Sept. 5, 1950 S. PENNELLA 2,521,186

METHOD AND APPARATUS FOR APPLYING CONDENSER TUBE PACKINGS

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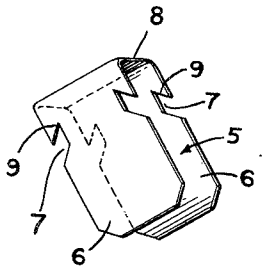


FIG. 5

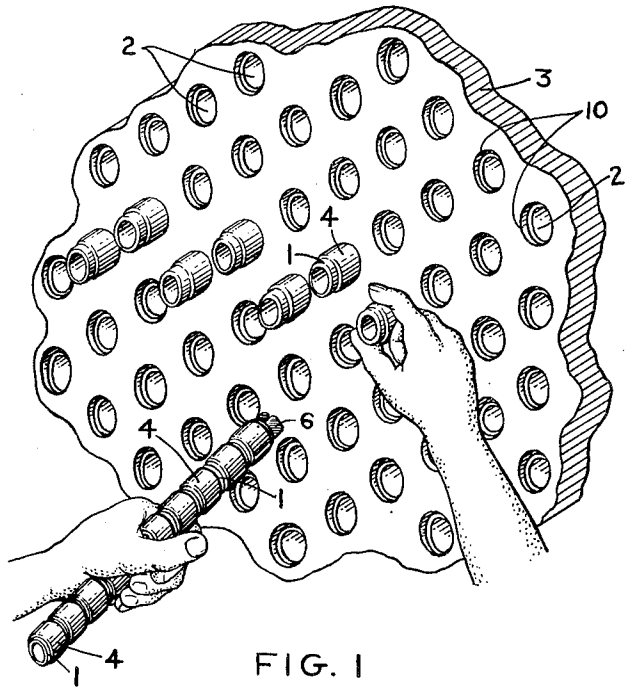


FIG. 1

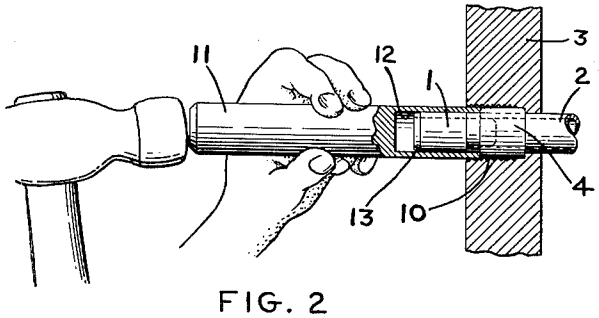


FIG. 2

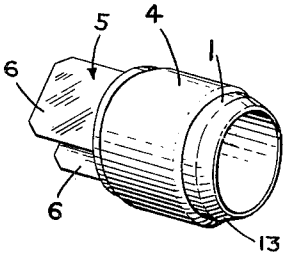


FIG. 3

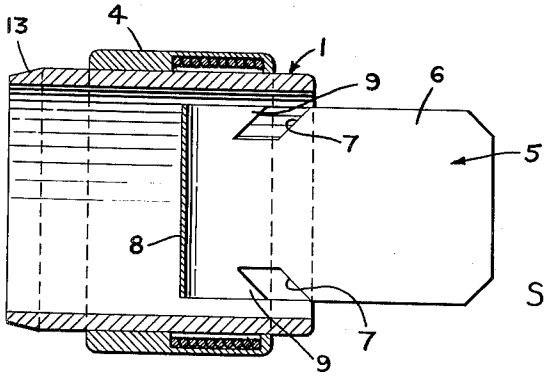


FIG. 4

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METHOD AND APPARATUS FOR APPLYING CONDENSER TUBE PACKING

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10 Claims. (Cl. 206—56)

1

This invention relates to packing for the tubes of surface-type condensers and more particularly to means facilitating the application of such packing to condenser, which means serves the additional function of providing a convenient, attractive-appearing manner of packing the packing units for shipment or transportation to the place of use.

One of the major costs of packing the tubes of a steam condenser of the surface type, i. e., sealing the tubes in the tube sheets or tube heads to prevent leakage of air or water around the tubes, is the cost of labor in installing them. With the present methods and apparatus employed for this work it requires a relatively large number of working hours to pack a condenser, and with some types of packing two men are required and the work is often tedious and results in spoilage of many packing units, as well as ineffective packing of some tubes due to improper installation of the packing unit or units.

An object of the present invention is to provide means whereby the tubes of a condenser may be packed by one man in a fraction of the time now required, means which will eliminate spoilage of the packing units and improper installation or placing of the packing in the tube sheet or head.

Another object of the invention is to provide means for facilitating the installation of condenser tube packing, which means also serves the function of holding a number of packing units in compact, firm arrangement for shipment or transportation; for convenient handling during the installation of the packing and for facilitating the counting of the number of packing units and eliminate error in such counting.

More specifically, the present invention embodies a packing carrier sleeve of the same diameter as the condenser tube with which the packing is to be used, together with spring gripping means which will hold the packing in carrier sleeve in position with respect to a condenser tube and tube sheet when installing the packing, and will hold two adjacent carrier sleeves in firm end-to-end engagement, whereby a number of carrier sleeves with packing thereon may be assembled in a conveniently gripped stick-like formation for facilitating the placing of the packing units in proper position with respect to the condenser tubes, and also provide an assembly of a number of carrier sleeves and packings for shipment or transportation.

With these and other objects in view, as may appear from the accompanying specification, the

2

invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a method and apparatus for applying condenser tube packing of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a perspective view illustrating a number of the carrier sleeves and packing assembled in the stick-like formation and illustrating the manner of initially applying the units to a surface condenser.

Figure 2 is a view partly in section, illustrating the manner of applying the packing in the surface condenser tube sheet.

Figure 3 is a perspective view of a carrier unit with a packing thereon.

Figure 4 is a longitudinal section through the carrier unit with the packing thereon.

Figure 5 is a perspective view of a spring member employed in the apparatus.

Referring more particularly to the drawings, the present invention comprises a carrier sleeve 1 made of hard, compact fiber or any other suitable material. The sleeve 1 has an exterior diameter equal to the diameter of the condenser tube indicated at 2 with which it is to be associated for packing the end of the tube in the tube head 3 of a condenser. The outside diameter of the carrier sleeve 1 is also of such size that the tube packing unit 4 will fit frictionally thereon with sufficient frictional engagement to retain the packing firmly in place upon the carrier sleeve but permit it to be driven therefrom into the condenser tube head 3. The packing 4 shown in the drawings is the type of condenser tube packing shown in my prior Patent 2,420,721, May 20, 1947, but it is to be understood that the carrier sleeve structure may be employed with any other type of packing suitable for association therewith without departing from the spirit of the present invention.

A U-shaped spring member 5 has its base end inserted into the sleeve 1 from one end thereof, and the spaced spring legs 6 of the spring member 5 project out of the end of the fiber carrying sleeve 1. Each of the spring legs 6 has diagonally-extending slots 7 cut therein extending diagonally inward from their edges and inclining towards the connecting length or head 8 of the U-shaped members. These diagonal slots provide sharp points 9 which, when it is endeavored to withdraw the U-shaped spring member 5 from

the sleeve 1, will bite into the fiber of the sleeve and prevent the withdrawal of the spring member 5 from the sleeve and will securely connect the spring member 5 to the sleeve 1. The legs 6 of the spring member 5 are of sufficient width as to frictionally engage within the end of an adjacent carrier sleeve and also frictionally engage in the end of a condenser tube which is to be packed by the packing 4 carried by the carrier sleeve.

A plurality of the carrier sleeves are assembled in stick-like formation, as shown in Figure 1 of the drawings, by the insertion of the spring legs carried by one sleeve into the open end of a second sleeve thus providing a stick-like assembly of a number of the carrier sleeves and packing units which not only can be conveniently gripped by the hand of the workman packing the condenser, but provide firm connection of the number of units to facilitate their packing and shipment, and prevent jostling about or mutilation of the packing. By making a packing box or case of a predetermined length, so as to take or receive a predetermined number of the carrier units with packing thereon the counting of the packing units is greatly facilitated. Say for instance, the packing case is of sufficient length that ten of the units assembled in stick-like formation will fit snugly therein, therefore anyone packing the units for shipment will know that each assembled stick contains ten units.

In applying the packing to condensers, the workman making such application holds a stick of the packing units in one hand, pulls one carrier sleeve with the packing thereon from the stick and inserts it into the counter bore, indicated at 10, in the tube head or tube sheet 3 with the spring legs engaging in the condenser tube to be packed. He may place any number of the units in position in the condenser tube head and after a number of them have been so placed a mandril, as shown at 11 in Figure 2 of the drawings, is employed. The mandril 11 has a counterbore 12 in one end thereof, the diameter of which is large enough to permit it to slip easily over the end of the carrier sleeve 1, while the exterior diameter of the mandril 11 is the same as the exterior diameter of the packing 4. Thus by the simple operation of placing the recessed or counterbored end of the mandril over the outer end of the sleeve 1 and striking the mandril a blow with a hammer the packing 4 is driven off the carrier sleeve 1 and onto the end of the condenser tube 2 within the counterbore 10 of the condenser tube head 3. The packing is thus firmly and properly positioned about the condenser tube in the tube head without liability of "cocking" or mutilation of the packing and in the exact proper position to provide the seal between the condenser tube and tube head when the packing swells due to wetting.

As clearly shown in Figures 2 and 3 of the drawings, the end of the carrier sleeve 1 opposite the end from which the spring legs 6 extend is beveled, as shown at 13, so as to permit easy positioning of the mandril 11 over the end of the carrier sleeve.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. The combination with a condenser tube packing, of a carrier sleeve having an outside diameter of sufficient size to cause a frictional gripping engagement between the sleeve and a condenser tube packing mounted thereon to prevent accidental displacement of the packing on the sleeve, a U-shaped spring member carried by said carrier sleeve and having portions of its legs projecting beyond one end of the sleeve, the legs of said U-shaped spring member having diagonally extending slots cut therein to form points for biting into said sleeve to prevent relative displacement of the sleeve and spring member.

2. The combination with a condenser tube packing, of a carrier sleeve having an outside diameter of sufficient size to cause a frictional gripping engagement between the sleeve and a condenser tube packing mounted thereon to prevent accidental displacement of the packing on the sleeve, a U-shaped spring member carried by said carrier sleeve and having portions of its legs projecting beyond one end of the sleeve, the legs of said U-shaped spring member having diagonally extending slots cut therein to form points for biting into said sleeve to prevent relative displacement of the sleeve and spring member, the outer surface of said carrier sleeve being beveled at the end of the sleeve opposite to the end from which the legs of said spring member projects.

3. Means for connecting condenser tube packing units for transportation and for facilitating application of the packing units to condenser tubes comprising, in combination with a condenser tube packing, a carrier sleeve having an outside diameter of sufficient size to cause frictional gripping engagement between the carrier sleeve and a condenser tube packing mounted thereon, and means carried by the sleeve for releasable gripping engagement with the interior of a second sleeve to connect the sleeves in stick-like form for transportation.

4. Means for connecting condenser tube packing units for transportation and for facilitating application of the packing units to condenser tubes comprising, in combination with a condenser tube packing, a carrier sleeve having an outside diameter of sufficient size to cause frictional gripping engagement between the carrier sleeve and the condenser tube packing, and a U-shaped spring member carried by said carrier sleeve and projecting beyond one end of the sleeve.

5. Means for connecting condenser tube packing units for transportation and for facilitating application of the packing units to condenser tubes comprising, in combination with a condenser tube packing, a carrier sleeve having an outside diameter of sufficient size to cause frictional gripping engagement between the carrier sleeve and the condenser tube packing, and a U-shaped spring member carried by said carrier sleeve and projecting beyond one end of the sleeve, and means formed on said U-shaped spring member for gripping engagement with the carrier sleeve to prevent displacement of the spring member relative to the carrier sleeve.

6. The combination with a condenser tube packing, of a carrier sleeve on which the packing is mounted, said carrier sleeve having an outside diameter approximately equal to the diameter of a standard condenser tube, and spring means projecting from one end of said carrier sleeve for insertion into and releasable gripping engagement with the interior of the condenser tube.

7. The combination with a condenser tube packing, of a carrier sleeve on which said packing

is mounted, said carrier sleeve having an outside diameter approximately equal to the diameter of a standard condenser tube, and a U-shaped spring member carried by said carrier sleeve and projecting beyond one end of the sleeve, the projecting ends of said U-shaped spring member adapted for releasable gripping engagement with the interior of a condenser tube.

8. The combination with a condenser tube packing, of a carrier sleeve on which said packing is mounted, said carrier sleeve having an outside diameter approximately equal to the diameter of a standard condenser tube, a U-shaped spring member having a portion thereof extending into the carrier sleeve and another portion thereof projecting beyond one end of the carrier sleeve for insertion into and releasable gripping engagement with the interior of a condenser tube, and means formed on said U-shaped spring member for gripping engagement with the carrier sleeve to prevent displacement of the spring member relative to the carrier sleeve.

9. The combination with a condenser tube packing, of a carrier sleeve on which said packing is mounted, said carrier sleeve having an outside diameter approximately equal to the diameter of a standard condenser tube, a U-shaped spring member having a portion thereof extending into the carrier sleeve and another portion thereof projecting beyond one end of the carrier sleeve for insertion into and releasable gripping engagement with the interior of a condenser tube, the legs of said U-shaped spring member having diagonally extending slots cut therein to form points for biting into the sleeve to prevent relative displacement of the sleeve and spring member.

10. The combination with a condenser tube packing, of a carrier sleeve having an outside diameter approximately equal to the diameter of a standard condenser tube, a U-shaped spring member carried by said carrier sleeve and projecting beyond one end thereof, the projecting ends of said spring member adapted to engage in the interior of a second carrier sleeve to connect the sleeves in spike-like form for transportation, and means formed on said U-shaped spring member for engagement with the first mentioned carrier sleeve to prevent displacement of the spring member relative to the first mentioned carrier sleeve.

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