Aug. 20, 1935. W. L. WILSON 2,011,668

GROOVING DEVICE FOR OPERATING ON SHOES

Filed Dec. 15, 1932

Fig. 2.

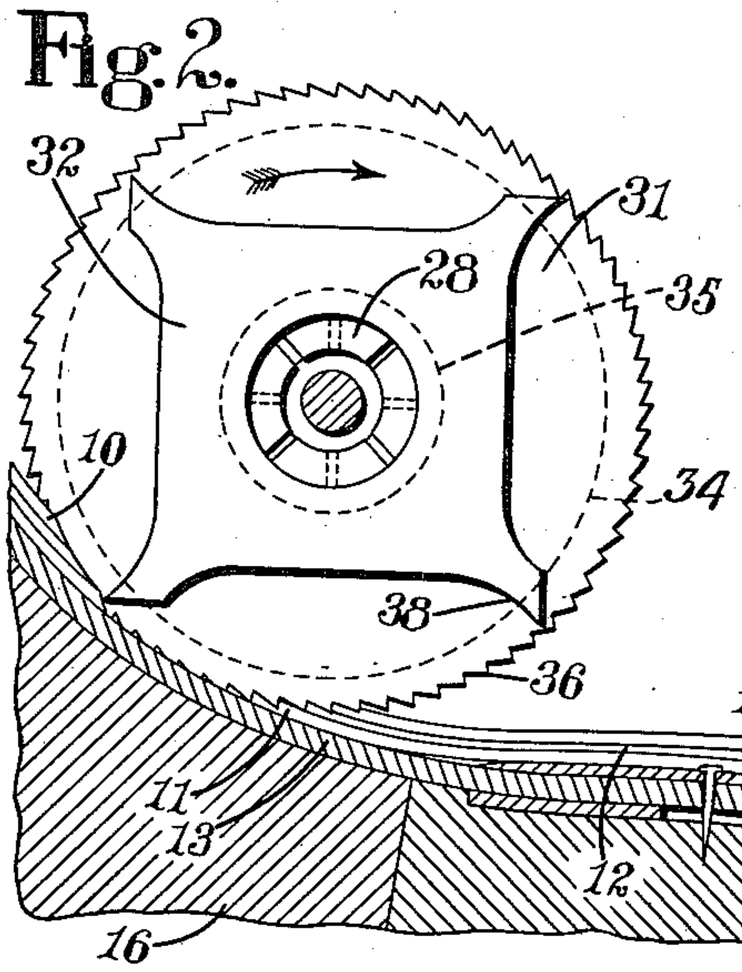


Fig. 1.

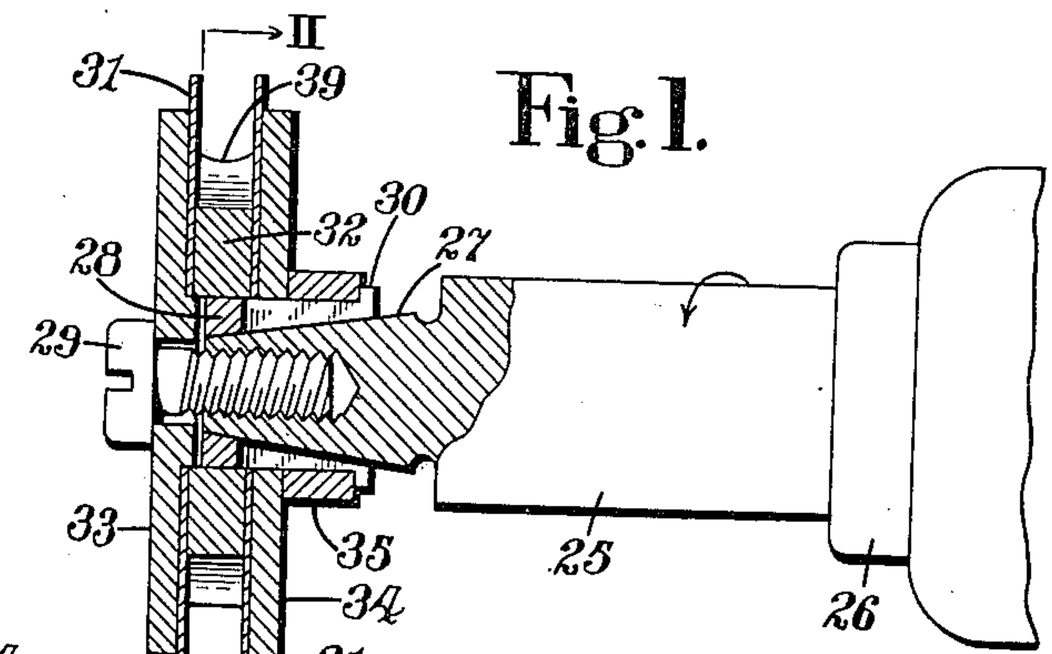


Fig. 3.

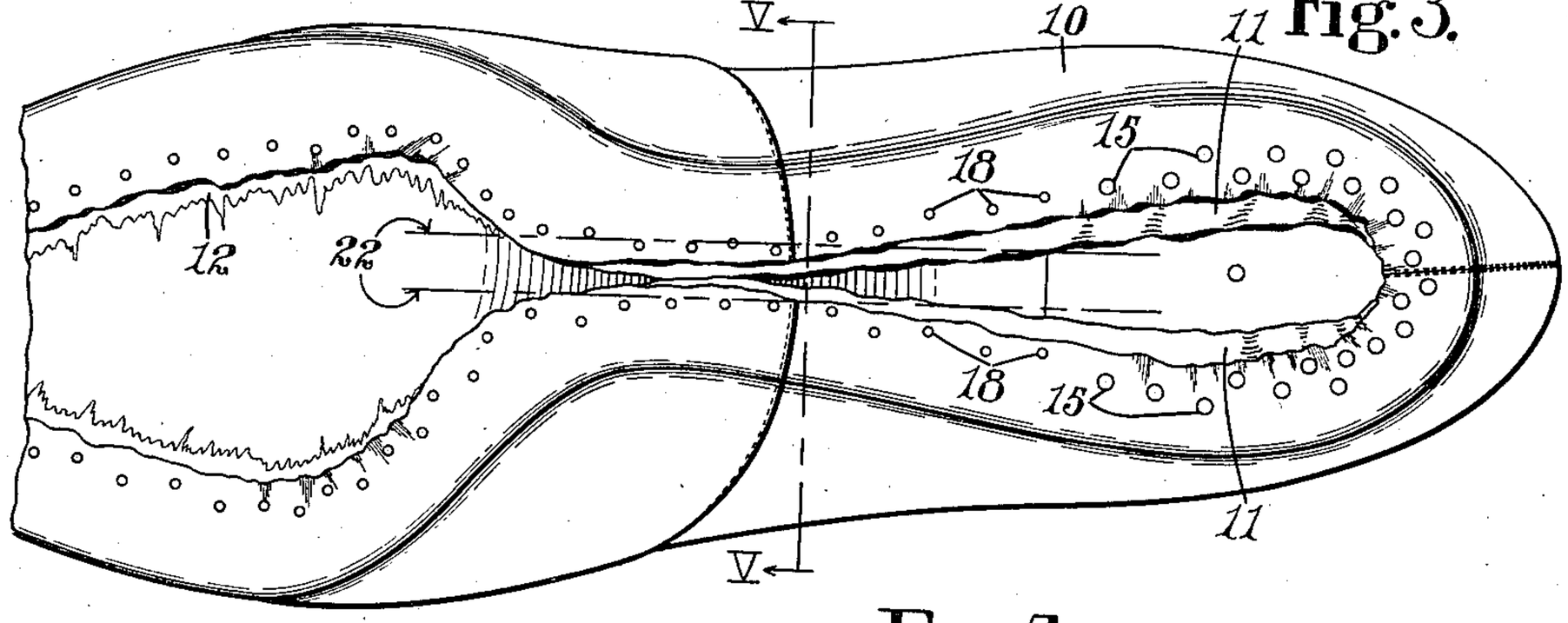


Fig. 4.

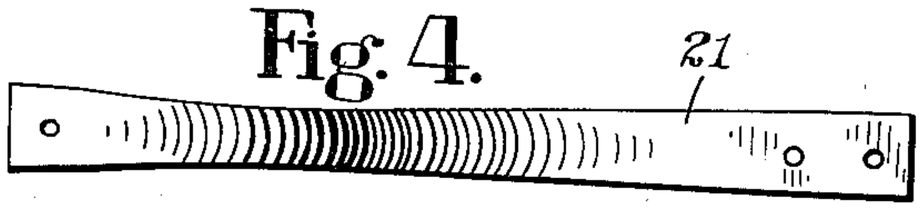


Fig. 5.

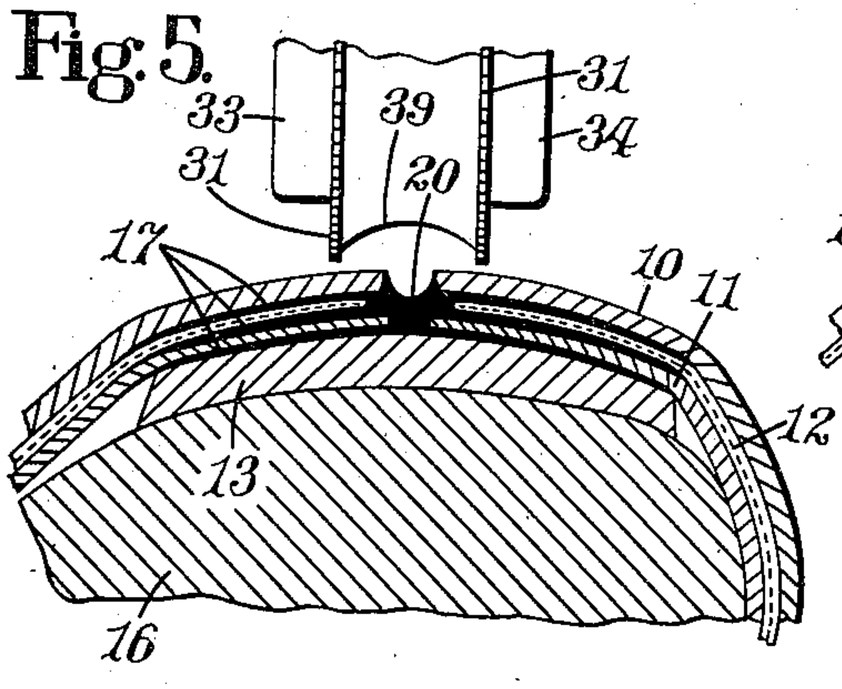
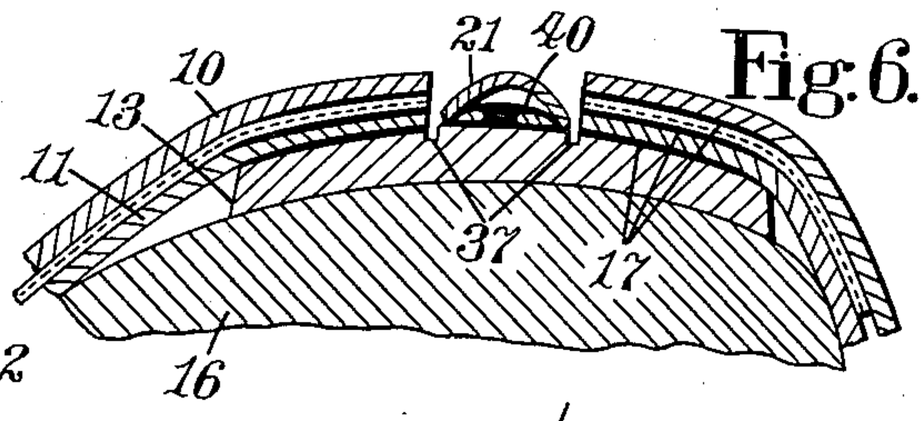


Fig. 6.



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2,011,668

GROOVING DEVICE FOR OPERATING ON SHOES

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13 Claims. (Cl. 12—83.5)

This invention relates to cutter-heads used in the manufacture of shoes and is herein illustrated as embodied in a device designed to cut a groove in the shank-portion of a lasted shoe for the reception of a shank-stiffener.

In the manufacture of women's shoes it is usual to reinforce the shank-portions with metallic stiffeners. The stiffeners most commonly used for this purpose are strips of sheet steel, suitably curved and molded in cross-section. In the finished shoes these stiffeners lie between the insoles and the outsoles, and because of their thickness it is necessary to provide space between the lasted margins of the upper material, to the end that they will not project beyond the general plane of such material, since if they did project it would be exceedingly difficult, if not impossible, to maintain the shank-portions of the outsoles in contact with these margins.

In preparing the uppers of shoes it is customary to provide surplus material by which the lower margins thereof may be pulled over and lasted. In shoes of certain types, not including welts, the lasted margins do not stand up from the insoles but lie against the insole, that is, in confronting relation thereto. Consequently, in such a shoe the lasted margins lie so closely to each other in the shank-portion, particularly if the shank is narrow, that there is not sufficient space between them to receive a shank-stiffener, and after the shoe has been thus lasted it is necessary to cut away one or both, usually both, lasted margins to provide a groove or channel as wide as the shank-stiffener to be used. For this operation it is the practice of some manufacturers to score the margins with a hand-knife, but to do so requires considerable care to locate the scoring cuts far enough apart and at the same time to avoid cutting away so much of the margins as to weaken the connection between them and the insoles. Moreover, when cutting away the margins by hand the operator has no means by which to guide the scoring knife in straight lines and nothing to guard against cutting too deeply into the insole. This method of procedure is particularly difficult when practiced on cement-lasted shoes, since the scoring knife is obliged to score margins that have been coated and impregnated with pyroxylin cement. The problem, so far as it relates to cement-lasted shoes, is further aggravated by the difficulty of removing the narrow strips that have been severed by a scoring knife, since these strips remain stuck to the insole by the pyroxylin cement after the scoring cuts have been made.

In view of the conditions above set forth, an object of the present invention is to provide improved means for cutting grooves in the shanks of lasted shoes for the reception of shank-stiffeners.

As herein illustrated, the invention is embodied in an improved grooving device comprising a pair of thin-edged scoring members spaced apart to score respectively the opposite margins of upper material that lie on the shank of the insole of a lasted shoe, a router arranged between the scoring members to take out the surplus upper material that lies between them, and rotary driven means by which the scoring members and the router are clamped and carried in rotational unity. Preferably, these elements of the grooving device are supplemented by, and arranged between, a pair of cooperative depth-gages arranged to run on the scored margins of the upper material adjacent to the scoring cuts and thereby limit the depth of these cuts so that if the scoring members penetrate the insole at all the magnitude of such penetration will be negligible. As herein illustrated, the scoring members are hardened steel disks that resemble the appearance of circular saws, but their peripheral teeth, which are fine and closely related, are not set. Moreover, these disks are preferably not much thicker than common paper, since their duty is not to remove stock but merely to make scoring cuts therein. Because of their extreme thinness they are flexible, but another feature of the invention provides for reinforcing them against flexure.

In accordance with the feature last mentioned, the depth gages of the illustrated cutter-head are made in the form of relatively thick circular disks and are arranged against the outer faces of the scoring disks so that they may cooperate with the interposed spacer not only to brace the scoring disks but also to clamp them.

Although, as hereinbefore stated, the scoring disks resemble circular saws in appearance they are preferably arranged or rotated to operate not as saws but to score the work without tearing the substance thereof. Accordingly, the teeth of the scoring disks are pitched backwardly so that their inclined edges rather than their abrupt edges will do the scoring. One advantage of this manner of execution is that the scoring teeth, instead of tending to pull the upper materials away from the insole will press them against the insole. Another advantage is that they will form cleaner cuts by reason of avoiding all tearing action.

In accordance with still another feature of the

invention, the spacer interposed between the scoring members is preferably provided with a small number of coarse teeth, spaced far apart, that project beyond the depth-gages to rout the surplus materials severed by the scoring members, to the end that the space between the two scoring cuts will be cleared of surplus stock as the scoring progresses. These coarse teeth that do the routing are preferably provided with sharp edges that extend across the gap between the scoring members, the better to rout surplus materials that have been stuck to the insole with cement.

Other features of the invention are illustrated in the drawing and are hereinafter described and claimed.

Referring to the drawing,

Fig. 1 is a vertical section of a grooving device embodying the present invention and is herein represented as mounted on a rotary driven shaft;

Fig. 2 is a cross-section of the device in the plane indicated by line II—II of Fig. 1 and includes a sectional view of a cement-lasted shoe in process of being grooved thereby;

Fig. 3 is a bottom plan view of a typical cement-lasted shoe, the shank-portion of which requires to be grooved for the reception of a shank-stiffener;

Fig. 4 is a bottom plan view of a shank-stiffener of well-known type suitable for attachment to a shoe of the type illustrated in the other figures;

Fig. 5 is a cross-sectional view on a larger scale of the shank-portion of the shoe approximately at the point indicated by line V—V of Fig. 3, the figure also including a portion of the grooving device about to start a grooving operation; and

Fig. 6 is a cross-sectional view similar to Fig. 5 but representing the shoe as having been grooved and provided with a shank-stiffener of the type represented in Fig. 4.

The lasted shoe illustrated herein comprises an upper **10**, a lining **11** of soft leather such as sheepskin, an interlining or doubler **12** of woven fabric, an insole **13**, a heel-seat piece **14** of compressed fiber, and heel-seat tacks **15**. The last is indicated at **16**. Although the upper **10**, the lining **11** and the interlining **12** are represented and identified individually, they are hereinafter referred to collectively as upper material.

In accordance with the procedure commonly followed in the manufacture of cement-lasted shoes, the margins of upper material that are laid upon the insole **13** are coated with pyroxylin cement indicated by heavy lines **17** in Figs. 5 and 6. Incidentally to the lasting procedure, lasting tacks (not shown) are driven through the overdrawn margins of upper material, through the insole **13** and into the last in the forepart and in the shank. These tacks are subsequently pulled out after the cement **17** has hardened or set sufficiently to form a permanent connection between the upper and the insole, the punctures formed by such tacks being indicated at **18** in Fig. 3. The heel-seat tacks **15**, however, remain in the shoe, their points being turned back and clenched by a metal plate **19** with which the heel-part of the last is shod.

It is to be observed in Figs. 3 and 5 that the overdrawn and lasted margins of upper material in the shank-portion lie very close to each other. In many cases one or more of the layers of which the upper material is composed may actually touch the opposite margin, and commonly the narrow space between the confronting edges of these margins is partially, if not entirely, filled with surplus cement as represented at **20** in Fig. 5.

To form a suitable channel in the shank-portion of the shoe for the reception of a shank-stiffener, such as that represented at **21** in Figs. 4 and 6, the present invention provides an improved cutter-head that includes a pair of cutters for scoring the overdrawn and lasted margins of upper material along lines suitably spaced one from the other as represented by the broken lines **22** in Fig. 3. The cutter-head also includes a router for clearing out the surplus materials between the scoring cuts. The construction of the cutter-head is illustrated in Figs. 1, 2 and 5.

Fig. 1 includes a rotary driven shaft **25** of a type common in edge-trimming machines, the shaft being mounted in stationary bearings, one of which is indicated at **26**. A detail of common construction in such shafts is a frusto-conical portion **27** projecting from the forward end thereof to receive an expansible split sleeve or bushing **28**. The frusto-conical portion **27** is bored and tapped to provide an internal screw-thread for the reception of a screw **29**. The rear end of the bushing **28** is provided with a peripheral flange **30** against which the parts to be mounted may abut and by which the bushing may be shifted toward the larger end of the frusto-conical portion to be expanded thereby.

The grooving device comprises two thin scoring disks **31**, **31**, an intermediate router **32** by which the scoring disks are spaced apart, and two relatively thick circular clamping disks **33** and **34**. The scoring disks **31** and the router **32** are arranged between the clamping disks **33** and **34** and this assemblage is mounted on the split bushing **28**. A collar **35** is also mounted on the bushing and is located between the clamping disk **34** and the flange **30** to furnish sufficient aggregate axial dimension of the parts to insure clamping pressure. When the screw **29** is set up tightly it acts against the clamping plate **33**, the clamping pressure being transmitted to the flange **30** by the interposed parts, and the bushing **28** being thereby shifted far enough toward the larger end of the frusto-conical portion **27** to be expanded thereby. The assembled parts are thus clamped in rigid relation to each other and to the shaft **25** so that they will all be carried in rotational unity.

Preferably, the scoring disks **31** are not much thicker than common paper, although in Fig. 1 their thickness is exaggerated. Because of their thinness they are flexible but they are adequately reinforced by the clamping disks and the interposed router **32** which cooperate to brace them against flexure adjacent to their perimeters. As illustrated in Fig. 2, each scoring disk is provided with a circular series of many fine scoring teeth **36** that are ratchet-shaped and pitched backwardly with regard to the direction of rotation, (see arrows in Figs. 1 and 2) to the end that their inclined edges will do the scoring while their abrupt edges will have no effect whatever. Consequently, in operation the scoring teeth will press the upper materials of a lasted shoe against the insole and will have no tendency to lift such materials away from the insole or to tear them. These teeth differ from saw-teeth in that they are not set.

The scoring disks **31** project radially beyond the peripheries of the clamping disks **33** and **34** a distance less than the thickness of the work to be grooved, which distance should be equal to the aggregate thickness of the layers of which

the upper material is made, to the end that all these layers may be scored quite to the outer surface of the insole, but in practice the factors that determine the aggregate thickness of the upper material may vary within small limits so that it is not always possible to score entirely through the upper materials without scoring the insole ever so slightly. Moreover, since the upper materials are compressible they may be slightly compressed by the force with which an operator holds a shoe against the grooving device. Nevertheless, since the peripheries of the clamping disks **33** and **34** are arranged to run on the scored margins of the upper material and since they have considerable width they act in the capacity of depth-gages to limit the depth to which the scoring disks may penetrate. Clamping disks of graduated diameters may be used alternatively according to the judgment of the operator or the thickness of the materials to be scored. However, no serious damage will be done to a shoe if the insole is scored slightly as indicated at the points **37** in Fig. 6, although this representation of scoring cuts in the insole may be slightly exaggerated.

The router **32** is illustrated in Fig. 2 as provided with a small number of coarse teeth **38**, spaced far apart, that project slightly beyond the peripheries of the disks **33** and **34** to rout the surplus material that lies between the scoring teeth **36**, but the latter project beyond the rotational boundary of the routing teeth. The front faces of the teeth **38**, considering their direction of rotation, are abrupt to insure the desired routing effect. Moreover, the extremities of these teeth are provided with sharp edges **39**, one of which appears in Fig. 1 and another in Fig. 5. These edges are preferably concave to afford relief in the middle zone of the space between the scoring disks **31**, but the high points of the teeth **38** project nearly although not quite to the rotational boundaries of the scoring teeth **36**.

When the described grooving device is used to cut a groove in a cement-lasted shoe having surplus cement **20** (Fig. 5) between the lasted margins of upper material, the high points of the routing teeth **38** will rout the surplus cement adjacent to the scoring teeth **36** but may leave a residue of cement in the middle zone of the groove as represented at **40** in Fig. 6. Such residue will not have objectionable effect if a shank-stiffener of the type illustrated is to be used, since it will merely occupy the cavity or channel between the edges of the shank-stiffener without preventing those edges from lying in contact with the insole.

The type of shoe hereinbefore described is the most difficult one in which to form a groove for the reception of a shank-stiffener because of the fact that the materials to be routed are stuck to the insole with tough and powerful cement, but the illustrated grooving device is capable of performing the described operation with satisfactory results not only on a shoe of that type but also on shoes of other types in which the conditions to be encountered are not so difficult. For example, another well-known type of shoe is lasted in the shank and in the forepart with fine wire staples but without any cement, the lasting staples being driven into and clenched in the insole and constituting the only connection between the upper material and the insole. In other respects a staple-lasted shoe is similar to the shoe herein illustrated except that the reinforcing member **14** of compressed fiber commonly extends all the way from the heel-end to the ball-line. Such a shoe may be grooved for the reception of a shank-stiffener by the grooving device herein illustrated with comparatively little burden on the routing teeth **38**, since the surplus material to be routed is not stuck to the reinforcing piece **14** and may therefore be more readily routed and removed from the scored groove. In fact, no routing may be necessary in a shoe of that type since the upper materials are seldom stapled within the boundaries of the lines of scoring. However, if one or more staples do lie within these boundaries the routing teeth **38** will pull them out or cut them off incidentally to routing the surplus upper materials severed by the scoring teeth **36**.

To cut a groove in a lasted shoe the operator holds the shoe bottom up in both hands with the heel-end toward him. Then, facing the grooving device according to Fig. 1 he presents the heel-seat portion of the shoe to the bottom of the grooving device and draws the shoe toward him until the groove has progressed to the ball-line thereof. Since the scoring disks are flat and parallel, and since they remain in the scoring cuts they guide the shoe in a straight path.

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

1. A grooving device comprising a pair of thin-edged scoring members spaced apart to score respectively the opposite margins of upper material that lie on the shank of the insole of a lasted shoe, a router arranged between said scoring members to route the surplus upper material that lies between them, and rotary driven means by which said scoring members and said router are clamped and carried in rotational unity, an element of said means being formed and arranged to limit the penetration of said scoring members by bearing on one of said margins.

2. A grooving device comprising two thin-edged scoring members, a spacer between them, rotary driven means by which said members and said spacer are clamped and carried in rotational unity, and two cooperative depth-gages between which said scoring members are arranged and beyond which they project a distance less than the thickness of the work, said spacer having one or more teeth provided with sharp edges arranged to rout the stock between the cuts made by said scoring members.

3. A grooving device comprising two thin-edged scoring members, a router arranged between them, rotary driven means by which said members and said router are carried in rotational unity, and two cooperative depth-gages between which said scoring members are arranged, said scoring members projecting beyond the depth-gages a distance less than the thickness of the work to be grooved.

4. A grooving device comprising two circular confronting depth gages spaced apart, two thin-edged scoring members arranged between them, a router arranged between said scoring members, and rotary driven means by which the aforesaid elements are carried in rotational unity, said router projecting beyond the perimeters of said gages a distance less than the thickness of the work to be grooved.

5. A grooving device comprising two thin-edged scoring members and an interposed router all arranged to rotate about a common axis, and rotary driven means by which said members and

said router are carried, said scoring members having backwardly pitched teeth that project beyond the rotational boundary of said router to score the work without tearing the substance thereof.

6. A grooving device comprising two thin flexible scoring disks, an interposed router, two relatively thick clamping disks between which said scoring disks and said router are arranged, and rotary driven means by which the aforesaid elements are clamped and carried in rotational unity, said router and said clamping disks being formed to brace said scoring disks against flexure adjacent to their perimeters.

7. A grooving device comprising two thin-edged scoring disks each having a circular series of peripheral teeth, said disks being arranged to score respectively the opposite margins of upper material secured to and confronting the shank of the insole of a lasted shoe, a spacer arranged between said disks, two circular clamping disks between which said scoring disks are arranged, said scoring disks projecting beyond said clamping disks a distance substantially equal to the thickness of such margins, and rotary driven means by which said clamping disks, said scoring disks and said spacer are clamped and carried in rotational unity, said clamping disks being arranged to run on the scored margins of upper material adjacent to the scoring cuts and thereby limit the depth of said cuts to the thickness of said margins.

8. A grooving device comprising a rotary carrier, a pair of thin-edged scoring disks, a spacer arranged between said disks, a pair of clamping disks between which said scoring disks are arranged, and means by which said clamping disks and said spacer may be caused to clamp said scoring disks and secure the parts to form a rotational unit, said scoring disks having backwardly pitched scoring teeth and said spacer having abrupt routing teeth.

9. A scoring device comprising a pair of thin-edged scoring disks, spacing means arranged between them to maintain them a certain distance apart, a pair of circular depth-gages arranged to run on the surface to be scored and between which said scoring disks are arranged in coaxial relation thereto, and rotary means by which said depth-gages, said scoring disks and said spacing means are clamped one against another and secured to establish rotational unity.

10. A grooving machine comprising a pair of rotary thin-edged scoring disks spaced apart in confronting relation and provided with backwardly pitched scoring teeth, and driven means arranged to rout the stock between the scoring cuts made by said teeth.

11. A scoring machine comprising a rotary driven shaft, a plurality of thin-edged scoring members carried thereby and spaced apart axially to produce individual scoring cuts, and means arranged to bear on the surface to be scored and thereby control the depth of the scoring cuts.

12. A scoring machine comprising a rotary driven shaft, means mounted thereon to bear on the surface to be scored and thereby maintain a manually supported work-piece at a certain distance from the axis of said shaft, and a plurality of scoring members carried by said shaft and arranged to form laterally spaced scoring cuts in the surface held against said means.

13. A grooving machine comprising a rotary driven shaft, a plurality of scoring disks carried thereby and spaced apart to form individual scoring cuts in a surface of a manually supported work-piece, means mounted on said shaft to bear on said surface and thereby control the depth of the scoring cuts, and power-operated means arranged to rout the stock between said scoring cuts.

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