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(54) Manufacturing process and end product of a wire-like rectangular section

(57) "MANUFACTURING PROCESS AND END PRODUCT OF A WIRE-LIKE RECTANGULAR SECTION", described as a manufacturing process and end product of a wire-like rectangular section which, according to the characteristics thereof, possesses as a basic principle to provide the formation of a specific and proprietary manufacturing process for producing wire-like rectangular sections (1) specifically for the utilization in metallic wire cloths for containers, partitions, trays and similar items and having as a basis a fully acceptable substituting alternative for the wire raw material, possessing a high initial manufacturing cost, which is the utilization of flat steel parings (2) by means of a complete and sequential straightening and shaping procedure thereof so as to obtain a wire-like rectangular section (1) bent and dented to form a rectangular section.

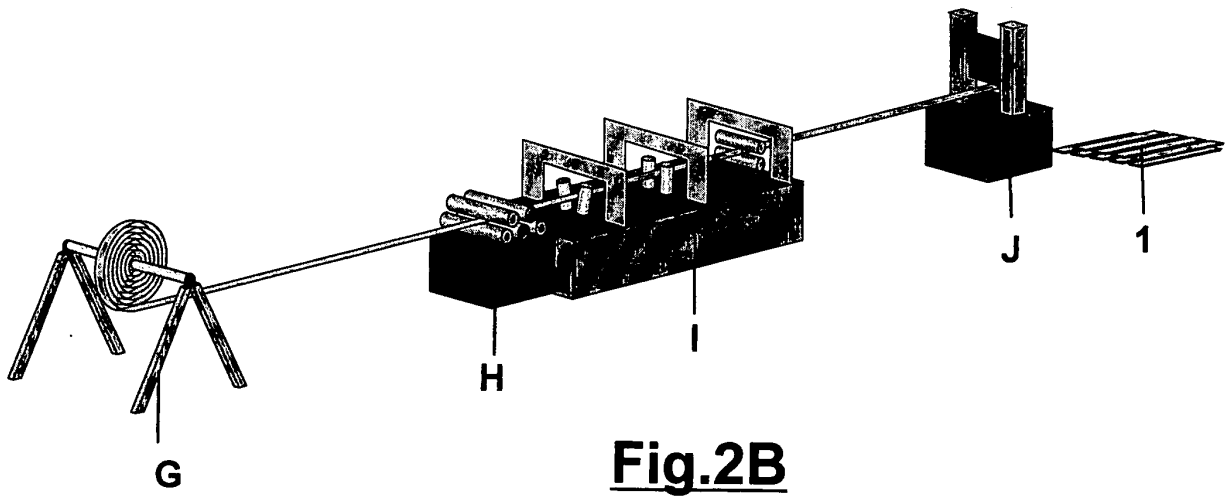

Fig.2B

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Description

[0001] The present patent relates to processes and products for the manufacturing of sections in general, more specifically to a manufacturing process and end product of a wire-like rectangular section which, according to the characteristics thereof, possesses as a basic principle to provide the formation of a specific and proprietary manufacturing process for producing wire-like rectangular sections specifically for the utilization in metallic wire cloths for containers, partitions, trays and similar items, by replacing a basic product for another one resulting in extraordinary improvements in performance and economy for the most varied purposes it is intended for, and having as basis a product in a rectangular section of great resistance, strength and versatility. With specific design and shape, easily accessible for a better adaptation and safety for the users, specific process, practical handling, functionality, accessible cost and due to its general characteristics, is easily adaptable to the most varied types of wire cloths for manufacturing containers, partitions, trays and similar items in general, regardless of the characteristics thereof.

[0002] The patent in question is characterized in that it aggregates components and processes in a differentiated concept to meet the several requirements the nature of its use demands, that is, the manufacturing of metallic wire cloths for the most varied purposes. Such concept provides an end product having more efficiency, functionality, safety, resistance, accuracy, versatility and, mainly economy, due to its excellent technical qualities, thereby providing advantages and improvements in the manufacturing of the most varied types of metallic wire cloths as a whole, the general characteristics of which differ from the other shapes and models known in the current state of the art.

[0003] The manufacturing processes of metallic wire cloths directly used in the production of containers, partitions, trays and similar items and widely known in the current state of the art are based on the utilization of low carbon wires of different gauges (three, four, six, eight and ten millimeters) and on the welding of wires with meshes of different spacings, the wire raw material being produced by steelworks specialized in this type of material, with a subsequent process to mechanically reduce the wire diameter (wire drawing) so as to achieve the desired diameters in each one of the types of applications it is intended for, that is, they vary according to the use, load capacity or manufacturing process.

[0004] The general conception of the present manufacturing process and end product of a wire-like rectangular section is based on a fully acceptable substituting alternative for the wire raw material, which possesses a high initial manufacturing cost and greatly burdens the entire productive chain and, consequently, the end product, particularly due to the few number of such companies in the market which thus helps keeping the high prices. The substituting alternative is based on the utilization of carbon steel plate strips directly extracted from steel coils (flat steel sheet original shape in the steelworks) after the longitudinal cutting process (Slitter cutting) or flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, whose scrap has no further use except for the foundry process and, as scrap, that is, a disposable material, the initial value thereof is extremely low and, consequently, can greatly benefit several industrial processes with the purpose of being transformed again into a fully reusable product; a process and products that would, therefore, possess extremely lower costs.

[0005] The present patent consists in the utilization of a modem, practical and efficient manufacturing process and end product of a wire-like rectangular section formed by an assembly of properly incorporated mechanical and manufacturing solutions comprising a complete and differentiated wire-like rectangular section, with an exclusive design, optimum finish details and proprietary characteristics, incorporating a section bent and dented to form a rectangular section and obtained from a complete and sequential straightening and shaping procedure of flat steel parings such as carbon steel plate strips extracted from steel coils (flat steel sheet original shape in the steelworks) after the longitudinal cutting process (Slitter cutting) or flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, so as to provide the formation of a unique, complete and safe product whose shapes and internal and external arrangements are generated from a section which is progressively bent lengthwise until the edges meet each other thus changing its shape to something similar to a wire since the section thickness and width are the same size and similar to that of a rectangle, the bent side having a round finish and the side the edges meet having a sharp corner with a slight dent for a better finish.

[0006] The present manufacturing process and end product of a wire-like rectangular section is based on the application of components and processes in a differentiated concept and employed in the manufacturing of wires and similar items in general for the application in wire cloths for containers, partitions, trays and similar items, without, however, achieving a high degree of sophistication and complexity, thereby allowing to solve some of the main inconvenience of the other shapes and models in the current state of the art, which are located in a work range wherein the shapes and/or models have a fairly high cost and general heavy weight, are difficult and slow to install and require high skilled labor.

[0007] The objects, advantages and other important characteristics of the patent in question can be more easily understood when read jointly with the appended drawings, wherein:

Figure 1A is a perspective view of the wire-like rectangular section during initial bending stage.

Figure 1B is a perspective view of the wire-like rectangular section during final bending stage.

Figure 1C is a perspective view of the wire-like rectangular section in the finish stage.

Figure 2A is a schematic view of the manufacturing process and end product of a wire-like rectangular section showing the manufacturing process during the straightening stage.

Figure 2B is a schematic view of the manufacturing process and end product of a wire-like rectangular section showing the manufacturing process during the shaping stage.

[0008] As can be inferred from the appended drawings that illustrate and integrate the present descriptive report of the patent of invention "Manufacturing Process and End Product of a Wire-like Rectangular Section", the same comprises a wire-like rectangular section (1) bent and dented to form a rectangular section and obtained from a complete and sequential straightening and shaping procedure of flat steel parings (2) such as carbon steel plate strips extracted from steel coils (flat steel sheet original shape in the steelworks) after the longitudinal cutting process (Slitter cutting) or flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, so as to form and end product whose shapes and internal and external arrangements are generated from a section which is progressively bent lengthwise (3) until the edges (4) meet each other thus changing its shape to something similar to a wire since the section thickness and width are the same size and similar to that of a rectangle whose sides are very close in size; its dimensions being, for instance, if we consider a strip (longitudinal cutting scrap) of approximately ten millimeters and a plate thickness of approximately two millimeters, fully shaped until the edges (4) meet each other with a final approximate size of five millimeters by four millimeters on each side characterizing a rectangle, in which the bent side possesses a round finish (5) and the side the edges meet (4) (opposite to the bent side) possesses a sharp corner (6) with a slight dent made on purpose during the shaping procedure for a better finish, and the surfaces of the five-millimeter sides would become a bit different, that is, flat and with optimum finish.

[0009] The manufacturing process is based on two fully mechanized stages schematically arranged in a well-defined and consecutive manner, the first stage being that of the regularização and the second, the shaping stage.

[0010] In the straightening stage, as shown on Figure (2A), flat steel parings (2) such as carbon steel plate strips (scrap from the flat steel sheet longitudinal cutting) or flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, are rolled directly in a coiler (an axis holding the scrap roller) (A). Next, the strip end (2) is fed through a set of drive rollers (B) that pull the strip (2) through straightening rollers (C) to straighten it. Subsequently, the strip (2), already straightened, goes through side rollers (D) that guide it to rotating knives (hardened steel rollers with sharp edges) (E) which, properly positioned, cut the strip (2) to determine the final width thereof. Finally, the strip (2) is taken to the coiler (F) that forms the new coil of flat steel parings (2), straightened and with an adjusted width for later positioning in the shaping production line.

[0011] In the shaping stage, the coil of flat steel parings (2), straightened and with an adjusted width, is taken to the decoiler (G). Next, the strip (2) is driven by rollers (H) and taken to the shaper (a set of cylinder heads with tools) (I) that gradually shapes (bends) the wire-like rectangular section (1) until it is completely bent (closed) with the edges pressed against each other. Finally, the wire-like rectangular section (1) goes through the non-stop moving guillotine cutter (J) that cuts it continuously to the desired length so as to generate a configuration which is similar to that of a wire with a slight circular section.

[0012] One of the great advantages of the end product of a wire-like rectangular section is the wide possibility of being manufactured in different sizes, both in width and thickness, it can also be positioned in such a way to better use its strength, increasing the section inertia with an improved performance as related to resistance and, especially, buckling strength, that is, the larger side is always placed in an upright position so that the height of the wire-like rectangular section (1) is increased.

[0013] As its structures are made of strong metallic material or similar material with equal or higher lightness and strength, the end product of a wire-like rectangular section has a high level of durability and strength, provides great safety for the users and, when used in the most varied types of wire cloths for containers, partitions, trays and similar items, does not present any risks of fatigue.

[0014] For all of the above, this is a process and a product that will be well received by the companies manufacturing containers, partitions, trays and similar items based on wires, since the present manufacturing process and end product of a wire-like rectangular section presents several advantages, such as: great safety, reliability and agility in its application; extremely high mechanical resistance and durability, low or no wear of the assembly as a whole; great efficiency and performance in its application due to its general conception; greater comfort and safety to the users in general; low weight and density; practical and safe use by any user; fully accessible costs which provides an optimum cost/benefit ratio; simplified manufacturing; greater general load capacity; a large variety of materials employed in the manufacture; great versatility and flexibility provided by the several types of application; all the production process stages are easy and fast; ecological, since it reuses disposable materials; and the certainty of always having a process and, especially, a product that fully meets the safety, resistance and strength conditions required to its application.

[0015] For all of the above, the manufacturing process and end product of a wire-like rectangular section can be

classified as a fully efficient, accurate and safe means for the manufacturing, in an extremely practical and economic way, of wire-like rectangular sections (1) of different gauges from flat steel parings (2) and for the application in the most varied types of wire cloths for containers, partitions, trays and similar items, regardless of the general characteristics thereof, they are also easy to produce, to install and to handle, and have great strength and excellent characteristics; the sizes, dimensions and quantities may vary, depending on the use needs.

Claims

1. "MANUFACTURING PROCESS AND END PRODUCT OF A WIRE-LIKE RECTANGULAR SECTION", **characterized in that** it comprises a wire-like rectangular section (1) bent and dented to form a rectangular section and obtained from a complete and sequential straightening and shaping procedure of flat steel parings (2) such as carbon steel plate strips extracted from steel coils (flat steel sheet original shape in the steelworks) after the longitudinal cutting process (Slitter cutting) or flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, so as to form an end product whose shapes and internal and external arrangements are generated from a section which is progressively bent lengthwise (3) until the edges (4) meet each other thus changing its shape to something similar to a wire since the section thickness and width are the same size and similar to that of a rectangle whose sides are very close in size, the bent side possessing a round finish (5) and the side the edges meet (4) possessing a sharp corner (6) with a slight dent for a better finish.

2. "MANUFACTURING PROCESS AND END PRODUCT OF A WIRE-LIKE RECTANGULAR SECTION", **characterized in that** it comprises a straightening stage in which flat steel parings (2) such as carbon steel plate strips (scrap from the flat steel sheet longitudinal cutting) or strips flat steel strips originated from the cutting process of flat steel sheets, pre-cut in smaller parts, are rolled directly in a coiler (an axis holding the scrap roller) (A); next, the strip end (2) is fed through a set of drive rollers (B) that pull the strip (2) through straightening rollers (C) to straighten it; subsequently, the strip (2) already straightened, goes through side rollers (D) that guide it to rotating knives (hardened steel rollers with sharp edges) (E) that cut the strip (2) to determine the final width thereof. Finally, the strip (2) is taken to the coiler (F) that forms the new coil of flat steel parings (2), straightened and with an adjusted width for later positioning in the shaping production line; and the shaping stage in which the coil of flat steel parings (2), straightened and with an adjusted width, is taken to the decoiler (G); next, the strip (2) is driven by rollers (H) and taken to the shaper (a set of cylinder heads with tools) (I) that gradually shapes (bends) the wire-like rectangular section (1) until it is fully bent (closed) with the edges pressed against each other; and finally, the wire-like rectangular section (1) goes through the non-stop moving guillotine cutter (J) that cuts it continuously to the desired length so as to generate a configuration which is similar to that of a wire with a slight circular section.

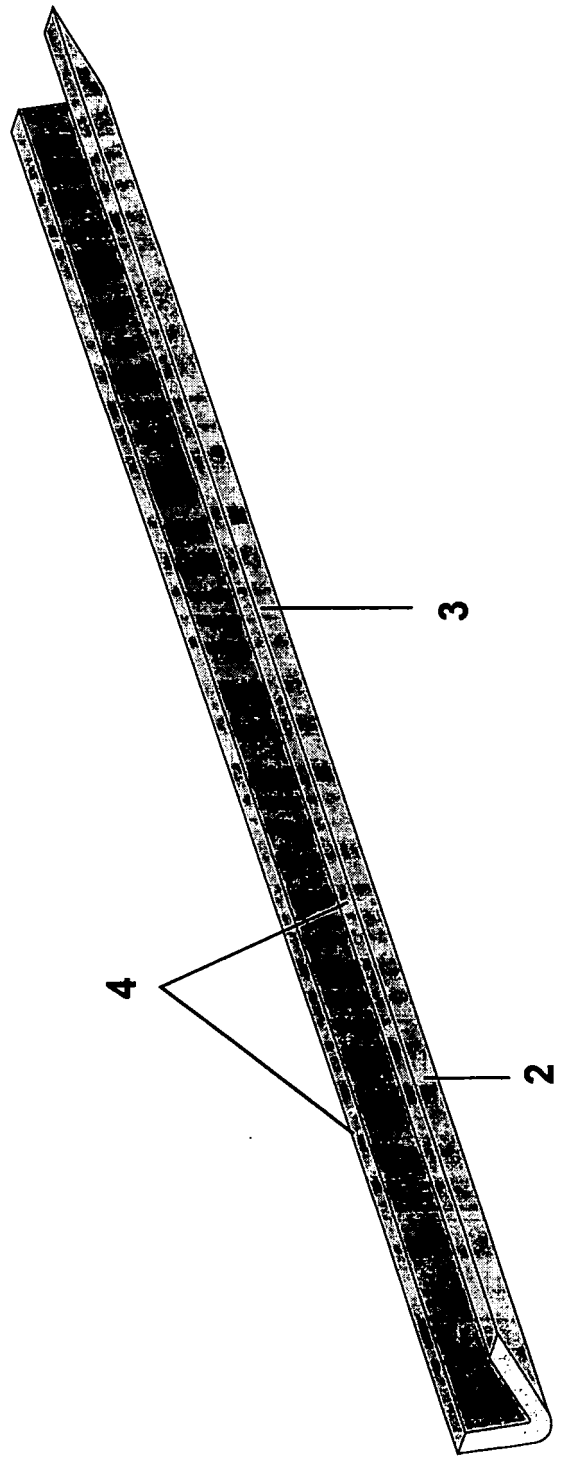

Fig.1A

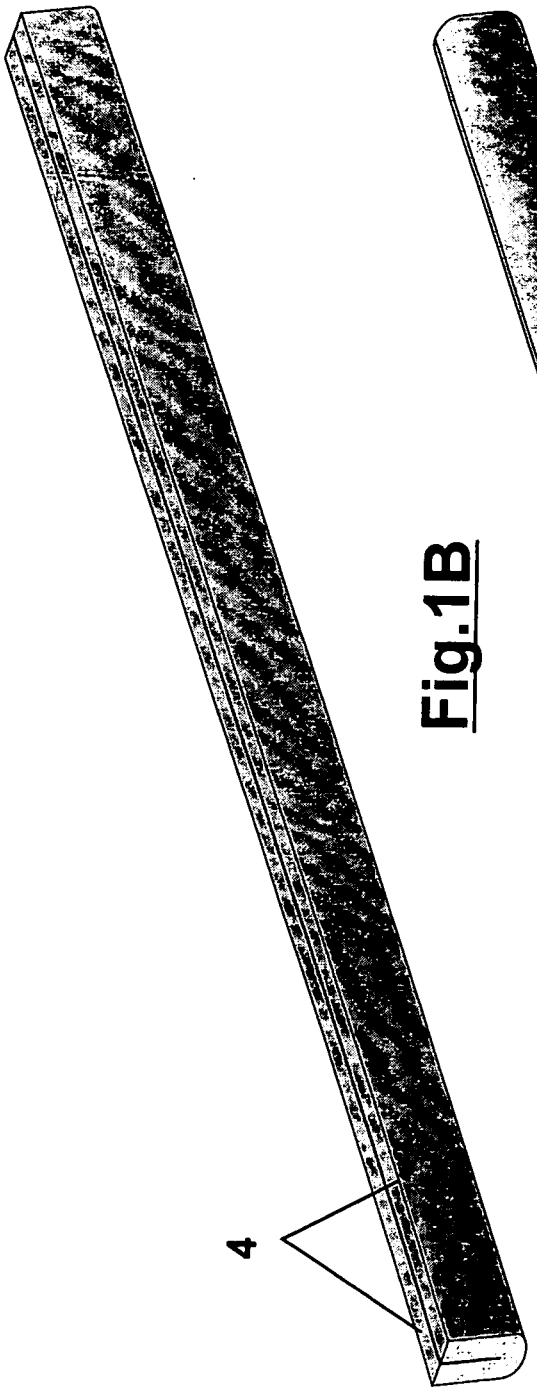

Fig.1B

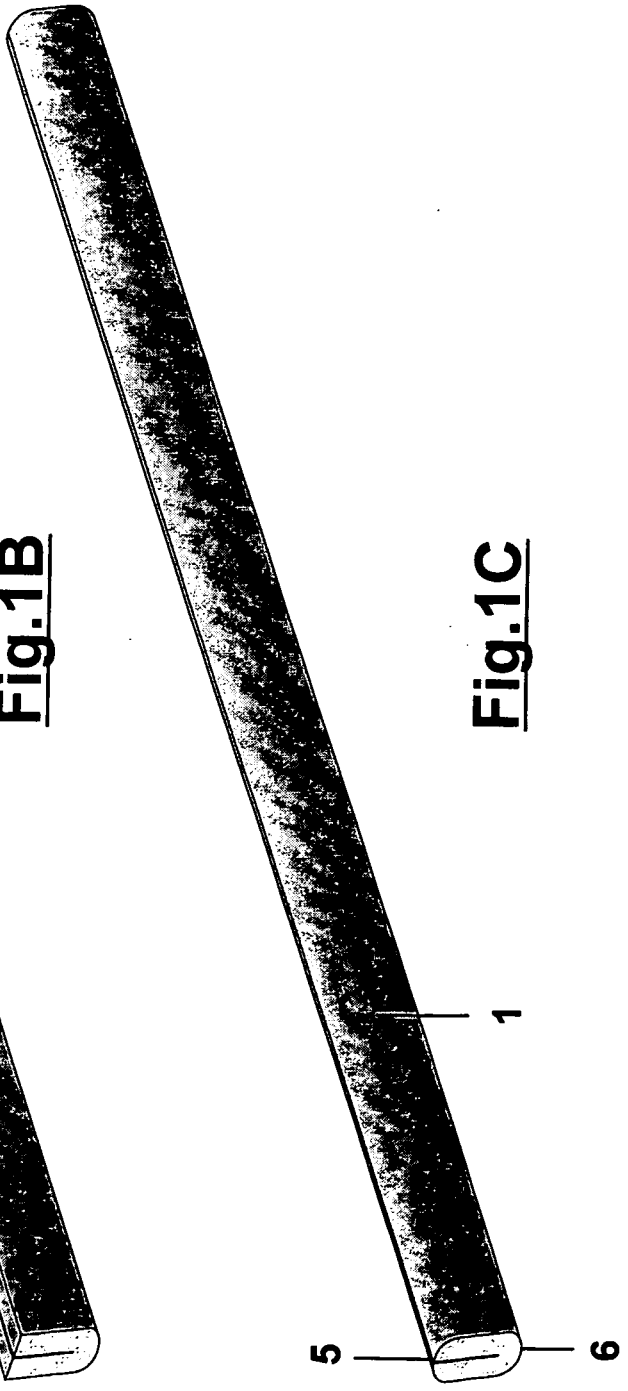

Fig.1C

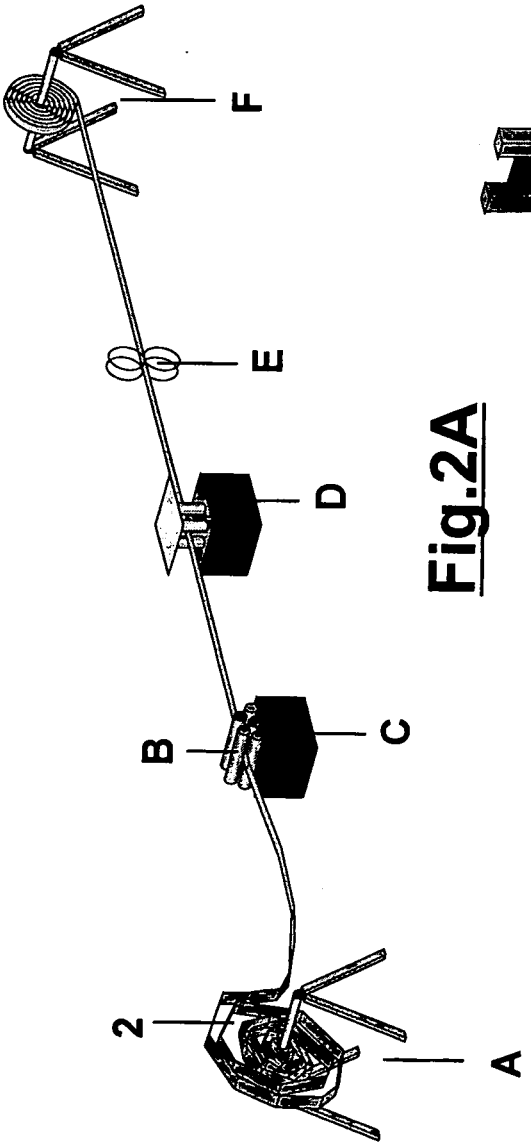

Fig.2A

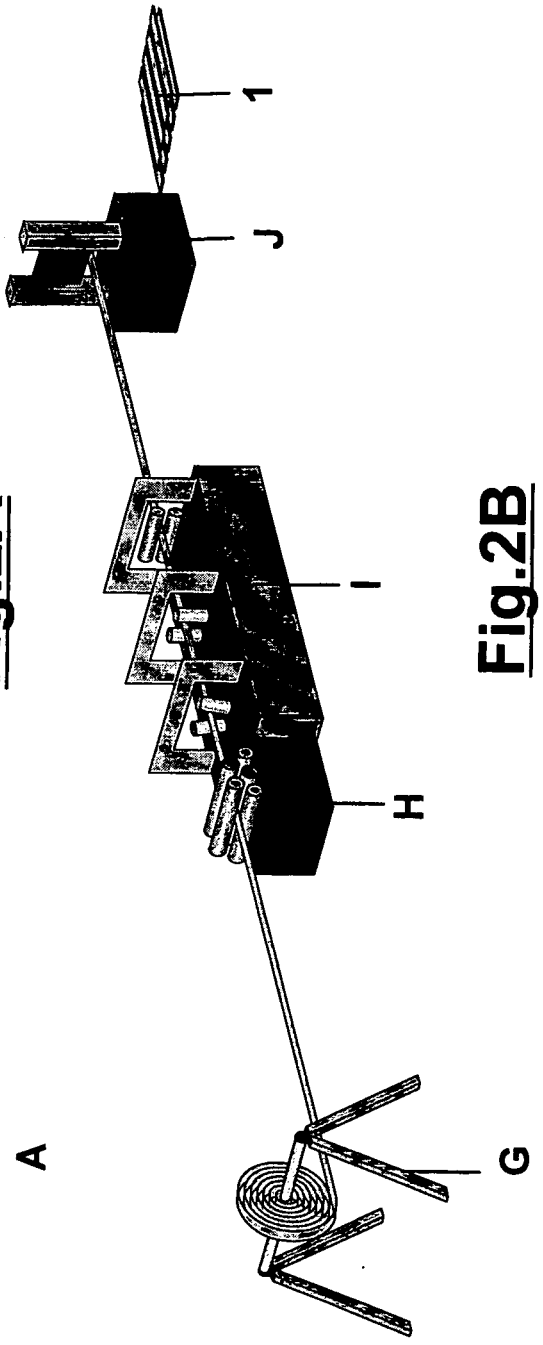

Fig.2B

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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 6860

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	CA 1 325 737 C (FLER, JACK) 4 January 1994 (1994-01-04) * page 6, paragraph 1 * * page 7, paragraph 2 - page 8, paragraph 1; claim 1; figures *	1,2	B21C37/04
Y	US 1 902 841 A (EASTER GEORGE C) 28 March 1933 (1933-03-28) * page 1, line 61 - page 2, line 12; figures 1-4 *	1,2	
A	GB 1 164 060 A (WILHELM HEDTMANN) 10 September 1969 (1969-09-10) * page 2, line 32 - line 42; figures 1,3 *	1,2	
A	WO 00/56495 A (BHP STEEL PTY. LTD; GALE, STEVEN, BRUCE) 28 September 2000 (2000-09-28) * page 9, line 3 - line 9; figure 1 *	1,2	
A	GB 477 581 A (METAL TRIM LIMITED; EMIL PENKALA) 29 December 1937 (1937-12-29) * page 3, line 56 - line 70; figures 6-8 *	1,2	TECHNICAL FIELDS SEARCHED (IPC) B21C B21B B21D B23D
A	US 1 410 785 A (VINCENT JOHN W) 28 March 1922 (1922-03-28) * page 2, line 20 - line 40; figures *	1,2	
A	US 2 164 836 A (PENKALA EMIL) 4 July 1939 (1939-07-04) * page 2, left-hand column, line 37 - line 54 * * page 2, right-hand column, line 4 - line 23; figures 1,2 *	1,2	
A	US 817 344 A (SLICK) 10 April 1906 (1906-04-10) * figures *	1,2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 November 2005	Barrow, J

CATEGORY OF CITED DOCUMENTS

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14-11-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CA 1325737 C	04-01-1994	NONE	
US 1902841 A	28-03-1933	NONE	
GB 1164060 A	10-09-1969	BE 705314 A	01-03-1968
		CH 466642 A	15-12-1968
		DE 1500781 A1	10-04-1969
		SE 320546 B	09-02-1970
WO 0056495 A	28-09-2000	NONE	
GB 477581 A	29-12-1937	NONE	
US 1410785 A	28-03-1922	NONE	
US 2164836 A	04-07-1939	NONE	
US 817344 A		NONE	

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