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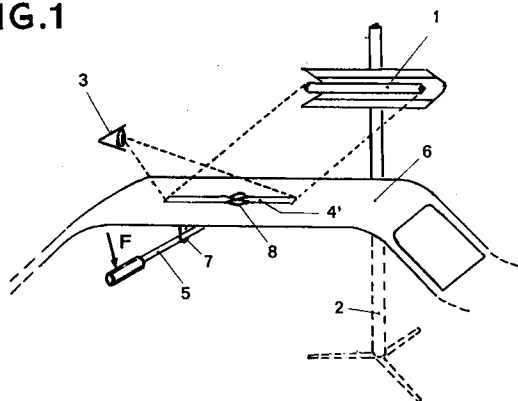
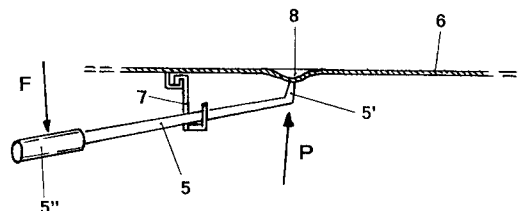
EUROPEAN PATENT APPLICATION(21) Application number: **94810405.4**(51) Int. Cl.⁶: **B21D 1/06**(22) Date of filing: **07.07.94**(30) Priority: **13.05.94 CH 1483/94**(43) Date of publication of application:
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CH-6924 Sorengo (CH)(74) Representative: **Baggiolini, Raimondo Patent**
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CH-6900 Lugano (CH)(54) **Process for straightening auto body parts dented as the result of collisions.**

(57) A process for straightening sheet metal parts of automobile bodies dented as the result of collision, comprising the following steps:

- transmission of a luminous image on the sheet metal parts;
- visual examination of the image (4') reflected by the lamp suitable for indicating the area (8, 9) where it will appear as the distorted sheet metal.
- use of lever (5) to apply a series of forceful motions F on the convex walls of each dented

area (8) in order to completely remove the aforementioned distortions of the reflected image, indicating perfect straightening of the sheet metal;

- application of pressure in the opposite direction if these motions have caused a dent in the direction opposite the one existing before the operation;
- polishing of the sheet metal parts. No puttying or painting operations are necessary.

FIG.1**FIG.3****EP 0 681 876 A1**

This invention relates to the field of repair of sheet metal components of auto bodies which have dents caused by collision or similar events.

In the state of the art, auto body specialists who must remove bulges or dents in the sheet metal of the auto body must in most cases carry out procedures which are lengthy and expensive, first removing the paint, then applying putty, then repainting.

At present, they cannot do otherwise, since the sheet metal to be straightened is frequently part of a box-type self-supporting structure formed by two layers of sheet metal, one on top of the other, and separated by gaps of varying shapes resulting from the way in which the different components are formed in order to obtain the desired resistance to static and dynamic stresses. Moreover, hammering of parts, in the few cases in which this is possible, does not result in a finished job which meets the quality requirements of the trade, due also to the difficulty of conducting an effective examination of the finished work. Frequently, the irregularity in the sheet metal is considerably minimized but not flawlessly removed.

For this reason, it is preferable that the dent be filled in with putty to easily create a flat surface which can subsequently be repainted.

This type of operation however, as mentioned above, is very labor-intensive and consequently costly. If there are multiple dents or bulges, for example resulting from a hail storm, the cost of repair can be quite high, and moreover the outside surface of the automobile is definitively altered in terms of its sheen and service life due to the existence of areas of varying thickness filled with putty.

The inventor, with the intention of eliminating problems of the type described above, has developed a process which allows an indefinite number of damaged and dented areas to be pinpointed and repaired quickly and flawlessly without having to remove the paint, putty and repaint the parts.

The process according to the invention is characterized as described in the attached claim 1.

The scope of the invention extends to a device suitable for carrying out this process.

The process according to the invention and the aforementioned device will at this point be described in more detail by referring to the attached figures, as follows:

- Figure 1 shows a partial perspective view of a lamp which is part of the device for carrying out the process according to the invention and which projects its luminous image on the roof of the body of an automobile in such a way as to reflect the image towards an observer;

- Figure 2 shows a perspective view of the lamp image as perceived by the observer when distorted by the presence of a dent which is concave towards the top;
- Figure 3 shows a partial transverse cross section of the auto body in Fig. 1 while a shaped lever (which is also part of the equipment for straightening the sheet metal) is applied;
- Figure 4 shows a cross-section of a box-type component of the auto body while a shaped lever which is part of the equipment for straightening the sheet metal is applied;
- Figure 5 shows the no longer distorted image reflected by the lamp described above after the sheet metal has been straightened;
- Figure 6 shows a lateral view of an example of a shaped lever which is part of the equipment for straightening the sheet metal;
- Figure 7 shows a lateral view of another example of the shaped lever.

The process, in the example which will be described, begins with placement of one or more lamps (one in Figure 1) which extend(s) linearly over a support member 2 with respect to which the lamp can slide and rotate. In this way it is possible to place the lamps in a position parallel to the extent of sheet metal which needs treatment, for example almost completely horizontal in the case of the roof, hood or trunk, or almost completely vertical in the case of the sides. The lamps are then fixed at a height which will ensure that their image reflected by the sheet metal will be within the range of an observer's eye 3, or better, that of an operator in charge of making the repair, when they are in a location suitable for carrying out the operation.

This operator, with only slight movements of his visual focus, will "slide" image 4 reflected from the lamps until he pinpoints one of the areas requiring treatment, which at that point has a distorted image 4' (Fig. 2).

Figure 2 shows the distorted image produced by a dent in the sheet metal, making it inwardly concave, as in the case of Fig. 1; in the case that the sheet metal is on the other hand dented so as to be convex, the image will also be distorted in some way, although the reflected lines will run in a different direction, that is, instead of diverging, they will converge, intersecting at the vertex of the part with the dented surface (this case is not shown in the figure).

At this point, the operator, who in the case of Fig. 1 has previously connected lever 5' (Figs. 6 and 7), properly shaped to work on that part of the automobile, for example on the lateral arch of roof 6 with a support hook 7, will move the lever until its end 5' (Figs. 3 and 7) is located exactly in the

center of the dented area 8 and then, exerting a successive series of forceful motions F on the other end 5", will exert pressure P on the dented part in order to achieve perfect straightening which will be confirmed by the fact that, after the operation, the image 4 reflected by the lamp will appear linear and no longer distorted.

If, during the operations described above, either too much pressure P has been inadvertently exerted or a dent in the sheet metal is produced whose opposite part bulges convexly with respect to the one existing before the operation, the inventor stipulates that a predetermined pressure be exerted in the direction opposite to that exerted previously using the tip or rounded-off punches made of nonabrasive synthetic material (not shown in the figure).

In the case of operations on other parts of the "box-type" auto body, the inventor stipulates that another type of lever 11 be applied (Figs. 4 and 6) which is configured in such a way that it can be inserted in the gaps of the molded component and pivoted on a fulcrum 10 provided by this reinforcing sheet 12, such that, operating in a manner similar to that described in the preceding case, it is possible to straighten the sheet metal 13 by exerting pressure on free end 11' of the lever in a direction almost perpendicular to area 9 where the sheet metal is dented.

The inventor stipulates that for each automobile a series of shaped levers be made in order to be able to work on any part of the body, no matter where it is located.

Thus it is possible to straighten all damaged parts of an automobile without having to putty and repaint, and therefore the invention fulfills the purpose intended by the inventor.

Obviously, the operating details of the process can differ from the preferred example described and represented.

In addition, the lamps and levers used in the device can be modified and configured in such a way that the device conforms better to individual cases and different requirements, but the processes and devices included in the descriptions in the attached claims are in some way within the scope of the protection conferred by this patent application.

Claims

1. Process for straightening sheet metal parts of automobile bodies dented as the result of collision, comprising the following steps:

- transmission of a substantially linear image having predetermined luminosity on the sheet metal parts to be straightened;

- pinpointing of the dented area through visual examination of the aforementioned image reflected from the lamp suitable for indicating the points or areas (8, 9) where it will appear as distorted.
- application, using the two ends (5', 11') of the shaped levers (5, 11), of a series of forceful motions F applied in succession on the convex part of each of the dented parts (8, 9) in order to completely remove the aforementioned distortions of the reflected image, indicating perfect straightening of the sheet metal;
- possible application of a predetermined pressure in the direction opposite to the direction of the aforementioned forceful motions in the case in which they have caused a dent in the sheet metal whose opposite part bulges convexly with respect to the one existing before the operation;
- cleaning and polishing of the sheet metal parts.

2. Device for straightening the sheet metal parts of automobile bodies dented as the result of collision, using the process described in claim 1, whereby the device comprises the following:

- a) one or more lamps (1) which extend(s) linearly and can be oriented and slid over a support member 2 with which they will be used;
- b) a plurality of levers (5, 11) sized and shaped so as to allow any sheet metal parts (6, 13) of the auto body to be reached from the inside of the automobile and to exert on this part and perpendicularly to it a certain pressure (P) using the ends (5' 11') of these levers (5, 11), which are also suitable for use while this pressure is exerted against an essentially fixed fulcrum (10, 7) composed of a structural element of the automobile (10) or an appropriate piece (7) that can be affixed to the auto.

FIG.1

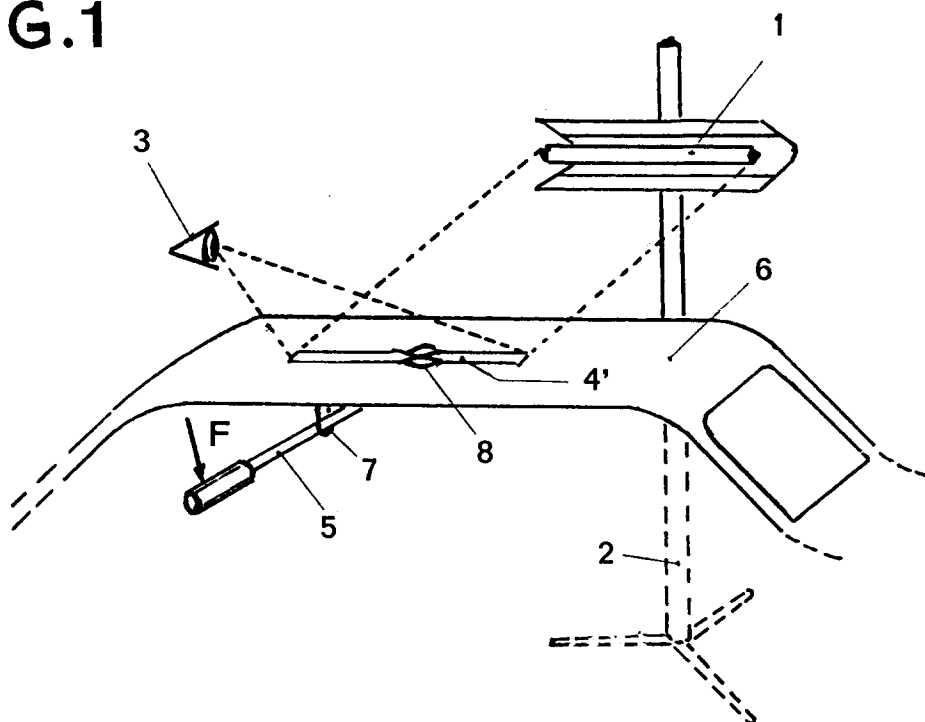


FIG.2

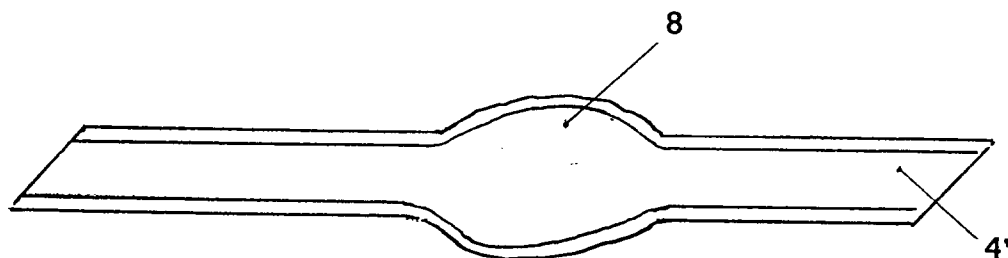


FIG.3

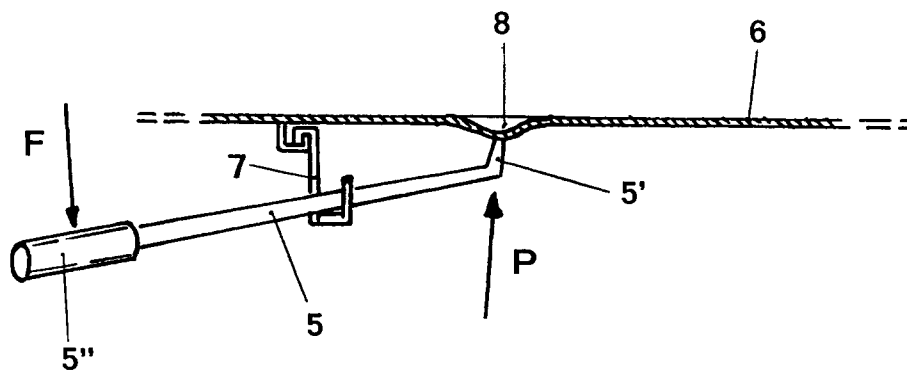


FIG.4

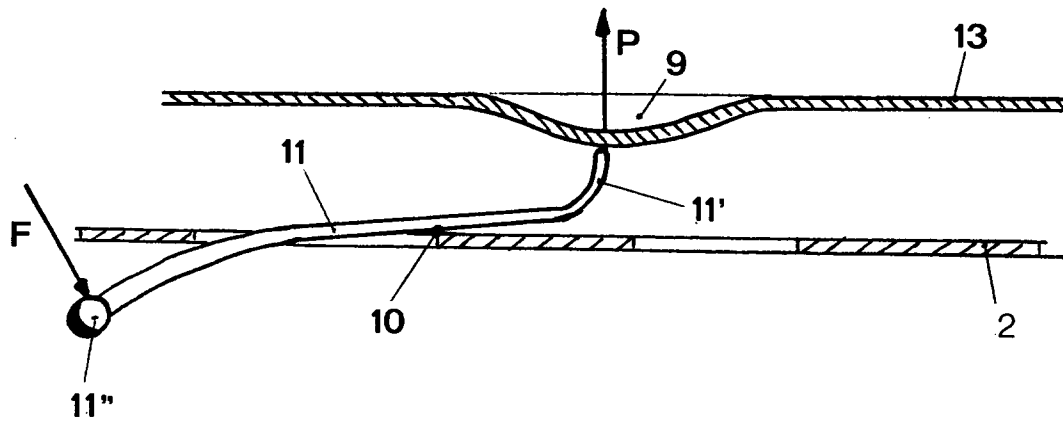


FIG.5

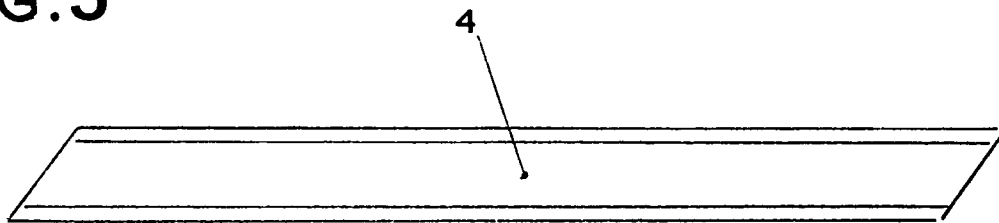


FIG.6

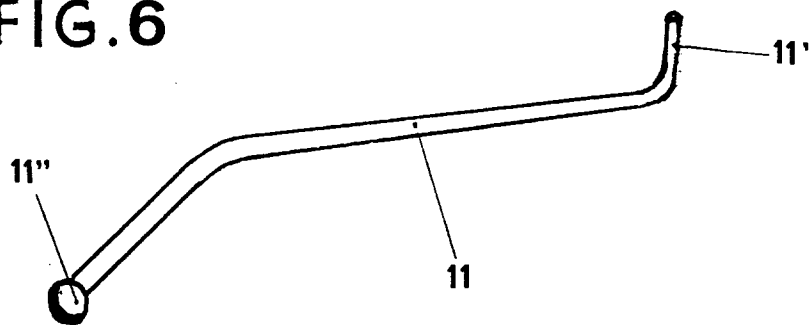
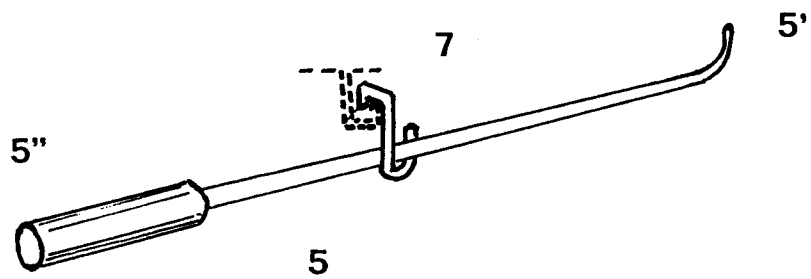


FIG.7





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EUROPEAN SEARCH REPORT

Application Number
EP 94 81 0405

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)
A	US-A-1 783 077 (FERGUSON) * the whole document * ---	1,2	B21D1/06
A	US-A-2 844 060 (HAGERTY) * the whole document * ---	1,2	
A	US-A-4 792 232 (SHELL OIL) * the whole document * ---	1,2	
A	US-A-4 742 237 (FUJI PHOTO FILM) -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B21D B23P G01B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 December 1994	Examiner Ris, M
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