COMBINED FINISHING AND TRIMMING UNIT

The invention relates to finishers, especially for sole repair according to the claims.

BACKGROUND OF THE INVENTION

Finishers are used in different fields and for multiple applications, e.g. for sole repair of all kinds of shoes and boots. Maybe the most known type of such machines are the finishers, distributed in the applicant's shops around the world.

Finishers fulfill variable and complementary tasks. They comprise a plurality of motor-driven tools, which are aligned side by side on a vertical work bench. Different tools, like trimmer units for soles and heels, brushes and sand belts, are arranged on the front side. Originally, such an axial arrangement of different tools occurred because of the tool driving vertical shaft. Nowadays, the tools are directly and individually motor-driven, the aligned disposition, however, is maintained. Apart from different kinds of motors for each tool,

finishers have an entire infrastructure, comprising devices for suction of dust, being generated during the repair and comprising a control by control panels.

Despite their robust and proven construction, finishers offer several disadvantages, resulting mostly from the aligned disposition of the different motor-driven tools, being arranged side by side and more or less at the same height on the front of a work bench.

Working with actually state-of-the-art finishers may be difficult and tiresome. In particular, the operator must stabilize the object to repair in one, or if possible in both of his hands, and by the help of his chest. The operator may be forced to position the object to repair with outstretched hands, e.g. in front of the rotational axis of a trimmer. Apart from the disadvantage of a poor ergonomic working posture, the operator must hold the object to repair fixedly in front of an opening of a vacuum system, in order to suck dust.

Finishers disposing tools aligned side by side on a work bench require large amounts of floor space. Since the machines are used in shopping centers and in small shops, having high rental fees, such a large shop floor space is quite uneconomic. Due to the large front of such a work bench, the operator must move laterally on a large working place from on tool to the other.

Finishers disposing tools, motors, transmission belts and vacuum systems for dust suction, distributed all over the front of the machine, represent an oversized and superfluous equipment. The specific installations reveal as being inefficient, having much too high energy consumptions. Often, all the tools are often started at the same time, regardless of whether only one tool, having

one motor and one vacuum system for dust suction, is required. The actual conception results in an increase in production costs, energy consumption and maintenance costs. In summary, said finishers being too big, too noisy, emitting too much dust and electromagnetic radiations, being costly in maintenance and difficult to repair.

SUMMARY OF THE INVENTION

The aim of the present invention is to provide a solution for the above cited problems. The finisher according to the invention has a construction being particularly compact and economic, being able to accomplish each operation.

According to the invention, said solution is obtained by a finisher of an entirely new and simplified conception. For doing so, the inventor had to overcome a technical prejudice. Instead of arranging the different motor-driven tools on a unique continuous work bench along an essentially horizontal axis, the motor-driven tools are arranged on a multitude of adjacent discontinuous work benchesand along differentiated axes. Said work benches are oriented along different disposition directions. Instead of an arrangement on one unique work bench, being long and voluminous, occupying all the front of the machine, the different motor-driven tools are arranged on a multitude of miniaturized work benches, providing their individual infrastructure for running the tools and being disposed in modular units.

The novel finisher comprises at least one module having at least one motor-driven tool. The finisher is complex, representing a combination of a

multitude of systems of modular tools, being fixed in a specific finisher case. The modules are arranged in said case are oriented along different disposition directions. The modules are interchangeable and easily replaceable.

The motor-driven tools, are e.g. inserted in modules having an identical volume and design, can be juxtapositioned one against the other forming a modular and symmetrical finisher. The tools and their work benches are, for example, arranged in a pivot case which pivots relatively to the working place, enabling the utilization of different modules without restrictions due to their proximity. The case can pivot around a horizontal or vertical axis. During the finishing process, instead of moving from one tool to another along the long work bench, now the case pivots and one tool gets exchanged by another. The tools and their miniaturized work benches can be rotated around a horizontal or vertical rotational axis mounted on the case. As a result, the space occupied by the finisher and the necessary size of the work bench are minimized. Moreover, a preferred work position relatively to the counter and to the customer can be chosen. The operator is no more forced to move in front of the modular finisher having a pivot case. He can, for example, work just in front of the counter and of the costumer. He can also work next to the counter and to the costumer, or he can work in a diagonal position relatively to the counter and to the costumer.

Each module comprises tools, a miniaturized work bench and the totality of the infrastructure in one unity. According to different preferred embodiments, the miniaturized work benches are arranged in a finisher in such a manner, that the side walls form geometrical elements like cubes or hexahedrons. Specific tools like sand belts, brushes and grinding wheels, adapters for said brushes for adapting and varying the polishing surface, sole and heel trimmers, adapters for said trimmers for adapting and varying the depth of the

cutting surface can be installed on each finisher side wall. The use of grinding wheels is novel as compared to the applicant's traditional finishers, being solely equipped with sand belts. Said tools are arranged in the finisher form a system of modular tools, which is characterized by a combination and by a concentration of a plurality of elements in one module. The tools and their infrastructure is realized in a compressed and compact manner. The trimmer units and their suction devices are, for example, arranged so closely together, that the distance between sole and heel trimmers and their suction openings is only a few millimeters. The suction device is, therefore, totally integrated in the trimmer unit itself, having more modest dimensions and reduced power requirement of the motor, being better adapted for each type of operation, reducing the costs of installation, manufacturing and maintenance of the modular finisher without alternation of its efficiency.

The advantages of said modules result from the modular conception of the finisher having more or less independent units in a single case. The orientations of the work benches are differentiated. The tools are arranged on the work benches in such a manner that the rotational axes of the motor elements are essentially parallel or perpendicular to the disposition of the used tools, i.e., to the orientation of the work benches. Trimmer units, disc-like axial brushes and grinding wheels have, for example, rotational axes essentially parallel to the work benches, the sand belt wheels, on the contrary, have rotational axes essentially perpendicular to the work benches.

One advantage of the modules consists in enabling the operator to work in a more ergonomic posture in front of the finisher, like in the good old times, as shoemakers used to work in a sitting posture. Two kinds of improvements occur: the miniaturized work benches can be oriented individually as a function of the operator's size, and, in order to obtain an optimal visual

control, the tools are arranged in a strictly functional manner relatively to the work bench and to the operator. Keeping in mind the compact construction of the finisher, the operator can work very close to and in front of the tool. Each tool can be arranged under an optimized angle, allowing a wide visual range for a less tiresome and surer operation.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described by illustrative embodiments referring to the attached drawings, in which:

Figure 1 is a schematic perspective view of a first preferred embodiment of a finisher according to the invention.

Figure 2 is a schematic perspective view of another preferred embodiment of a finisher according to the invention.

Figure 3 is a schematic perspective view of another preferred embodiment of a finisher according to the invention.

Figure 4 is a view of a finisher unit showing preferred embodiments of sole and heel trimmers.

Figures 5 and 6 are a side view and a rear view of a finisher unit showing embodiments of trimmer units according to figure 4.

Figure 7 is a side view of a finisher unit showing another preferred embodiment of a trimmer unit having an incorporated suction device.

Figure 8 is a side view of a finisher unit showing another preferred embodiment of a trimmer unit having a telescopic cutter head.

Figure 9 is a perspective view of a finisher unit showing a preferred embodiment of a trimmer unit according to figure 8.

Figures 10 and 11 are two top views of a finisher unit showing preferred embodiments of trimmer units having movable shields.

Figures 12 and 13 are perspective views of a finisher unit showing a preferred embodiment of a brushing unit having brush changers as a function of the chosen color.

Figure 14 is a perspective view of a finisher unit showing a preferred embodiment of a sand belt.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 is schematic lateral view of a first preferred embodiment of a modular finisher according to the invention. The finisher 1 looks like a drum, comprising a base case 2, supports 3 and a pivot case 4. Said elements are proven constructions, made from known materials, like profiles and punching parts made from steel, stainless steel but also from plastic and wood. The

supports 3 hold the pivot case 4 and are stabilized by the base case 2. The supports 3 comprise rotation tools 6, rendering the pivot case 4 movable and allowing an individual height adaptation of the work benches as a function of the operator's size. The pivot case 4 is movable by an angle of 360° around his horizontal rotational axis 5, in a way that a movement of the rotation tools 6 is transmitted into rotation of pivot case 4, held by crossbeams 15. The rotation tools 6 are based on ball bearings and can be fixed in any orientation by a stop device. Such rotation tools 6 are known and can be activated automatically, without intervention of the operator, or, they can be activated in an interactive manner, with intervention of the operator. A person skilled in the art, being aware of the present invention, is able to realize many different executions thereof. The length of the supports 3 can, for example, be adjusted to the operator's preferred work height.

In a preferred embodiment the pivot case 4 has a honeycomb design. This hexagonal structure has six side walls 7 of identical dimensions, being separated by a separation angle of 60°, serving as base for the insertion of modular units 8. In figure 1, for the reason of clearness, only one module 8 is inserted. The pivot case 4 is conceived to house up to six modules 8. Each module 8 possesses a miniaturized work bench 9 having at least one motor-driven tool and said tools are accessible on the miniaturized work benches 9 and being oriented having differentiated disposition directions O. In order to facilitate the insertion of modules 8, the case 4 can be accommodated with guide rails. The miniaturized work benches 9 of the modules 8 are separated from each other by an angle of 60°, allowing an use of the different modules 8 without movement restriction in their surroundings. In order to change from one unit to another during the finishing process, one simply has to rotate the pivot case 4 by 60°, 120° or 180°. The working place 10 is minimized. It is obvious, that a person skilled in the art, being aware of the present invention,

is able to realize other pivot cases 4, having other designs, other necessary work bench numbers and other symmetries.

The modules 8 are preworked units, comprising beside the tools, a whole infrastructure enabling its operation. The modules 8 are interchangeable, in a break down or for maintenance reasons, the modules 8 can be replaced rapidly. According to figure 1, in order to remove a module 8, one simply has to tighten the screws 13 and to disconnect the motors 14 from the power supply. Figure 1 shows, for example, a module 8 being combined with a brush 11 and with a grinding wheel 12. Said two tools 11,12 are arranged side by side on the miniaturized work bench 9. The infrastructure, that means the motors 14 and the control electronic of the two tools 11,12 are hidden partially by the work bench 9. The tools 11,12 are controlled by a control panel 20 being inserted in the work bench 9. The brush 11 and the disc-like grinding wheel 12 can be realized having different designs and being intended for different colors. They can be provided with adapters for adapting and varying the polishing surface. The brush 11 or grinding wheel 12 and their adapters form a system of modular tools. Said system is characterized by a combination and by a concentration of a plurality of elements in one module. The use of grinding wheels is novel as compared to the applicant's traditional finishers being solely equipped with sand belts, which are noisy, dust generating and which can cause fire. The brush 11, the grinding wheel 12, the same as the motors 14 and their control electronic are proven and known devices for a man skilled in the art. As an example, the arrangement of the tools can be changed or a motor-driven rapid brush changer can be introduced. See the following figures for more details relating to this subject.

Figure 2 is a schematic perspective view of another preferred embodiment of a modular finisher 1 according to the invention. Said finisher 1 looks like a

kiosk. Said finisher 1 differs from the embodiment according to figure 1 having an asymmetric and rigid case. As to the other features, the present description refers to the description of figure 1. In the following, only the differences to figure 1 will be discussed.

Said embodiment of a finisher 1 discloses only a rigid case 4. The rigid case 4 is immovable allowing an adjustment of the height of the rigid case as a function of the operator's size. The height adjustment can be made, for example, by changing the length of the spindle 23 of the rigid case 4.

Said embodiment of a modular finisher 1 comprises up to six modules 8 with six miniaturized work benches 9, being arranged to form the side walls 7 of a polyhedron. Said side walls 7 have differentiated angles one to each other. The miniaturized work benches 9 are much bigger as compared to the embodiment of figure 1. In order to change from one module to another, the operator must move on the working place 10. The working place 10 is much bigger as compared to the embodiments of figures 1 and 3. Each module 8 and its miniaturized work bench 9 have at least one motor-driven tool and said tools are oriented having differentiated disposition directions O. The module separation by differentiated angles allows an use of the different modules 8 without movement restriction in their surroundings. Figure 2 shows a combined module 8 having a brush 11, a grinding wheel 12, being controlled by a control panel 20, being inserted in the work bench 9.

Figure 3 is a schematic perspective view of another preferred embodiment of a modular finisher 1 according to the invention. Said finisher 1 looks similar to the finisher according to figure 1, being distinguished thereof because having a pivot case being rotational around a vertical rotational axis 5. The

finisher 1 looks like a carousel. The present description refers to the description of figure 1 and in the following, only the differences to figure 1 will be discussed.

The finisher 1 according to this embodiment comprises a base case 2, crossbeams 15 and a pivot case 4. The crossbeams 15 are stabilized by the base case 2, hold the pivot case 4 and render the pivot case 4 movable around vertical rotational tools 6. The height adjustment of the pivot case 4 is possible as a function of the operator's size. The pivot case 4 is movable by an angle of 360° around its vertical rotational axis 5, in a way that a movement of the rotation tools 6 is transmitted into rotation of pivot case 4, held by crossbeams 15. The rotation tools 6 are based on radial ball bearings, can be fixed in any orientation by a stop device. The height adjustment of the pivot case 4 occurs, for example, by changing the height of the rotational mechanism 6 or by changing the height of the base case 2.

The finisher 1 according to this embodiment comprises up to four modules 8 with four miniaturized work benches 9, being arranged to form the side walls 7 of a hexahedron. Said side walls 7 form angles of 90° one to each other. The miniaturized work benches 9 are much bigger as compared to the embodiment of figure 1. In order to change from one module to another, the operator must rotate the hexahedron by 90° relatively to the working place 10. Each module 8 and its work bench 9 have at least one motor-driven tool and are oriented having differentiated disposition directions O. The module separation by an angle of 90° allows an use of the different modules 8 without movement restriction in their surroundings. The working place 10 is minimized. Figure 3 shows a combined module 8 having a brush 11, a grinding wheel 12, being controlled by a control panel 20, being inserted in the work bench 9.

Figures 4 to 6 show a modular unit 8 according to a preferred embodiments of the invention having two trimmer units 16,16'. Figure 4 shows a front view, figure 5 shows a side view and figure 6 shows a rear view. Said modular unit 8 having two trimmer units 16,16', comprises a miniaturized work bench 9 having the same dimensions as the units having a brush and a grinding wheel according to figure 1. The modular unit 8 can, therefore, be inserted in the pivot case 4 of the modular finisher 1 using screws 13, in a way that a plurality of miniaturized work benches 9 of modules 8 are oriented by differentiated disposition orientations O.

Said two trimmer units 16,16' comprise cutter heads 17,17', cutter spindles 18,18' and an infrastructure being composed of motors 14,14' and of dust shields 19,19', the latter being part of the dust suction device 21,21'. The trimmer units 16,16' are fixed ruggedly on a miniaturized work bench 9. The cutter heads 17,17' are conceived for trimming soles and heels. Said cutter heads have e.g. a width of 18 millimeters. The two motors 14,14' are identical standard electric motors. For the raison of security, the motors 14,14' of trimmer units 16,16' of one and the same modular unit 8 can not get started at the same time. The dust shields 19,19' delimit suction openings 22,22'. These suction openings 22,22' and the cutter heads 17,17' are separated by a minimal distance of a few millimeters from each other. This construction offers the unique advantage that almost all the dust is collected very close to the cutter heads 17,17'. State-of-the-art finishers, on the contrary, have suction openings being distant some tenth of centimeters. Such a traditional arrangement has big inconvenient. The operator, in order to collect dust using a standard dust suction device, is constraint to keep the trimming object in a fixed position next to the cutter heads and relatively to the dust suction. The improvement of the finisher according to the invention results, therefore, from an increased solid angle of the dust particles relative to the suction device.

Dust particles are accelerated by the cutter heads 17,17', are attracted under a large solid angle by the dust suction device.

Figure 4 shows suction openings 22,22' which cover almost 120° of the circumference of the cutter heads 17,17'. Figure 5 shows suction openings 22,22' forming an aperture on both sides of the cutter heads 17,17', in a way that all possible trajectories of dust particles, generated during the repair, are included by said aperture under a maximized solid angle. As a result and compared with the state-of-the-art, the capacity of the dust suction device 21,21' can be decreased. Such suction devices having a lower suction capacity, reduce sensibly the purchase costs and the maintenance costs.

Figure 6 shows a rear view of a module 8 and of a part of its infrastructure. According to figure 6, the suction openings 22,22' of the dust suction devices 21,21' are connected by means of flexible suction tubes 21.1,21.1' and rigid suction tubes 21.2 with a ventilation unit 25. A joint 27 combines the suction tubes 21.1,21.1' and 21.2. The ventilation unit 25 may dispose of purifying filters. Said elements form a modular tool system are characterized by a combination and concentration of a plurality of elements in one module. The motors 14,14' of the trimmer units 16,16' and the ventilation unit 25 are electrically interconnected by means of interconnection cables 26',26",26"' with an electronic control unit 24. The electronic control unit 24, the triggering of motors 14,14' and of a ventilation unit 25 are known devices for a man skilled in the art. Being aware of the present invention, he can realize many different executions of similar infrastructures. Preferentially, one of the different motors 14,14' of a modular unit 8 gets started only for the use of its tool and afterwards gets stopped automatically.

A preferred embodiment of modules 8 in a case 4 of a modular finisher 1 comprises an electronic control unit 24 and motors 14,14', being optimized for their function. The motors 14,14' of the trimmer units 16,16' according to figures 2 and 4 and of the grinding wheel 12 according to figure 1 have, for example, variable speeds in the range from 0 to 12'000 rotations per minute (rpm). Present and actual embodiments dispose of a continuous speed regulation in the speed range varying from 5'600 to 6'700 rpm, using e.g. variable resistors. As a function of the materials being trimmed, the motors can drive the tools having a different speed. The trimming speed of caoutchouc, for example, amounts approximately to 5'600 rpm, for leather it amounts to 6'500 rpm, and for synthetics it amounts to 7'500 rpm. As a result, the power consumption and the performance of the motors, being optimized for each type of operation, reduce the production costs, and above all, reduce the maintenance costs of the modular finisher without alternating its efficiency. As an example, the brushes 11 and the grinding wheels 12 dispose of motors 14 having a unique speed but their adapters for the variation of the polishing surface dispose of motors having variable speeds. Therefore, it is possible, to enlarge or to reduce the polishing surface in an easy manner.

This construction is a compact and solid one, which can be realized having much lesser production costs than comparable known systems. The setting up is easy and fast. The modules 8 is inserted into free side walls 7 of a case 4, then they are mechanically fixed to the case 4, and then are connected with the power supply. The connection with the power supply can be realized in different manners. The embodiment according to figure 1 shows, for example, an electric connection via the supports 3 and via the base case 2. On the contrary, the embodiment according to figure 2 and 3 shows an electric connection occurring directly via the base case 2.

It is of course possible to divide the infrastructure into a plurality of modules or into different cases of the modular finisher. Therefore, it is possible to install a part of the infrastructure in another module or in the base case. The ventilation unit 25 according to figure 6 can, for example, be positioned in the base case of the modular finisher 1 according to figures 1 or 3. In order to set up the module 8 according to figure 6, one simply has to link the suction tubes and the interconnection cables with the ventilation unit 25.

Figure 7 shows a side view of a finisher unit with a part of another preferred embodiment of a trimmer unit 16 having an incorporated dust suction 21. The trimmer unit 16 is comparable with the embodiment of a trimmer unit according to the preceding figures. One or two of said trimmer units can be fixed on a miniaturized work bench of a finisher unit, which can be inserted in the case of a modular finisher according to the invention. In the following, the description will be limited to the differences relative to the description of embodiments according to preceding figures.

The trimmer unit 16 according to figure 7 comprises an incorporated dust suction 21. Said dust suction 21 being part of the trimmer unit 16 is fixed on the cutter spindle 18, therefore, being directly driven by the motor 14 of the trimmer unit 16 and ejecting the dust particles directly into a filter 31 and into a recipient 32.

The advantages of this embodiment are multiple. First of all, the construction of the finisher is even more compact. The trimmer unit 16 and the suction device 21 are integrated on a unique miniaturized work bench 9. Therefore, it is no more necessary to provide for suction tubes or for interconnection cables. Second, the dust generated during the trimming operation is aspirated

by a suction opening 22, which form an aperture close to the cutter head 17 and of the dust shield 19. Said dust shield 19 encloses the trimmer unit 16, in a way that only a small access opening remains, enabling the trimming operation on the cutter heads 17. The suction opening 22 covers nearly 240° of the circumference of the cutter head 17, in a way that most of the possible trajectories of dust particles, generated during the repair, are included by said suction opening 22. This arrangement of the dust shield 19 renders the construction even more compact as compared to the embodiment according to figure 5. Third, the dust is ejected into a flexible suction tube 21.1, filtered by a filter 31 and amassed in a recipient 32. The filter 31 and the recipient 32 are arranged on the modular unit 8, in a way that both are easily accessible in order to wash the filter 31 and to clean the recipient 32. According to other embodiments, the filter 31 and the recipient 32 are fixed directly on the outlet tube of the dust suction device 21. In order to enable a fast exchange, the filter 31 and of the recipient 32 are provided with hose clamps.

The trimmer unit 16 is fixed on the miniaturized work bench 9 in a way that the module 8 is inserted in the case of the finisher under an optimized angle relatively to the working place and to the operator. An orientation of the disposition direction O of the trimmer unit 16 of 15° to 50° relatively to the operator revealed as being little tiresome, an inclination of 35° allows an optimized control of the trimming operation.

The maintenance of the trimmer unit 16 gets more economic. A cutter head, for example, has to be sharpened from time to time, resulting in a decrease of the cutter head diameter. Due to this decrease in diameter of the cutter head, the cutter plate, which is a shoe protection, having a face situated exactly above the cutter head, preventing, therefore, a slip of the shoe into the cutter head, said cutter plate has to be replaced. In order to avoid such a

replacement of a cutter plate and in order to spend less money and time, the trimmer unit 16 of the embodiment according to figure 7, comprises a modulator 57 being arranged inside a movable shield 34. Said movable shield 34 fulfills the function of a cutter plate. Said modulator 57 allows an easy adaptation of each change in diameter of the cutter head. The modulator 57 being mounted beside the suction opening 22 and next to cutter head 17, disposes of a plate which can slide inside the movable shield 34 and which can be locked with the movable shield 34 using an adjustment device. This adjustment device can, for example, be an adjusting screw. Each change of the cutter head diameter, therefore, is correctable by a simple and immediately length adaptation of the modulator 57, using the adjusting screw.

The movable shield 34 can be removed, allowing an access of working tools to the cutter head 17, and therefore, an instantaneous replacement of the cutter head 17. A fork 56 being mounted inside the dust shield 19, acts directly on the cutter spindle 18. The cutter spindle 18 is freely rotatable and can be locked by moving the fork 56 inside a corresponding notch of the cutter spindle 18. The cutter spindle 18 is, therefore, locked and the cutter head 17 can be easily unscrewed and replaced. The fast acting fork lock can, for example, be realized by a pushing a button of the fork 56.

Figures 8 and 9 show a side and a perspective view of a finisher unit showing another preferred embodiment of a trimmer unit, having a telescopic cutter head 17. One or two of said trimmer units can be fixed on a miniaturized work bench of a finisher unit which can be inserted in the case of a modular finisher according to the invention. The trimmer unit 16 is comparable with the embodiments of trimmer units according to the preceding figures. In the following, the description will be limited to the differences relative to the description of embodiments according to preceding figures.

The trimmer unit 16 according to figures 8 and 9 comprises two cutter heads 17,37. A cutter head 37 is arranged in a fixed manner, another telescopic cutter head 17 is arranged in a movable manner relatively to said first cutter head 17. In a preferred embodiment, the two cutter heads 17,37 are arranged in a coaxial manner, so as to arrange the fixedly mounted cutter head 37 inside the movable telescopic cutter head 17. This disposition of two cutter heads 17,37 has an adjustable mutual distance, allowing a modulation of the trimming surface. The two cutter heads 17,37 are, in an initial position, at the same height, forming a minimal trimming surface. The adjustment of the mutual distance is possible by manipulation of an adjustment lever 36, acting on the cutter spindle 38 of the telescopic cutter head 17 and allowing the fixation of a chosen position by locking the adjustment lever 36. The more the reciprocal distance of the two cutter heads 17,37 increases, i.e. the more the movable telescopic cutter head 17 is carted inside the cutter head 37, the more the trimming surface increases. Therefore, it is possible to adjust the depth of the two cutter heads 17,37 as a function of the chosen position of the adjustment lever 36 and to adapt the trimming surface of the trimmer unit 16 accordingly to the thickness of the shoe sole to be worked. Preferentially, the interior cutter head 17 is 18 millimeter large, allowing an adjustment of the depth of the two cutter heads 17,37 forming a trimming surface from 0 to 18 millimeters. The blades of the cutter head 37 are, for example, inclined by 45° relatively to the interior cutter head 17. The locking of the adjustment lever 36 allows the definition of a range of predefined depths, ranging, for example, from 2.5, 4, 7, 9, 12, 14, 16 to 18 millimeters. A person skilled in the art, being aware of the present invention, is able to realize many different executions of trimmer units having a telescopic cutter head. Therefore, it is possible to realize, for example, an automatic adjustment into predefined positions by using a motor-driven cutter spindle 18 of the telescopic cutter head 17, being controlled by a control panel. It is also possible to inverse the arrangement of the cutter heads and to adjust the depth of the two cutter heads using a

telescopic or movable cutter head being mounted inside a fixedly mounted cutter head.

In order to facilitate the operation with the trimmer unit 16, said trimmer unit 16 comprises a shoe support 28 being arranged inside the dust shield 19. The shoe support 28 forms as bearing area while trimming a shoe. More precisely, the operator can put a shoe on the shoe support 28 and on the inclined blades of the exterior cutter head 17. The shoe is, therefore, supported, allowing a trimming of the border of the shoe by the interior cutter head 37. The shoe support 28 and the inclined blades of the cutter head 17 form a combined, larger support. In a preferred embodiment, the adjustment lever 36 acts on the cutter head 17 and on the shoe support 28, allowing an operation using said combined support and independently from chosen depth of the trimming surface.

This embodiment offers multiples advantages. First thing to note is the gain of time. It is no more necessary, as compared to state-of-the-art trimmer models, to exchange the whole cutter head because of a different width of the shoe sole. Such an exchange of a cutter head takes one or more minutes, and represents, compared to the quasi instantaneous adjustment according to the invention and because of the high repetition rate of this exchange operation, a considerable gain of time. Second, dust suction is no more limited to only one suction opening 22 beside the cutter head 17 and the dust shield 19, but dust suction is also effected through the central opening of the two hollow cutter heads 17,37. In order to increase the suction ability of the trimmer unit 16 even more, also the shoe support 28 disposes of suction apertures. Dust suction is, therefore, effected by suction openings 22, by central openings of one or two hollow cutter heads 17,37 and by suction apertures of the shoe support 28. Due to this increased suction ability, the suction device 21 can be

reduced in dimension as compared to the state-of-the-art. Finally, the cutter plate 35, which is normally used as shoe protection, preventing a slip of the shoe leather into the cutter head, said cutter plate 35 obtains a new function because of the use of hollow cutter heads 17,37. According to the invention, the cutter plate 35 has a cover function, covering the central part of the trimmer unit 16, increasing the suction ability and preventing dust accumulation. The cutter plate 35 can be also used as a modulator, allowing an adjustment of the diameter of the cutter head 17, as shown by the embodiment according to figure 7. For the reason of clearness, the modulator is not shown in figures 8 and 9.

Figures 10 and 11 show two views of a finisher unit with two embodiments of movable shields 34 of a trimmer unit 16. The trimmer unit 16 is comparable with the embodiments of trimmer units according to the preceding figures. In the following, the description will be limited to the differences relative to the description of embodiments according to preceding figures.

According to figure 10, the movable shield 34 has an embodiment forming a rotating disc and which encompasses the peripheral part of the cutter head of the trimmer unit 16, increasing, therefore, the suction power and preventing dust accumulation. Preferentially, said movable shield 34 is movable, disposing of a rotational mechanism, made for example, from ball bearings 33 and which are fixed on the border of the dust shield 19. According to a preferred embodiment, four balls of a spring-loaded bearing are fixed by an angle of 90° to each other, allow a rotational movement of 360° of the movable shield 34 on the border of the dust shield 19. The rotating disc comprises an access opening to the trimmer unit, of an angle of approximately 120° of the circumference of the cutter heads 17,37. Said access opening to the trimmer unit is large enough to ensure a trimming of a shoe 50, the access opening

adapts easily to position changes or contour changes of the shoe 50. The access opening is minimized and much smaller as compared to the access opening of the embodiment according to figure 5, in a way that most of the dust particles, generated during the repair, will be absorbed.

According to figure 11, the movable shield 34 has an embodiment forming only part of a rotating disc. Preferentially, said movable shield 34 is mobil, disposing of a rotational mechanism, made for example, from rails 53 hold by springs and which are fixed on the border of the dust shield 19. The rotational disc comprises a variable access opening to the trimmer unit, of an angle in between 20° and 120° of the circumference of the cutter heads 17,37. Due to the spring resistance, the movable shield 34 is pressed slightly against a shoe 50 and the access opening adapts easily to position changes or contour changes of the shoe 50. Said access opening to the trimmer unit is large enough to ensure a trimming of a shoe 50 and the access opening is minimized and much smaller as compared to the access opening of the embodiment according to figure 5, in a way that most of the dust particles, generated during the repair, will be absorbed. A person skilled in the art, being aware of the present invention, is able to realize many different executions of such movable shields 34. He can, for example, realizer a combination of the two embodiments according to the figures 10 and 11.

The features of the embodiments of a trimmer unit 16 according to the figures 10 and 11 allow a much easier and comfortable trimming action. The operator can work in a posture assuring an optimal control of the shoe trimming. The movable shield 34 renders the trimmer unit 16 likewise valuable for righthanders and for lefthanders. The shoe support 28 allows a controlled positioning and a controlled rotational movement of the shoe 50 in front of the cutter heads 17,37. On the contrary to known trimmers, the

operator can hold the shoe by both hands, enhancing, therefore, the working security. The particularly compact construction allows a work posture in front of the trimmer unit 16 fixed on a miniaturized work bench 9 of a finisher. As compared to known trimmers, having a work posture perpendicularly to the cutter heads, the visual range is, therefore, increased and the working security enhanced. The operator can work very close to the trimmer unit 16, allowing a control of the cutter heads 17,37 under an optimized range of vision of 35°. The operator can stand the shoe on the shoe support and on the inclined blades of the exterior cutter head 37 and the operator is no more forced to work with outstretched hands, which facilitates the trimming operation. The movable shields 34 adapts easily to position changes or contour changes of the shoe 50, in a way to minimize the dust propagation, to reduce, therefore, the pollution of the working place and to increase the working quality.

Figures 12 and 13 are perspective views of a finisher unit showing a preferred embodiment of a brushing unit 11 having brush changers 43. This modular unit 8 is arranged on three miniaturized work benches 9, having the same dimensions as the units of grinding wheels and trimmer unit according to the preceding figures. The modular unit 8 can, therefore, be inserted in the pivot case of the modular finisher using screws, in a way that a plurality of miniaturized work benches 9 of finisher modules are oriented by differentiated disposition orientations. The modular unit 8 is controlled by a control panel.

The brushing unit 11 comprises a motor 14, three colored brushing tools 11.1,11.2,11.3 for different colors, e.g. for brushing white, red and black shoes and it comprises a position changer 43. Each colored brushing tool 11.1,11.2,11.3 has several elements 40,41,42 for different manipulations, being a polishing brush 42, a wax finishing brush 41, a wax applicator 40 or a

cleaning brush. Preferentially, the brushes are made from cotton or nylon and the wax applicator 40 is, preferentially, made from natural felt 44, having a surface, which is accessible and adjustable by a metallic telescopic cursor 45. The depth of the felt surface is, therefore, continuously adjustable in a range varying from 0 to 18 millimeters. The rotating brushes have a speed of e.g. 1'500 rpm. Said telescopic cursor 45 can, for example, slide on a rail 39, allowing, therefore, to increase or decrease the depth of the felt surface, being accessible to the wax applicator. The application of wax on the felt 44 occurs using a felt, rotating at high speed. Hard wax is applied, for example, from a wax delivering rod. Due to the high friction force, the wax delivering rod and the felt 44 are heated and applied wax enters into the felt 44. According the same principle is effectuated the application of absorbed wax from the felt to a shoe. The wax penetrates because of the heating of the felt 44 due to the friction force.

The elements 40,41,42 are fixed and locked on the rail 39 having a groove 51. In order to exchange or to replace one of the elements 40,41,42, for example, in order to dispose of a brush having a higher hardness, one simply has to remove the lock and to remove the elements, by sliding along the rail 39. The groove 51 protects the elements 40,41,42 from rotating on the free axis of the rail 39. The number or the presence of elements 40,41,42 is not prescribed. For example, instead of mounting a wax applicator 40 for a rarely used color, it is possible to mount a cleaning brush made from nylon. The brushing unit 11 disposes of a work light, allowing a good control of the brushing operation.

Preferentially, the motor 14 acts on a central rod using a toothed belt 52 and acts simultaneously on three colored brushing tools 11.1,11.2,11.3 using other toothed belts 30, connecting the central rod with each brush rods 39 of the three colored brushing tools 11.1,11.2,11.3. A specific colored brushing tool of

the brushing unit 11 is selected automatically by pushing a button of the control panel, corresponding to the desired color. Then, an electromagnetic brake 58 is released, in a way that the brushing unit 11 can turn around its exchange axis 54. then, a position changer 43 is started, rotating the brushing unit 11 around its exchange axis 54 using another toothed belt 55. The central rod and the exchange axis 54 are arranged in a coaxial manner. A detector detects the position of a specific colored brushing unit tool, corresponding to the desired color. Said detector is, for example, a mechanically detecting detector. After detection of the specific colored brushing tool, the detector sends a signal, activating the brake 58 and locking the position changer 43. The change from one colored brushing tool 11.1,11.2,11.3 to another is, therefore, effectuated without interrupting the motor 14 and without interrupting the rotation of brushes.

The advantages of this preferred embodiment of a brushing unit 11 are multiple. First thing to note is the gain of time. In order to change from one color brush to another, it is no more necessary, as compared to state-of-the-art brushing tools, to stop the motor, to wait until the brushes ceased to rotate, to exchange the elements of a certain color by other elements corresponding to another color and to restart the motor. Such an exchange takes, for example, one or more minutes, and represents, compared to the quasi instantaneous change according to the invention and because of the high repetition rate of this exchange operation, a considerable gain of time. Second, the operator exchanges the colored brushes without soiling his hands, as compared to state-of-the-art brushing tools. Third, the application of wax on a felt, which rotates at high speed, heats the wax delivering rod and the felt, due to the friction force. It is no more necessary, as made hitherto, to heat the wax applicator separately, resulting, therefore, in a gain of time and in an easier operation. A person skilled in the art, being aware of the present

invention, is able to realize many different executions of such brushing tools, allowing a color selection without stopping the motor.

Figure 14 is a perspective and schematic view of a finisher unit showing a preferred embodiment of a sand belt 29. This modular unit is arranged on a miniaturized work bench 9 having the same dimensions as the brushing units, the grinding wheels and trimmer units according to the preceding figures. The modular unit 8 can, therefore, be inserted in the pivot case of the modular finisher using screws, in a way that the tool is accessible on the miniaturized work benches 9 and that a plurality of miniaturized work benches of finisher modules are oriented by differentiated disposition orientations.

The sand belt 29 is characterized by the use of three or two wheels 46 having a diameter comparable to the size of the shoe to be scoured. A first wheel 46 is driven by a motor 14, another wheel 46 is used as scouring wheel. As compared to known sand belts, the diameter of the wheels 46 is reduced by a factor of two, in a way that the wheel curvature corresponds to the shoe contour, rendering the scouring operation easier. Moreover, the sand belt 29 comprises belts having also a width comparable to the size of shoes to be scoured. Preferentially, the sand belt is 70 millimeters wide. The sand belt 29 is arranged on a miniaturized work bench 9, in a way that on the left and right sides of the sand belt, there is enough space, allowing a total accessibility for shoes. The sand belts 29 are accessible for shoes in curved regions 29.1 and in flat regions 29.2. For maximal security reasons, in curved regions 29.1, a shoe is scoured by pressing the shoe against the wheel 46, and in flat regions 29.2, the shoe is pressed against a metal sheet 47. In order to reduce the noise and to increase the working security, the sand belt 29, standing proud of the miniaturized work bench 9, is provided with a left side plate 29.3 and a right side plate 29.4, covering completely the sides, delimited by the

three wheels 46. The sand belt 29 is provided with an incorporated suction unit and comprises a suction opening 22, being placed next to the belt.

CLAIMS

1. Finisher (1) for sole repair, provided with at least one motor-driven tool (11,12,16,29) and a case (4) for fixing a system of tools, said finisher (1) comprising a multitude of modular units (8), each modular unit (8) having at least one motor-driven tool (11,12,16,29) and a multitude of modular units (8) being arranged in the case (4), in a way that the modular units (8) are oriented along different disposition directions (0).

2. Finisher (1) according to claim 1, wherein rotational axes of the tools (11,12,16,29) are essentially parallel or perpendicular to the disposition directions (0) of the modular units (8).

3. Finisher (1) according to claim 1, wherein said modular units (8) are accessible by miniaturized work benches (9) and said modular units (8) provide the infrastructure for running the tools (11,12,16,29).

4. Finisher (1) according to claim 1, wherein said case (4) is a pivot case are movable relatively to a working place (10).

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5. Finisher (1) according to claim 1, wherein said case (4) is a rigid case being fixed relatively to a working place (10).

6. Finisher (1) according to claim 4 or 5, wherein said case (4) having a symmetric, hexagonal honeycomb design structure, having six side walls (7) of identical dimensions, said side walls (7) being separated by a separation angle of 60°, said side walls (7) serving as base for the insertion of modular units (8) and said case (4) pivots around a horizontal rotational axis (5).

7. Finisher (1) according to claim 3, wherein said modular unit (8) comprises at least one brushing unit (11) and/or at least one grinding wheel (12) and their infrastructure comprises motors (14,14'), driving the at least one brushing unit (11) and/or at least one grinding wheel (12) and their control electronic.

8. Finisher (1) according to claim 3, wherein the power and rotation speed of said motors (14,14') of the tools (11,12,16,29) are adapted to the materials to be treated.

9. Trimming unit (16,16') for the use in a finisher (1) according to claim 1, wherein said modular unit (8) comprises at least one motor-driven trimming unit (16,16'), suction devices (21,21') for collecting dust being generated during the trimming operation by cutter heads (17,17',37), and their control electronic (24).

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10. Trimming unit (16,16') according to claim 9, wherein dust is sucked by suction openings (22,22'), being situated under a maximized solid angle and a few millimeters from said cutter heads (17,17',37).

11. Trimming unit (16,16') according to claim 10, wherein said suction devices (21,21') are incorporated within the trimming unit (16,16') and driven by said motors (14,14') of the trimming units (16,16').

12. Trimming unit (16,16') according to claim 10, wherein dust is sucked by suction openings (22,22'), by central openings of one or two hollow cutter heads (17,17',37) and by suction apertures of a shoe support (28).

13. Trimming unit (16,16') according to claim 10, wherein said dust is ejected directly into filters (31) and into recipients (32).

14. Trimming unit (16,16') according to claim 9, wherein said trimming units (16,16') have two cutter heads (17,37), a first cutter head (37) is arranged in a fixed manner and another telescopic cutter head (17) is arranged in a movable manner relatively to the first cutter head (37), both cutter heads (17,37) being arranged in a coaxial manner, in a way that the first immovable cutter head (37) is inside the telescopic or movable cutter head (17), both cutter heads (17,37) having an adjustable mutual distance, allowing a modulation of the depth of the trimming surface.

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15. Trimming unit (16,16') according to claim 14, wherein said telescopic or movable cutter head (17) is adjustable in distance relatively to the immovable cutter head (37) by manipulation of an adjustment lever (36), allowing an adjustment of the depth of the two cutter heads (17,37) forming a trimming surface from 0 to 18 millimeters.

16. Trimming unit (16,16') according to claim 15, wherein inclined blades of said telescopic or movable cutter head (17) and a shoe support (28) form a combined support for standing on shoes, and said telescopic or movable cutter head (17) and the shoe support (28) together are adjustable in distance relatively to the immovable cutter head (37) by manipulation of the adjustment lever (36).

17. Trimming unit (16,16') according to claim 9, wherein said trimming units (16,16') are provided with a dust shield (19) and with a movable shield (34) is fixed on the border of the dust shield (19), in a way to encompass the peripheral part of the cutter head (17,37) and to allow a rotational movement of 360° of the movable shield (34).

18. Brushing unit (11) for the use in a finisher (1) according to claim 1, wherein said brushing unit (11) is arranged on a miniaturized work bench (9), said brushing unit (11) comprises colored brushing tools (11.1,11.2,11.3) for different colors, respectively for brushing shoes of different colors, said brushing unit (11) comprises a motor (14) for driving said colored brushing tools (11.1,11.2,11.3) and it comprises a position changer (43) allowing to pivot said colored brushing tools (11.1,11.2,11.3).

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19. Brushing unit (11) according to claim 18, wherein the change from one colored brushing tool (11.1,11.2,11.3) to another is effectuated without interrupting the motor (14) and without interrupting the rotation of brushes.

20. Brushing unit (11) according to claim 18, wherein each colored brushing tool (11.1,11.2,11.3) has a polishing brush (42), a wax finishing brush (41), and wax applicator (40) or a cleaning brush.

21. Brushing unit (11) according to claim 18, wherein said brushes are made from cotton or nylon, a wax applicator (40) is made from natural felt (44), having a surface which is accessible and adjustable by a metallic telescopic cursor (45) allowing a continuous adjustment of the depth of the felt surface in a range varying from 0 to 18 millimeters.

22. Brushing unit (11) according to claim 20, wherein wax can be applied on said wax applicator (40) having a felt (44), said felt (44) being rotating at high speed, allowing to apply wax from a wax delivering rod in contact with said felt (44) because due to the high friction force, said wax delivering rod and said felt (44) are heated and applied wax can enter into said felt (44).

23. Brushing unit (11) according to claim 20, wherein wax can be applied from said wax applicator (40) having a felt (44), said felt (44) is rotating at high speed, allowing to apply wax from said felt (44) to the shoe in contact with said felt (44), because due to the friction force, said felt (44) is heated and wax can penetrate onto said shoe.

24. Sand belt (29) for the use in a finisher (1) according to claim 1, wherein said modular unit (8) comprises at least one sand belt (29) having two or three wheels (46), said wheels (46) having a diameter comparable to the size of the shoes to be scoured and the sand belt has a width of 70 millimeters, comparable to the size of the shoes to be scoured.

25. Sand belt (29) according to claim 24, wherein said sand belt (29) is arranged on a miniaturized work bench (9), in a way that on the left and right sides of the sand belt (29) is enough space to allow a total accessibility for shoes in curved regions (29.1) of a wheel (46) and in flat regions (29.2) of a metal sheet (47).

ABSTRACT OF THE DISCLOSURE

The invention concerns a finisher (1) for sole repair, provided with at least one motor-driven tool (11,12,16,29) and a case (4) for fixing a system of tools, said finisher (1) comprising a multitude of modular units (8), each modular unit (8) having at least one motor-driven tool (11,12,16,29) and a multitude of modular units (8) being arranged in the case (4), in a way that the modular units (8) are oriented along different disposition directions (0), wherein rotational axes of the tools (11,12,16,29) are essentially parallel or perpendicular to the disposition direction (0) of the modular units (8), said modular units (8) being accessible by miniaturized work benches (9) and said modular units (8) providing the infrastructure for running the tools (11,12,16,29).

(Figure 1)

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