June 5, 1956 R. N. FERGUSON 2,748,637

POWER HAMMER ACTUATED SHEET METAL RESHAPING TOOL

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Fig. 1.

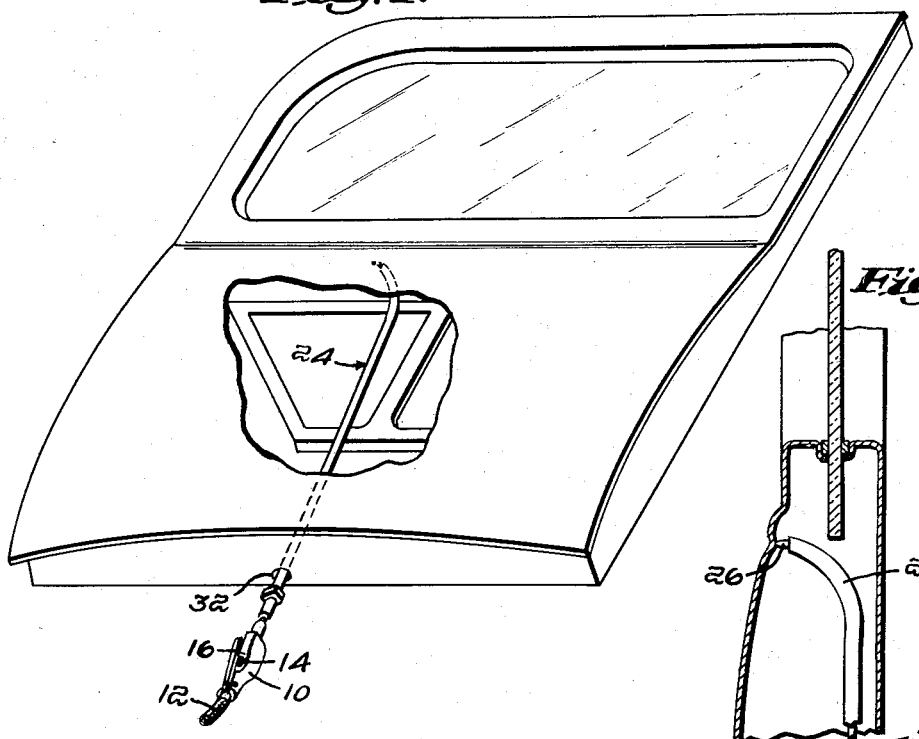

Fig. 2.

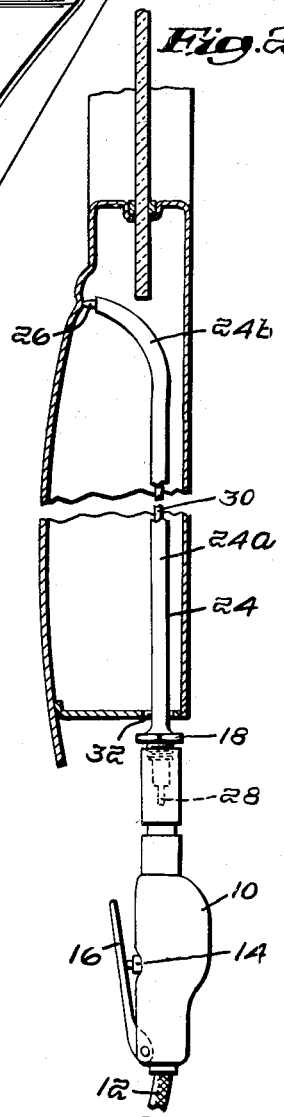

Fig. 4.

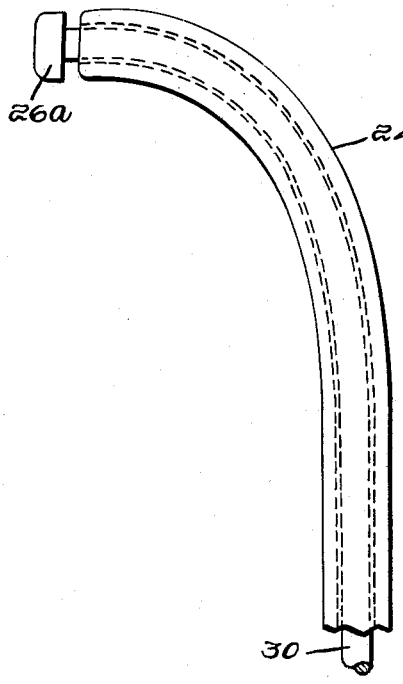

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Fig. 3.

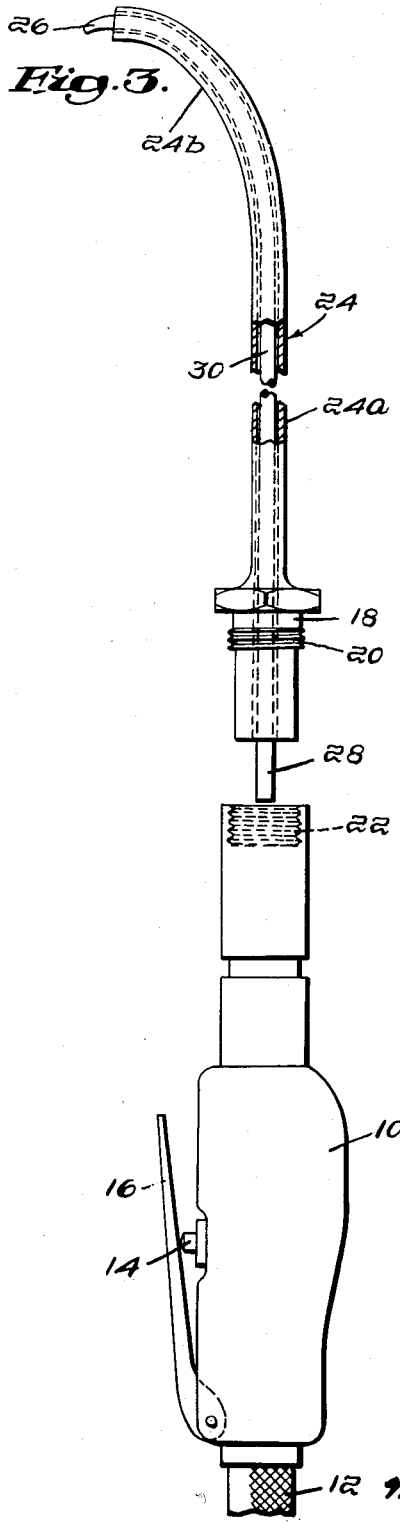
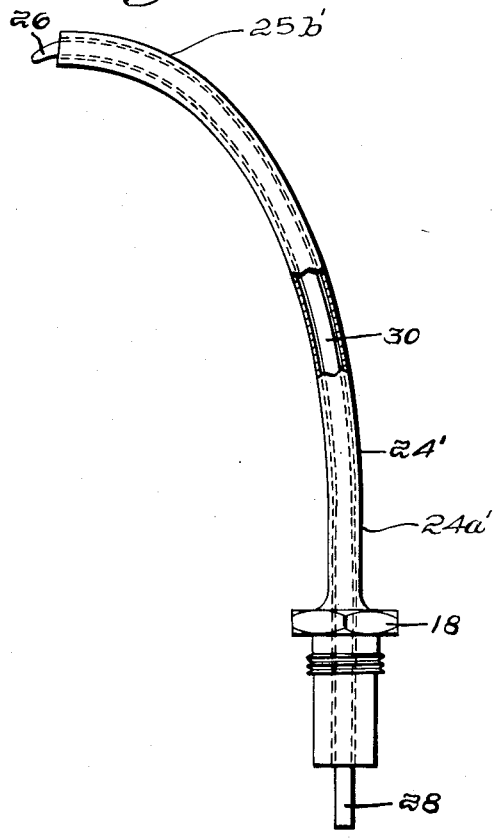


Fig. 5.



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POWER HAMMER ACTUATED SHEET METAL RESHAPING TOOL

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Application January 28, 1954, Serial No. 406,779

2 Claims. (Cl. 81—15)

This invention relates to tools for reshaping the panels of automobile bodies and removing dents therefrom.

In reshaping the panels of automobile bodies which have been injured in collisions the major deformations may be brought back to their approximate original position by use of pushing tools of suitable design, conveniently powered by a hydraulic jack. Other dents, if easily accessible from both sides, may be hammered into their proper contour by use of a hammer and suitable dolly blocks. In modern automobile practice many parts are not so accessible because covered over by the interior construction through which avenues of access are most restricted. Frequently relatively small dents occur along margins of the panels to which access is most difficult. Even when not of functional importance, such dents are often particularly unsightly, detracting from appearance and from the resale value of the car.

Hitherto such dents have been reformed by the use of what are known as picking tools, examples of which are shown in the patents to William H. Ferguson, 2,485,487 and 2,485,489. These are light, hand-operated tools with blunt points and are formed to permit access to the damaged area from a relatively remote point, either through an existing available opening in the body structure or through an opening of restricted size formed for the purpose, and which could thereafter be closed if desired. These tools are manipulated to provide successive pressing actions exerted at substantially single points of the work throughout the area to be reshaped, which is thus pushed back toward its original contour. In many instances the operation of such tools caused a stretching of the metal so as to form hollow domes which project as minor excrescences or "pimples" at the points where pressure was applied at the interior. These however could be dressed off by filing or grinding to provide a smooth exterior surface.

In accordance with my present invention I provide a tool for use in connection with a power hammer, for instance a pneumatic hammer, and of a form to permit it to be introduced into the interior of the body structure as were the shank portions of the "picking" tools, and provided at its end with a peen portion facing in a direction laterally to the general length of the tool, means being provided whereby the strokes of the hammer at the exterior of the body structure are communicated to this peen portion, so that light, highly localized blows are struck against the metal to be reformed. These blows, rapidly repeated and applied over the surface to be reshaped, provide for a rapid correction of the malformation. Generally the metal will not be stretched and the pimples referred to above will not appear on the outer surface.

My invention will be well understood by reference to the following description of the illustrative embodiments thereof, shown in the accompanying drawings, wherein:

Fig. 1 is a schematic view illustrating a portion of an automobile door being operated on by means of a tool exemplifying the invention;

Fig. 2 is a section on Fig. 1;

Fig. 3 is a side elevation of the tool and of a pneumatic hammer with which it may be assembled to form, in effect, a unitary appliance the parts being shown separated and a portion of the former being broken away;

Fig. 4 is a fragmentary view showing a different form of peen; and

Fig. 5 is a side elevation showing a different shape of tool.

From one point of view the tool which I am about to describe when in use embodies as a unitary element thereof a pneumatic hammer, the compiete appliance constituting a portable tool, wieldy and light, which may be lifted, directed and held by the hands of the workman. However, since the form of pneumatic hammer or similar power hammer may be widely varied and may even be identical with such devices as known in the prior art, the tool may be considered as an attachment for such a hammer, and I will herein so describe it. Indeed, as will be apparent, it will be desirable for a workman to have for use with a single hammer unit several attachments or tools similar in fundamental design, but of slightly different dimensions or form to be able to operate most advantageously on deformations encountered in practice.

Referring now to Fig. 3, I have shown separated at the left of the figure a power hammer 10 of the pneumatic type, supplied with compressed air through the hose 12. It is unnecessary to illustrate the hammer in detail, but it will be understood that it embodies a reciprocating piston which serves as a hammer proper, and that it is operated when the plunger 14 for controlling the throttle valve is depressed by the thumb lever 16. Such a hammer adequate for purposes of the invention may be of a size to permit it to be held in a grasping hand with the thumb overlying the lever 16. At the right of the figure is shown the elements of the tool cooperating with the hammer and which, while they would not be of substantial utility unless they were combined with such a tool, nevertheless represent the novel constructional features involved.

As illustrated in Fig. 3 the attachment is provided with a base portion 18 herein shown as having a screw thread 20 cooperating with a screw thread 22 on the housing of the hammer, this representing by way of example one means for securing the two parts together. From this base extends an elongated tube 24 having a long straight portion 24*a* which merges smoothly into an arcuate distal portion 24*b* laterally deflected therefrom. The reference to the device as a tube emphasizes that its length is many times its diameter, which latter is restricted so that the tube may be introduced through a narrow opening and find its way to a remote point past intermediate obstructions. For this purpose it continues without increase of or abrupt change in its cross sectional dimension. The characterization of structure expressed by the preceding sentence is expressed in the claims by the words "free from any peripheral obstructions" and the latter expression is to be taken as synonymous with the former. It has no external shoulders to be caught on interior parts. The tube, while small, is substantially rigid under such stresses as would be applied thereto by a manual prying action.

While the dimensions are not critical, to give a general idea of the order of sizes involved, I give the dimensions successfully used in one practical device, stating them as approximate values in terms of fractions of an inch, since dimension so stated will be more readily apprehended. The tube may be of about one-half inch external diameter with a wall thickness of about one-eighth inch, it being made of steel of suitable character. The over-all length, measured axially of the straight por-

tion of the shank, may vary for different tubes. Tubes 20, 12 and 8 inches in length might make up a kit. The overhang or offset of the distal end of the tube from the axial line may also widely vary. A long tube may have an offset of two inches to reach a great distance yet work in close spaces. A tool of generally similar dimensions would probably have the widest range of utility. However a tube with an offset of as much as five inches and preferably rather short overall, may be provided for reaching around obstructions as will appear.

From the distal end of the tube projects a peen part **26** and from the proximal end an anvil part **28** which latter, when the two elements shown in Fig. 3 are assembled, is in the path of the reciprocating hammer proper and serves as an anvil therefor. These two elements, as will appear, are herein the end portions of a rod. I have referred to them separately because the intervening portion **30** of the rod is in a sense a motion-transmitting member between them which however it is convenient to form integral therewith. This rod fits rather loosely in the tube and in the case of a tube with the dimensions above referred to I have had good results from a rod about three-sixteenths of an inch in diameter. It is thus free to move within the bore of the tube under the strokes of the hammer exerted on its proximal end while it is supported by the walls of the tube. One way of assembling the parts is to insert the rod in the tube when both are straight and then to bend the two as one to the desired easy curve which causes the peen to face in a direction transverse to the length of the shank and subsequently to heat treat the parts. While under the stroke of the hammer the rod actually moves longitudinally relative to the tube, the motion is slight. In practice the movement of the peen **26** is probably only from one-eighth to one-fourth of an inch. The rod, while not flexible in a popular sense of the word, under the conditions of use does move longitudinally in the bore of the tube "and around the corner," as is necessary to perform the desired functions of the tool. No means is herein shown for returning the rod toward the left viewing Fig. 3, because it bounces back from the work under the influence both of its own elastic recovery from the slight flexural deformation imposed thereon by the hammer stroke and of the reaction of the work.

Referring to Figs. 1 and 2, I have there shown the shank of the tool introduced to an opening **32** formed in the bottom of an automobile door, the peen end of the tool being presented to the interior surface of the outer panel of the door, adjacent the belt line. When the pneumatic hammer is actuated a rapid succession of blows is applied to a very restricted portion of the area of the panel. The peen vibrates rapidly and the operator can move it from place to place along the surface of the panel gradually to reshape the same by a sort of delicate forging operation which is possible because the power drive permits striking multitudinous blows rapidly.

I have previously referred to the fact that the tube **24** is rigid as against manually applied stress. The tool can be thus used in the beginning or at an intermediate stage of the work as a hand operated prying lever to unfold major parts which are then more accurately reshaped by the percussive action of the tool as described.

In Fig. 3 the peen of the distal end of the rod has a rather blunt point similar to those of the picking tools above referred to. In Fig. 4 there is shown a peen **26***a* slightly enlarged relative to the diameter of the rod proper and having a rounded face. On a small scale this resembles the face of a certain form of metalworking hammer.

In Fig. 3 the proximal portion of the tube is straight and long, in the sense that its extension outwardly from the proximal end is several times that of the distal, curved part into which it merges. In the majority of cases such a tube may be introduced from some remote point of vantage and, because of its smooth, unobstructed, exterior contour, so positioned angularly that it may be extended past existing obstructions, to bring the peen end adjacent the area to be operated on. Rotary movement then permits the peen to be faced in the proper direction. It will not usually be the case of providing an offset to extend around an obstruction closely adjacent that area, and therefore the offset may be considered rather as a means to permit the delivery of the blow "around the corner" than as a means in placing the peen past an obstruction into a tight place. A considerable offset might indeed be an embarrassment in inserting the tube and in bringing the peen to the desired point and, moreover, it might prevent the tube from being turned in the space available to face the peen in the desired direction. For many purposes it is desirable to have a relatively slight offset that is extended laterally for a distance only a minor fraction of the length of the tube, less than one quarter. However tools otherwise similar in having a long, straight, proximal portion, but with different degrees of offset, may be supplied as parts of a kit.

In certain instances it may be desirable to reach far around an obstruction which in itself is relatively accessible. In Fig. 5 I have shown a tool having a tube **24'**, wherein the length of the offset is a major fraction of the length of the tube as a whole. Herein the length of the proximal portion **24***a'* of the tool is minimized while the distal end **24***b'* is formed along a relatively long and shallow arc. Preferably, the anvil end **28** of the rod has a straight path through the base **18**, although the proximal portion **24***a'* of the tube rising therefrom may even have a curvature on a long radius for a short distance, merging smoothly into the arcuate distal part of shorter radius by means of which the offset is provided. In this form of tool the offset, instead of being a minor fraction of the actual extension, may be a major fraction thereof. If we have an opening of narrow width between two walls, we can with the tool of Fig. 3 operate either outwardly on those walls, or on a bottom portion between them if we can have access from above. With the tool of Fig. 5 we could approach from the side and could operate on the bottom, but in general not effectively on the side walls.

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:

1. A tool for reshaping deformed portions of metal panels adapted for assembly with a power hammer to be manhandled therewith as a portable unit and comprising solely a base having means for assembling it with such a hammer, an elongate tube substantially rigid under manually applied stress extending from the base, being free from any peripheral obstructions and comprising a proximal portion which merges smoothly into an arcuate, laterally deflected distal portion and a rod received loosely within the bore of the tube and following the contour of the same, the rod having a proximal portion to extend therefrom as an anvil to be presented to the reciprocating hammer element proper and a distal end to project beyond the distal end of the tube and providing a peen movable under the hammer strokes in a path transverse to the axis of the shank portion.

2. A tool for reshaping deformed portions of metal panels adapted for assembly with a power hammer to be manhandled therewith as a portable unit and com-

prising solely a base having means for assembling it with such a hammer, an elongate tube substantially rigid under manually applied stress extending from the base, being free from any peripheral obstructions and comprising a long, straight proximal shank portion which merges smoothly into an arcuate distal portion the end of which latter is laterally offset from the line of the shank portion for a distance not more than one quarter of the length of the outward extension of the tube, a rod received loosely within the bore of the tube and following the contour of the same, the rod having a proximal portion to extend therefrom as an anvil to

be presented to the reciprocating hammer element proper and a distal end to project beyond the distal end of the tube and providing a peen movable under the hammer strokes in a path transverse to the axis of the shank portion.

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