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E. L. BRONSON ETAL

3,122,194

AUTOMOBILE BODY AND PART STRAIGHTENING TOOL

Filed Sept. 26, 1961

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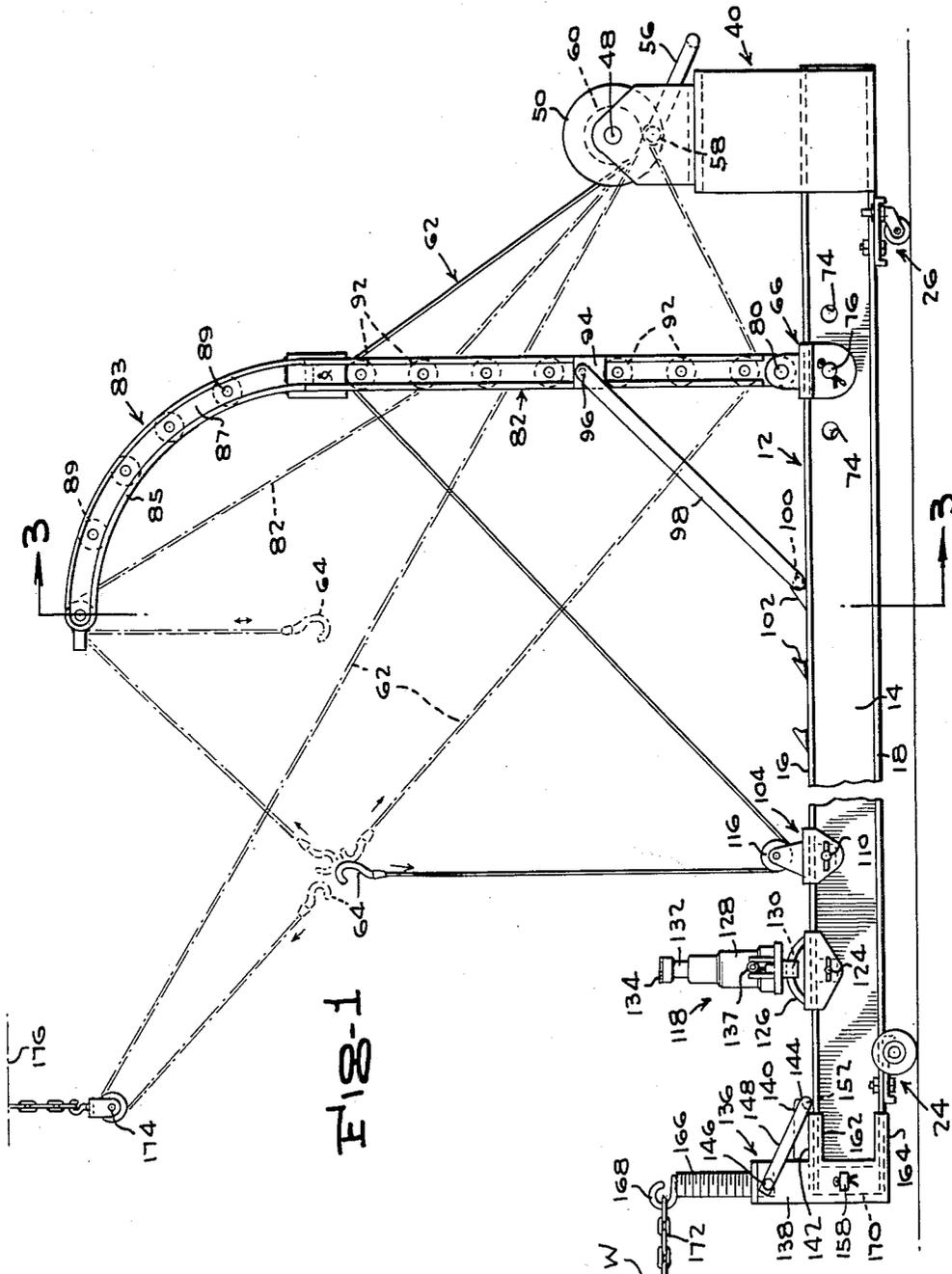


FIG-1

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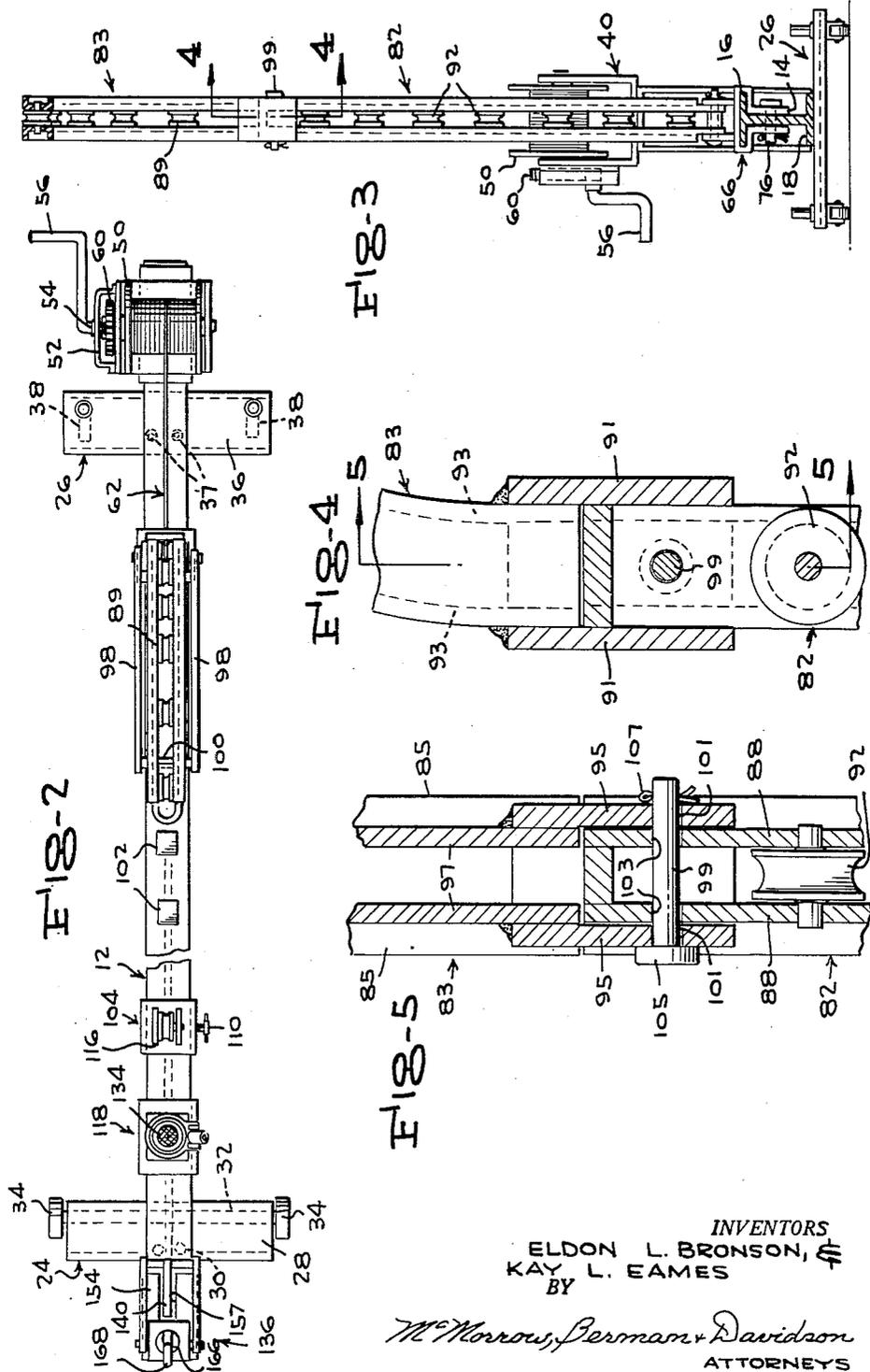
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4 Sheets-Sheet 2



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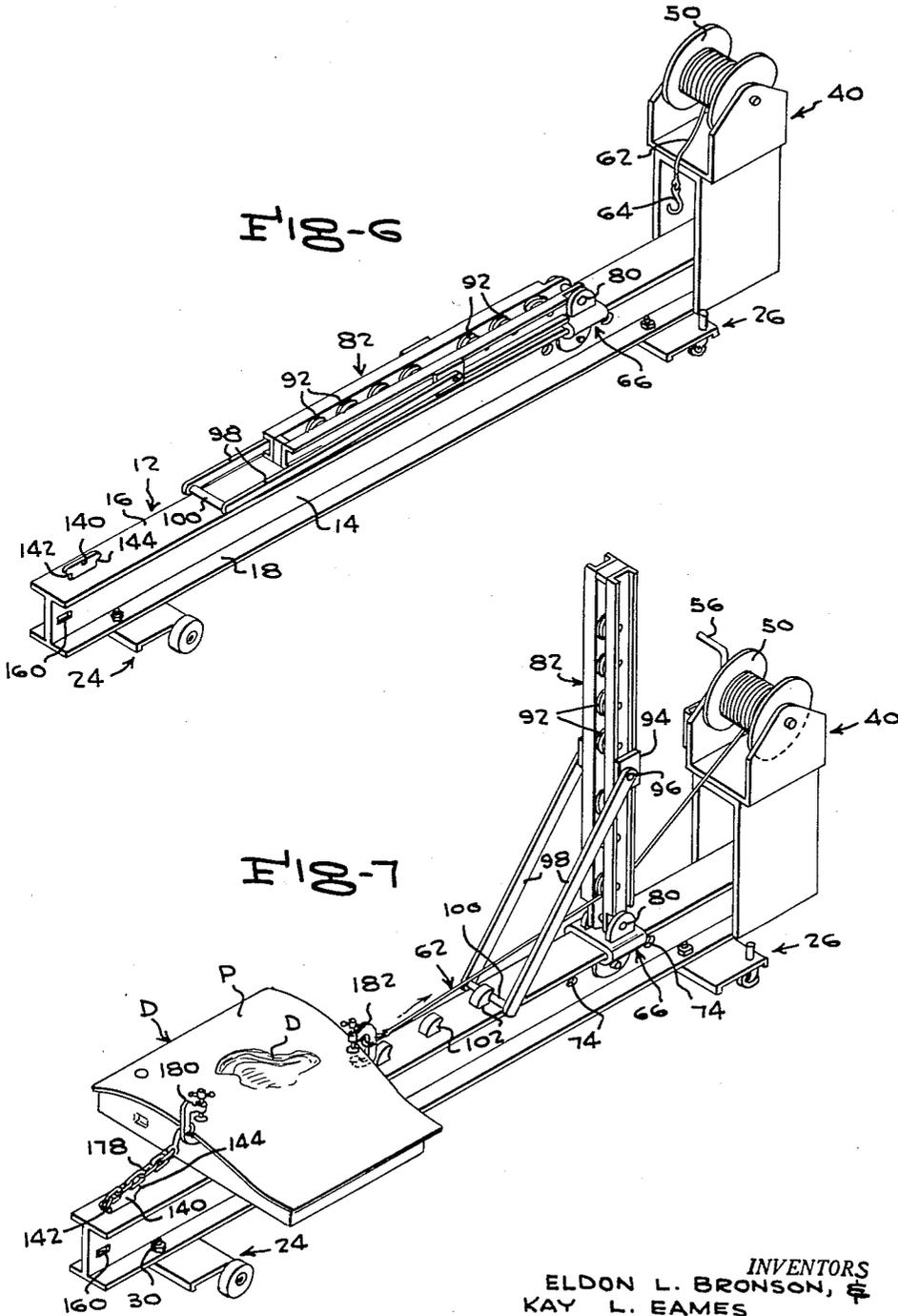
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4 Sheets-Sheet 3



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FIG-8

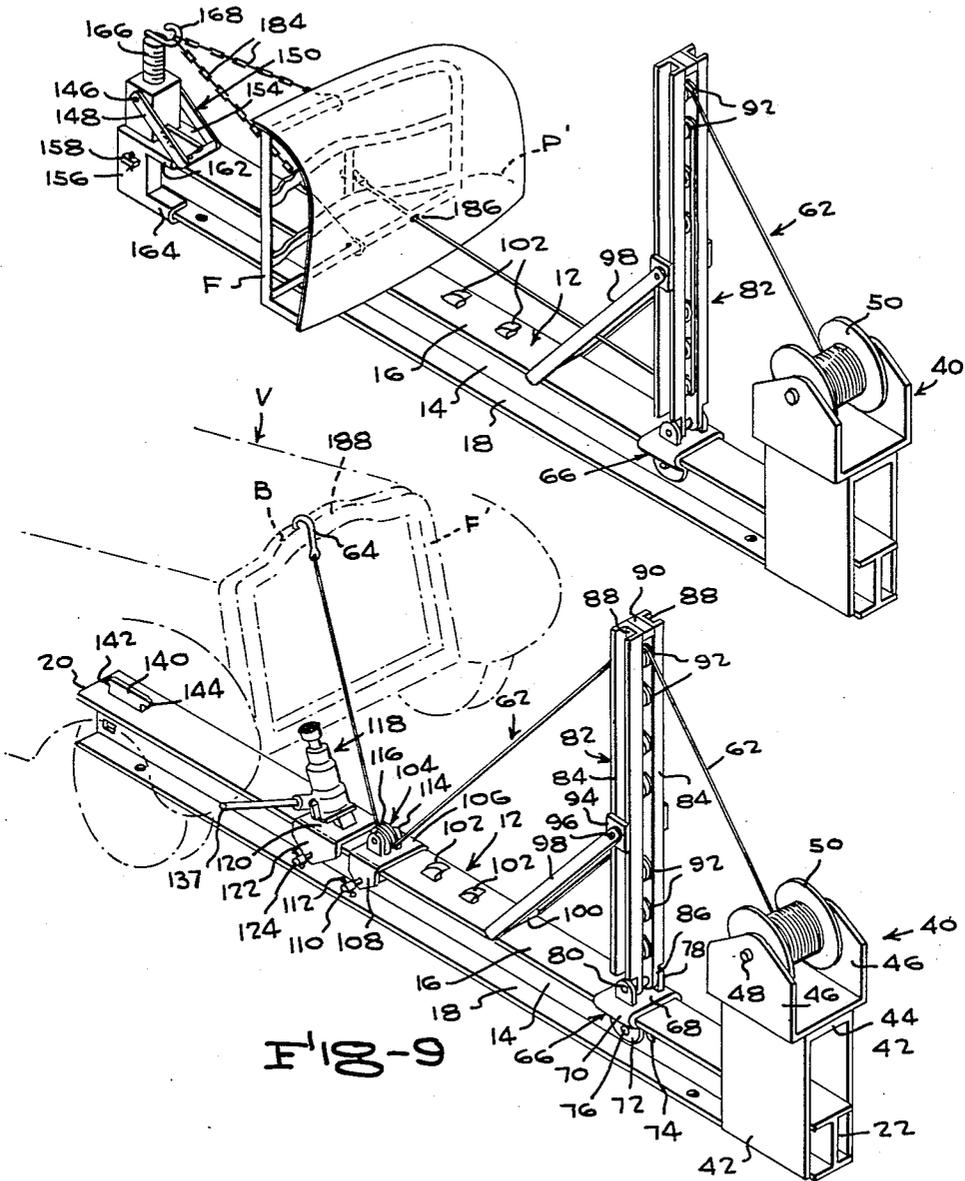


FIG-9

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3,122,194

AUTOMOBILE BODY AND PART STRAIGHTENING TOOL

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10 Claims. (Cl. 153—32)

This invention relates to a novel portable tool for straightening and restoring the shape of automobile bodies, frames, and other components of automobiles and the like, through the exertion of pull.

The primary object of the invention is the provision of an efficient, practical, and extremely versatile tool of the kind indicated, which combines, in one unit, the separate tools and facilities ordinarily required to be provided and used individually in a body and frame repair shop, and which can also be used for pulling motors, jacking up automobiles at one side or one end thereof, and related tasks.

Another object of the invention is the provision of a tool of the character indicated above, which is adapted to exert pull, on anchored parts to be straightened or reshaped, at substantially unlimited vertical, horizontal, and intermediate angles, and to substantially unlimited extents in such directions, and in exactly opposite directions at the same time.

A further object of the invention is the provision of a tool of the character indicated above, which, when not in use, can be collapsed to a relatively small mass for easy out-of-the-way storage.

Other important objects and advantageous features of the invention will be apparent from the following description and the accompanying drawings, wherein, for purposes of illustration only, a specific form of the invention is set forth in detail.

In the drawings:

FIGURE 1 is a contracted side elevation of a tool of the present invention, showing the same set up for exerting a downward vertical pull, in solid lines, and for exerting pull at an intermediate angle in phantom lines;

FIGURE 2 is a top plan view of FIGURE 1;

FIGURE 3 is a vertical transverse section taken on the line 3—3 of FIGURE 1;

FIGURE 4 is an enlarged fragmentary vertical section taken on the line 4—4 of FIGURE 3;

FIGURE 5 is a fragmentary vertical section, on the scale of and taken on the line 5—5 of FIGURE 4;

FIGURE 6 is a perspective view of the tool in collapsed condition;

FIGURE 7 is a perspective view showing the tool set up for exerting horizontal pull on an automobile body door anchored to the tool, for pulling a dent out of the door panel;

FIGURE 8 is a perspective view of the tool, showing the same set up for exerting horizontal pull on an interior portion of a body part anchored to the tool, for straightening or reshaping said interior portion; and

FIGURE 9 is a perspective view of the tool showing the same set up for exerting downward vertical pull for straightening or reshaping a radiator core support frame.

Referring in detail to the drawings, wherein like numerals designate like parts throughout the several views, the illustrated tool comprises an elongated horizontal base in the form of an I-beam 12 having a vertical web 14, and upper and lower flanges 16 and 18, and has forward and rear ends 20 and 22 respectively. The beam 12 is supported on forward and rear dollies 24 and 26, respectively.

The forward dolly 24 comprises a transversely elongated plate 28 which extends across the underside of the lower beam flange 18, and is bolted thereto, as indicated

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at 30. A transverse axle 32 is suitably secured to the underside of the plate 28, and carries outrigger ground-engaging rollers 34, on its ends. The rear dolly 26 comprises a transversely elongated plate 36 which extends across the underside of the lower beam flange 18, and is bolted thereto, as indicated at 37, and carries ground-engaging caster rollers 38 on its underside at its ends.

A winch, generally designated 40, is fixed to and rises from the beam 12, at the rear end thereof, and comprises an inverted U-shaped support composed of vertically elongated sides 42 suitably fixed to the side edges of the upper and lower flanges of the beam and rising above the beam. An erect U-shaped yoke rests upon and is slidably fixed upon the cross member 44 of the support, and has upstanding laterally spaced arms 46, through which a shaft 48 is journaled, on which is fixed a flanged winch drum 50. On preferably the right-hand arm of the yoke a support 52 is fixed, through which is journaled a short drive shaft 54 having a crank handle 56, on its outer end, and a pinion 58, on its inner end, which is meshed with a gear wheel 60 on the drum shaft 48. Ratchet mechanism (not shown) can be associated with the drum 50, if desired.

A flexible cable 62 is wound around and suitably fixed to the drum 50, and pays off the underside of the drum, the free end of the cable having a hook 64 secured thereon.

A slide, generally designated 66, positioned forwardly of the winch 40, is engaged on the beam 12, and preferably comprises a flat plate 68 which bears upon the upper flange 16 of the beam and having downwardly and laterally inwardly directed hook flanges 70, on its ends, which embrace the side edges of the upper beam flange 16, and terminate in downwardly extending ears 72, which engage the opposite sides of the web 14 of the beam 12. The ears 72 have central holes, adapted to be selectively registered with a plurality of longitudinally spaced adjustment holes 74, provided in the beam web 14, and receive a removable positioning pin 76.

The plate 68 of the slide 66 has a pair of upstanding laterally spaced lugs 78 fixed thereon, through which a fixed transverse pivot pin 80 extends. A forwardly and rearwardly tiltable post 82 is pivoted on and rises from the pivot pin, which comprises laterally spaced, vertically elongated outwardly facing channel side members 84, having extensions 86, on the lower ends of their webs 88, which are pivoted on the pin 80. A spacer block 90 is fixed to and extends between the upper ends of the webs 88, at the upper end of the post 82. A plurality of vertically spaced cable pulleys 92 are journaled on and between the channel webs 88, to selectively accommodate the cable 62, as exemplified in phantom lines in FIGURE 1.

Journal blocks 94 are fixed to the outer edges of the flanges of the channel side members 84, at the midheight points thereof, and a transverse shaft 96 is journaled there-through, on whose ends are suitably fixed forwardly declining, laterally spaced bars 98, which are spaced and connected, at their forward ends, by a cross rod 100, which is adapted to bear slidably upon the upper surface of the upper flange 16 of the beam 12, and to be selectively engaged under any of a plurality of longitudinally spaced rearwardly facing fixed stop hooks 102 which rise from the flange 16, at locations spaced forwardly from the post 82 for propping the post 82.

A forwardly and upwardly curved post extension 83 is adapted, at times, to be mounted on the upper end of the post 82, and comprises outwardly facing channel side members 85 having webs 87 between and on which are journaled longitudinally spaced cable pulleys 89, over which the cable 62 is adapted to be selectively trained, for exerting upward pull, at various angles be-

tween the perpendicular and forward and rearward angles, as indicated in FIGURE 1. The extension 83 is removably mounted on the upper end of the post 82 by means, shown in detail in FIGURES 4 and 5, which comprises vertical end plates 91, fixed to the outer sides of the flanges 93 of the channel side members 85 and extending therebelow, and side plates 95, fixed to the outer sides of the webs 97 of the members 85 and extending therebelow. The end plates 91 engage the outer sides of the flanges of the side members 84 of the post 82, and the side plates 95 engage the outer sides of the webs 88 of the post 82, between their flanges, and a removable pin 99 extends through holes 101 in the side plates 95 and holes 103 in the webs 88 of the post side members. The pin 99 has an enlarged head 105 on one end, and a removable cotter pin 107 in its other end.

At a location forwardly of the stop hooks 102, a removable pulley assembly 104 is slidably mounted upon the beam 12, and comprises a horizontal plate 106, which bears upon the upper beam flange 16, and has pendant ears 108, on its ends, which bear against the opposite side edges of the flange 16. One or both of the ears 108 have clamping screws 110 threaded therethrough, for clamping engagement with the beam web 14, which are provided with cross handles 112. A pair of fixed laterally spaced upstanding lugs 114 on the plate 16 carry a cable pulley 116 therebetween, under which the cable 62 is adapted to be trained, at times, as shown in FIGURES 1 and 9, for exerting downward vertical pull.

A jack 118 is removably and slidably mounted upon the beam 12, in front of the pulley assembly 104, and comprises a plate 120 which bears upon the upper beam flange 16 and has pendant ears 122, on its ends, which bear against the opposite side edges of the flange 16, with a handle equipped clamping screw 124 threaded through one of the ears 122 for engagement with the beam web 14. A longitudinal upwardly bowed bar 126 is fixed, at its ends, upon the plate 120, on the longitudinal centerline of the plate, and an upstanding hydraulic jack body 128 has a U-shaped loop 130, on its lower end, which slidably embraces the bar 126, so as to permit of adjusting the jack body to various forward and rearward angles from an erect intermediate position. The jack body 128 has a jack plunger 132 extending from its upper end, which has a head 134 on its upper end. An operating handle 137 extends from one side of the jack body 128.

An anchor assembly, generally designated 136, is removably mounted on the beam 12, at the forward end thereof, and comprises an upstanding block 138 which bears downwardly upon the upper surface of the upper beam flange 16 and rearwardly against the forward end of an upstanding, longitudinally elongated rib 140 which is undercut, at its ends, to provide forward and rear hooks 142 and 144, respectively. The block 138 has pivoted, as indicated at 146, to its opposite sides, the forward ends of the laterally spaced longitudinal arms 148 of a U-shaped anchor yoke 150, whose cross bar 152, extending between the rear ends of the arms 148, is adapted to be engaged under the rear hook 144 of the rib 140, as shown in FIGURES 1 and 8, or optionally under the forward hook 142, when the anchor assembly 136 is reversed and is positioned behind the rib 140.

The anchor assembly 136 further comprises a plate 154 which bears directly upon the beam flange 16, extends forwardly from the block 138, and is provided with a longitudinal slot 157 which accommodates the rib 140. The plate 154 has downwardly extending sides on opposite sides thereof, which comprise intermediate portions 156 which engage the beam web 14 between the beam flanges 16 and 18, through which a removable rectangular retaining pin 158 extends, which extends also through a slot 160 provided in the beam web 14. The intermediate portions 156 have vertically spaced hori-

zontal longitudinal upper and lower channels 162 and 164, respectively, which extend longitudinally from one end of the intermediate portions and embrace the opposite side edges of the upper and lower beam flanges 16 and 18, respectively. An upstanding screw 166 is threaded in the upper end of the block 138, for vertical adjustment relative thereto, and carries an upwardly curved, laterally opening hook 168 on its upper end, which preferably extends laterally from the screw in line with the rib accommodating slot 157. In one form, the intermediate portions 156 of the assembly sides can have a cross plate 170 which extends between the portions 156, at the forward ends thereof, for abutting engagement with the forward end 20 of the beam 12.

In use and operation, and as shown in FIGURE 1, in certain operations involving exertion of upward and down pulls at angles to the perpendicular, the tool is adapted to be anchored to such as a wall W, by means of a chain 172 engaged with the hook 168 on the upper end of the screw 166 of the anchor assembly 136. For the exertion of pull at forward and upward angles, the cable 62 is adapted to be trained over an overhead pulley 174 suspended, as from a ceiling beam 176; and for the exertion of pull at a rearward and upward angle, the cable 62 is adapted to be trained over a pulley 89 of the post extension 83. For the exertion of a downward pull, the cable 62 is adapted to be trained over a pulley 92 of the post 82, and trained under the pulley 116 of the pulley assembly 104.

As shown in FIGURE 7, removal of a dent in the outside panel P of an automobile door D, illustrates another use of the tool. In this case, with the door D laid upon the beam 12, with the jack 118 removed, a chain 178 is provided, which has one end engaged under the forward hook 142 of the rib 140 and is secured, at its other end to a clamp 180, which is clamped around the forward edge of the panel P, in opposition to another clamp 182 which is clamped around the rear edge of the panel P. The clamp 182 is engaged on the cable hook 64, and the cable 62 is trained horizontally under a lower one of the post pulleys 92, so that when the cable is wound upon the winch drum 50, the panel P is tensioned or stretched, so that the dent D therein is caused to spring out and restore the original shape or contour of the panel P.

FIGURE 8 illustrates use of the tool for straightening or restoring the shape of an inside frame F of an automobile body part, such as a fender or body section, which has an outside panel P' connected to but spaced from the frame F. In this instance, the frame F having been anchored to the anchor assembly 150 by means of chains 184 engaged on the screw hook 168 and connected to appropriate portions of the frame F, the cable 62, trained under a lower pulley 92 of the post 82, is passed through a hole 186, provided for the purpose in the outside panel P', and its hook 64 engaged with the appropriate portion of the frame F, so that rearward pull exerted on the frame by the cable 62, serves to pull the frame to original shape.

FIGURE 9 illustrates another use of the tool, for eliminating an upward bow in the top cross bar 188 of a radiator core support frame F'. In this instance, the frame F' is carried by the vehicle V on which it is mounted, to a position over the forward part of the beam 12, in front of the pulley assembly 104, the jack 118 having been removed from the beam 12. The cable 62 is trained from the winch drum 50 over an upper pulley 92 of the post 82 and trained under the pulley 116 of the pulley assembly 104 and up to the cross bar 188 and its hook 64 engaged over the bow B in the cross bar, so that upon operation of the drum 50 the cable exerts downward pull on and eliminates the bow B.

The jack 118 can be used in a variety of ways, for

lifting vehicles either from the side or from one end, or in conjunction with operation of the cable 62.

As shown in FIGURE 6, when the tool is not in use, the same can be collapsed to compact form for out-of-the-way storage, by removing the anchor assembly 150, the pulley assembly 104, and the post extension 83, and swinging the post 82 forwardly down onto the beam 12, with the cable 62 substantially fully wound upon the winch drum 50.

Straightening and reshaping operations other than those described above are capable of being performed by the herein disclosed tool, as will occur to automobile body repair men and workers in related repair operations.

While there has been shown and described a preferred form of the invention, it is to be understood that the invention is not necessarily confined thereto, and that any change or changes in the structure of and in the relative arrangements of components thereof are contemplated as being within the scope of the invention as defined by the claims appended hereto.

What is claimed is:

1. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly.

2. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated member upstanding on the beam between and spaced from the winch and the anchor assembly, said member having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said member having a forwardly and upwardly curved extension on its upper end, said extension having vertically spaced pulleys thereon around which the cable is adapted to be selectively trained.

3. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between and spaced from the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of said pulleys and adapted to be trained around the pulley assembly, a slide embracing the beam on which the lower end of the post is pivotally supported, and means for retaining the slide in longitudinally adjusted positions along the beam.

4. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the

beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between and spaced from the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of said pulleys and adapted to be trained around the pulley assembly, a slide embracing the beam on which the lower end of the post is pivotally supported, and means for retaining the slide in longitudinally adjusted positions along the beam, said beam having a plurality of longitudinally spaced rearwardly facing stop hooks thereon, and forwardly declining prop means pivoted on the post and having a cross bar selectively engageable with stop hooks for propping the post in erect and in forwardly tilted positions.

5. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained over and under one of the pulleys and adapted to be trained around the pulley assembly, and an upstanding jack slidably mounted on the beam between the pulley assembly and the anchor assembly and tiltably forwardly and rearwardly relative to the beam.

6. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said pulley means comprising vertically spaced pulleys over and under which the cable is adapted to be optionally trained, said anchor assembly being removable from the beam and comprising an upstanding block having a vertical screw threaded in and extending above its upper end, and a hook on the upper end of the screw to which an external anchoring means is adapted to be connected.

7. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said pulley means comprising vertically spaced pulleys over and under which the cable is adapted to be optionally trained, said anchor assembly being removable from the beam and comprising an upstanding block having a vertical screw threaded in and extending above its upper end, and a hook on the upper end of the screw to which an external anchoring means is adapted to be connected, a horizontal plate bearing upon the beam

upon which said block is fixed, said plate reaching rearwardly from the block and having a longitudinal slot therein, an upstanding longitudinal rib on the beam received by said slot, and sides on said plate and extending downwardly therefrom and embracing opposite sides of the beam, said rib having forward and rear hooks on its ends, and retaining means comprising a member on and extending rearwardly from the block and engageable under the rear rib hook.

8. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam, a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said pulley means comprising vertically spaced pulleys over and under which the cable is adapted to be optionally trained, said anchor assembly being removable from the beam and comprising an upstanding block having a vertical screw threaded in and extending above its upper end, and a hook on the upper end of the screw to which an external anchoring means is adapted to be connected, a horizontal plate bearing upon the beam upon which said block is fixed, said plate reaching rearwardly from the block and having a longitudinal slot therein, an upstanding longitudinal rib on the beam received by said slot, and sides on said plate and extending downwardly therefrom and embracing opposite sides of the beam, said rib having forward and rear hooks on its ends, and retaining means comprising a member on and extending rearwardly from the block and engageable under the rear rib hook, said retaining means further comprising a removable pin extending through said sides and the beam.

9. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said pulley means comprising vertically spaced pulleys over and under which the cable is adapted to be optionally trained, said anchor assembly being removable from the beam and comprising an upstanding block having a vertical screw threaded in and extending above its upper end, and a hook on the upper end of the screw to which an external anchoring means is adapted to be connected, a horizontal plate bearing upon the beam upon which said block is fixed, said plate reaching rearwardly from the block and having a longitudinal slot

therein, an upstanding longitudinal rib on the beam received by said slot, and sides on said plate and extending downwardly therefrom and embracing opposite sides of the beam, said rib having forward and rear hooks on its ends, and retaining means comprising a member on and extending rearwardly from the block and engageable under the rear rib hook, said retaining means further comprising a removable pin extending through said sides and the beam, said beam having a vertical web and upper and lower horizontal flanges, said sides having vertically spaced channels receiving the opposite side edges of the upper and lower beam flanges.

10. An automobile body and part straightening tool comprising an elongated horizontal beam having forward and rear ends, a cable winch upstanding on the beam at the rear end thereof and having a cable drum, an anchor assembly upstanding on the forward end of the beam a vertically elongated post upstanding on the beam between and spaced from the winch and the anchor assembly, said post having vertically spaced pulleys thereon, a pulley assembly mounted on the beam between the anchor assembly and the post, and a cable trained over the cable drum and having a work-engaging hook on its free end, said cable being trained around one of the pulleys and adapted to be trained around the pulley assembly, said pulley means comprising vertically spaced pulleys over and under which the cable is adapted to be optionally trained, said anchor assembly being removable from the beam and comprising an upstanding block having a vertical screw threaded in and extending above its upper end, and a hook on the upper end of the screw to which an external anchoring means is adapted to be connected, a horizontal plate bearing upon the beam upon which said block is fixed, said plate reaching rearwardly from the block and having a longitudinal slot therein, an upstanding longitudinal rib on the beam received by said slot, and sides on said plate and extending downwardly therefrom and embracing opposite sides of the beam, said rib having forward and rear hooks on its ends, and retaining means comprising a member on and extending rearwardly from the block and engageable under the rear rib hook, said retaining means further comprising a removable pin extending through said sides and the beam, said beam having a vertical web and upper and lower horizontal flanges, said sides having vertically spaced channels receiving the opposite side edges of the upper and lower beam flanges, and intermediate portions bearing against opposite sides of the beam web.

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