Nov. 18, 1930. W. F. KIESEL, JR 1,781,849

SMOKE ARCH SEAL

Filed July 11, 1927

FIG. 1.

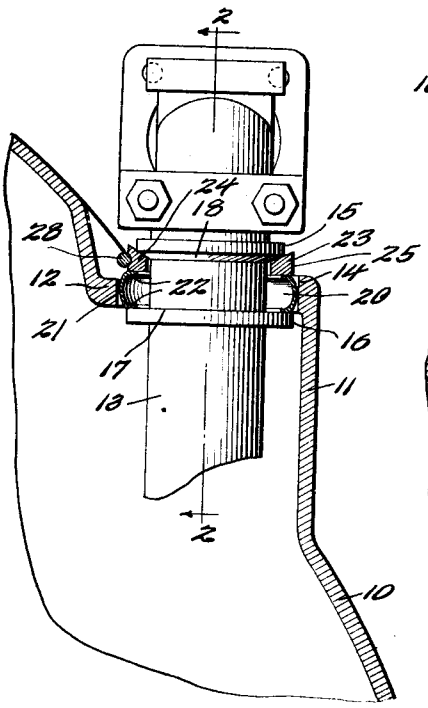


FIG. 2.

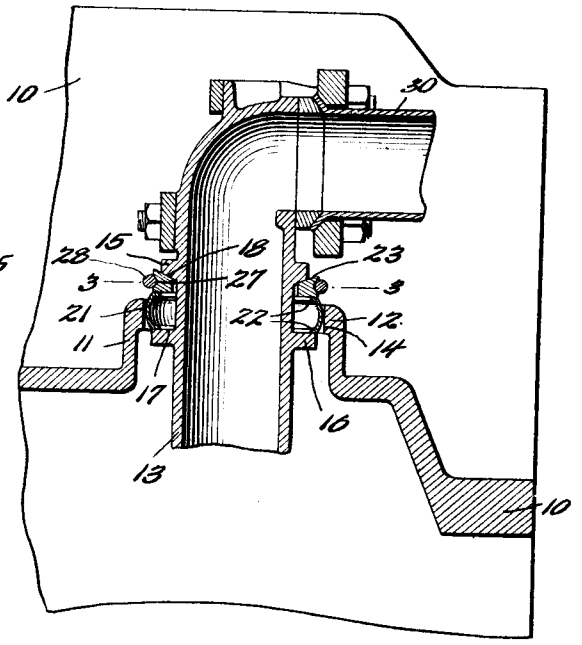
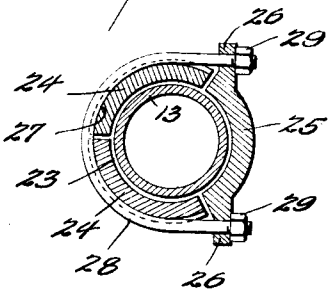


FIG. 3.



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Patented Nov. 18, 1930 1,781,849

UNITED STATES PATENT OFFICE

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SMOKE-ARCH SEAL

Application filed July 11, 1927. Serial No. 205,019.

This invention relates in general to that type of joint whereby a tube or pipe may pass through an opening in a plate in a fluid-tight manner and yet have slight lateral and longitudinal movements in respect to the plate without affecting the tightness of the joint.

More particularly the invention has for its object the provision of a seal where a steam pipe, or the like, passes through the smoke box of a locomotive in order that air may not enter the smoke box to affect the draft through the boiler flues.

Further the invention resides in the provision of a seal between a steam pipe and the walls of a hole in the smoke-box of a locomotive, wherein a seal ring of resilient material is arranged to have a press fit against said walls and to have one of its lateral sides forced into engagement with the lateral surface of a flange on the pipe, the pipe proper being out of contact with the seal whereby it may move laterally and the seal being resilient whereby it may move longitudinally by sliding on the walls of the opening.

Other and further objects and features of the invention will be better understood by reference to the accompanying drawing and following specification wherein is disclosed a single exemplary embodiment of the invention. It will be understood that various changes may be made in the apparatus as disclosed such as fall within the scope of the appended claims without departing from the spirit of the invention.

In said drawing:

Fig. 1 is a partial transverse section through a locomotive smoke box.

Fig. 2 is a longitudinal vertical section on line 2—2 of Fig. 1 and,

Fig. 3 is a horizontal section on line 3—3 of Fig. 2.

In the construction of locomotives and in numerous other places, it is often desirable to have a pipe pass through the wall of a compartment wherein the pressure is different from that of the atmosphere. If the pipe or the walls of the compartment, or both, are subject to slight movements due to vibration or expansion resulting from changes in temperature, it is difficult to maintain a fluid-tight joint between the wall of the compartment and the pipe. The present invention provides a novel form of seal which is shown particularly for use in certain types of locomotives in which the dry-pipe is divided into two parts and passes into the smoke box from above. It may pass directly through the smoke box, leaving the same near the bottom to enter a steam chest, or, within the smoke box may be connected to suitable superheaters. Under either condition rapid fluctuations of temperature both of the smoke box and of the dry-pipe may cause relative movement between these parts which must be accommodated by the seal, where the pipe enters the smoke box, in order to prevent the entrance of air into the smoke box which would seriously affect the draft.

Referring to the drawings there is disclosed at 10 the arched wall of a smoke box of any desired form having pressed therefrom the extension 11, whose upper wall 12 is substantially at right angles to the axis of that portion 13 of the dry-pipe where it enters the smoke box. The portion 13 of the dry-pipe is shown as circular in cross-section although it is not necessary that it have this configuration. A hole 14 is drilled through the wall 12 substantially concentric with the normal position of the dry-pipe and with its wall substantially cylindrical. The diameter of the hole is considerably larger than that of the pipe as is evident from Figs. 1 and 2. The portion 13 of the dry-pipe, which may well be a casting of steel, adjacent to where it passes through the smoke box is provided with a pair of integral flanges 15 and 16 each preferably of such a diameter as to easily pass through the hole 14 for convenience in assembly. The flange 16 is normally positioned so that its radial upper surface 17 is in substantial alignment with the inner surface of the wall 12, whereas the flange 15 has its surface 18 frustro-conical and a substantial distance from the outer surface of the wall 12.

The actual seal comprises a member of resilient or springy material such as phosphor-bronze, steel, or the like, having a configuration such as to engage the walls of the hole 14 all around irrespective of the shape of this

hole. This member 20 is formed of a thin sheet of the resilient material one side of which in cross-section, is substantially U-shaped having the convex bottom 21 and the substantially radial walls 22. These walls are quite short and their inner edges are spaced a considerable distance from the surface of the pipe 13. The seal member is several thousandths of an inch greater in diameter than the aperture 14 so that it must be driven into position whereby its convex walls 21 make a fluid-tight fit with the walls of the opening 14. The flange 15 is of such a diameter that the seal member can be readily passed over the same and be driven into the opening until its lower wall 22 is in engagement with the radial surface 17 of the lower flange 16. To retain the seal against this flange and to prevent it from having a longitudinal movement relative to the pipe, a wedge ring 23 is arranged between the upper wall 22 of the seal and the conical surface 18 of the flange 15. This wedge ring 23 is formed of three parts. Two of these parts 24 are merely segments of a circle of wedge-like cross-section as seen in Fig. 1, whereas the third section 25 in addition to this segmental wedge-like part is provided with the lugs 26. The outer surface of the parts 24 is provided with a shallow circumferential groove 27 for the reception of the U-bolt 28, the ends of which pass through holes in the lugs 26 and are threaded to receive the nuts 29. It will be seen that by tightening these nuts the three parts of the wedge ring may be forced inwardly and by sliding on the conical surface 18 of the flange 15 are moved axially over the pipe to press downwardly on the upper wall 22 of the seal member and thus force that member into tight engagement with the flange 16. At the same time such compressing of the seal member maintains its convex walls tightly against the walls of the opening 14.

Any changes in length of the dry-pipe which result in longitudinal movement thereof only serve to cause a slipping between the convex surface 21 of the seal and the walls of the opening 14 without affecting the fluid-tightness at this point. Any movement of the pipe laterally takes place by a slippage of the flange 16 and of the wedge ring 23 over the wall 22 of the seal member without, however, effecting the fluid tightness between the surface 17 and the seal. Any movement of the dry-pipe about a center transverse to its axis will only cause a rocking of the seal member within its opening and since it is resilient it will maintain a tight contact with the walls of the opening.

The upper end of the portion 13 of the dry-pipe over which the seal member must be passed is constructed as shown in Figs. 1 and 2 so as to be secured against the tube 30 without having any projections from its surface which would prevent the free placing of the seal thereover. Since this joint between the two members of the dry-pipe forms no portion of the present invention it will not be further described.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a locomotive, in combination, a smoke-box having an opening through the wall thereof, a pipe passing loosely through said opening and subject to longitudinal and lateral movements due to temperature changes, a pair of circumferential flanges on said pipe spaced one on each side of said smoke-box wall, an annular seal of resilient material the outer surface of the cross section being U-shaped, the base of the U having a pressed fit into said opening, the inner edges of said seal being spaced from said pipe so that one of said flanges can pass therethrough on assembly, one side of said seal abutting one of said flanges, a sectional wedge ring between the other side of said seal and said other flange and means to contract said wedge ring to form an airtight fit between said seal and smoke-box and between said seal and flange.

2. In a locomotive, in combination, a smoke-box having an opening through the wall thereof, a pipe passing through said opening and subject to slight lateral and longitudinal movements, a seal of resilient material, the outer surface of said seal being of U-shape with the base facing outward and having a press fit in said opening, two flanges on said pipe, one larger than the opening in said seal and the other smaller, and means between said smaller flange and seal to force the seal into tight contact with said larger flange.

3. In a locomotive, in combination, a smoke-box having an opening through a wall thereof, a pipe passing through said opening and subject to lateral and longitudinal movements and means to prevent leakage into said smoke-box around said pipe including a resilient seal having an airtight fit in said opening and a loose fit around said pipe, a flange on said pipe adapted to engage one side of said seal and means to hold said seal against said flange.

4. A fluid-tight joint for the passage of a pipe through a plate including a metal seal ring slidable axially in the opening in the plate but always tightly engaging the walls thereof, means restraining said seal from relative movement axially of said pipe and means whereby the pipe may have lateral movement in respect to the whole seal.

5. A fluid-tight joint including in combination, a plate having a hole therein, a pipe passing through said hole with considerable clearance, a resilient seal shaped to engage the walls of said hole in a fluid-tight manner but clear of said pipe, a flange on

said pipe having a radial face engaging said seal for lateral sliding thereon and means to retain said seal in fluid-tight engagement with said flange.

6. A fluid-tight joint between a pipe and a plate including in combination, a plate having a hole therein, a pipe having spaced radial flanges thereon, one on each side of said plate and out of engagement therewith, a seal of resilient material adapted to be passed over one of said flanges and pressed into fluid-tight engagement with the walls of said hole and means to press said seal into fluid-tight slidable engagement with the other flange, said seal being a ring normally U-shaped in cross-section so that said means also presses it against said walls.

7. A fluid-tight joint between a plate and a pipe passing therethrough including in combination, a plate having a hole therein, a pipe passing loosely through said hole and having a circumferential flange on each side of said plate, a resilient seal member closely engaging the walls of said hole and having a central opening of such size as to pass over one of said flanges and clear the pipe, and means to press a face of said seal into slidable, fluid-tight engagement with the other flange.

8. A fluid-tight joint for the passage of a pipe through a plate including a flange on said pipe and a seal engaging said flange, means whereby said pipe and seal jointly may move axially in respect to said plate and means whereby said pipe may move laterally in respect to said plate and the flange slide laterally in respect to the whole seal.

9. A fluid-tight joint for the passage of a pipe through a plate including a flange on said pipe and a seal engaging said flange, means whereby said pipe and seal jointly may move axially in respect to said plate, means whereby said pipe may move laterally in respect to said plate and slide laterally over said seal and means to retain said seal always against said flange.

In testimony whereof I hereunto affix my signature.

WILLIAM F. KIESEL, JR.