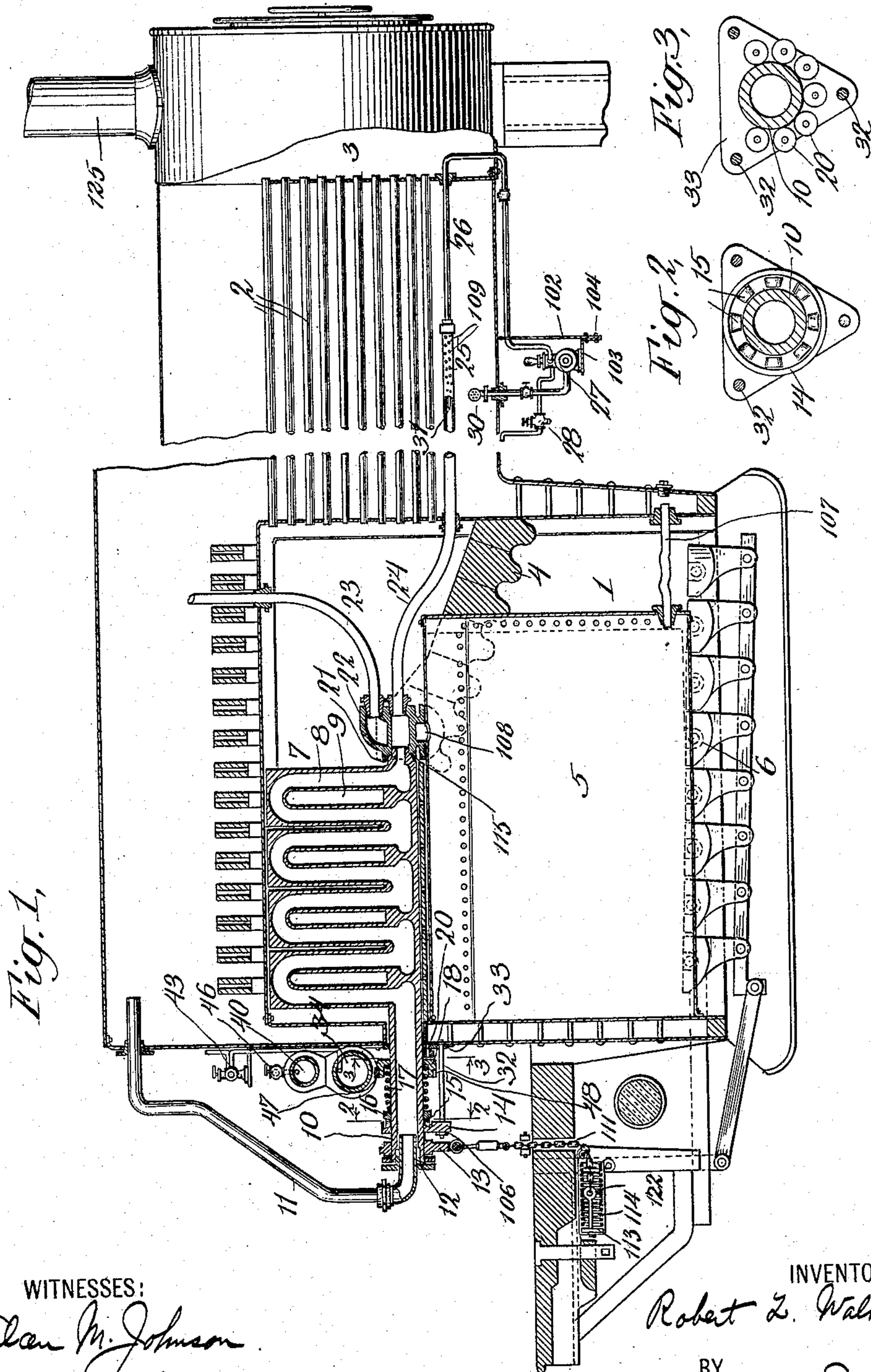


R. L. WALKER.
SMOKE CONSUMING FURNACE.
APPLICATION FILED DEC. 7, 1905.

911,688.

Patented Feb. 9, 1909.
2 SHEETS—SHEET 1.



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Fig. 5.

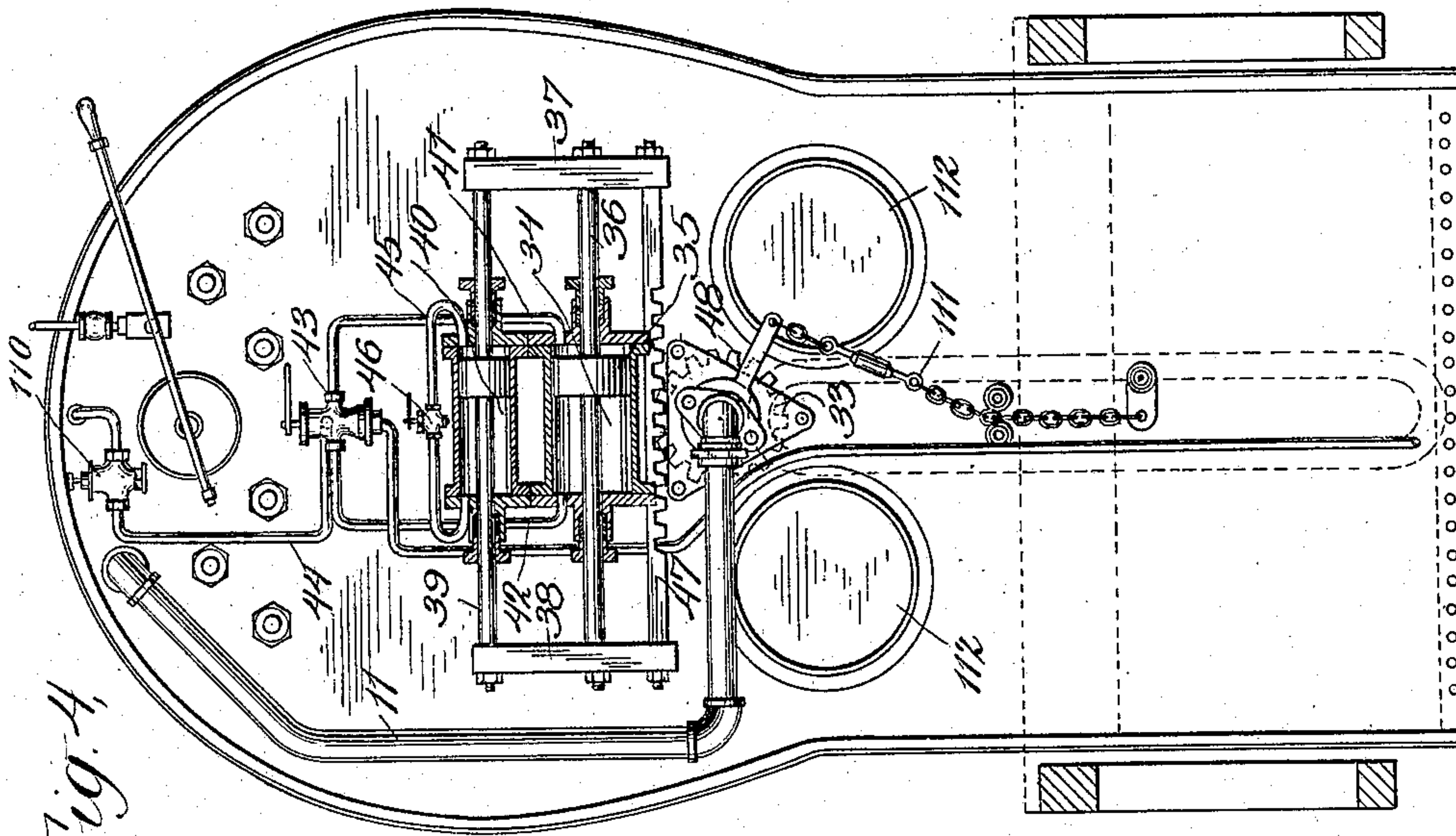
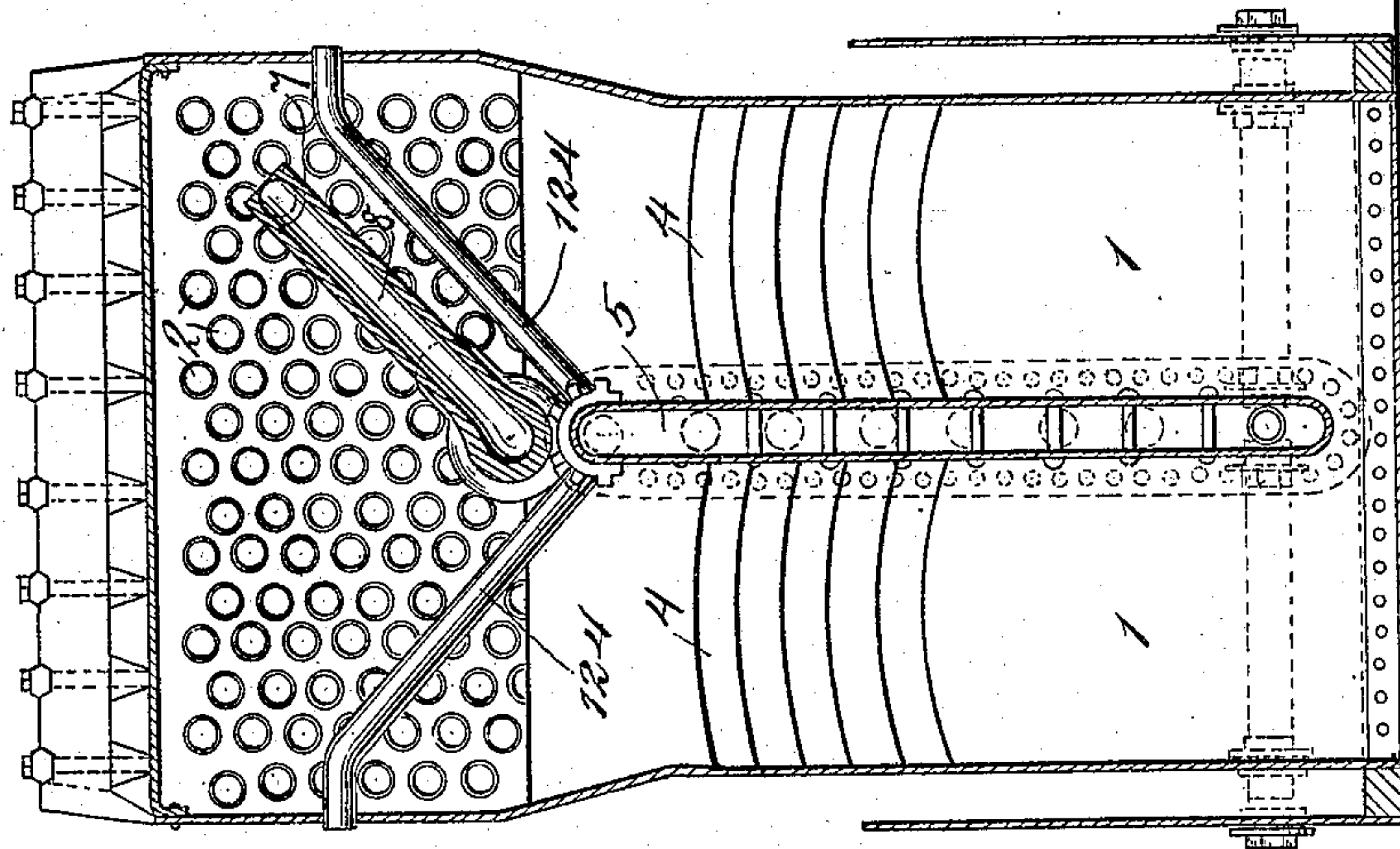


Fig. 4.

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ROBERT L. WALKER, OF BROOKLYN, NEW YORK.

SMOKE-CONSUMING FURNACE.

No. 911,688.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed December 7, 1905. Serial No. 290,669.

To all whom it may concern:

Be it known that I, ROBERT L. WALKER, a citizen of the United States, and resident of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Smoke-Consuming Furnaces, of which the following is a specification, reference being had to the drawings accompanying and forming part of the same.

My invention relates to a furnace with a fire-box which is divided horizontally in two portions and its lower portion also divided vertically by an upright partition into two portions; together with a damper which forms a cover first to one lower portion of the divided fire-box and then to the other lower portion.

It relates particularly to certain improvements upon my former patent 479,100, patented July 19, 1892 as will more fully appear hereinafter.

In the accompanying drawings in which the same reference character refers to similar parts in the several figures, Figure 1 is a vertical longitudinal section through a locomotive boiler; Fig. 2 is a vertical section upon line 2—2 of Fig. 1; Fig. 3 is a vertical section upon line 3—3 of Fig. 1; Fig. 4 is an elevation of the rear of the boiler, certain parts being shown in section; Fig. 5 is a vertical section through the boiler showing the damper 7 partly closing the right hand portion of the fire-box.

In the embodiment of this invention as shown in the drawings, 6, 6 are grate bars upon which the fuel is fed through the stoke holes 112, 112. The fire-box 1, 1 is divided in the center by a water leg 5; it is also divided horizontally into two portions by the fire-brick arches 4, 4. By moving this damper 7 upon its bearings the products of combustion from the fuel in one part of the divided fire-box is compelled to pass around the inner end of the water leg 5 and under the arch of the other part and over the incandescent fuel in the second portion of the fire-box in order to get to the flues 2 leading to the front portion of the boiler 3 and thence to the stack 125, consuming the smoke in the well known manner set forth in my previous patent mentioned. The damper 7 has a trunnion 21 which fits within the complementary opening 115 in the saddle 22. This damper has circuitous passages 8 and hollow portions 9. At the opposite end from the

trunnion it has an extended bearing which passes through the rear of the boiler and is supported upon the rollers 20 mounted upon the plate 33 which is firmly secured to the boiler by means of bolts 32, 32 which extend out from the boiler and plate 33 and at their other end carry the plate 14 which is loosely mounted upon the end of the bearing 10 of the damper 7. The face of this plate 14 acts as a bearing for the cones 15, 15, the other portion of this bearing being the plate 16 which is loosely mounted upon bearing 10 and is held in place by the spring 17 which bears at one end upon the plate 16 and at the other upon the cog 48. This cog wheel is fastened to the bearing 10 by being shrunk upon the same or otherwise suitably fastened. The ring 14 is adjustable along the length of the bearing 10 by means of the nuts 106 upon the bolts 32. By this construction the damper 7 is firmly pressed into its seat 115 within the saddle 22 by means of the pressure exerted from the adjustable plate 14 pressing upon the cones 15, the ring 16, the spring 17 and the fixed pinion 48 within which the spring is partly seated as shown. The thrust of the damper within its seat in the saddle 22 can be regulated as previously noted by the nuts 106 upon the bolts 32.

In devices of this character it is very essential that there be a good circulation through the water leg 5, the saddle 22 and the damper 7. To insure proper circulation I use an inlet pipe 107 which connects the water leg 5 with the boiler across the constricted passage 1 below the combustion arch 4. Water passing through this pipe 107 into the water leg 5 circulates up through the opening 108 in the leg 5 and into the saddle 22 and then out through the water leg connection 23 into the upper portion of the boiler. I sometimes also use the brace pipes 124, 124, Fig. 5, as outlets for the water leg 5 though those may be dispensed with. On the under side of the boiler there is preferably formed a depending flange 102 to which is secured the plate 103 by means of rivets 104. Mounted upon this plate 103 and securely fastened thereto I locate a circulating pump 27 having an intake in the boiler at 30 and proper controlling valve 28. The water passing in at 30 is forced through the pump and through pipe 26 into the injector 25. This injector consists of a pipe 24 having its end perforated by perforations 109. Securely fitted within this end of the

pipe is the end of the pipe 26 which has a reduced end 31 as shown. The water forced through the pipe 26 causes a circulation of water in the boiler through the perforations 5 109 into the pipe 24 in a well known manner and from this pipe 24 it is forced into the saddle 22, thence through the circuitous passages 8 of the damper 7 and out through the damper outlet or discharge pipe 11 back 10 to the top of the boiler. This outlet 11 has a packing ring 12 which makes a water and steam tight connection between 10 and 11 but permits bearing 10 to move relatively to the outlet 11.

15 For operating the damper 7 so as to make it close one or the other portions of the fire-box 1, 1, I use a pinion 48 fast upon the bearing 10 of the damper. Meshing directly with this pinion is a rack 47 which is oper- 20 ated by means of the steam cylinder 34. The cross rods 37, 38 which connect the rack with the piston rod 36 of the steam cylinder also connect with the piston rod 39 of the hydraulic cylinder 40. Steam is ad- 25 mitted from the boiler through the inlet valve 110 and pipe 44 to the ordinary three-way valve 43. This valve controls the admission and exhaust of the steam to the steam cylinder 34 previously mentioned and 30 in an obvious manner causes the piston to move back and forth within the cylinder and in this way move, through the rack bar 47 and the pinion 48, the damper 7 upon its seat 115 in the saddle 22 and upon the bearing cylinders 20. To prevent too rapid 35 movement of the damper I sometimes employ an arm 13 fast upon the bearing 10 of the damper by being shrunk upon the same or otherwise suitably secured thereto; to the 40 end of this arm I secure a chain 111 which at its other end is connected to the eye bolt 122 carried by a plate 113 which bears against the buffer spring 114. While I may use this buffer spring and arm connected to the bearing 10 of the damper as described I 45 preferably employ a hydraulic cylinder 40 having its piston rod 39 connected to the same cross rods 37, 38 which connect the rack 47 and the piston rod of the steam 50 cylinder 34 as previously mentioned. Each end of the hydraulic cylinder is connected by the pipe 45 within which is located the

throttle valve 46. By adjusting this valve it is obvious that a too rapid movement of the damper through its operating cylinder 55 34 can be prevented. In addition to this hydraulic cushioning means the buffer spring construction previously referred to may also be used.

While I have shown this invention ap- 60 plied to a locomotive boiler, it is obvious it may be used upon other boilers and I therefore do not desire to limit myself to the disclosure made in this case, but what I claim as new and what I desire to secure by Letters 65 Patent is set forth in the appended claim.

In locomotive boiler furnaces, a fire-box provided with a grate, a water leg to divide said fire-box into compartments, a combustion arch at the front end of the fire-box to 70 form a constricted passage around the front of said water leg beneath said arch, a thrust bearing mounted on said water leg, a pivoted damper mounted in said thrust bearing and having a trunnion projecting through the 75 rear water face of the boiler, a roller bearing for said trunnion supported by and mounted close to said water face, a pinion on said trunnion, a bearing plate engaging said trunnion and loosely supported from said 80 water face, an antifriction bearing and thrust spring between said bearing plate and said pinion to hold said damper against said thrust bearing, a rack cooperating with said pinion, a steam operating cylinder and 85 hydraulic cushioning cylinder substantially parallel to said rack, an operating piston having a piston rod projecting through both ends of said steam cylinder, a similar cushioning piston and piston rod in said hydraulic 90 cylinder, cross-bars rigidly connecting said rack and said piston rods, steam connections comprising a three-way valve to operate said steam cylinder and piston, an adjustable throttling by-pass around said hydraulic 95 cylinder, a circulating pump to positively circulate water from the cool part of said boiler through a staggered passage formed in said damper, and a damper outlet carrying said water back into the boiler.

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Witnesses:

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