

UNITED STATES PATENT OFFICE

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LOCKING DEVICE FOR FLUID PRESSURE TOOLS

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This invention relates to fluid pressure tools and more particularly locking devices therefor. It has been developed with particular relation to pneumatic yoke and jam riveters but it has features of more general application.

One object of the invention is to provide an improved locking device operating as an automatic take up for the hammer parts. Another object is to make the device simple and inexpensive both to manufacture and to install but efficient in operation. Other objects will be apparent from the detailed description which follows.

In order to illustrate the invention one concrete embodiment thereof is shown in the accompanying drawings in which:

Fig. 1 is a vertical sectional view through a riveting machine, the support for the same being cut away.

Fig. 2 is a transverse sectional view substantially on the line 2—2 of Fig. 1.

Fig. 3 is a top plan view of the plug.

Figs. 4 and 5 are, respectively, side and end elevational views of the locking and take up ring.

The embodiment of the invention chosen for the purpose of illustration comprises a hollow cylinder or tubular member 6 which receives in its axial bore or chamber 6a for sliding movement a percussive motor A of the fluid pressure type. One end of chamber 6a is reduced in size at 7 to prevent the percussive motor A from being forced out of chamber 6a. The opposite end receives with a threaded connection a closure disk 8 having a series of perforations 8a therethrough to pass pressure fluid for moving motor A in chamber 6a and for operating the motor. Disk 8 also has a central threaded bore 8b receiving a clamping bolt 9 which secures a pressure fluid inlet head 10 to cylinder 6. Cylinder 6 forms a part of or is secured to a suitable supporting member 11 (cut away in the drawings) which may be a yoke, the arm of a pedestal, or any similar support.

Percussive motor A comprises a barrel 12 having an axial bore providing a piston chamber within which reciprocates a hammer piston 13 arranged to deliver its blows upon

a working tool such as rivet set 14, having a shank projecting within the outer end of barrel 12 and kept in place by suitable means such as retainer collar 15. Percussive motor A is of the valve type and has an automatically thrown valve (not shown) moving in timed relation with the piston and disposed in a two part valve box 16 of conventional form located in a counterbore in the rear end of the piston chamber, a plug 17 in screw threaded engagement with the interior of barrel 12 being provided to securely clamp valve box 16 in place. The plug has a rearward extension 17a provided with an axial bore to conduct motive fluid from the rear end of cylinder 6 to operate the percussive motor.

The locking and automatic take up means for plug 17 to which the invention particularly relates will now be described. The upper face of plug 17 (Fig. 3) is provided with a plurality of recesses or sockets 17b, in the present instance an even number such as 4. One end of a circular spring ring 18 (Figs. 4 and 5) is disposed in one of the sockets 17b and the other end fits into one of a series of holes 19a in an annular plate member 19 which has telescoping engagement with extension 17a of the plug. Plate member 19 carries upon its lower face one or more plugs or key members 19b arranged to seat in one or more recesses 12a in the rear end of cylinder 12 so that a locking connection is established between plug 17 and cylinder 12 by spring ring 18, plate member 19, and key member 19b. The holes 19a in the plate member are preferably an odd number such as 5 as shown in Fig. 2. In engagement with plate member 19 and the rear end of barrel 12 is a packing ring 20 of suitable flexible material such as leather, the packing ring being maintained in place by a clamping disk 21 which telescopes over plug extension 17a and is held in place by any suitable means such as a cotter pin 22 extending through a transverse bore in extension 17a (Fig. 1). In operation admission of motive fluid through inlet connection 10 is first operative to move percussive motor A as a unit outwardly of cylinder 6 to bring the working tool 14 in contact with the work, the motive fluid then

passing through central bore of plug 17a to put the percussive motor into operation.

In order to maintain the valve parts tightly clamped within barrel 12, the spring locking ring 18 is utilized automatically to take up any looseness which may develop through the shocks and vibration of the tool. This is readily accomplished by putting locking ring 18 under tension when the percussive motor A is assembled. The even number of sockets 17b in plug 17 and the odd number of sockets 19a in plate member 19 permit two sockets to be chosen for the ends of ring 18 which will cause ring to be put under tension when plate 19 is rotated to place key members 19b in line with barrel sockets 12a. Plate 19 is then forced inwardly to seat in the shallow counter bore provided for it in the end of barrel 12, whereupon packing ring 20 and clamp plate 21 are applied thus securely holding plate member 19 in place. The constant rotative force then exerted by the tensioned ring 18 upon plug 17 will screw the latter into the barrel and hold valve box 16 against movement.

While the invention has been herein disclosed in what is now considered to be a preferred form, it is to be understood that the invention is not limited to the specific details thereof but covers all changes, adaptations and modifications within the scope of the appended claims.

I claim as my invention:

1. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with the interior of one end of said barrel, a member adjustably secured to said barrel adjacent said plug, and a resilient member under tension between said plug and said member and arranged to exert its force upon the former to tighten it.

2. In a riveting machine having a cylinder providing a chamber having a fluid pressure tool movable therein, said tool having a barrel with an open end, and closure means for the open end of said barrel comprising members engaging the interior of said barrel and in telescoping engagement with each other, and resilient means under tension interposed between said members and within a radial projection of said barrel for exerting a tightening force upon one of said members.

3. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with one end of said barrel and a rearward extension serving as a conduit for motive fluid for said tool, an annular member telescoped over said extension and adjustably secured to said barrel adjacent said plug, packing means for said tool secured to said extension beyond said member, and resilient means interposed be-

tween said plug and said member automatically and continuously to apply a torque to said plug to screw it into said barrel.

4. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with the interior of said barrel and a rearward extension serving as a conduit for motive fluid for said tool, an annular member telescoped over said extension and adjustably secured to said barrel adjacent said plug, packing means for said tool secured to said extension beyond said member, and a spring ring tensioned between said plug and said member and arranged to exert its force upon said plug in a direction to screw it into said barrel.

5. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with the interior of said barrel and a rearward extension serving as a conduit for motive fluid for said tool, an annular member telescoped over said extension and adjustably secured to said barrel adjacent said plug, packing means for said tool secured to said extension beyond said member, said plug and said member having one or more recesses, and a spring having its ends shaped to cooperate with said recesses placed under tension and arranged to exert its force upon said plug to screw it into said barrel.

6. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with the interior of said barrel and a rearward extension serving as a conduit for motive fluid for said tool, an annular member telescoped over said extension and adjustably secured to said barrel adjacent said plug, said plug and said member having a plurality of sockets, and a spring ring of circular shape having its ends turned outwardly on opposite sides of the plane thereof to engage said sockets, said member being adjusted relative to said plug to put said ring under tension so as to exert a force continuously on said plug to tighten it on said barrel.

7. In a riveting machine providing a chamber having a fluid pressure tool movable therein, said tool having a barrel, a plug having a threaded connection with the interior of said barrel and providing a conduit for motive fluid for said tool, a member adjustably keyed to said barrel adjacent said plug, a resilient member under tension engaging both said member and said plug for automatically tightening the latter, a packing ring of flexible material against said member for preventing escape of motive fluid along said barrel, and a clamping disk telescoped over said extension into engagement

with said packing ring, and means on said extension for retaining said disk in place.

8. A fluid pressure percussive tool having a barrel, with an open end, a plug having a threaded connection with the interior of the open end of said barrel and providing a conduit for motive fluid for said tool, a member within said barrel adjacent said plug, means adjustably keying said member to said barrel, and a resilient member under tension engaging both said member and said plug for automatically tightening the latter.

9. A fluid pressure tool adapted to be movably mounted in a riveting machine comprising a barrel, a plug having a threaded connection with the interior of said barrel and providing a conduit for motive fluid for said tool, a member keyed to said barrel and secured in spaced relation to said plug, and a spring ring interposed between said member and said plug under tension automatically to tighten the latter, said ring having out-turned ends and said member and said plug having a differing number of sockets to receive said ring ends thereby to provide for convenient adjustment of the tension of said ring.

10. A fluid pressure percussive tool comprising a barrel, a plug having a threaded connection with the interior of said barrel to form a closure for one end thereof and having a portion providing a conduit for motive fluid, a locking ring encircling the conduit portion of said plug and adjustably keyed to said barrel, and a spring member under tension and engaging both said plug and said locking ring for exerting a constant tightening force upon said plug.

11. A fluid pressure tool comprising a barrel having an open end, a closure member having threaded engagement with said barrel at its open end, and means including a resilient member under tension for automatically tightening said closure member, said closure member and said means being wholly within a radial projection of said barrel.

Signed by me at Detroit, in the county of Wayne, and State of Michigan this 20 day of April, 1928.

EDWARD W. STEVENS.