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I-33100 Udine(IT)(54) **System to cut textile surfaces and the like with a jet of fluid.**

(57) System to cut surfaces (13) of various materials and, in particular, textile surfaces and the like, the surfaces (13) being positioned on a work surface (12) of a cutting table (10) advantageously having a rectangular geometric shape, the system comprising a fluid-jet cutting head (11) which is slidably connected to a support element (15) secured to the cutting table (10) and is able to slide parallel to, and along the periphery of, one of the two longer sides of the table (10) along the whole extent of the table (10), the surfaces (13) to be cut cooperating with an engagement unit (17) that displaces those surfaces (13) on the work surface (12) in a direction orthogonal (19) to the direction of sliding (18) of the fluid-jet cutting head (11) on the support element (15).

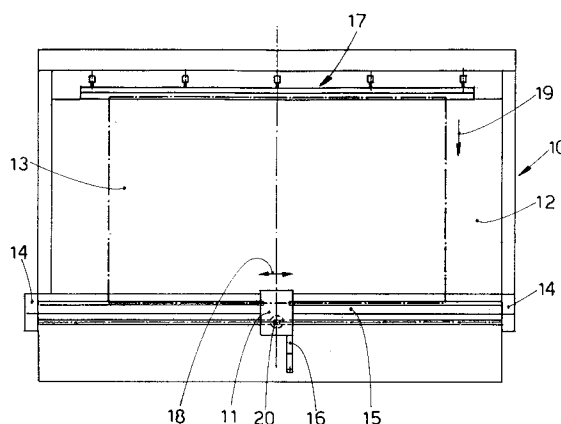


fig. 1

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This invention concerns a system to cut textile surfaces and the like with a jet of fluid. To be more exact, the invention concerns a cutting system consisting of a table equipped with a cutting head employing a jet of fluid; the head runs along a support secured to the table and moves parallel to one of the sides of the table, whereas the textile surface is fed in a direction at a right angle to the direction of movement of the cutting head employing the jet of fluid.

The invention is used in the automatic cutting of textile and other surfaces such as hides, leather, etc. for instance and is also employed in cooperation with a connected system that monitors the details of models.

The state of the art covers a plurality of systems and equipment suitable for the cutting of textile surfaces and of materials which can be likened thereto such as hides, leather, etc.

Manifold specific devices are also known which employ various cutting systems and cooperate with suitably equipped tables.

In general the state of the art includes a cutting head slidably connected to a support which can move in a direction at a right angle to the movement of sliding of the cutting head.

The support moves in relation to the work surface of the table on which the material to be cut is positioned immovably.

A configuration of this type entails a plurality of working problems, particularly so where the cutting head has to be operated by hand, as may happen in given processes or special cases and particularly when the cutting heads work with fluids at very high pressures.

The invention is set forth in the main claim, while the dependent claims describe various features of the invention.

The present applicant has the purpose of embodying a highly versatile cutting system whereby the machine operator also has ready access to the textile surface on which he has to work.

Such accessibility has to be ensured also where the surfaces to be cut are of considerable dimensions, as is required by the market.

The surfaces to be cut are preferably of a textile type but can also consist of other materials, and therefore the cutting head must possess requirements of great flexibility and cutting capacity.

A further purpose is to embody a cutting system able to work in connection with systems that monitor the details of models, so that the system can perform automatically all the cutting operations in conformity with the model thus monitored.

The system has also to be able to perform manual cutting of the surfaces in question.

The above purposes are achieved by employing a cutting table to which a support element for a

cutting head is fixed above the work surface and peripherally to one of the sides of the work surface.

The work surface is normally of a rectangular type and the support element is fixed along the whole extent of, and parallel to one of the two longer sides of, the work surface.

A cutting head employing a fluid jet is connected to the support element and can run along that element.

The cutting head is substantially a device with a terminal nozzle able to deliver a flow of fluid at very high pressures of the order of 2000-4000 atmospheres.

The fluid may be merely water or water mixed with an abrasive or be of yet another type.

The cutting head works in cooperation with collecting or receiving means suitable to collect the used jet of fluid.

The cutting table is equipped above its work surface with a unit to engage and move the surface to be cut; this surface is displaced in a direction orthogonal to the support element and therefore to the cutting head able to slide on the support element.

The actuation of the cutting head and of the unit to engage and move the surface to be cut is controlled and regulated by suitable data processing means, which perform automatic steering of the head and of the unit.

The cutting head is suitably equipped also to be steered by the machine operator for performance of the cutting by hand. The operator can follow a profile to be cut by applying the required operating sequences to the cutting head.

The attached tables, which are given as a non-restrictive example show the following:-

Fig.1 is a diagram of a plan view of a cutting system according to the invention;

Fig.2 is a side view of the longer side of the cutting table of Fig.1;

Fig.3 is a side view of the shorter side of the cutting table of Fig.1;

Fig.4 is a side view of the cutting head employing a fluid jet according to the invention.

Figs.1, 2 and 3 show diagrammatically the cutting system of the invention, which employs a cutting table 10, rectangular in this example, with a fluid-jet cutting head 11.

The cutting table 10 comprises a work surface 12 on which the surfaces 13 to be cut are positioned. A bridge structure consisting of uprights 14 and of a

transverse support element 15 is positioned immovably parallel to one of the two longer sides of the table 10 and near one of the outer edges of the table 10.

A cutting head 11 employing a fluid jet and capable of to-and-fro straight movement on the

support element 15 is moved by suitable means along the support element 15.

The fluid-jet cutting head 11 is suitably equipped with an arm 16 or with analogous means for the performance of the cutting of the surface 13 by a machine operator by hand.

The cutting can be carried out by hand owing to the configuration and mutual arrangement of the surface 13 and cutting head 11 and owing also to their reciprocal displacement, as will be described below.

A unit 17 to engage the surface 13 to be cut is included on the cutting table 10 and is suitably actuated to move on the work surface 12 in a direction orthogonal to the support element 15 of the fluid-jet cutting head 11.

The gripping of the surfaces 13 to be cut by the engagement unit 17 and the displacement of the surfaces 13 to be cut on the work surface 12 are already known.

The displacement of the fluid-jet cutting head 11 in the directions of the arrows 18 and the movement of the surfaces 13 to be cut in the direction of the arrow 19 at the same time will produce the pre-set and pre-determinable cutting profile on the surface 13 to be cut.

The cutting programme is controlled by a computerized system which operates on each occasion according to pre-set or pre-settable programmes.

Fig.4 shows a form of embodiment of the substantial part of a fluid-jet cutting head 11. In this example the cutting tool is a tapered nozzle 20 to concentrate the jet, which may consist of an amalgam of water under high pressure and an abrasive.

In fact an input of abrasive 21 and an input of fluid under high pressure 22 flow together into the nozzle 20 after passing through a mixing chamber 23.

In Fig.4 a bracket to support the cutting head 11 is referenced with 24, while an ON-OFF switch unit is referenced with 25.

The input of abrasive 21 is connected to a suitable tank that stores this material, while the high pressure fluid input 22 is connected to a circuit including means to filter the cutting fluid, means to pump the fluid and an intensifier unit which has the purpose of bringing the fluid to very high pressures.

It is obvious that the abrasive input 21 may be eliminated or disconnected according to the desired characteristics of the cut to be made, and the jet of water alone may be enough for the cutting operation.

The collection of the used jet of fluid during the cutting operations is particularly easy with the system of the invention. Indeed, if the cutting head 11 is moved lengthwise along a stationary support element 15, it is possible to provide in cooperation

with the cutting head 11 receiving means which are moved in synchronization with the head 11, but other collection means too may be included such as baffles arranged in stationary positions and co-operating with a tank that collects the jet of water.

Claims

1. System to cut surfaces (13) of various materials and, in particular, textile surfaces and the like, the surfaces (13) being positioned on a work surface (12) of a cutting table (10) advantageously having a rectangular geometric shape, the system being characterized in that it comprises a fluid-jet cutting head (11) which is slidably connected to a support element (15) secured to the cutting table (10) and is able to slide parallel to, and along the periphery of, one of the two longer sides of the table (10) along the whole extent of the table (10), the surfaces (13) to be cut cooperating with an engagement unit (17) that displaces those surfaces (13) on the work surface (12) in a direction orthogonal (19) to the direction of sliding (18) of the fluid-jet cutting head (11) on the support element (15).
2. System as claimed in Claim 1, in which the cutting of the surfaces (13) is carried out automatically according to pre-set and pre-settable sequences.
3. System as claimed in Claim 1, in which the cutting of the surfaces (13) is carried out by hand by the machine operator, arm means (16) to steer the fluid-jet cutting head (11) being included.
4. System as claimed in any claim hereinbefore, which is connected to a device that monitors the details of models by means of a data processing unit.
5. System as claimed in any claim hereinbefore, in which the fluid of the jet is water at a very high pressure (2000-4000 atmospheres).
6. System as claimed in any claim hereinbefore, in which the fluid of the jet is water mixed with an abrasive.
7. System as claimed in any claim hereinbefore, which comprises means to collect the used jet of fluid which are able to move in synchronization with the cutting head (11).
8. System as claimed in any of Claims 1 to 6 inclusive, which comprises means of a station-

ary type to collect the used jet of fluid.

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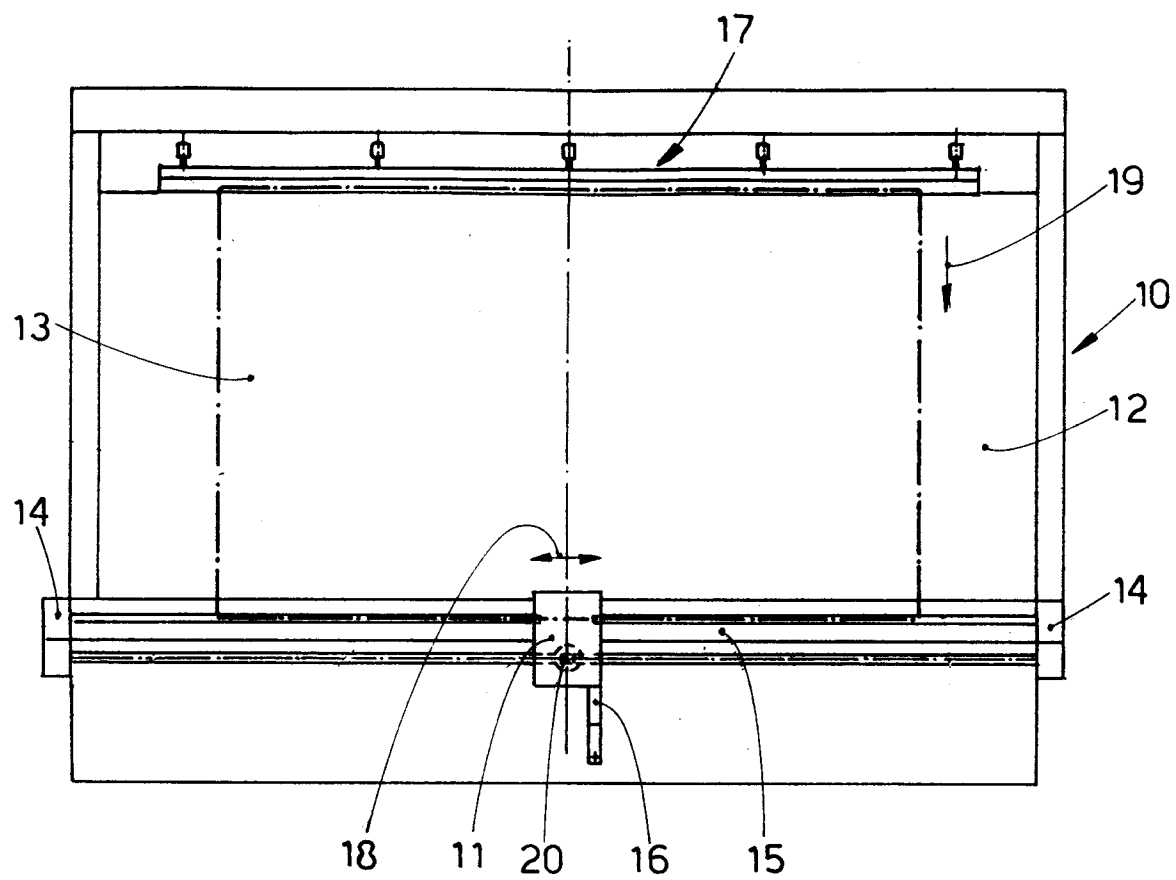


fig. 1

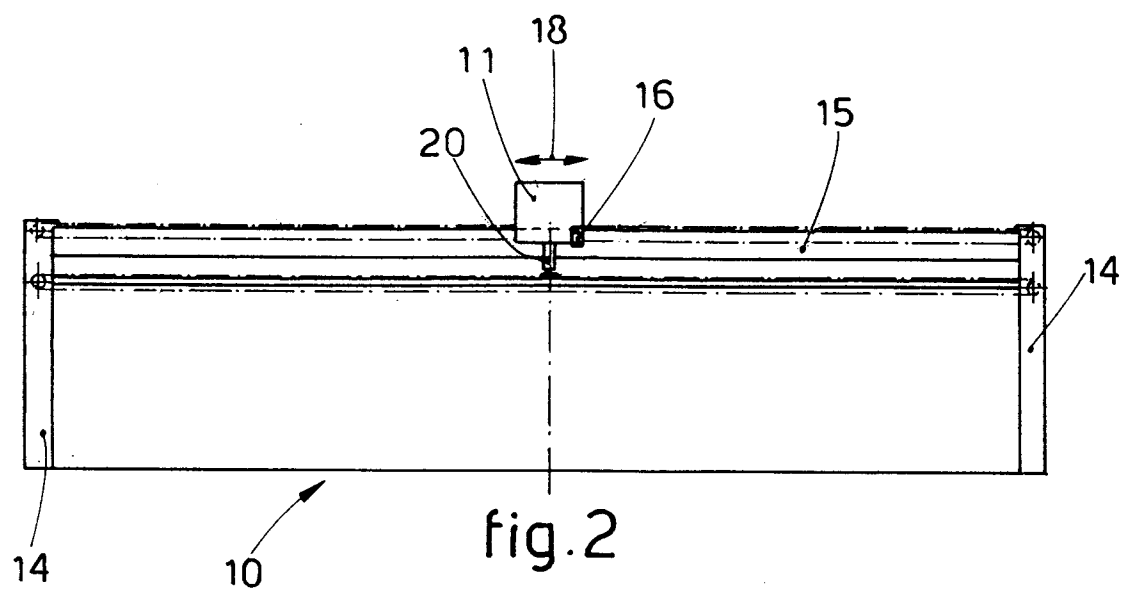
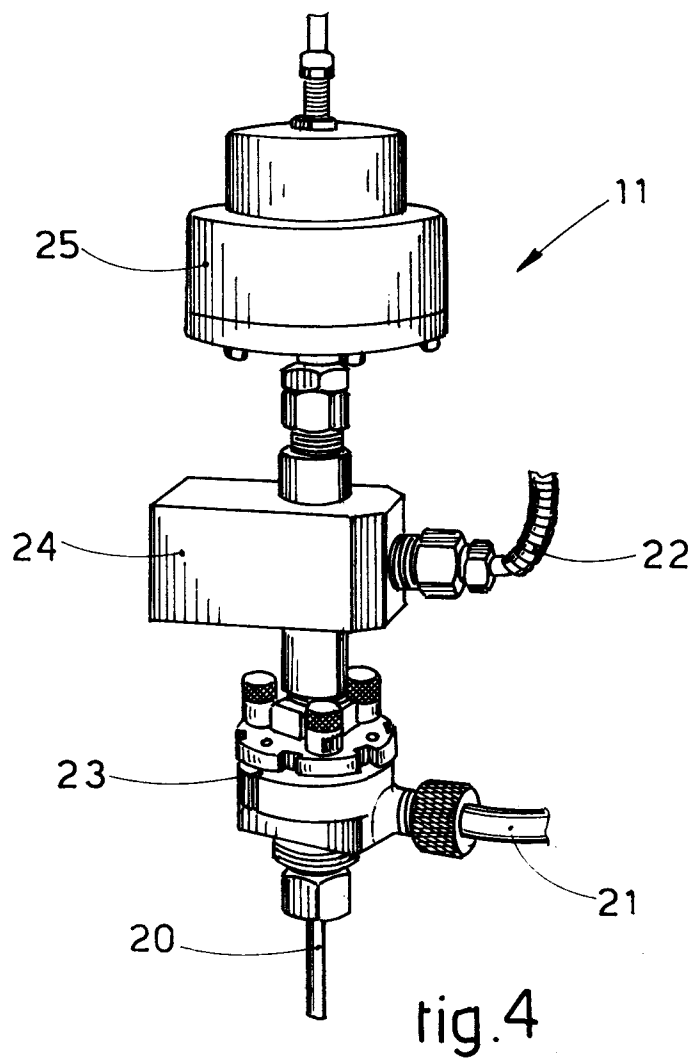
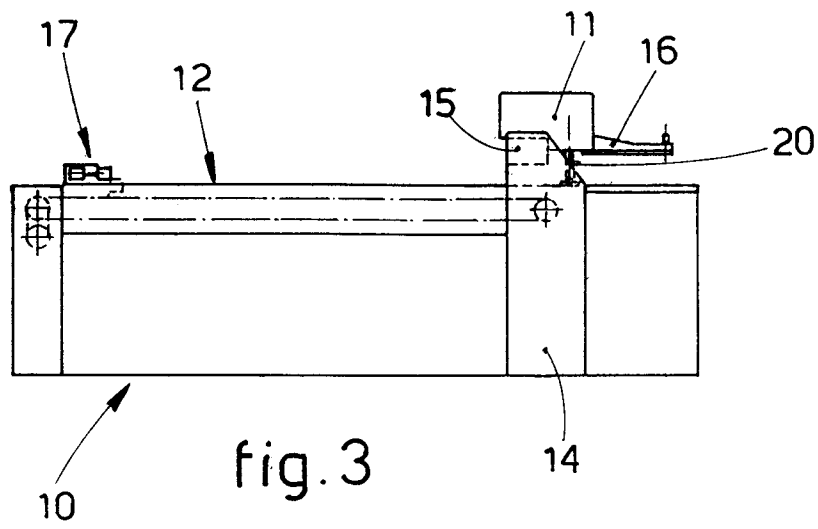


fig. 2





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EUROPEAN SEARCH REPORT

Application Number

EP 91 10 9524

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)
Y	DE-C-3 533 644 (DÜRKOPP SYSTEM TECHNIK GMBH) * column 2, line 57 - column 3, line 3 *	1	D06H7/22 B26F1/38 B26F3/00
A	---	5	
Y	DE-A-3 813 128 (KABUSHIKI KAISHA KAWAKAMI SEISAKUSHO) * column 7, line 68 - column 9, line 28 *	1	
A	---		
A	US-A-4 787 178 (G.M.MORGAN ET AL) * column 4, line 43 - column 5, line 19 * * column 5, line 47 - column 6, line 1 * * column 10, line 9 - line 13 *	1,2,5,6, 8	
A	---		
A	DE-A-1 949 583 (N.C.FRANZ) * page 6, line 11 - line 15 * * page 13, line 16 - page 14, line 7 * * page 19, line 19 - page 20, line 3 *	2-4	
A	---		
A	US-A-4 213 359 (C.BOGERT ET AL) * column 5, line 57 - column 6, line 23 *	7,8	

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 20 NOVEMBER 1991	Examiner C. J. GOODALL
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	