United States Patent

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[72] Inventor **Fernando Estigarribia**
219-55 74th Ave., Bayside, N.Y. 11361

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[45] Patented **June 1, 1971**

[54] **AUTOMOBILE BODY AND FRAME STRAIGHTENING APPARATUS**
1 Claim, 10 Drawing Figs.

[52] **U.S. Cl.** **72/453,** 72/705
[51] **Int. Cl.** **B21d 1/14**
[50] **Field of Search** ..... 72/705, 453; 248/206 A

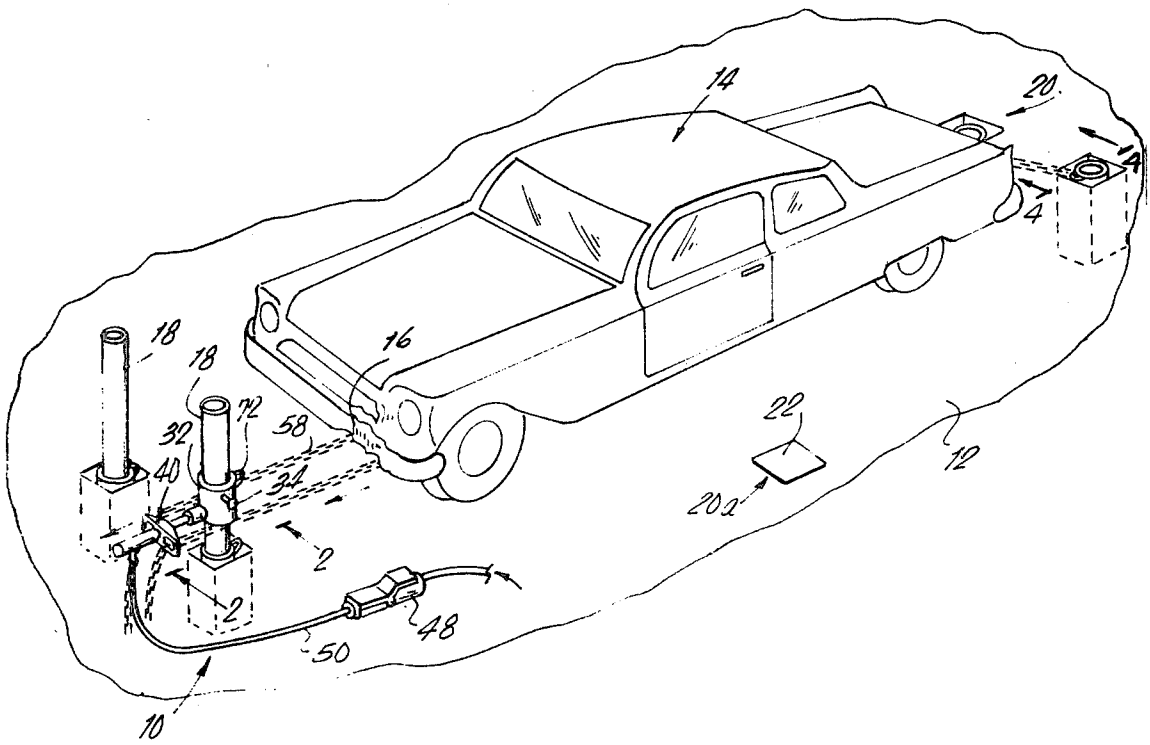
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Primary Examiner—Charles W. Lanham
Assistant Examiner—B.J. Mustaikis
Attorney—Amster & Rothstein

ABSTRACT: An automobile body and frame straightening apparatus which includes a post removably fixed in a sleeve in the floor of a garage. Six such sleeves make up the total assembly, with similar posts being placed into the various sleeves, as is desired, around the perimeter of the automobile. Each post carries a collar and each collar carries a chain retainer. A chain is run from the retainer to a portion of the automobile and the retainer is hydraulically shifted on the post, moving it and its chain away from the post to thereby straighten any damaged portion of the automobile.



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SHEET 1 OF 2

FIG. 1

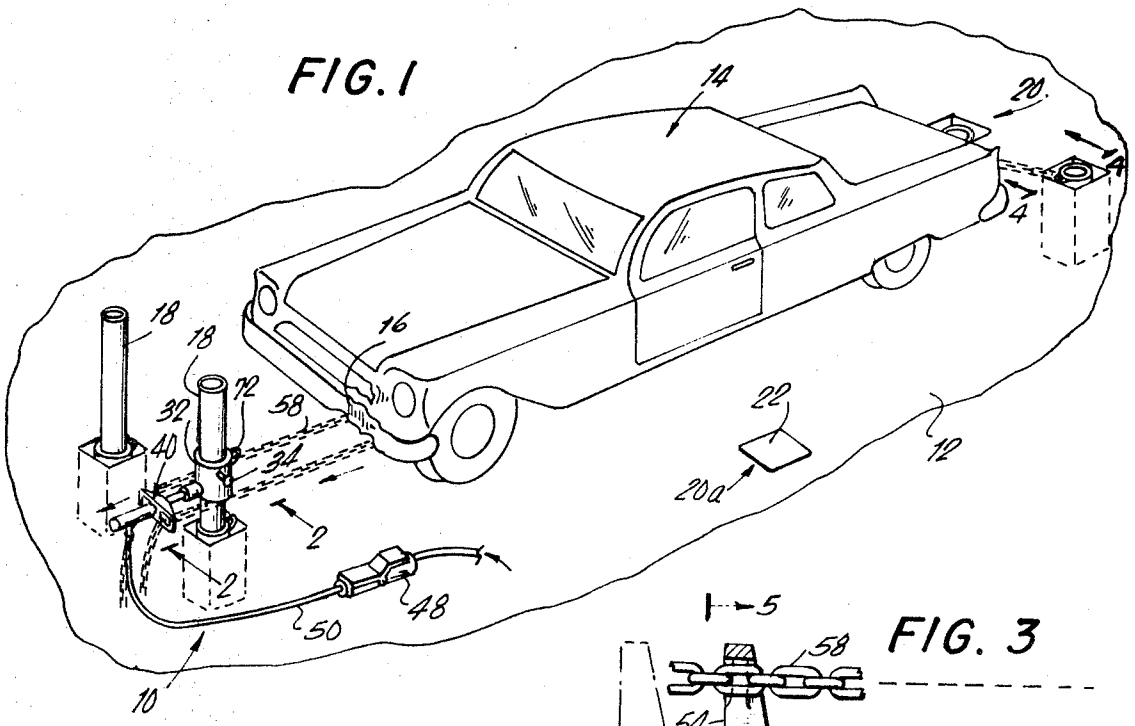
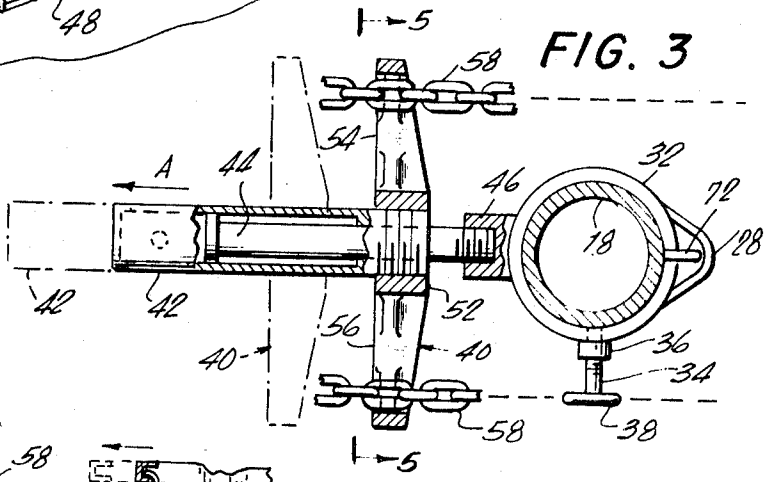


FIG. 3



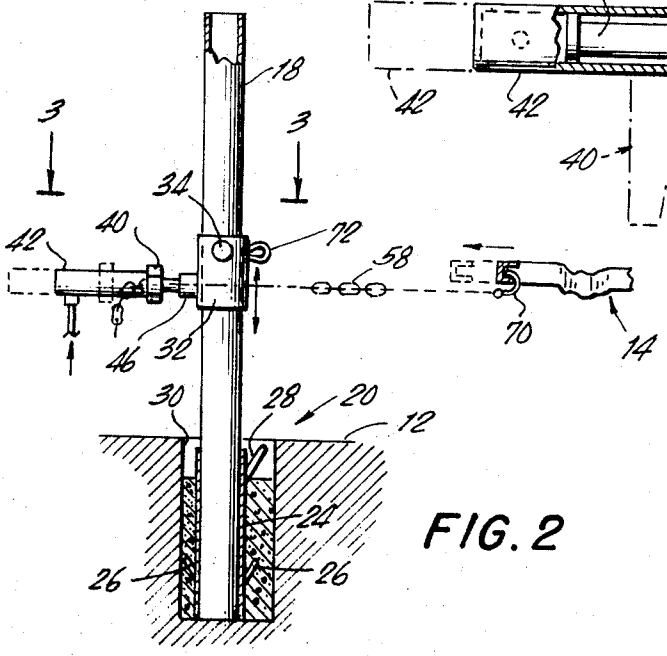


FIG. 2

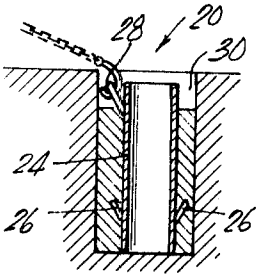
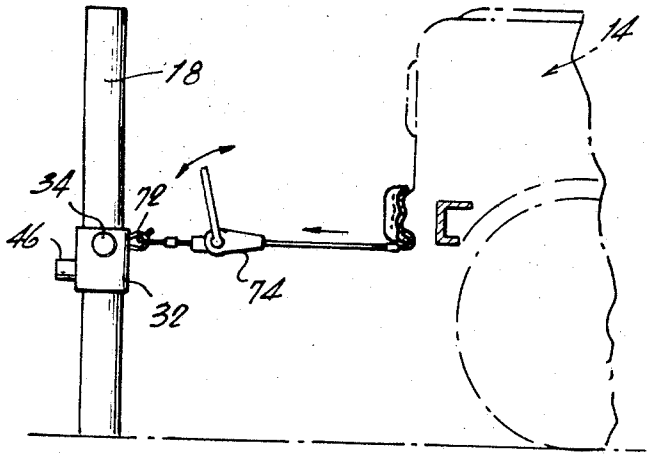


FIG. 4

INVENTOR.
FERNANDO ESTIGARRIBIA
BY
Amster & Rothstein
ATTORNEYS

FIG. 7



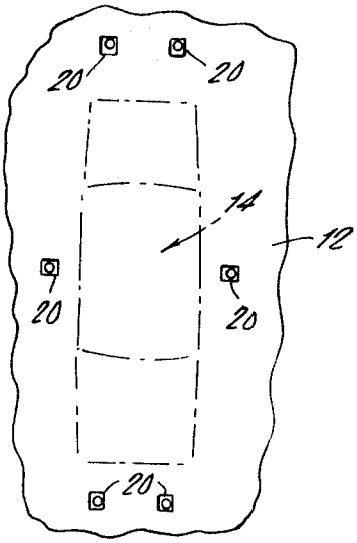


FIG. 10

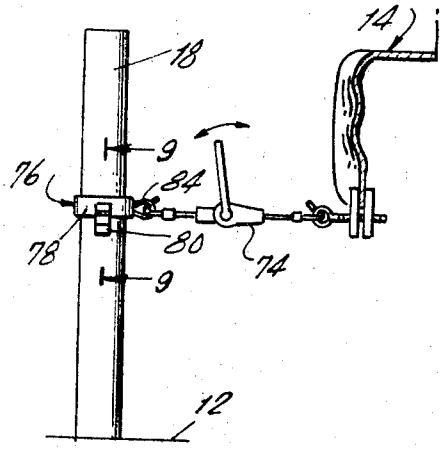


FIG. 8

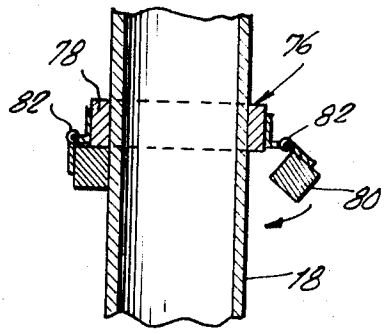
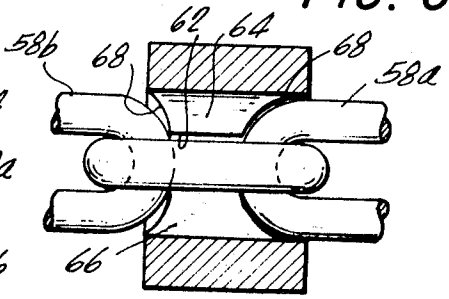


FIG. 9

FIG. 6



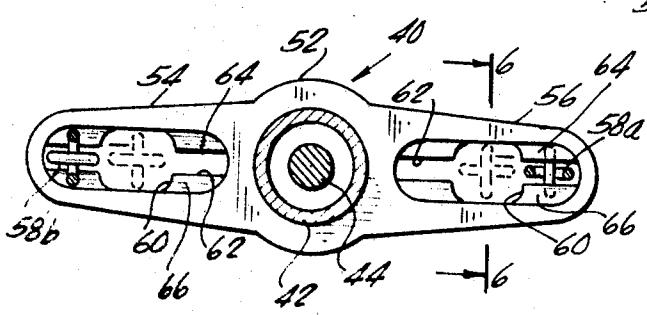


FIG. 5

INVENTOR.
FERNANDO ESTIGARRIBIA
BY
Amster Rothstein
ATTORNEYS

AUTOMOBILE BODY AND FRAME STRAIGHTENING APPARATUS

This invention relates to an apparatus for straightening an automobile body and frame after these portions of the automobile have been bent out of shape, usually in an automobile accident.

It is the primary object of the present invention to provide an automobile body and frame straightening apparatus which can be quickly and easily set up on the floor of a garage in connection with predetermined sites, whereupon the automobile mechanic can utilize the apparatus to efficiently straighten out bent portions of an automobile, and which thereafter may be disassembled and stored away so that the same garage floor area may be used for other purposes, as for example in connection with other automobile repairs.

It is a further object of the present invention to provide an automobile body and frame straightening apparatus of the character described which is especially light in weight and portable so that an automobile mechanic may set up the entire apparatus, utilize it, and disassemble it without the necessity for assistance by other mechanics on the premises.

It is still a further object of the present invention to provide an automobile body and frame straightening apparatus of the character described which has predetermined sites on the garage floor for its location and erection, such sites being below the level of the garage floor so as not to interfere with other garage operations when the apparatus is not in use.

It is still a further object of the present invention to provide an automobile body and frame straightening apparatus of the character described which yields great flexibility in the positions, including levels and angles, from which pressure may be applied to the automobile, and wherein the various components of the apparatus may be utilized as either anchor points to hold the automobile fast or may be utilized as pulling points from which the automobile is straightened.

In general, and in accordance with the present invention, an automobile body and frame straightening apparatus is provided which includes one or more posts, each of these posts carrying other components of the apparatus. A number of cylindrical sleeves are embedded in the garage floor, below the level thereof, these sites being situated generally along a boundary similar in shape but larger than the plan outline of an automobile. Each of these sleeves is adapted to receive a post, and due to the various positions of the sleeves, the posts can be located on any side or end of the automobile. A collar slides upwardly and downwardly along each post and a screw fixes the collar to the post at any desired level. Each collar carries a retainer and the retainer is shifted toward or away from the post by a hydraulically operated piston and cylinder arrangement. Each retainer is adapted to engage a pair of link chains. The retainer engages portions of these chains and the ends of the chains are adapted to be attached to the portion of the automobile which requires straightening. After these chains have been attached to the retainer and to the area of the automobile which is to be straightened, the piston and cylinder arrangement is operated so that the retainer is moved away from the automobile, and the retainer in turn exerts pressure on the chains which serve to straighten the bent or deformed portion of the automobile to the extent desired.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a perspective view showing the automotive body and frame straightening apparatus being utilized on an automobile;

FIG. **2** is an enlarged partially elevational and partially cross-sectional view of the apparatus;

FIG. **3** is an enlarged cross-sectional view of the apparatus taken substantially along the line **3–3** of FIG. **2** and showing in dot and dash lines the position to which the retainer is shifted in the straightening process;

FIG. **4** is a cross-sectional view of the sleeve embedded in the garage floor for receiving the post and is taken along the line **4–4** of FIG. **1**;

FIG. **5** is an elevational view of the retainer taken substantially along the line **5–5** of FIG. **3**;

FIG. **6** is an enlarged cross-sectional view of the chain-holding slot in the retainer and is taken substantially along the line **6–6** of FIG. **5**;

FIG. **7** is a side elevational view showing the use of an auxiliary loop carried by the collar;

FIG. **8** is a side elevational view showing the use of an auxiliary loop carried by the post;

FIG. **9** is an enlarged cross-sectional view of the auxiliary collar taken substantially along the line **9–9** of FIG **8**; and

FIG. **10** is a plan view showing the layout of the sites for the posts of the apparatus.

Referring now in detail to the drawings, the reference numeral **10** in FIG. **1** denotes the automobile body and frame straightening apparatus of the present invention stationed on the floor **12** of a garage. As is evident from FIG. **1**, the apparatus **10** is utilized to straighten out a bent or deformed portion of an automobile **14**, the automobile pictured in said FIG. having a deformed front bumper and grill shown at **16**. The apparatus includes a post **18** which is elongated and cylindrical in configuration, and is hollow. The post **18** may be deemed the primary component of the apparatus since it carries the majority of the other components of the apparatus.

A number of sites **20** are prepared to receive the posts **18** and, as best seen in FIG. **10**, these sites are desirably six in number and lie along a boundary line having the general configuration of the plan outline of an automobile but larger than said outline, so that the sites are situated adjacent to but outwardly from the sides and the ends of the automobile. FIG. **10** shows that a desirable layout for the sites would be one or more on each side of the automobile, two at the front of the automobile, and two at the rear of the automobile, with each of the latter four sites being near the corners of the automobile. It will be appreciated that all of the apparatus components which make up the sites **20** are below the level of the garage floor **12** (see FIGS. **2** and **4**) so that when the apparatus is not in use, the sites do not interfere with the use of the garage floor for other purposes. If desired, a cover **22** can be placed over each of the sites (see site **20***a*) so that the floor at the area of the site is flat and is without a depression.

In each of the sites **20**, a sleeve **24** is embedded, desirably in cement, in the garage floor. Each sleeve is cylindrical and hollow, and each sleeve **24** is oriented so that its axis is vertical. Two or more tabs **26** are fixed to the external surface of each sleeve **24**, protrude outwardly therefrom, and serve to anchor the sleeve **24** within the site. A loop **28** is also fixed to each sleeve **24** at an upper portion thereof but below the surface of the garage floor **12**. It will be seen from FIGS. **2** and **4** that this loop **28** is situated within a depression **30** at the site **20** and is provided so that a chain may be hooked to the loop (see FIGS. **1** and **4**).

As has been stated, the post **18** is cylindrical and has a diameter such that its lowermost end can be slipped into the sleeve **24** so that the post remains in place in the sleeve and is held by the sleeve **24** upright with its axis vertical. It will be apparent that any number of posts can be provided and that of the six sites any number can have posts placed therein at any one time. The number of posts utilized and their positions depend upon the type of body or frame deformity and the manner in which the automobile mechanic desires to operate on these damaged portions.

A collar **32** is carried by each post **18** and the collar is of tubular construction and can slide upwardly and downwardly on the post. Mechanical means is provided to fix the collar **32** at any desired level on the post **18** and desirably said means comprises an elongated screw **34** which is threaded into a nut **36** fixed to the external surface of the collar **32**. The screw **34**

carries a handle **38** at its outer end and upon rotation the inner end of the screw will abut the outer surface of the post **18** so as to hold the collar **32** in place. The collar carries a retainer **40** and hydraulically operated means is provided to drive the retainer away from or closer to the post **18**. The hydraulically operated means includes a cylinder **42** within which a piston **44** is slidably engaged. The end of the piston **44** distant from the cylinder **42** is threaded into a female receptacle **46** fixed to the collar **32**. A foot-operated hydraulic pump **48** is linked to the chamber of the piston-cylinder arrangement by a hydraulic line **50**, and it will be obvious that when the pump **48** is operated the cylinder **42** will move away from the stationary piston **44** in the direction indicated by the arrow A in FIG. **3** to the dot and dash position of the cylinder in the same FIG. The cylinder **42** and the retainer **40** move radially with respect to the post **18**. The piston and cylinder arrangement, its connection to the pump **48**, and the pump **48** itself, are all commercially available units and need not be described further.

The retainer **40** is best seen in FIGS. **3**, **5** and **6** and includes a central hub **52** and a pair of diametrically opposed horizontally extending arms **54**, **56** which are mirror images of one another. The hub **52** is fixed to the external surface of the radially innermost end of the cylinder **42** so that the retainer **40** moves by virtue of movement of the cylinder **42**. The arms **54**, **56** of the retainer **40** are configured to engage any elongated flexible member such as a heavy line made either of fiber or of metal, desirably a link chain **58**. The central portion of each arm has an opening **60** formed therein which is of dimensions larger than the side to side and top to bottom extend of the links of the chain (see FIG. **5**) so that the chain can be pulled freely through this opening **60**.

A pair of slots **62** are also formed in each arm **54**, **56**, with each slot leading off from a different side of the opening **60**. Each of the slots **62** is defined by an upper tapered shoulder **64** and a lower tapered shoulder **66** and, as will be seen in FIGS. **5** and **6**, each slot is horizontal in orientation and is wide enough in its vertical dimension to pass a chain link which is horizontal in orientation, that is, has its opposed sides on a horizontal level, but is not wide enough to pass a chain link which is vertical in orientation, that is, has one of its sides vertical over its other side. It will be appreciated that since the chain is made up of links which can be turned to a vertical or horizontal orientation, the chain can be engaged to the arms **54**, **56** at essentially any point along its length. To so engage a chain, the chain is first passed through the central opening **60** in an arm and then is slid to the right or to the left into either one of the slots **62**. The position of the chain within the opening **60** is indicated by the dot and dash lines in FIG. **5** and the position of the links in the slot **62** is shown in solid lines in the same FIG. As best seen in FIG. **6**, the forward and rearward faces **68** of the shoulders **64**, **66** are concave to match the configuration of the adjacent ends of the chain links.

The utilization of the automobile body and frame straightening apparatus **10** will be apparent from the foregoing description. A post **18** is placed into any one of the sleeves **24** in one of the sites **20**, it being understood that two or more posts may be utilized adjacent any desired side or end of the automobile **14**. The collar **32** is fixed to the post **18** at any desired level, this often being in the same horizontal plane as the damaged portion of the automobile. Of course, if it is desired to pull the damaged portion of the automobile at an upward or downward angle, this can be achieved by appropriate adjustment of the position of the collar **32**. The collar **32** is oriented on the post **18** so that the receptacle **46** points away from it either in alignment with the long axis of the automobile or any desired angular variation thereof. Then, a chain **58**, or two chains if so desired, are engaged to the retainer **40** by being passed first through the opening **60** and then into one of the slots **62**. The other end of the chain, the end distant from the post **18**, is attached to the automobile adjacent the deformed portion thereof, and the chain usually carries a hook **70** at said distant end for this purpose (see FIG. **2**).

Then, the pump **48** is operated so that hydraulic fluid is forced into the chamber of the piston-cylinder arrangement, thereby driving the cylinder **42** and thus the retainer **40** radially away from the post **18**. The continued application of this pressure initially makes the chain **58** taut and then pulls the chain away from the automobile to straighten out any deformed areas of the automobile. Previous to this straightening operation, the other end of the automobile has been anchored in place, that is, has been chained to one of the sites **20** by passing a chain from the rear end of the automobile and hooking it about the loop **28**. This anchorage is shown in both FIGS. **1** and **4**.

It will thus be seen that the posts can be set up by a mechanic without the aid of helpers quickly and easily, and the setup for the realignment of the automobile is readily accomplished. When the post and its components are disassembled and stored, the space formerly occupied by these components may be utilized for other purposes such as automobile engine repair.

In FIG. **7**, an auxiliary loop **72** is shown fixed to the collar **32** and a hand-operable mechanical jack **74** of conventional design runs from the loop **72** to a deformed portion of an automobile **14**. It will be appreciated that the loop **72** provides the facility for a hand-operated alignment apparatus which may be used independently of the hydraulically operated apparatus previously described, or may be used in conjunction therewith.

In FIGS. **8** and **9**, an auxiliary collar **76** is shown in use on the post **18**, and comprises a ring **78** which is cylindrical in configuration and which slips over the post. A pair of strong magnets **80** are connected by hinges **82** to the ring **78** and are pivoted for movement between a position in contact with the exterior surface of the post **18** and a position out of contact with and distant from said post. The auxiliary collar **76** can thus be slipped over the post **18** as necessary and is held in position against dropping by simply swinging both magnets **80** against the metal post **18**. The auxiliary collar **76** also carries a loop **84**. When the auxiliary collar **76** is slipped over the post to its desired position, and is held at any desired height by the magnets **80**, then a hand-operable mechanical jack **74** is utilized with the loop **84** to work on any deformed portion of an adjacent automobile **14**. It will again be appreciated that the auxiliary collar **76** may be utilized on the same post as carries the collar **32** or may be used separately on a different post **18**. By use of the loop **72** on the collar **32** and by the use of the auxiliary collar **86**, it will be appreciated that the mechanic has a wide latitude of components which he may utilize in the straightening process.

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What I claim is:

1. An automobile straightening apparatus system adapted to be assembled to stand on a garage floor and to be disassembled when not in use, the system including an erect post of substantially uniform external circular cross section, means for removably fixing the post in the garage floor at any one of a number of spaced locations, said means comprising at least two sleeves fixed in the floor at spaced locations completely below the level of the floor, the axis of each sleeve being vertical, each sleeve being of matching internal circular cross section so that the lowermost end of the post can be slipped into and pulled from any one sleeve, each sleeve having at least one anchor attached to its external surface and adapted to be embedded in the garage floor, and carrying a loop on its external surface completely below the level of the garage floor, and including a lid for covering each sleeve when not in use, said lids being carried by the sleeves at floor level, a collar of circular internal cross section slidable along and rotatable about

the post, bolt means for securing the collar to the post at any level along and at any angle with respect to the post, a retainer carried by the post, hydraulically operated piston and cylinder means for shifting the retainer toward and away from the post, a first elongated flexible member comprising a chain fixed to the retainer at one portion thereof and adapted to be fixed to an area on an automobile at another and distant portion, whereby when the retainer is shifted, the flexible member applies pressure to the area on the automobile to which the member is fixed, and a second elongated flexible member comprising a chain adapted to be fixed to another area on the automobile and fixed to the loop of any other sleeve.