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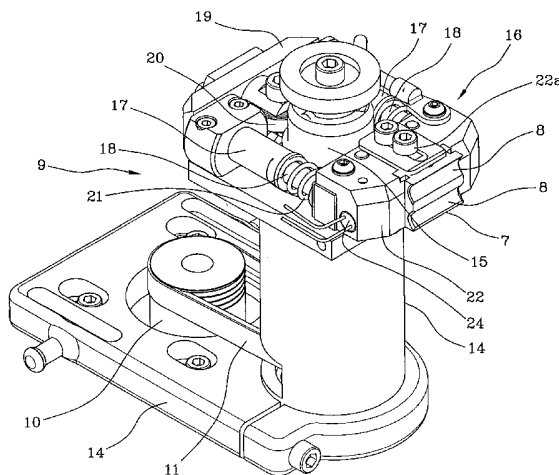
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(54) Title: METHOD AND APPARATUS FOR SURFACE FINISHING OF EDGES OF HIDE, LEATHER AND SIMILAR MATERIALS



(57) Abstract: The edges of a belt or other article of manufacture ("M") made of leather, hide or similar materials are treated with a protective coating applied through painting or waxing, and submitted to a step of surface finishing the protective coating. To this aim, the edge of the article of manufacture ("M") is repeatedly submitted to a beating step by a tool (7) carrying out a vibratory motion against the edge of the article itself, by means of an abutment surface (8) conforming in shape to the crosssection outline of the edge of the article of manufacture ("M"). The beating tool (7) is heated to a temperature in the range of 50°C to 250°C. Powered guide rollers (5a, 5b) disposed in parallel rows engage the article of manufacture ("M") at the opposite longitudinal edges, to cause moving forward of said articles on the line of action of the tools (7). The guide rollers (5a, 5b) further produce a rolling operation on the edges of the article ("M") submitted to the action of the beating rollers (7).



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# METHOD AND APPARATUS FOR SURFACE FINISHING OF EDGES OF HIDE, LEATHER AND SIMILAR MATERIALS

| 5 | Description |
|---|-------------|
|---|-------------|

The present invention relates to a method of surface finishing edges of articles of manufacture made of hide, leather and similar materials.

10

The invention also relates to an apparatus for surface finishing of articles of manufacture in accordance with the above method.

15 More specifically, the invention is particularly conceived for surface finishing of the edges of belts or other articles of manufacture made of leather, to be carried out before and/or after the painting or waxing operations on same.

20

It is known that in working articles of manufacture of the above specified type a finishing step is often provided which aims at giving the edges of the article a glossy aspect with a colouring coordinated with that given to the article surfaces by the previously carried out tanning process.

For the purpose, the edges of the article of manufacture are submitted to grinding and possibly brushing operations, to make the surfaces sufficiently smooth. In this connection, the Applicant has already developed machines that lend themselves to automatically carry out grinding and brushing operations on the edges of the article of manufacture under working.

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These apparatus, disclosed in the international patent

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application WO 99/57327, essentially comprise feed rollers disposed in two parallel rows, in each of which the rollers are aligned according to a common tangent. The article of manufacture is engaged by its edges  
5 between the rollers belonging to the first and second rows respectively, and is moved forward at a constant speed so that the article edges are translated along the common tangent of the rollers belonging to the respective rows, which tangent is coincident with the line of action  
10 of a spring or other tool driven in rotation by a motor.

The grinding and brushing operations are usually followed by spreading of an appropriate wax or paint, in one or more steps in succession, adapted to give the edges the  
15 desired colouring and at the same time to protect the surfaces. A further step of surface finishing usually called "sleeking" may be also required, which step is adapted to further improve the surface aspect of the paint. To this aim, it is known using apparatus  
20 essentially comprising feed means carrying out engagement of the article of manufacture to move it forward at a controlled speed with at least one of the article edges in contact with a hot tool that is constantly pressed against the article edge to cause localized heating and  
25 sleeking of the paint layer.

The qualitative level of the surface finish carried out by these apparatus is not however fully satisfactory. In this connection, the Applicant has perceived that the  
30 action of the hot tool tends to cause new fulling of the wax or paint with irregular accumulation of material at the corners defined by the edge of the article of manufacture.

35 As a result, when working of more valuable articles is to be carried out, long and arduous operations of manual

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finishing are still used that lead to better qualitative results than those obtainable with known apparatus, but that however involve an important increase in costs and production times.

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It is an aim of the present invention to overcome the limits of the known art, by proposing a method and an apparatus that appear to be able to carry out an excellent degree of surface finishing of the edges of  
10 articles of manufacture made of hide, leather and similar materials, qualitatively comparable with or higher than that obtainable with the present manual methods.

Another aim of the invention is to carry out the above  
15 mentioned finish in a very quick and easy manner, without involving arduous manual operations.

It is a further aim of the invention to propose a method and an apparatus than can be obtained by installing  
20 appropriate accessories on known apparatus, already employed for prior finishing operations.

The foregoing and further aims that will become more apparent during the following description are  
25 substantially achieved by a method of surface finishing edges of articles of manufacture made of hide, leather and similar materials, comprising the features set out in claim 1.

30 Still in accordance with the present invention, this method can be put into practice by an apparatus comprising the features set out in claim 14.

Further features and advantages will be best understood  
35 from the detailed description of a preferred, but not exclusive, embodiment of a method and an apparatus for

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surface finishing of edges of articles of manufacture made of hide, leather and similar materials, in accordance with the present invention. Said description will be taken hereinafter with reference to the  
5 accompanying drawings, given by way of non-limiting example, in which:

- Fig. 1 is a fragmentary perspective view of an apparatus for surface finishing of edges of articles of manufacture made of leather, in accordance with the  
10 present invention;
- Fig. 2 is a perspective view of a construction detail of the apparatus in Fig. 1, highlighting a beating tool and the relevant drive means;
- Fig. 3 is a section view of a detail in Fig. 2;
- 15 - Fig. 4 is an enlarged perspective view of the beating tool, seen from the opposite side with respect to Fig. 2;
- Fig. 5 diagrammatically shows an article of manufacture being worked in engagement between two guide rollers.

20 With reference to the drawings, an apparatus for surface finishing of articles of manufacture made of hide, leather and the like in accordance with the present invention has been generally identified by reference numeral 1.

25

In the embodiment described and illustrated, apparatus 1 is particularly conceived for carrying out working of belts made of leather, hide or synthetic material imitation leather. However, the invention can easily also  
30 apply to working of articles of hide, leather and the like to be used for making other objects such as furniture coverings and furniture components, shoes, bags and others.

35 Apparatus 1 lends itself to be inserted in a production

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line in which the articles of manufacture "M" (Figs. 4 and 5), in the form of a strip or a sheet, must be submitted to a series of working operations aiming at giving a desired surface aspect to the perimetral edges of the articles of manufacture themselves. These operations may for example include, in a manner known by itself, a step of grinding and subsequent brushing of the edges, followed by application of a surface coating obtained through one or more waxing or painting steps, and subsequent drying of the paint applied to the article edges.

These processes can be conducted for example following the teachings of the international patent WO 99/57327 in the name of the same Applicant.

Apparatus 1 and the method in accordance with the invention can be employed before and/or after the mentioned steps of waxing or painting and drying, to optimise the surface aspect of the protective layer applied to the edges of the article of manufacture "M".

For the purpose, apparatus 1 comprises a base 2 defining, at the upper part thereof, a horizontal work surface 3 on which guide means 4 operates, said means being set to engage the article being worked "M" to dispose it with at least one of the article edges along a predetermined line of action "L" (Fig. 4), at which the finishing method in accordance with the invention is carried out.

30

The guide means 4 may for example comprise a plurality of wheels or guide rollers 5a, 5b preferably disposed in two parallel and opposite rows. The guide rollers 5a, 5b belonging to each of the rows lend themselves to operate, through respective circumferential work surfaces 6a, 6b, along each of the opposite longitudinal edges of the

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article of manufacture "M" being worked. To this aim, the guide rollers 5a, 5b belonging to each row have the respective rotation axes orthogonal to the work surface 3, and are distributed with the respective work surfaces 6a, 6b aligned in a common tangent direction that is coincident with the line of action "L" on the respective longitudinal edge of the article of manufacture "M".

It is also preferably provided that at least part of the guide rollers 5a, 5b be powered and drivable in rotation to cause translation of the article of manufacture "M" being worked along the lines of action "L", at a controlled speed to be adjusted depending on requirements.

15

The guide rollers 5a, 5b belonging to one or both rows may be also provided to be mounted on a carriage susceptible of being positioned with respect to the base in a direction perpendicular to the line of action to adapt the distance between the two rows of guide rollers 5a, 5b to the width of the article of manufacture being worked.

Apparatus 1 further comprises at least one beating tool 7 having an abutment surface 8 turned to the line of action "L" and set to act against one of the edges of the article of manufacture "M" being worked that is in engagement with the guide means 4. In particular, in a preferential solution, the presence of at least two beating tools 7 operating simultaneously on the opposite longitudinal edges of the article of manufacture "M" is provided. Each beating tool 7, as clearly shown in Fig. 1, is interposed between the guide rollers 5a, 5b belonging to one of the above mentioned rows. Each beating tool 7 is driven with a reciprocating motion towards the respective line of action "L", through drive

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means generally denoted at 9 in Figs. 2 and 3.

The drive means 9 preferably comprises at least one motor (not shown) controlling a driving pulley 10 connected through a transmission belt 11 with a driven pulley 12 fitted on an output shaft 13 rotatably mounted to a support structure 14 connected to the base 2.

Fitted on top of the output shaft 13 is a cam 15 arranged to act on the beating tool to move the same with a reciprocating rectilinear motion. To this aim, the beating tool 7 is slidably supported by a guide assembly 16, for example comprising a pair of cylindrical sleeves 17 that are fixed with respect to the support structure 14 and slidably passed through, in a direction perpendicular to the line of action "L", by two sliding rods 18 fastened at the end to a block 22 to which the beating tool 7 is removably fastened, through a plate 22b, for example, that is engaged by threaded elements 22a or in another manner.

The rod ends opposite to the beating tool 7 are interconnected by a bridge element 19 with which a follower element 20 is in engagement, said follower element 20 being in the form of a roller set to act against the peripheral surface of cam 15. Elastic elements consisting of return springs 21 for example, that are fitted on the sliding rods 18 and operated between the beating tool 7 and the ends of the guide sleeves 17 elastically push the follower element 20 against the peripheral surface of cam 15 in a constant manner. As an alternative to use of roller 20 and the elastic return means, the follower element may comprise a connecting rod operatively linked between the cam 15 and bridge element 19.

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In order to obtain a better surface finishing, the abutment surface 8 of the beater element 7 is preferably provided to be concave, its shape substantially matching the cross-section outline of the edge of the article of manufacture "M" being worked. To allow working of different articles of manufacture "M", it is preferably provided that one and the same beating tool 7 should have at least one first and one second abutment surfaces 8 having different shapes from each other so as to be alternately used, depending on the shape exhibited by the article of manufacture "M". Only one of these work surfaces 8, the one disposed at a lower position for example, is coplanar with the article of manufacture "M" being worked and therefore lends itself to operate on the edges thereof. However, it is sufficient to disengage the beating tool 7 from the support block 22 through untightening or removal of the threaded elements 22a, and mount it again thereon in an overturned and/or reversed position in order to replace the abutment surface 8 by which the tool operates on the article of manufacture "M".

Preferably, the support structure 14 is connected with base 2 through interposition of the positioning means that is operable through a control wheel 23 and is not described in detail because it can be made in a manner known by itself; said means allows adjustment of the distance of the beating tool 7 from the line of action "L" defined by the guide rollers 5a, 5b, also following adjustment of the distance existing between the guide rollers 5a, 5b belonging to one row and to the other.

Also associated with the beating tool 7 is heating means set to bring and keep the abutment surface 8 to a predetermined work temperature, included just as an indication between 50°C and 250°C. This heating means may

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for example comprise at least one electric resistor 24 controlled by a thermostat and fitted in the support block 22 to which the beating tool 7 is fastened.

- 5 A control panel 25 allows power supply to the electric resistor 24 to be governed, as well as power supply to the motors intended for operation of the output shaft 13 and the guide rollers 5a, 5b, to easily adjust the work temperature of the beating tools 7, the frequency of the  
10 vibratory motion transmitted thereto by the respective cams 15, and the translation speed imparted to the article of manufacture "M" by the guide rollers 5a, 5b.

In addition, an auxiliary beating tool 26 can be  
15 installed on a front portion of base 2; said auxiliary tool has an abutment surface 26a of an arched extension and can be fixed or carry out a vibratory motion in the same manner as the previously described beating tools 7. The auxiliary tool 26, heated by respective electric  
20 resistors, can be used to carry out surface finishing operations at the ends of a belt or other regions of the article of manufacture "M" being worked in which the edges thereof are not straight and/or parallel and/or, also due to other reasons, cannot be reached by the  
25 beating tools interposed between the guide rollers 5a, 5b. Said auxiliary tool can be further used in place of the previously described tools 7 to carry out working of articles of manufacture having an uneven conformation with curvilinear and/or not parallel edges.

30

In accordance with a finishing method being an integral part of the present invention as well, operation of apparatus 1 is as follows.

- 35 The article of manufacture "M" being worked is inserted between the guide rollers 5a, 5b belonging to the first

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and second rows, close to the front side of base 2. The guide rollers 5a, 4b, driven in rotation to a controlled speed by a first adjustment knob 27 and relevant display 27a set on the control panel 25, move the article of manufacture "M" in such a manner that the opposite longitudinal edges of same carry out a rectilinear uniform movement along the respective lines of action "L", tangent to the work surfaces 6a, 6b of the guide rollers themselves.

10

Each of the longitudinal edges of the article of manufacture "M" consequently reaches the respective beating tool 7 the abutment surface 8 of which, upon the action of the electric resistor 24, is maintained to the desired work temperature preset on the control panel through appropriate keys 28 and relevant display 28a. Concurrently with its translation along the line of action "L", each longitudinal edge of the article of manufacture "M" is therefore repeatedly submitted to a beating step against the abutment surface 8 of the respective tool 7, driven so as to carry out a reciprocating motion the frequency of which is preset by means of a second adjusting knob 29 and relevant display 29a.

25

The beating action, with the aid of heating through the abutment surface 8, causes a surface sleeking of the longitudinal edge of the article of manufacture "M" and the protective layer previously applied thereto.

30

Translation of the article of manufacture "M" leads the abutment surface 8 of each tool 7 to progressively act along the whole extension of the longitudinal edge of the article of manufacture "M" itself, in spite of the fact that the longitudinal extension of the latter is much higher than that of the abutment surfaces themselves.

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Advantageously, engagement of the article of manufacture "M" between the guide rollers 5a, 5b also causes a rolling action executed on the edges of the article of manufacture "M" before and after the beating step. This  
5 rolling action gives rise to a further smoothing of possible surface unevennesses that should be still present on the wax or paint still hot following the beating step. In order to improve the rolling effect, the circumferential work surfaces of the guide rollers 5a, 5b  
10 can be advantageously provided to have a concave profile the shape of which substantially matches the cross-section profile of the edges of the article of manufacture "M" being worked, as better shown in Fig. 5.

15 The present invention thus reaches the intended purposes.

In fact, it has been found that the beating action executed in accordance with the invention gives rise to an excellent surface finishing of the edges of the  
20 article of manufacture, eliminating the risk of uneven accumulations of the protective material applied thereto following new fulling of the wax or paint, which inconvenience, on the contrary, is likely to take place with use of the methods and apparatus of the known art.

25 It will be also recognised that the apparatus in reference can be easily obtained through utilisation of parts of apparatus already used in the known art to carry out grinding, brushing and/or painting operations  
30 preceding the surface finishing operation being the subject of the present invention.

The concerned apparatus therefore can be made, if required, by suitably adapting already existing  
35 apparatus, through replacement of the abrasive grinding wheels or brushes with beating tools and the respective

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drive devices proposed by the present invention. It is apparent that this aspect represents important economic advantages in terms of design and investment for manufacture of the components.

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The apparatus in reference further lends itself to be easily inserted in conventional production lines employed for carrying out grinding, brushing, painting and drying of the edges of the articles of manufacture. This aspect  
10 too represents an important advantage under an economic point of view.

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C L A I M S

1. A method of surface finishing edges of articles of manufacture made of hide, leather and similar materials,  
5 in which at least one edge of the article of manufacture being worked is repeatedly submitted to a step of beating it against an abutment surface to cause surface sleeking of same.
- 10 2. A method as claimed in claim 1, further comprising the step of applying at least one protective layer to said at least one edge of the article of manufacture being worked.
- 15 3. A method as claimed in claim 2, wherein the beating step is carried out subsequently to application of the protective layer, to cause surface sleeking of the protective layer itself.
- 20 4. A method as claimed in claim 1, wherein beating is carried out concurrently with a step of heating said at least one edge of the article of manufacture being worked.
- 25 5. A method as claimed in claim 1, wherein the abutment surface is heated and maintained to a predetermined temperature, preferably included between 50°C and 250°C.
- 30 6. A method as claimed in claim 1, wherein the beating step is carried out by a beating tool carrying said abutment surface and driven with a reciprocating motion towards the edge of the article of manufacture in a direction substantially coplanar with the article of manufacture itself.
- 35 7. A method as claimed in claim 1, wherein the abutment

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surface substantially conforms in shape to a cross-section outline of the edge of the article of manufacture being worked.

5 8. A method as claimed in claim 1, wherein during the beating step a relative translation of the abutment surface along the edge of the article of manufacture being worked is carried out, said abutment surface having smaller sizes than the longitudinal extension of the edge  
10 of the article of manufacture being worked.

9. A method as claimed in claim 8, wherein the relative movement is caused by translation of the article of manufacture in a direction parallel to the edge being  
15 worked.

10. A method as claimed in claim 1, wherein before and/or after the beating step at least one rolling step is executed on the edge being worked.

20 11. A method as claimed in claim 9, wherein translation of the article of manufacture takes place by means of guide rollers operating on the edge being worked to cause a rolling operation on said edge before and/or after the  
25 beating step.

12. A method as claimed in claim 1, wherein the beating step is carried out simultaneously on two opposite edges of the article of manufacture being worked.

30 13. A method as claimed in claim 2, wherein application of the protective layer is carried out by means of a painting or waxing step, preferably preceded by a smoothing operation of said at least one edge of the  
35 article of manufacture being worked.

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14. A method as claimed in claim 13, further comprising a step of drying the paint, preferably carried out before the beating step.
- 5 15. An apparatus for surface finishing of edges of articles of manufacture made of hide, leather and similar materials, comprising:
- at least one beating tool having an abutment surface set to act against an edge of the article of manufacture
- 10 being worked;
- driving means to drive the beating tool with a reciprocating motion towards the article of manufacture being worked.
- 15 16. An apparatus as claimed in claim 15, further comprising guide means set to engage an article of manufacture being worked in order to dispose an edge of said article along a predetermined line of action of the beating tool.
- 20 17. An apparatus as claimed in claim 15, characterised in that it further comprises heating means associated with the beating tool to heat the abutment surface.
- 25 18. An apparatus as claimed in claim 15, characterised in that said abutment surface substantially conforms in shape to a cross-section outline of the edge of the article of manufacture being worked.
- 30 19. An apparatus as claimed in claim 16, characterised in that said guide means comprises a plurality of guide rollers having circumferential work surfaces distributed in a common tangent direction coincident with said line of action.
- 35 20. An apparatus as claimed in claim 19, characterised in

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that said guide rollers are distributed in two rows spaced apart from each other in parallel to operate on two opposite edges of the article of manufacture being worked.

5

21. An apparatus as claimed in claim 19, characterised in that said guide rollers are drivable in rotation to cause a translation of the article of manufacture being worked along the line of action.

10

22. An apparatus as claimed in claim 19, characterised in that said circumferential work surfaces have a shape conforming to the shape of a cross-section outline of the edge of the article of manufacture being worked.

15

23. An apparatus as claimed in claim 19, characterised in that at least one of the rows of the guide rollers is operatively carried by a carriage to be positioned with respect to a fixed base in a direction substantially perpendicular to the line of action, to adjust the distance existing between the rows of the guide rollers.

20

24. An apparatus as claimed in claim 16, characterised in that it comprises at least two beating tools facing respective parallel lines of action to operate on respective opposite edges of the article of manufacture being worked.

25

25. An apparatus as claimed in claim 16, characterised in that it further comprises positioning means to move the beating tool in a direction substantially perpendicular to the line of action.

30

26. An apparatus as claimed in claim 15, characterised in that said drive means comprises at least one cam mounted on an output shaft drivable in rotation by a motor and a

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follower element connected with the beating tool and acting against said cam.

27. An apparatus as claimed in claim 26, characterised in  
5 that said drive means further comprises elastic elements acting on the beating tool to elastically push the follower element against the cam.

28. An apparatus as claimed in claim 26, characterised in  
10 that said drive means further comprises a guide assembly slidably engaging the beating tool to guide it in a direction substantially perpendicular to the abutment surface.

15 29. An apparatus as claimed in claim 28, characterised in that said guide assembly comprises sleeves integral with a support structure, sliding rods slidably passing through the sleeves, a support block fastened to the guide rods and carrying the beating tool, and a bridge  
20 element fastened to the guide rods on the opposite side from the support element.

30. An apparatus as claimed in claim 29, characterised in that the beating tool is removably in engagement with the  
25 support block.

31. An apparatus as claimed in claim 30, characterised in that said beating tool has at least one first and one second abutment surfaces having different shapes from  
30 each other.

FIG 1

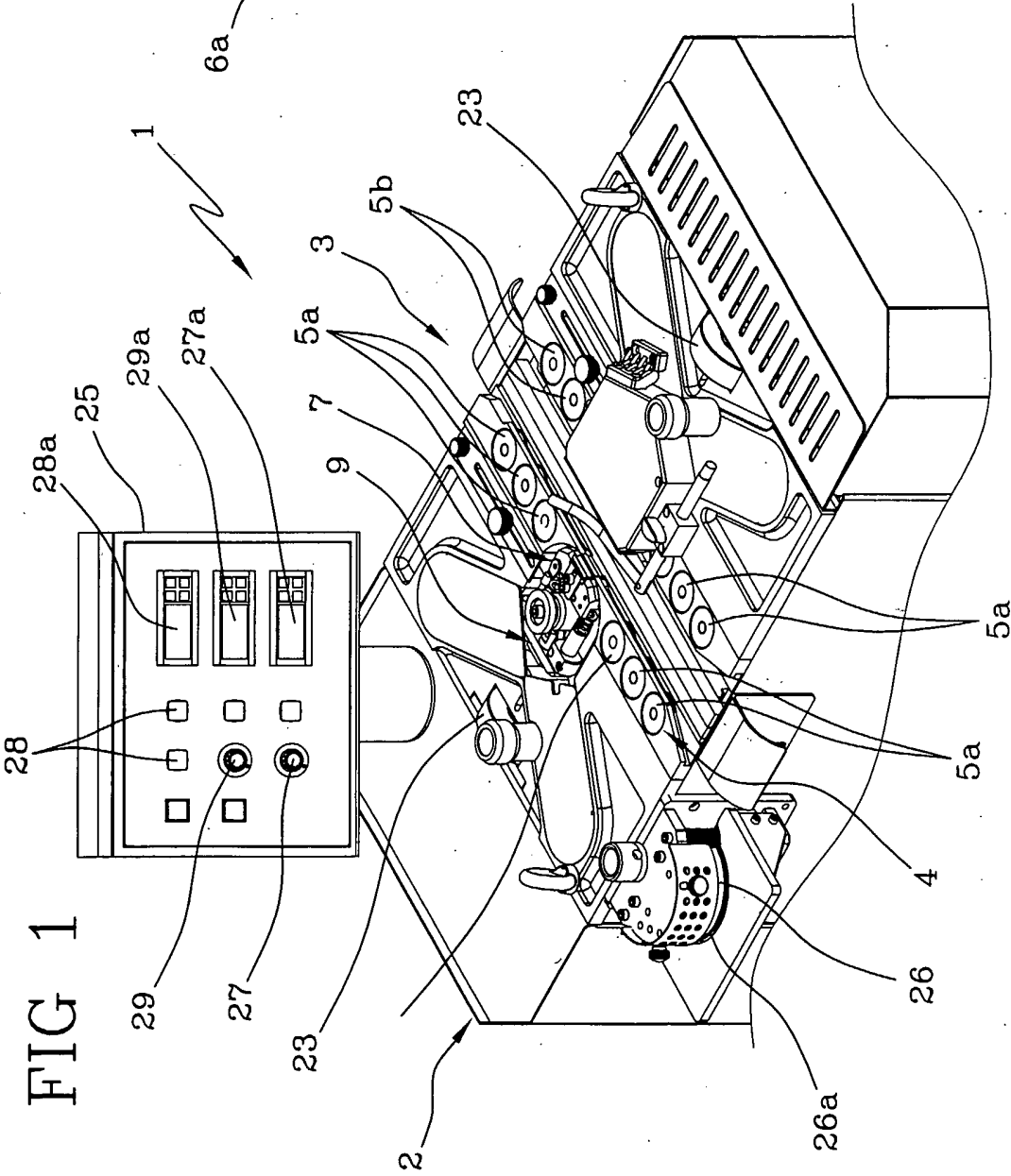
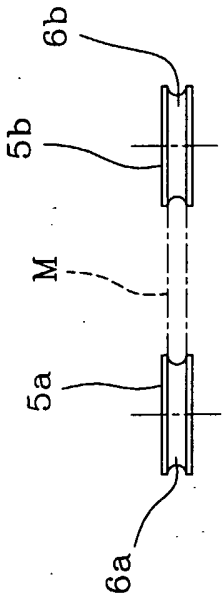
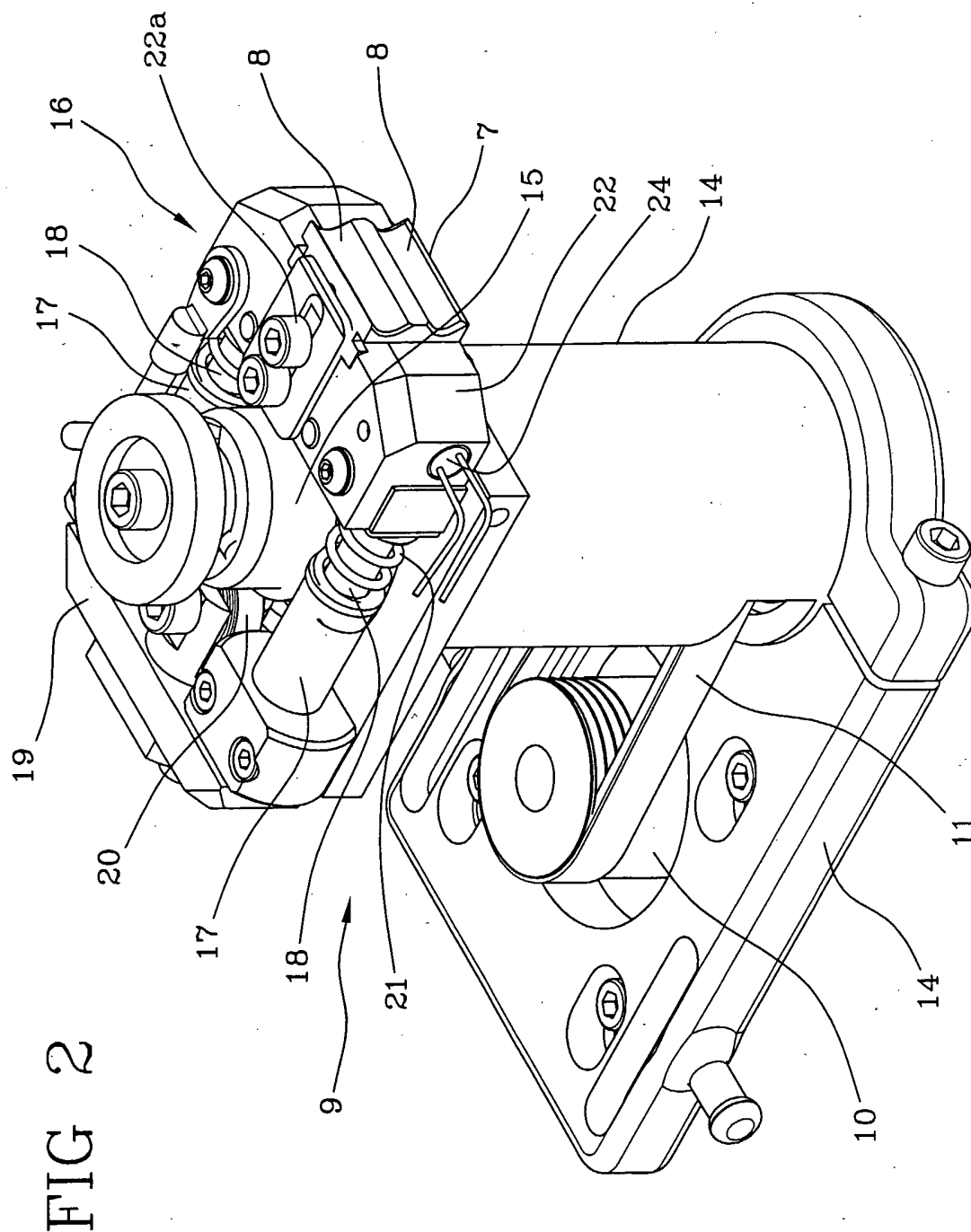


FIG 5





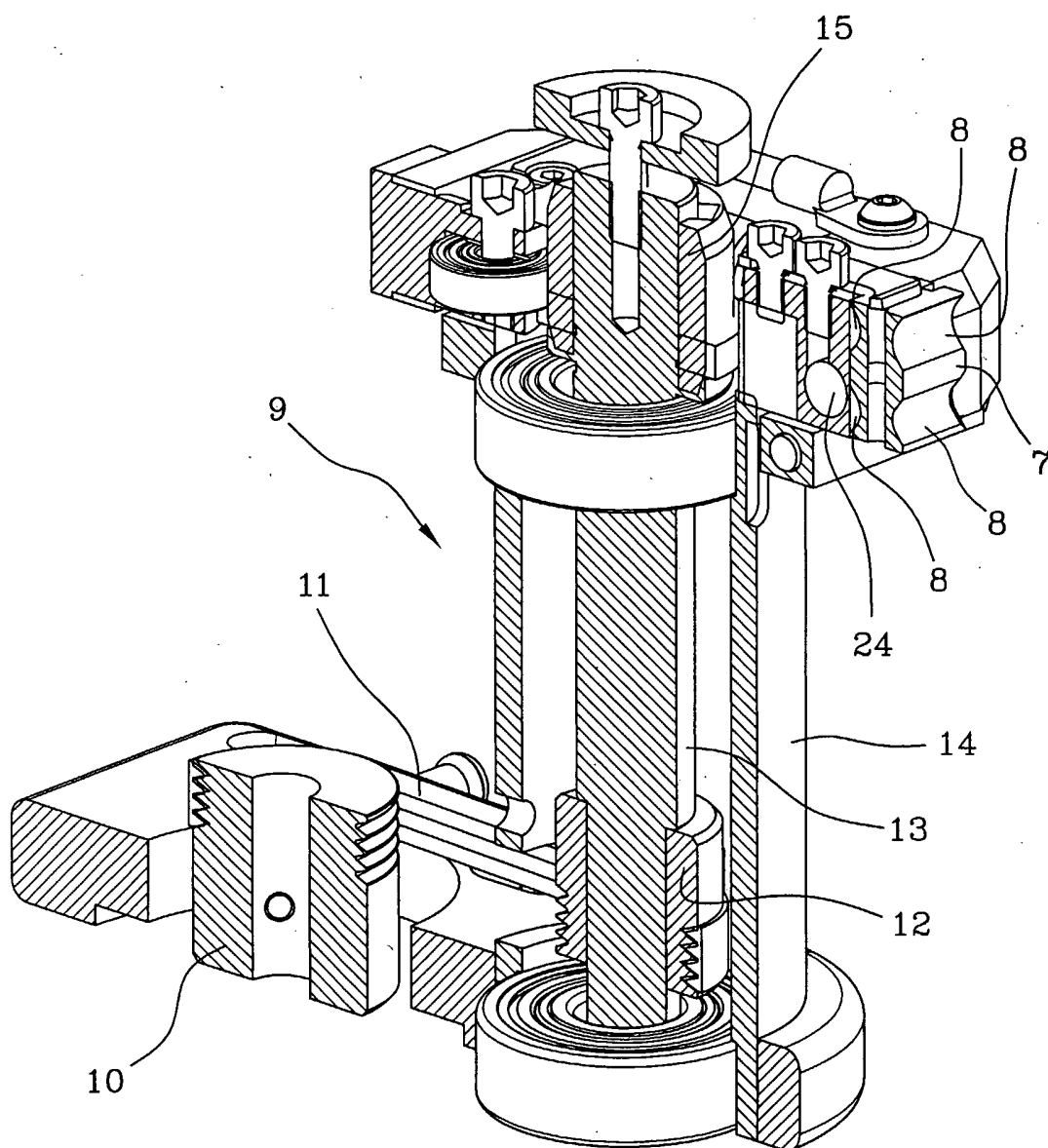
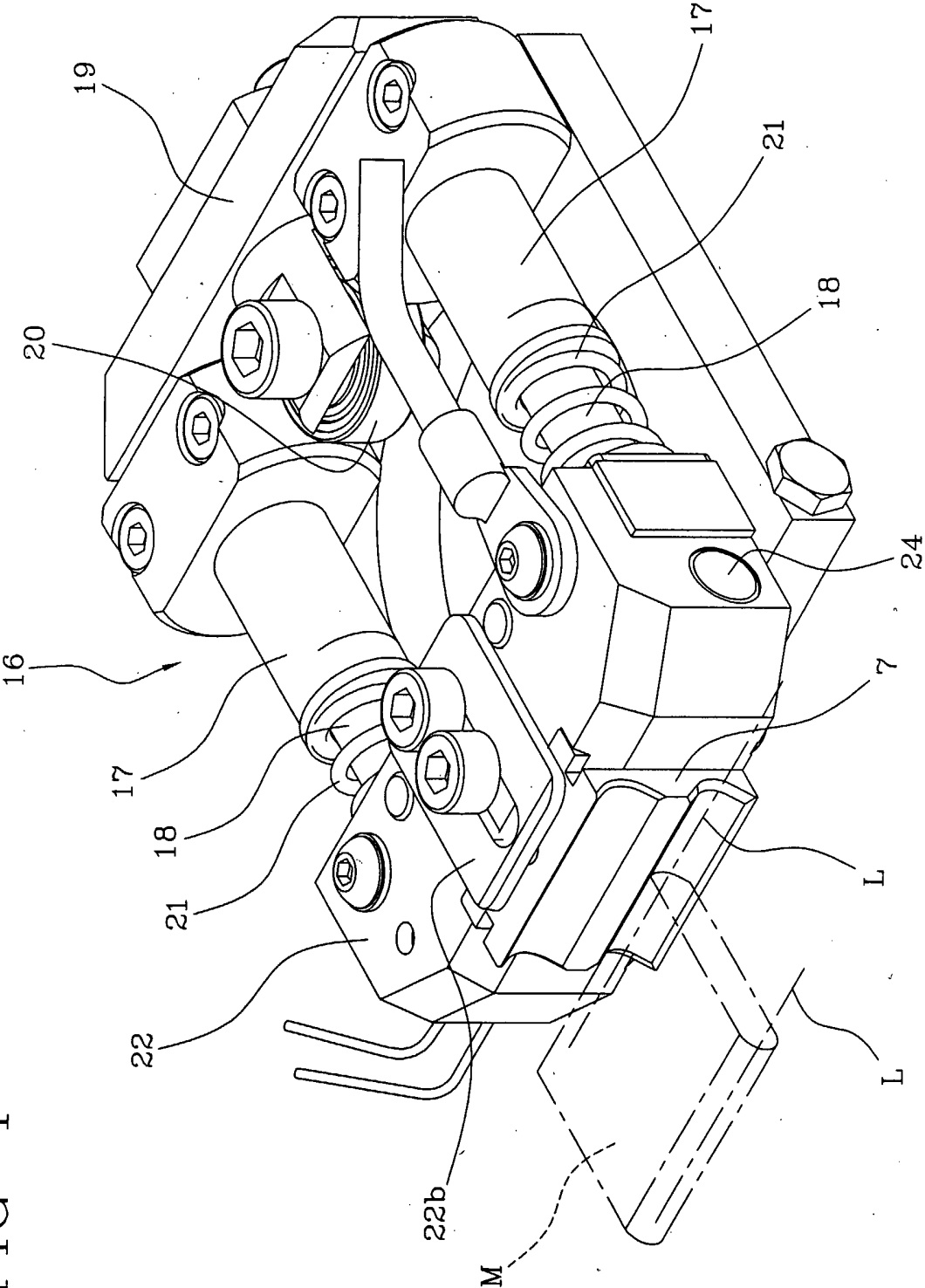
3/4  
FIG 3

FIG 4



## INTERNATIONAL SEARCH REPORT

International Application No

/IB2004/000478

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 7 C14B11/00 C14B9/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 7 C14B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                                  | Relevant to claim No.          |
|------------|-------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| X          | GB 421 981 A (UNITED SHOE MACHINERY CORP)<br>1 January 1935 (1935-01-01)<br><br>page 2, line 25 - page 3, line 30; figures<br>----- | 1, 4, 5,<br>7-11,<br>15-18, 25 |
| A          | WO 99/57327 A (GALLI S P A)<br>11 November 1999 (1999-11-11)<br>cited in the application<br>the whole document<br>-----             | 1, 15                          |



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

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