

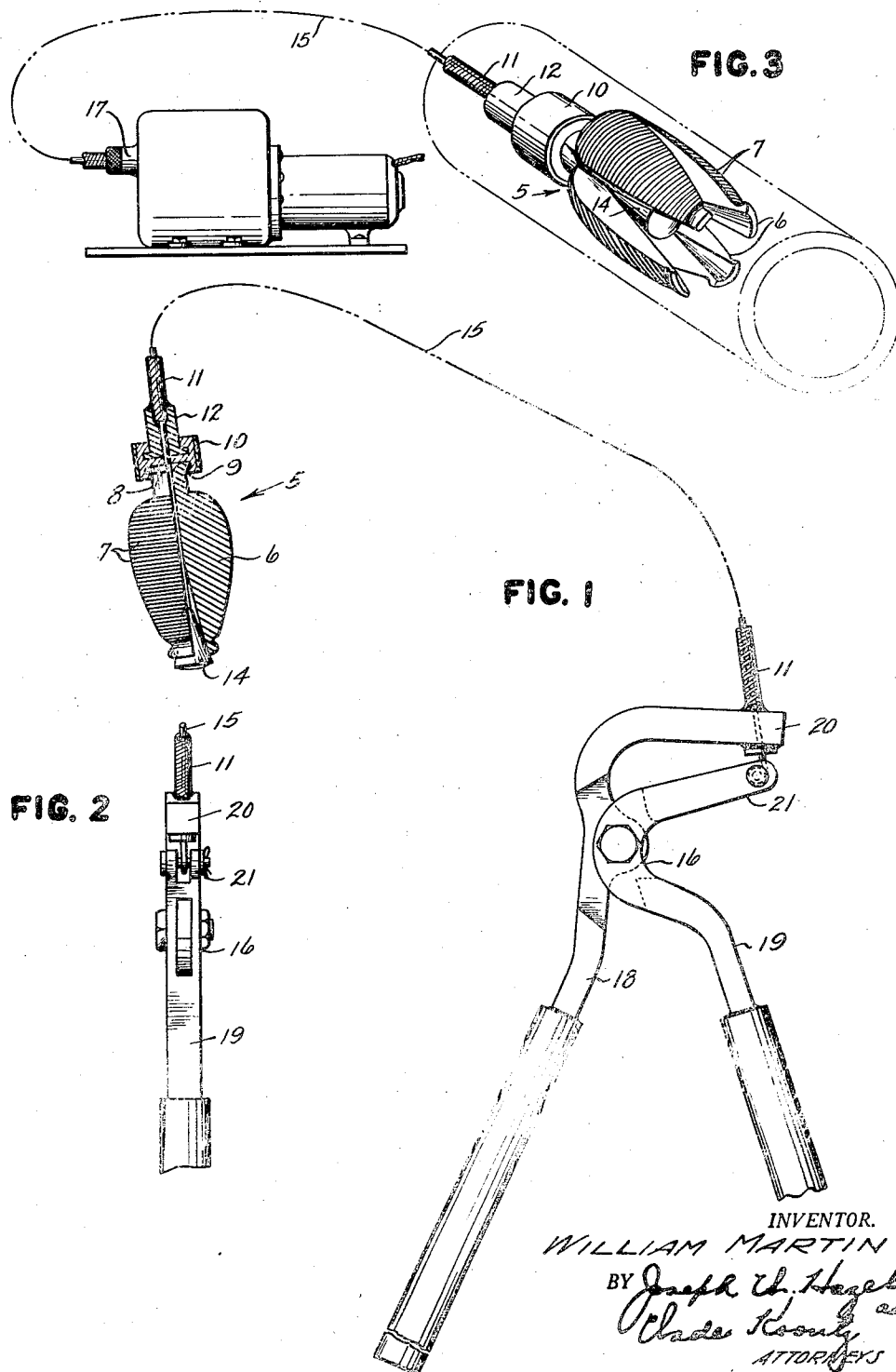
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EXPANDING TOOL AND FLEXIBLE SHAFT FOR REMOVING DENTS FROM TUBING

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UNITED STATES PATENT OFFICE

2,423,458

EXPANDING TOOL AND FLEXIBLE SHAFT
FOR REMOVING DENTS FROM TUBING

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2 Claims. (Cl. 153—80)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates to a device for removing dents, flat spots and the like from the inside of aluminum, copper, or steel tubing; and it is more particularly useful for removing such dents and flat spots from aircraft oil lines constructed of aluminum or copper tubing, which are otherwise in serviceable condition.

One of the essential objects of this invention is to provide a device for removing dents from tubing, which device is capable of negotiating sharp bends in the tubing, and is also capable of negotiating several bends formed in opposite directions in the tubing.

Another object of the invention is to provide a device for removing dents from tubing, which device is arranged and constructed to move forward in the tubing by the operation of the device.

A further object of the invention is to provide such a device which is simple in construction and thus economical in manufacture, and is also practical and highly effective in use.

These and various other objects and advantages are attained with this invention, as will become apparent from the following description taken in connection with the accompanying drawing wherein the invention is shown in its preferred form, it being evident that other arrangements and forms of construction may be resorted to in carrying out the objects and purposes of this invention.

In the drawing:

Fig. 1 is a view illustrating my invention in its preferred form, being shown in a collapsed position and partly in section, and provided with means for manually operating the same.

Fig. 2 is a partial view thereof, showing the manual operating means at right angles to the position of Fig. 1.

Fig. 3 is a view illustrating this invention with the dent removing member expanded, and being actuated by hydraulic operating means.

This invention, as illustrated in the drawing, comprises an expansible dent removing member 5 which is substantially pear-shaped and is composed of a plurality or set of segments 6, said segments being substantially wedge-shaped and preferably arcuate on the exterior, as illustrated herein. Each of these segments is provided on its exterior surface with serrations or projecting means 7, arranged to extend transversely of the segment, and being preferably in the form of

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transverse ridges, substantially as shown. These projections 7 are thus adapted to firmly engage the interior surface of the tubing.

Each segment is provided at its larger end with a lip 8 engaging in a groove 9 provided in a supporting member or head 10, so that the segments may be swung apart at their opposite smaller ends. A conduit 11 is connected with the head 10, as by means of a sleeve or connecting member 12; and this conduit is somewhat flexible, so that it is adapted to negotiate any bend or bends in the tubing with which the device is used.

An expanding member 14 is positioned between the segments, and it is preferably in the shape of a tapered plug, as indicated in the drawing. It has a flexible member 15 connected to its smaller end, which is preferably in the form of a thin rod or pull-wire and extends from member 14 through head 10 and conduit 11. Said rod or pull-wire 15 is flexible so that it is bendable along with the conduit 11 wherein it is housed.

The means for operating this device may be in the form of manual operating means 16, as shown in Fig. 1, or may also be in the form of hydraulic operating means 17, as shown in Fig. 3.

The manual operating means 16, as shown in Figs. 1 and 2, is preferably provided in the form of a pair of levers 18 and 19 which are pivotally connected and are provided with a pair of jaws 20 and 21, respectively. The jaw 20 has the end of conduit 11 attached thereto and the jaw 21 has the end of wire 15 attached thereto, and the wire thus extends through jaw 20 and through conduit 11.

In operating this device, the segments 6 in their collapsed form, with plug 14 positioned at their smaller ends, as indicated in Fig. 1, are entered in the tubing which is to have its dents or flats removed, or is to be straightened out; and the levers 18 and 19 are operated, substantially in the manner of a pair of scissors or pliers. The separating and the joining of the jaws 20 and 21 will thus cause an intermittent separating and joining or expanding and collapsing of the segments 6; and the transversely extending projecting means or ridges 7 on the exterior surface of the segments, upon the expanding of the segments, will then firmly engage and bite into the inner surface of the tubing and will thus apparently facilitate the desired forward movement of the expanding member through the tubing.

As indicated in Fig. 3, this dent removing device may also be used in conjunction with hydraulic operating means 17 which includes an hy-

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draulic piston for actuating the pull-wire 15, as is well understood.

It is apparent from the above disclosure that this device, whether actuated by either of its types of operating means, is adapted to be utilized for removing dents and flats in tubing, whether the tubing is straight or whether it possesses several bends therein.

I claim:

1. A device for removing dents from tubing, comprising a substantially pear-shaped member composed of a set of expansible wedge-shaped segments having arcuate exteriors, means for pivotally supporting each of the segments at their larger ends, a flexible conduit extending from said means, a tapering plug operable between the smaller unsupported ends of said segments, a flexible wire extending from the plug through said conduit, adapting this device for use with bent tubing, and movably connected operating members being operably connected one with the conduit and another with the wire for intermittently actuating the segments by the plug, to force said segments against the interior of said tubing through action of said operating members to thereby remove dents in the walls of the tubing.

2. A device for removing dents from tubing,

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comprising a set of expansible segments and a head for swingably supporting each of the segments at one end, a tapered plug operably positioned between the free unsupported ends of said segments, flexible guiding means connected with the head, a wire connected with the plug and guided by the flexible means, thus adapting the device for use with bent tubing, and pivotally connected levers, one connected with said wire and the other with said flexible means, for intermittently operating one relative to the other, said segments having exterior ridges extending transversely thereof, and the device being operated to force said ridged segments against the interior of said tubing on actuation of said levers to thereby remove dents in the walls of said tubing.

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