Dec. 30, 1924. 1,521,381

J. McPHERSON

CONDENSER TUBE EXTRACTOR

Filed Feb. 23, 1924

Fig. 1.

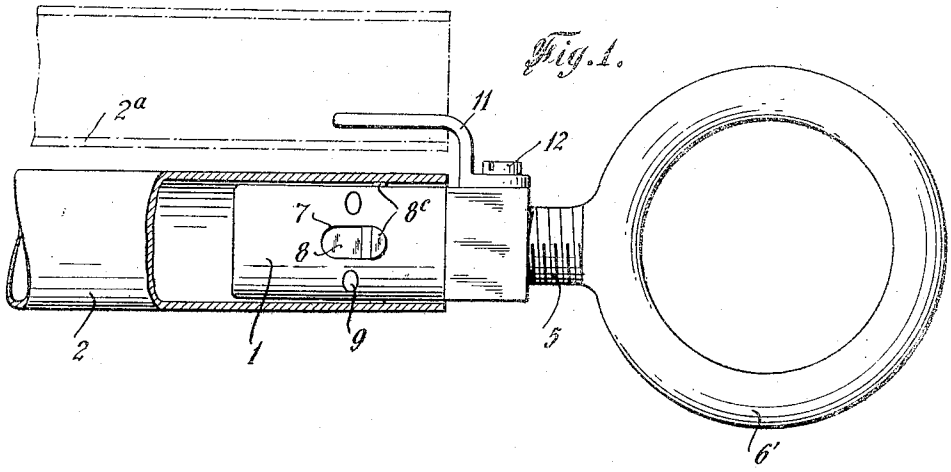


Fig. 2.

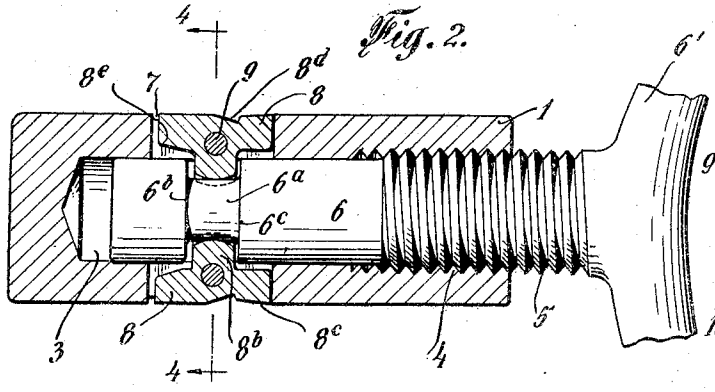


Fig. 4.

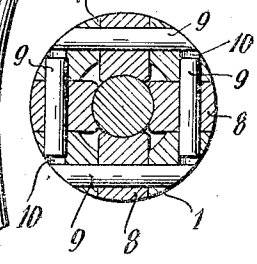


Fig. 3.

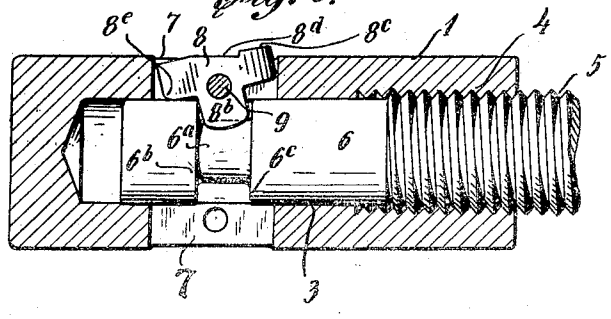
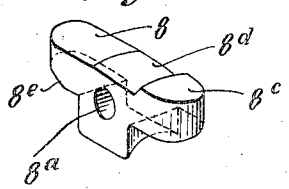


Fig. 5.



Inventor

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UNITED STATES PATENT OFFICE.

JAMES McPHERSON, OF NEW YORK, N. Y.

CONDENSER-TUBE EXTRACTOR.

Application filed February 23, 1924. Serial No. 694,660.

To all whom it may concern:

Be it known that I, JAMES McPHERSON, a citizen of the United States, and resident of New York city, in the county of Bronx and State of New York, have invented certain new and useful Improvements in Condenser-Tube Extractors, of which the following is a specification.

In condensers for steam and other fluids the tubes are frequently secured at their ends to the headers or tube sheets by means of packing retained by glands or the like. When it is desired to remove and replace tubes it has been a laborious and somewhat costly operation due to the confinement of the tube ends in the compressed packing, as well as to the difficulty in pushing the tubes to present their ends in position to be grasped for pulling them.

The object of my invention is to provide an extractor which will be adapted to enter the tubes and be securely attached thereto, in a simple way, so that by pulling upon the extractor the tubes may be readily pulled out from the condenser headers or tube sheets.

My invention comprises novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part hereof, wherein—

Fig. 1 is a side view of my improved extractor shown in position in a tube;

Fig. 2 is a longitudinal section of the extractor, showing the parts in position to be entered into or removed from a tube;

Fig. 3 is a view similar to Fig. 2 illustrating the parts in a position assumed for extracting the tube;

Fig. 4 is a cross section on line 4, 4, in Fig. 2, and

Fig. 5 is a detail perspective view of one of the movable dogs of the extractor.

Similar numerals of reference indicate corresponding parts in the several views.

At 1 is indicated the main body or member of my improved extractor, shown in circular form adapted to enter a tube 2. The body 1 is provided with a longitudinal bore 3 shown threaded at 4 near its outer end adapted to receive threads 5 upon a stem or rod 6 that has a circular inner portion and is fitted to rotate within bore 3. The body 1 is provided with one or more transversely disposed openings 7 communicating with bore 3 and leading through the outer surface of the body. At 8 are dogs pivotally supported within the openings 7 to be tilted therein so that one of the ends of each dog may project beyond the surface of body 1 to engage the inner surface of tube 2. The dogs 8 are shown pivotally supported on pivot pins 9 located in holes 10 in body 1. In the arrangement illustrated in Fig. 4 two of the pivot pins 9 are located entirely within the material of body 1 and the two other pins 9 oppose the first named pins and have their ends curved to correspond to the curvature of the outer surface of body 1, so that said pins will not interfere with tube 2 when the extractor is inserted therein. The dogs 8 have transverse holes 8^a forming bearings for rotating on the pivot pins 9, whereby the dogs are retained in the openings 7. Said dogs are provided each with inwardly extending projections 8^b adapted to enter an annular recess 6^a in stem 6. The material at the sides of the annular groove 6^a provides abutments or shoulders 6^b against which the corresponding sides of the projections 8^b of the dogs 8 may bear. The outer corners 8^c of dogs 8 are prominent to engage the inner surface of tube 2 when the dogs are tilted outwardly, said outer corners being provided by means of transverse depressions 8^d formed in the outer surfaces of the dogs and inclined toward the corners 8^c. The inner corners or edges of the dogs at 8^e, diagonally opposite the outer corners 8^c, are inclined or beveled outwardly to provide normal spaces between the dogs and the stem to permit the dogs to tilt in the openings 7. The surfaces 8^e are adapted to engage the adjacent portion of stem 6 when the dogs are in tube-engaging position, (Fig. 3), whereby to limit the tilting of the dogs and prevent the corners or edges 8^c thereof from protruding too far from the outer surface of body 1 so as not to injure tube 2. The stem 6 is shown provided with a suitable handle or eye 6′ whereby the stem may be rotated for rocking or tilting the dogs 8, and may be used for pulling the extractor.

When the extractor is to be inserted in a tube the stem 6 is rotated, (as to the right in Fig. 4), to cause the stem to advance longitudinally in the body 1, whereby the abutment or shoulder 6^c will engage the projections 8^b of the dogs to tilt the latter so that their outer surfaces will be substantially flush with the corresponding outer surface of body 1, as illustrated in Fig. 2. With the dogs in such position the body 1 of the extractor will be inserted within tube 2. By now retaining body 1 from rotating and rotating stem 6 reversely, (as to the left in Fig. 4), stem 6 by means of threads 4 and 5 will be caused to move longitudinally outwardly and thereupon the shoulder 6^b of said stem, by engaging the projections 8^b, will cause the dogs 8 to tilt so that their outer corners 8^c will be projected beyond the outer surface of body 1 to engage the inner surface of tube 2, as illustrated in Figs. 1 and 3. At such time the under surfaces 8^e of the dogs can bear against stem 6 so that the dogs will not pierce the tube. With the parts in such position the extractor will be securely attached within the tube 2, and by pulling upon stem 6 the tube will be pulled out of the headers or tube sheets.

In order to keep body 1 from rotating when stem 6 is rotated to set the dogs against tube 2 said body may be held by any suitable means. As a convenient means to prevent body 1 from rotating within tube 2 I have shown said body provided with a finger 11 projecting laterally from and substantially parallel with body 1, which finger may be secured to said body by screw 12 or in any other desired way. Said finger 11 will enter a tube 2^a adjacent to tube 2 which will act as an abutment to keep body 1 from rotating. When tube 2 is pulled by the extractor the finger 11 will slide out of tube 2^a. To release the extractor from tube 2 it is merely necessary to rotate stem 6 to the position shown in Fig. 2 to release the dogs 8 from the tube.

My improved extractor is simple in construction, efficient in use and not liable to get out of order. My extractor enables tubes to be pulled out of headers or tube sheets without requiring the tubes to be pushed or the packing to be released around the tubes, thereby expediting and saving cost of extracting tubes from headers and the like over the present practice as known to me.

While I have shown a plurality of dogs 8 it will be understood that one or more dogs may be used, and that changes may be made in the details set forth without departing from the spirit of my invention as defined in the appended claims.

Having now described my invention what I claim is:

1. A tube extractor comprising a body provided with a longitudinal bore and having an opening communicating with the bore, a stem operative in said bore, a dog pivotally supported in the opening and provided with a projection, said stem having abutments to cooperate with said projection to tilt the dog in the opening, said body and stem having cooperative means to cause longitudinal movement of the stem in opposite directions.

2. A tube extractor as set forth in claim 1, in which an inner corner of the dog is reduced providing a space between said corner and the stem to permit the dog to tilt and engage the stem to limit the tilting of the dog.

3. A tube extractor as set forth in claim 1, in which the dog has a depression in its outer surface providing a projecting corner adapted to engage a tube.

4. A tube extractor comprising a cylindrical body having a longitudinal bore provided with threads, said body having a lateral opening communicating with said bore, a dog pivoted in said opening and provided with an inner projection, the outer surface of the dog being adapted to lie substantially flush with the outer surface of the body and to have one of the corners of the dog protrude from said body, said stem having an annular groove providing abutments on opposite sides, the projection of said dog being fitted within said groove in position to be engaged by said abutments for tilting the dog according to the longitudinal movement of the stem.

5. A tube extractor as set forth in claim 4, in which an inner corner of the dog is normally spaced from the stem and adapted to engage the same to limit the projection of a diagonally opposite corner of the dog from the body.

6. A tube extractor comprising a cylindrical body provided with a longitudinal bore, a portion of said bore being provided with threads, a stem having a cylindrical portion fitted within the bore and another portion provided with threads meshing with the first named threads, said stem having an annular groove, said body having a lateral opening communicating with its bore, a dog pivoted in said opening adapted to protrude at one corner from the body, said dog having a projection operative in said groove, the material of the stem on opposite sides of the groove providing abutments to engage the stem to tilt the dog according to the direction of movement of the stem.

JAMES McPHERSON.