

(No Model.)

5 Sheets—Sheet 1.

J. NITSCHÉ & T. GRELLNETH.
FURNACE FOR STEAM BOILERS.

No. 245,207.

Patented Aug. 2, 1881.

FIG. 1.

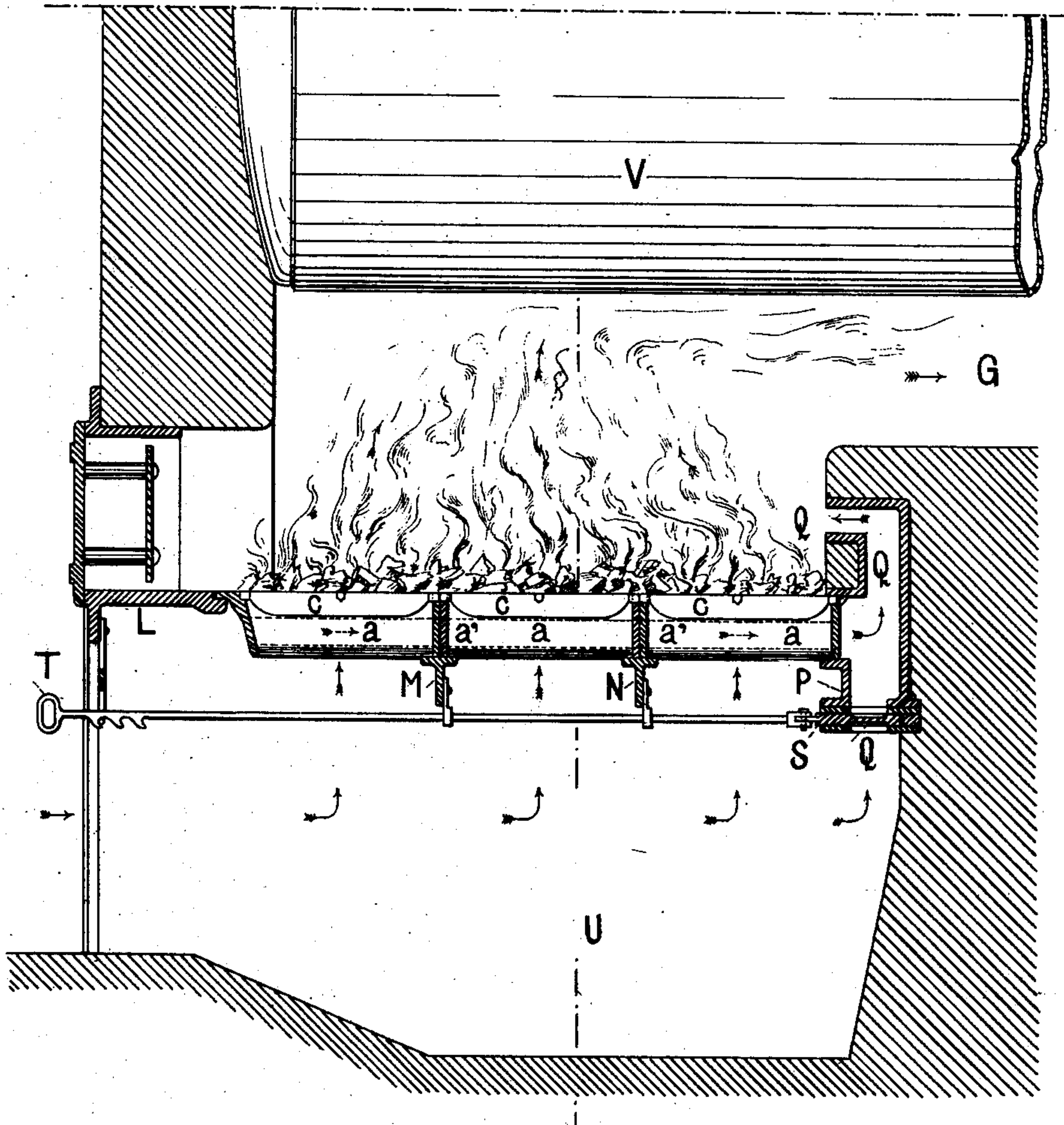
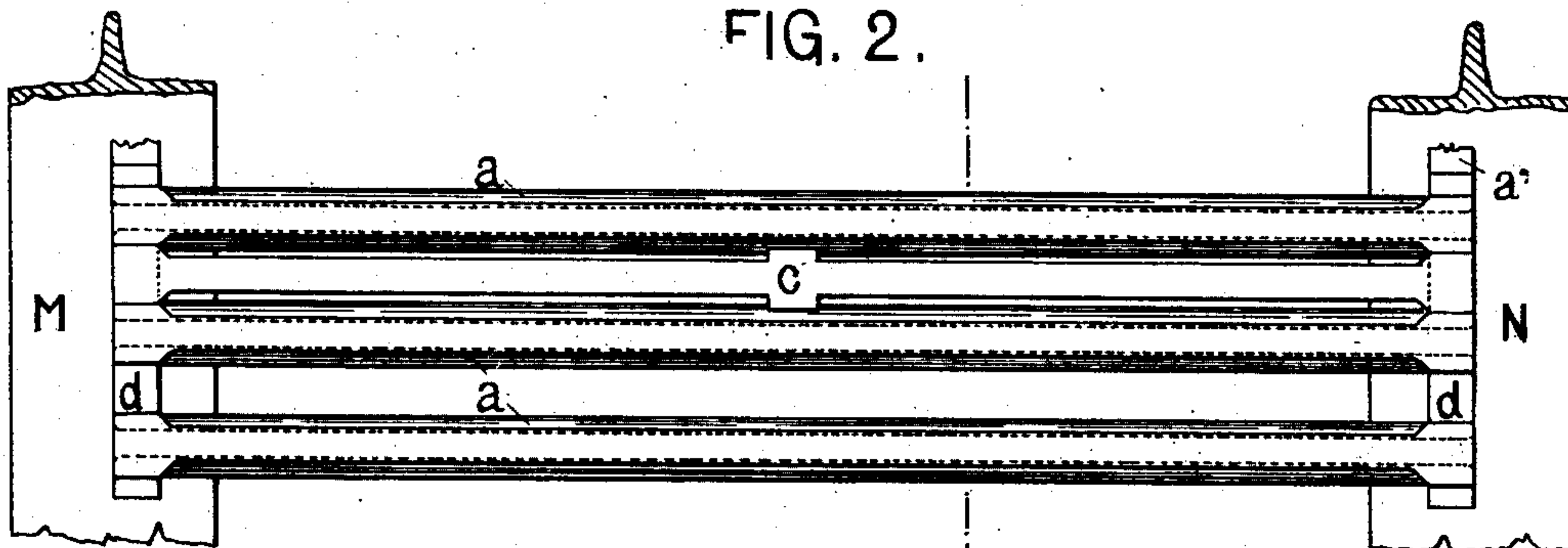


FIG. 2.



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FIG. 3.

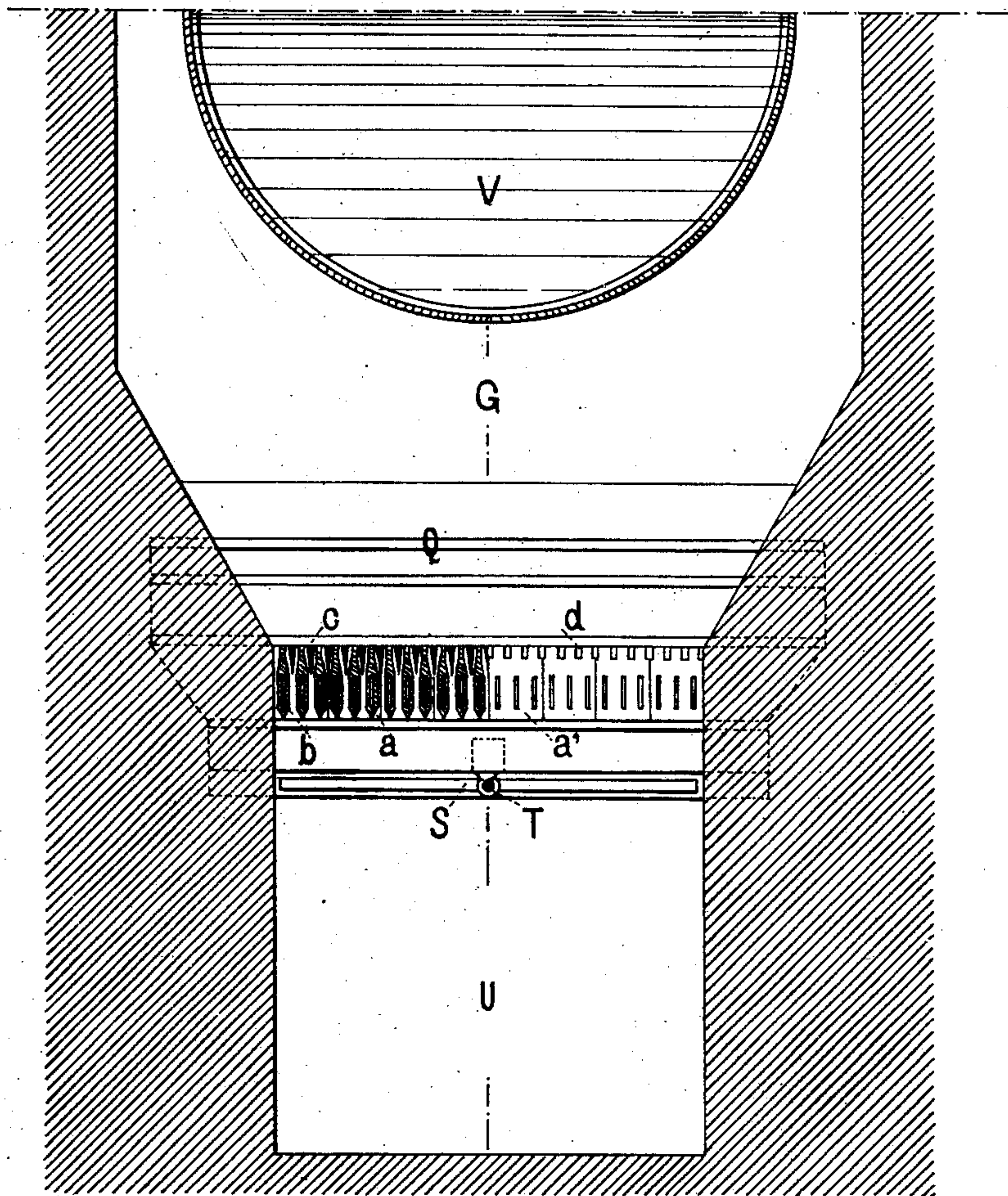


FIG. 5.

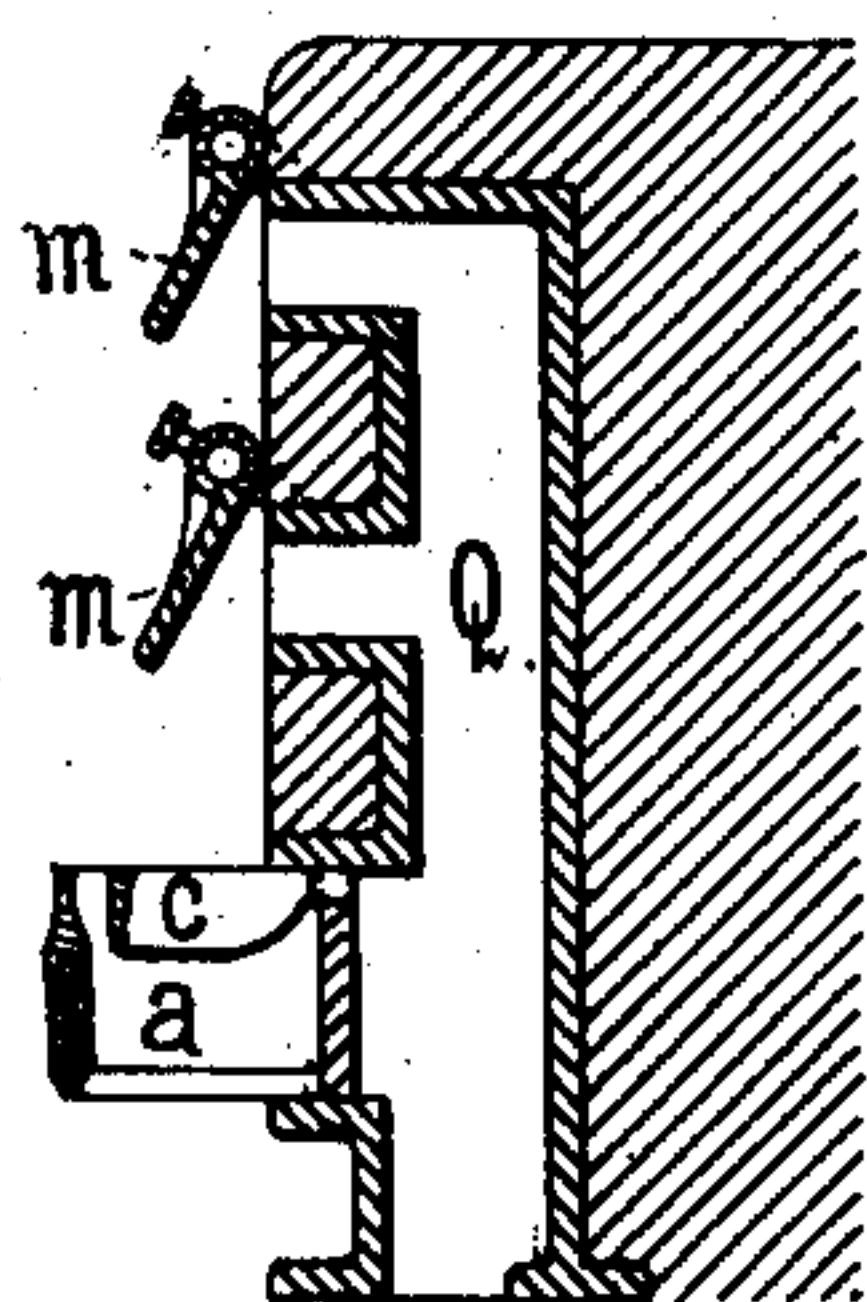


FIG. 4.

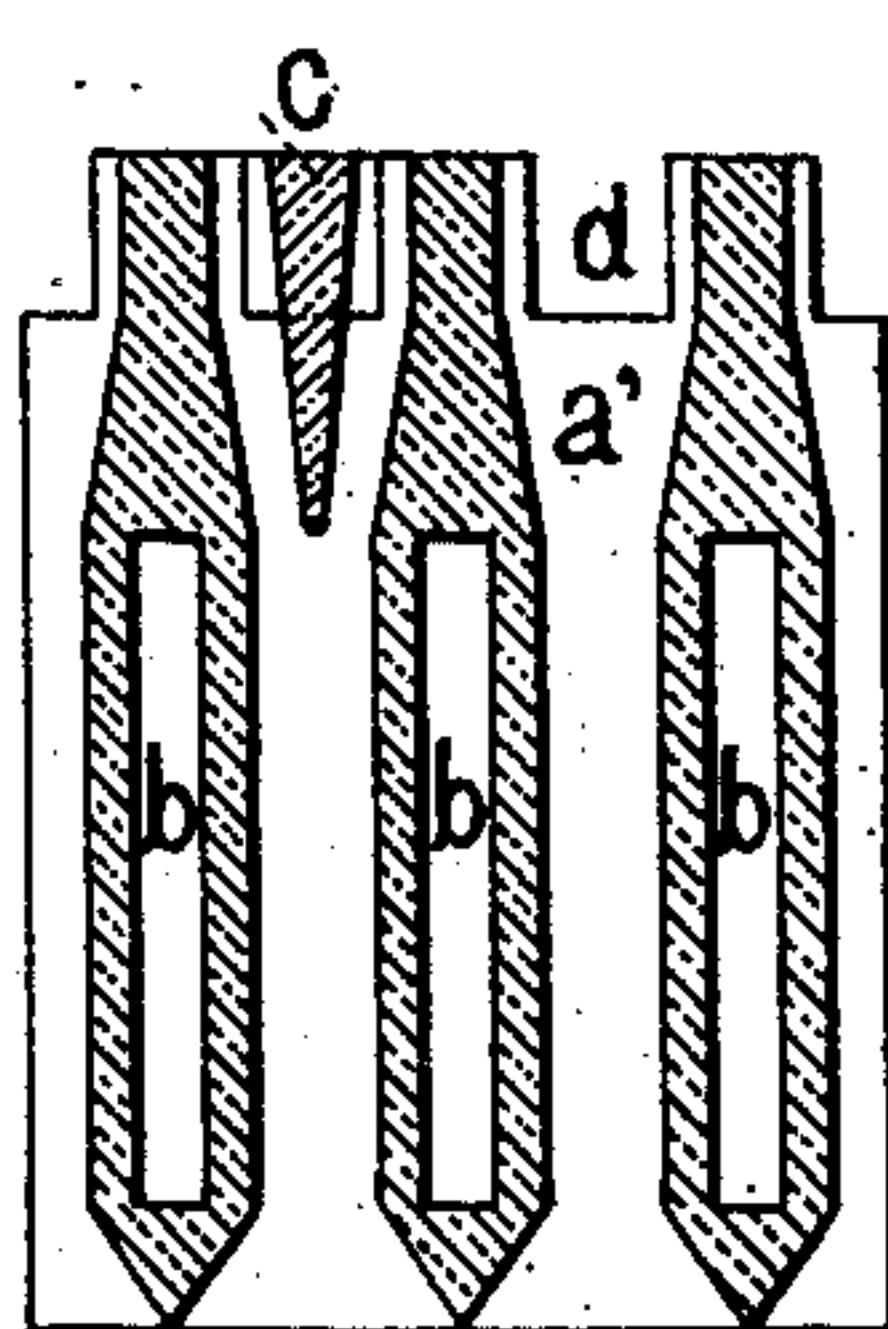


FIG. 6.

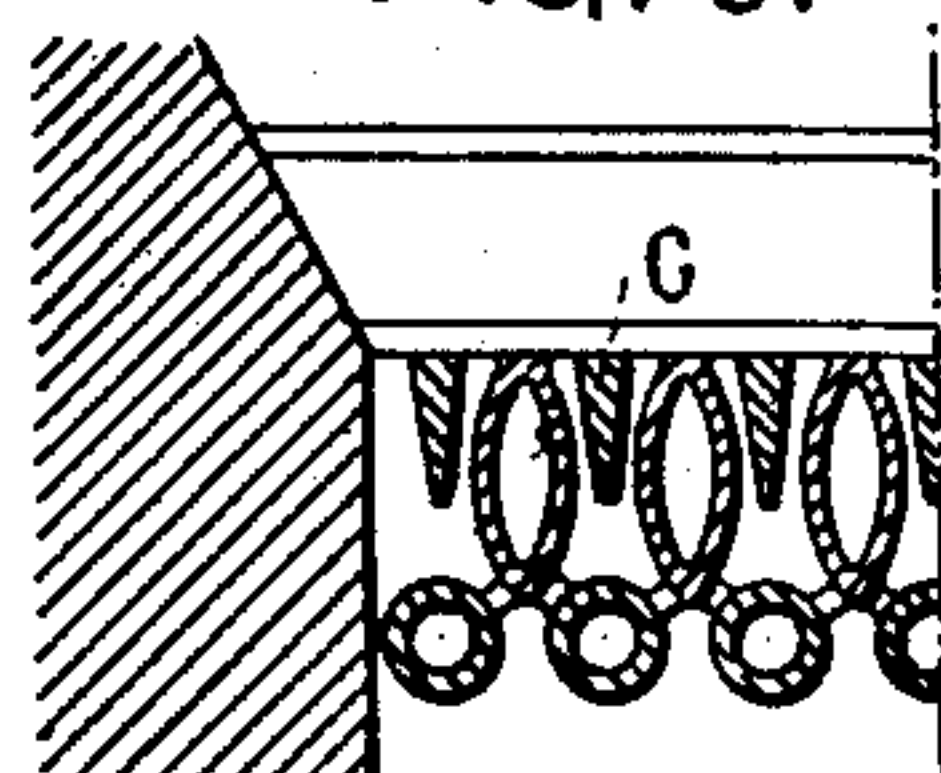
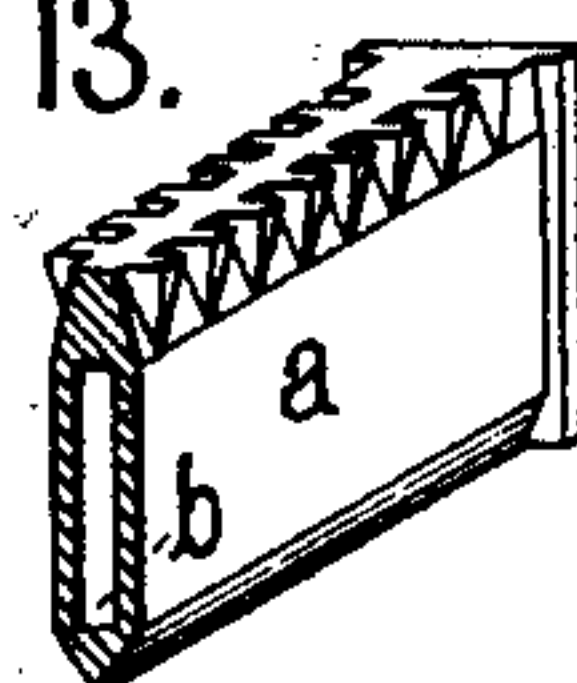


FIG. 13.



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FIG. 10.

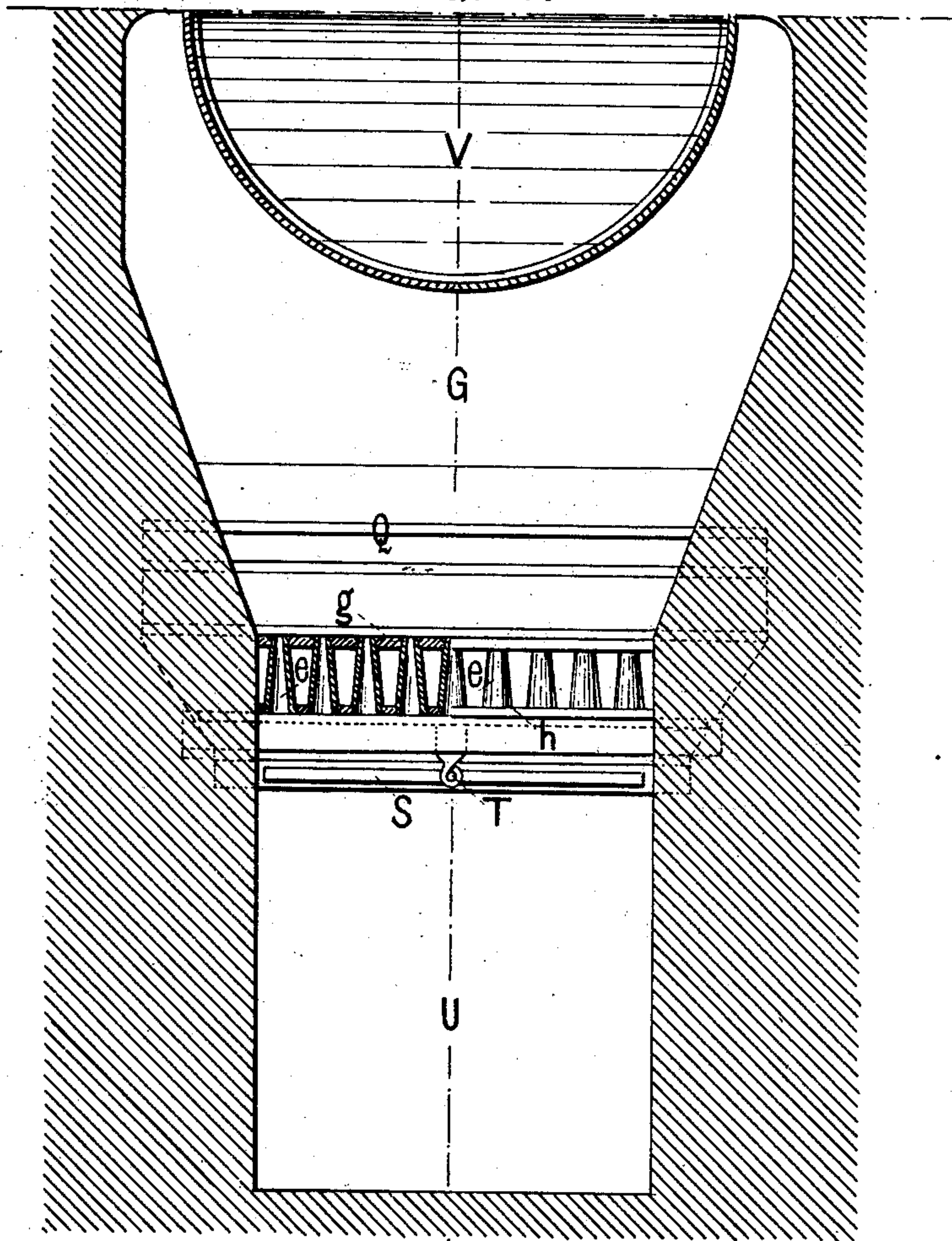


FIG. 7.

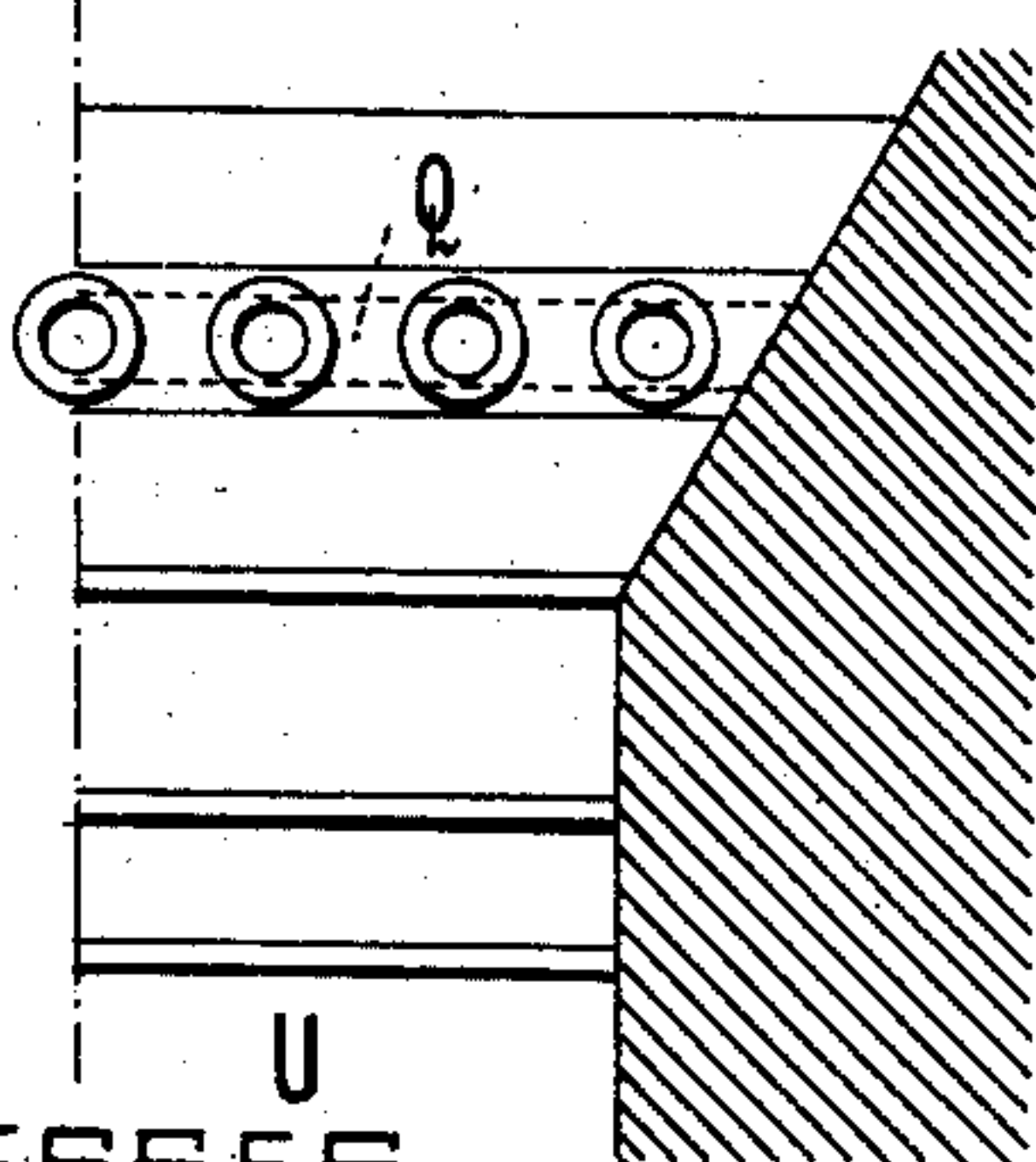


FIG. 12.

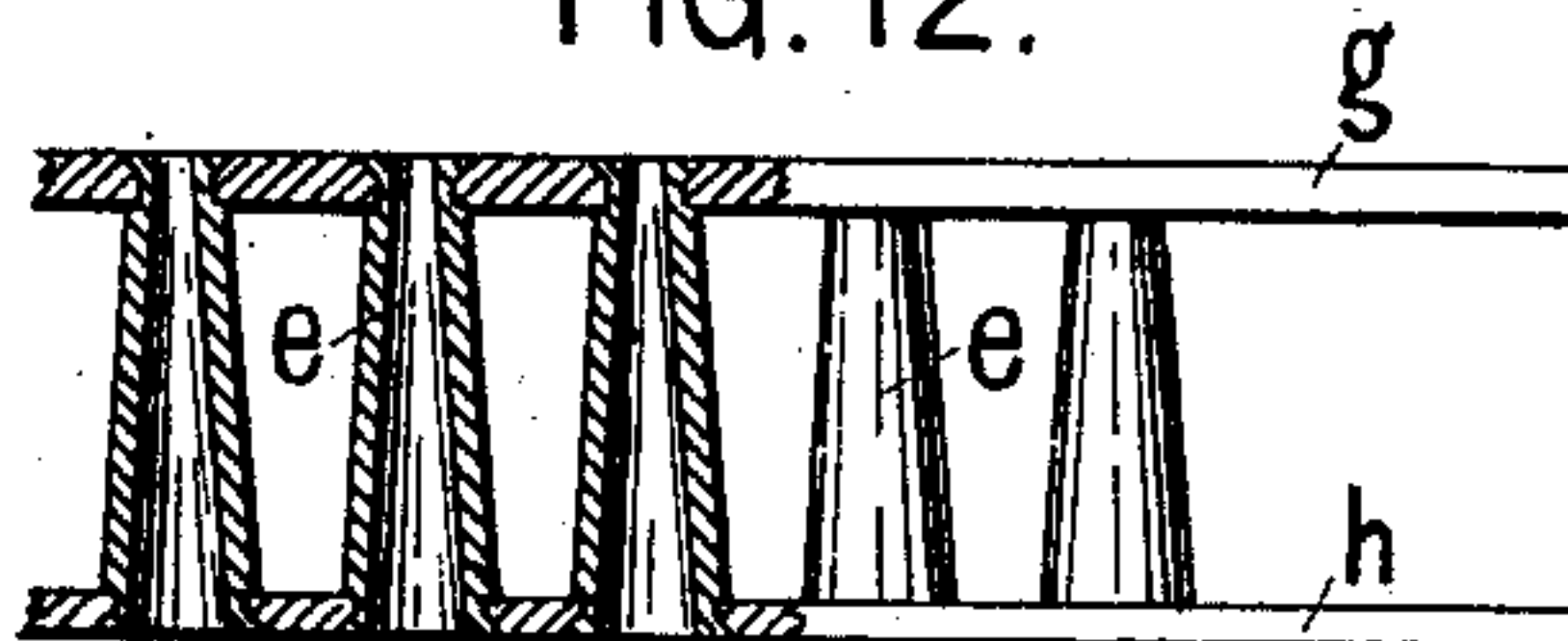
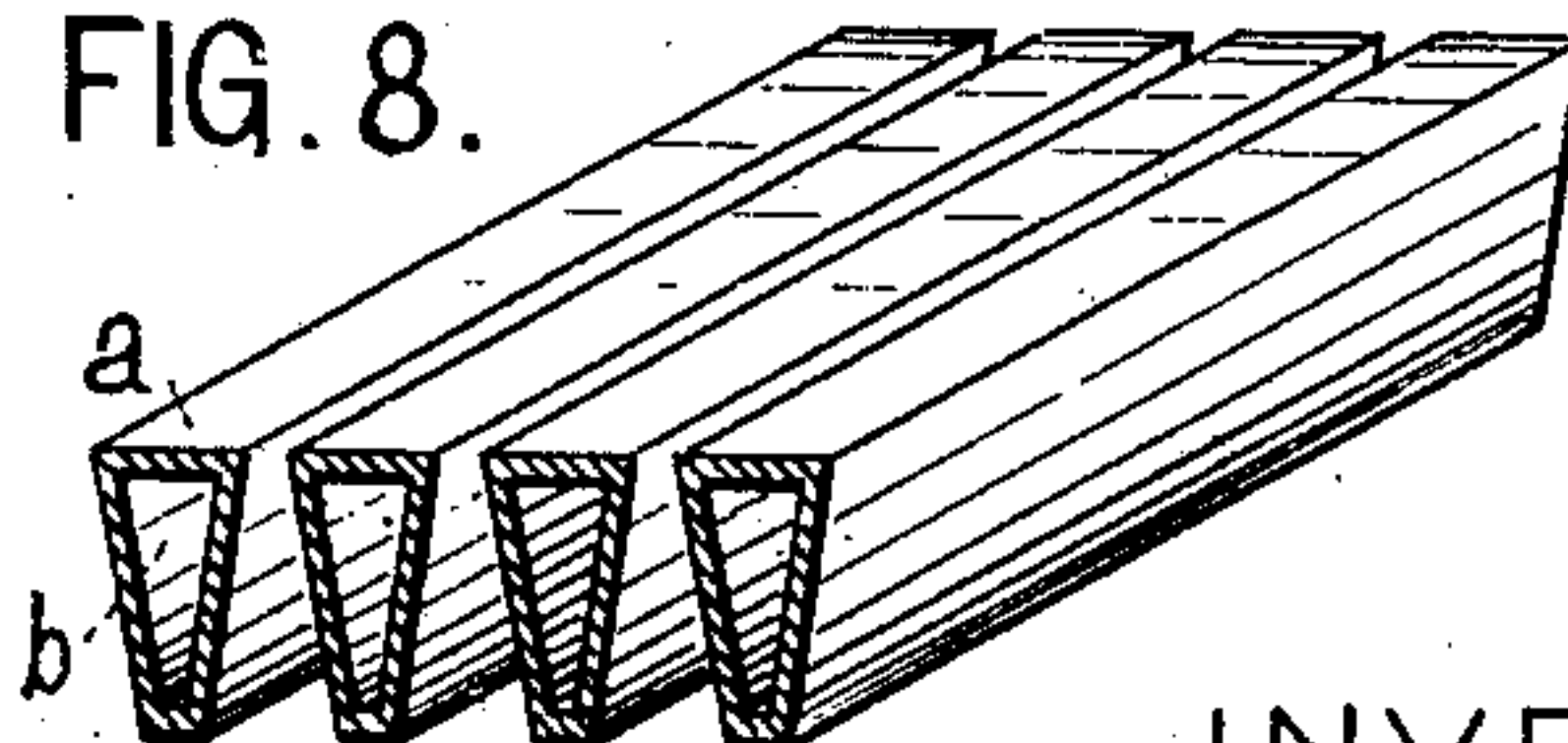


FIG. 8.



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FIG. 9.

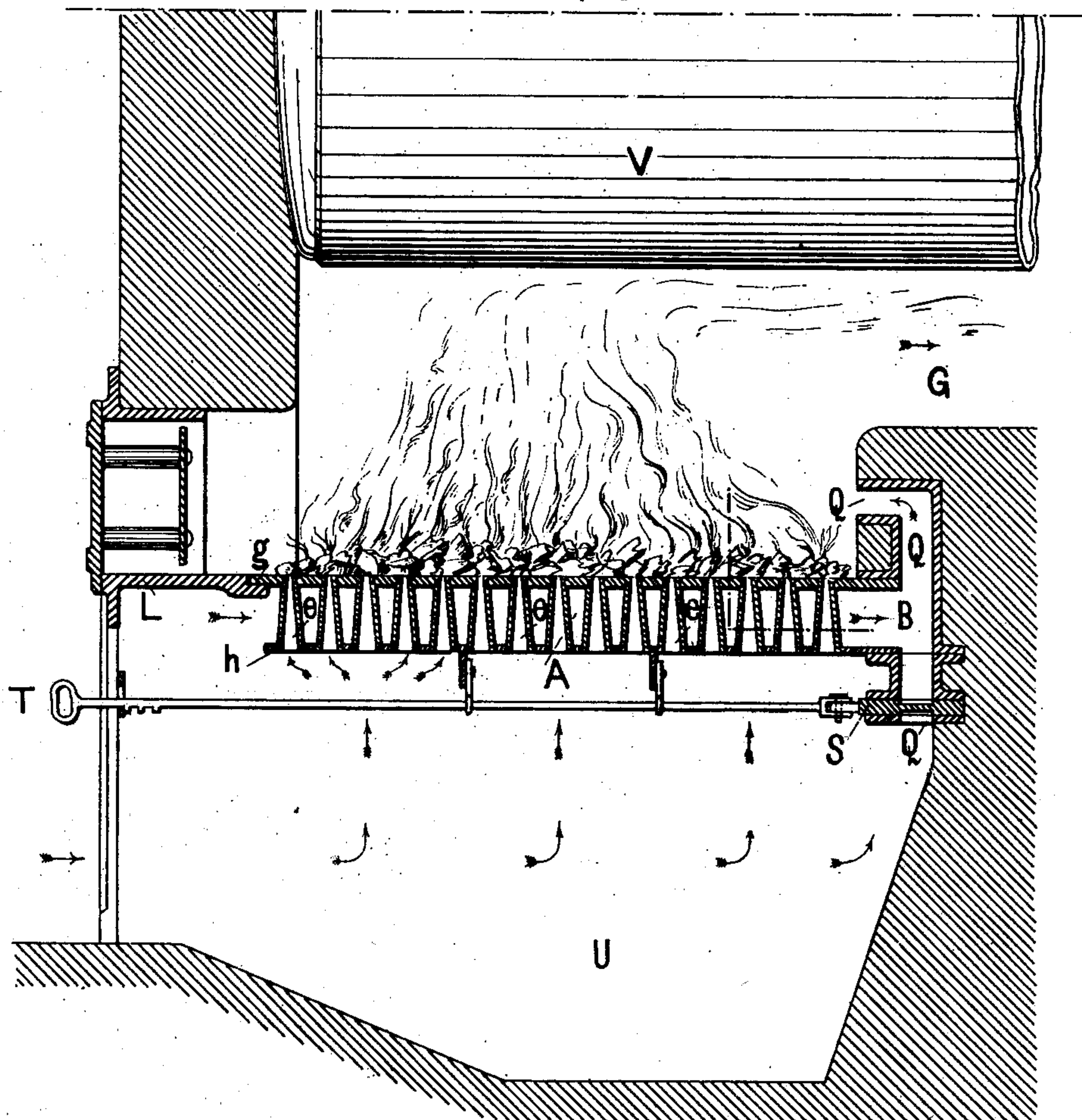
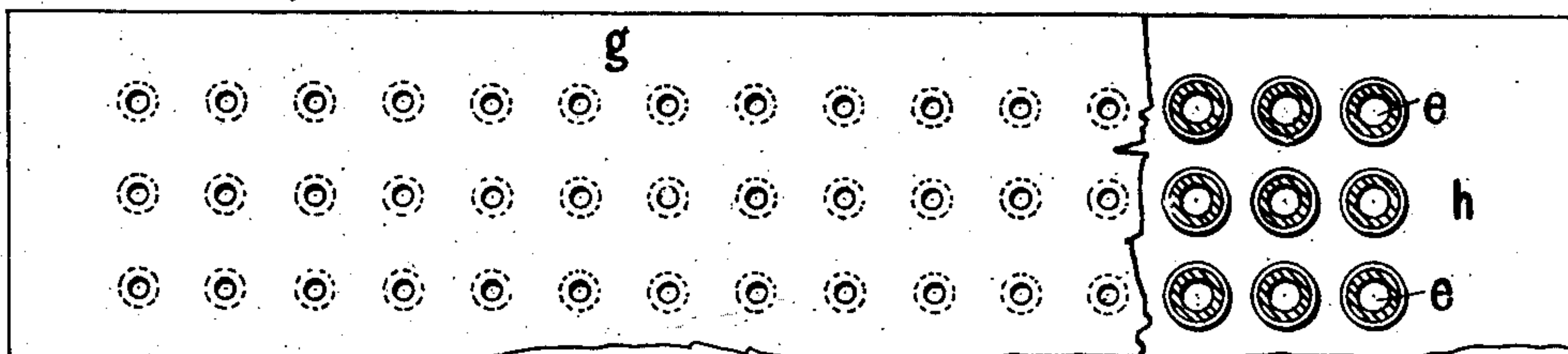


FIG. 11.



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FIG. 14.

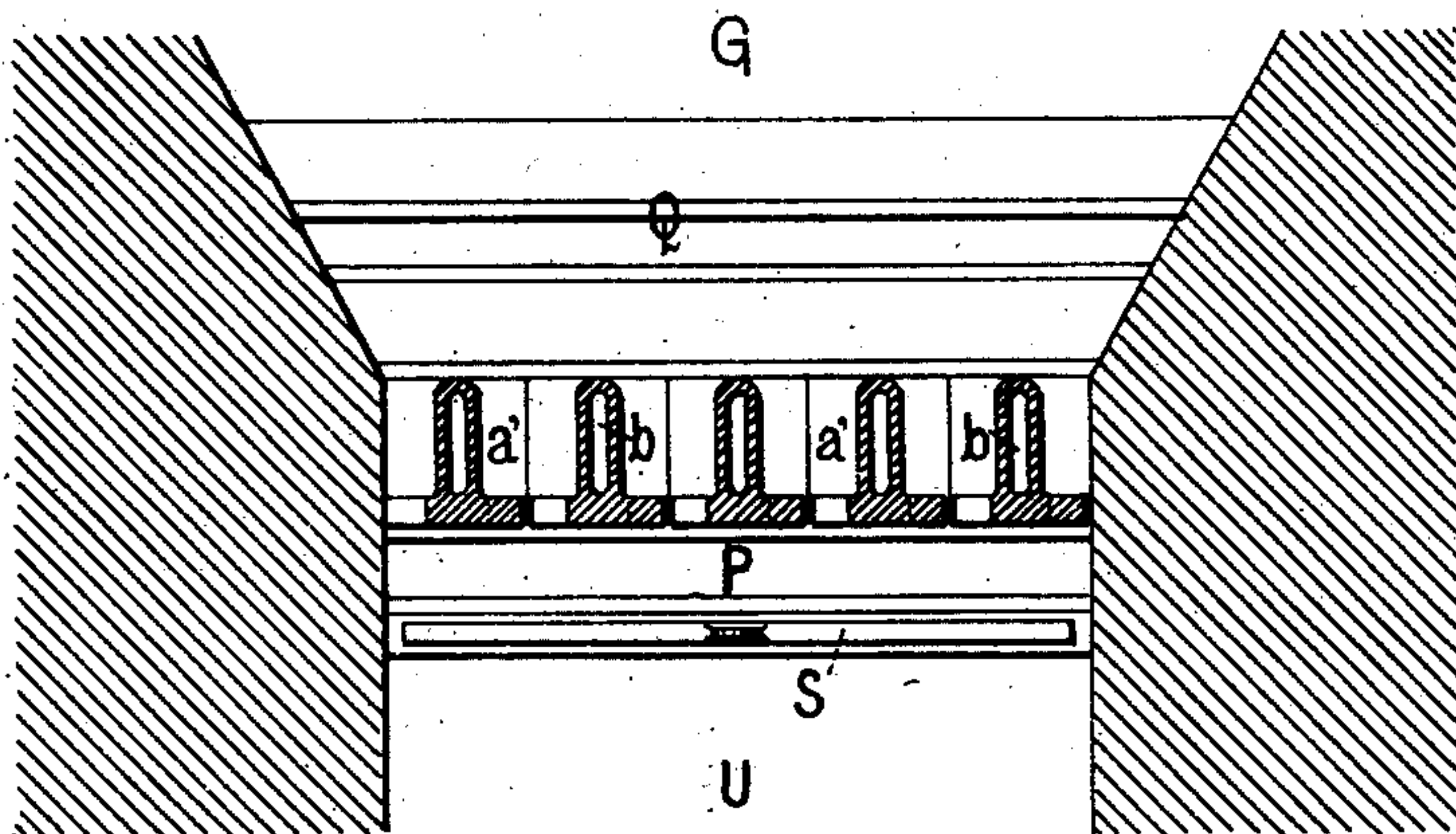
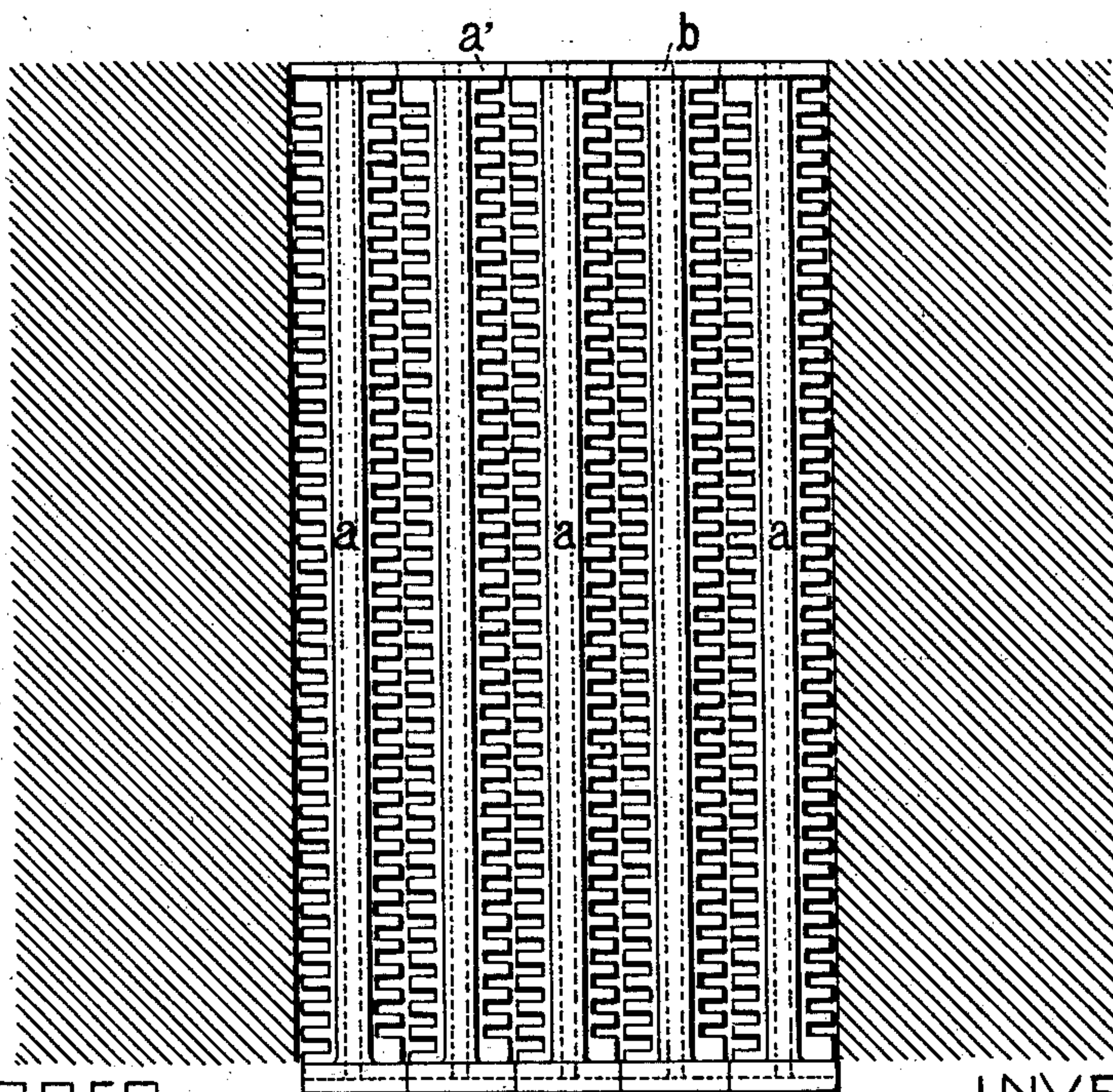


FIG. 15.



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UNITED STATES PATENT OFFICE.

JOSEF NITSCHKE AND THEODOR GRELLNETH, OF VIENNA, AUSTRO-HUNGARY.

FURNACE FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 245,207, dated August 2, 1881.

Application filed March 1, 1881. (No model.)

To all whom it may concern:

Be it known that we, JOSEF NITSCHKE and THEODOR GRELLNETH, both of Vienna, in the Empire of Austro-Hungary, have invented
5 new and useful Improvements on Furnaces for Steam-Boilers and other purposes; and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same.

10 This invention may be carried out in various ways, but the main feature in all is that a part of the air which passes through the grate and is thereby heated, is led to a passage or chamber, whence it, at a certain height above the
15 grate, is made to meet the gaseous products of combustion before they escape over the bridge, the carbon particles which have not been consumed, or the carbon which has only been
20 formed into carbonic oxide and otherwise escaping into the chimney, are thus again brought into contact with the oxygen of the heated air, and thus completely burned.

In the accompanying drawings we have shown two modifications or modes of carrying
25 out this invention.

Figure 1 is a longitudinal section, and Fig. 2 a part end view and part cross-section of a fire-place with horizontal tubular grate; Fig. 3 is an enlarged part plan of the grate, and
30 Fig. 4 a cross-section through same. Figs. 5 and 7 are modifications of the passage Q. Figs. 6, 8, and 13 represent different modifications of the tubular grate. Fig. 9 is a longitudinal section, and Fig. 10 a part end view
35 and part cross-section, of a fire-place with our so-called "vertical tubular grate." Fig. 11 is an enlarged part plan, partly in section, of such a grate; and Fig. 12 is a part sectional elevation of same. Fig. 14 is a cross-section, and
40 Fig. 15 is a plan, of a modification of the fire-bars.

The same letters refer to corresponding parts in all the figures.

In Figs. 1 to 4 the grate proper consists of
45 separate sections, one of which is shown enlarged in Figs. 3 and 4. Each section consists of two or more (in this case three) high parallel or not parallel hollow bars, *a*, by preference of the section shown in Fig. 4, but it may be
50 of any other suitable section, as shown in the

modifications Figs. 6, 8, 13, 14, or 15. These bars are at their ends united by a plate, *a'*, or cast in one therewith. The plates *a'* have openings corresponding with the flues C, through the hollow bars *a*, and have notches *d* in their up- 55 per edges for the solid fire-bars *c* to rest in, and so as to leave spaces on each side between *c* and *a* for the free access of air from below to the fuel on the bars. A required number—here three—of such grate-sections rests on the dead- 60 plate L, (or separate bearing-bar,) and on the bearing-bars M, N, and P, close together lengthwise, and so that their flues *b* correspond.

The form and arrangement of the hollow 65 and solid grate or furnace bars may, of course, be varied without changing the principle on which this invention is founded. Thus, tubes of circular or any other, by preference, by elliptical section, Figs. 4, 6, 8, 13, and 15, may 70 be so placed side by side or above each other, that the air from the ash-pit passes partly through such tubes to the chamber or passage Q, and partly between such tubes up into the fuel. The hollow and the solid furnace-bars 75 may be made or cast in one piece.

The fuel rests partly on the solid bars *c* and partly on the hollow bars *a*, and the air entering by the ash-pit door, passes partly from below up between the hollow bars *a*, and then 80 between these and the solid bars *c* direct into the fire, and partly by the front apertures in the plates *a'* into and through the hollow bars *a*, and thence into the cross-chamber Q, extending the whole width of the furnace. The 85 air, which thus becomes very hot, then flows out at a moderate height above the grate and right into and against the flame, which it supplies with fresh oxygen, thus causing the unconsumed particles of coal, or the coal which 90 has only been burned into carbonic oxide to be totally burned—that is, into carbonic acid. The combustion is a particularly lively one. Moreover there is almost entire absence of smoke, and the economy in fuel is considerable. 95

The side of the chamber Q exposed to the fire is covered with fire-brick or other fire-proof material, or made entirely of it, so as to resist the action of the very intense heat in this place. The chamber Q itself may be of cast- 100

iron. The outlet may be tapered or contracted in order to produce greater air pressure or force.

Instead of using one chamber, Q, the air from the hollow flues *b* may be led into several smaller adjoining chambers, or adjoining and superposed, or pipes, Figs. 5 and 7, of any section, and terminating similarly over the grate; or the air may pass out from Q through two or more openings above each other, one or more of same being provided with dampers *m*, Fig. 5. If it be desired to let in cold air also, the sliding damper T S may be opened, admitting air from the ash-pit U.

G is the flue for the products of combustion to pass off by, and V the bottom of the steam-boiler.

These grates are easily applicable to all existing fire-places, and are suitable for all kinds of fire-places for domestic room and kitchen fire-places, for stationary boilers, and for marine and locomotive boilers.

In consequence of the lively combustion produced a lower chimney may be used, and the smoke, which is so obnoxious with factories and heating apparatus, done away with.

Instead of using hollow fire-bars of the form shown in Fig. 14, tubes of the form shown in Figs. 6, 8, 13, and 15 may be employed.

In another modification Figs. 9, 10, 11, and 12, A is the grate proper, consisting of two plates, *g* and *h*, the former having smaller and the latter having larger holes for receiving taper-tuyeres *e*, of circular, elliptical, or other section, so as to form one piece or structure. The plates may be of sheet-iron and the tuyeres of cast-brass, and with shoulders at top and bottom, and riveted over; or the tuyeres may be of sheet-iron and united with the plates by drifting or expanding, as with the tubes and fire-box of a locomotive. In many cases, especially for very large fire-places, the whole grate may be cast in one.

The upper holes in the tuyeres should be so small that the fuel does not fall through; the tuyeres should, in fact, be as numerous as possible without unduly weakening the grate.

The grate rests here on the dead-plate L

and bearing-bar P, or is supported in any other well-known manner. The air from the ash-pit door passes partly through *e* direct in among the fuel and flame and partly between the two plates *g* and *h*, around the outside of the tuyeres *e*, in the direction of the arrow B, into the chamber Q, and thence into the flame, as described with reference to the first modification. In this case, also, the air to be let in above the grate may have its exit from several adjoining or superposed chambers or pipes instead of one chamber, Q.

Our grates are easily cleaned by means of steam admitted from the boiler.

Instead of the ordinary atmospheric air, we may pass oxygen, hydrogen, steam, superheated or not, or combustible gases or vapors through the hollow bars or pipes, collect them into the chamber Q, and let them thence into the flame.

We claim—

1. A boiler-furnace grate-bar consisting of the hollow bars *a*, provided with perforated end plates, *a'*, having notches *d*, and the solid fire-bars *c*, resting in the notches of the said end plates, substantially as herein shown and described.

2. In a boiler-furnace grate-bar, the combination, with the hollow bars *a* and the perforated end plates, *a'*, provided with notches *d*, of the solid fire-bars *c*, having enlarged ends and middle portions, substantially as herein shown and described.

3. The combination, with the dead-plate L, the bearing-plates M N P, and the chamber Q, extending across the whole width of the furnace at the rear of the combustion-chamber, and provided with a valve of the grate-bar composed of alternate hollow and solid bars *a c* and the end-plates *a'*, the said solid bars being supported in notches of the end plates, substantially as and for the purpose set forth.

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Witnesses:

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