

No. 724,647.

PATENTED APR. 7, 1903.

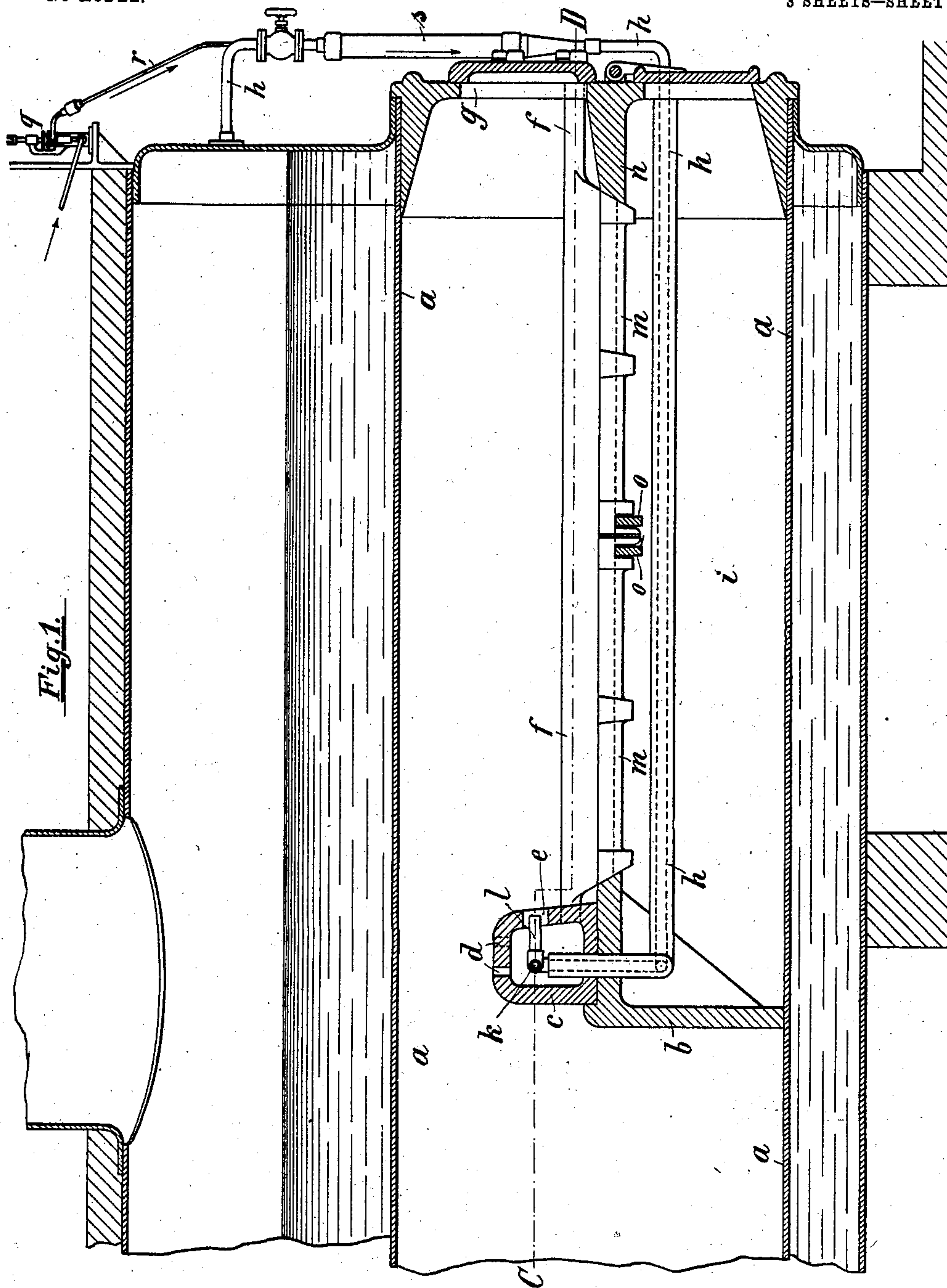
J. F. ZARUBA.

SMOKE CONSUMING APPARATUS FOR FURNACES.

APPLICATION FILED JULY 10, 1901.

NO MODEL.

3 SHEETS—SHEET 1.



Witnesses:

Edward Ray
William Schulz

Inventor:
Josef Franz Zaruba
by his attorneys
Boeder & Briesen

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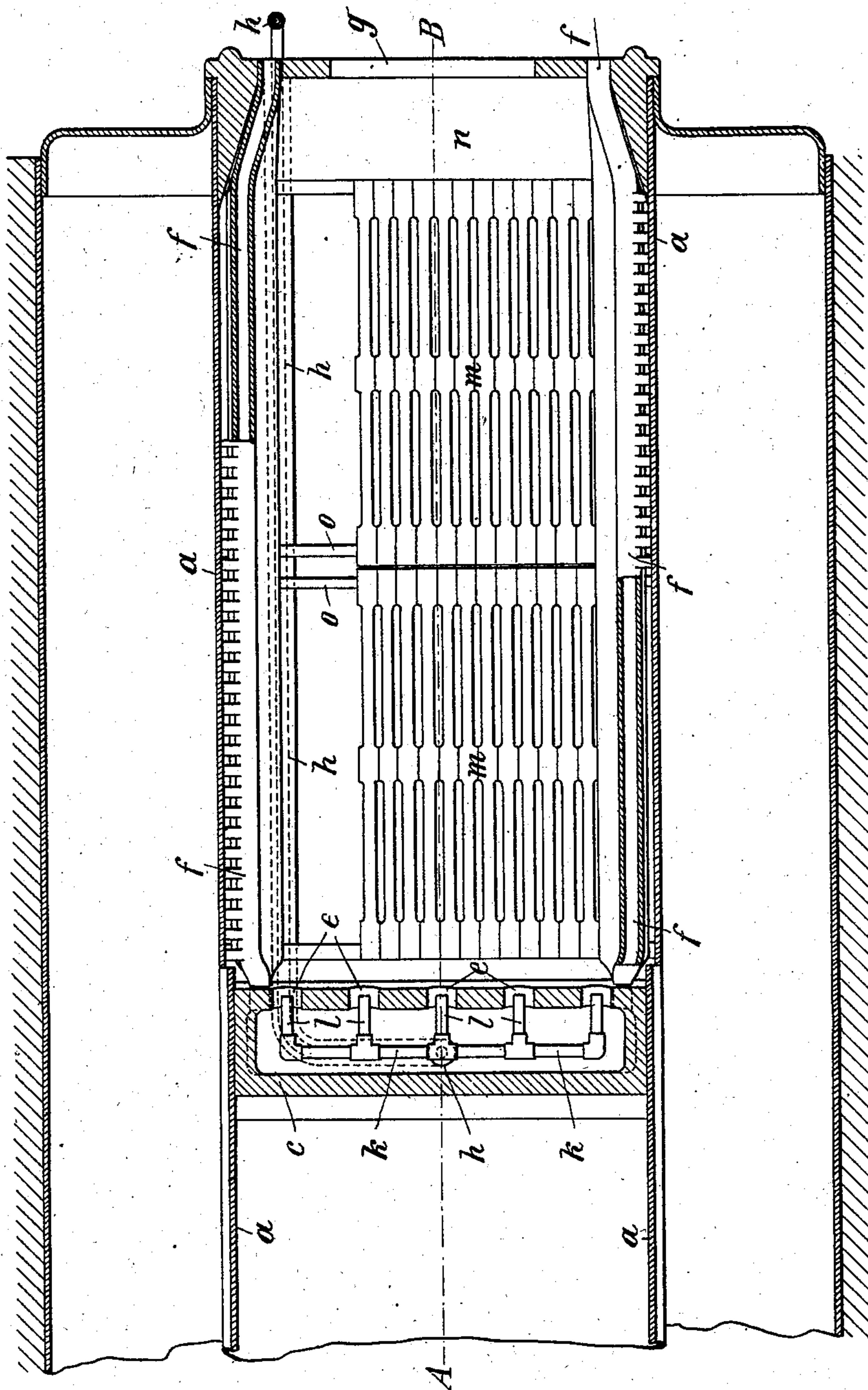
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3 SHEETS—SHEET 2.

Fig. 2



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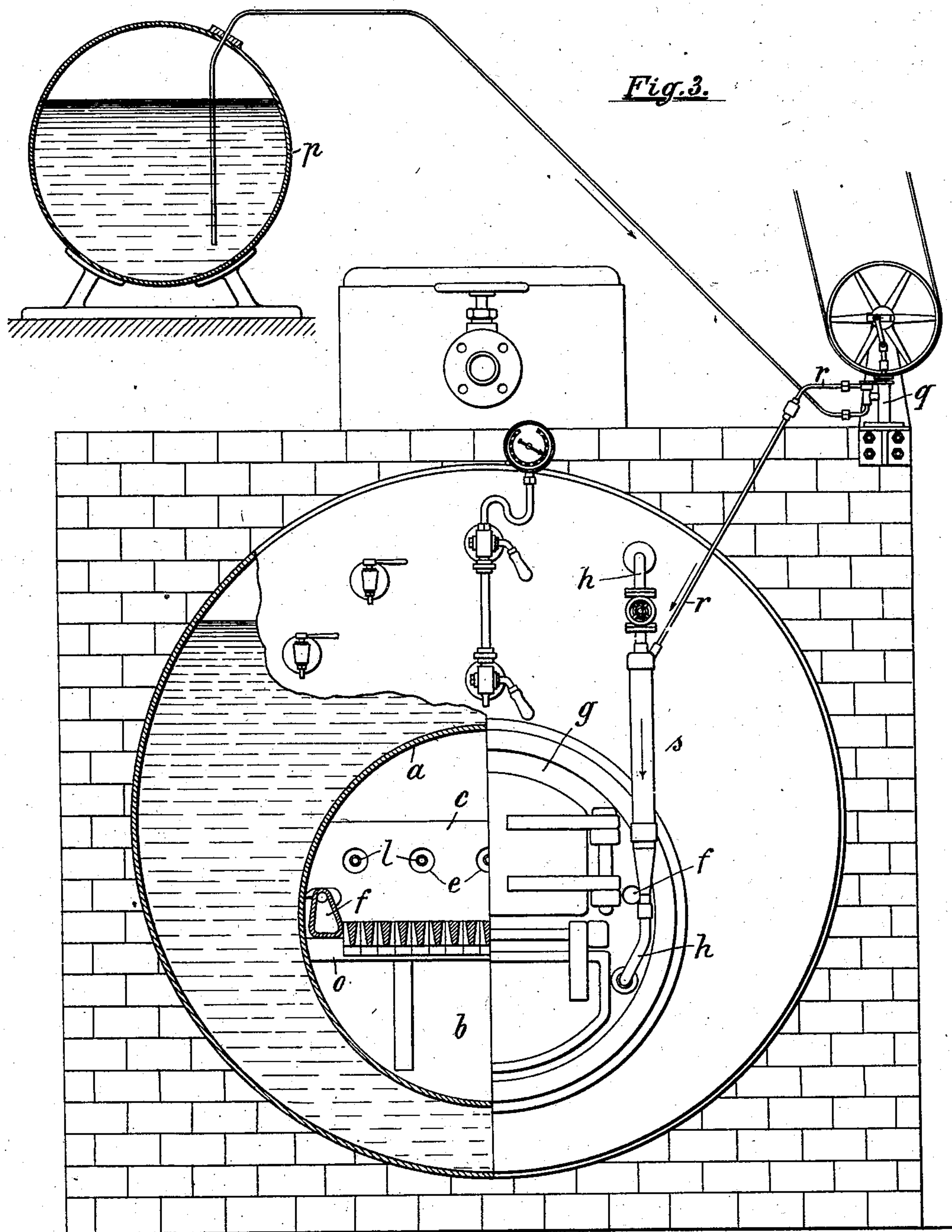
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JOSEF FRANZ ZARUBA, OF HAMBURG, GERMANY.

SMOKE-CONSUMING APPARATUS FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 724,647, dated April 7, 1903.

Application filed July 10, 1901. Serial No. 67,698. (No model.)

To all whom it may concern:

Be it known that I, JOSEF FRANZ ZARUBA, a citizen of the German Empire, and a resident of Hamburg, Germany, have invented
5 certain new and useful Improvements in Smoke-Consuming Apparatus for Furnaces, of which the following is a specification.

The present invention relates to a device for the consumption of the smoke in steam-boiler furnaces. The arrangement consists
10 in a hollow fire-bridge into which highly-heated atmospheric air is drawn through two or more hollow fire or grate bars. The air is sucked by steam which is taken from the
15 boiler and passes through the fire-bridge and thence out through forward openings of the same, so as to be blown into the fire in a direction opposite to that of the draft. The steam sucks in the air through the hollow
20 grate-bars, which becomes highly heated and is borne along by the steam, which is under boiler-pressure. Means are also provided for saturating the steam with a liquid fuel which is forced into the steam-feed pipe by a pump.
25 The drawings illustrate the invention as applied to a flame-tube boiler.

Figure 1 is a longitudinal vertical section of the boiler on line A B, Fig. 2. Fig. 2 is a horizontal section on line C D, Fig. 1; Fig.
30 3, an elevation, partly in section, of the boiler.

Upon a support *b* in the flame-tube *a* is mounted the hollow fire-bridge *c*, which is hollow from end to end. In the top of this bridge are provided holes *d*, and in its front
35 are provided holes *e*. Into the lower part of the fire-bridge *c* enter the hollow fire-bars *f*, of which two are shown. These tubes extend from the front *g* of the flame-tube *a* along the right and left side of the same. The tube
40 *h* passes from the steam-space of the boiler downwardly into and through the ash-pit *i* and thence through the support *b* into the fire-bridge *c*. Here it connects with a transverse pipe *k*, arranged within the fire-bridge and
45 provided with nozzles *l*, that project into the front openings *e*. To protect the tube *h* against the heat, it is surrounded by a fireproof jacket or is itself composed of fireproof material—chamotte, magnesite, Dinas stones,
50 &c. The grate-bars *m* are carried by the support *b*, front plate *n*, and cross-bars *o*.

The two fire-bars *f*, which serve as air-tubes, are shown to be of triangular cross-section; but they may obviously be differently shaped.
55 On the side of each fire-bar that extends along

the flame-tube *a* are provided a number of recesses through which the air may enter laterally into the fire. These air-tubes are similar to the steam-pipe *h*, inclosed by a fireproof jacket, or are composed of a fireproof
60 material.

The liquid fuel is introduced into the steam-pipe *h* from a receptacle *p* by means of a pump *q*, that is driven by a belt or other transmission through steam made in the
65 boiler, the drawings showing a belt transmission. The liquid fuel is conveyed through pipe *r* into a case *s*, that is arranged around the steam-pipe *h*, so that the fuel runs down along such pipe and is taken along by the
70 steam admitted near the lower end of the case. The steam thus saturated with the liquid fuel is ejected into the fire directly through the openings *e* of the fire-bridge *c*. It also sucks in the air, highly heated, within the
75 hollow fire-bridge. The steam forms water-gas in large quantities, while it simultaneously, in conjunction with the liquid fuel, saturates the small particles of coal, so as to increase their weight, and thereby retain
80 them. In this way such particles are rekindled and are completely consumed. The air which enters the flame-tube *a* through the openings *e*, as well as through the openings
85 *d*, serves to materially increase the combustion.

By the above construction a mixture of steam, air, and liquid fuel is supplied to the fire-chamber, which renders the combustion
90 smokeless.

What I claim is—

In a steam-boiler furnace, the combination of a steam-pipe with a surrounding communicating casing, a liquid-fuel pipe entering said casing, a transverse pipe having forwardly-projecting nozzles and communicating with the steam-pipe, an inclosing hollow fire-bridge having perforations for receiving said nozzles, and a pair of hollow fire-bars entering said bridge so that a mixture of hot
95 air, steam and liquid fuel is ejected from the fire-bridge into the fire in a direction opposite to that of the furnace draft, substantially as specified.

Signed by me at Hamburg, Germany, this
21st day of June, 1901.

JOSEF FRANZ ZARUBA.

Witnesses:

A. TOTH,

E. H. L. MUMMENHOFF.