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SMOKE CONSUMING FURNACE.

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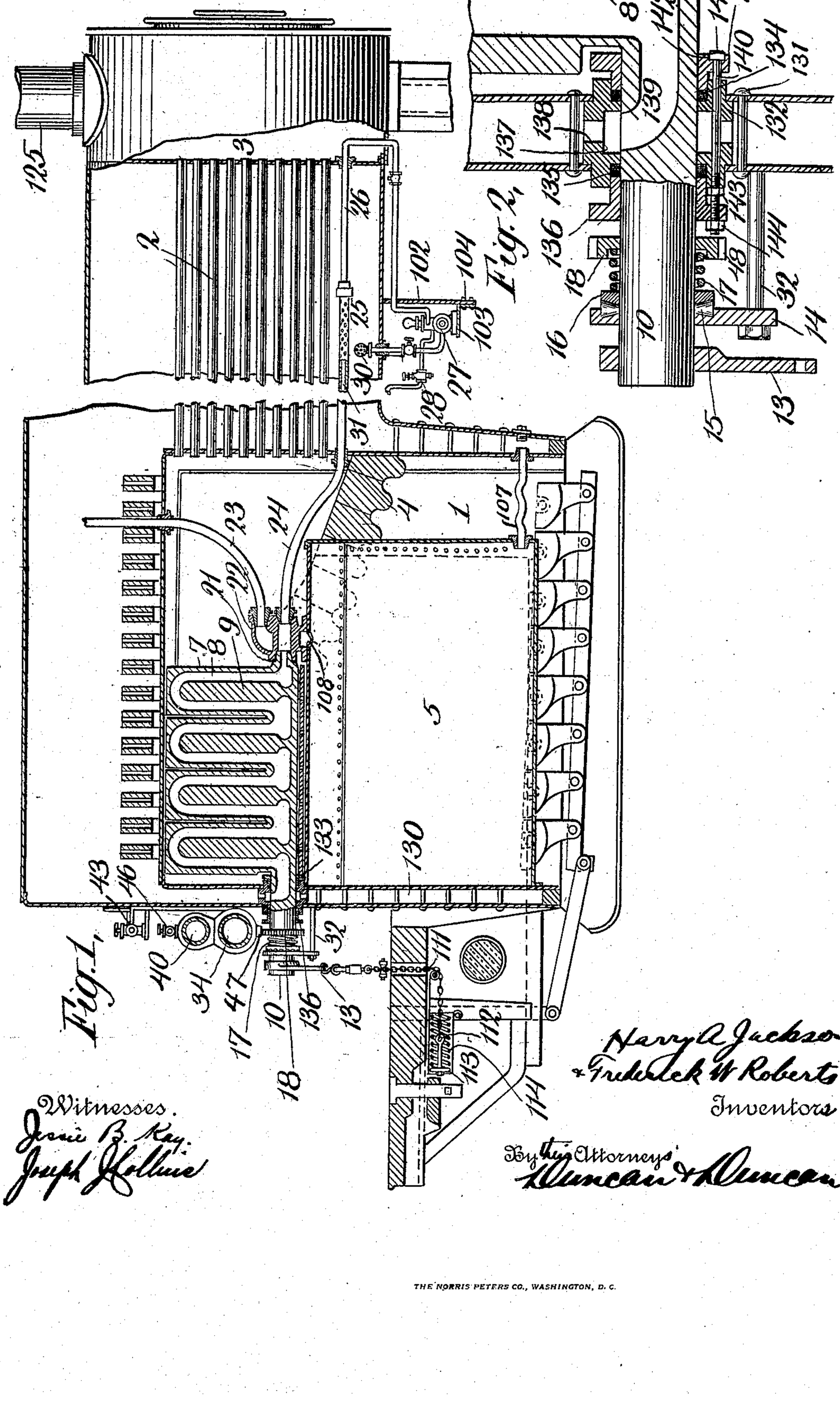

Fig. 2.

Fig. 1.

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SMOKE-CONSUMING FURNACE.

No. 905,321. Specification of Letters Patent. Patented Dec. 1, 1908.

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To all whom it may concern:

Be it known that we, HARRY A. JACKSON, a resident of Lynn, in the county of Essex and State of Massachusetts, and FREDERICK W. ROBERTS, a resident of Boston, county of Suffolk, and State of Massachusetts, citizens of the United States, have invented certain new and useful Improvements Relating to Smoke-Consuming Furnaces, of which the following is a specification, taken in connection with the accompanying drawing, forming part of the same.

This invention relates to smoke-consuming furnaces and relates especially to furnaces for locomotive boilers having a divided fire-box and pivoted damper so as to effect the consumption or suppression of smoke as described in the patent to Walker, 821,628, May 22, 1906.

In the accompanying drawings showing an illustrative embodiment of this invention, and in which the same reference numeral refers to similar parts in the several figures, Figure 1 is a longitudinal vertical section through the furnace; and Fig. 2 is a similar section on a larger scale showing the details of the trunnion box and mounting.

In the illustrative embodiment of this invention shown in the drawings, the locomotive boiler may be constructed in the usual way and provided with the regular fire tubes 2 leading from the fire-box to the smoke-box 3 communicating with the stack 125. The fire-box, which may be provided with the grate bars 6 of usual construction, may be divided at its lower rear portion by a water leg 5 so as to form a smoke passage or throat 1 around the front of this water leg beneath the combustion arch 4 of firebrick or other suitable material. A circulation of water is maintained through the water leg through suitable inlets and outlets, such as the inlet 107 and the outlet 108 leading into the thrust bearing or saddle 22 secured upon the water leg, the outlet 108 connecting with the pipe 23 leading into the boiler.

The pivoted damper 7 may be mounted above the water leg in any desired way so as to properly close the opening behind the combustion arch on either side of the fire-box when swung down into horizontal position on that side. This damper 7 indicated in its vertical or middle position may be provided with a suitable zigzag damper passage 8 through the same around the various ribs 9. The pivot or forward trunnion 21 of the damper fits into a seat 115 in the thrust bearing 22 and this hollow pivot allows water from the pipe 24 to enter the damper passage and circulate through the same so as to keep the damper cool.

If desired, the water may be positively fed through the damper passage by the use of a circulating pump 27 mounted upon the support 103 secured to the stay plate 102 by the rivets 104. This pump may be supplied by steam through the following connection 28 so as to take water from the valved intake 30 and discharge the same through the pipe 26 and injector nozzle 31 in the injector 25 which as indicated may be formed with a series of inlet holes adjacent the nozzle. In this way the water issuing from the injector nozzle 31 draws in an additional quantity of water from the water space of the boiler by the injector action and forces the same through the pipe 24 and connected damper passage.

The trunnion 10 on the rear of the damper may be mounted in a suitable trunnion box 132 supported in the rear water face 130 of the boiler, this trunnion box being, of course, rigidly held in position by the stay bolts 131, or otherwise. As indicated in Fig. 2, this trunnion box may be provided with a groove or annular passage 137 with which the discharge passage 139 of the damper communicates in any operative position of the damper.

Any desired number of radial discharge holes 138 may be formed in the trunnion box so that the water from the damper passage may be discharged into the rear water face.

Any desired means may be employed to secure steam tight joints between the damper trunnion and box, and if desired suitable metallic packing may be employed such as the corrugated steel packing 134. This packing may be held in operative position by the gland 133 held down in any desired way. Similar packing 135 may be held in place by the rear gland 136 on the rear or outside of the rear water face and both these glands may be held in position by a single set of tightening or fastening bolts 140. The heads 141, of these bolts may be prevented from rotating with respect to the gland 133

by being seated in corresponding polygonal apertures 142 in the gland and the nuts 143 on the bolts on the outside of the water face enable this forward gland and packing to be adjusted and held in proper position. The nuts 144 on these tightening bolts cooperate with the gland 136 and serve to adjust its position and the force with which it engages the metallic packing 135.

The damper may be properly held against its thrust bearing by shrinking the gear 18 on the trunnion, this gear being provided with the teeth 48 to coöperate with the toothed operating rack 47. The spring 17 engages a suitable recess in the gear pinion and engages the bearing ring 16 at its rear end, this ring engaging a series of bearing cones or members 15 which run in a recess in the plate 14. This plate as indicated may be held in any desired position by a series of bolts 32 secured to the water face so as to regulate the longitudinal thrust on the damper.

The arm 13 on the damper is connected with the chain 111 as shown in Fig. 1, this chain connecting with the stem 112 of the buffer 113 which as indicated is constantly acted on by the spiral spring 114 so as to keep the chain in tension and exert a cushioning action on the damper as it moves downward into horizontal position.

The damper may be operated by the steam cylinder 34 receiving steam through the three-way valve 43. The piston in this cylinder is connected with the rack bar 47 and if desired the movement of this rack bar may be suitably regulated by a piston working in the dash-pot 40 having the valved bypass 46 between its two ends, this damper mechanism being similar in construction and operation to that shown in the Walker patent referred to and operating to swing the damper into the desired position. By the use of the trunnion box and rear bearing devices previously described in this case the damper trunnion and connecting parts project only a little way out from the rear water face into the firing space of the cab and thus cause practically no interference with the regular firing operations which is a highly important consideration in installing such smoke-consuming devices on locomotives.

Having described this invention in connection with an illustrative embodiment thereof, to the details of which disclosure the invention is not, of course, to be limited, what is claimed as new and what is desired to be secured by Letters Patent is set forth in the appended claims.

1. In a locomotive furnace, a fire-box provided with a grate, a water leg to divide said fire-box into compartments, a swinging damper mounted above said water leg to close the top of one of said compartments while allowing gases to discharge from such compartment through the throat around said water leg at the front of said fire-box, said damper having a pivot engaging a thrust bearing secured to said water leg and having a zigzag damper passage communicating with said pivot and thrust bearing and having a trunnion passing through the rear water face of the boiler, a trunnion box provided with a groove and discharge holes and mounted in said water face to receive said trunnion, there being a curved discharge passage in said trunnion communicating with said groove and with said damper passage to discharge water therefrom into said water face, corrugated metallic packing mounted in said trunnion box on either side of said water face, a front gland coöperating with said packing on the inside of said water face, a rear gland coöperating with the packing on the outside of said water face, fastening bolts having heads engaging said front gland and prevented from rotating with respect thereto, fastening nuts on said bolts on the outside of said trunnion box to tighten said front gland from the outside of said water face and outer nuts on said fastening bolts to tighten said rear gland and packing, means to hold said trunnion and damper against said thrust bearing and means to feed water through said damper passage.

2. In a locomotive furnace, a fire-box provided with a grate, a water leg to divide said fire-box into compartments, a swinging damper having a damper passage communicating with its front pivot and a communicating discharge passage in the damper trunnion, a trunnion box mounted in the rear water face of the boiler and provided with discharge holes and a communicating groove to coöperate with said discharge passage in said damper, packing, and packing glands around said trunnion on both sides of said water face, fastening bolts engaging said glands to tighten the same from the outside of said water face and means to supply water to said damper passage.

3. In a locomotive furnace, a fire-box having mounted therein a swinging damper provided with a damper passage and a communicating discharge passage in the damper trunnion, a trunnion box mounted in the rear water face of the boiler and having discharge apertures communicating with said discharge passage, packing means in said trunnion box on both sides of the same, and means to tighten said packing means from the outside of said water face.

4. In a locomotive furnace, a fire-box, a swinging damper in said fire-box and provided with a damper passage and a discharge passage located in the damper trunnion and communicating with said damper passage, a trunnion box mounted in a water face of the boiler and provided with discharge apertures

communicating with said discharge passage, packing means in said trunnion box and means to supply water to said damper passage.

5. In a locomotive furnace, a fire-box provided with a grate, a movable damper in said fire-box and provided with a damper passage and communicating discharge passage located in the damper trunnion, a trunnion box mounted in a water face of the boiler and provided with a discharge aperture communicating with said discharge passage and discharging into said water face and means to supply water to said damper passage.

6. In a locomotive furnace, a fire-box provided with a grate, a water leg to divide said fire-box into compartments, a swinging damper mounted above said water leg to close the top of one of said compartments while leaving a throat around said water leg at the front of said fire-box, said damper having a damper passage and a communicating discharge passage located in the trunnion of said damper, a trunnion box mounted in a water face of the boiler and provided with a discharge aperture to coöperate with said discharge passage and means to operate said damper.

7. In a locomotive furnace, a fire-box provided with a grate, a water leg to divide said fire-box into compartments, a swinging damper mounted above said water leg to close the top of one of said compartments while leaving a throat around said water leg at the front of said fire-box, said damper having a damper passage and a communicating discharge passage located in the trunnion of said damper, a trunnion box mounted in a water face of the boiler and provided with a discharge aperture to coöperate with said discharge passage and means to operate said damper coöperating with said trunnion beyond said trunnion box.

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