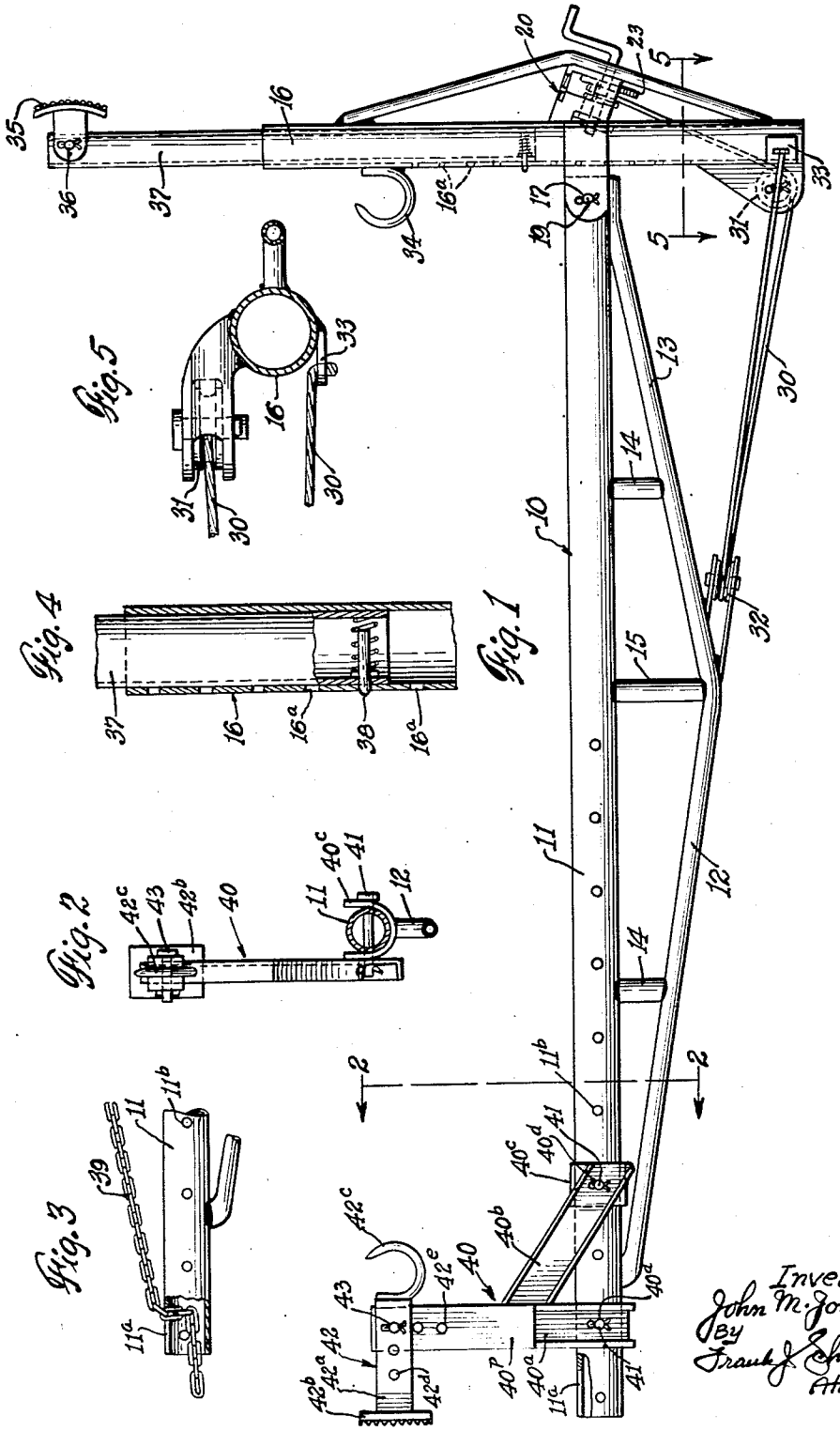
May 27, 1958 J. M. JOHNSON 2,836,220

PORTABLE MANUALLY OPERABLE AUTOMOBILE BODY AND FENDER SHAPE RESTORING TOOL

Filed Dec. 6, 1956 2 Sheets-Sheet 1



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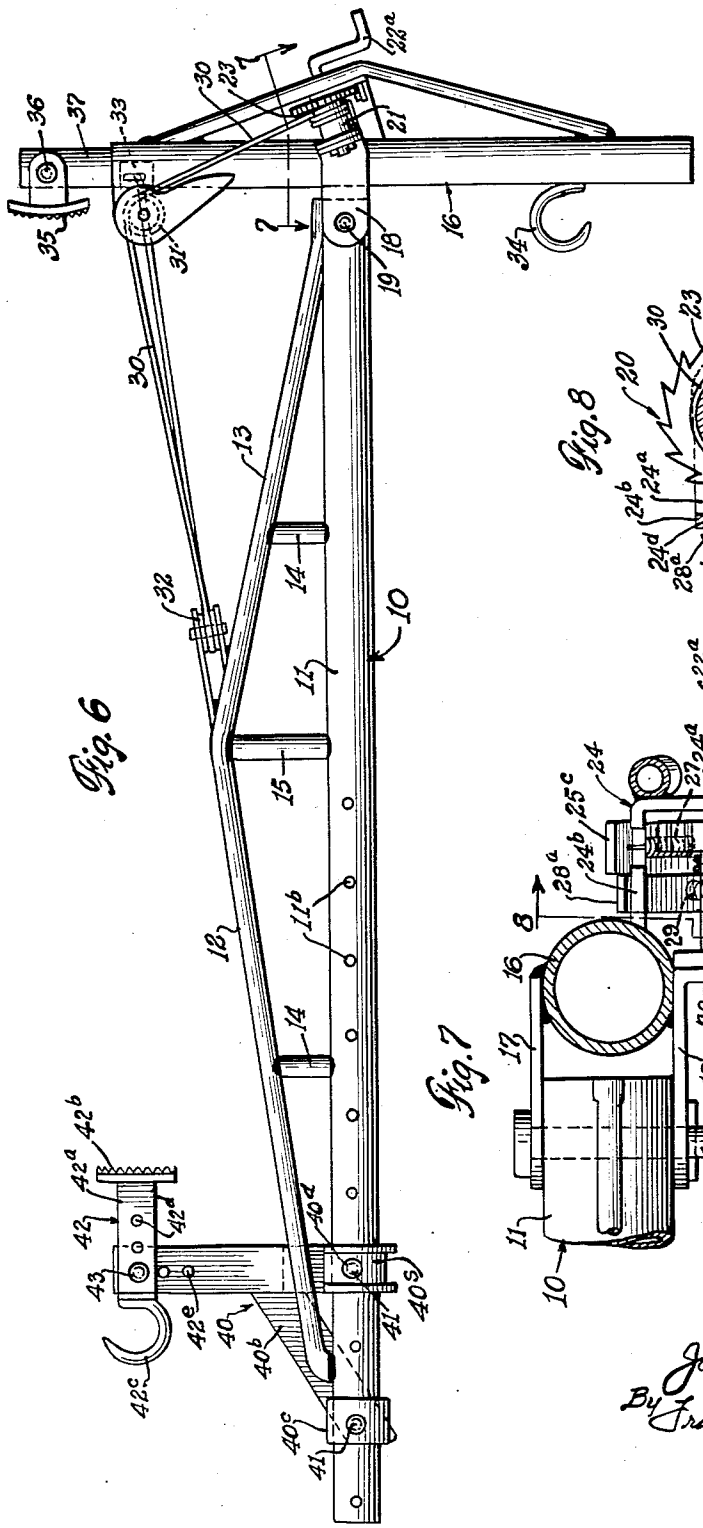

Fig. 6

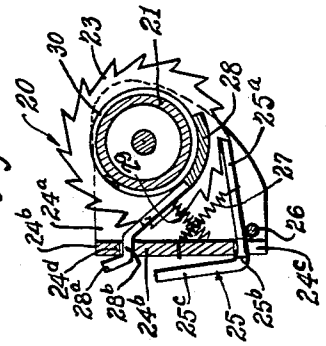

Fig. 8

Fig. 7

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United States Patent Office 2,836,220 Patented May 27, 1958

2,836,220

PORTABLE MANUALLY OPERABLE AUTOMOBILE BODY AND FENDER SHAPE RESTORING TOOL

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Application December 6, 1956, Serial No. 626,732

14 Claims. (Cl. 153—39)

The present invention relates to hand operated tools of the general type disclosed in my Patent No. 2,757,705 and a still earlier Patent No. 2,597,103, for reshaping damaged bodies, fenders, doors, etc. of automobiles.

The purpose of the present invention is to create a tool that shall be very simple, light and sturdy and be more adaptable to problems encountered and adaptable to a greater variety of problems than are the prior tools.

In the preferred embodiment of my invention I employ a rigid body member or trussed beam composed of tubular members connected together to form an isosceles triangle the base of which is equal to many times its height, together with a force-applying lever in the form of an open-ended tube hinged at a point remote from both ends to one end of the beam for rocking movements in the plane of the triangle.

With this arrangement the stem of a work-engaging member may be inserted in either end of the lever.

To operate the lever I provide means that connects one end of the same to the trussed beam at the apex of the triangle; thereby enabling a user to pull that end of the lever inward while forcing the other end outward. Therefore a work-engaging part on the lever is driven inwardly or outwardly, depending on which of the two ends of the lever it is mounted.

As in my aforesaid patent, I employ a detachable post at the second or opposite end of the beam. However, the parts are so constructed that the post may be positioned on the beam at various points along the latter, and may be adjusted through an angle of 180 degrees in the plane of the triangle about an axis extending lengthwise of the beam and about a second axis extending at right angles to the latter axis through openings 42e.

The foregoing features of the invention, and others, will be more fully explained in the following detailed description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side view of a tool constituting a preferred embodiment of the present invention, a small portion at the left hand end being shown in section.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a side view of a fragment of the body or beam member of the tool, with the post removed and a chain attached.

Fig. 4 is an axial section, on a larger scale, through the force-exerting lever, but showing only a fragment of the tool.

Fig. 5 is a section, on the same scale as Fig. 4, on line 5—5 of Fig. 1.

Fig. 6 is a view similar to Fig. 1, showing the triangular body of the tool turned upside down, with the work-engaging elements on the post and lever still positioned above the beam.

Fig. 7 is a section, on a still larger scale, on line 7—7 of Fig. 6.

Fig. 8 is a section on line 8—8 of Fig. 7.

Referring to the drawings, 10 represents a beam comprising a truss in the form of an isosceles triangle having a base length many times as great as the distance from the base to the apex. The sides of the triangle are tubular, the tube 11 that forms the base having a diameter at least twice as great as that of the bent tube constituting the other two sides 12 and 13 of the triangular truss. Three tubular compression members or struts 14, 14 and 15 are interposed between tube 11 and the bent tube portions 12 and 13. These tubes are welded together to create a rigid, unitary triangular structure.

At one end the trussed beam is a transverse, force-transmitting lever 16 that is hinged to the beam for rocking movements in the plane of the triangle about an axis remote from both ends of the lever. The hinge connection conveniently consists of two plates 17 and 18, best shown in Figs. 1 and 7, welded to opposed sides of the lever 16 and projecting from the latter to receive one end of tube 11 between the same. A hinge pin 19 extends through these plates and diametrically through the tube 11.

Mounted on the lever 16 directly opposite the hinge connection between the lever and the beam, is a windlass 20. This windlass includes a drum 21 mounted on a shaft 22 provided at one end with a crank 22^a for turning the same. Fixed to one end of the drum is a ratchet wheel 23. The drum and ratchet wheel are located between a flange 18^a on plate 18 and one wing 24^a of an L-shaped bracket 24; the free end edge of the second wing 24^b of the bracket being welded to the lever 16 in a position to cause wing 24^a to stand parallel to flange 18^a. Shaft 22 extends through and is supported by wing 24^a and flange 18^a.

A pawl 25 engages the teeth on the ratchet wheel. As best shown in Fig. 8, this pawl is an L-shaped piece, one arm or leg 25^a extending through a downwardly opening slot 24^c in wing 24^b; this arm being wider than the slot and having in the edges notches 25^b to create a neck that can pass up into the slot. A little pin 26 extends from wing 24^a across the slot near and underneath the pawl to prevent the pawl from falling out, and to provide a fulcrum on which the pawl rocks. A spring 27, connected at its ends to the pawl and to wing 24^b, respectively, holds the pawl yieldingly against the ratchet wheel. The second arm 25^c of the L-shaped pawl is on the outside of wing 24^b and stands at a small angle thereto. By pressing arm 25^c inwardly the pawl is swung clear of the ratchet wheel.

Drum 21 is provided with a brake in the form of a plate 28 having a flat stem 28^a that extends out through a hole 24^d in wing 24^b; the stem containing two sharp bends to create between them a short section 28^b which is at right angles to wing 24^b while the inner and outer sections of the stem form acute angles with this wing. A spring 29 presses plate 28 yieldingly against the drum. One of the bends in the stem may be pre-formed, the other being created by simply bending the protruding end upward after the stem has been slipped through hole 24^d from within the bracket.

One end of lever 16 is connected to the beam at the apex of the triangle by a cable and pulley power transmission device operated by the windlass; the cable component 30 of which is fastened at one end to the drum and passes over a pulley 31 at such end of the lever. The cable then continues to and over a pulley 32 mounted on the apex of the beam. From pulley 32 the cable goes back to a point 33 near pulley 31, where it must be connected to the lever in some manner to cause the lever to rock when the drum is turned to wind up the cable. If additional pulleys are placed on the lever and the beam, the second end of the cable must be attached either to the beam or to the lever, depending upon the

number of pulleys used. Since it is obvious that more pulleys simply means greater multiplication of the force applied by the user, I have illustrated only the simplest form of this type of apparatus, with the cable passing from pulley 32 directly to an anchoring point 33 on the lever.

Lever 16 also is provided with a hook 34 on the side facing the opposite end of the beam.

Any desired type of work engaging device may be attached to either end of lever 16. In the arrangement shown, there is a work-engaging shoe or cushion 35 hinged at 36 on one end of a tubular stem 37 in a manner to permit it to be swung from a position in which it faces the far end of the beam to a position in which it faces in the opposite direction. Lever 16 is provided with a row of holes 16^a running lengthwise of the same, and stem 37, as best shown in Fig. 4, is provided with a spring-pressed pin 38 which snaps into any one of the holes with which it is caused to register. To detach this stem, one needs only to press the pin back until it is clear of the hole into which it extends, turn the stem slightly, and then lift the stem out of the lever.

The end of tube 11 opposite that at which the lever is located is extended slightly beyond the adjacent corner of the triangle and contains a slot 11^a that opens out through the end edge of the tube. This permits a chain 39, interlocked with the beam at the slot, to connect that end of the beam to some stationary part of the automobile.

There is also provided a post 40 adapted to be attached to the beam 10 at or inwardly from its slotted end. This post consists preferably, of a post proper and a brace portion. The post proper may be simply a channel 40^a with the upper portion reenforced with plate 40^p and the brace portion 40^b welded thereto or integral therewith and extending laterally and downwardly at an angle of about 60 degrees. The bottom portion of the channel 40^a is formed into a U-shaped seat 40^s as more clearly shown in Fig. 6. On one side of the lower end of the brace portion is an upwardly-opening U-shaped seat 40^c. The post and brace seats 40^s and 40^c embrace the tube 11. Tube 11 and seats 40^s and 40^c are provided with holes 11^b and 40^d respectively; each seat containing two holes and tube 11 containing many holes distributed lengthwise of the same. The holes are so disposed that, in various positions of the post 40 along the tube 11, the holes in each seat are aligned with holes in the wall of the tube; thereby permitting the post 40 to be locked to the beam, in a selected position, by passing a pin 41 through the holes in each seat and diametrically through the tube.

By placing the holes of each opposed pair in tube 11 at the ends of a diameter, the post structure 40 may be shifted and turned angularly of tube 11 through 180 degrees, so as to lie on the same side of the tube as the apex of the beam or in a directly opposite position as shown in Figs. 1 and 6. Because the seats on the post structure project laterally therefrom, tube portions 12 and 13 do not interfere with the positioning of the post member in either of its two positions angularly of tube 11.

Mounted on the upper end of the post 40 is a dolly 42, comprising a stem 42^a having at one end a shoe or pad 42^b and at the other end a hook 42^c. The stem 42^a contains a row of holes 42^d distributed lengthwise thereof. The upper part of the post 40^a contains a vertical row of holes 40^e. The dolly is secured to the post by passing a pin 43 through any one of the holes in the dolly and through any one of the holes 42^e in the post.

In using the tool it may be anchored to a stationary part of the work to be operated upon, by chain 39 one end of which may be attached to the hook 34 on lever 16, or to the hook on post 40, or to tube 11 at slot 11^a. Shoe or pad 35 may be connected to either end of the lever and stand at various distances from the hinge axis of the lever. The post member 40, with the dolly illustrated or any other suitable dolly or device, may stand as shown in Fig. 1, at any one of seven different locations along tube 11; or it may be positioned to stand, as in Fig. 6, in any such location as may be selected; and dolly 42 may be adjusted on the post lengthwise of and also from and toward tube 11, and it may be turned end for end. Fig. 6 also illustrates the post member 40 as being on the same side of the base of the triangle as is the apex and facing toward the lever, the opposite of the conditions disclosed in Fig. 1.

With shoe 35 in the position in Fig. 1, it pushes outwardly or toward the right as the windlass is operated, whereas, when the shoe is at the other end of the lever, as in Fig. 6, the thrust is inward or to the left.

By reason of the manner in which stem 37 is attached to lever 16, the effective length of the lever arm on which shoe 35 is mounted may be varied to meet the needs of the particular job to be done.

The adaptability of the present tool is such that many different kinds of straightenings and reshapings can be effected satisfactorily. With the parts in the positions occupied in Fig. 1, shoe 42^b may engage a part of an automobile body or frame so that the thrust of shoe 35 against a dent in a fender will press out such dent into normal shape. Or a damaged car door may be stretched by attaching short chains to hooks 34 and 42^c and, by means of suitable clamps, to opposite ends of the door. Then, when the windlass is turned, powerful stretching forces are exerted on the door.

With the parts as shown in Fig. 6, shoes or pads 35 and 42^b face each other, thereby exerting forces to compress a piece of work located between them, upon turning the windlass.

It will of course be understood that after the tool has been adjusted and applied to the structure to be operated upon, the user needs only to turn the windlass to bring about the desired reshaping effort. After the reshaping has been accomplished the user simply presses the pawl into its release position, whereupon the lever may be rocked freely, subject to the light pressure of the brake, to separate the tool from the work.

The beam is very rigid and retains its shape under any stresses that may be imposed on the same by the cable. This is due to the fact that the pull of the cable is directly in line with beam member 12 and subjects the same only to forces as to make it a simple tension member, all of the other tubular components of the beam being under compression.

Although the particular windlass illustrated, namely one having the readily releasable pawl for the ratchet wheel and the brake that engages with the cable on the drum, is well adapted to perform the services required therefrom, any suitable block and tackle apparatus, including a cable one end of which is attached to the drum of the windlass, may be used to effect any desired multiplications of the force manually applied by the user. So, also, any other suitable tension means may be interposed between the lever and the apex of the triangular beam.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact details so illustrated and described; but intend to cover all forms and arrangements coming within the definitions of the invention constituting the appended claims.

I claim:

1. A portable automobile body and fender straightening tool comprising: a trussed beam composed of members forming an isosceles triangle the base of which has a length many times the height of the triangle; a lever pivotally connected to one end of the beam for rocking movements in the plane of the triangle about a point remote from both ends of the lever; adjustable lever-

operating means connecting one end of the lever to the beam at the apex of the triangle for forcibly rocking the lever; and elements at the opposite end of the beam and at one end of the lever for respectively engaging spaced parts on the work, at least one of which parts is to be reshaped through pressure exerted by the lever.

2. A tool as set forth in claim 1 wherein the element at said opposite end of the beam is a flexible tension member, and wherein said opposite end of the beam contains a notch to receive such member and attach it to the beam.

3. A tool as set forth in claim 1, wherein the lever is a tube, and wherein the work-engaging part on the lever is provided with a stem that may be inserted into either end of the lever.

4. A tool as set forth in claim 3, wherein the tube contains a longitudinal row of holes and the stem on the work-engaging part carries a spring-pressed pin adapted to enter any one of such holes.

5. A tool as set forth in claim 1, wherein the lever-operating means comprises a winch mounted on the lever adjacent to the pivot point, pulleys on the beam and on the lever, and a cable attached at one end to the winch, around the pulleys and to a point of attachment on the tool.

6. A portable automobile body and fender straightening tool comprising: A beam composed of members forming an isosceles triangle the base of which has a length many times the height of the triangle; a lever pivotally connected to one end of the beam for rocking movements in the plane of the triangle about a point remote from both ends of the lever; adjustable means connecting one end of the lever to the beam at the apex of the triangle for forcibly rocking the lever; a work-engaging element at the opposite end of the beam; and a work-engaging element adapted to be attached to either end of the lever.

7. A portable automobile body and fender straightening tool comprising: A beam consisting of tubular elements forming an isosceles triangle the long base of which has a length many times the height of the triangle, a lever pivotally connected to one end of the beam for rocking movements in the plane of the triangle about a point remote from both ends of the lever, adjustable means connecting one end of the lever to the beam at the apex of the triangle for forcibly rocking the lever, a post, means to secure said post selectively in any one of several positions along the long base, at right angles to that base and in the plane of the triangle, and work-engaging elements adapted to be attached to the post and to the lever, respectively.

8. A tool as set forth in claim 7, wherein said post may be set in the plane of the triangle with either of two opposed sides facing the lever.

9. A tool as set forth in claim 8, wherein said post may be set in the plane of the triangle either on the same side of the base of the triangle at the apex or on the side opposite that on which the apex is located.

10. A tool as set forth in claim 7, wherein the post has a brace and is provided with two U-shaped seats for the long base, one seat being directly below the post proper and the other being displaced laterally therefrom at the foot of the brace, and wherein the seats and the base contain holes so positioned that a pair of holes in parts of a seat on opposite sides of the base may be caused to register with holes in the base to permit a pin to be inserted diametrically through the base.

11. A tool as set forth in claim 10, wherein there are several times as many holes, spaced lengthwise of the long base, as there are seats.

12. In a portable automobile body and fender straightening tool: A trussed beam composed of tubes united to form a rigid isosceles triangle the base of which has a length many times the height of the triangle, the tube forming the base being of substantially greater diameter than the other tubes, a lever connected to one end of the beam for rocking movements in the plane of the beam and about an axis remote from both ends of the lever; adjustable lever-operating means connecting one end of the lever to the beam at the apex of the triangle; a post including a brace portion having thereon a pair of spaced open seats projecting from one side of the post for the reception of the base tube and the selective positioning of the post along one side of and at right angles to that base tube, one seat being directly below the post and the other being displaced laterally therefrom, the base tube and the seats being provided with holes to receive pins each passing diametrically through the base tube and through holes in parts of a seat on opposite sides of the base tube, and there being a sufficient number of holes in the base tube to permit the post to be secured at selected points along the base tube.

13. A tool of the character described, comprising a trussed beam member in the form of an isosceles triangle the base of which is many times as great as is its height, a lever member pivoted at a point remote from both ends to one end of the beam member for rocking movements in the plane of the triangle; and lever operating means consisting of a windlass mounted on the lever member near the pivot point, a cable secured at one end to the windlass, pulleys on one end of the lever member and at the apex of the beam member, the other end of the cable being secured to one of said members, and a brake overlying the windlass and pressing against that portion of the cable surrounding the windlass.

14. A tool as set forth in claim 13; wherein the windlass includes a manually rotatable drum, a ratchet wheel attached to the drum and a manually operable pawl engaged with the ratchet wheel.

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