March 3, 1931. I. MOE ET AL 1,794,705

FURNACE ARCH

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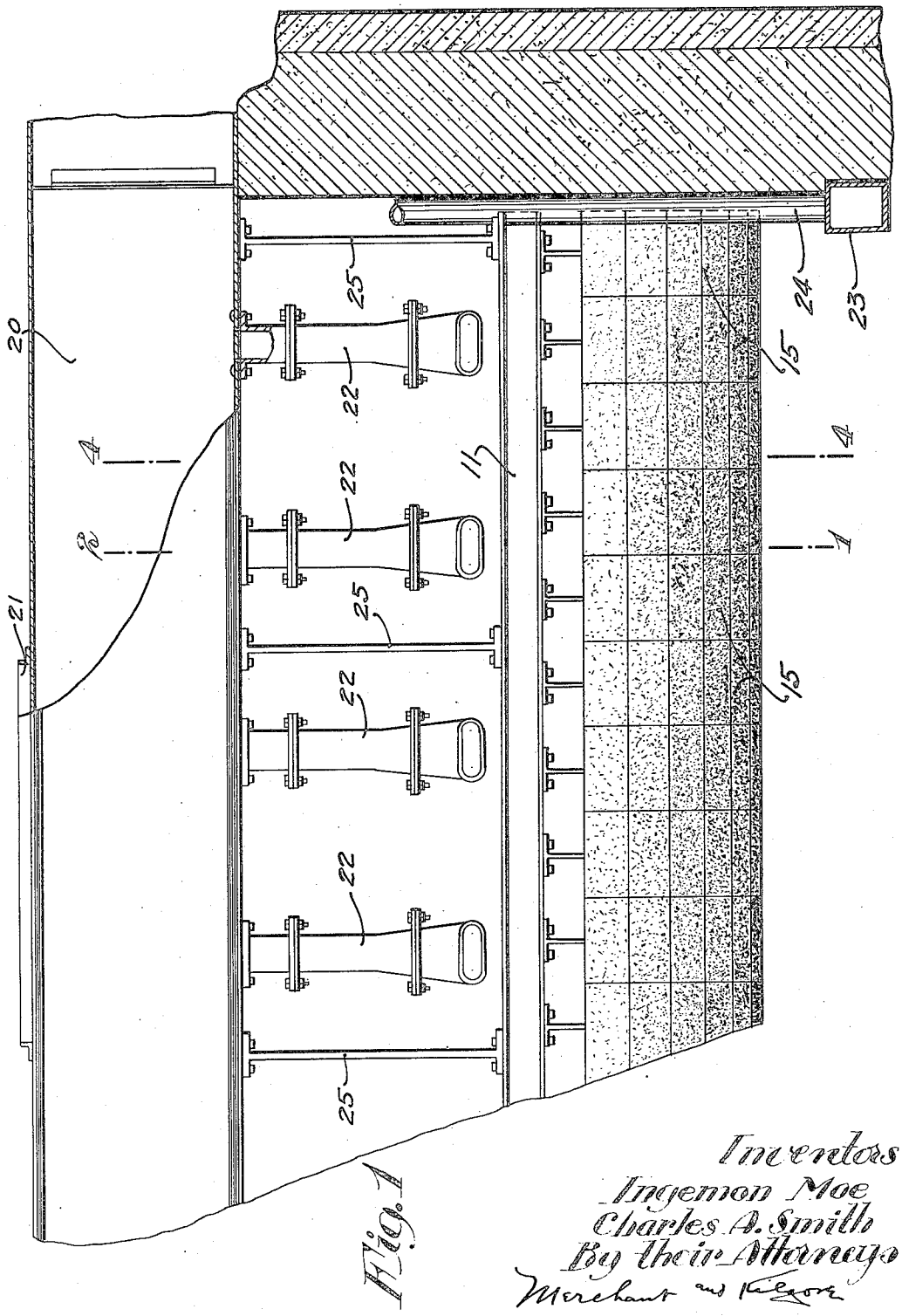

Fig. 1

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Fig. 3

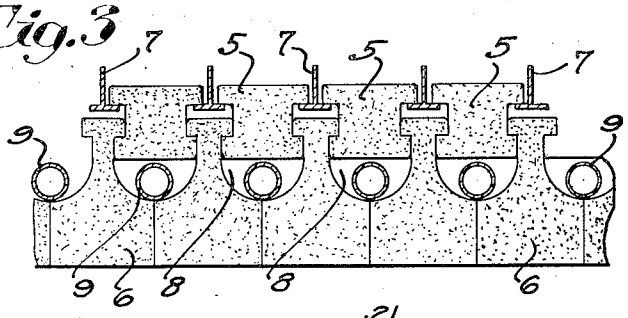
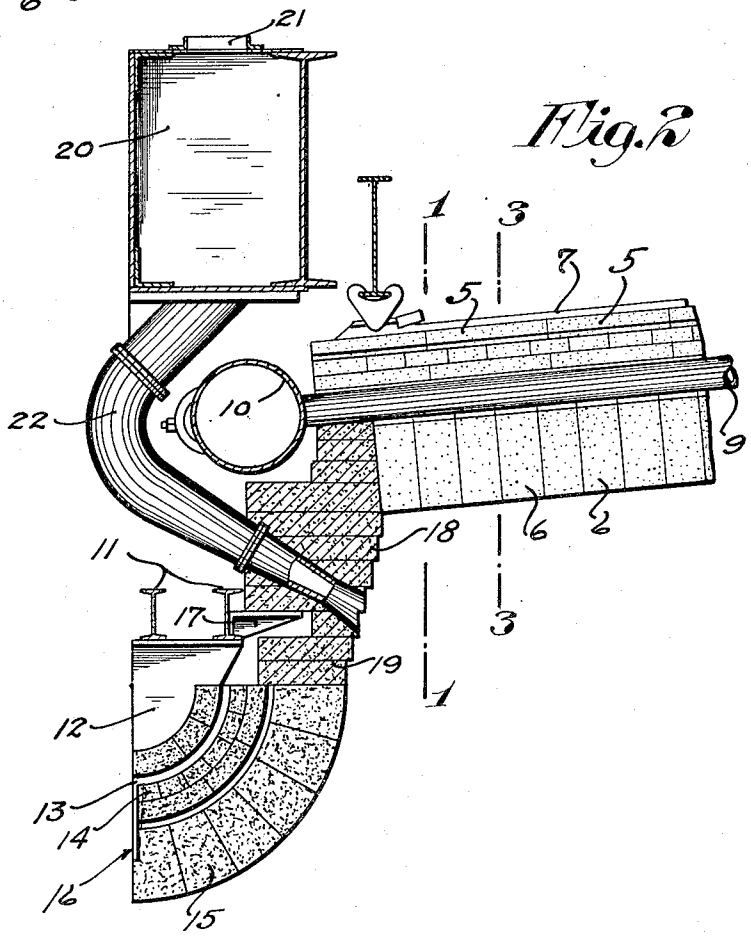


Fig. 2



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FURNACE ARCH

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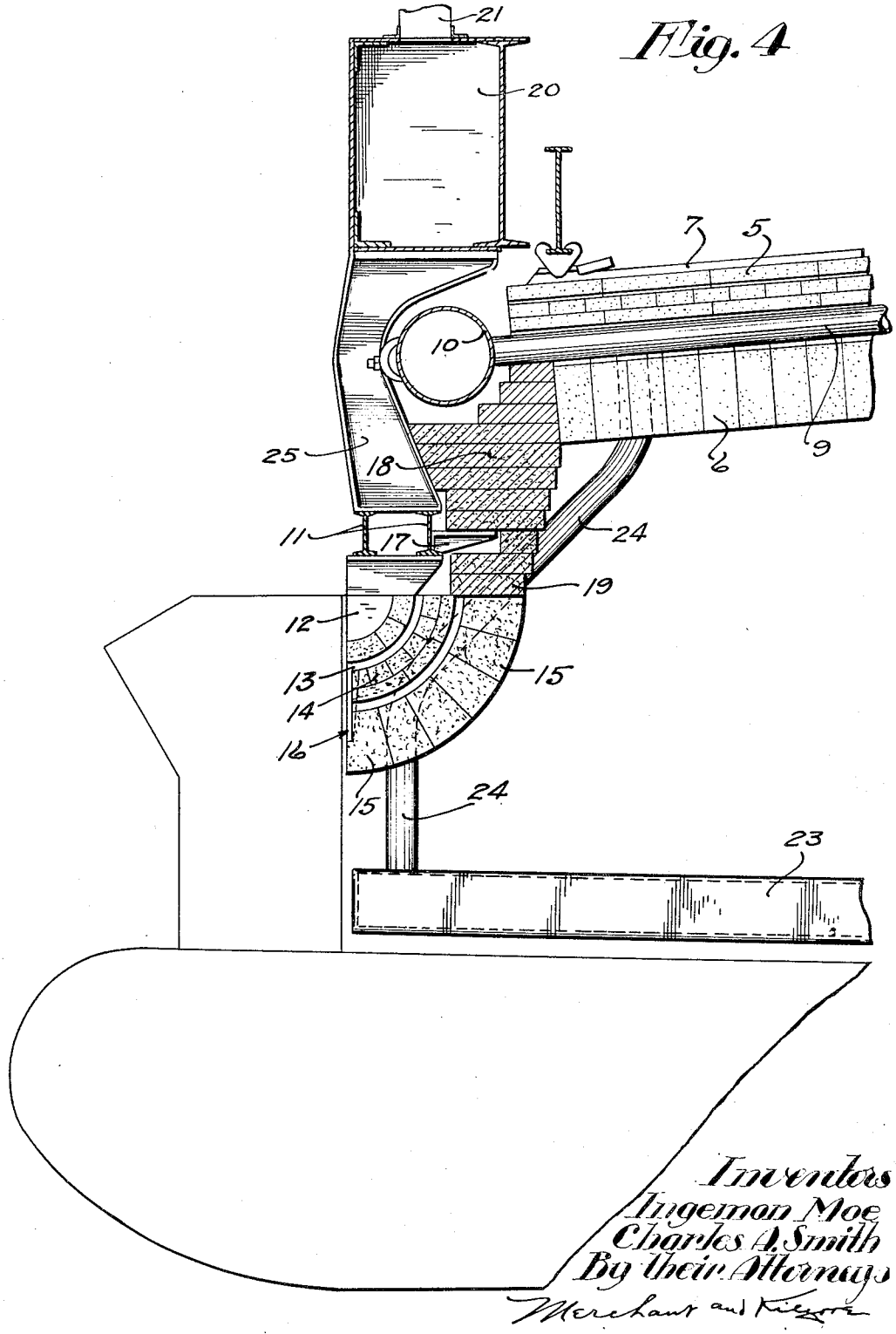
Fig. 4



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UNITED STATES PATENT OFFICE

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FURNACE ARCH

Application filed September 6, 1928. Serial No. 304,315.

Our present invention relates to fire arches for boilers or furnaces and is in the nature of a modification of or improvement on the structure disclosed and claimed in a companion application filed of even date herewith and entitled "Water cooled furnace arch".

The present invention, in addition to the arrangement of water tubes in the arch for the cooling of the arch and preheating of boiler feed water, includes other important features such as a novel arrangement for the introduction of "over fire" air into the boiler through the fire arch, and the novel construction and arrangement of the fire arch and cooperating devices.

Referring to the drawings:

Fig. 1 is a view partly in elevation and partly in vertical section on the line 1—1 of Fig. 2, some parts being broken away and some of the upper portions of the arch being removed to expose the air nozzle to full view;

Fig. 2 is a section taken on the line 2—2 of Fig. 1, some parts being broken away;

Fig. 3 is a transverse section of the arch on the line 3—3 of Fig. 2; and

Fig. 4 is a section taken on the line 4—4 of Fig. 1, some parts being broken away.

The main body of the arch is made up of upper blocks 5 and lower blocks 6, all of highly refractory fire brick material. These blocks are of the general type disclosed and broadly claimed in the prior Liptak Patent No. 1,326,752 of date December 30, 1919, and entitled "Furnace arch for boilers". The upper blocks 5 have grooved sides that form upper flanges that rest upon the lower flanges of laterally spaced and suitably supported metallic beams 7. The lower blocks 6 have T-shaped upper flanged portions that are slidably hung upon and interlocked with the lower flanges of the upper blocks 5. The bodies of the lower blocks are so formed that longitudinal passages 8 are formed between the upper and lower blocks and through which water pipes 9 are extended. These water pipes 9 at the front end of the arch are connected to a water drum or header 10 and at their other ends said water pipes will, in practice, usually be connected to the boiler, not shown.

The ignition arch or that portion of the arch that depends from the main arch at the fuel-receiving end of the furnace is supported by means independent of the supports for the main arch and, as shown, its elements are directly or indirectly supported from a pair of transverse I-beams 11 that will be anchored to the sides of the furnace or otherwise rigidly supported.

Flanged metallic hanger brackets 12 are rigidly secured to and supported from the I-beams 11. These brackets have curved flanges 13 on which wedge-shaped blocks 14 are hung. In transverse cross section the blocks 14 correspond to the blocks 5. Lower wedge-shaped refractory blocks 15 which, in cross section, correspond to the lower blocks 6 are slidably hung on the flanges of the blocks 14. Stop flanges 16 on the brackets 12 limit the downward and forward movements of the blocks 14 and 15.

Shelf-forming brackets 17 are rigidly secured to the inner I-beam 11 and these brackets support highly refractory masonry 18 that forms a sort of curtain wall that joins and overlaps the front end of the main arch. It will be noted by reference to Figs. 2 and 4 that the masonry 18 supports the water pipes 9 adjacent the connection of the pipes with the header 10. This masonry 18 is thus supported from the I-beams and exerts no weight upon the radial portion of the ignition arch. Filler blocks 19 fill the space between the top of the radial portion of the ignition arch and the bottom of the masonry.

Located outside of the combustion chamber of the furnace, preferably above the ignition arch, is a large transversely extended air trunk 20 that receives air under pressure through a supply pipe 21. This air trunk is provided with a plurality of downwardly extended air discharge nozzles 22, the tips of which are extended through the masonry 18 of the ignition arch and are positioned to discharge a plurality of blasts of air over the fire and immediately under the main body of the arch.

It will be noted that the water pipes 9

which cool the arch are laterally spaced in the arch and that the nozzles 22 are laterally spaced so that they produce blasts of air immediately under those portions of the arch that are cooled by the pipes 9. The blasts of air from the air nozzles complete and intensify the combustion, but spread the flames in a substantially continuous sheet under the water-cooled portion of the arch, and this is a desirable arrangement because the cooling of the arch is spread substantialy in proportion to the intensification of the combustion.

As an auxiliary or additional means for preheating the water that is to be fed into the boiler, there is provided a pair of water drums or large tubes 23, shown as rectangular in cross section, that are extended along the sides of the combustion chamber of the furnace closely above the grate. These drums 23 will receive the relatively cold water through connections not shown and will deliver the heated water upward through water pipes or tubes 24 which, at their upper ends, are connected to certain of the outer water pipes 9. As indicated in Fig. 4, these pipes 24 may, however, be independently connected to the boiler and in some arrangements and especially where the water is to be heated approximately to steam temperature before entering the boiler this latter arrangement would be preferable.

As shown in Fig. 4, the air trunk 20 is supported from the beams 11 by brackets 25. From the foregoing description and statements made, it will be understood that the invention herein disclosed is capable of various modifications, all within the scope of the appended claim.

What we claim is:

In a furnace, a main fire arch and an ignition arch, said main arch characterized by a plurality of laterally spaced water tubes extended therethrough for cooling the same, a header outside the furnace connected to the tubes, the ignition arch comprising upper and lower portions, beams mounted beyond the furnace, brackets carried by the beams and independently supporting the upper and lower portions of the ignition arch, said upper portion having air discharging nozzles extending therethrough and also supporting the water tubes adjacent the header.

In testimony whereof we affix our signatures.

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