March 21, 1933. D. F. MITCHELL 1,902,571

APPARATUS FOR EXTRACTING TUBES

Filed Sept. 17, 1931

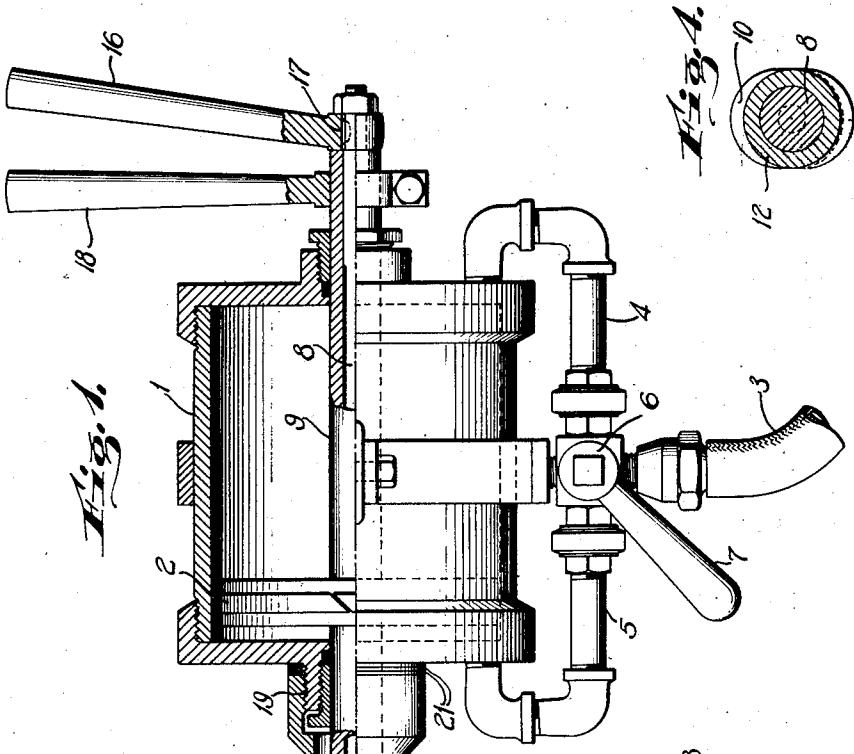


Fig. 1.

Fig. 4.

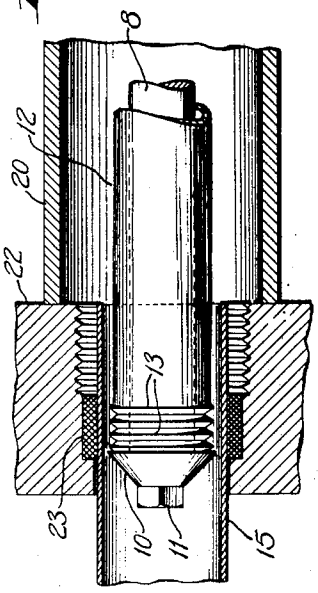


Fig. 2.

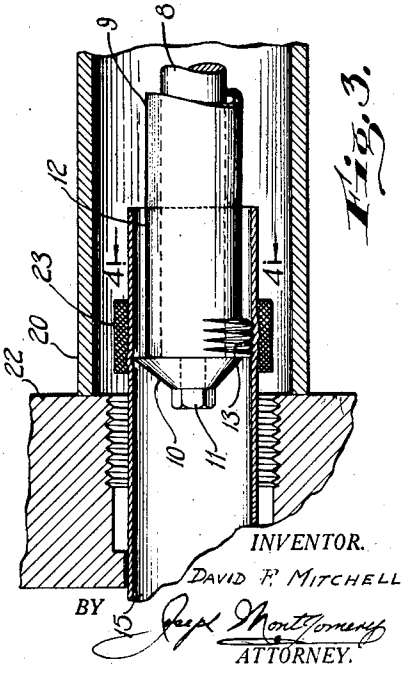


Fig. 3.

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UNITED STATES PATENT OFFICE

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APPARATUS FOR EXTRACTING TUBES

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My invention relates to an improved apparatus for extracting tubes, and is particularly adapted to extracting tubes from steam condensers and the like.

One of the objects of my invention resides in the provision of a device for protuberating the tube to securely grip the same and applying power to extract the tube so gripped.

Another object of my invention is the provision of a device of the character indicated having a minimum number of parts and which is easily operated.

A further object of my invention is the provision of a device which will not only remove the tube but which will simultaneously remove the packing.

Further objects of my invention will be manifest from the following description and the accompanying drawing in which:

Fig. 1 is an elevational view of my device partly in section;

Fig. 2 is a sectional view showing the tool or forward end of the device, inserted in a tube;

Fig. 3 is a sectional view showing the tube and packing in the process of being extracted; and

Fig. 4 is a sectional view on line 4—4 of Fig. 4.

Referring to the drawing in detail, 1 designates a cylinder enclosing a piston 2, the piston being adapted to be reciprocated in the cylinder by compressed air supplied through a flexible conduit 3 from any suitable source. The flexible conduit 3 is in communication with two conduits 4 and 5 leading to opposite sides of the cylinder, the air line being controlled by a valve 6 operated by a valve handle 7 which when thrown to one side will admit air to one conduit and when thrown to the other side will admit air to the other conduit, whereby the piston may be reciprocated in the cylinder at will as will be obvious.

The piston has secured thereto in any suitable manner a piston rod which is in the form of a shaft or rod 8 and a sleeve 9, the rod 8 and sleeve 9 being rotatable about a longitudinal axis relative to each other.

The forward end of the shaft 8 is provided with an eccentric cutter 10 which is removably secured thereto by means of a nut 11. The sleeve 9 is in two sections, the forward end section 12 being provided with eccentric cutters 13 and screw-threaded to the main or body portion of the sleeve at 14, whereby this section can be removed for the purpose of sharpening or replacing the cutters. The forward ends of the rod and sleeve, which for convenience I will call a tool, are adapted to be inserted in a tube 15 in the manner and for the purpose to be hereinafter described.

The other end of the rod 8 is provided with a manually operated handle 16 which is keyed thereto at 17 and which abuts the end of the sleeve 9. At this same end of the device the sleeve 9 is also provided with a manually operated handle 18. These handles 16 and 18 are for the purpose of rotating the rod and sleeve relatively to each other as will be more fully explained hereafter.

The cylinder 1 is provided with a threaded hub 19 adapted to receive a sleeve 20 which surrounds the sleeve 9. This sleeve 20 is for the purpose of limiting the depth to which the tool may be inserted in the tube. This sleeve 20 is adjustable on the hub 19 and any number of washers 21 may be inserted between the sleeve 20 and the cylinder 1, depending on the depth to which the tool is to be inserted.

When employing my device for extracting tubes, the handles 16 and 18 are moved relatively to each other, or one handle may be moved relative to the other to bring the eccentric cutters 10 and 13 into alignment with each other, whereupon the diameter of the tool will be reduced to a lesser diameter than the inside of the tube whereby the tool may be readily inserted in the tube.

The tool is then inserted in the tube until the sleeve 20 abuts the tube sheet 22 and if this sleeve has been properly adjusted the cutters will then be adjacent the inner end of the packing 23. The handle 16 is then rotated relative to the handle 18, or both handles may be rotated relative to each other to bring the cutters out of alignment whereby

the cutting members will be forced into and protuberate the wall of the tube as shown in Fig. 3 to securely grip the tube and lock the tool therein.

It will be noted from Fig. 3 that where the tube has been protuberated a depression is formed in the packing 23.

With the tool locked to the tube as just described the valve handle 7 may then be moved to the right whereby air will be admitted to the cylinder 1 to move the piston to the right as viewed in Fig. 1. The piston on its movement in this direction will withdraw the tool, tube and packing simultaneously into the sleeve 20.

While I have illustrated and described my invention in connection with the extracting of steam condenser tubes, it will be obvious that my device may be employed for extracting tubes from other devices. Hence I do not wish to be limited in the application of my device.

It will be understood also that various modifications may be made in the structure of the device herein illustrated and described without departing from the spirit and scope of my invention.

What I claim is:

1. A device of the class described comprising a sleeve, a shaft within said sleeve, a removable extension comprising an eccentric cutting member carried by said shaft and an eccentric cutting member carried by said sleeve, said shaft being rotatable within said sleeve to move the cutting members into and out of alignment.

2. A device of the class described comprising a sleeve, a shaft within said sleeve, a removable extension comprising an eccentric cutting member carried by said sleeve, a removable eccentric cutting member carried by said shaft, and means for rotating said shaft relative to said sleeve to move said cutting members into and out of alignment.

3. A device for extracting tubes and packing from tube sheets comprising a tool having eccentric cutters adapted to be inserted in a tube, means for rotating said cutters relative to each other to protuberate the tube into the packing whereby the tube and packing may be securely gripped for removal.

4. A device for extracting tubes and packing from tube sheets comprising a tool having relatively rotatable cutters adapted to be inserted in a tube, means for limiting the depth to which said tool may be inserted in the tube so that said cutters will be adjacent said packing, and means for rotating said cutters relative to each other to protuberate the tube into the packing to securely grip the tube and packing for simultaneous removal.

5. A device for extracting tubes from steam condensers and the like comprising a piston rod having relatively movable cutters adjacent one end thereof and adapted to be inserted in a tube, means for rotating said cutters relative to each other to protuberate and securely grip said tube, and means operable to move said piston to withdraw said tube and cutters simultaneously.

6. A device for extracting tubes from tube sheets, comprising a cylinder, a piston therein, a piston rod, said piston rod comprising a sleeve having a shaft therein, the forward ends of said sleeve and shaft being provided with removable cutters adapted to be inserted in a tube, handles carried by said sleeve and shaft operable to rotate said cutters into engagement with said tube to protuberate and securely grip the same, and means for causing said piston to move in said cylinder to withdraw said tube and cutters simultaneously.

This specification signed this 3rd day of September, 1931.

DAVID F. MITCHELL.