The present invention relates in general to improvements in devices for prying adjacent surfaces or objects apart, and relates more specifically to improvements in the construction and operation of fluid pressure actuated wedge assemblies or tools.

An object of the invention is to provide an improved fluid pressure actuated wedge assembly which is extremely simple and compact in construction, and which is moreover highly flexible and efficient in use.

Many and varied conditions arise in the art of repairing damaged automobiles or the like, and it frequently happens that several adjacent and normally parallel sheet metal plates such as door panels, become indented and jammed against each other. When such a condition arises, the space available for insertion and manipulation of a suitable repair tool, is usually restricted and relatively inaccessible; and since considerable force is ordinarily required in order to pry the panels apart and to remove the dents, it is necessary to provide a compact and powerful tool for this class of work. A spreading tool of this type should be adapted to be universally shifted and positioned in dark and cramped quarters, and should preferably be operable with the aid of fluid such as liquid under pressure supplied from a remote source. Such a repair tool should also be limited in stroke or action so as not to unduly damage the thin metal of the body or panels, and must also be quickly and conveniently removable when the job is completed. In order to save time, the prying device must also be expeditiously operable and manipulable, and should moreover be relatively inexpensive to manufacture and operate so that it may be purchased and used by all classes of repair men. Up to the present time, no prying tool adapted to meet all of these conditions and requirements has been available to the public.

It is therefore a more specific object of my present invention to provide an improved compact yet powerful hydraulically actuated prying tool especially adapted to be operated in dark and restricted zones, and which adequately meets all requirements for service such as door panel repairs.

Another specific object of this invention is to provide an improved spreader tool and pump assembly whereby the tool unit is universally movable applicable to the work, and is operable by high pressure liquid supplied from a readily manipulable pump unit disposed remote from the working zone.

A further specific object of the invention is to provide a simple and durable hydraulic wedge assembly having a powerful hydraulic motor confined and concealed between sturdy pivotally connected spreader jaws the available movement of which is positively limited.

Still another specific object of the present invention is to provide a new and useful prying tool which can be manufactured and operated at moderate cost, and which is adapted for diverse uses.

An additional specific object of my present invention is to provide a simplified hydraulic system for effecting actuation of a spreader wedge, which can be readily controlled to spread and collapse the wedge, and which can also be readily relieved of objectionable air entrapment.

These and other specific objects and advantages of the present improvement, will be apparent from the following description.

A clear conception of the several features constituting my present invention, and of the mode of constructing and of operating hydraulic wedge assemblies built in accordance with the improvement, may be had by referring to the drawing accompanying and forming a part of this specification, wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a perspective view of a hydraulic pump and wedge assembly, showing the improved wedge unit in collapsed condition.

Fig. 2 is an enlarged perspective view of the improved wedge unit in spread condition, showing the relative size of the same with respect to the operator's hand.

Fig. 3 is a part sectional side elevation of the improved hydraulically operated prying unit, showing the same collapsed; and

Fig. 4 is a fragmentary longitudinal section through the rear portion of the base or lower jaw of the improved spreader unit.

While the invention has been shown and described herein as being specifically embodied in a relatively small hydraulically operated wedge unit especially adapted to repair door and body panels of automobiles or the like, it is not my desire or intent to thereby unnecessarily restrict the scope or utility of the improvement; and the improved pump for supplying liquid under pressure, which is shown and described herein, forms no part of the present invention, since any desired liquid pressure source may be substituted.

Referring to the drawing, the present improved fluid pressure actuated spreader or wedge assem-
The wedge base 6 has rear inclined abutments 15 at its pivot end, while its opposite end is provided with a stop or contact area 18; and the pivoted end of the wedge spoon 8 has integral lugs 17 which are cooperable with the base abutments 18 to limit the opening or spreading movement of the wedge elements, and is provided at its opposite end with a contact area 18 which is cooperable with the base area 16 to limit the closing movement of the wedge jaws. The wedge elements 8, 8 are moreover provided with integral reinforcing and enclosing opposite side walls as shown, which besides strengthening these jaw elements, also enclose and protect the cylinder 7 and springs 14. The tension springs 14 of a coil form with transverse suspension pins 19, 20, tend to constantly collapse the wedge assembly and to maintain the projection 3 in contact with the upper face of the plunger 11 at all times.

The piston or plunger 11 is snugly fitted for sliding within the bore of the cylinder 7, and the upper end 21 of this plunger is flat, while the lower end thereof is provided with an integral central threaded stud 22 which pierces the cup packing 12 and coacts with a retainer and spreader nut 23 for holding the packing in place and against the cylinder bore. The plunger displacement chamber is adapted to receive and to discharge liquid through a port 24 which communicates with an enlarged threaded socket 25 and with a lateral passage 28, all formed in the base 6; and the passage 28 is normally sealed by a ball 27 held in place by a screw plug 28 as shown in Fig. 4. This ball 27 and plug 28 serve to effect removal of air from the hydraulic passages and displacement chamber 18, and the latter normally communicates only with the source of liquid supply.

The improved hydraulic wedge assembly may be supplied with liquid under pressure from any suitable source such as a pump 28, preferably through a flexible conduit or hose 30 having one end connected to the threaded base socket 28 by means of a coupling 31, and its opposite end connected to the pump assemblage by means of a self-sealing swivel coupling 32 of the general type shown in Patent 2,218,518. The pump 28 may be of the manually operable type having a liquid supply reservoir 33 and a release or by-pass valve 34 for relieving the hydraulic pressure in the wedge displacement chamber 18 so that the springs 14 may collapse the wedge assembly, after a spreading operation has been completed. The general assemblage of pump and wedge units, is shown in Fig. 1, and it is to be noted that the wedge unit is universally movable independently of the pump unit, and is relatively small as compared to the hand 38 of an operator, as depicted in Fig. 2.

During normal operation of the improved hydraulic wedge assemblage, the wedge unit while collapsed as shown in Figs. 1 and 3, may be inserted between the objects or surfaces which are to be spread, and after the by-pass valve 34 has been properly set to prevent escape of liquid from the wedge unit to the reservoir 33, the pump 28 may be operated to force liquid under pressure through the coupling 32, hose 30, coupling 31, and port 24 into the displacement chamber 18. As this high pressure liquid enters the chamber 18, the plunger 11 will be moved outwardly and by virtue of its contact with the spoon projection 9, the spoon element 8 will be swung away from the base element 6 about the pivot pin 10, thereby stretching the springs 14, see Fig. 2. This spreading action will continue until stopped by external pressure on the spreading ends of the jaws, or until the lugs 17 of the spoon engage the abutments 15 of the base. If the relief valve 34 is subsequently adjusted to connect the hose 30 with the pump supply reservoir 33 around the pump 28, the stretched springs 14 will immediately become active to pull the wedge elements 8, 8 toward each other about the main pivot 10, thereby forcing the plunger 11 into the cylinder 7 of the base and restoring the wedge unit to collapsed condition as in Figs. 1 and 3. The hydraulic wedge assembly may thereafter be adjusted to new positions, and the operation may be repeated as desired; and if air should be confined in the hydraulic system it may be allowed to escape by merely removing the plug 28 and ball 27 momentarily.

From the foregoing detailed description, it will be apparent that my improved invention provides a simple, compact, durable, and readily mani pulable wedge or spreader tool which is highly efficient in action. The improved assemblage is obviously extremely sturdy in construction and by providing the base and spoon elements 8, 8, with flat and curved working surfaces, respectively, as shown in the drawing, the flat surfaces of the base may be caused to coact with a flat reaction surface while the curved spoon surface will roll along the opposing dented surfaces and will tend to smoothly iron out the dents. The improved repair tool is especially applicable to normal parallel sheet metal panels, such as door or body panels which have become distorted or indented, and can be produced as a powerful unit adapted to be inserted and manipulated in relatively cramped and inaccessible quarters. The internal working parts of the improved assemblage are simply protected against possible damage by the improved construction of the base and spoon elements, and while the liquid under pressure coacts with the movable plunger in effecting separating movement of the spreader jaws, the tension springs quickly return the plunger and collapse the tool when the hydraulic pressure is released. The improved tool can obviously be used expeditiously in dark and obscure zones, may be manufactured and operated at moderate cost, is safely manipulable by a novice, and has proven highly satisfactory in actual commercial use.

It should be understood that it is not desired to limit this invention to the exact details of construction, or to the precise mode of use of the tool, herein shown and described, for various
modifications within the scope of the claims may occur to persons skilled in the art.

1. A spreader wedge comprising, a pair of wedge shaped elements of approximately the same size and shape pivotally interconnected at their adjacent, thicker ends and having co-operable abutments for limiting the relative swinging movement thereof, one of said elements having a transverse cylindrical bore opening toward the other and the other element having a projection extending toward the open end of said bore, a piston movable in said bore and having a smooth outer face slidably abutting said projection, a tension spring disposed approximately parallel to said bore and connecting the medial portions of said elements remote from the connecting pivot to urge said projection against said piston, and flexible conduit means for admitting liquid under pressure to said bore to move said piston outwardly while permitting universal movement of the wedge assembly.

2. A spreader wedge comprising, a pair of wedge shaped elements of approximately the same size and shape pivotally interconnected at their adjacent thicker ends and having co-operable abutments for limiting the relative swinging movement thereof, one of said elements having a transverse cylindrical bore opening toward the other and the other element having a projection extending toward the open end of said bore, a piston movable in said bore and having a smooth outer face slidably abutting said projection, a tension spring disposed approximately parallel to said bore and connecting the medial portions of said elements remote from the connecting pivot to urge said projection against said piston, and flexible conduit means for admitting liquid under pressure to said bore to move said piston outwardly while permitting universal movement of the wedge assembly.

3. A spreader wedge comprising, a pair of wedge shaped elements of approximately the same size and shape having their adjacent thicker ends swingably interconnected by a transverse pivot pin and being provided with integral directly co-operable abutments for positively limiting the relative swinging movement thereof in either direction, one of said elements having a cylindrical bore therein disposed transversely of said pin and opening toward the other and the other element having an integral curved projection extending toward the open end of said bore, a floating piston movable in said bore and having a plane outer face slidably abutting said projection, a tension spring disposed approximately parallel to said bore and connecting the medial portions of said elements remote from said pin to constantly urge said projection against said piston, and a flexible conduit for admitting liquid under pressure to said bore to force said piston outwardly while permitting universal shifting of the wedge assembly.

4. A spreader wedge comprising, a pair of wedge shaped elements of approximately the same size and shape having their adjacent thicker ends swingably interconnected by a transverse pivot pin and being provided with integral directly co-operable abutments for positively limiting the relative swinging movement thereof in either direction, one of said elements having a cylindrical bore therein disposed transversely of said pin and opening toward the other and the other element having an integral curved projection extending toward the open end of said bore, a floating piston movable in said bore and having a plane outer face slidably abutting said projection, a tension spring disposed approximately parallel to said bore and connecting the medial portions of said elements remote from said pin to constantly urge said projection against said piston, and a flexible conduit for admitting liquid under pressure to said bore to force said piston outwardly while permitting universal shifting of the wedge assembly.

5. A repair tool comprising, a pair of work engaging elements having corresponding ends formed for direct engagement with the work and being pivotally interconnected remote from said ends, one of said elements having a rigid transverse cylinder provided with a bore opening toward the other and the other element having a rigid projection extending toward the open end of said bore, a piston movable in said bore and having a smooth outer face slidably abutting said projection, a spring connecting the medial portions of said elements remote from said ends for constantly urging said projection toward said piston face, and a flexible conduit for admitting liquid under pressure to said bore to move said piston outwardly while permitting universal movement of the tool.

6. A repair tool comprising, a pair of lever elements having co-operating work engaging ends formed for direct engagement with the work and being pivotally interconnected remote from said ends, one of said elements having a rigid transverse cylinder provided with a bore extending transversely of the element and opening toward the other element and said other element having a rigid projection extending transversely thereof toward the open end of said bore, a piston movable in said bore and having a smooth outer face adapted to slidably abut said projection, a spring connecting the medial portions of said elements remote from said work engaging ends for constantly urging said ends toward each other, and a flexible conduit for admitting liquid under pressure to said bore to move said piston outwardly toward said projection while permitting universal movement of the tool.

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