

No. 849,566.

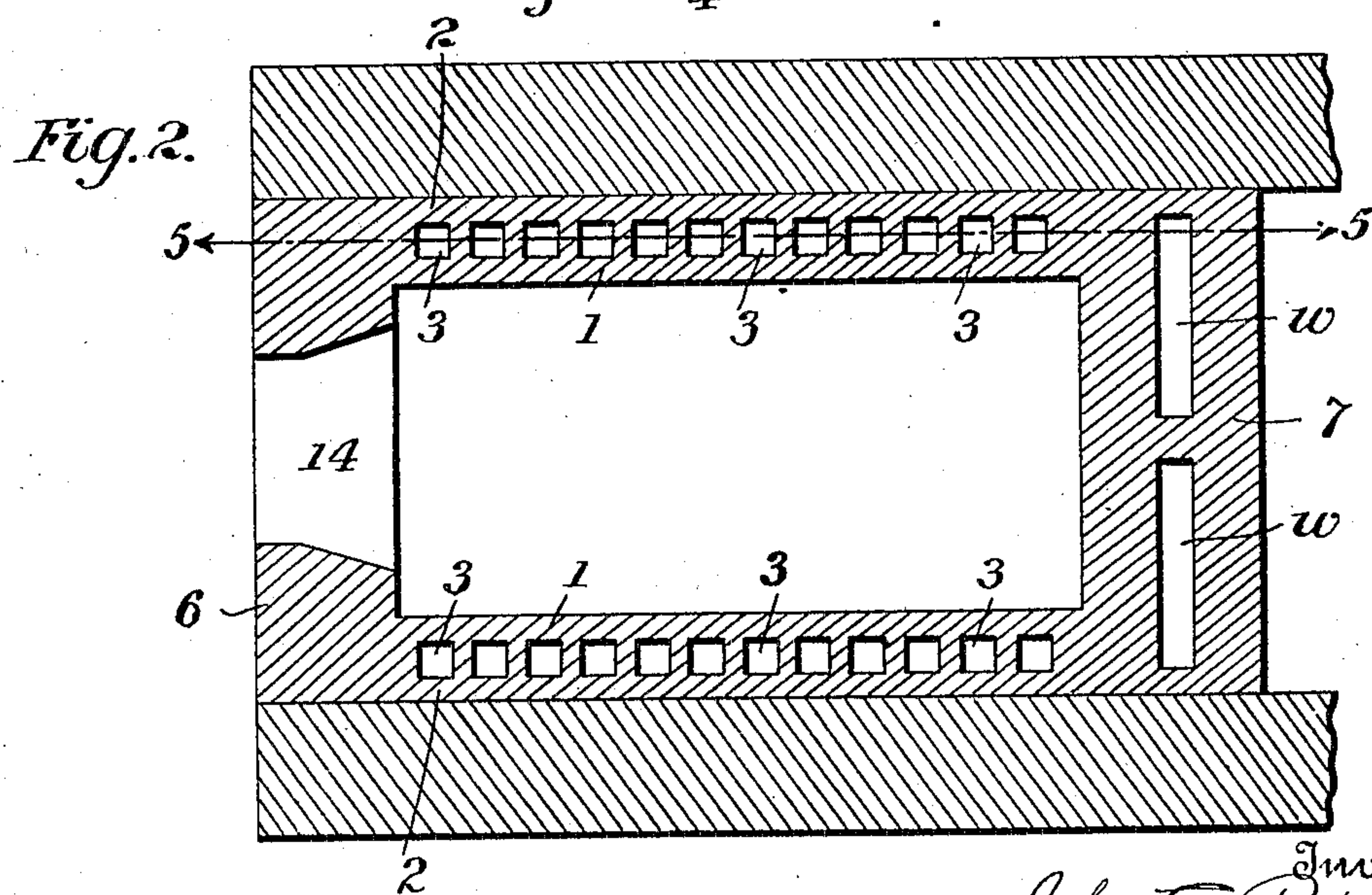
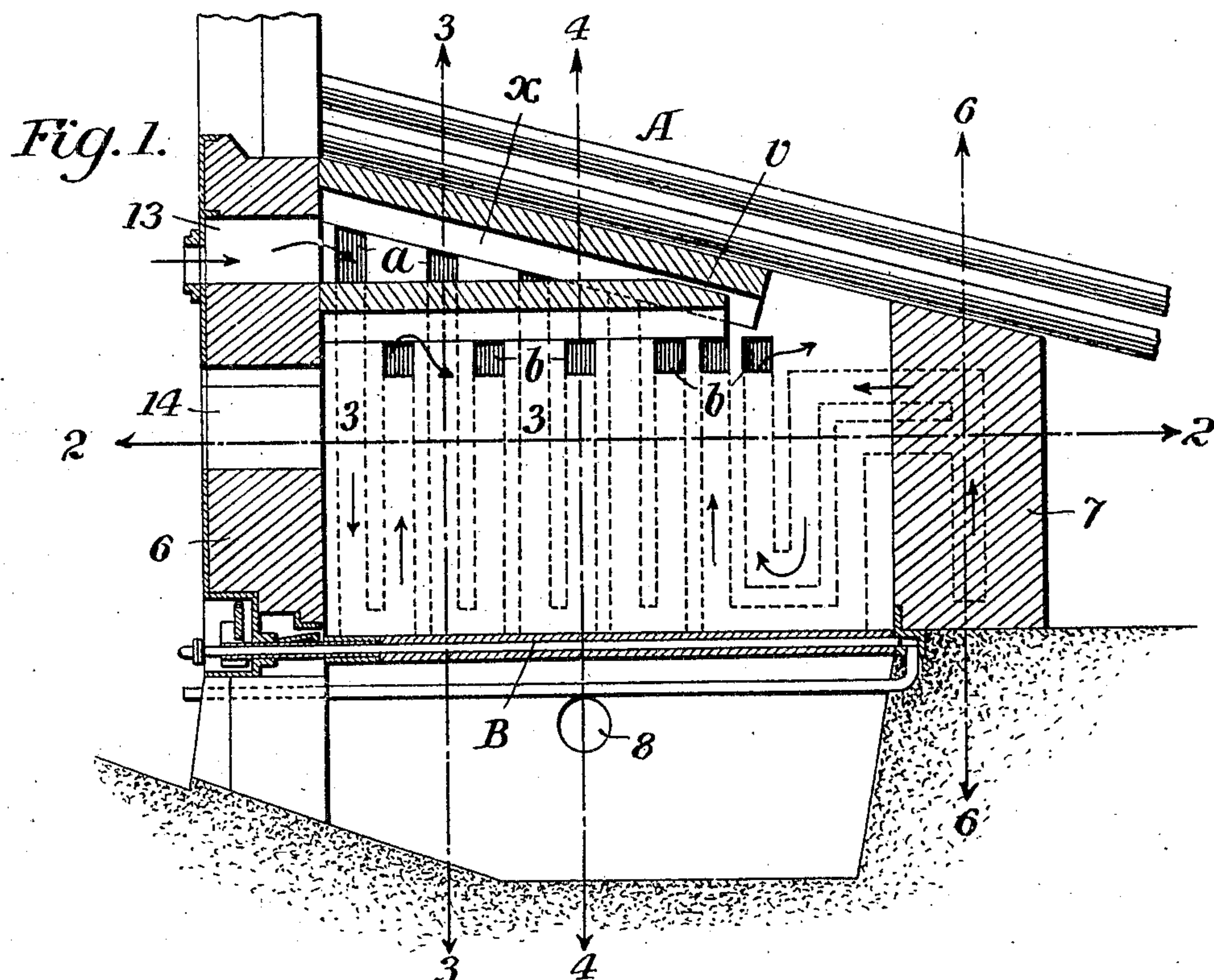
PATENTED APR. 9, 1907.

J. E. PARKISON.

## FURNACE FOR BURNING SOFT FUELS.

APPLICATION FILED JAN. 19, 1907.

2 SHEETS—SHEET 1.



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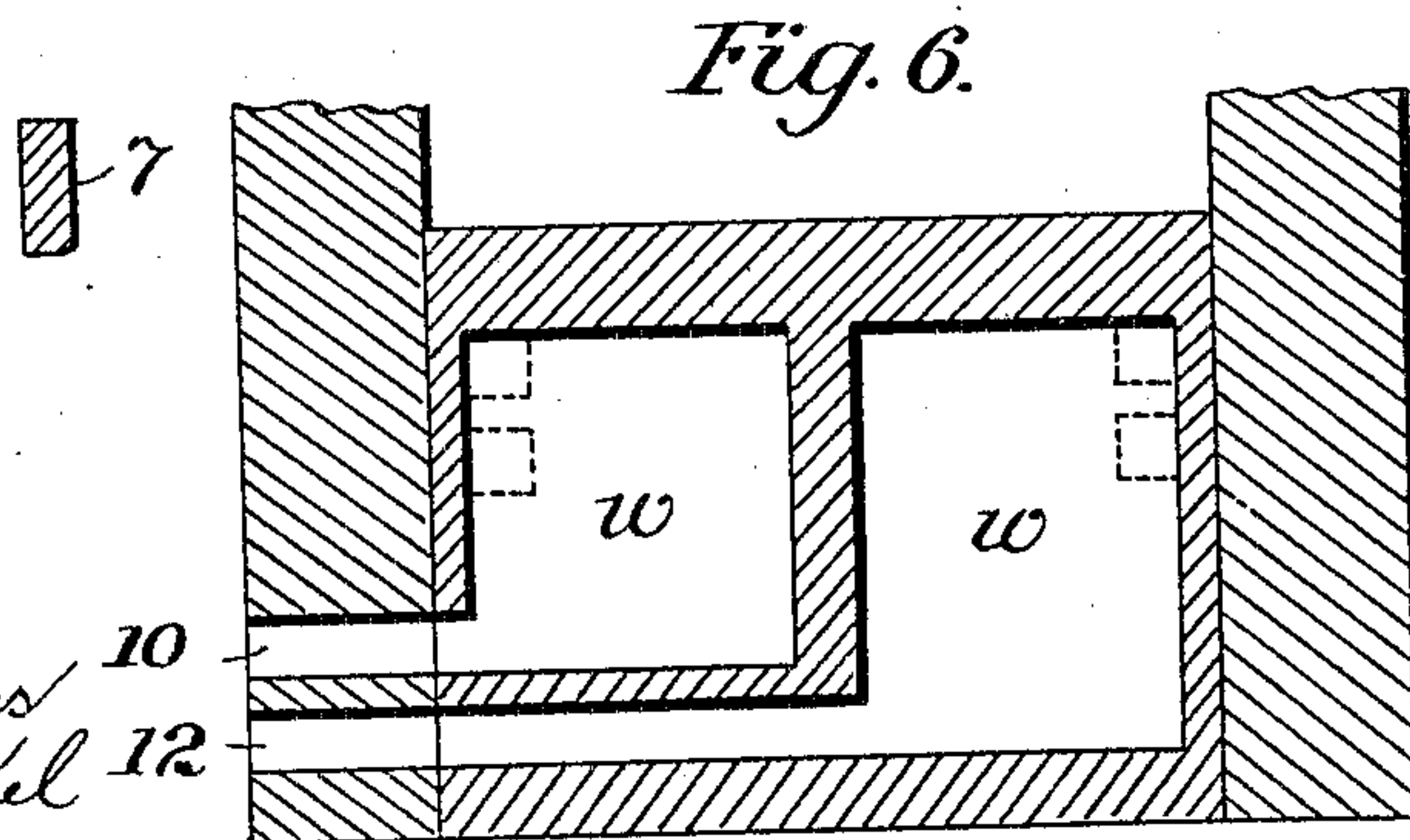
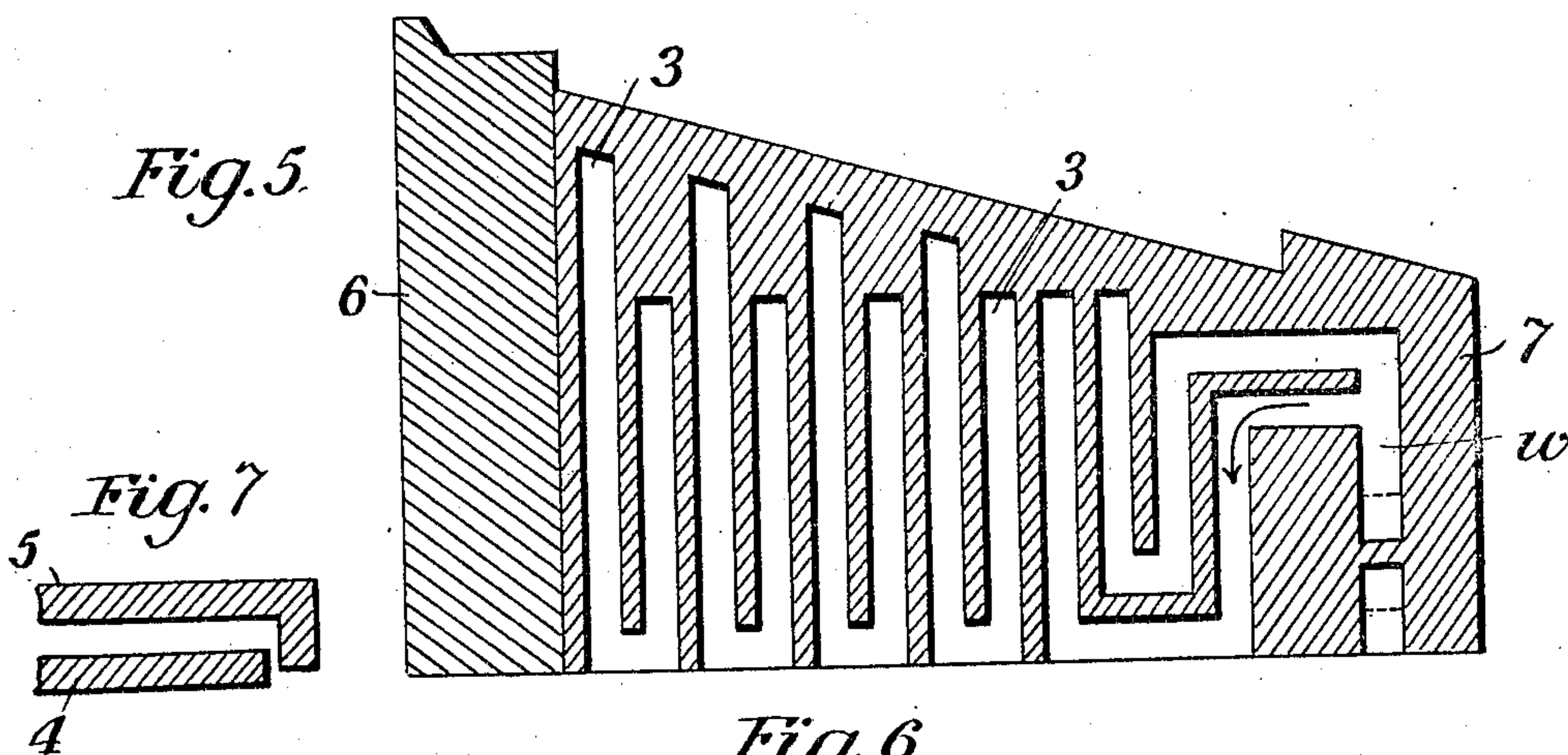
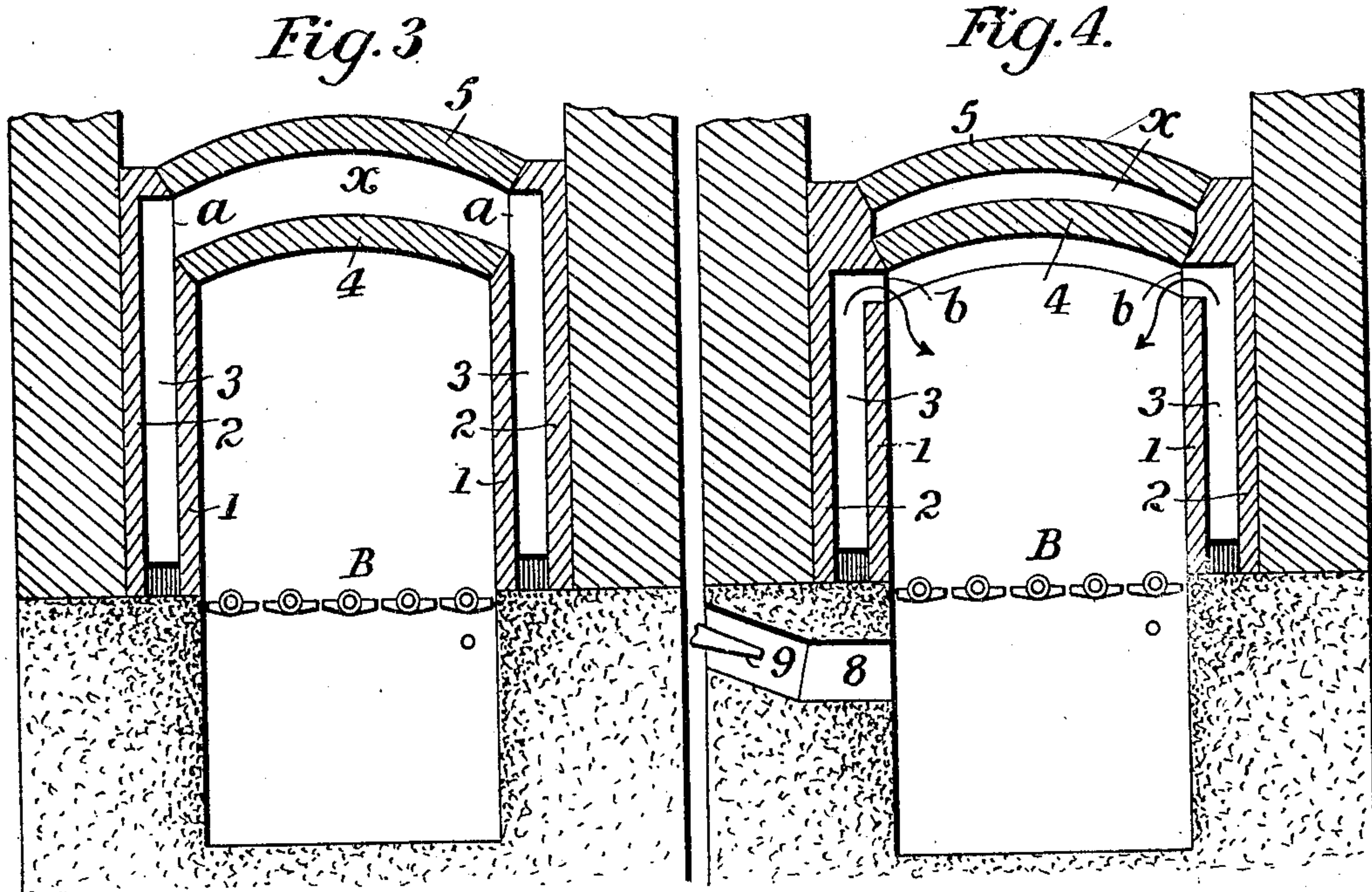


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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

JOHN E. PARKISON, OF DENVER, COLORADO, ASSIGNOR TO THE WESTERN FURNACE COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

## FURNACE FOR BURNING SOFT FUELS.

No. 849,566.

Specification of Letters Patent.

Patented April 9, 1907.

Application filed January 19, 1907. Serial No. 353,088.

*To all whom it may concern:*

Be it known that I, JOHN E. PARKISON, a citizen of the United States, and a resident of Denver, Denver county, Colorado, have invented certain new and useful Improvements in Furnaces for Burning Soft Fuels, of which the following is a specification.

My invention relates to furnaces for heating boilers or roasting ore or any other purpose, intended primarily for use with soft coal or lignite, which give off large volumes of gases at a comparatively low heat, and has for its object to supply the gases as fast as generated with such an abundant supply of highly-heated air as will insure the combustion of the gases and the prevention of smoke, and to this end my furnace is constructed with side walls and U-shaped flues through which air is admitted, and otherwise, as fully set forth hereinafter, and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved furnace, showing the same as applied for heating a boiler. Fig. 2 is a sectional plan on the line 2 2, Fig. 1. Figs. 3, 4, 5, and 6 are sections on the lines 3 3, 4 4, 5 5, and 6 6, respectively, of the other figures; and Fig. 7 is a view illustrating a modified arrangement of the arches.

The walls of the furnace are of brick, there being at each side two parallel walls 1 2 with vertical flues 3 between them, the walls 1 1 meeting the top or arch 4 and the walls 2 2 the parallel top or arch 5, between which arches is an intervening chamber or flue *x*, and there is a front wall 6 and a bridge-wall 7, and above these parts are the flues of the boiler A if the furnace is for heating a boiler or supports for ore or other construction, according to the purpose for which the furnace may be employed.

The chamber between the wall 1 1 is divided by a suitable grate B, a water-cooled grate being shown, so as to form the combustion-chamber above the grate and the ash-pit below the grate, and if a forced draft is required the air may be forced into the ash-pit through an opening 8 by means of a jet from a steam-nozzle 9 or in any other suitable manner.

Each of the side flues 3 is U-shaped, the longer branch communicating at the upper end with the chamber *x* through an opening

*a*, while the other end communicates with the combustion-chamber at a point just below the fire-arch 4, and as it is desired in some instances to provide side flues at a point beyond the termination of the chamber *x* these flues may receive air from chambers *w w* formed in the bridge-wall and to which air is admitted through side openings 10 12, as best shown in Fig. 6.

Air is admitted to the chamber *x* through an opening 13, which is best formed in the front wall 6, and this wall has an opening 14, through which the fuel may be introduced into the fire-chamber.

The upper arch or top 5 extends rearward beyond the lower arch, and the two are arranged at the rear end in such close proximity as to form a narrow opening *v*, the arches in no case meeting the bridge-wall, so as to allow for the passage of the gases and products of combustion between the ends of the arches and the bridge-wall and upward to heat the boiler or other object. Where the upper arch 5 is inclined in respect to the lower or fire arch, the latter is beveled near the end to form a flat face which is parallel to, but distant from, the lower face of the arch 5, sufficient space being left between the two to permit the expansion of the lower arch in consequence of the greater degree of heat to which it is subjected without disturbing the upper arch and also without closing the space between to an undue extent. Where it is desirable to have the upper arch parallel to the lower, it is turned down at the end opposite the lower arch, as illustrated in Fig. 7.

In the operation of the structure above described the gases and products of combustion which are given off rapidly and in great volume where lignite or soft coal is employed must, in order to be burned successfully, be supplied with hot air in large quantities introduced at the point where the greatest combustion should take place, and this is effected in the construction described because the air admitted to the opening 13 passes in contact with the fire-arch 4 and is highly heated and passes down through the openings *a* to the lower ends of the U-shaped flues 3 and then up and is discharged through the openings *b* directly against the highly-heated arch 4, with the result that the air is heated to a very high degree before being injected



into the products of combustion, while in turn it tends to prevent the burning out of the side walls and of the fire-arch by taking up the excessive heat imparted to the same.

5 A like result ensues in connection with the bridge-wall, where the air is heated in the chambers *w* and discharged through the upper openings of the U-shaped flues into the products of combustion near the ends of the  
10 arches, while a thin stream of highly-heated air flows from the chamber *x* through the narrow space or channel between the two arches and is carried downward by the projecting portion of the upper arch, so as to be  
15 injected or deflected into the gases passing from the fuel to supply the oxygen required to insure proper combustion before the said gases pass from the furnace itself to the boiler or other object to be heated.

20 By making the flues U-shaped, as described, I not only provide tortuous and longer passages for the air, in which it can be thoroughly heated, but insure the proper automatic discharge, as the colder air will naturally flow down the longer portions of the  
25 flues, while as it becomes heated it will ascend in the shorter portions and be projected against the hot fire-arch.

Without limiting myself to the precise construction and arrangement of parts hereinbefore described, I claim as my invention—

1. A furnace provided with side walls having openings and with two separated arches, an air-inlet to the space between the arches,  
35 and a series of U-shaped flues in each side

wall, the upper ends of said flues communicating with the space between the arches, and the lower ends with the interior of the furnace through openings below the lower arch.

2. The combination in a furnace, of side walls having openings and provided with a series of U-shaped flues, and separated arches between said walls, each flue communicating at one end with the space between the arches, 40 and at the other with the interior of the furnace through an opening below the lower arch, the upper arch extending beyond the lower arch, in position to leave a narrow air-discharge channel between the two, for the 50 purpose set forth.

3. The combination in a furnace, of side walls having openings and provided with U-shaped flues, separated arches between the walls, each flue communicating with the 55 space between the arches at one end and at the other with the interior of the furnace through an opening below the lower arch, additional U-shaped flues in the side walls beyond the arches, and a bridge-wall provided with chambers and air-inlets thereto 60 and communicating with said additional flues.

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

JOHN E. PARKISON.

Witnesses:

CHARLES E. FOSTER,  
ARTHUR L. BRYANT.