April 11, 1961 H. C. FERGUSON ET AL 2,979,102

STRAIGHTENING TOOL

Filed Jan. 31, 1958

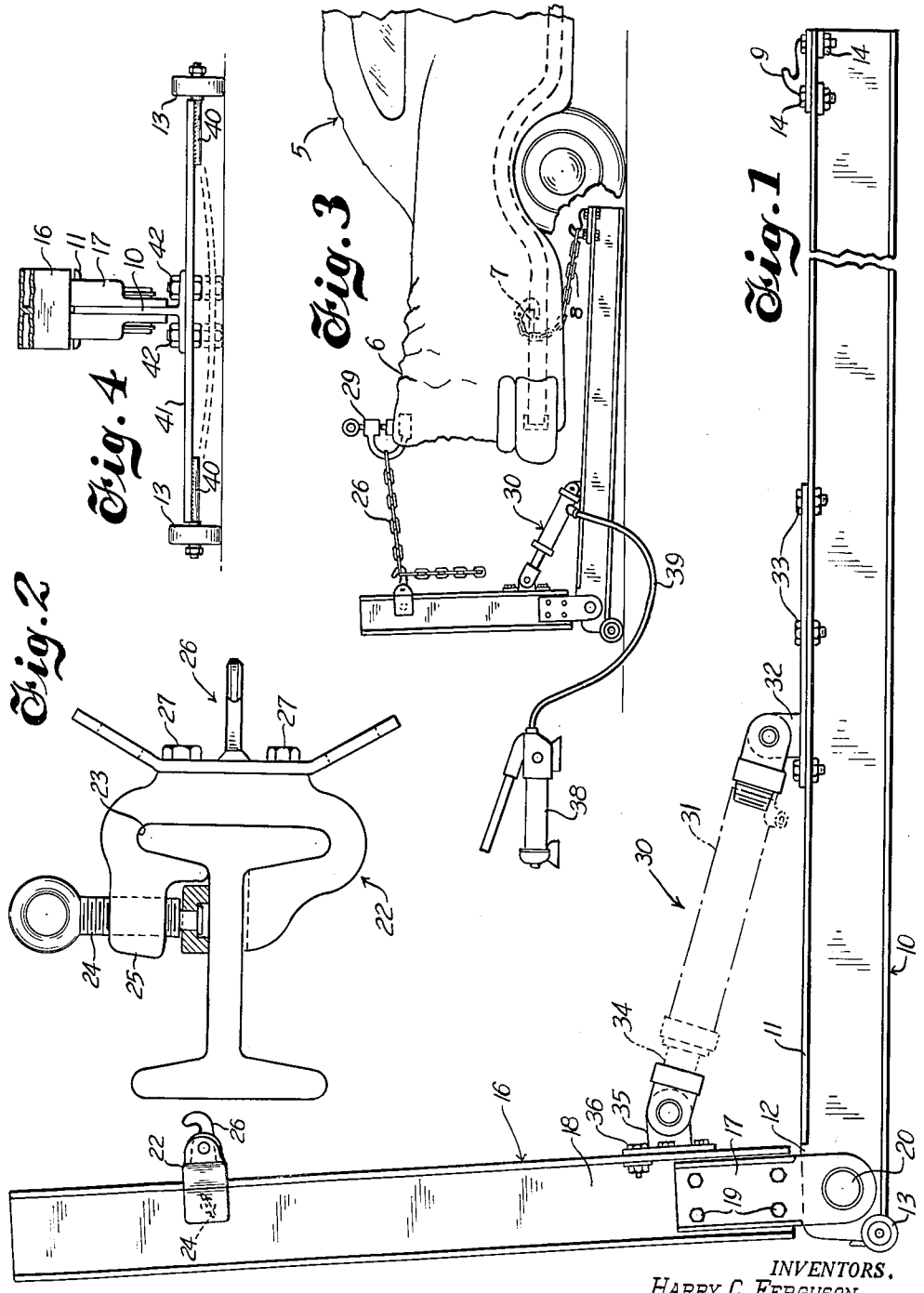


Fig. 4

Fig. 3

Fig. 1

Fig. 2

INVENTORS.
HARRY C. FERGUSON
JOHN E. BRUSSOCK
BY
Lieber, Lieber & Nilles
Attorneys

United States Patent Office 2,979,102
Patented Apr. 11, 1961

2,979,102

STRAIGHTENING TOOL

Harry C. Ferguson and John E. Brussock, Wauwatosa, Wis., assignors to Blackhawk Mfg. Co., Milwaukee, Wis., a corporation of Wisconsin

Filed Jan. 31, 1958, Ser. No. 712,373

3 Claims. (Cl. 153—39)

This invention relates to straightening tools which find particular utility in vehicle body repair work and the like.

In repair work of this general nature, it is desirable to be able to straighten the work without disassembly of the fenders or other parts of the vehicle. Frequently the body is damaged at a congested place and it is difficult to position a tool adjacent the damaged area. It is therefore important that the tool is adjustably positionable, particularly the dolly portion thereof. These tools must also be so constructed and capable of reaching into narrow and relatively inaccessible places and at the same time be exceptionally strong and rigid, considering their weight and size limitations.

In accordance with the present invention a hydraulically operated straightening device is provided which has adjustment over an exceptionally wide range; has considerable strength and rigidity; and the parts of which are so arranged as to be able to reach into otherwise inaccessible locations.

Another object of the invention is to provide a novel transport support for a tool of the above type which permits the tool to rest firmly on the floor when pressure is applied between the vehicle and the tool, and then when the pressure is released permits the tool to raise to a transport position.

These and other objects and advantages of the invention will appear hereinafter, reference being had to the accompanying drawings, in which:

Figure 1 is a side elevational view of a tool made in accordance with the invention;

Figure 2 is an enlarged plan view of the adjustable dolly bracket shown in Figure 1;

Figure 3 shows the tool of Figure 1, on a reduced scale, as applied to an automobile; and

Figure 4 is a fragmentary end view of the tool and showing the transport support.

Referring more particularly to the drawings, the automobile 5 is shown as having a damaged rear fender 6 which must be pulled rearwardly as a preliminary straightening operation. The drawings show a typical hook-up that is used to restore auto-body damage externally. A cross frame member 7 of the auto is used as an anchoring location for chain 8 which is secured at one end to member 7. The other end of the chain is secured to the hook 9 of the tool.

The tool comprises a generally horizontally disposed supporting I beam 10, the upper flange 11 of which has been cut away at one end, as at 12. A pair of wheels 13 are mounted at that end, at each side of the beam, to facilitate the movement of the tool which is of considerable weight. The hook 9 is secured to the other end of the beam by bolt means 14 which extend through flange 11.

A generally upwardly extending I beam 16 constitutes a pressure applying arm which has a pivotal connection with the base member 10 as follows. A wide flange plate 17 is located on each side of the web 18 of beam 16 and is rigidly secured thereto by bolt means 19. The plate 17 extends beyond the lower end of arm 16 and forms a

bifurcated end between which fits the web portion of beam 10. A large diameter pin 20 extends through the plates and web forming a pivot axis for the arm 16. As the space between plates 17 is the same as the thickness of the web of beam 10, relative lateral tilting or twisting between the beams is prevented.

A dolly bracket 22 has an opening 23 which is complementary to a flange of the beam 16 and is adapted to be secured thereto in any one of a plurality of positions to provide infinite adjustment in a vertical direction. For this purpose an eye bolt member 24 threadably passes through an ear 25 of the bracket and bears against the web 18 when tightened. Thus a wide range of vertical positions are obtainable for the dolly bracket and thereby the most desirable line of corrective force can be readily obtained.

Various types of attachments may be secured to the brackets 22 depending on the type of work to be performed. For purposes of illustration, a hook member 26 has been shown which is secured by cap bolts 27 to the bracket. Thus, to exert a pulling action on the dented fender 6, a chain would be secured between hook 26 and clamp 29, the latter of which is secured to the fender.

In other applications, it may be necessary to insert arm 16 within the framework of the automobile for the purpose of pushing outwardly on a dented portion of the fender. In the latter case, a conventional round dolly head (not shown) would be attached to arm 16 and on the opposite side from which hook 26 is located.

A fluid motor 30 is pivotally attached between the base 10 and the pressure applying arm 16 for forcibly urging them apart.

The single acting hydraulic ram or motor 30 includes a cylinder 31, the head end of which is pivotally attached to the bracket 32, the latter in turn being rigidly secured to flange 11 by bolt means 33. The ram also includes a piston 34 which is pivotally attached to bracket 35 which in turn is rigidly secured to arm 16 by bolt means 36. The cylinder-piston unit 30 is shown as being of the single acting type but a double acting unit could, of course, be employed.

A conventional hydraulic hand pump 38 is connected by the conduit 39 to the head end of the cylinder 31 and furnishes pressure fluid thereto for extending the piston 34 and thereby forcibly swinging the arm 16, as when straightening the fender 6. The pump 38 has the conventional pressure release valve (not shown) by means of which fluid from the cylinder 31 can flow back to the pump when the chain 26 is to be disconnected.

It will be noted that piston 34 is connected adjacent the lower end of arm 16. The major length of the arm is therefore unobstructed and can be positioned in relatively small spaces. Furthermore, by so locating the ram 30, the upper end of the arm 16 moves a considerable distance under power for a comparatively short stroke of the fluid ram. The unit is free of any obstructions formed by cross braces or other parts and yet is rugged in construction.

As clearly shown in Figure 4 the wheels 13 are rotatably mounted on stub shafts 40 which in turn are welded to the leaf spring 41. The central portion of the leaf spring is secured by bolt means 42 to the underside of I beam 10 and the spring extends a considerable distance beyond each side of the beam to provide good lateral support.

The full line position shown in Figure 4 indicates the approximate position of the tool when being transported in which case its end is free of the floor. The dotted lines indicate the position of the tool when used in certain circumstances and show the tool resting firmly on the floor. An example of such a use would be when the repair man uses blocks, jacks or other separators between

the tool and the under body of the automobile in order to prevent the tool from rising under the pulling force applied to the body. If a rigid axle was used, instead of the flexible spring 41, it would be bent and deformed by such a force until it no longer raised the tool end free of the floor when the force was removed. The flexible axle, however, merely deflects when loaded and springs back to the transport position when the load is removed.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

We claim:

1. A straightening mechanism for automobile body parts comprising, a generally horizontally disposed I beam base member having upper and lower flanges and a web therebetween, said upper flange being cut away at one end of said beam, a generally upright I beam pressure arm having a plate secured thereto and extending downwardly from each side thereof, said plates extending on opposite sides of said web and pivotally secured thereto at one end of said base member, means at the other end of said base member for connection to the body part, a hydraulic ram pivotally connected between said base member and adjacent the lower end of said arm below the mid-point thereof, and a dolly bracket adjustably secured to said arm in any one of a plurality of vertical positions along the length thereof between the ram connection and the upper end of said arm.

2. A straightening mechanism for automobile body parts comprising, a generally horizontally disposed I beam base member having upper and lower flanges and a web therebetween, said upper flange being cut away at one end of said beam, a generally upright I beam pressure arm having a plate secured thereto and extending downwardly from each side thereof, said plates extending on opposite sides of said web and pivotally secured thereto

at one end of said base member, means at the other end of said base member for connection to the automobile body part, a hydraulic ram pivotally connected between said base member and adjacent the lower end of said arm below the mid-point thereof, and a dolly bracket embracing a flange of said I beam arm and adjustably secured thereto in any one of a plurality of vertical positions along the length thereof between the ram connection and the upper end of said arm.

3. A straightening mechanism for vehicle bodies and the like comprising, a generally horizontally disposed base member, a generally upright pressure arm pivotally mounted at one end to one end of said base member, means for applying force between said base member and arm, means on said arm for connection to a portion of the vehicle to be repaired, means at the opposite end of said base member for connection to another portion of said vehicle, a flexible axle secured at a mid-point thereof to said one end of said base member and extending laterally from both sides thereof, and a wheel rotatably mounted at each end of said axle, said axle adapted to flex to a ground engaging position when said tool is loaded and then return to a normal ground clearing position when the tool is unloaded.

References Cited in the file of this patent

UNITED STATES PATENTS

985,072	Simmons	Feb. 21, 1911
1,378,163	Zawitowski	May 17, 1921
2,194,991	Voges	Mar. 26, 1940
2,421,981	Becker	June 10, 1947
2,442,604	Johnson et al.	June 1, 1948
2,456,218	Semisch	Dec. 14, 1948
2,597,103	Johnson	May 20, 1952
2,634,788	Harteker et al.	Apr. 14, 1953
2,836,219	Pertner	May 27, 1958