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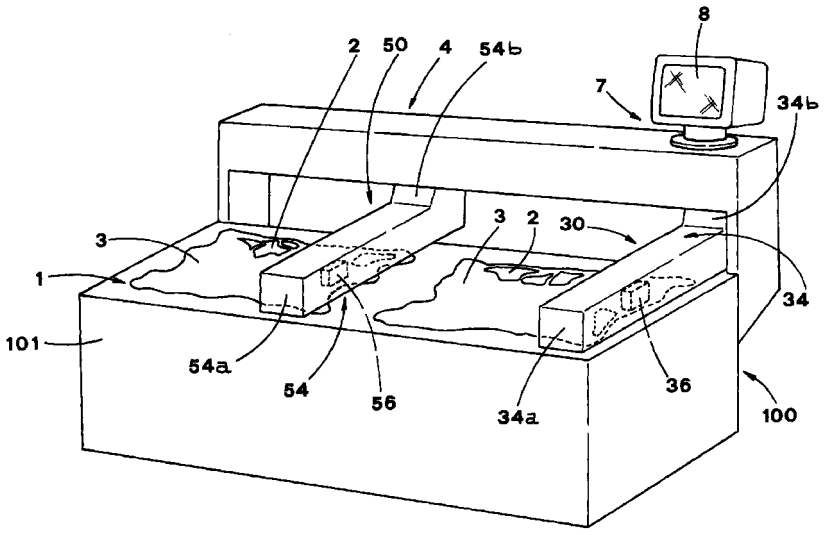
(54) Improved machine for cutting leather and the like

(57) A machine for cutting leather and the like includes a substantially horizontal working plane, on which at least one piece of leather (3) is spread in order to obtain corresponding components (2). The machine includes also processing means (7), which optimise the arrangement of the components (2) to be cut, on the piece of leather (3). The machine (100) includes also a base (101), to which a longitudinal horizontal support member (4), equipped with a guiding track (5), is fastened. The machine (100) includes also first cutting means (30) and second cutting means (50), supported slidingly by the support means (4) immediately over the working plane (1) and controlled by said processing means (7), and aimed at performing on said piece of leather (3) cutting and/or piercing operations. The first cutting means (30) and second cutting means (50), substantially coplanar, are equipped with driving means and are guided by the processing means (7) independently one from the other.

FIG.1



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Description

[0001] The present invention relates to machines for automation of production of articles obtained by working flat material, and in particular, the present invention relates to a machine for automatic cutting off the above mentioned articles, mainly in leather or similar materials, used principally in the production of footwear and other articles of leather.

[0002] As it is known, articles made of leather or similar materials, e.g. footwear, are usually obtained from a plurality of components made of leather or similar materials, suitably shaped and worked in relation to the article model and joined together by stitching.

[0003] The components are cut out from big leather pieces and then possibly decorated by series of holes or slits.

[0004] During production of one series of products, in particular footwear, a great number of parts of various shapes and sizes are produced, since many models of upper are produced and each upper is composed of several parts.

[0005] Furthermore, every shoe upper model is usually produced in different sizes and colors and, lastly, the parts of a right upper are symmetrical with the parts of a left one.

[0006] Cutting these parts must be very accurate, so as to guarantee high and constant production quality.

[0007] Another problem involved while cutting the pieces of the shoe uppers, relates to optimum exploitation of the material. As it has been already said, the parts are cut out from big pieces of leather, which usually have irregular shape and are always different. Therefore, it is necessary to plan and pre-set the number and best arrangement of the parts to be cut out every time, so as to occupy a surface of the leather piece as big as possible, without making component cutting areas overlap one another and reducing off-cuts.

[0008] This concerns substantially also most of the articles made of leather or similar materials.

[0009] Thus, it is obvious that the cutting operations are rather complicated and require a lot of resources.

[0010] These operations are carried out automatically by complex cutting machines helped by a processor, so as to improve the productivity and reduce use of specialized manpower, as well as operation time.

[0011] In particular, the cutting machines have heretofore been provided, as including a large working plane, over which an arm slides longitudinally and supports a tool carrying head, which moves along the arm.

[0012] The tools are moved along Cartesian axes on the entire surface of the working plane by a combined movement of the arm and the head.

[0013] The tools include bits of different thickness for making holes, particular blades for straight and curved cutting, and others.

[0014] The movable arm usually slides along one or more guides which extend parallel to the working plane.

[0015] The arm and the tools carrying head are driven by a computerised system of the machine according to known techniques of digital definition of the paths.

[0016] The driving commands are issued in response to data which define the profiles of various parts to be cut out, and which are stored in the above mentioned system.

[0017] The arrangement of the profiles can be set on a monitor by an operator, or can be automatically optimised by suitable calculation algorithms after the leather has been arranged on the working plane and after its outline and position have been scanned by known techniques.

[0018] The main limit for efficiency and productivity of the above mentioned machines derives from the speed of leather cutting and drilling operations.

[0019] In fact, all other operations, like complicated calculation of the best arrangement of the profiles and coding the driving commands for the arm and tool carrying head are carried out automatically by the machine processor.

[0020] Due to the current performance continuous and quick improvement of the electronic data processors, which can be compared only with their prices reduction, the processor unit carries out the above mentioned operations in much shorter time than the corresponding mechanical means.

[0021] From the other side, the linear velocity and acceleration of the arm and tool carrying head cannot be increased indefinitely because of inertia, control power and material resistance.

[0022] The main object of the present invention is that of providing a machine for cutting leather and the like, which makes optimum use of the machine controlling processor system, so as to obtain much better performance than the cutting machines used so far, and therefore, for improving the machine productivity and efficiency.

[0023] Another object of the present invention is to fulfil the above mentioned object by only small increase of the machine production cost.

[0024] A further object of the present invention is to obtain the above mentioned objects without affecting machine reliability, simplicity of use and maintenance operation.

[0025] The above mentioned objects are fully obtained in accordance with the invention as claimed.

[0026] The characteristic features of the present invention will become more fully apparent from the following detailed description, taken in conjunction with the accompanying drawings, in which:

- Figure 1 shows a schematic view of a machine obtained according to the present invention, in a usual working position;
- Figure 2 shows a schematic view, in crosswise section, of a possible sliding mechanism for arms of the

machine of Figure 1.

[0027] With reference to Figures 1 and 2 and to a preferred embodiment of the present invention, reference numeral 1 indicates a substantially horizontal working plane of a machine 100 used for cutting components 2 forming parts of articles made of leather or similar materials, such as shoe uppers, bags, leather garment and others.

[0028] One or more pieces of leather 3, indicated partially with broken line, are put on the working plane 1 to be cut, pierced and so on, in order to obtain the above mentioned components.

[0029] First cutting means 30 and second cutting means 50, situated over the working plane 1, are aimed at cutting, piercing and performing other operations on the pieces of leather 3, in a substantially independent way.

[0030] The machine 100 includes also a substantially parallelepiped base 101, whose top portion forms the above mentioned working plane 1, that is located at such level as to allow an operator to have an easy access to it.

[0031] A longitudinal horizontal member 4, fastened along one of the longer sides of the base 101, supports slidingly in known way the first cutting means 30 and the second cutting means 50, which are substantially coplanar.

[0032] The machine 100 includes also a processor unit 7, which controls the machine working cycle. The processor units also have stored therein the digitised shape data of all components 2 to obtain, and also a known program for optimising the arrangement of the profiles of the component 2 on the piece of leather 3 and for automatically guiding the first cutting means 30 and the second cutting means 50.

[0033] The processor unit 7 is suitably equipped with a monitor 8, which allows the operator to follow and possibly modify all the operations performed by the machine 100, and with a keyboard or other means for data input, not shown for simplicity's sake.

[0034] The first cutting means 30 include a first driving arm 34, horizontal and transversal to the working plane 1, for driving a first tool carrying head 36.

[0035] The first tool carrying head 36 slides along the first driving arm 34, over the entire surface of the working plane 1, to cut and pierce the piece of leather 3 according to predetermined shapes and paths.

[0036] The first driving arm 34 (see also Figure 2) includes a substantially straight horizontal portion 34a, and a connecting portion 34b, made in the above mentioned horizontal portion 34a at the end of this latter closer to the longitudinal member 4.

[0037] The connecting portion 34b engages slidingly, by substantially known sliding means 35, a guiding track 5, situated inside the longitudinal member 4.

[0038] The first driving arm 34 and the first head 36 are operated, according to known techniques, by suitable motor means, not shown, which are controlled, as has been already said, by the processor unit 7.

[0039] The second cutting means 50 include a second driving arm 54, similar to the above described first driving arm 34, and a second tool carrying head 56, similar to the first tool carrying head 36.

[0040] The connecting portion 54b of the second driving arm 54 engages slidingly, by means of related sliding means 55, the same guiding track 5, while the horizontal portion 54a of the second driving arm 54 supports the above mentioned second tool carrying head 56.

[0041] Also the second driving arm 54 and the second tool carrying head 56 are operated, according to known techniques, by suitable motor means, not shown, which are controlled by the processor unit 7.

[0042] Each of the above mentioned operating means of the first driving arm 34 and the second driving arm 54 can include e.g. a ball screw in engagement with a corresponding powered rotating lead nut.

[0043] Power means of this type are commonly used in traditional leather cutting machines.

[0044] In this case, the motor means of the first driving arm 34 and of the second driving arm 54 can advantageously use the same ball screw, which obviously reduces the production and maintenance costs.

[0045] Obviously, the above described configuration is a pure example, therefore other configurations, like the presence of further independent cutting means controlled by the processor unit 7, or further tool carrying heads in each driving arm 34,54, remain within the protective scope of the invention.

[0046] The machine 100 works with one or more pieces of leather 3 placed on the working plane 1.

[0047] The first driving arm 34 and the second driving arm 54, with the respective tool carrying heads 36, 56, are situated in different dwell areas of the working plane 1, so as not to interfere with the operations of placing the pieces of leather 3.

[0048] At this point, scanning of the leather 3 shapes, choosing of the component profiles 2 to be cut and/or pierced, and optimising of the arrangement of the pieces of leather 3 are carried out in a known way, automatically or by an operator.

[0049] Then, the processor unit 7, using a suitable program stored therein, prepared according to known programming techniques, elaborates separate driving commands for the first cutting means 30 as well as for the second cutting means 50.

[0050] Since the first cutting means 30 and the second cutting means 50 are equipped with wholly independent power means, the paths of the first tool carrying head 36 and the second tool carrying head 56 are practically independent one from the other.

[0051] In fact, the first cutting means 30 and the second cutting means 50 are limited only by the fact that the first driving arm 34 and the second driving arm 54 slide on the same guiding track 5, and consequently,

they cannot be placed one upon the other or step one over the other.

[0052] This limitation practically does not influence the tool carrying heads operations, because the program of the processor unit 7 can easily issue to each of the heads commands for cutting and/or piercing components arranged in different areas of the piece or pieces of leather 3.

[0053] It is also to be noted that the presence of two driving arms 34, 54 allows to obtain much bigger operative independence with respect to e.g. two or more tool carrying heads sliding on the same arm, because each of the above mentioned tool carrying heads can move almost completely autonomously on both cartesian axes.

[0054] Therefore, the machine 100 speed of cutting and piercing of the profiles 2 is practically doubled and the total productivity of the machine 100 increases considerably, since the presence of more cutting means 30, 50 allows to use better the processor unit 7 capacity for preparing simultaneously two or more different components arranged in any way on the piece of leather.

[0055] The performance improvement is obtained also with a small increase of the machine 100 production costs, especially if all provided cutting means 30, 50 use the same support and guiding means.

[0056] Another advantage of the proposed machine derives from the fact that the cutting means are identical, therefore the maintenance costs are low and the reliability of the machine 100 increases.

Claims

1. Machine for cutting leather and the like including:

at least one substantially horizontal working plane, which forms the top portion of the base (101) of said machine (100), and on which at least one piece of leather (3) is spread in order to obtain corresponding components (2);
processing means (7) for optimising an arrangement of said components (2) to be cut, on said piece of leather (3);
said machine (100) being characterised in that it includes also:
support means (4), which are fastened to said base (101), and which are substantially parallel to said working plane (1) and extend over the whole length thereof;
at least first cutting means (30) and second cutting means (50), supported slidingly by said support means (4) over said working plane (1) and controlled by said processing means (7), and aimed at performing on said piece of leather (3) cutting and/or piercing operations, with said first cutting means (30) and second cutting means (50) being equipped with driving means and being guided by said processing means (7) independently one from the other.

2. Machine according to claim 1, characterised in that said support means (4) include only one guiding track (5), on which said first cutting means (30) and second cutting means (50) are slidingly mounted.

3. Machine according to claim 1 and 2, characterised in that said first cutting means (30) and second cutting means (50) are identical.

4. Machine according to any of previous claims, characterised in that said first cutting means (30) include a first driving arm (34), horizontal and transversal to the working plane (1), including a horizontal portion (34a), which supports slidingly at least one first tool carrying head (36), and a connecting portion (34b), aimed at engaging slidingly said support means (4).

5. Machine according to one of the claims from 1 to 4, characterised in that said second cutting means (50) include a second driving arm (54), horizontal and transversal to the working plane (1), including a horizontal portion (54a), which supports slidingly at least one second tool carrying head (56), and a connecting portion (54b), aimed at engaging slidingly said support means (4).

6. Machine according to claim 4 or 5, characterised in that said horizontal portions (34a,54a) of said first driving arm (34) and second driving arm (54) are situated over said working plane (1), substantially coplanar.

FIG.1

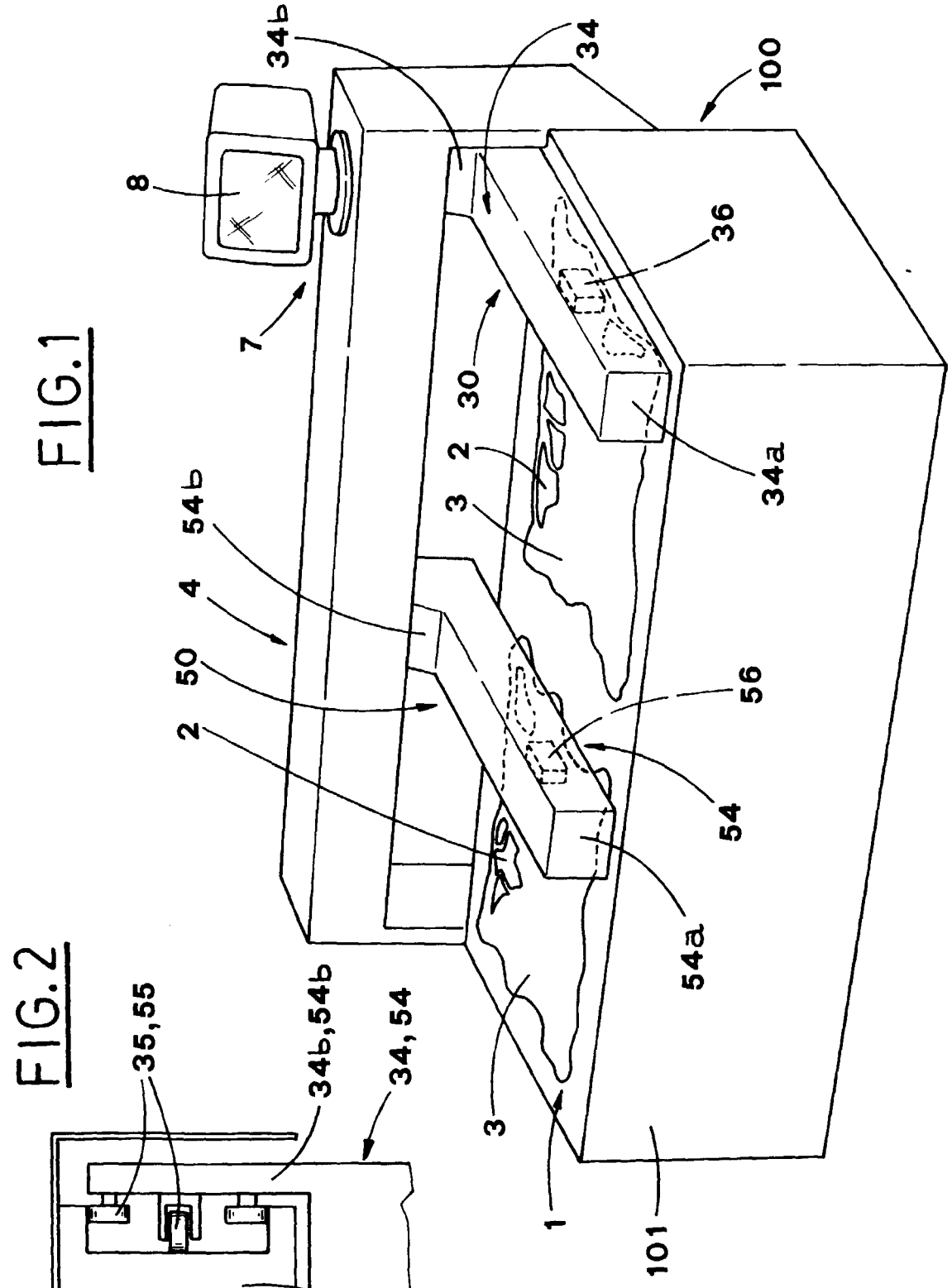
34b
34
100
8
36
7
30
2
34a
3
54b
4
50
56
2
54
54a
3
1
101

FIG.2

35,55
34b,54b
34,54
5
4
35,55
34a,54a

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 11 7405

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.7)
X	DE 38 09 630 C (DÜRKOPP SYSTEMTECHNIK) 18 May 1989 (1989-05-18) * the whole document *	1,3-6	C14B5/00
X	DE 197 19 196 A (BRUDER) 13 November 1997 (1997-11-13) * the whole document *	1,3-6	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

C14B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 June 2000	De Rijck, F

CATEGORY OF CITED DOCUMENTS

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06-06-2000

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3809630 C	18-05-1989	DD 283578 A	17-10-1990
		DE 58907540 D	01-06-1994
		EP 0334044 A	27-09-1989
		ES 2051902 T	01-07-1994
		JP 1274997 A	02-11-1989
		JP 2676627 B	17-11-1997
		SU 1644714 A	23-04-1991
		US 4994979 A	19-02-1991
DE 19719196 A	13-11-1997	NONE	

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