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P. H. SEERY.

APPARATUS FOR SAFE ENDING TUBES.

APPLICATION FILED APR. 11, 1904.

NO MODEL.

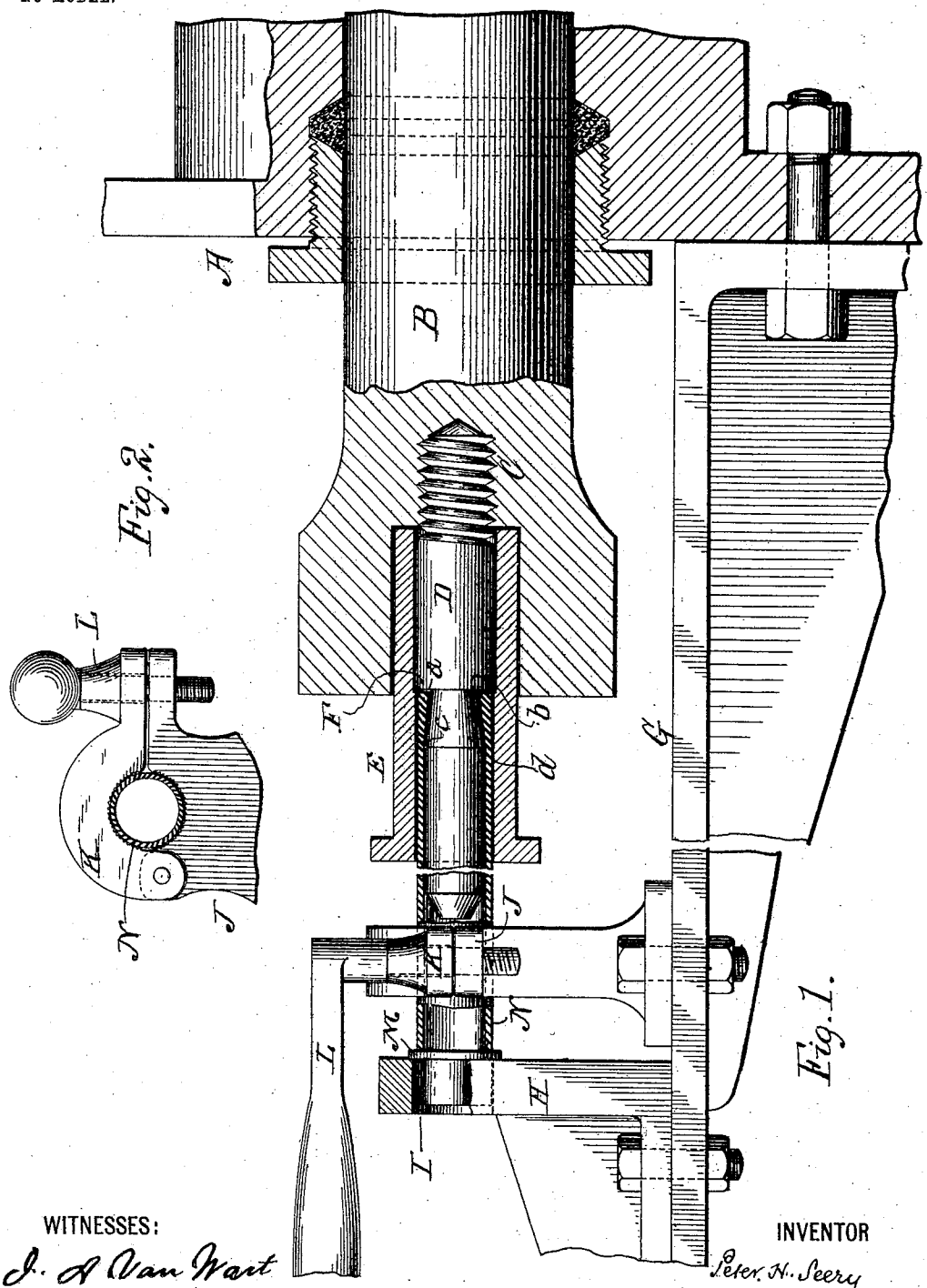


Fig. 2.

Fig. 1.

WITNESSES:

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UNITED STATES PATENT OFFICE.

PETER H. SEERY, OF NEWARK, NEW JERSEY.

APPARATUS FOR SAFE-ENDING TUBES.

SPECIFICATION forming part of Letters Patent No. 767,665, dated August 16, 1904.

Application filed April 11, 1904. Serial No. 202,658. (No model.)

To all whom it may concern:

Be it known that I, PETER H. SEERY, of Newark, Essex county, New Jersey, have invented a new and useful Improvement in Apparatus for Safe-Ending Tubes, of which the following is a specification.

The invention relates to the safe-ending of tubes of malleable metal, such as are commonly employed as fire-tubes in steam-boilers.

The object of the invention is to produce a thickening at the end of the tube for a definite distance inward, whereby the metal becomes condensed and the thickened wall offers greater resistance to the effects of heat and wear.

The invention consists in the combination of a tube-holding device, means for upsetting the metal forming the wall of said tube, and means for limiting the length of the upset portion back from the extremity of said tube; also in combination with the foregoing elements means for simultaneously shaping said upset portion, so that the wall thereof will gradually increase in thickness to said extremity; also in the other combinations of parts more particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the working parts of the apparatus, showing the ram-head, sleeve, arbor, and tube in longitudinal section. Fig. 2 shows the tube-clamp in elevation, the lower portion thereof being broken away.

Similar letters of reference indicate like parts.

A is the head of a hydraulic-press cylinder, in which works the ram B.

D is an arbor threaded at its end C and so secured in the end of ram B. Surrounding the arbor D is a loose flanged sleeve E. The arbor D is shouldered at F and is of reduced diameter from *a* to *c*. It may be tapered, as shown, and of less diameter at *a b* immediately adjacent to said shoulder than at *c d* at a distance therefrom. Beyond *c d* the diameter of the arbor is uniform except at the extreme end, which may be tapered.

Bolted to the cylinder-head A is a bracket G, which supports the standard H. Said standard has an opening I in line with arbor D and of a diameter slightly larger than the internal diameter of sleeve E. Also on bracket G, between the standard H and the end of arbor D, is an ordinary tube-clamp J, Fig. 2, the upper part K of which can be set up by the screw and handle L.

The operation is as follows: The ram B being retracted, the tube N to be safe-ended is passed through the opening I in standard H, through the clamp J, and into the annular space between the arbor D and sleeve E, so that its end bears against the shoulder F on said arbor. The position of the ram with respect to the standard H is then such that an interval will be left between said standard and the tube, and in this interval is placed a plate M, of metal, which is larger in area than the opening in said standard. The clamp J is now tightened upon the tube and the pressure admitted to the ram-cylinder. The ram is suddenly forced outward, thus compressing the tube N endwise. The metal of the tube-wall between the cylindrical portion of the arbor D and the inclosing sleeve E is prevented from thickening by reason of its confinement; but in the tapered annular space between the diameters *a b* and *c d* it is free to become thickened until the inner periphery of the tube meets the reduced portion of the arbor. The safe-ending is thus produced at the tube end and from the metal of the tube itself. The clamp J is now released, the plate M removed, the sleeve E withdrawn from the ram-head, and the tube withdrawn from the arbor.

It is to be understood that the relative thicknesses of the tube-walls, as shown in the drawings, are only illustrative and are necessarily exaggerated. In practice the increase in wall thickness at maximum is about two numbers Brown & Sharpe gage—say from No. 10 to No. 12—equaling about .030 inch, the tube being two inches in external diameter. This being the case, there is no difficulty in withdrawing the tube from the arbor, as above stated.

It will be observed that the annular space between the arbor and sleeve in which the end portion of the tube N is upset constitutes an annular die, which determines the thickness of the wall due to the upsetting action of the ram.

The object of limiting the extent of upset-

ting inwardly from the end of the tube is to enable large numbers of tubes to be made precisely uniform in this particular. This is especially advantageous when said tubes are used as fire-tubes in steam-boilers, since it renders the resisting qualities of the tubes at the ends, where the effects of heat are greatest and the most wear comes, substantially uniform, a condition which would not prevail if the thickened end portions were of a variety of different lengths. So, also, it should be noticed that the wall of the tube is thickest at the extremity, thus providing metal for flanging over to resist the direct heat of the flame in the fire-box.

I claim—

1. The combination of a tube-holding device, means for upsetting the metal forming the wall of said tube, and means for limiting the length of the upset portion back from the extremity of said tube.

2. The combination of a tube-holding device, a movable ram and means carried by said ram for upsetting said tube for a distance from its extremity, and means for simultaneously shaping said upset portion so that the wall thereof will gradually increase in thickness to said extremity.

3. The combination of a tube-holding device, a movable ram, a fixed arbor carried by said ram and adapted to enter said tube and having a portion *a c* of constricted diameter and a detachable sleeve surrounding said tube and said arbor and received in a recess in said ram.

4. The combination of a tube-holding device, a movable ram, a fixed arbor carried by said ram and adapted to enter said tube and having a tapering portion enlarging in diameter outwardly from said ram, and a cylindrical sleeve of uniform internal diameter surrounding said tube and said arbor and supported on said ram.

5. The combination of a tube-holding device, a fixed arbor adapted to enter the tube and having a portion *a c* of constricted diameter, a sleeve surrounding said tube and said arbor and means for upsetting said tube and thereby causing the wall thereof to expand to fill the annular space between said sleeve and said constricted portion of said arbor.

6. The combination of a tube-holding device, a movable ram, a fixed arbor carried by said ram and adapted to enter said tube and having a portion *a c* of constricted diameter, and a sleeve surrounding said tube and said arbor and supported on said ram.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PETER H. SEERY.

Witnesses:
WM. H. SIEGMAN,
I. A. VAN WART.