The present invention relates to a machine for roughening the soles and insoles for footwear. In the manufacturing of footwear it becomes more and more the standard practice to glue, before sewing, the sole to the insole in the same manner as products which are simply cemented without being sewn.

This operation consists in the following steps: roughening of the surfaces to be glued for a good penetration of the glue, application of glue, drying, placing of the surfaces in mutual contact and finally pressing by hydraulic or pneumatic pressure to ensure a good setting.

Known roughening methods are inadequate and in most cases they consist in holding the sole or the insole in the hands and in applying it against a moving metal brush or an emery cloth. The process is long, tedious, costly in man-hours and dangerous, as the roughening element cannot be protected and may injure the operator. In addition, the roughening is irregular, too intense as some points where it decreases the thickness of the sole and not intense enough at other points where it may cause a premature ungluing when in use, particularly in products which are only cemented.

Machines have been designed, such as shown in Figure 7, in which a rotating drum 7 carries on its periphery spikes 2 or the like which tear or shred the material 3 to be roughened. The material 3, such as a sole or insole, slides on a table 4 and an upper cylinder 5 presses on the material 3 during the operation to prevent the spikes from driving away the material 3.

This method has a serious drawback. To operate efficiently the drum must protrude above the table 4 end, therefore, the latter must be provided with a relatively large opening to allow the passage of the protruding portion of the drum 1 and its spikes 2.

When the sole is first engaged with the drum 1, it is largely in an overhanging position and the spikes 2 are biting more than normally due to the pressure of the upper rollers, this is a serious drawback. Moreover, when the sole is almost entirely roughened, the rear end, which is still engaged, also assumes an overhanging position; the spikes have a still greater effect due to their direction of rotation, they penetrate deeply the surface of the sole, literally eating away the rear end thereof, thereby reducing its thickness by a substantial degree.

The main object of the present invention is to obviate the above-mentioned drawbacks. Another object of the present invention is to provide a machine with which it will be very easy to roughen the exact area of the outer face of the sole onto which the heel will be glued, that is, on the grain side for leather soles and on the pattern side for rubber soles.

In the accompanying drawings:

Figure 1 is a side elevation of the machine for roughening leather according to the invention;

Figure 2 is a plan view of a detail showing the mounting of the roughening blades;

Figure 3 is an end elevation of a roughening blade;

Figure 3a is a side elevation of the same;

Figure 4 is a view in elevation showing the roughening blades and the sole feeding cylinders;

Figure 5 is a diagrammatic plan view showing the operation roughening the sole at the exact location of the heel;

Figure 6 is a plan view similar to Figure 5, showing a modification; and

Figure 7 shows a conventional roughening machine as described hereabove.

In the drawings, like reference characters indicate like elements throughout.

The machine, according to the invention, comprises an upper frame 6 pivoted at 7 on the lower frame 8.

The purpose of this pivotal mounting is to make it possible to lift the upper mechanism completely to gain access to the roughening blades and the lower mechanism.

A locking crank 9 on each side of the upper frame 6 makes it possible to maintain this frame in the working position, i. e. folded back on the lower frame 8.

The most important parts in the present invention are two straight comb-like blades 10 provided on their two end faces with very sharp teeth 12, and driven with a very rapid vibratory motion in the horizontal plane, such that each blade will move at any instant, in a direction opposite to the displacement of the other one, the sole being driven transversely of and pressed against these sharp teeth.

The roughening blades 10, the design of which will be easily understood from an examination of Figures 3 and 3a, consist in a flat bar of very hard steel provided on a side face with transverse parallel grooves 11 of triangular section. The two end faces are bevelled preferably at a 45° angle so that teeth 12, which have sharp points, are formed.

The interest of this design resides in the fact that when the teeth 12 have lost their sharp
edges due to wear, it will be sufficient to grind them again to the same angle.

Of course these roughening blades 10 may be designed differently and may consist, for instance, of fine needles mounted on a metal base. Apart from this facility for sharpening the blades 10, the interest offered by the embodiment thus chosen will become apparent in what follows.

The roughening blades 10 are two in number and are mounted face to face at a short distance apart on two metal supports 13 and clamped by countersunk bolts and nuts 13'.

These two support members 13 are provided at one end with a downwardly depending arm 14 carrying a roller 15. Each roller 15 bears onto a cam 16' of a camshaft 16 under the action of a traction spring 17.

It will be easily understood that the rotation of the camshaft 16 causes a displacement of the rollers 15 which, in turn, will cause an alternating longitudinal displacement of the supports 13 and blades 10. The cams 16' will be so arranged that the two blades 10 will move in opposite directions at any instant.

According to cases and needs, there may be one or more vibrations of each blade 10 per turn of crankshaft 16 according to the shape of the cams 16'.

The support members 13 are each mounted on several flat spring blades 18 (Figure 1) which are secured at their lower end to a stand 19 which may be vertically adjusted, the position of ramps 21 of the member 21' movable horizontally by means of the adjusting bolt 20 slidably passing through the frame 8 and threadedly engaging the said member 21'. Stops 24 mounted on the frame 8 opposite the ends of the stand 19 prevent horizontal displacement of the latter.

Thus the extent to which the teeth 12 of blades 10 protrude through the narrow slot 23 of the table 22 above the level of the latter may be adjusted at will in order to suitably vary the roughening depth in the material passing over said table 22.

The mounting of the blade supports 13 avoid the need for lubricating the pivotal connections, but it is clear that these supports may be mounted on connecting rods pivoted at their upper and lower ends or they may have pivotal connections of the silent-block type, within the scope of the present invention.

The fact that blades 10 are linearly movable permits the slot 23 to be made very narrow and consequently the drawback mentioned for rotary roughening devices of the type shown in Figure 7 is eliminated.

The fact that the end face of the roughening blades 10 is bevelled causes the transversely moving material to climb over the ramp thus formed before actually reaching the teeth 12; consequently, the sole is not drawn downwardly and, due to this fact, its thickness is not decreased by the tearing off of deep fibres as is the case in other systems.

The material to be roughened is moved transversely of the blades 10 over the table 22 by means of two feeding cylinders 25 (see Figure 4) parallel to said blades and protruding through openings made in said table 22 on both sides of said blades. The feeding cylinders 25 are rotated by means of worms 26 mounted on camshaft 16 and meshing with worm gears 24 respectively keyed to the shafts 33 of said cylinders 26.

Thus the leading cylinder 26 feeds the material over the blades 10, and the rear cylinder removes said material to maintain a continuous forward movement of the same.

Above the table 22, which is supported by the upper frame 6, are journaled on members 30 mounted within said frame 6, three cylinders 27, connected with each other by rubber belts 31. The two outer cylinders 27 ensure the contact of the material to be roughened with the two feeding cylinder 26, while the central cylinder 21 presses this same material against the roughening blades 10.

The assembly of the three upper cylinders connected by belts thus rotates at the same speed as the material to be roughened and this assembly is urged downwardly by pressure springs to equalize thickness differences.

Each one of the three upper cylinders 27 is resiliently connected to the frame members 38 in order to have a vertical displacement, made necessary by thickness differences in the material, without modifying the positions of the two other cylinders and conversely. Each one of the cylinifers 27 is independent of the others as to its vertical displacements.

The camshaft assembly rotates in an oil bath 28 (Figure 1).

The operation of the machine, therefore, is as follows: a continuous rotational motion is imparted to the camshaft 16; the cams 16' cause a rapid horizontal oscillation of the roughening blades 10 by means of the rollers 15.

The camshaft worms 25 drive, in a continuous motion, the two feeding cylinders 25. If a shoe sole 34, for instance, is introduced on the table 22, it is pressed against the first feeding cylinder 26 and directed towards and transversely of the vibrating blades 10 which fulfill their function, the sole being pressed by the central upper cylinder 27 against said blades 10.

When the sole has been roughened, the third cylinder ensures its evacuation.

When the blades 10 need re-grinding, the lever 9 is turned and the table 22 and upper cylinders 27, depending from the frame sections 6, are lifted together, thus exposing the entire mechanism so that the blades 10 can easily be removed.

A grindstone (not shown) may be mounted on the machine for a rapid grinding.

The second operation performed by the machine, according to the invention, is the roughening on the grain side for leather soles and on the pattern side for rubber soles, at the exact location of the heel. A device is mounted for this purpose on the side of the machine, on the bracket 29. It comprises a carriage 30 mounted on rollers 31, rolling over rails 40 associated with a platform 32 supported by said bracket 29.

If it is desired to use heels in which the instep portion is straight, the sole 34, Figures 1 and 5, is placed on the carriage 30 at a location indicated by marks for each size and the carriage and sole are pushed so as to engage the ends of the blades 10. The limit of roughening is thus a straight line 33. If, on the other hand, it is desired to use heels having a curved instep, a turn table 42 is used instead of the carriage 30, to be rotatably mounted on the axle 35. Figure 6 shows at 38 the results obtained.

It should be understood that the roughening blades 10 are driven in opposite directions with
5 respect to each other, the one moving towards
the right while the other moves towards the left,
this combined motion having the effect of oppos-
ing the driving which might occur of the rough-
ening machine itself by the blades 10, which
would be detrimental to a regular roughening by
causing the material to be roughened to oscil-
late at the frequency of the roughening blades.

The present invention is not limited to the
present description but covers various modifi-
cations, even if less practical, such as replacing
the described roughening blades by other toothed
combs, or by endless chains moving in opposite
directions on sprockets. In any case, the rough-
ening is linear and not rotary, and the roughen-
ing members go through a narrow slot thus pre-
venting the material to be roughened from get-
ing caught in the roughening members.

What 1 claim is:

1. A roughening machine of the character de-
scribed comprising a table for supporting the
material to be roughened and having a narrow
slot, a pair of spaced elongated roughening mem-
bers having teeth projecting through said slot,
means to impart to said members a longitudinal
vibratory movement and means for feeding said
material transversely of said members.

2. A machine as claimed in claim 1 wherein
said members are moving in opposite directions
at any instant.

3. A machine as claimed in claim 2 wherein
said members are vertically adjustable relatively
to said table.

4. A machine as claimed in claim 3 wherein
said members consist in elongated plates having
a side face provided with transverse grooves of
triangular section and at least one bevelled end
face so as to form pointed teeth on said end face.

5. A machine as claimed in claim 4, including
supporting means for said plates, said means
comprising a horizontally disposed support mem-
ber on which said plate is removably secured,
a lower horizontal stand and spring blades con-
necting said support member to said stand.

6. A machine as claimed in claim 5 including
horizontally displaceable ramp member engaging
coo-operating faces of said stand and means to
adjustably displace said ramp member relatively
to said stand whereby adjustably vertically dis-
placing said stand and said plate.

7. A machine as claimed in claim 6 wherein
said means to impart a vibratory movement com-
prise a rotary camshaft, arms depending from
said support members and engaging respective
cams on said cam shaft.

8. A machine as claimed in claim 7, wherein
said feeding means comprise a pair of opposed
rotary cylinders disposed on both sides of said
roughening members and parallel therewith, and
means for positively rotating at least one cylinder
of each pair.

9. A machine as claimed in claim 8, further
including a pressure roller disposed above and
opposite said roughening members.

10. A roughening machine comprising in com-
bination a lower frame section, an upper frame
section pivotally mounted on said lower frame
section to take an operative position over the
latter and an inoperative position uncovering the
same, a table for supporting the sheet material
to be roughened secured underneath said upper
frame section and having a narrow elongated slot
made therethrough, closely spaced parallel elon-
gated roughening members horizontally movable
and resiliently mounted within said lower frame
section and having upwardly extending teeth
protruding through said table slot when said up-
per frame section is in said operative position,
means to impart to said roughening members a
longitudinal vibratory movement and means for
feeding said sheet material over said table and
transversely of said roughening members, so con-
structed and arranged that access to the latter
is made possible when said upper frame section
is in said inoperative position.

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No references cited.