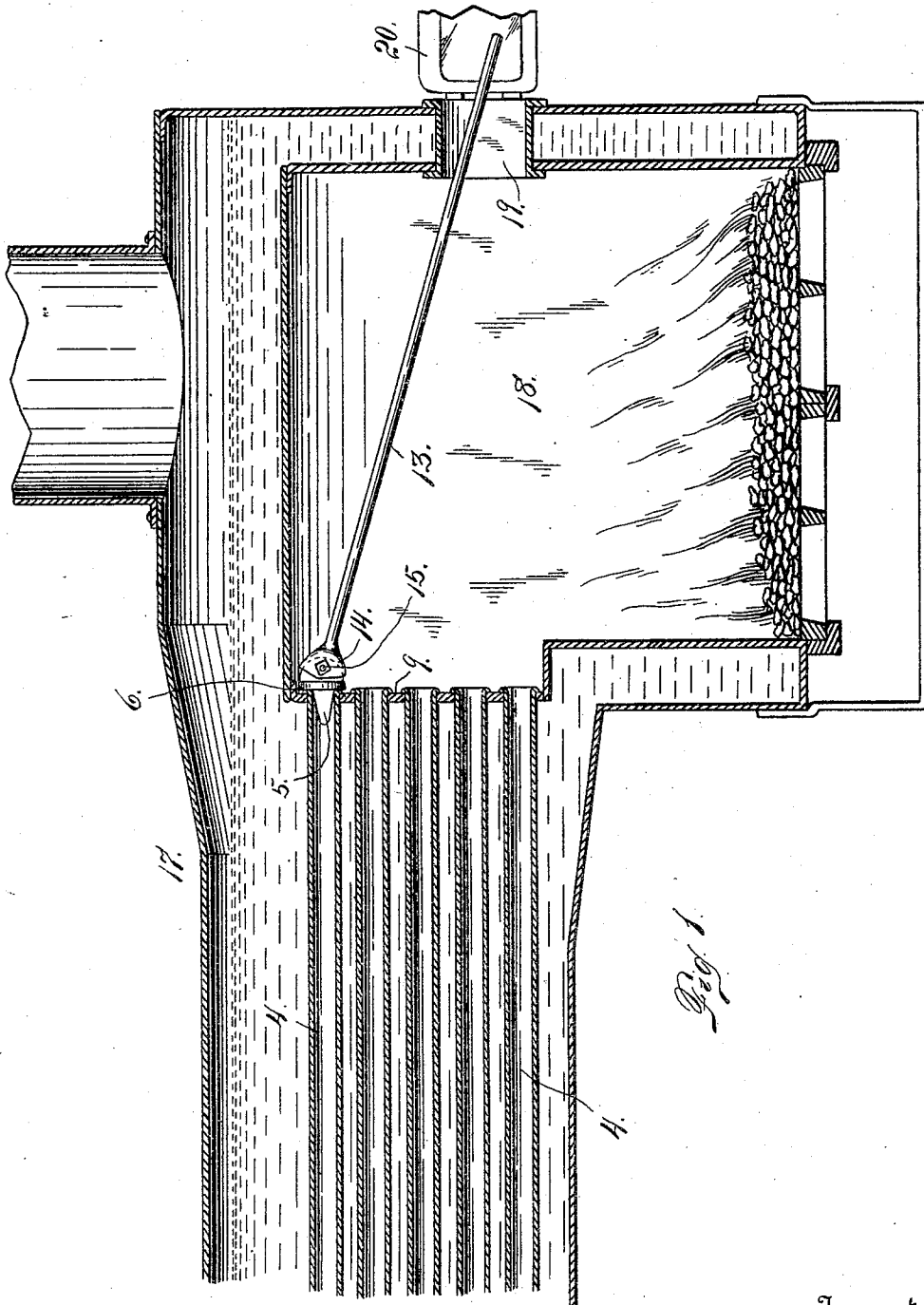


T. H. HAYES.
 COMBINED FLUE BEADER AND EXPANDER.
 APPLICATION FILED FEB. 14, 1908.

933,707.

Patented Sept. 7, 1909.
 2 SHEETS—SHEET 1.



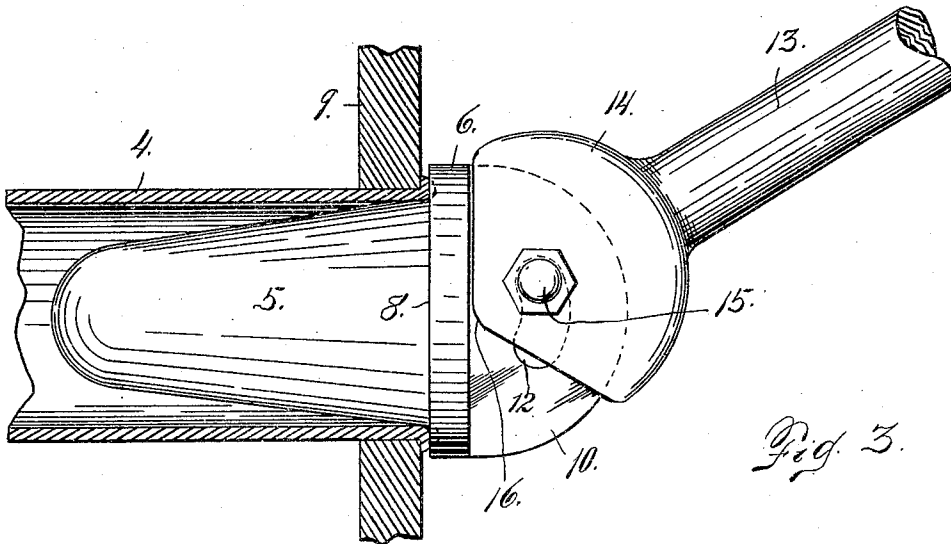
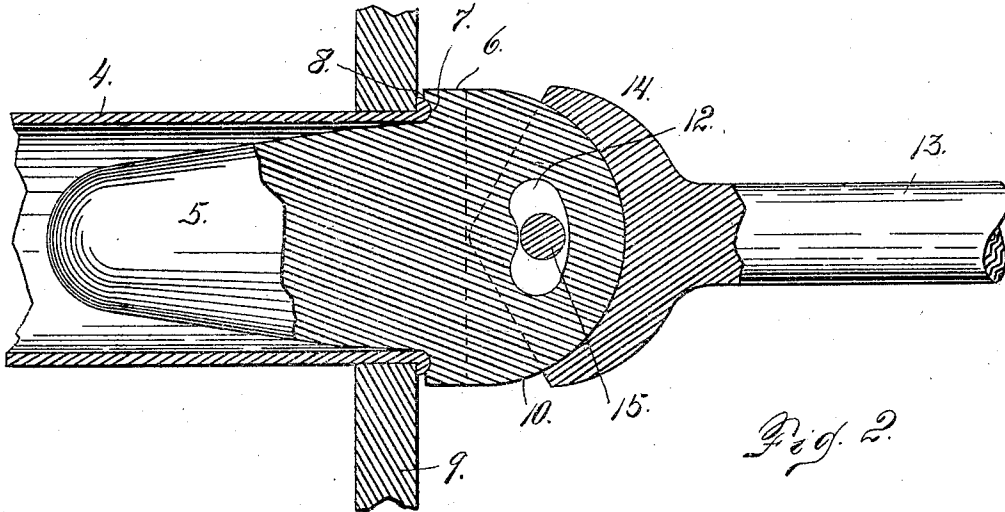
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UNITED STATES PATENT OFFICE.

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COMBINED FLUE BEADER AND EXPANDER.

933,707.

Specification of Letters Patent.

Patented Sept. 7, 1909.

Application filed February 14, 1908. Serial No. 415,799.

To all whom it may concern:

Be it known that I, THOMAS H. HAYES, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in a Combined Flue Beader and Expander; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates more especially to means for temporarily repairing the flue sheet of a boiler to prevent leakage around the flues and is more particularly adapted for use in connection with the boilers of locomotives, to prevent the necessity for changing engines due to a leaky flue sheet while out on the road. It is evident, however, that the device may be advantageously employed in connection with the boilers of stationary, traction or other engines.

The device is termed by me a combined flue beader and expander since a portion of it is inserted in the flue around which the leak occurs, this inserted portion performing the expanding function while an exteriorly located portion acts on the extremity of the flue to perform the beading function. These two functions close the leak around the flue since the expanding of the flue extremity forces the latter out tightly against the adjacent portion of the flue sheet, while the beading function presses the bead on the flue extremity tightly against the flue sheet around the same.

The expanding portion of my improved device is cone-shaped and of sufficient size at its base to completely fill the flue extremity when the latter is of full size or expanded to the maximum degree. Attached to the base of this cone-shaped expanding member, is the beading member which is circular in shape and provided with a beading groove adapted to engage the extremity of the flue and form a bead thereon as heretofore explained. The beading member is provided with a lug with which is rockingly connected a handle of sufficient length to pass through the furnace and protrude beyond the same sufficiently to allow it to be acted upon by a hammer or other suitable tool, during the

operation of expanding and beading the flues as heretofore explained.

Having briefly outlined my improved construction, I will proceed to describe the same in detail reference being made to the accompanying drawing in which is illustrated an embodiment thereof.

In this drawing, Figure 1 is a vertical section taken through a boiler and boiler furnace, the rear portion of the boiler being broken away. Fig. 2 is an enlarged sectional view of my improved device shown in operative relation with the boiler flue and flue sheet, the last named parts being also sectionized. Fig. 3 is a similar view, my improved device, however, being shown in elevation and the handle turned to occupy a different angle.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate the expanding member of my improved device; and 6 the beading member. This expanding member is somewhat conical in shape. It diminishes in size or tapers from the beading member 6 whereby, as it is inserted in the flue 4 of the boiler, it performs the function of a circular wedge so to speak by virtue of the inclination of its wall.

The beading member 6 is circular in shape and provided with a circumferential groove 7 adapted to engage the protruding extremity of the flue, whereby the bead 8 is pressed tightly against the flue sheet after the said extremity has been expanded to cause it to tightly engage the flue sheet 9. The diameter of the beading member 6 is somewhat greater than that of the largest part of the expander, whereby the beader forms a shoulder which limits the movement of the expanding member as it is inserted in the flue. This limitation, however, does not take place until the flue extremity is fully expanded.

Extending beyond the beader 6 is a semi-cylindrical lug 10 provided with a curved slot 12. The handle 13 of the device is provided with a head 14, grooved to receive the lug 10 whereby the head 14 straddles the lug and is connected therewith by a bolt which passes through registering openings formed in the wings of the head on opposite sides of the slot and through the curved slot 12 formed in the lug 10. The face of this head adjacent to the beader is angle-shaped,

the apex of the angle being somewhat rounded, however, as shown at 16, whereby the head is allowed to rock without touching the rear face of the beader which is formed flat. The sides of this angle-shaped face, limit the rocking movement of the head upon the lug 10 in either direction. The lug 10 is formed relatively heavy and its rear surface is curved to conform to the shape of the bottom of the groove or recess formed in the head. These two curved walls or surfaces are always in contact the one with the other and the force of the blows delivered upon the rear extremity of the handle during the expanding and beading operation, are expended upon the head and the lug whereby the bolt or connecting pin 15 is entirely relieved from the force of these blows. This is the object of the rocking connection between the handle and the head. If it were not for this fact, a simple pivotal connection between the parts would be sufficient.

From the foregoing description the use and operation of my improved device will be readily understood.

Referring more particularly to Fig. 1 of the drawing, let the numeral 17 designate the boiler provided with the flues 4 and the flue sheet 9. Connected with the boiler 17 and in communication with the fire flues 4 is a fire box 18 provided with a fuel opening 19 adapted to be closed by a door 20.

When using my improved device for flue expanding and beading purposes, the door 20 is opened and the device inserted through the fuel opening 19 (see Fig. 1). The member 5 is first inserted in the flue sheet extremity of the flue 4 to be repaired, after which hammer blows are expended upon the exposed extremity of the handle 19, whereby the expanding member 5 of the device is driven into the extremity of the flue to its limit of movement or until the grooved shoulder or beading member of the device engages the outer extremity of the flue after which, further blows delivered upon the handle result in pressing the bead 8 of the flue tightly against the flue sheet and completely closing any opening around the flue through which water may have leaked.

It must be understood that my improved device is adapted for temporary use only in repairing boilers, and while adapted for use in repairing boilers of all kinds while in actual service, is more especially intended for use in repairing locomotive boilers while out upon the road, to prevent engine failures. The work heretofore described is performed while fire is still in the furnace and when the flues and flue sheet are heated, whereby the metal yields readily to the action of my improved device or tool in the performance of the functions heretofore explained. It must be understood that the beading member

of the device is not intended for use in forming beads on the extremities of the flues but for the purpose of pressing these beads tightly against the flue sheet after the bead has become more or less separated from the flue sheet resulting in leakage. By the use of my improved device the flue extremity is virtually expanded simultaneously with the pressure of its bead tightly against the sheet around the flue. Heretofore repair work of this kind has been accomplished by inserting an iron plug in the flue sheet extremity of the flue and leaving the same in place until the locomotive reaches the shop for regular repair. This plug while it stops the leak, also stops the passage through the flue and has a tendency to hasten the burning out of the flue since the passage of heat therethrough is checked or confined within the flue. My improved device is intended to take the place of these iron plugs. After the flue has been repaired by the use of my device, the latter is of course removed since the work of repair has been accomplished in such a manner that there is no necessity for leaving a plug within the flue.

Having thus described by invention, what I claim is:

1. A flue beader comprising a beading member and a handle member, one of the said members having a lug and the other a grooved head to receive the lug, one of the said parts having a convexly curved edge, and the other a concave shoulder engaging the said edge, and a pin loosely connecting the head and lug, one of which has a curved slot through which the pin passes and the other an opening in which the pin is fitted.

2. A flue beader and expander comprising a member adapted to enter and expand the flue extremity, a beading member at the rear extremity of the expanding member, the beading member being of greater diameter than the expanding member and provided with a circumferential groove for beading purposes, a handle member, the beading member having a lug provided with a curved slot, and a convexly curved outer wall, the handle member having a groove or recess whose bottom is the counterpart in shape of the outer wall of the said lug, the bottom of the groove and the outer wall of the lug being in contact, whereby the force of blows expended upon the handle will be delivered upon the said lug, and a rocking connection between the handle and the lug, substantially as described.

3. A beader and expander comprising an expanding member adapted to enter and expand the flue extremity, a beading member at the outer end of the expanding member, the beading member being of greater diameter than the expanding member whereby a beading shoulder is formed, a handle member, the beading member having a lug pro-

vided with a curved slot and a curved outer wall, the handle member having a slot whose bottom is shaped to conform to the shape of the outer wall of the lug, the bottom of the groove and the outer wall of the lug being in contact, and a rocking connection between the handle and the said lug, substantially as described.

4. A flue beader and expander comprising an expanding member, a beading member, and a handle member, the beading member having a lug provided with a curved slot and circular outer wall, the handle member having a groove or recess whose bottom is shaped to conform to the shape of the outer wall of the said lug, the bottom of the groove and the said outer wall being in contact whereby the force of blows expended upon the handle will be delivered upon the said lug, and a rocking connection between the handle and the said lug, substantially as described.

5. A flue beader and expander comprising an expanding member, a beader at the outer extremity of the expanding member, the beader being provided with a lug having a circular outer wall, a handle having a head grooved to receive the said lug and having its bottom curved to conform to the curve of the outer wall of the lug and in contact therewith, the said lug being provided with a curved slot and the head of the handle member with registering openings, and a connecting pin passed through the slot and the said registering openings, for the purpose set forth.

6. A tool of the class described, comprising a beading member adapted to enter and expand the extremity of a boiler flue, the device having a shoulder at the rear extremity of the expanding member of greater

diameter than the expanding member, the said shoulder being adapted to engage the bead at the extremity of the boiler flue and press the latter tightly against the flue sheet as force is applied, a handle member, the beading member having a lug provided with a curved slot and a circular outer wall, the handle member having a groove or recess whose bottom is the counterpart in shape of the outer wall of the said lug, the bottom of the groove and the said wall being in contact, and a rocking connection between the handle and the said lug, substantially as described.

7. A tool of the class described comprising a beading member adapted to enter and expand the extremity of a boiler flue, the device having a shoulder at the rear extremity of the expanding member and of greater diameter than the expanding member, the said shoulder having a circumferential groove adapted to receive the bead at the extremity of the flue, the said grooved shoulder being adapted to engage the said bead of the boiler flue and press the latter tightly against the flue-sheet as force is applied, a handle member, the beading member having a lug provided with a curved slot and a convexly curved outer wall, the handle member having a groove or recess whose bottom is the counterpart in shape of the outer wall of the said lug, the bottom of the groove and the outer wall of the lug being in contact, and a rocking connection between the handle and the said lug, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS H. HAYES.

Witnesses:

DENA NELSON,
A. J. O'BRIEN.