Spreading Tool for Reshaping Deformed Automobile Bodies

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1. Claim. (Cl. 81—15)

This invention relates to spreading tools particularly intended for use in connection with the repair of automobile bodies and fenders which have been deformed by collision or otherwise in order to bend displaced parts back to or toward their original position. A tool of this type which is in some respects similar to that herein disclosed is shown in the patent to William H. and Harry C. Ferguson 2,447,401. The fundamental object in both cases is to provide a wieldy but powerful device capable of use in tight places, as by insertion within the interior of the body construction to apply within the same the force of a powerful force-exerting mechanism of the type of a jack. In the present case however, a construction is provided particularly suitable for embodiment in a relatively small size or at least in relatively restricted transverse dimension considering the tool in the closed position. While the construction has various practical advantages which will appear to those skilled in the art, it will be sufficient at this place to point out that it provides a favorable initial power factor without sacrifice of slim contour in the closed position, or undue limitation of the amount of spread effected in the opened position.

As in the case of the patent referred to it is convenient to use a jack which may be applied to other uses and in a sense the construction herein shown may be considered as an attachment for use with a jack or a mechanism to be powered by a jack, parts being provided for detachable coupling to the relatively stationary and movable parts of the jack, conveniently by means of screw-threaded connections as in the case of the device shown in the said Ferguson patent wherein, as in the present disclosure, a jack of the hydraulic type is illustrated.

My invention will be well understood by reference to the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a side elevation showing the device mounted on a hydraulic jack, the latter being only fragmentarily shown, the parts being in closed position;

Fig. 2 is a similar view, with parts in section, showing the device in open position;

Fig. 3 is a section on the line 3—3 of Fig. 2, and

Fig. 4 is a plan and Fig. 5 a side elevation of one of the base members used in the construction.

Referring to Fig. 1 of the drawings, there is there indicated the cylinder C of a hydraulic jack from which projects the plunger or piston P, on which parts are mounted respectively the base member 10 and 12 on which the parts of the spreader proper are organized. Herein the connection of these base members and the parts of the jack is direct and by means of screw threads. The member 10 is of annular form so that the plunger P passes up through the open center of the same. In the example of the invention shown the spreading action is effected by axial extension of the plunger or piston rod P under hydraulic pressure.

On opposite sides of the base member 10 are ears 14 which, in keeping with the purpose of keeping or maintaining the transverse dimension of the tool small, may be formed at the distal end face thereof. The ears receive pins 15 on which are pivotally mounted the right- and left-hand spreader arms 13R and 13L respectively. As herein shown the major portion of the length of these comprises a hollow body formed from a web 20 having stiffening flanges 22 which are extended to form the knuckles 24 to receive the pivot pin. The webs of the arms 13 are extended distally to provide work-engaging portions 25 which are closely arranged in the closed position of the parts, as seen in Fig. 1, forming a relatively long, narrow stem which may be easily inserted between the parts which it is desired to press apart as, for example, between a relatively stationary interior framing element and a panel which has been crushed down toward the same.

To cause separating movement of the arms they are swung outwardly about their pivots 15 by movement communicated to them from the piston rod or plunger P of the jack, which has a link connection thereto. Herein (see Fig. 2) the right-hand arm 13R has connected thereto at an intermediate point of its length, remote from its pivot point 15, an actuating link 35R which may be received between knuckles formed on the inner face of the web 20 in the space between the flanges 22, this link conveniently being in the central plane, whereas the left-hand arm 13L has similarly pivoted thereto two links 36L (front) and 36L (rear) symmetrically disposed on either side of that plane. The pressures exerted through the links on the two arms will thereby be balanced and conveniently, as shown in Fig. 3, the link 35R may be heavier than the two links 36L, so that it is of approximately the same strength as the two latter, account being taken of the principle that the
strength of a beam varies as the square of its depth.

The links 36 in the closed position of the parts (see Fig. 1) extend inwardly and proximally (downwardly) at a substantial angle to the vertical and extend across the center line of the device to be there connected pivotally to the member 12 at points respectively at the further side of that line. When the ram P of the jack is extended, as indicated in Fig. 2, the links approach a horizontal position, swinging the arms 18 outwardly and spreading the work-engaging portions 26 as is apparent from the figure. The action of the links is similar to that of the usual toggle.

Referring to Fig. 1, it will be clear that if we extended the link 35R to be connected to the member 12 at the same side of the center line as its upper end, the link would be nearly vertical and very slight outward force would be exerted when the ram started in motion. In fact, if the position of the pivot on the member 12 were the same as that herein shown, it is clear from Fig. 1 that the link would be beyond dead center, and it would be impossible to open the tool. By extending the links across the center line as herein described, an adequate initial angle is provided for without sacrificing either the desired minimum transverse dimension of the tool or adequate size of the parts to give them the necessary strength.

Referring now more particularly to Figs. 4 and 5, the member 12 to which the proximal ends of the links are pivoted is shown as taking the form of a square block having a central and two lateral grooves 38, the ribs between which provide bearings for the pivot pins which secure the ends of the links. The bottoms of these grooves are inclined and their bottoms provide abutments and opposing edges of the links against which these edges seat in the open position of the parts, as seen in the case of link 36R in Fig. 2. The arrangement being such that a stop is provided when the links approach but have not quite reached the transversely aligned position. The action of this stop is easily felt in working with the tool, since the mechanical advantage of the assembly is enormous at the time when the stop functions, and therefore the sudden and substantial increase in resistance is radially felt. In the case of a hydraulic jack it is felt at the pump handle. In the intermediate positions of the parts the sides of the grooves 38 oppose the sides of the links and resist any twisting strain arising from the reactions of the parts on which pressure is exerted.

While the invention is not limited to a tool of any predetermined dimensions, I may mention without limitation that the tool shown in the drawings represents an actual construction which measured seven inches long and 2½ inches in maximum transverse dimension viewing Fig. 1, and with the combined width of the work-engaging portions 26 in the closed position of the parts shown in Fig. 1 five-eighths of an inch.

In referring to the parts in the annexed claim they will be spoken of as if in the position of Fig. 1, the collapsed or retracted position of the tool, as contrasted with the expanded position of Fig. 4. Such words as right and left, upper and lower, are used with reference to the drawing for easy identification of the parts, but are not otherwise significant.

I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, as is in fact clear in several matters from the description itself. Reference is to be had to the appended claims to indicate those principles of the invention exemplified by the particular embodiment described and which I desire to secure by Letters Patent.

I claim:

A spreader tool comprising first and second base members pivotally connected whereby the parts hereinafter recited are respectively operatively associated with the movable and stationary members of a jack, the second member having work-engaging arms arising from opposite sides thereof and pivoted proximally thereto and links pivoted at one end to the arms at points remote from the pivots of said arms and extending inwardly and proximally across the center line of the device and pivotally connected at their other ends to said first member at points respectively at the further side of that line, the said base members being located at the proximal ends of the links and arms respectively, the links in the approximated position of the arms, corresponding to a rearward position of the first base member as when the movable member of the jack is retracted, crossing the center line at an acute angle and on outward movement of said first member, corresponding to extension of the movable member of the jack, moving close to a transversely aligned position at right angles to said line, said first member having surfaces opposing the links which about the same and provide stops to prevent the links actually reaching that position.

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