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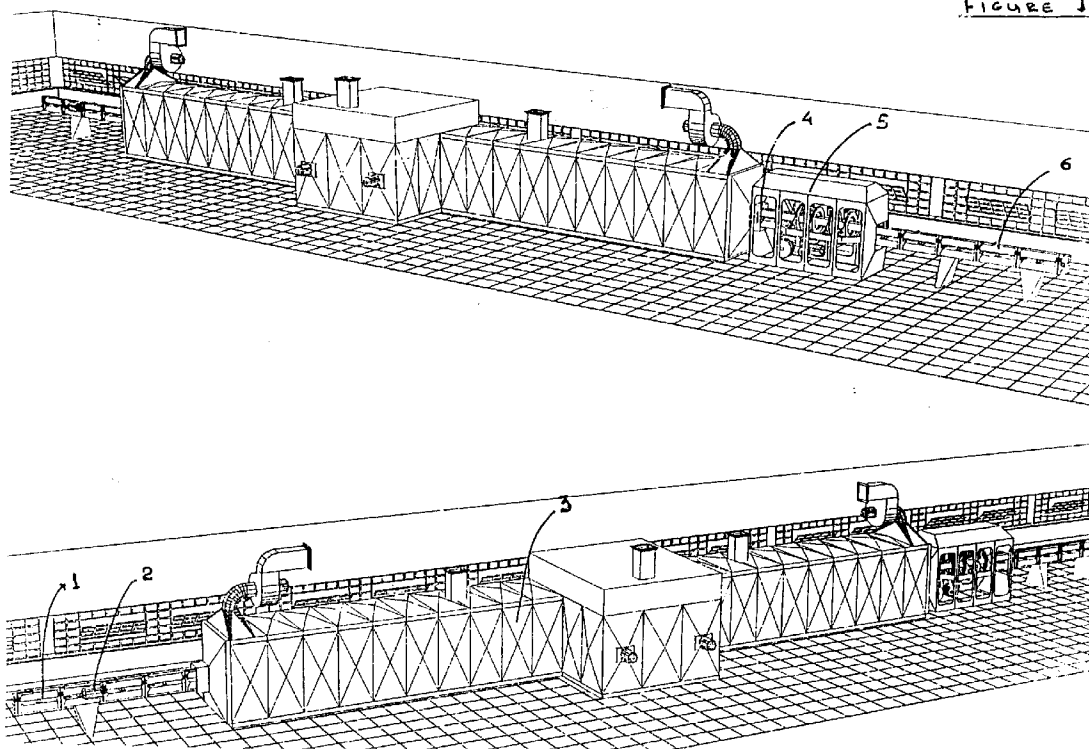
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(54) Process for printing on aluminium bars with sublimable inks

(57) A printing process to decorate Architectural Aluminum Profile bars achieved by the following steps. A colored powder coating is applied as a base coat. The coated aluminum profile bar is driven into a tunnel oven (3) for heating and the temperature is checked at the exit from the tunnel oven by optical thermometer (4). The hot bar enters immediately into a printing unit (5). The hot bar enters immediately into a printing unit (5).

Special constructed pressing silicon cylinders (11) force the transfer paper or transfer fabric (7) to cover the aluminum bar. The sublimable ink on the printing material penetrate the base coat, by sublimation, leaving the pattern on it. The printing materials are automatically removed after use (12). A transparent powder coating is applied as top coat to achieve maximum outdoor resistance.

FIGURE 1



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Description

FIELD OF THE INVENTION

This invention refers to a transfer printing process on Architectural Aluminum Profiles, in order to decorate them, using sublimable inks.

DESCRIPTION

This method is based on sublimable inks which have been known for a number of years.

Such inks are used in a process of heat transfer printing. Sublimable inks are used in order to prepare a paper transfer sheet or a transfer fabric. The above insures the printing of the pattern, having as a result various decorations on Architectural Aluminum profiles. Pressing the transfer paper or the transfer fabric on an Aluminum profile just heated to 180 - 225 C, the inks penetrate the base coat immediately, achieving the instant stamping of the pattern. This invention is characterized by (4) four steps.

1 Base coat application.

A base coating of polymeric powder is applied and cured as in the standard process of industrial powder coating, constituting a subsoil to receive the sublimable inks.

2 Heating preparation .

In this phase the aluminum profile bars are driven one after the other in to a tunnel oven with recycling hot air.

At the entrance of the oven a mechanism, responsible for the movement of the architectural profile bars is placed. This mechanism causes one profile to push the other entering the oven in a straight uninterrupted line. To insure the best printing result, the whole system is supported by an alignment mechanism.

By calculating the speed of the aluminum profile bars and with the help of optical thermometers we ensure the temperature of the metal bar to reach 185-225 C at the exit from the oven.

3 Printing unit.

It is essential for the hot aluminum profile bars to be driven out from the oven straight into the printing area. The printing is obtained by pressing the transfer paper or the transfer fabric on the aluminum profile bars, using silicon cylinders, properly shaped, in order to achieve an equal pressure and full contact of the transfer paper or transfer fabric on all points of the surfaces and edges of the bars.

Various shapes of silicon cylinders are used in the printing unit, according to the shape of the architectural alu-

minum profile.

These silicon cylinders press and drive the transfer paper or the transfer fabric on the surfaces to be printed. After the contact with the hot aluminum profile bar, the transfer paper or the transfer fabric releases, by sublimation, the ink on the base coat, creating the pattern. The color of the base coat together with the sublimated ink create the final effect.

These pressing silicon cylinders are fixed to the knurling of several metal rings, through which the aluminum profile bars are driven. The metal rings must be knurled on both the internal and external edge, enabling the silicon cylinders to be fixed at any inclination angle of the 360 degrees of the circumference of the ring. This is needed in order to have the silicon cylinders to follow any shape the Architectural Aluminum profile bar may have.

Moreover, the above mentioned cylinders are supported by a mechanical or hydraulic regulating pressing system, which enable the desirable pressure to be adjusted. After this contact the printing material is removed.

4 Top coat.

Applying a specially formulated transparent polyester powder coating as a top coat, we achieve maximum outdoor resistance as well as an excellent aesthetic appearance.

BRIEF DESCRIPTION OF THE DRAWINGS

For the present invention to be readily understood and easily practiced we attach three different drawings along with analytical details.

FIGURE 1. Total perspective of the production line.

Prepared with the base coat, the aluminum profile bars are placed onto the working area (1).

Each aluminum profile bar, hooked to the movement system, pushes all the preceding profile bar so that running production is obtained. This movement transmitting system is placed before the entrance of the oven (2).

The aluminum profile bars travel through a recycling hot air oven in order to reach the desired temperature (3).

The reaching of the desired temperature on the aluminum profile bar is controlled at the exit of the oven by an optical thermometer (4).

The just heated aluminum profile bar enters immediately into the printing unit (5).

At the end of the line the printed aluminum profile bars are collected (6).

FIGURE 2 Printing Unit.

As soon as the heated aluminum profile bars reach the printing area, it comes in contact with the transfer paper or transfer fabric that has been previously placed on an existing feeding system (7).

The knurled metal rings are shown (8).

FIGURE 3 Printing Unit

The alignment mechanism (9) insures ideal alignment of the aluminum profile bar, to meet printing requirements .

Pressing mechanic or hydraulic mechanisms (10) support the silicon cylinders (11) in order to adjust the pressure as needed.

The aluminum bar is pushed through round knurled metal rings (8).

Placing the pressing silicon cylinders in the required position, which is determined by the shape of the architectural profile bars, we oblige the transfer paper or the transfer fabric to come in full contact with all points of the surface and the edges of the hot architectural profile bar. After this contact the transfer paper or transfer fabric releases, by sublimation, the ink which penetrate the base coat creating the pattern.

Inside the printing unit a mechanism is responsible for the collection of the used paper or fabric (12).

Claims

1. The method by which we achieve the decoration of Architectural Aluminum Profile bars using a continuous productive procedure, in which the aluminum profile bars are driven one after the other without any interruption in the production line.

This method of printing special effects is the result of the contact between the printing materials, such as transfer paper or transfer fabric, and the hot aluminum profile bars.

It derives that the powder coated Aluminum profile bars enter the oven in a row with uninterrupted movement and are heated to a temperature between 185 and 225 C

As they exit the oven, heated to a certain temperature, they enter a so called printing unit. This printing unit has properly arranged silicon cylinders that cause the transfer paper or the transfer fabric to be pressed on all the points of the surfaces and edges of the aluminum profile bars. After the contact with the hot aluminum profile bar, the printing material release, by sublimation the ink on the base coat creating the pattern. The color of the base coat together with the sublimated ink create the final effect.

2. According to claim 1 this method is characterized by the fact that the pattern to be printed on the Aluminum profile bars are primarily printed on paper or fabric, which represent the vehicle for the ink.
3. According to claim 1 this method is characterized by the fact that the pressing cylinders force the transfer paper or the transfer fabric to cover, with

the required pressure, every point of the surface of the Aluminum profile bars, in order to transfer the patterns of the transfer paper or transfer fabric to the bar, by sublimating the ink into the base powder coating.

4. According to claim 1 this method is characterized by silicon cylinders placed on knurled metal rings, that enable the cylinders to be fixed in any position or inclination needed to follow any shape the aluminum profile bar may have.
5. According to claim 1 this method is characterized by previous appliance of polymeric powder coating on the Aluminum profile bars, in order to receive the sublimable inks.
6. According to claim 1 this method is characterized by the fact that the pressure by contact at a certain temperature causes the immediate penetration of the sublimable inks on the coated surface. In fact after this contact with the hot aluminum profile bar, the transfer paper or transfer fabric release, by sublimation, the ink on the base coat creating the pattern. The color of the base coat together with the sublimated ink create the final effect. After this contact the transfer paper or transfer fabric, used as a vehicle for the ink, is removed. The Printing system is supported by a paper or fabric feeding and collecting unit.
7. The final finish requires a top coat of transparent coating especially formulated in order to insure maximum outdoor resistance and excellent aesthetic appearance.
8. According to claim 1 this method is characterized by the fact that the mechanism responsible for the whole movement of the architectural aluminum profile bars is placed before the entrance of the oven.

Figure 1

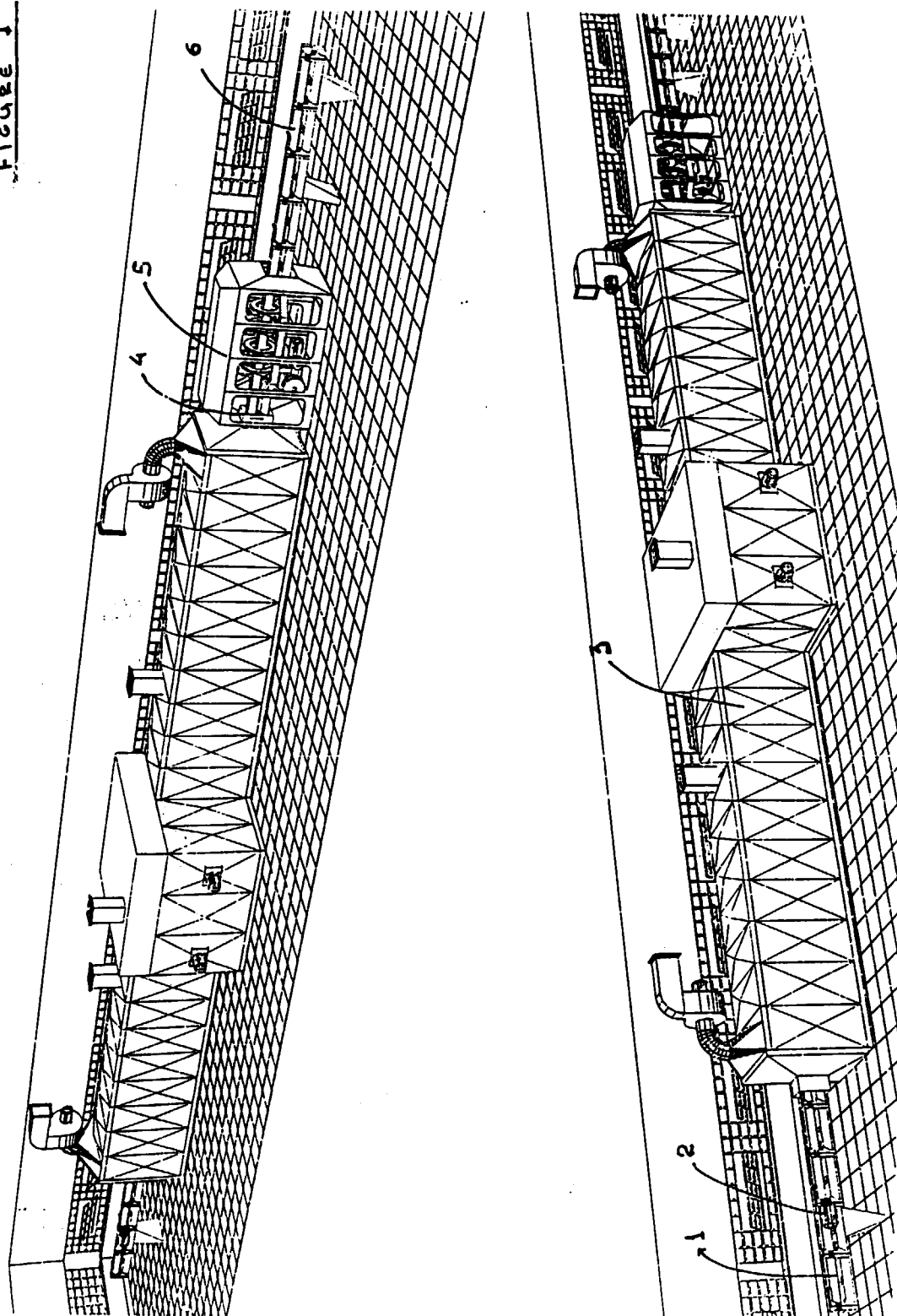


Figure 2

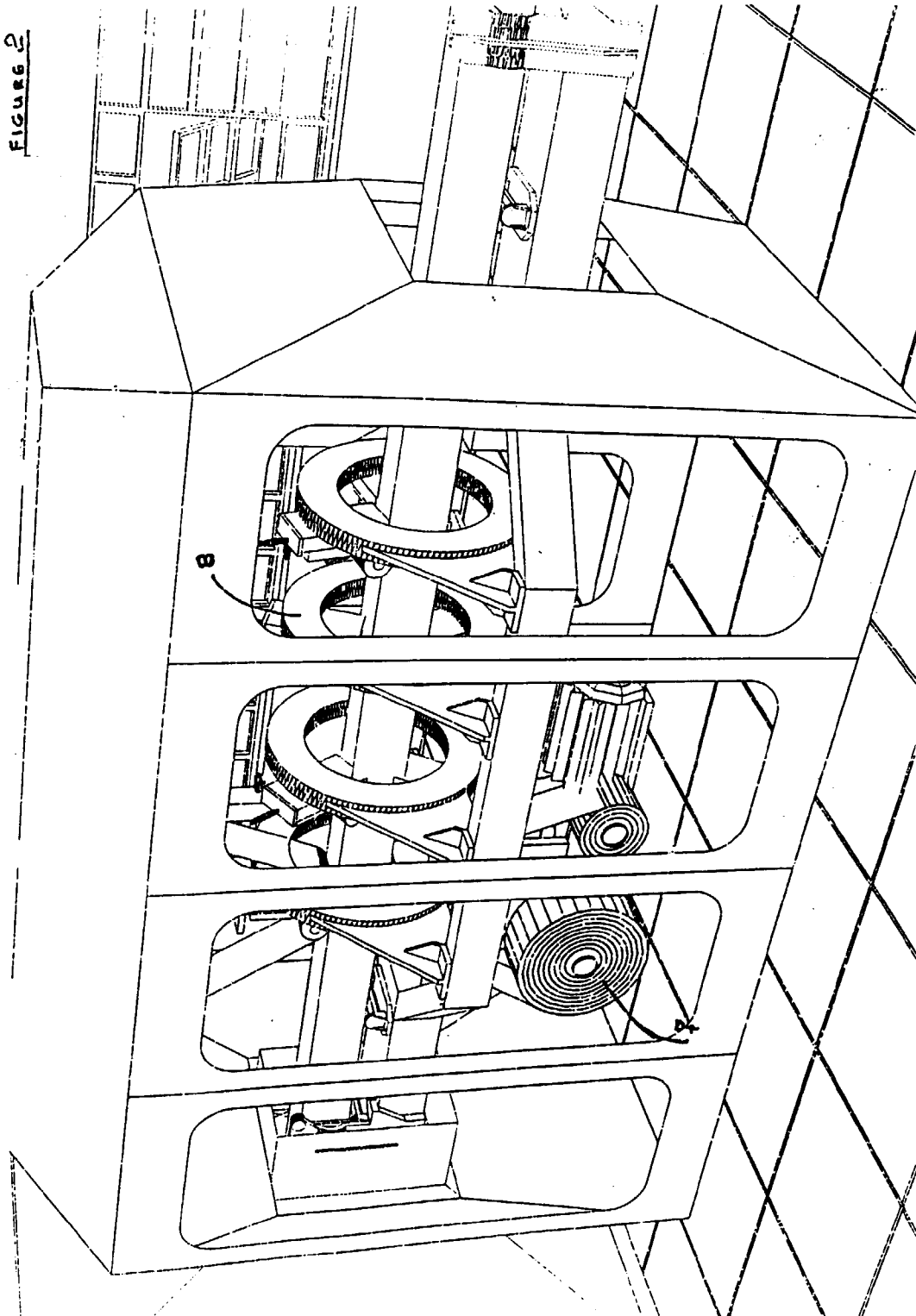
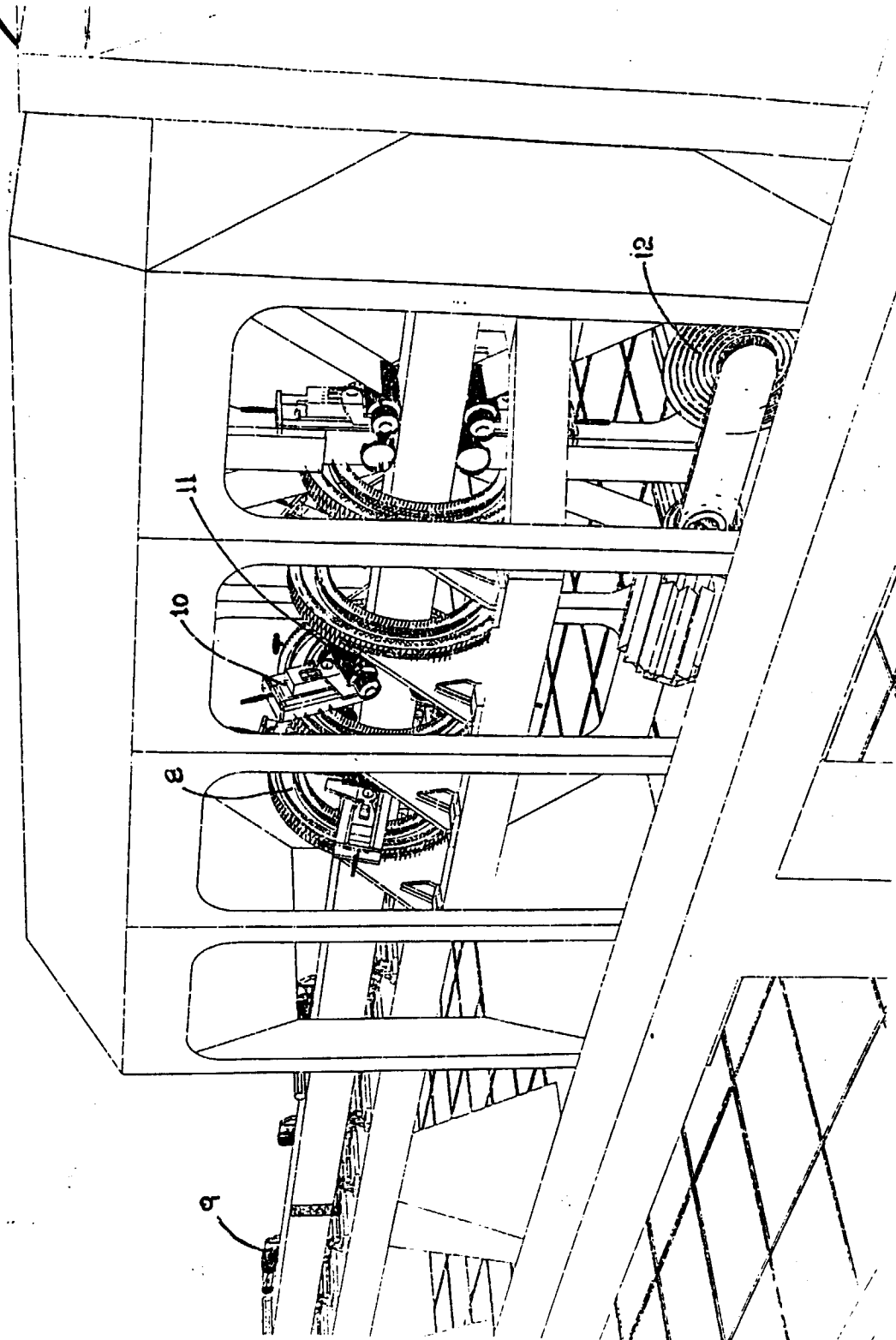


Figure 3





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EUROPEAN SEARCH REPORT

Application Number
EP 97 60 0004

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 September 1997	Examiner Doolan, G
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			

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EUROPEAN SEARCH REPORT

Application Number
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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.6)
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			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 September 1997	Examiner Doolan, G
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	

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