(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 512 773 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **92303990.3**

(22) Date of filing : **01.05.92**

(51) Int. Cl.[5] : **A43D 119/00,** A43D 25/18, A43D 37/00

(30) Priority : **08.05.91 GB 9109891**

(43) Date of publication of application : **11.11.92 Bulletin 92/46**

(84) Designated Contracting States : **DE GB IT**

(71) Applicant : **British United Shoe Machinery Limited**
P.O. Box 88 Ross Walk Belgrave
Leicester LE4 5BX (GB)

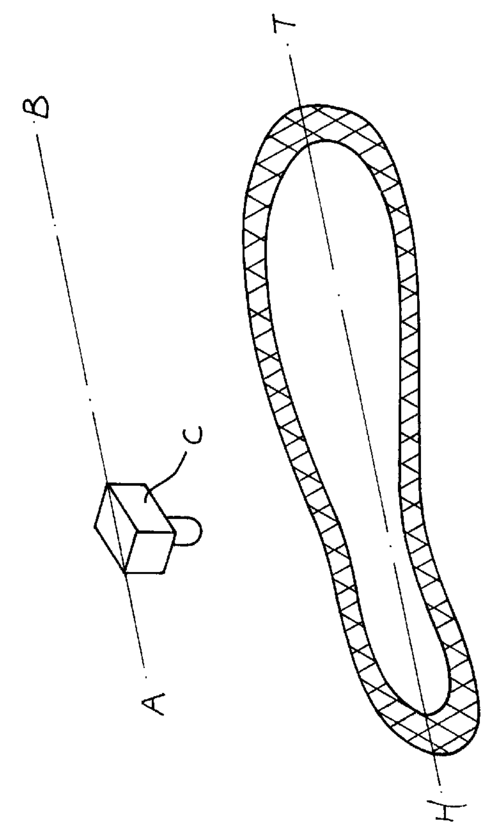
(72) Inventor : **Lansdown, Edward John**
8 Forest Rise
Oadby, Leicester LE2 4FH (GB)
Inventor : **Reedman, David Creyke**
The Cottage, Wartnaby
Melton Mowbray, Leicestershire (GB)

(74) Representative : **Atkinson, Eric**
c/o British United Shoe Machinery Limited
P.O. Box 88 Ross Walk
Belgrave Leicester LE4 5BX (GB)

(54) Apparatus for operating progressively along selected portions of shoe uppers.

(57) An apparatus for roughing and subsequently applying adhesive to selected portions of a shoe upper, e.g. marginal portions of the bottom of a lasted shoe, has a camera (C) by which the roughed region is scanned and, from such scanning, the extent and also degree of rough are determined and stored as digitised information. From this information firstly the acceptability of the roughing operation is determined, by comparison with a stored model, and secondly the path along which adhesive is to be applied is established so as to ensure that adhesive is applied only to the roughed region.

FIG_1



EP 0 512 773 A1

This invention is concerned with apparatus for operating progressively along selected portions of shoe uppers, more particularly apparatus for roughing and thereafter applying adhesive to selected portions of shoe uppers.

Various individual apparatuses are known for performing progressive operations along portions of shoe uppers. For example, there is described in EP-A 0 043 645 apparatus for performing a progressive roughing operation upon marginal portions of shoe bottoms, while in EP-A 0 351 993 is described, in a first embodiment, an apparatus for applying adhesive progressively to marginal portions of shoe bottoms. Also described in this latter publication, in a second embodiment, is an apparatus for performing a roughing operation progressively along sidewall portions of lasted shoes, and furthermore, it is envisaged in this publication that an adhesive-applying operation may also be performed progressively along sidewall portions of lasted shoes.

Each of these apparatuses comprises a shoe support, tool supporting means, and means, including a plurality of n.c. motors, for effecting relative movement between the shoe support and the tool supporting means in directions extending lengthwise, widthwise and heightwise of a shoe supported by the shoe support, whereby to cause a tool supported by the tool supporting means to operate progressively along marginal portions of such shoe, together with processor means for controlling the operation of said n.c. motors in accordance with a programmed instruction, comprising a data set including digitised coordinate axis values, using three coordinate axes, for a plurality of successive selected points along the marginal portions of the shoe. (By the phrase "n.c. motor" where used herein is to be understood a motor the operation of which is controlled by control signals supplied thereto in accordance with digitised information appropriate to the desired operation of the motor. Examples of such motors are stepping motors and d.c. servo motors.)

For providing the programmed instruction, furthermore, each apparatus has a path-determining mode of operation in which a tool is moved successively to selected points along the marginal portions of the shoe under operator control, the coordinate axis values for each such selected point being "taught" and stored to form part of the required data set. It will of course be appreciated that for each style of shoe a separate data set is required, but in general each of the aforementioned apparatuses has a grading programme whereby, for a given style, all sizes within that style can be operated upon using the same data set, and in addition the same "taught" data can be used for left and right shoes.

In the manufacture of shoes the processes of roughing and adhesive application or, in certain cases, application of a primer, go hand-in-hand, the purpose of the roughing operation being essentially to prepare the surface for the application of adhesive (or primer) to it. Consequently, it is desirable that adhesive is applied only to those areas which have been roughed. Moreover, bearing in mind that in the roughing operation it is very desirable to ensure that the outer boundary of the roughed region is accurately controlled, since on the one hand if the boundary of the roughed region projects beyond the region to which a further shoe component, e.g. in the case of a shoe bottom, a sole unit, is to be attached, then the exposed roughed region will provide an unsightly appearance in the finished shoe, while on the other hand if the roughed region falls short of the region to which the shoe component is to be secured, then there is likely to be a perceptible gap between the component and the shoe upper which will not only be unsightly but also could allow e.g. water to penetrate into the shoe.

Using the apparatuses referred to above which are commercially available the operator has an opportunity between the roughing and subsequent adhesive-applying operations to inspect the shoe bottom with a view to ensuring that the roughing operation has been performed satisfactorily prior to subjecting the shoe to a subsequent adhesive-applying operation. In cases where the roughing is deficient, it is then possible for the operator to "touch up" the roughing of the shoe by manual presentation to a suitable roughing device. In the case where the deficiency in roughing arises from a defect in the programmed instruction, furthermore, it is possible for the operator to "edit" the digitised information in order to correct for such deficiency. Under such circumstances, however, unless the operator then also corrects the digitised information for controlling the adhesive-applying operation, the roughing region and the region to which adhesive is subsequently applied will not coincide.

Whereas in the foregoing discussion reference has been made merely to marginal portions of shoe bottoms and to sidewall portions thereof, together with a subsequent adhesive-applying operation thereto, it will be appreciated that wherever it is necessary to apply adhesive to a shoe component which is provided with some form of finish, it is likely that a prior roughing operation will be necessary in order to achieve adequate bond between the shoe component and a further component which is to be secured thereto by the adhesive. Thus, it can also be envisaged that similar problems will arise where the shoe component is located in a flat condition for the application thereto of a further component.

It is thus one of the various objects of the present invention to provide an apparatus for roughing and thereafter applying adhesive to selected portions of shoe uppers, whether in a flat condition or in a formed condition, e.g. a lasted shoe, wherein the region of a shoe upper which has been roughed is thereafter reliably coated with adhesive with particular reference to the boundary of the roughed region.

The invention thus provides, in one of its several aspects, an apparatus for roughing and thereafter applying adhesive to selected portions of shoe uppers comprising a shoe support, tool supporting means, and means, including a plurality of n.c. motors, for effecting relative movement between the shoe support and the tool supporting means, along at least two coordinate axes, whereby to cause a tool supported by the tool supporting means to operate upon a selected portion of a shoe upper supported by the shoe support progressively along a desired path, together with processor means for controlling the operation of said n.c. motors in accordance with a programmed instruction, comprising a data set including digitised coordinate axis values, using said at least two coordinate axes, for a plurality of successive selected points along the desired path, the apparatus further comprising an optical scanning device, operable after a roughing operation has been effected, for scanning the region which has been roughed and for supplying information to the processor means relating to such region as scanned, and the processor means determining, from such information, the location of a boundary of such region and creating a data set including digitised coordinate axis values for a plurality of points along such boundary, such data set constituting a, or part of a, programmed instruction for controlling the path of an adhesive-applying tool whereby adhesive is applied to the previously roughed region up to said boundary thereof.

It will be appreciated that, using the apparatus in accordance with the invention, therefore, the path followed by an adhesive-applying tool is now dependent upon the region which has been roughed, as scanned by the optical scanning device. Thus, once the region to be roughed has been satisfactorily determined, it is now possible, without the degree of pre-programming previously required, to ensure that the same region, particularly in relation to its boundary, is reliably coated with adhesive.

The invention is especially, but not exclusively, suitable for use in an apparatus wherein relative movement is effected between the shoe support and tool supporting means along three coordinate axes, and each data set includes digitised coordinate axis values, using said three coordinate axes, for the selected points along the path of such movement. Thus, the invention further provides, in another of its several aspects, an apparatus for roughing and thereafter applying adhesive to marginal portions of lasted shoes comprising a shoe support for supporting a lasted shoe, tool supporting means and means, including a plurality of n.c. motors, for effecting relative movement between the shoe support and the tool supporting means, in directions extending lengthwise, widthwise and heightwise of a shoe supported by the shoe support, whereby to cause a tool supported by the tool supporting means to operate progressively along marginal portions of such shoe, together with processor means for controlling the operation of said n.c. motors in accordance with a programmed instruction, comprising a data set including digitised coordinate axis values, using at least two coordinate axes, for a plurality of successive selected points along the marginal portions of the shoe, the apparatus further comprising an optical scanning device operable after a roughing operation has been effected, for scanning the region which has been roughed and for supplying information to the processor means relating to such region as scanned, and the processor means determining, from such information, the location of an outer boundary of such region and guiding an adhesive-applying tool along the marginal portions of a shoe supported by the shoe support whereby adhesive is applied to the previously roughed region up to said outer boundary thereof.

It can be envisaged that the apparatus comprises a single shoe support and the tool supporting means is arranged to support both roughing means and also adhesive-applying means. In such a case relative movement between the tool supporting means and the shoe support takes place in such a manner that two operating "passes" are effected over the shoe bottom, firstly by the roughing tool and thereafter by the adhesive-applying tool. Moreover, in such a case the same programmed instruction may be used for each "pass", subject to modification in the second "pass" in accordance with information supplied by the scanning device.

Alternatively, the apparatus may comprise a first, roughing, station and a second, adhesive-applying, station, each of the stations comprising a shoe support, tool supporting means and means for effecting relative movement as aforesaid therebetween. Moreover, each such station may be provided by one of the commercially available apparatuses referred to above. Again in such an apparatus the same programmed instruction may be provided for both the roughing and the adhesive-applying operations. Thus, in this case only a path-determining operation of the roughing apparatus need be effected and the data set thus provided may then be used to control not only the roughing apparatus but also the adhesive-applying apparatus. In such a case, furthermore, in accordance with the invention for controlling the path of the adhesive-applying toolthe data set, constituting the, or part of the, programmed instruction, is modified by the processor means in accordance with the information supplied thereto as aforesaid by the optical scanning device. In this way, therefore, the data set representing the general outline of the path of the tools is modified, after the roughing tool has executed its operation, so as to ensure that the adhesive-applying tool causes adhesive to be applied over the roughed region up to the boundary thereof.

In an alternative embodiment of the invention, on the other hand, individual programmed instructions may be provided for the roughing and the adhesive-applying operations. In this case, also, nevertheless, the data set constituting the, or part of the, programmed instruction for the adhesive-applying operation is modified by the processor means in accordance with the information supplied thereto as aforesaid by the optical scanning device.

In each of the various commercially available apparatuses referred to above, and as disclosed in the aforementioned EP publications, the data set for controlling the path of a tool supported by the tool supporting means also includes information which relates to the angular disposition of the tool in relation to the shoe upper at the selected points and which controls said angular disposition during the operation on the shoe upper. Thus, in the case of the shoe bottom roughing apparatus, the tool is mounted on a holder for pivotal movement about an axis which extends transversely of the shoe bottom and which passes through the operating surface of the tool, i.e. the portion of the tool surface in engagement with the shoe bottom. In the adhesive-applying apparatus and also the sidewall roughing apparatus, on the other hand, not only is the tool mounted for pivotal movement about an axis extending transversely of the bottom of a shoe being operated upon, which axis intersects the axis of rotation of the tool, but also the tool is mounted for pivotal movement about an axis which extends in a direction lengthwise of the shoe bottom and also passes through the point of intersection of the axis of rotation of the tool and said transverse axis. In the apparatus in accordance with the present invention, such pivotal movement for angularly disposing the adhesive-applying tool in relation to the shoe upper is also provided, and moreover such information relating to the angular disposition of the tool is not modified by the processor means in accordance with information supplied by the optical scanning device. Thus, for example, in the case of the adhesive-applying apparatus where X-, Y- and Z-axis movement together with pivotal movement about transverse and lengthwise axes is under the control of a predetermined programmed instruction, the pivotal movement of the tool about the intersecting axes (i.e. the "tilt movement" and also the "camber movement") is retained regardless of any modification of the three coordinate axis values.

By retaining the information relating to the angular disposition of the tools unmodified in this way, the optical scanning device may remain a relatively simple device which effectively detects only the X- and Y-axis dimensions and also the Z-axis dimension. Thus, the optical scanning device may comprise a line-following device which is carried by the tool supporting means of the adhesive-applying station and is progressively moved along said outer boundary by, and controls the operation of, the means for effecting relative movement between the tool supporting means and the shoe support of the adhesive-applying station, the line-following device and a tool supported by the tool supporting means being mounted in such a relationship with one another that the path followed by the tool enables adhesive to be applied to the previously roughed region as aforesaid. Alternatively, however, the optical scanning device may comprise a digital camera, e.g. a line scan camera, or may be a video camera; in either event the camera is of a conventional type, but in selecting such a camera it will be appreciated that a facility for identifying differences in texture of the surface of an article being scanned thereby will be required in order that the boundary of the roughed region with the unroughed area of the shoe upper can readily be detected.

Similarly, the processor means of the apparatus in accordance with the invention is wholly conventional, comprising a frame store, an image analysis facility and a texture identification facility. Especially where a line following device is used care must be taken to select processor means which can achieve the desired resolution in the relatively short time which is available. Similarly, in the case of a video camera or a digital camera, whereas the speed requirement is not of the same order as with the line-following device, nevertheless in order to ensure a relatively high productivity from the apparatus in accordance with the invention, a quick response in the identification of the boundary of the roughed area and the consequent provision of a data set, whether by modification of an existing data set or otherwise, is required of the selected processor means.

Using a camera with a texture-identifying facility, furthermore, it is possible also for the roughed region to be inspected using the optical scanning device prior to the initiation of an adhesive-applying operation, in order to determine whether the roughing operation has been performed adequately or not. Where a deficiency is sensed in the quality of the roughing operation, the processor means signals such deficiency and the adhesive-applying operation on the particular shoe is then prevented. Following any necessary action then by the operator, e.g. by way of a "touch-up" operation or a further pass through the roughing operation, the adhesive-applying operation can then be proceeded with. Where, on the other hand, the roughing and adhesive-applying stations are provided by separate apparatuses, e.g. the currently commercially available apparatuses, then either an automatic shoe transfer device may be provided from the shoe support of the roughing apparatus to that of the adhesive-applying apparatus, in which case again any inspection must be carried out using the optical scanning device which may, for this purpose, be located at a station intermediate the roughing and adhesive-applying stations. Alternatively, the shoes which have been roughed may be transferred manually to the adhesive-applying station, in which case the operator himself may inspect the quality of rough and take any remedial action which may be required prior to loading the shoe in the adhesive-applying apparatus.

Whichever system of inspection is provided, however, it will be appreciated that in accordance with the invention the programmed instruction for the adhesive-applying operation is determined, whether by modification of an existing programmed instruction or otherwise, according to the actual boundary of the roughed region.

By using the apparatus in accordance with the invention, it will be appreciated, the adhesive-applying operation can be implemented and adhesive be applied accurately to the roughed region up to the boundary thereof both reliably and consistently, without the requirement for the operator accurately to determine the path of the adhesive-applying tool. In this way, therefore, a significant productivity gain may be expected since effectively once the path-determining operation has been effected at the roughing station with the necessary accuracy of control, that accuracy can be automatically transferred to the adhesive-applying operation without further requirements on the operator's time.

Whereas the foregoing description has essentially referred to separate roughing and adhesive-applying stations, or indeed the use of separate apparatuses for the purpose, it will be appreciated that within the scope of the invention is also included a single-station apparatus where a roughing operation and an adhesive-applying operation are successively carried out on a shoe supported by a shoe support at said single station, and the tools used for the two operations may be mounted either on the same tool supporting means or indeed on individual tool supporting means. When a single-station apparatus is thus used, furthermore, it will be appreciated that, as already described, either a single programmed instruction may be used for both operations or alternatively two individual programmed instructions may be provided, one for roughing and the other for adhesive application, in the same manner as where two separate stations are provided.

In order to explain the invention in further detail, there now follows a description, to be read with reference to the accompanying drawings, of one apparatus in accordance with the invention for roughing and thereafter applying adhesive to marginal portions of shoe bottoms, which apparatus has been selected to illustrate the invention by way of non-limiting example.

In the accompanying drawings:-

Figure 1 is a diagrammatic representation showing a shoe bottom the heel-to-toe axis of which lies in the longitudinal central plane of the operating locality of an automatic bottom roughing machine, together with a linescan camera;

Figure 2 is a schematic representation indicating various steps, including image acquisition, image processing and signal generation, arising out of the scanning of the shoe bottom by the linescan camera; and

Figure 3 is a schematic representation by way of explanation of the image processing step indicated in Figure 2.

The apparatus in accordance with the invention, now to be described, is an apparatus for roughing and thereafter applying adhesive to selected portions of a shoe bottom and comprises two work stations one, a roughing station, of which comprises an apparatus of the type described in EP-A 0 043 645, and the second, an adhesive-applying station, of which comprises an apparatus as described in EP-A 0 351 993. In the case of each of these apparatuses, as already described above, a plurality of n.c. motors is provided for effecting relative movement between a shoe support and tool supporting means of the apparatus in directions extending lengthwise, widthwise and heightwise of a shoe supported by the shoe support thus to cause a tool supported by the tool supporting means to operate progressively along marginal shoes of the bottom of such shoe. For controlling the n.c. motors, furthermore, processor means is provided which is effective in accordance with a programmed instruction, comprising a data set including digitised coordinate axis values, using three coordinate axes, for a plurality of successive selected points along the marginal portions of the shoe bottom. Further details of the construction of these two apparatuses can be found by reference to the aforementioned specifications.

For effecting transfer of a shoe which has been roughed from the roughing station to the adhesive-applying station, either the shoes can be transferred by an operator or, and preferably, an automatic transfer device (not shown) may be provided.

The apparatus in accordance with the invention further comprises, in the particular case at the roughing station, a CCD linescan camera C between which and the shoe support (not shown, but designated 18 in the aforementioned specifications) at said station relative movement is arranged to take place in a direction along the longitudinal centre plane of the operating locality at said station, in the apparatus now being described the camera C is moved progressively along an axis parallel with the heel-to-toe axis HT of the shoe bottom, scanning the already roughed shoe bottom during such movement.

Instead of a linescan camera a video camera could be used instead, thereby eliminating the need for relative movement between the camera and the shoe support. On the other hand, because of the needs for high resolution using a video camera, the video camera would be costly, quite apart from any considerations of size of the camera and difficulties of mounting it appropriately adjacent or at the operating locality. Moreover, whereas in the apparatus in accordance with the invention now being described the camera C is located at the roughing station, it could equally be mounted at the adhesive-applying station or indeed at an intermediate station between the roughing and adhesive-applying stations. The main consideration in this regard relates to the need to maintain a relatively high productivity using this apparatus.

Turning to Figure 2, in an initial image acquisition step I during the progressive relative movement between the camera and the shoe support the shoe bottom is progressively scanned and, in accordance with the intensity of light received by each pixel in the linescan camera, a value in digital form is stored in a computer memory. At the end of the progressive scanning of the shoe bottom, therefore, a complete picture, in digitised form, of the shoe bottom is stored in the computer memory.

The levels of intensity of light received by the pixels are graded into a relatively small number. It will of course be appreciated that, according to the degree of roughing of the shoe bottom surface, the intensity of light falling on the pixels will vary. By thus distinguishing between grades of intensity, therefore, an indication of degree of rough is thereby established.

Thus, at the next step, image processing step II, from the stored digitised values the boundaries of the roughed region of the shoe bottom, and also the extent of the roughing, are determined. More particularly with reference to Figure 3, the image processing takes place by sampling a succession of small windows within the roughed region (step IIa). A preferred method of determining the texture parameters within each window (step IIb) is by the use of Haralick measures, a system which determines not only the degree of rough within the window, but also, by considering the relative intensity of neighbouring pixels, reduces textural features effectively to a mathematical value indicative of the degree of rough in any given area.

An alternative approach using Haralick measures would be the use of auto-correlation techniques.

After each window has been thus processed in respect of the extent of rough and also the degree of rough therewithin, a next window is then similarly sampled, the previously described steps again taking place (step IIc).

When all the windows within the roughed area have been thus sampled and processed (step IId), the results are compared with a mathematical model which is stored in the computer memory (step III, Fig. 2). By this comparison, firstly the degree of rough is compared and in the event that the actual degree of roughing is not comparable with the desired degree within predetermined tolerances, the shoe will be rejected and will not be transferred to the adhesive-applying station, the operator being alerted to the rejection of the shoe. Under such circumstances the operator can then manually "touch up" the deficient roughing or, if the roughing is significantly unsatisfactory, he can load the shoe once again at the roughing station for a further roughing operation to be performed thereon.

Alternatively, in the event that the overall degree of roughing is unsatisfactory, i.e. is unacceptably low, the machine may automatically initiate a further roughing operation on the shoe bottom.

At the same time, the comparison of the actual area of rough with the desired area of rough will indicate deviations, especially at the boundaries of the roughed area, between the two and these deviations, which are in the form of mathematical calculations, can then readily be applied as deviation factors to the data set for controlling the operation at the adhesive-applying station so that the path of the adhesive-applying tool be varied according to the deviations from the desired roughed area, as determined in the image processing steps and subsequent steps (step IV). In this way effectively a new data set is created, and indeed in an alternative embodiment predetermining the path of the adhesive-applying tool may be dispensed with and the data set be created for each tool path individually from the data obtained relating to the area of rough and in particular the boundaries of such area.

Whereas in the apparatus described above the sensing of the extent of rough and also the degree of rough is carried out essentially in order to control the subsequent operation of the adhesive-applying tool, it will also be appreciated that where consistently over a number of shoes the roughing operation proves to be deficient, either in terms of the extent of the roughing thereof or the degree of such roughing, by comparing the actual roughing with a desired roughing standard, corrective measures may be calculated by the computer and modifying signals be generated which are then supplied to the processor means of the apparatus at the roughing station in order to modify the path, along the relevant X-, Y- or Z-axis, as the case may be, thus to correct the deficiencies in the roughing.

It will thus be appreciated that, using the apparatus in accordance with the invention, provision is made for ensuring that adhesive is applied only to those areas of the shoe bottom which have previously been roughed, without the intervention of the operator. Furthermore, the degree of rough can also be examined between roughing and adhesive application, a feature the absence of which in previous proposals for a roughing and adhesive-applying apparatus has been regarded as a shortcoming.

APPENDIX

Figure 2:

I	=	Interface with Camera including Camera Drive - Image Acquisition, Digitisation and Storage.
II	=	Image Processing - Determining Boundaries of Roughed region and Degree of Roughing (see Fig. 3).
III	=	Compare Digitised Information with Stored Mathematical Model (relating to both Area of Rough and Degree of Rough).
IV	=	Modify Path of Tool at Adhesive-applying Station.

Figure 3:

IIa	=	Sample Image within Small Window
IIb	=	Compute Texture Parameters using Haralick Measures
IIc	=	Move to Next Small Window and Repeat Steps IIa and IIb
IId	=	When All Windows have been Sampled, go to Step III

Claims

1. Apparatus for roughing and thereafter applying adhesive to selected portions of shoe uppers comprising a shoe support, tool supporting means, and means, including a plurality of n.c. motors, for effecting relative movement between the shoe support and the tool supporting means, along at least two coordinate axes, whereby to cause a tool supported by the tool supporting means to operate upon a selected portion of a shoe upper supported by the shoe support progressively along a desired path, together with processor means for controlling the operation of said n.c. motors in accordance with a programmed instruction, com-

prising a data set including digitised coordinate axis values, using said at least two coordinate axes, for a plurality of successive selected points along the desired path, the apparatus further comprising an optical scanning device, operable after a roughing operation has been effected, for scanning the region which has been roughed and for supplying information to the processor means relating to such region as scanned, and the processor means determining, from such information, the location of a boundary of such region and creating a data set including digitised coordinate axis values for a plurality of points long such boundary, such data set constituting a, or part of a, programmed instruction for controlling the path of an adhesive-applying tool whereby adhesive is applied to the previously roughed region up to said boundary thereof.

2. Apparatus according to Claim 1 wherein relative movement is effected between the shoe support and tool supporting means along three coordinate axes, and each data set includes digitised coordinate axis values, using said three coordinate axes, for the selected points along the path of such movement.

3. Apparatus according to either one of Claims 1 and 2 wherein the same programmed instruction is provided for both the roughing and the adhesive-applying operations, but for controlling the path of an adhesive-applying tool the data set, constituting the, or part of the, programmed instruction is modified by the processor means in accordance with the information supplied thereto as aforesaid by the optical scanning device.

4. Apparatus according to either one of Claims 1 and 2 wherein individual programmed instructions are provided for the roughing and the adhesive-applying operations,
and wherein the data set constituting the, or part of the, programmed instruction for the adhesive-applying operation is modified by the processor means in accordance with the information supplied thereto as aforesaid by the optical scanning device.

5. Apparatus according to either one of Claims 3 and 4 wherein the data set for controlling the path of an adhesive-applying tool also includes information which relates to the angular disposition of the tool in relation to the shoe upper at the selected points and which controls such angular disposition during the adhesive-applying operation,
and wherein such information is not modified by the processor means in accordance with the information supplied by the optical scanning device.

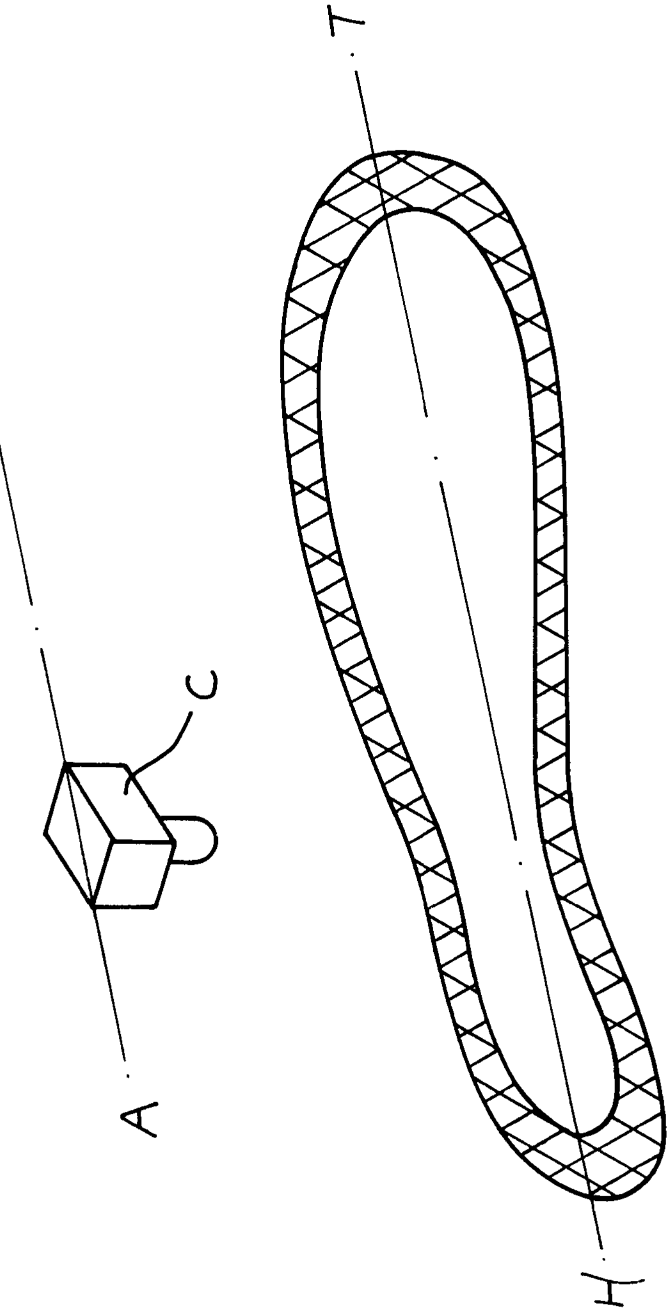
6. Apparatus according to any one of the preceding Claims wherein the optical scanning device is a line following device which is progressively moved along said outer boundary by, and controls the operation of, the means for effecting relative movement between the tool supporting means and the shoe support of the adhesive-applying station,
and wherein the line following device and a tool supported by the tool supporting means are mounted in such a relationship with one another that the path followed by the tool enables adhesive to be applied to the previously roughed region as aforesaid.

7. Apparatus according to any one of the preceding Claims have a first, roughing, station and a second, adhesive-applying, station, each of the stations comprising a shoe support, tool supporting means and means for effecting relative movement as aforesaid therebetween.

8. Apparatus according to Claim 7 when tied to Claim 6 wherein the optical scanning device is located at a station intermediate said first and second stations.

9. Apparatus according to Claim 7 when tied to Claim 6 wherein the optical scanning device is carried by the tool supporting means of the adhesive-applying station.

Fig_1



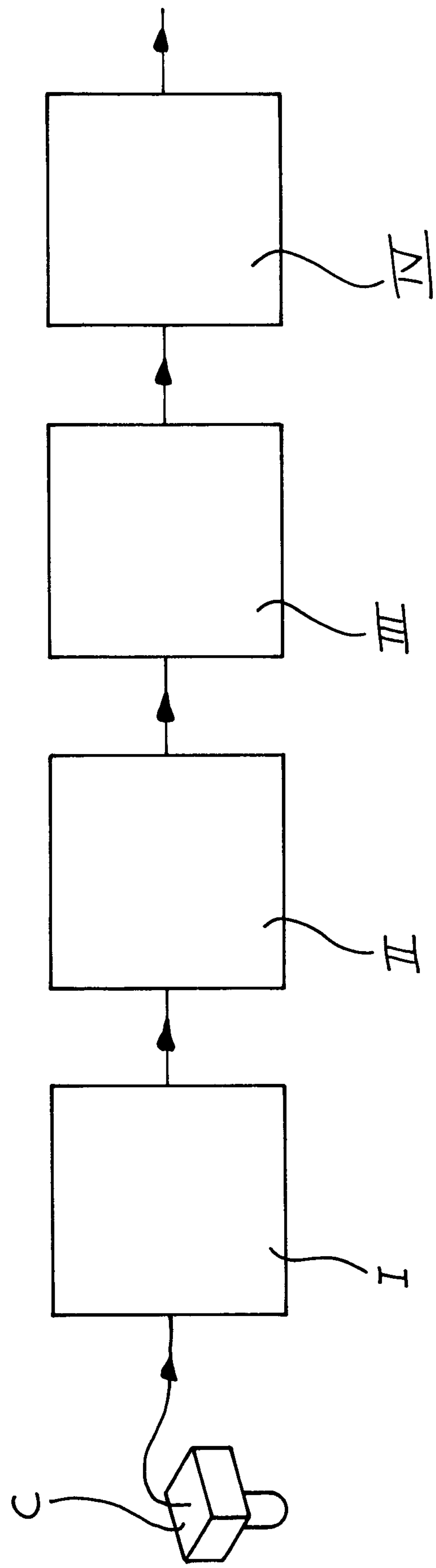


Fig-2

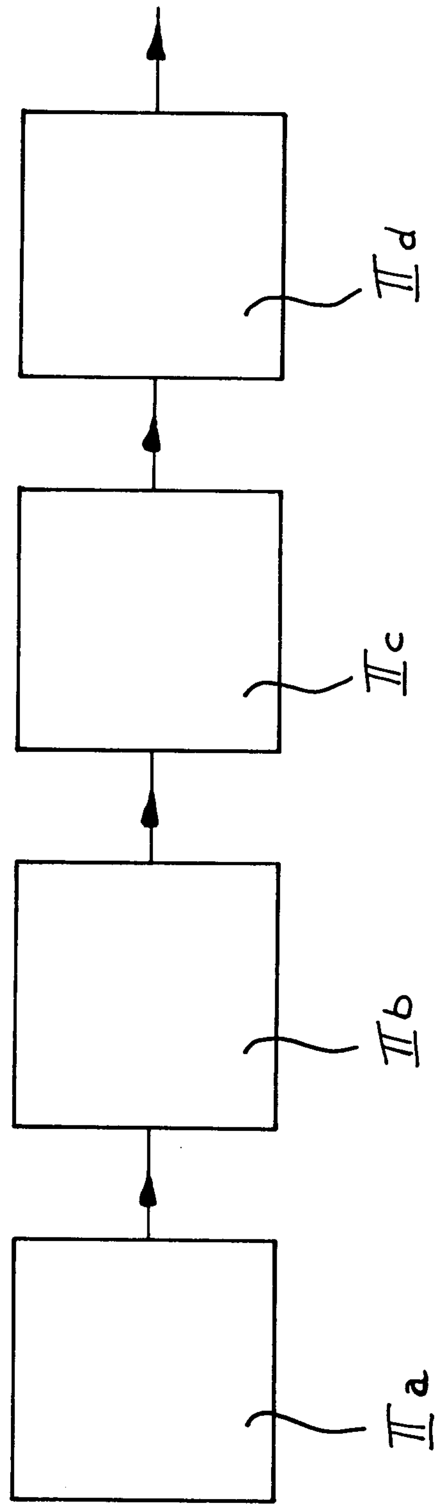


Fig. 3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 3990

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
P,X	WO-A-9 117 021 (TORIELLI ET AL.) * page 2, line 5 - line 24; claims; figure 1 *	1-9	A43D119/00 A43D25/18 A43D37/00
X	EP-A-0 336 671 (BRITISH UNITED SHOE MACHINERY) * column 1, line 53 - column 2, line 41 * * column 5, line 47 - column 6, line 6; claim 1; figure 1 *	1-9	
X	EP-A-0 340 695 (COMELZ SPA) * column 2, line 24 - line 35 * * column 5, line 5 - line 43; claims; figure 5 *	1-9	
X	FR-A-2 529 763 (ANVER SA) * page 2, line 17 - line 26; claims; figure 2 *	1-9	
A	GB-A-2 094 029 (TOVARNY STROJIRENSKE TECHNIKY KONCERN PRAHA)		
A	US-A-4 745 290 (FRANKEL ET AL.)		TECHNICAL FIELDS SEARCHED (Int. Cl.5) A43D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	30 JULY 1992	SOEDERBERG J.E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)