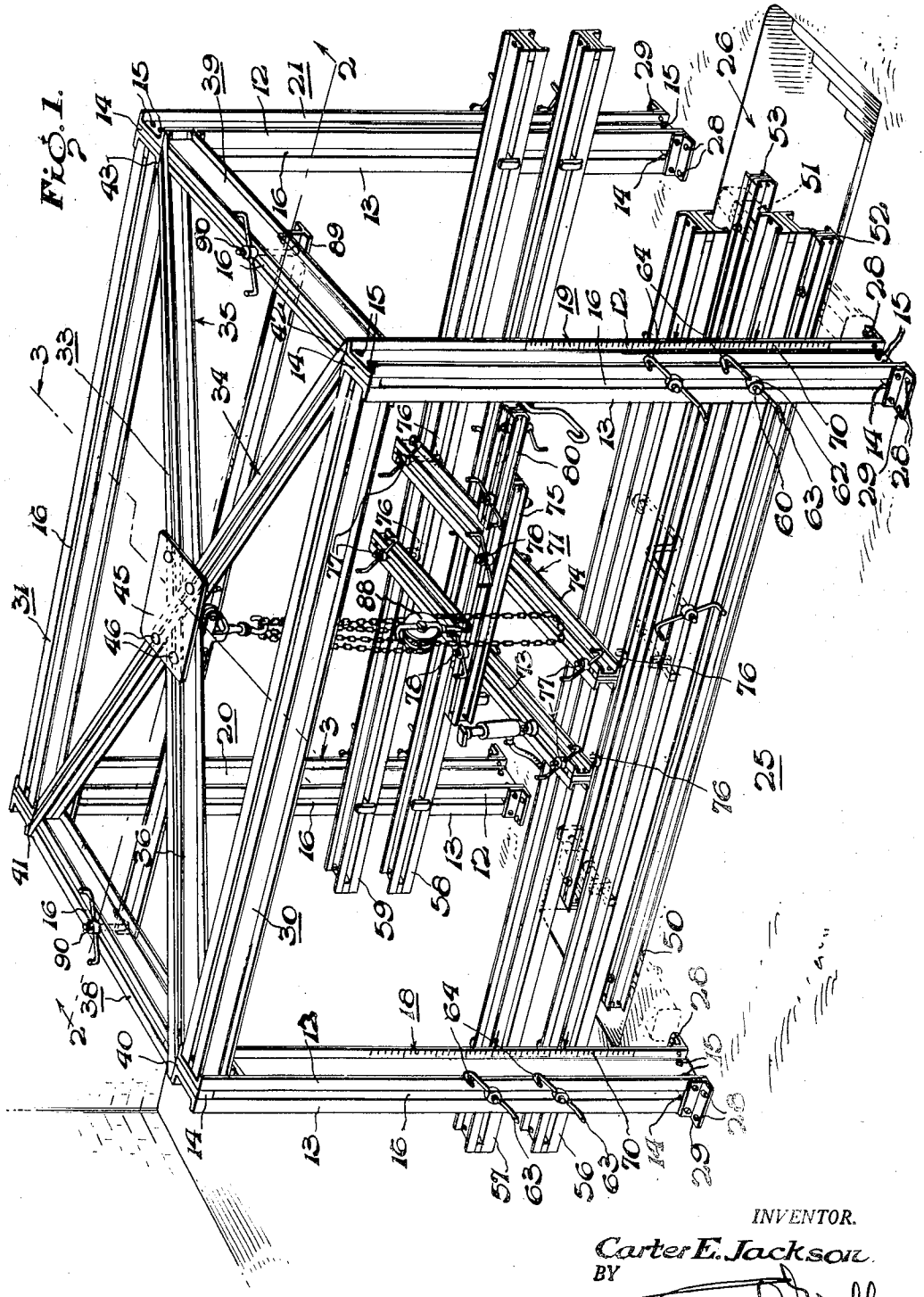
July 3, 1951 C. E. JACKSON 2,559,250

AUTOMOTIVE BODY AND FRAME STRAIGHTENING APPARATUS

Filed March 19, 1947 3 Sheets-Sheet 1

Fig. 1.



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Filed March 19, 1947 3 Sheets-Sheet 2

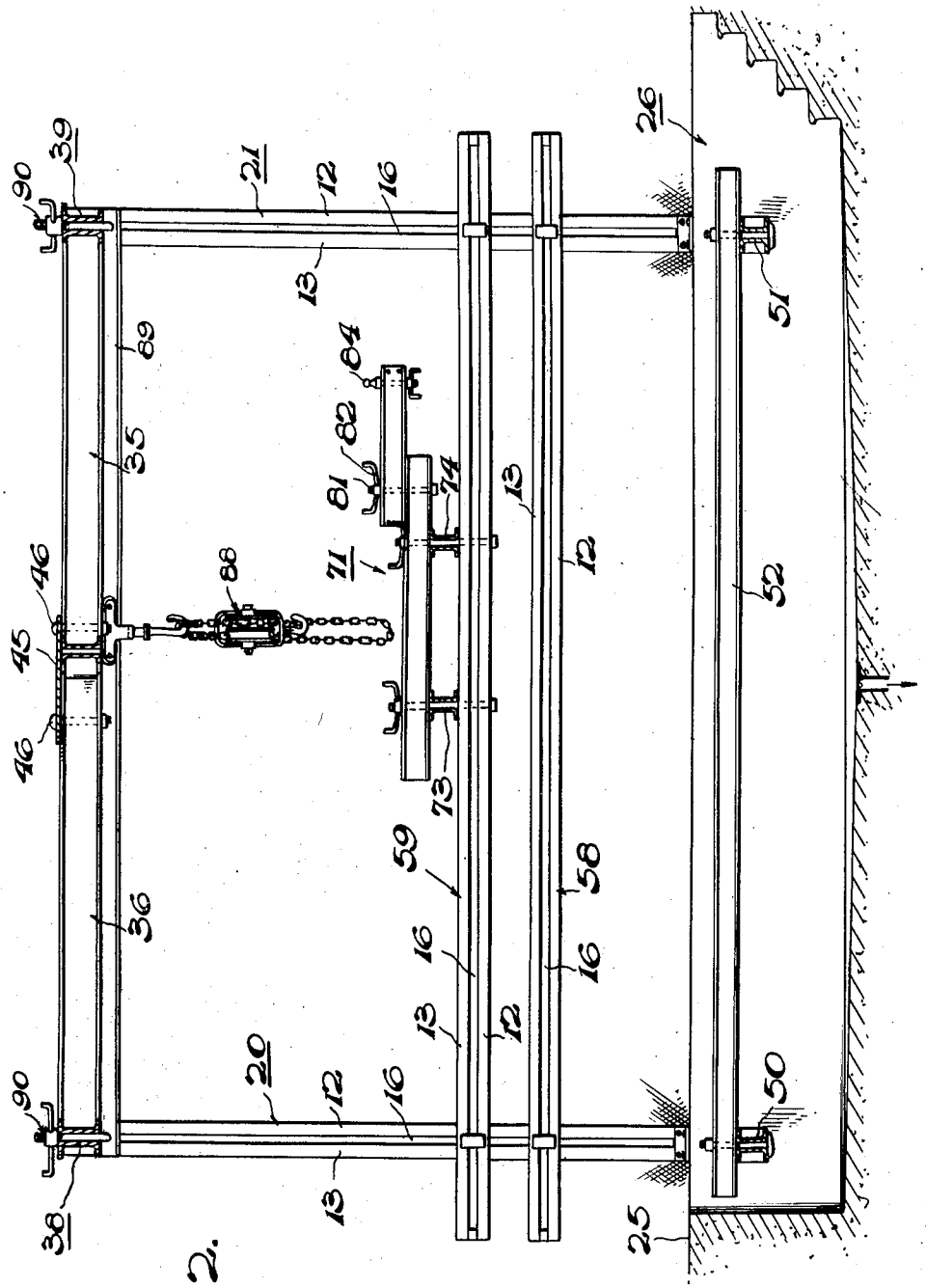

Fig. 2.

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Filed March 19, 1947 3 Sheets-Sheet 3

Fig. 3.

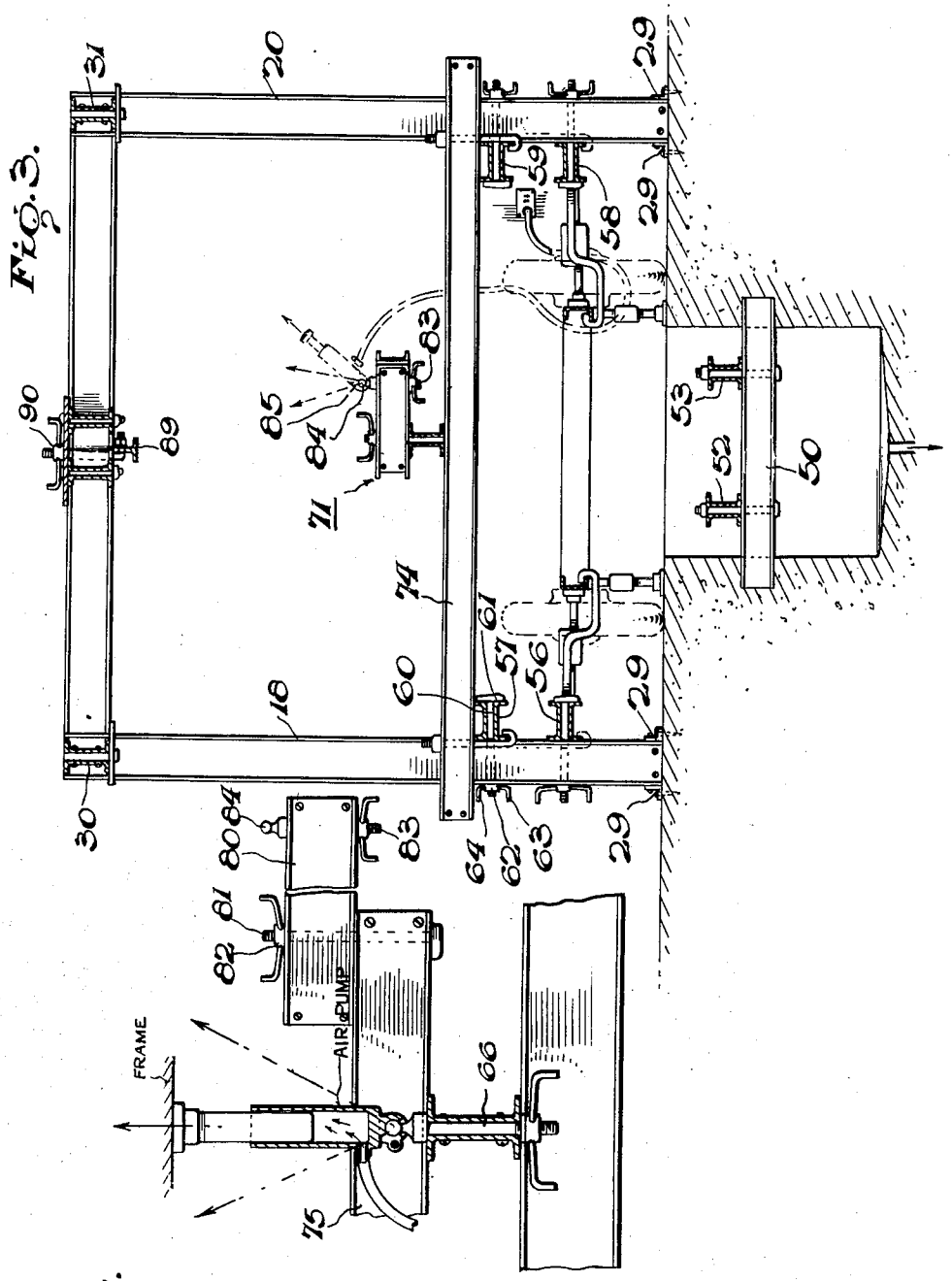

Fig. 4.

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AUTOMOTIVE BODY AND FRAME STRAIGHTENING APPARATUS

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4 Claims. (Cl. 153—32)

1

This invention relates to an apparatus for straightening the various parts of an automobile which have been damaged through accident, and greatly facilitates the expeditious restoration of major distortions.

A general object of the invention is to provide a framework including a system of structural elements having more or less standardized characteristics in the sense that the primary elements consist of channel members arranged back to back and spaced apart by spacing blocks or their equivalent to provide elongated slots which adjustably receive supports for various tools whereby the latter may be adjusted to the desired locations to apply pressure to straighten damaged parts.

In apparatus of this type heretofore generally used, it has been difficult for workmen or operators to have ready accessibility to the various parts of an automobile, truck or other automotive vehicle without laborious maneuvering which impedes the accuracy and increases the labor incident to the straightening operations. In this connection, one of the objects of the present invention is to provide an apparatus which is relatively open on all sides to permit free accessibility of workmen not only to the chassis or frame, but also to the body itself thereby materially cutting down the time element of the major operations involved in straightening the damaged parts.

Another feature of the invention resides in providing a framework including a system of structural elements of the type previously referred to which may be built above and about a pit in the floor thereby enabling the structural elements constituting the assembly to be conveniently and properly placed across the mouth of the pit to serve as a base for straightening jacks or similar tools or instruments in combination with the elevated part of the structure above the mouth of the pit.

A further feature resides in the provision of a rigid framework built to accurate specifications, which constitutes a basis for straightening operations to the maximum degree of exactness and uniformity rather than relying on judgment or inspection by sight to determine whether or not the damaged parts have been restored to their original balanced and normal condition. For example, it has heretofore been the general practice to rely more or less on the skill and judgment of the operator or workman, and in many cases the finished repair operation has been untrue and unbalanced, one side of the repaired car being from a fractional measure of an inch to perhaps several inches higher on one side than on the other. With the present apparatus, however, these objections are avoided since the framework of the machine if provided with scale

2

elements for adjusting the major frame parts to the main base locations from which measurements, with the aid of a standard chart and a scale or rule may be further taken to insure the absolute accuracy of the dimensions to which the damaged parts should be restored.

In conjunction with the present novel system of frame elements which provide a rigid superstructure more or less in the form of a scaffolding which envelopes the top, bottom and sides of a damaged vehicle, it is proposed to provide an adjustable chain hoist device which may be readily adjusted and fixed as desired to not only bring the vehicle to proper position on the main supports, but to also adjust the vehicle vertically or horizontally as the straightening and repair operations proceed to compensate for the progressive pressing out or restoring operations. This chain hoist device is mounted in such a position that it may be readily fixed to any desired location, and when the hoists are removed after having served their purpose, the supporting element therefor is moved to a position where it will not in any way conflict with further repair operations.

One of the advantages of the mobility and adjustability of the chain hoist device is to permit removal of an automotive body or cab of any type from a chassis or frame in order to give further access to the parts of the frame to be straightened while the body or cab is disconnected therefrom. After the frame or chassis has been precisely straightened, the body may then be put back in position and body straightening operations may proceed to make the body again conform with the dimensions of the chassis.

Another feature of the invention resides in the provision of more or less standard adjusting bolts for the various structural elements. That is to say, the structural elements are designed in conjunction with elongated bolts having heads for engaging with one side of the bolts in the structure which are threaded to receive an operating element of the type which not only enables the workmen to use both hands in effecting the tightening operation but also permits of the use of a bar to be interlocked therewith so that greater leverage will be used for the final tightening operation. This is a particular advantage because the structural elements are heavy and must be rigidly anchored for safety and accuracy in preceding with the various straightening operations.

With the above and other objects and advantages in view which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

A preferred and practical embodiment of the

invention is shown in the accompanying drawings, in which:

Figure 1 is a general perspective view of the assembled frame structure showing a pit and the relative positions of the structural elements in the mouth of the pit to those above the pit and with several straightening implements mounted on the frame structure.

Figure 2 is a longitudinal cross section view of the top frame structure along the line 2—2 of Figure 1 and shows a side elevation view of the side of the frame structure.

Figure 3 is a transverse cross section view of the top frame structure along the line 3—3 of Figure 1 showing one end of the frame structure in elevation.

Figure 4 is a detail showing one of the novel mountings for the frame straightening jacks with a ball and socket base connectable with the slots of the several frame elements.

Referring to the drawings and first with particular reference to Fig. 1, the apparatus includes a main frame of rigid elements. Each of these elements comprises channel iron members 12 and 13 positioned back to back and spaced apart at each end by spacer blocks 14, secured together by fasteners such as rivets or bolts 15 extending through the blocks and both ends of the members 12 and 13. The spaced oppositely facing back portions of the several channel members 12 and 13 provide elongated guide tracks or slots 16 which receive supporting bolts for the vehicle frame and body straightening implements so that they are movable along the length of the slots to any desired position, as hereinafter more fully described.

The disposition of the several rigid elements of the above construction provides the aforesaid main framework having four uprights or columns 18, 19, 20 and 21 of equal length rigidly anchored in a base, such as the floor 25 near each corner of the mouth of a rectangular pit 26, by bolts 28 and brackets 29. Similarly constructed compound rigid elements 30 and 31 horizontally connect the upper free ends of the uprights or columns together at each top side of the frame, and the sides of the framework thus formed are connected together by a top brace device 33 comprised of crossed elements 34, 35 and 36 in the form of an X. The ends of these elements are joined or connected together by welding two end elements 38 and 39, which connected elements are of a length adapted to snugly fit between the top ends of each pair of opposite vertical uprights to insure permanent rigidity to the entire structure. The ends 40, 41, 42 and 43 of the X brace formation of crossed elements are tapered or beveled to seat flatly against the top inner surfaces of each pair of opposite vertical uprights and the crossing point of the elements is covered by an anchor plate 45, which is secured to each cross element by bolts 46 for still further rigidity.

The frame structure thus far described is permanently fixed and reinforced and the four uprights 18, 19, 20 and 21 provide four elongated slots 16 extending from the floor 25 to the top structure 33, two of each of the slots facing each other from opposite sides of the pit 26. Also, permanently mounted in the pit 26 and transverse the same are rigid elements 50 and 51 likewise constructed of channel iron members 12 and 13. Across these elements 50 and 51, if desired or needed during the repair operation, elongated rigid elements such as 52 and 53 may be placed for mounting pressure applying implements to work on the undercarriage of a vehicle positioned within the frame over the pit 26.

Each structural unit of the device whether it is part of the fixed framework and in an upright or vertical plane or in a horizontal plane from the ground surface is formed on the spaced back to back channel members generally designated as 12 and 13. So also, in addition to the above described rigidly fixed framework members for enveloping a vehicle chassis or body positioned therein over the pit 26, there are provided a plurality of horizontally disposed shiftable secondary frame elements 56, 57, 58 and 59 also constructed of channel members 12 and 13. These elements have the same elongated slots 16 and spacer blocks 14 and are adjustably secured to the upright members 18, 19, 20 and 21 by bolts 60 having heads 61 large enough to bridge the slots 16 and shanks long enough to project through the slots of the channel members of one upright element and one of the moveable elements, so as to leave exposed a threaded end for a nut 62 having arms 63 and 64 with hooked ends. These arms and the hooked ends enable the workmen to use both hands in effecting the tightening operation between the fixed and moveable elements and also permits a bar, not shown, to be interlocked with the hooked ends to provide for greater leverage for the final tightening operation of the moveable elements to the fixed framework.

Any number of additional separate secondary frame elements may be used, for example as shown in Fig. 1 there are two mounted on each side of the fixed main framework, but one or more than two to a side may be used if needed for a particular operation or repair job. With the addition of elements 56, 57, 58 and 59 pressure applying implements may be mounted on bolt supports 66, such as shown in Fig. 4, for example and again in Fig. 1 mounted on element 73. The spaced apart opposite top horizontal elements 57 and 59, see Fig. 1, may be positioned in a level plane according to a scale 70 marked on the web of each upright, and an auxiliary frame attachment 71 comprised of elements 73 and 74, and a third element 75 adjustable on these members are provided for interior body work.

The elements 73 and 74 bridge the pit and rest at each end on the top edges of one of the channel irons of elements 57 and 59 with their slots vertical with respect to the web of the top channel iron of these elements and adjustably secured by hooked end bolts 76 and armed nuts 77, similar to nut 63 previously described, by engagement of the hooked end of each bolt 76 under the lower flange of the lower channel member of the element 56 on one side and the element 58 on the other. The opposite threaded end of each of the bolts 76 projects through the slots 16 at each end of the elements 73 and 74 and the armed nuts 77 are threaded thereon to secure them in their adjusted position, see Fig. 1.

The auxiliary attachment 71, before it is anchored to the supporting elements 57 and 59, has its elements 73 and 74 extended through the doors or windows of the body of a vehicle, the interior of which is to be worked on with the element 75 completely inside the body and secured by bolts 78 and armed nuts 79 across the elements 73 and 74. The element 75 is moved along the slots 16 of the elements 73 and 74 to the desired position between the sides

of the body. To one of the extended ends of the element 75 is mounted a short section 80 (see Figs. 2 and 4) formed from the same type of channel irons 12 and 13 with a slot 16 therebetween. This short section 80 has one end secured to one of the extended ends of element 75 by bolt 81 and nut 82 and the other end is free to receive an implement mounting bolt 83 with a ball head 84 over which fits a ball socket 85 on the bottom of a jack body or hydraulic jack cylinder 86 connected with a source of fluid supply, not shown. Thus by swinging the short section 80 around on the bolt 81 upon loosening the nut 82 and swivelling the jack as required within the body or cab of the vehicle, the operating head of the jack may be brought into contact with crushed-in metal parts of the body to push the parts outward toward their former normal positions.

In working on the outside of the vehicle various types of straightening implements may be used, and in many instances the chassis or frame of the vehicle may be damaged to a degree requiring implements capable of exerting 50 to 60 tons of pressure on the damaged parts to return them back to position. Thus it is clear that the main frame structure must be sufficiently rigid and strong to withstand and resist pressures of the degree mentioned, and no portable or unanchored structure is sufficient for such heavy work.

Frequently, it is necessary to completely remove the body or cab of the vehicle from the chassis. Provision is made for such removal by a chain hoist 88 mounted for longitudinal movement along a T-beam 89 supported by bolt members 90 in the slots 16 of the top end elements 38 and 39. Thus, the cab or vehicle body may be raised and moved from over the chassis of the vehicle until all necessary repairs have been made to the chassis by connection of pressure applying jacks or the like to the removeable side members 56, 57, 58, and 59. The elongated slots 16 of the rigid frame elements throughout the structure make it possible by slight adjustment to serve as mounting for jacks having a novel swivel connection, such as shown in Fig. 4 for example, so that the jack may be adjusted to any angular position with reference to the frame part in which it is mounted to exert pressure at the desired point of damage. These swivel connections for the jacks enable the operators to quickly and easily place the screw or hydraulic jacks in a position to apply straightening pressures at any specific point on either the interior or exterior of the vehicle.

When it is desired to use the apparatus, a damaged vehicle is driven or moved over the pit 26 into the confines of the main frame and the secondary or moveable units, such as 56, 57, 58 and 59 are adjusted adjacent the damaged sides of the vehicle. After the desired adjustment has been made of these secondary frame units, then straightening implements may be mounted as described within the elongated slots 16 of these units and operated to provide bending pressures as high as sixty tons, if necessary, against the deformed part of the vehicle body or chassis. Likewise, such implements may be mounted in the slots 16 of the secondary units 52 and 53 mounted on the pit embedded units 50 and 51, so as to straighten the undercarriage of the vehicle, if necessary.

Whenever it is desired to remove the body or cab of the vehicle, the chain hoist is applied

thereto and moved longitudinally along the main frame to any position desired. Also, as explained previously, work may be efficiently performed from the interior of the vehicle body by the insertion of secondary units 73 and 74 through the doors or windows of the body, so that units 75 and 80, adjustably mounted thereon, will be inside the body and in a position to properly mount straightening implements to work on the interior.

From the foregoing it will be seen that selected types of straightening implements may be developed and used in combination with the novel rigid frame elements of the invention, and the actual operation and use of the apparatus will be apparent to those skilled in the art.

I claim:

1. In an apparatus for restoring distorted automotive vehicles, the combination, comprising, a main frame, including a pair of horizontally disposed members with vertical longitudinal slots, a pair of bolt members each slidable in the slot of one of the horizontal members and supported thereby and terminating at its lower end in a hook portion, a horizontally disposed beam including a vertical web with a pair of openings each for one of the hook portions and having at the lower web end oppositely extending horizontal flanges constituting a track for a chain hoist.

2. An apparatus according to claim 1, wherein, a nut with arms is threaded on the end of the hook portion of the bolt members.

3. An apparatus according to claim 1, wherein, the beam has a T-section.

4. In an apparatus for restoring distorted automotive vehicles, the combination, comprising, a frame including a horizontally disposed base member having a longitudinal vertical slot, a second similar member slidably mounted on said first-mentioned member with an end projecting therefrom, bolt means slidable in the slots of the members and operable to hold the second member projected in a predetermined horizontal position coplanar with and angular to the first member, implement mounting bolt means slidably mounted in the slot of the second member, said implement bolt means having its upper end formed into a ball and a shoulder resting upon the second member on each side of the slot therein, and a fluid cylinder jack formed with a ball socket engageable over said ball on said implement bolt, to thereby permit swivel movement of the said jack on the end of said implement bolt.

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