upper guard, by engaging the rim of the upper acts also as a gage to guide the work. During the trimming operation, the lower cutter runs inside the shoe while the upper cutter runs outside, and the shoe is manipulated so as to maintain the rim of the upper against the guard and gage 55. The work is fed partly by the cutters and partly by the rigid roll 49 and the cooperating yielding roll 51, these two rolls serving also to carry away from the cutting locality the projecting portion of the lining as fast as it is severed. The face of the work support is inclined to the plane of the cut so that the work may be correspondingly inclined to enable the cutters to sever the lining with an undercut bevel, and to prevent undue rubbing of the upper cutter against the bead 300.

Although the invention has been set forth as embodied in a particular machine and has been described in connection with operating upon a certain kind of work, it should be understood that the invention is not limited in the scope of its application to the particular machine which has been described nor to operation upon any particular kind of work.

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

1. A machine for trimming the lining which projects beyond the edge of the upper at the top of a shoe, comprising a frame having a fork to provide a passageway for the projecting lining, a pair of rotary shafts journaled in the branches respectively of said fork, a pair of rotary cutters carried by said shafts respectively, and co-operating feed members mounted one on each shaft in position to engage the projecting lining, one of said members being yieldable transversely with respect to the shaft upon which it is mounted.

2. A machine for severing one layer of a composite piece of sheet material which projects beyond the edge of another layer having, in combination, rotary shear members the axes of which are fixed, and yielding feed mechanism arranged to engage the projecting portion of the layer which is to be severed.

3. A machine for trimming a layer of sheet material, comprising two rotary carriers and cutters carried thereby in cooperative shearing relation, a feed-roll and an idle presser roll supported by said carriers respectively and arranged to grip the sheet material, said idle roll being rotatable relatively to the carrier by which it is supported.

4. A trimming machine comprising a pair of circular trimming cutters arranged in co-operative shearing relation, driven shafts each carrying one of said cutters, means arranged to drive both of said shafts and co-operative rolls arranged on said shafts respectively, one of said rolls being driven by its shaft to feed the work and the other being loose relatively to its shaft and arranged to press the work against said feed roll.

5. A trimming machine comprising two rotary shearing cutters arranged to operate one inside and the other outside a shoe to sever surplus lining flush with an edge of the upper, driven shafts to which said cutters respectively are fixed, a driven roll supported by one of said shafts, and an idle roll supported by the other one of said shafts, said rolls being arranged to grip the surplus lining and said driven roll having a slower peripheral speed than the cutter carried by the shaft that supports said driven roll.

6. A machine of the class described having, in combination, a pair of co-operating rotary cutters, one of said cutters being of conical shape and serving to support the work at an inclination to the plane of the cut, and a pair of co-operating feed members constructed and arranged to engage that portion of the work which is trimmed off by the cutters.

7. A machine of the class described having, in combination, a pair of co-operating rotary cutters, one of said cutters being of conical shape and serving to support the

work at an inclination to the plane of the cut, and a pair of co-operating rotary feed members rotatable respectively about the same axes as the cutters, said feed members being constructed and arranged to engage that portion of the work which is trimmed off by the cutters, and one of said feed members being yieldable toward the axis of one cutter and away from the axis of the other cutter.

8. A machine of the class described having, in combination, a rotary cutter of comparatively small diameter, a co-operating rotary cutter of larger diameter in the form of a frustum of a cone, said latter cutter being adapted to support the work in a plane inclined to the plane of the cut, and a pair of co-operating rotary feed members located to engage that portion of the work which is trimmed off by the cutters.

9. A machine for trimming from a composite piece of sheet material a portion of one layer which projects beyond the edge of the other layer having, in combination, a pair of co-operating rotary cutters, and two guards one located adjacent to one cutter and the other adjacent to the other cutter, the space between the guards being of sufficient width to permit passage through it of that layer only which is to be severed by the cutters.

10. A machine for trimming from a composite piece of sheet material a portion of one layer which projects beyond the edge of the other layer having, in combination, a pair of co-operating rotary cutters, two guards one located adjacent to one cutter and the other adjacent to the other cutter, the space between the guards being of sufficient width to permit passage through it of that layer only which is to be severed by the cutters, and means whereby one of the guards may be adjusted to vary the width of the space.

11. A machine for trimming the lining which projects beyond the edge of the upper of a shoe having, in combination, a pair of co-operating rotary cutters past which the edge is fed, and means located in advance of the cutters, with relation to the direction of feed-movement of the work, for permitting the lining only to be fed to the cutting mechanism.

12. A machine of the class described having, in combination, two co-operating rotary cutters arranged with their axes one above the other, the lower cutter being of frusto-conical shape and serving also as a work support, a guard partially encircling the upper cutter, and a second guard associated with the lower cutter.

13. A machine of the class described having, in combination, two co-operating rotary cutters, two guards one associated with each cutter, there being a space between the guards to permit passage through it of the portion of the work which is to be severed, and means whereby one of the guards may be adjusted to increase or diminish the space.

14. A machine of the class described having, in combination, a work support including a shear member, a co-operating rotary cutter, and a guard nearly surrounding said cutter and having a portion arranged to engage the edge of the upper while permitting the lining to pass beneath it.

15. A machine for trimming the lining which projects beyond the edge of the top of a shoe having, in combination, a work support shaped to enter the shoe so as to support the upper and lining at the top of the shoe and to permit the edge to be fed over it, a rotary cutter, and a stationary segmental guard nearly surrounding said cutter and arranged to engage and guide the edge of the upper.

16. A machine for trimming the lining which projects beyond the edge of the top of a shoe having, in combination, a work support shaped to enter the shoe so as to support the upper and lining at the top of the shoe and to permit the edge to be fed over it, a rotary cutter, and a combined guard and gage extending in front of the cutter in position to engage the edge of the upper, said combined guard and gage having an opening in which said rotary cutter is arranged.

17. A machine for trimming the lining which projects beyond the edge of the top of a shoe having, in combination, a work support shaped to enter the shoe so as to support the upper and lining at the top of the shoe and to permit the edge to be fed over it, a rotary cutter, and a stationary guard arranged to enclose all of the cutting edge of said cutter except a short segment at the trimming locality.

18. A machine for trimming the lining which projects beyond the edge of the top of a shoe having, in combination, a work support formed and arranged to enter the shoe so as to support the upper and lining and to permit the edge to be fed over it, a co-operating cutter of smaller diameter located above the work-support, and a stationary guard located above the work support with its lower edge spaced from said support a distance slightly greater than the thickness of the lining, but less than the combined thickness of the lining and upper.

19. A machine for trimming the lining that projects beyond the edge of a shoe upper, having, in combination, two stationary cooperative guards forming a passageway for the projecting lining, and trimming means arranged to sever the lining as it leaves said passageway, one of said guards being arranged to guide the work by engaging said edge of the upper.

20. A machine of the class described comprising two cooperative shearing members

one of which is a rotary cutter, and a segmental guard surrounding said cutter except the work-engaging portion thereof, the extremities of said guard being spaced apart so that the work may be sheared between them.

21. A trimming machine comprising two cooperative rotary shearing cutters arranged to operate one inside and the other outside a shoe upper to trim off surplus lining material projecting beyond an edge of said upper, and a segmental guard nearly encircling said outside cutter, the extremities of said guard being arranged to guide the upper by engaging the edge from which said surplus lining projects.

22. A trimming machine comprising two work-guiding abutments spaced apart and arranged to engage a rim of an article of work having a marginal extension projecting from said rim, and two cooperative shearing members arranged to sever said extension between said abutments.

23. A trimming machine comprising two work-guiding abutments spaced apart and arranged to engage a rim of an article of work having a marginal extension projecting from said rim, and two rotary shearing cutters arranged to sever said extension between said abutments, one of said abutments being adjustable to and from the shearing plane of said cutters.

24. A machine for trimming surplus lining from the top of a shoe comprising an upper circular cutter and a lower circular cutter in shearing relation, the lower cutter being in front of the upper cutter and formed and arranged to run inside the shoe while the upper cutter runs outside, means for rotating both of said cutters continuously, and means arranged to guide the shoe by engaging the top edge of its upper.

25. A machine for trimming surplus lining from the top of a shoe comprising an upper circular cutter and a lower circular cutter in shearing relation, the lower cutter being formed and arranged to run inside the shoe while the upper cutter runs outside, means for rotating both of said cutters, a pair of rolls arranged to grip the surplus lining material close to the cutting locality, and means arranged to drive one of said rolls to feed the shoe.

26. A machine for trimming surplus lining from the top of a shoe comprising an upper circular cutter and a lower circular cutter in shearing relation, the lower cutter being in front of the upper cutter and formed and arranged to run inside the shoe while the upper cutter runs outside, means for rotating both of said cutters, means arranged to feed the shoe, and means arranged to guide the shoe by engaging the top edge of its upper.

27. A trimming machine comprising a driven shaft, a circular disk cutter carried thereby, an idle roll arranged on said shaft adjacent to said cutter, a shear member arranged in cooperative relation to said cutter, and a driven feed-roll arranged to cooperate with said idle roll to grip and feed material severed by said cutter and said shear member.

In testimony whereof I have signed my name to this specification.

JAMES A. BROGAN.