

No. 885,608.

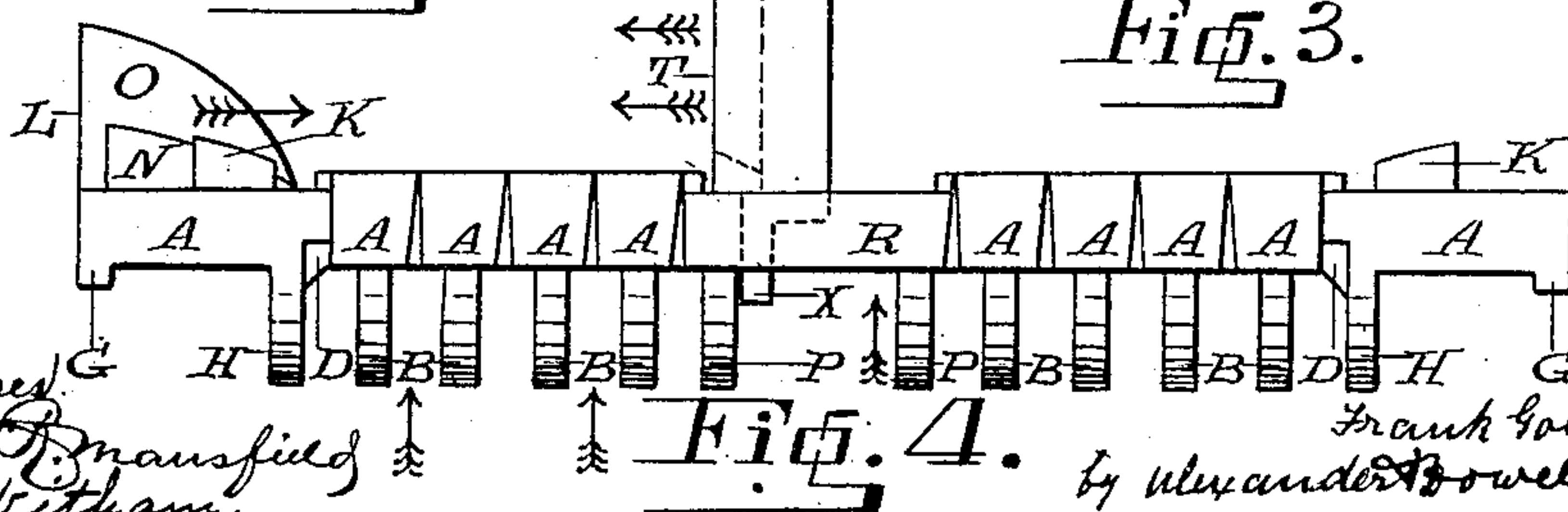
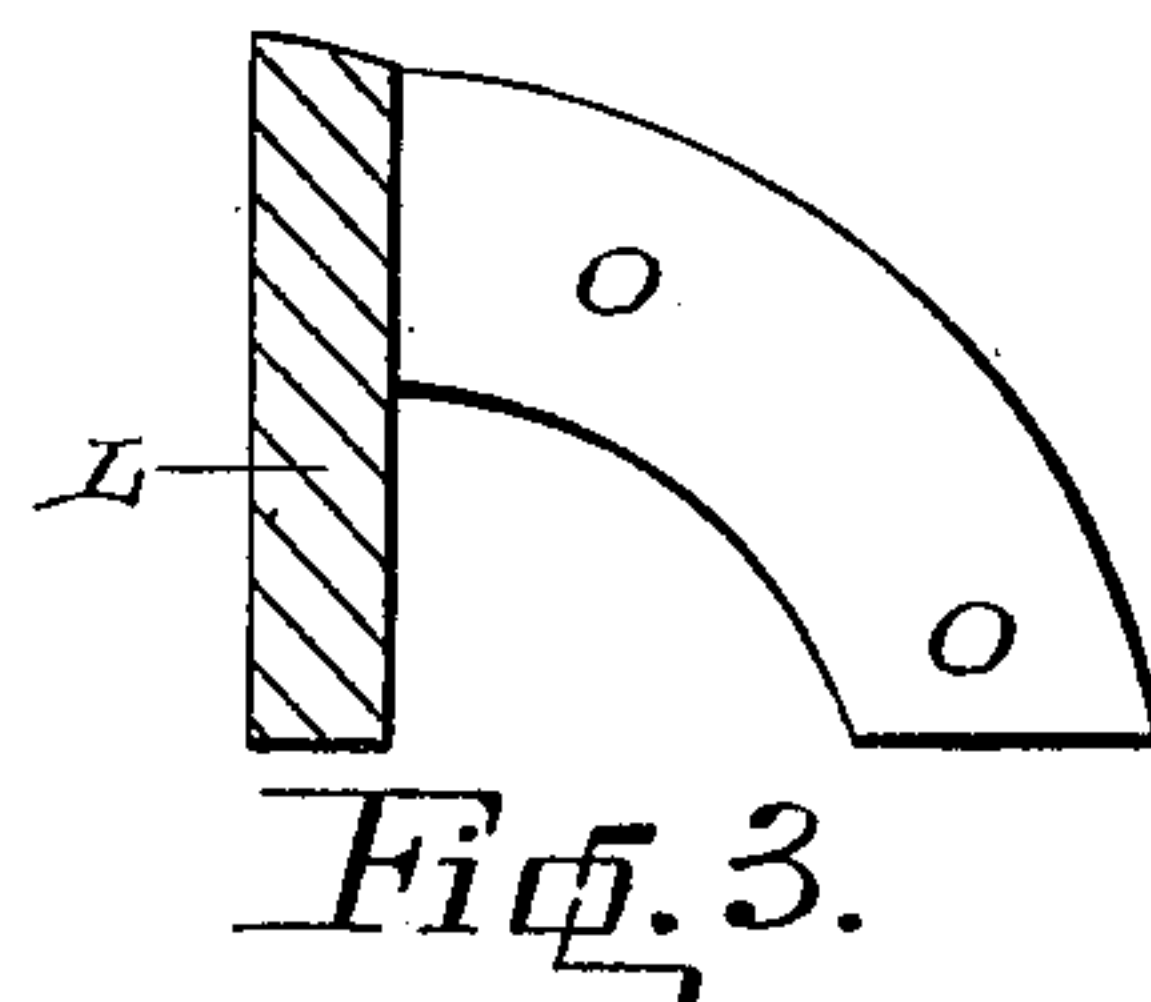
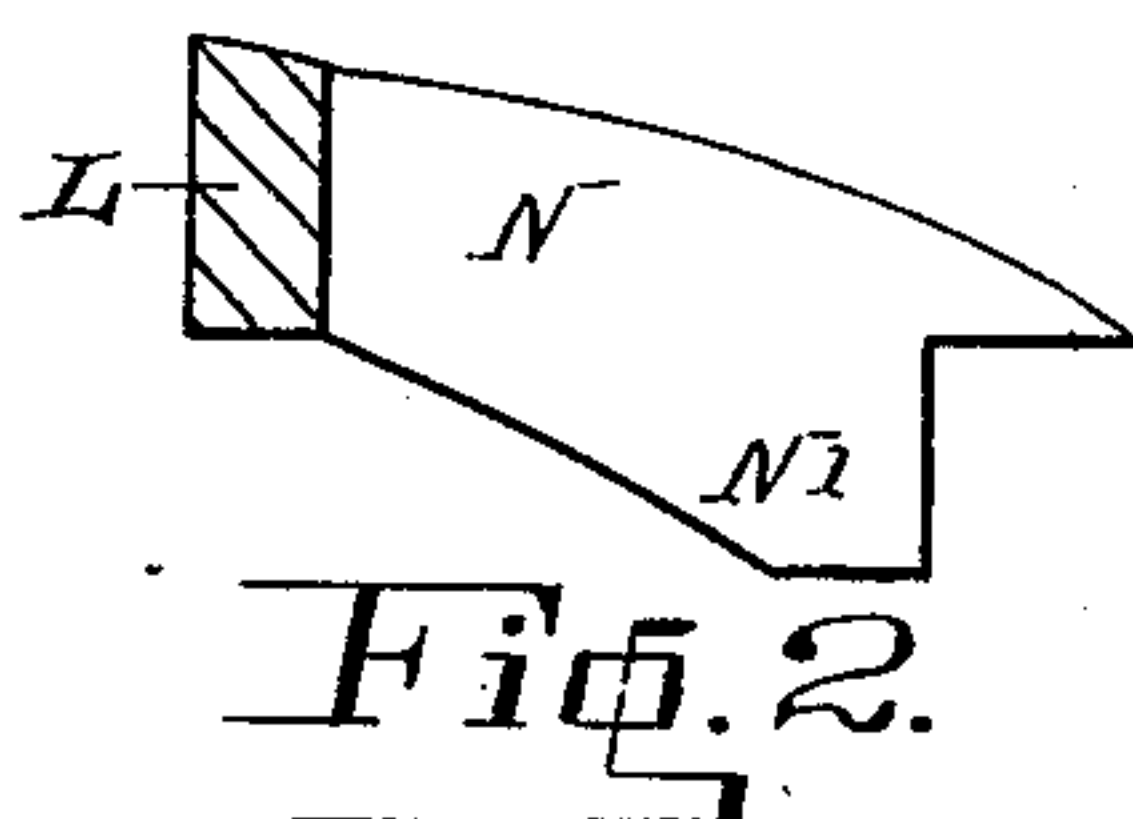
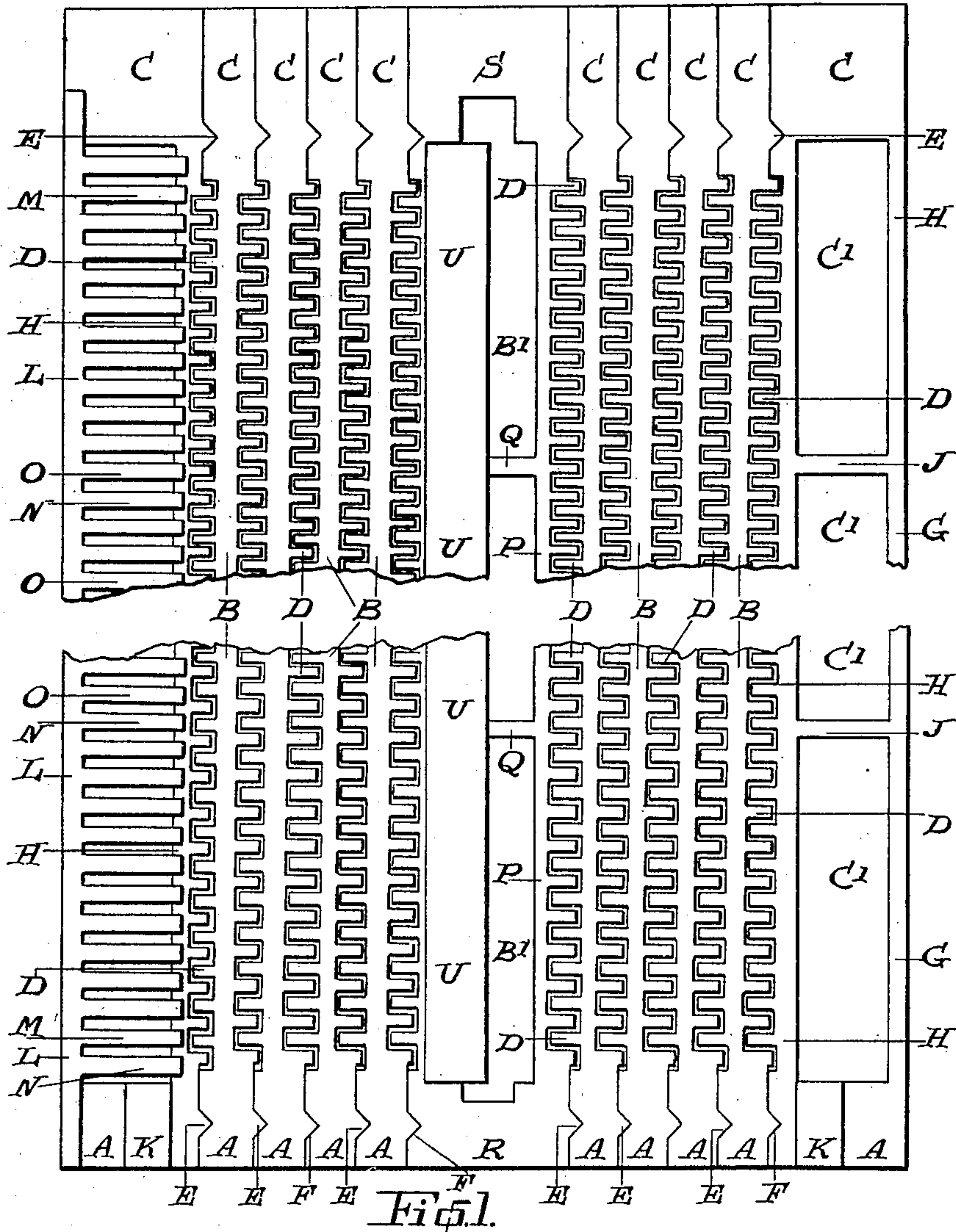
PATENTED APR. 21, 1908.

F. GOLD.

GRATE SURFACE OF FURNACES.

APPLICATION FILED MAR. 26, 1907.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

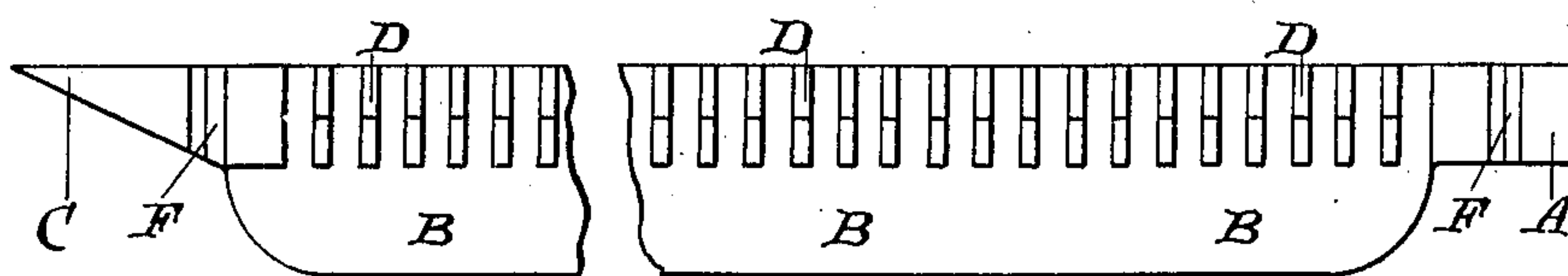


Fig. 5.

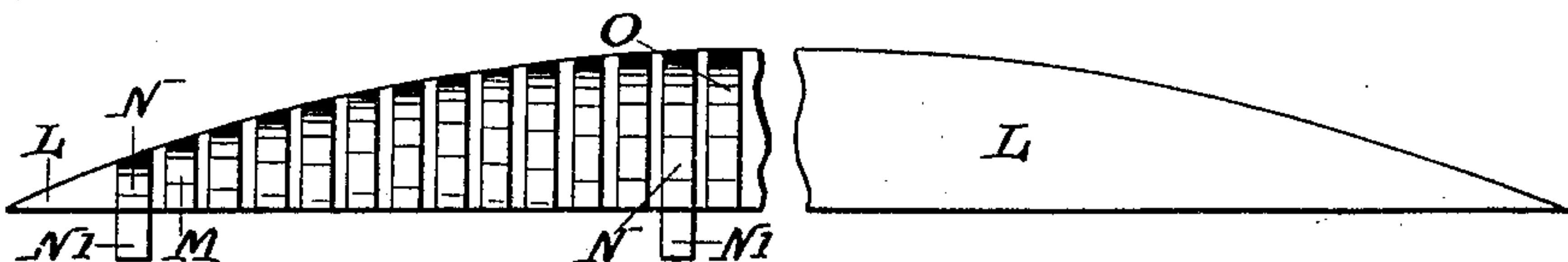


Fig. 6.

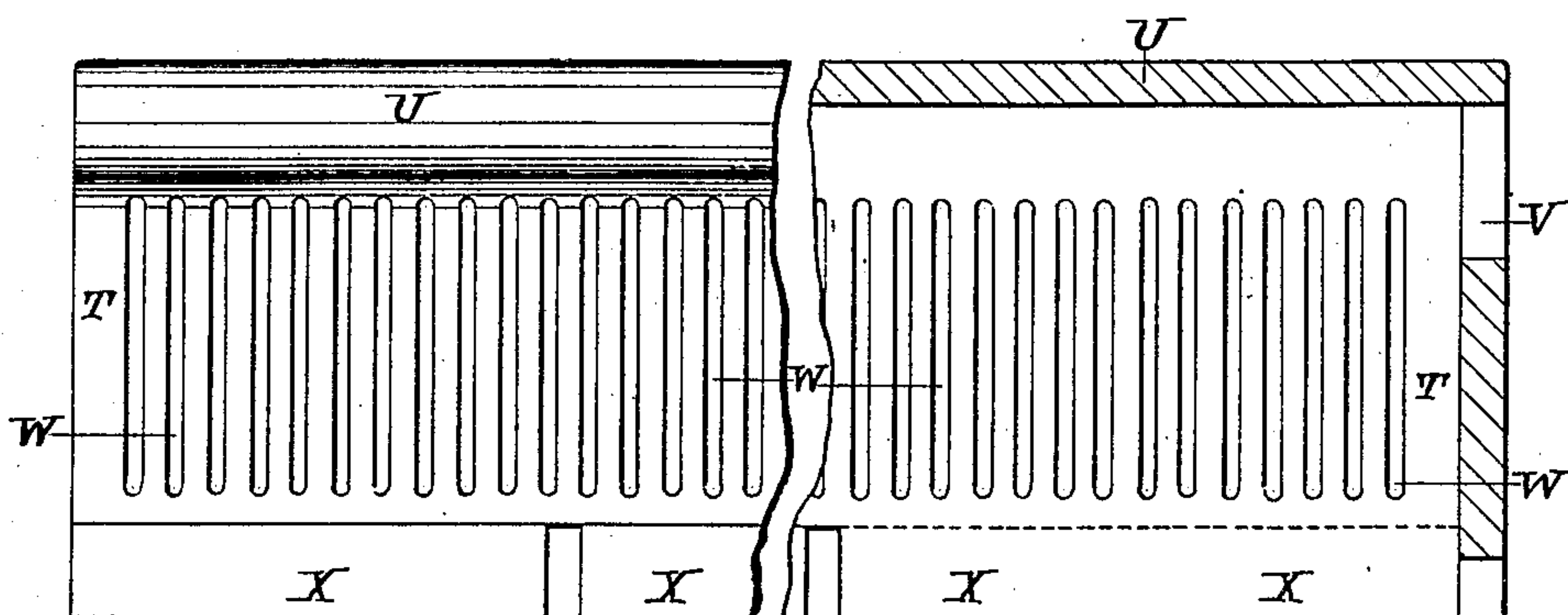


Fig. 7.

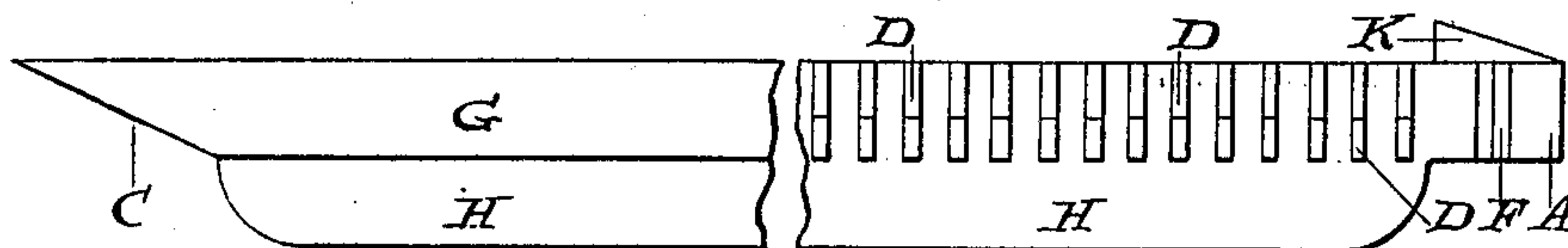


Fig. 8.

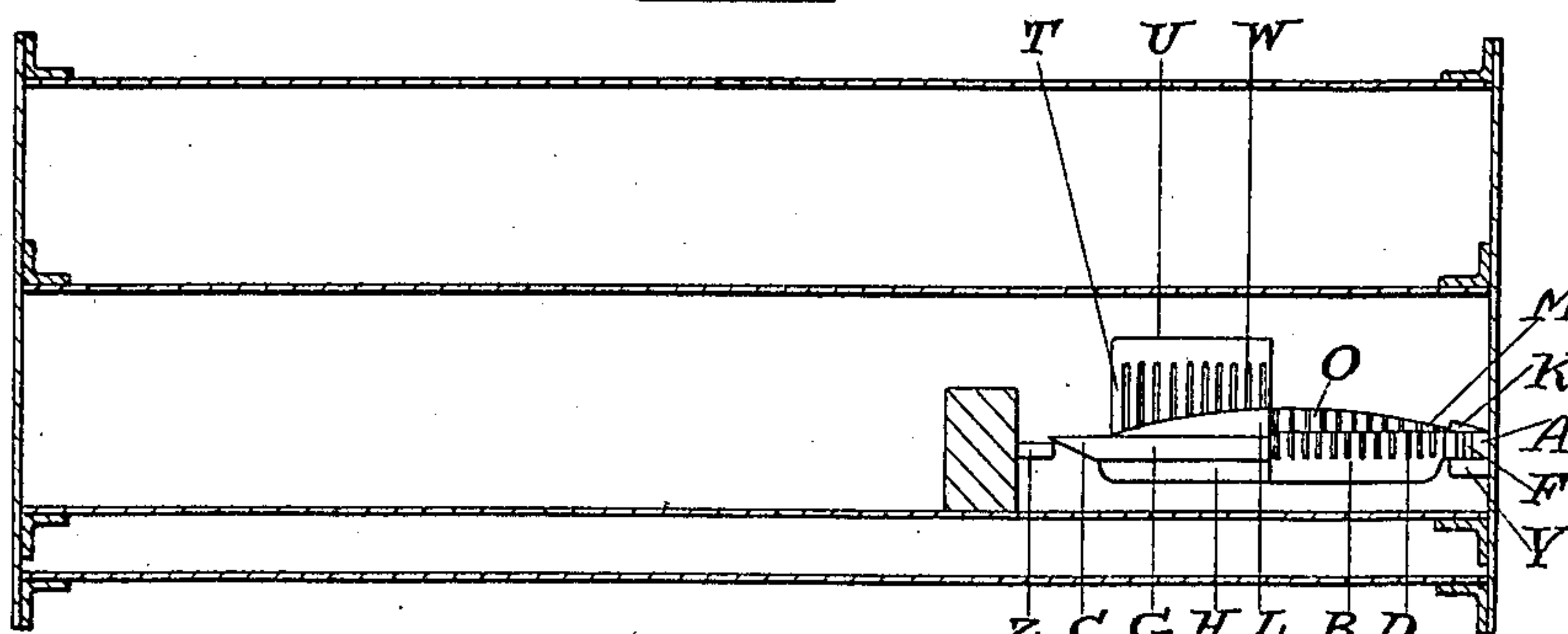


Fig. 9.

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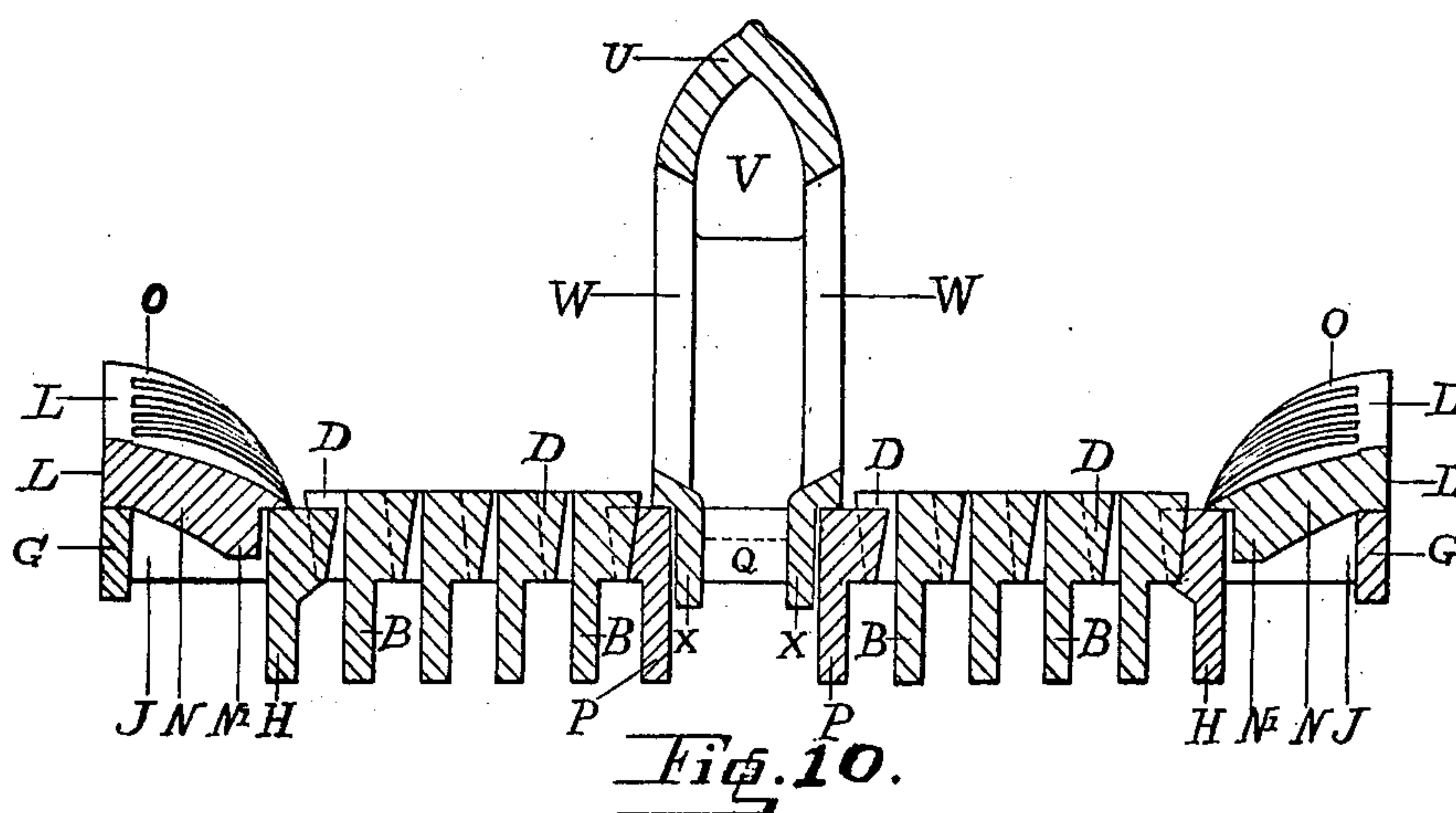
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

FRANK GOLD, OF RICHMOND, VICTORIA, AUSTRALIA.

GRATE-SURFACE OF FURNACES.

No. 885,608.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed March 26, 1907. Serial No. 364,569.

To all whom it may concern:

Be it known that I, FRANK GOLD, a subject of the King of Great Britain and Ireland, residing at 95 Palmer street, Richmond, in the county of Bourke, State of Victoria, and Commonwealth of Australia, have invented certain new and useful Improvements in the Grate-Surfaces of Furnaces, of which the following is a specification.

10 My invention relates to furnaces used for the generation of steam, or other purposes, and its object is to provide a greater supply of air to the fuel.

15 I am aware that irregular surfaced fire bars, moving fire bars, and other forms of bars have been used. Also that inclined shaking bars, rocking bars in one form or another have been introduced. But with my combination a grate surface is provided, in 20 which air attacks the fuel in six places. In two places (through ordinary fire bars), in two places (from each side of the fire) and in two places (from the middle of the fire). The air entering into the sides and middle of the 25 fire passes through bearers. These bearers are hot and communicate their heat to the said air. Additional heat is imparted to the air by its passage through elevated air suppliers.

30 Referring to the drawings which form a part of this specification:—Figure 1 is a plan of my grate surface. In the left hand portion everything is in place and complete. In the right hand portion, half of the intermediate elevated air supplier and the whole of a 35 side elevated air supplier are removed. Portion of the intermediate and the whole of a side bearer is exposed. Fig. 2 is a side elevation of an end rib, protruding from the side 40 piece (shown in section) of a side elevated air supplier. Fig. 3 is a side elevation of one of the middle ribs protruding from the side piece (shown in section) of an elevated air supplier. Fig. 4 is a view of my invention 45 looking at the fire door end of the grate surface as shown in Fig. 1. Fig. 5 is a side elevation of a fire bar. Fig. 6 is a side elevation of one of my side elevated air suppliers. The left hand portion shows the area exposed to 50 the fuel, the right hand portion shows the back of it adjoining the furnace wall. Fig. 7 is a side elevation of my intermediate elevated air supplier. The left hand half is in elevation, the right hand half in section. 55 Fig. 8 is a side elevation of a side bearer. The left hand portion represents the area adjoin-

ing the wall of the furnace. The right hand portion represents the area meeting the fire bars. The intermediate bearer is similar to the side bearers, save that both its longitudinal members are the same and have spurs protruding from them. Fig. 9 is a sectional elevation of the shell of a boiler showing my invention in position. The left hand half of my invention has been shown full and complete as a side elevation. In the right hand 60 half parts have been removed showing a fire bar and the spurs thereon and the area exposed to the fuel of a side elevated air supplier. Fig. 10 is a transverse section through 70 the complete grate.

Similar letters of reference indicate similar or corresponding parts where they occur in the several views:—

My invention includes a furnace of any 75 character. On one end of this is a dead plate Y which adjoins the fire door. Near the other end of the said furnace is a bridge Z. Upon the said dead plate and the said bridge, or upon extensions therefrom, rest my fire 80 bars and bearers. The said furnace and the said dead plate and bridge are of any ordinary character.

Upon (see Fig. 9) the dead plate Y rests the door end A of a fire bar, the longitudinal 85 member of which is marked B. The bridge end C of this rests upon the bridge Z or an extension thereof. From the longitudinal member and at each side of the same protrudes spurs D. The length of these spurs, 90 the width of the same, their height and distance from each other will depend upon circumstances.

Protruding from the door end and the bridge end of each bar (see Fig. 1) is an alining 95 rib E. There is also in each door and bridge end the alining groove F. The number of the fire bars will vary, being dependent upon conditions.

Near each side of the furnace are placed 100 side bearers. Each side bearer has an outer longitudinal member G and an inner longitudinal member H. Between these two members are (see Fig. 1) cross pieces J. The spaces between these are marked C'. The 105 outer or wall furnace member G is preferably shallower than the inner member H. At one end of the said side bearer is a door end A and at the other a bridge end C. Upon the said door and bridge ends may be alining ribs E 110 or grooves F as described in connection with the fire bars. From the inner longitudinal

member H protrudes spurs D. The number, conformation and disposition of these agrees with the spurs protruding from the fire bars before referred to. Standing above the door
 5 end A of each of the side bearers is a shovel guide K. The said shovel guide is preferably integral with the said bearer and is so designed that instead of the front end of the fireman's shovel striking the end ribs M
 10 (hereinafter described) of the side elevated air suppliers hereinafter referred to and being injured by the impact, it glides upwardly.

Above each side bearer before referred to is situated a side elevated air supplier. Each
 15 one of these consists essentially of a side piece L. This adjoins the furnace wall. Protruding inwardly towards the fuel and integral with or attached to said side piece are ribs. These are of three characters. All of them on the
 20 top are of rounded conformation. The said rounded formation extends from the top to the side piece L, to the surface of the bearer. Plain or end ribs are marked M and are flat along their bottom edge. Other ribs N are
 25 provided with lugs marked N¹. By the said lugs N¹ the side elevated air supplier is maintained in its correct relative position upon its bearer. The third class of rib is marked O and is hollow on its underneath edge. These
 30 are situated near the middle of the air supplier. The number of these ribs, their distance from each other, the thickness of the same and other dimensions will depend upon conditions.

35 In the middle of the furnace (see Figs. 1 and 4) is situated an intermediate bearer. This has longitudinal members P and cross pieces Q. The spaces between these are marked B¹. The door end R rests upon the
 40 dead plate Y or an extension thereof, and the bridge end S rests upon the bridge Z or an extension therefrom. Protruding from the longitudinal members are spurs D. The disposition, proportions and number of these
 45 corresponds with the spurs upon the fire bars before described. The ends of the said bearers may be provided with alining ribs E and alining grooves F, of the same character as those described in connection with the fire
 50 bars. Resting above the said intermediate bearer is an intermediate elevated air supplier. This has side walls T and a crown U. Through each end wall of the said intermediate elevated air supplier may be (see
 55 Figs. 2 and 7) an end air hole V. The area of this hole, if any, will depend upon circumstances. In its sides are side air holes W. Below the said intermediate elevated air supplier protrudes a foot X. This foot fits into
 60 the spaces B¹ formed between the longitudinal members P and the cross pieces Q of the intermediate bearer. The area of the side air holes W as also the number of the same will depend upon circumstances.

65 I do not wish to be understood as limiting

myself to the exact details of construction and arrangement described since various slight and immaterial modifications may be made therein without departing from the spirit and the scope of my invention. For
 70 instance the shape of the grate surface in plan may not be rectangular as shown, but in some instances may be constructed of a circular, octagonal, or any other suitable conformation which will be particularly appli-
 75 cable to the class of boiler to the furnace of which my invention is to be fitted.

The passage of air through my fire bars, bearers and elevated air suppliers is as follows:—A current enters the ash-pit below the
 80 furnace door or enters from any other source and some of it passes up underneath and between the fire bars. Some of it, there being no obstruction to its upward passage passes through the spaces B¹ formed between the
 85 longitudinal members and the cross pieces of the intermediate bearer. This bearer being hot heats the air. This air then passes through the foot of the intermediate elevated air supplier and passes into the interior of
 90 said elevated air supplier. It then passes outwardly through the side air holes W and on to the side of the fuel. Some air also passes through the spaces C¹ between the longitudinal members and the cross members
 95 of the side bearers. These side bearers are also hot. It rises upwardly and passes between the ribs M, N, and O. It is thereby liberated to the sides of the fuel. With my invention air not only ascends between fire
 100 bars as in the ordinary manner, but also ascends through bearers and through air suppliers above the fire bars and above the bearers.

Having now described my invention, what
 105 I claim as new and desire to secure by Letters Patent is:—

1. In combination with grate bars, a hollow bearer P arranged centrally of the grate between and parallel with the grate bars and
 110 having vertical openings; an intermediate hollow air supplier arranged over and mounted upon said bearer and having a crown and vertical slits forming air holes in its walls, and also having depending lugs en-
 115 gaging the openings in said bearer to prevent displacement of the air supplier thereon.

2. In combination, a grate, hollow side bearers at opposite sides of and parallel with the grate, side air suppliers supported upon
 120 said side bearers and each comprising a side piece adjacent the wall of the fire chamber having a series of curved lateral ribs projecting inwardly over the open spaces of the side bearers, said ribs being rounded on their
 125 upper surfaces and projecting above the surface of the grate and the central ribs standing above the end ribs.

3. In combination, a grate composed of ribbed bars; hollow side bearers G—H at
 130

each side of the grate having vertical openings, air suppliers supported upon said side bearers and each comprising a side piece L adjacent the wall of the fire chamber formed
 5 with a lateral series of inwardly extending ribs N, O, rounded on their upper surfaces and projecting above the surface of the grate and extending over the open spaces of the side bearers, the ribs N having depending
 10 lugs adapted to engage recesses in the bearers.

4. In combination, hollow side bearers, an intermediate hollow bearer parallel therewith, said bearers having vertical openings for the passage of air, and parallel fire bars
 15 arranged between said intermediate and side bearers; side air suppliers arranged above and supported upon the side bearers each comprising a plate provided with an inwardly projecting series of lateral ribs projecting above the side bearers and rising
 20 above the surface of the grate, and an intermediate air supplier resting upon the intermediate bearer and projecting above the grate and having vertical slots forming air
 25 holes in its side walls.

5. In combination, side bearers G—H—, an intermediate bearer P parallel therewith, said bearers having openings for the passage of air, parallel fire bars D arranged between
 30 the intermediate and side bearers, removable side air suppliers arranged above and supported upon the side bearers and each comprising a plate L provided with an inwardly projecting series of ribs N, O, said ribs being
 35 curved on their upper sides and projecting above the surfaces of the grate, and an in-

intermediate removable air supplier W resting upon the intermediate bearer P and projecting above the side bearers and having air holes in its walls. 40

6. Improvements in the grate surfaces of furnaces consisting of the combination of fire bars having longitudinal members, spurs protruding from said longitudinal members, a door end on each fire bar, a bridge end on
 45 each fire bar, alining ribs and alining grooves on and in said ends, side bearers having outer and inner longitudinal members, cross pieces, a door end and a bridge end, spurs protruding from the said inner longitudinal member, 50
 a shovel guide above said door end of each side bearer, a side elevated air supplier above each side bearer, said side elevated air supplier consisting of a side piece, plain and hollowed ribs, and ribs with lugs, an intermediate bearer consisting of longitudinal mem- 55
 bers, cross pieces, a door end and a bridge end, spurs protruding from said longitudinal members, an intermediate elevated air supplier above said intermediate bearer, said intermediate elevated air supplier having side 60
 walls, air holes in the side walls, a crown and a foot, all as and for the purposes hereinbefore described or as illustrated in the drawings. 65

In testimony whereof I affix my signature in the presence of two subscribing witnesses.

FRANK GOLD.

Witnesses:

EDWIN PHILLIPS,

CECIL W. J. SLASTRIER.