

No. 634,916.

Patented Oct. 17, 1899.

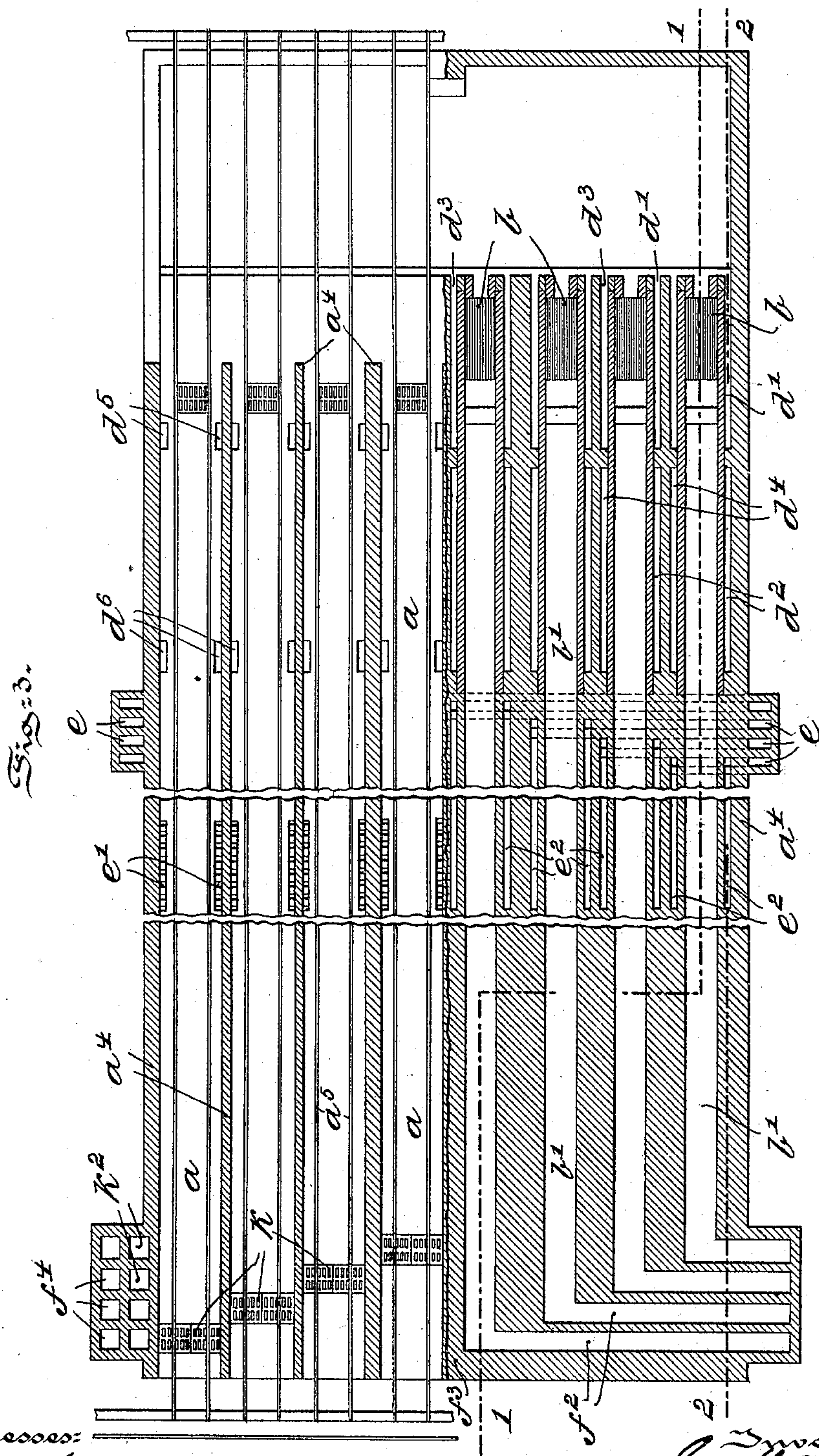
G. W. SHARER.

DRYING KILN.

(Application filed Aug. 2, 1899.)

(No Model.)

8 Sheets—Sheet 2.



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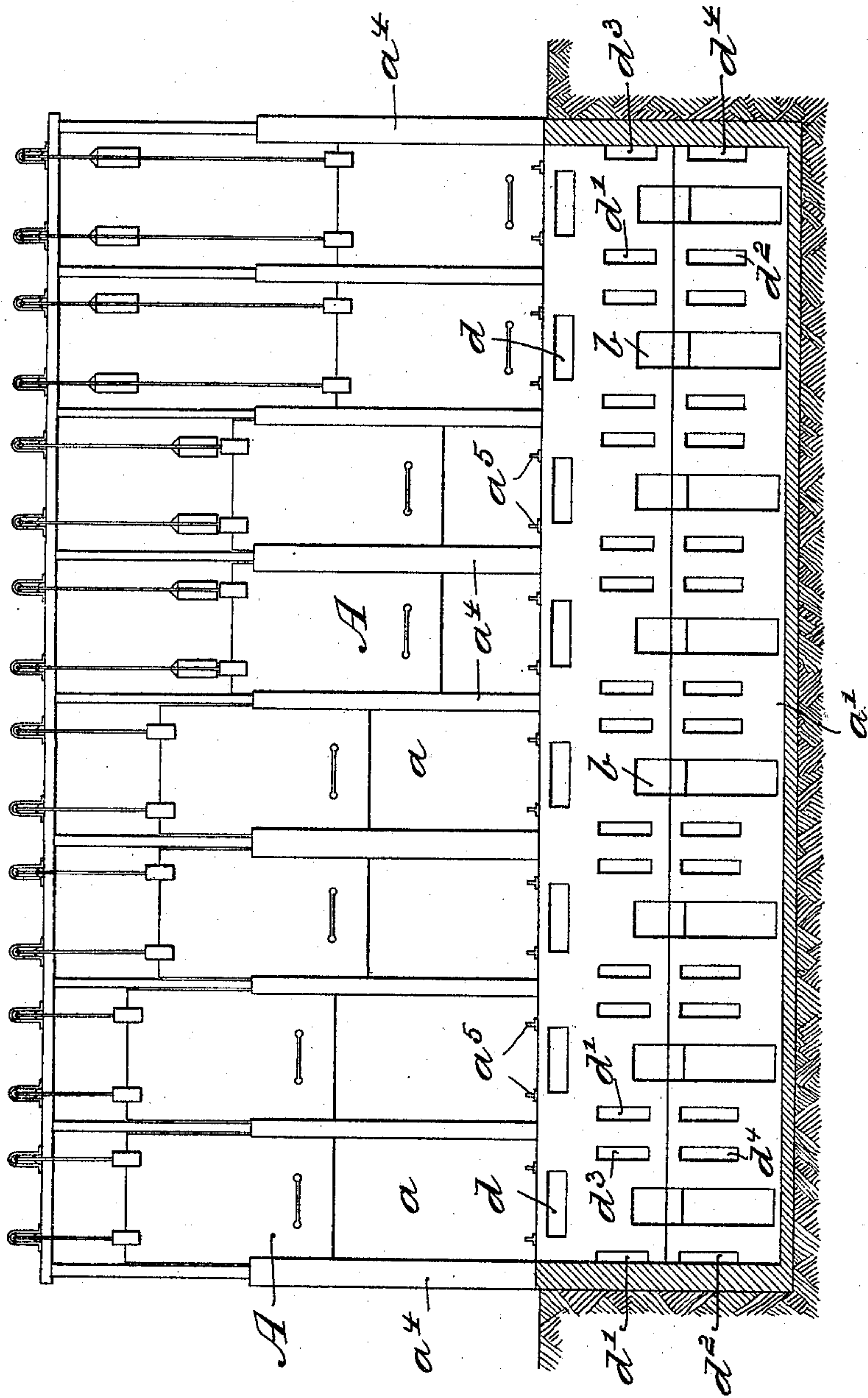
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8 Sheets—Sheet 3.

Fig. 4.



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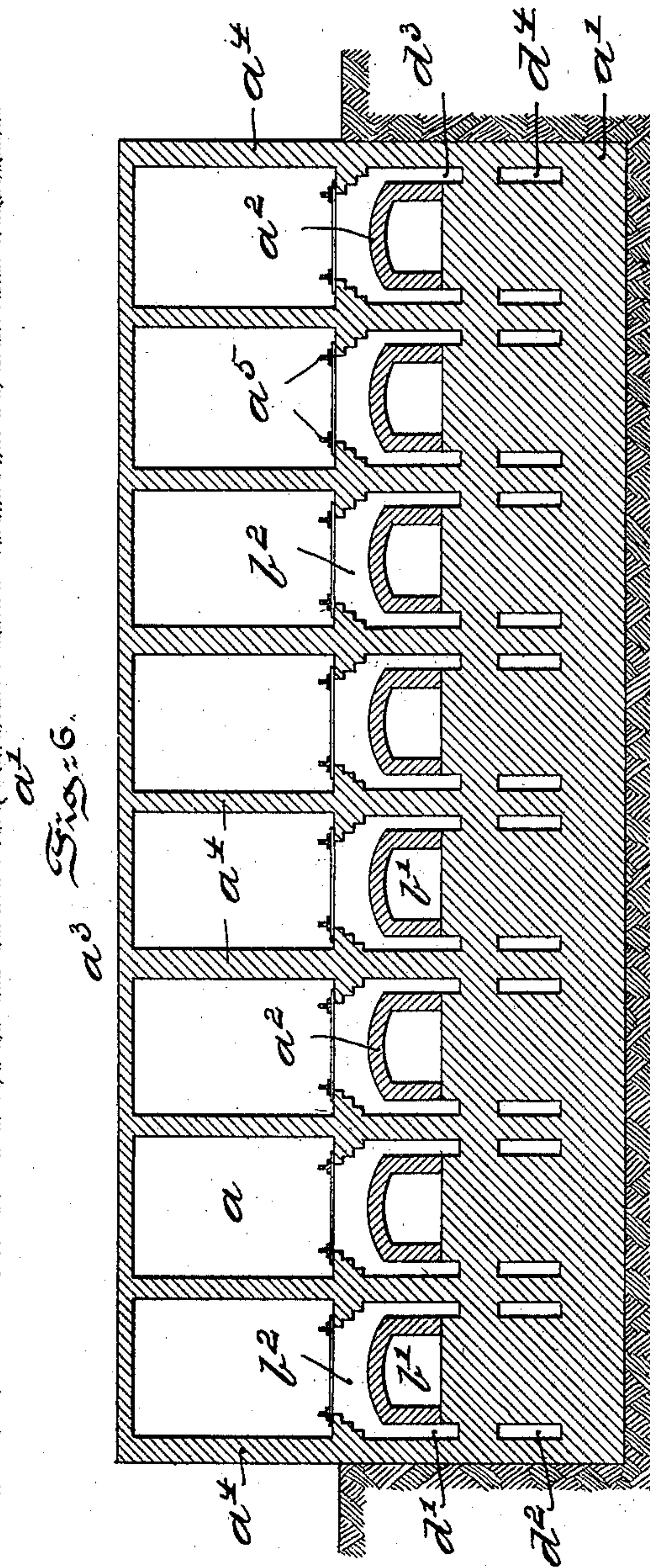
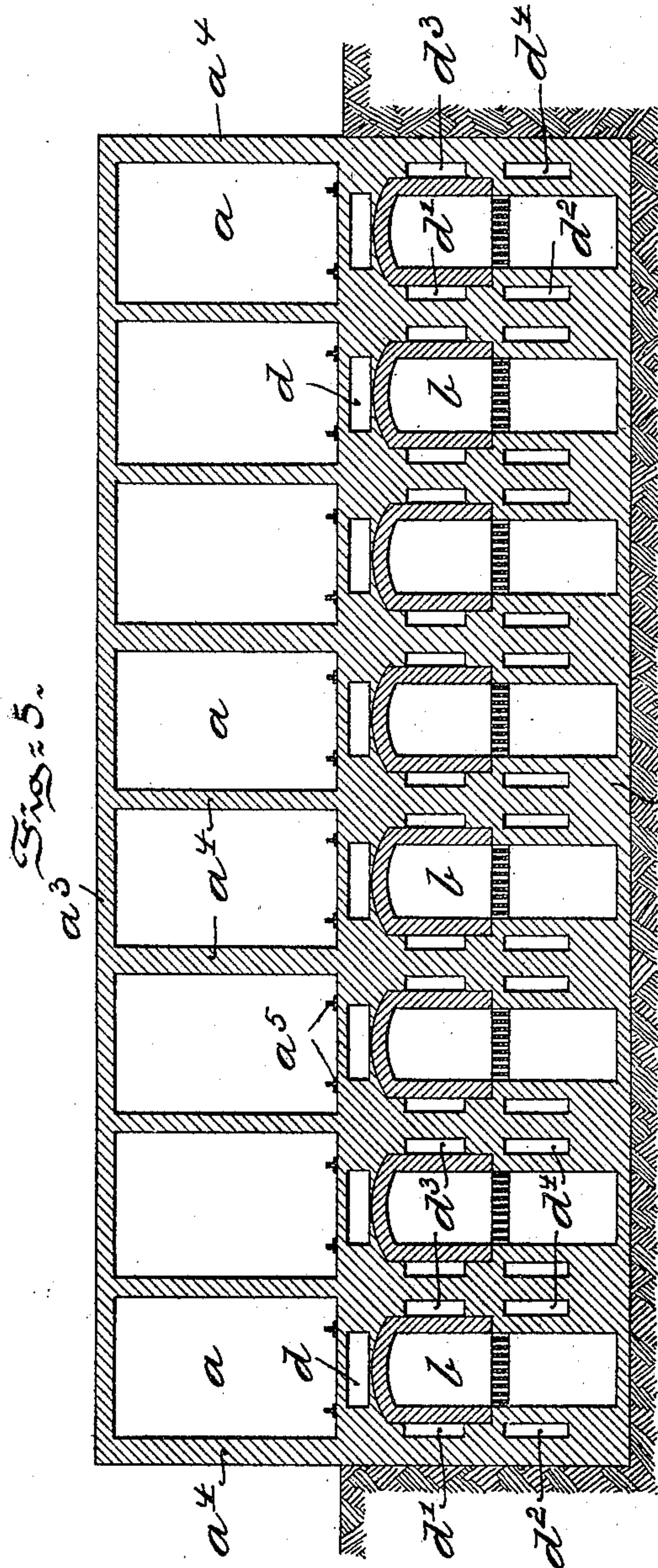
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8 Sheets—Sheet 4.



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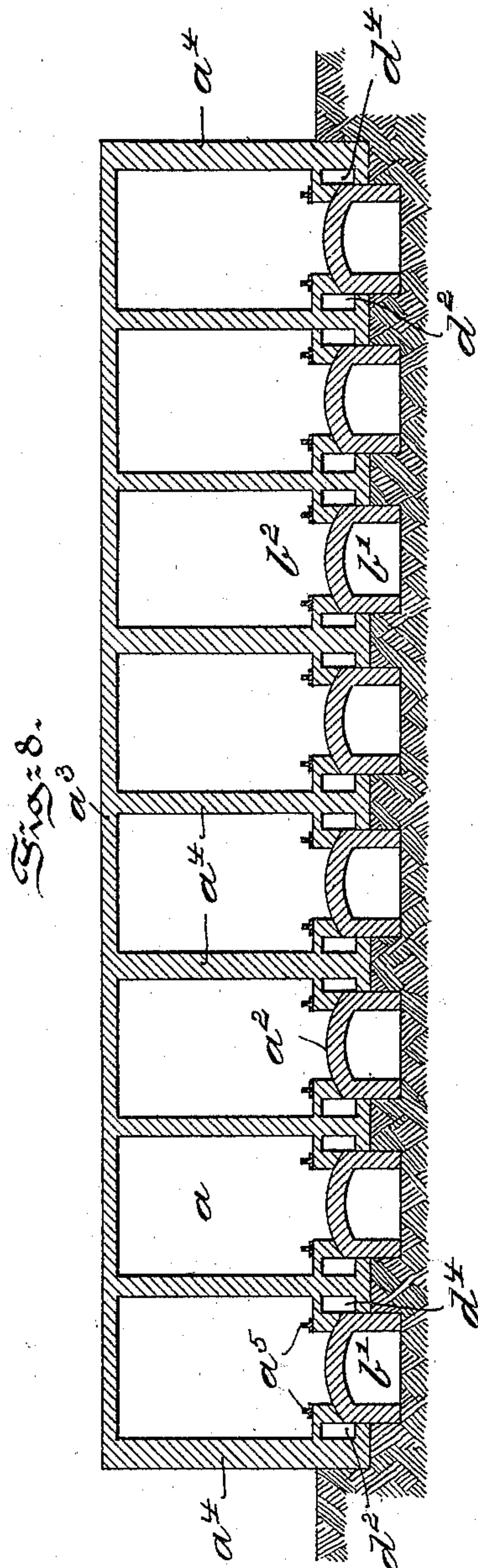
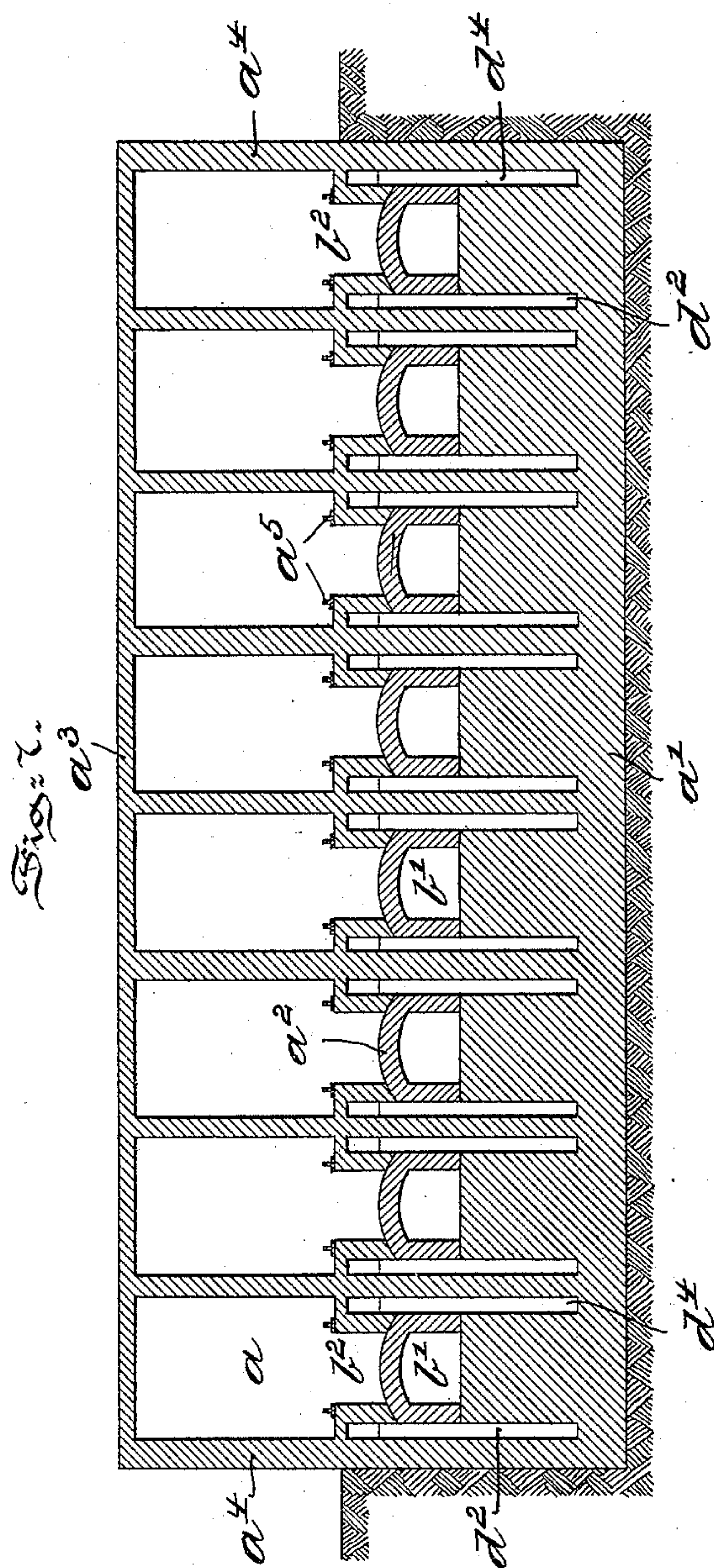
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(No Model.)

8 Sheets—Sheet 5.



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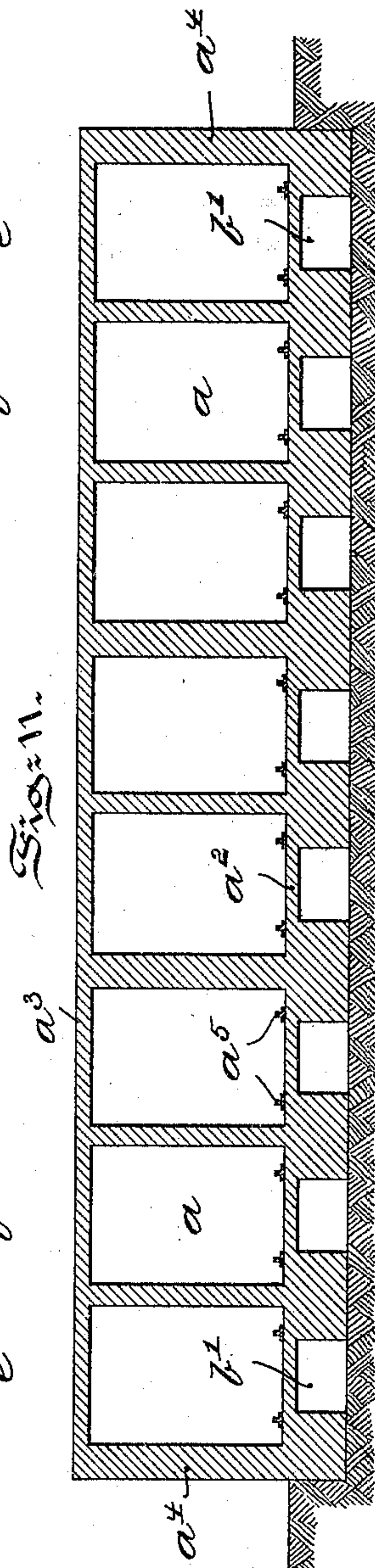
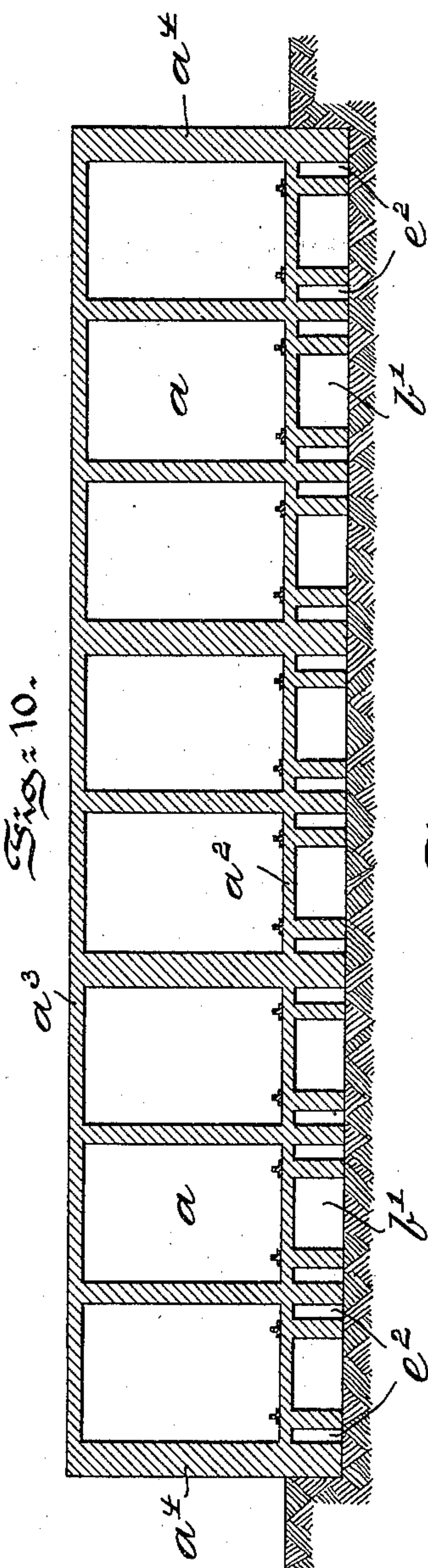
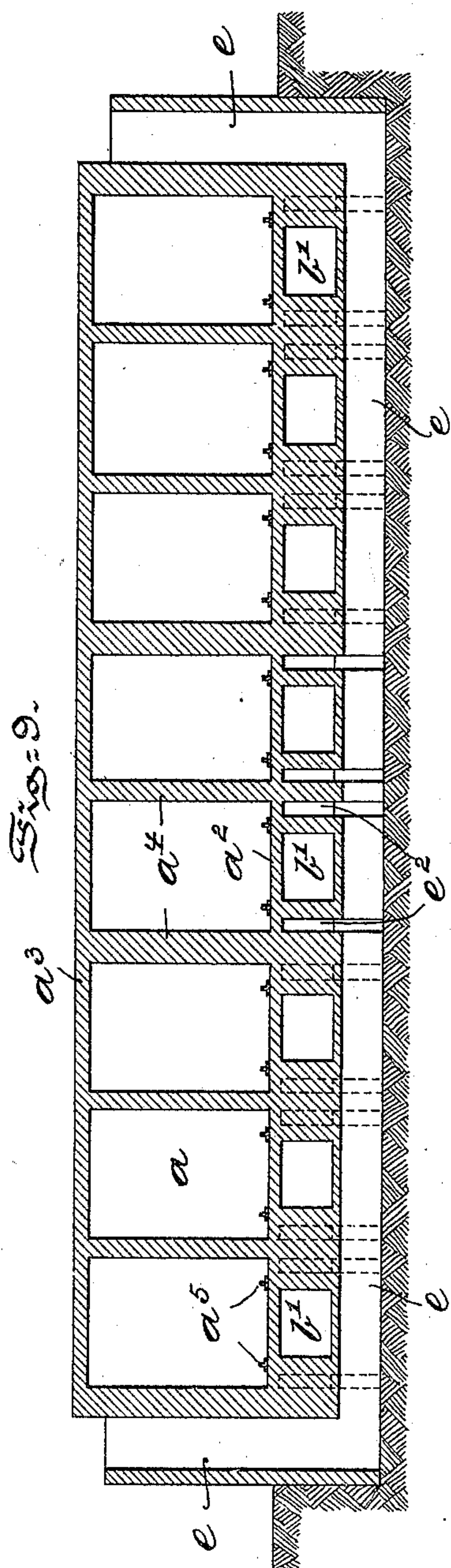
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(Application filed Aug. 2, 1899.)

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8 Sheets—Sheet 6.



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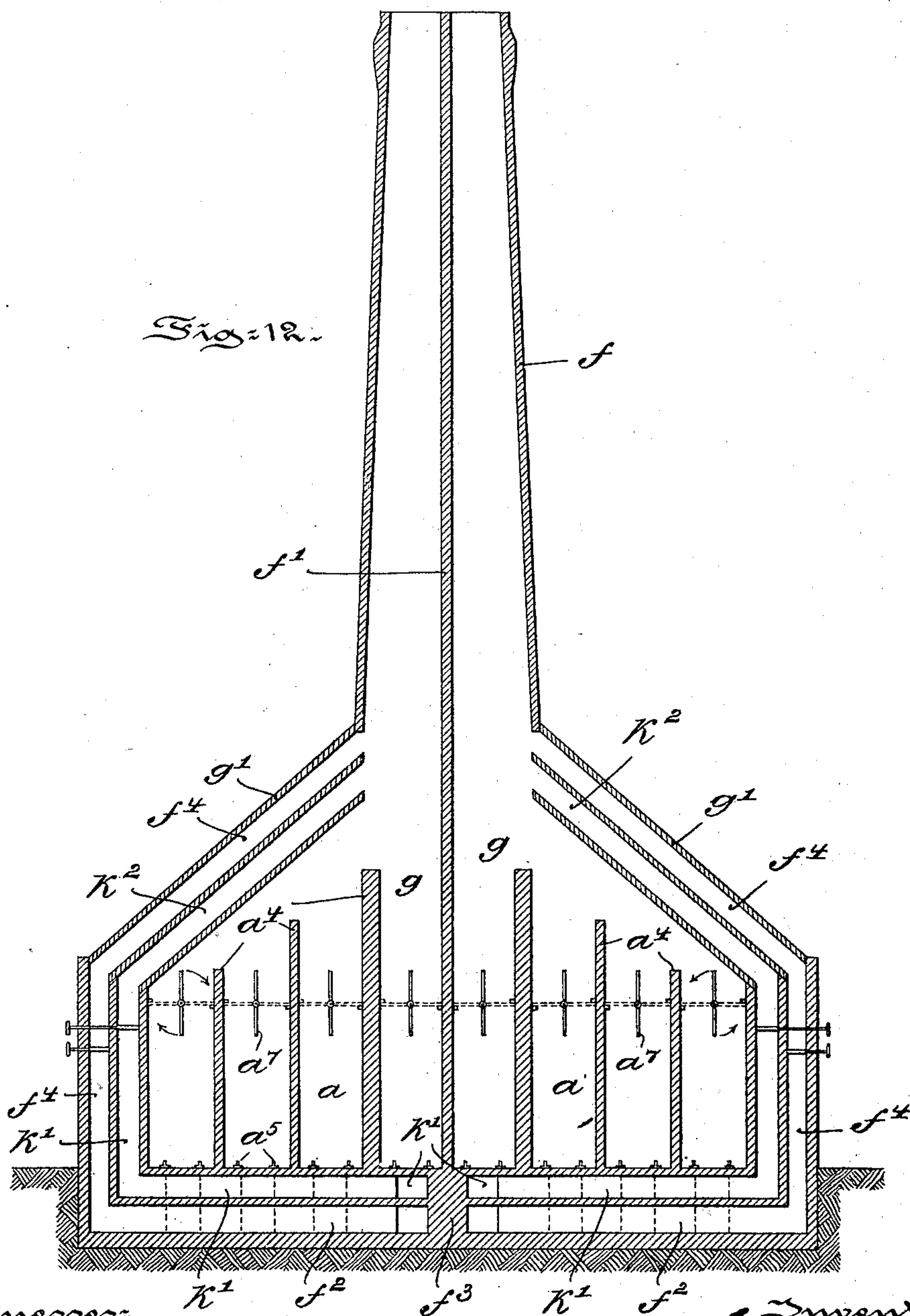
G. W. SHARER.

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8 Sheets—Sheet 7.



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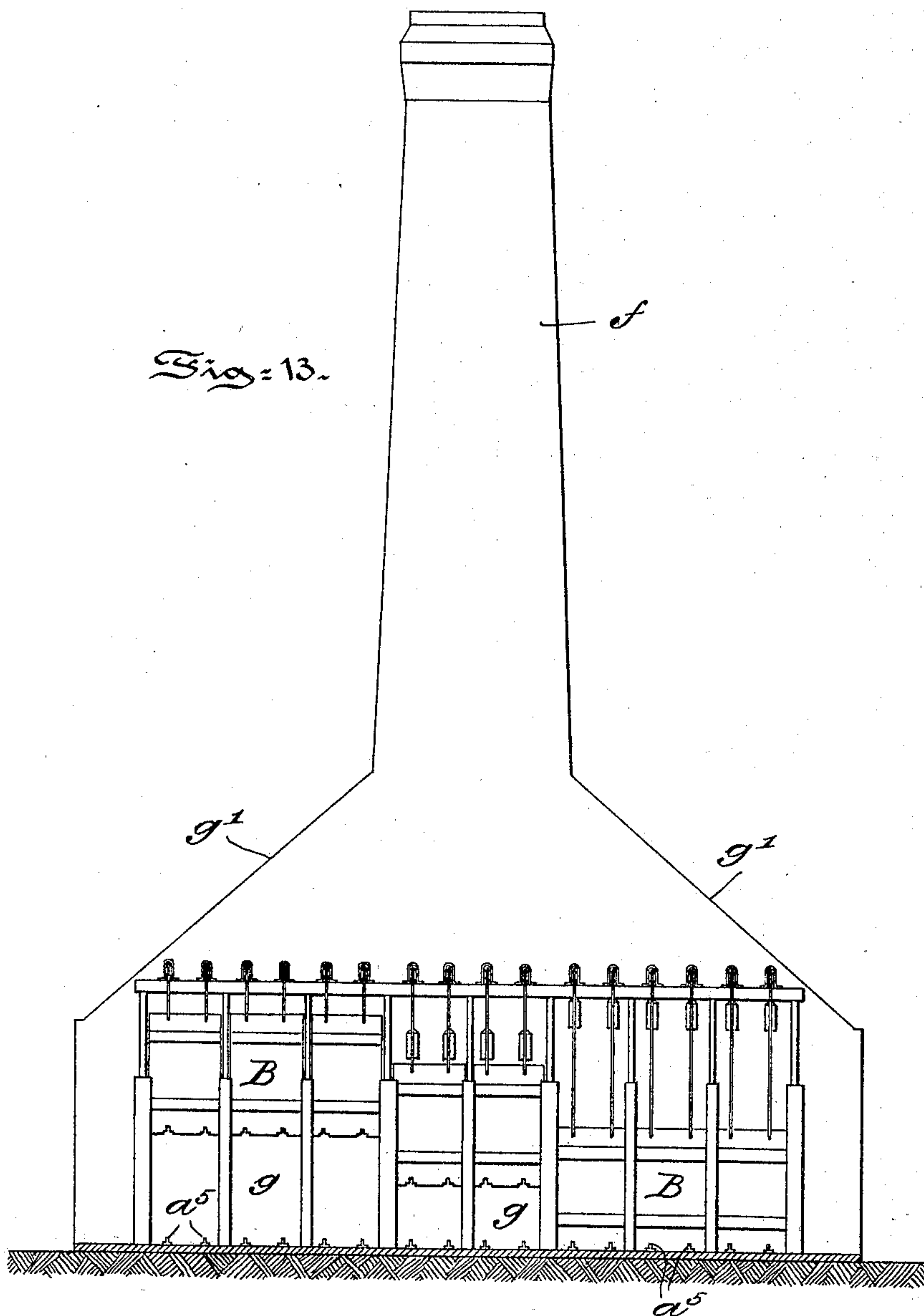
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G. W. SHARER.
DRYING KILN.

(Application filed Aug. 2, 1899.)

(No Model.)

8 Sheets—Sheet 8.



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UNITED STATES PATENT OFFICE.

GEORGE W. SHARER, OF PHILADELPHIA, PENNSYLVANIA.

DRYING-KILN.

SPECIFICATION forming part of Letters Patent No. 634,916, dated October 17, 1899.

Application filed August 2, 1899. Serial No. 725,842. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SHARER, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Drying-Kilns, of which the following is a specification.

My invention has relation to a drier or kiln wherein brick, tile, pottery, and materials of various descriptions may be quickly and readily dried, and in such connection it relates more particularly to the construction and arrangement of such a drier or kiln.

The principal objects of my invention are, first, to provide a drier having a series of drying-chambers and an offtake-stack divided by a vertical strengthening partition or wall into two sections, one of the stack-sections being in communication with one half the series of drying-chambers, while the other stack-section is in communication with the other of said chambers. Each of the chambers is provided with dampers for opening or closing the exit for the air from each chamber into the stack. As each chamber is closed by a damper for controlling the exit of the heated air to the stack, all the other chambers of the furnace or drier may be in use or out of use without affecting the action of that chamber or any others in use, for it is to be understood that each chamber according to my invention may be used without affecting or in any way interfering with the other chambers of the drier either in or out of use; second, in providing in a drier of the character described, at the feed or entrance end of each drying-chamber, a vapor-chamber the roof whereof is upwardly inclined toward the offtake-stack, whereby the moist-charged air is upwardly and rapidly conducted away from the entrance, and thereby prevented from coming into contact with the freshly-introduced materials; third, in providing in such a drier a smoke-stack having at its base a vapor-chamber forming a continuation of the stack and connecting each drying-chamber with the stack and arranged so as to readily conduct the vapor into the vapor-chamber, the air in the drying-chambers, and the smoke from the smoke-flues to the exterior of the drier without commingling the vapor, air, and smoke,

and, fourth, to provide in such a drier having a series of separate drying-chambers a set of smoke-flues arranged below the floor of the chambers, a series of air-flues for each chamber arranged at the sides and top of the furnace proper, said flues terminating at different points in each drying-chamber, a second series of air-flues surrounding the drier and jacketing the smoke-flues, said second series of air-flues adapted to conduct air directly from the exterior of the drier to each of the drying-chambers, offtake-flues arranged at the feed end of each drying-chamber and communicating from the bottom of the drying-chambers to a stack, said stack being normally in open communication with the top of each drying-chamber, and means for cutting off the direct draft upward from the drying-chamber to the stack, whereby the air is forced downward through the offtake-flues.

My invention stated in general terms consists of a drier or kiln constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a longitudinal sectional view of a drier or kiln embodying the main features of my invention, the section being taken on the line 1 1 of Fig. 3. Fig. 2 is a similar view on the line 2 2 of Fig. 3. Fig. 3 is a sectional view of the drier, taken in horizontal planes, one of which passes above and the other below the floor of the drying-chambers. Fig. 4 is a vertical sectional view of the drier or kiln on a plane represented by the lines 4 4 of either Fig. 1 or Fig. 2. Figs. 5, 6, 7, 8, 9, 10, 11, and 12 are similar vertical sectional views on the respective lines 5 5, 6 6, 7 7, 8 8, 9 9, 10 10, 11 11, and 12 12 of either Fig. 1 or Fig. 2; and Fig. 13 is an end elevational view of the feeding end of the drier or kiln.

Referring to the drawings, the drying-chambers a are arranged upon a common foundation a' , and each comprises a floor a^2 , a roof a^3 , preferably of brick, and side walls a^4 , thus making each drying-chamber separate and distinct from the others. On the floor a^2 of each chamber are arranged the tracks

a^5 , upon which runs the truck or car (not shown) carrying the material to be dried. In driers of the type herein described there is located at the exit end of each drying-chamber a and below the floor-level thereof a furnace b , having a main smoke-flue b' extending, as illustrated in Fig. 1, from end to end of the structure, the roof of said flue forming the base of the floor a^2 of the drying-chamber a . The smoke-flue b' thus serves to heat the floor a^2 of the chamber from end to end. In addition to the heat thus radiated into each chamber a there is provided in the present device means for conducting heated air directly into each drying-chamber at various points in its length. This is accomplished by means of several air-ducts, of which one duct d is located directly above the furnace b and heated thereby, said duct d being open at both ends and terminating in the floor a^2 of the chamber at a point most contiguous to the exit-gate A of the chamber. A second set of air-ducts d' and d^2 are arranged on one side of the furnace b , with one duct d' above the other duct d^2 , and a third set of ducts d^3 and d^4 are similarly arranged on the other side of the furnace b , as clearly illustrated in Figs. 1, 2, and 4.

The upper ducts d' and d^3 enter the chamber a at the points d^5 d^5 , slightly beyond the point where the upper air-duct d enters said chamber, and the lower ducts d^2 d^4 enter the chamber a at the points d^6 d^6 , beyond the points d^5 d^5 . In addition to the air-ducts d d' d^2 d^3 d^4 another air-duct e is adapted to enter the chamber a at the point e' approximately midway of the ends of said chamber. The duct e has an opening at either end for the entrance of air from the exterior of the drier and also has midway of its ends the outlet e^2 , which traverse the floor of the chamber a on either side of the smoke-flue b' . The duct e and its outlets e^2 surround or jacket the smoke-flue b' , leading from the furnace b , as clearly illustrated in Figs. 1, 2, 3, and 9. To further increase the heat radiation from the furnace b and its flue b' into the chamber a , the flue b' as it leaves the furnace is upwardly inclined from a point considerably below the floor a^2 of the chamber a to a point where it forms, in fact, said floor. The inclined space b^2 thus formed at the base of the chamber a is clearly illustrated in Fig. 1 and serves to hold a considerable body of air in equilibrium and presents it to the heated smoke-flue.

So far as described it will be understood that one of the principal features of my present invention resides in the heating of the chamber a both by radiation from the furnace and smoke-flue as well as by the discharge of heated air into the chamber at various points in its length. Thus by radiation the chamber is heated by the flue b' for almost its entire length, and in addition thereto it is heated by the still air held in the space b^2 , adjacent to the rear of the furnace b and to

the smoke-flue b' . The chamber also receives heated air from ducts d , d' , d^2 , d^3 , and d^4 and from duct e at various points lengthwise of the chamber.

The material to be dried is placed in a chamber a by being inserted through a door B at the entrance end of the drier, which is the end opposite to that at which the furnace b is located. At the entrance end of the drier is located a stack f , below which the chamber a is enlarged into a vapor-chamber g , the pent-roof g' of which is inclined downward from the stack f to where it meets the main roof a^3 of the chamber a . In this vapor-chamber g the article to be dried is first placed, and the vapor driven off during the subsequent manipulation of the article collects at the apex of the roof g' and is conducted away by the stack f before it can be driven against succeeding articles. The abnormally hot air driven through the chamber a is likewise led off at the top of the vapor-chamber g to the stack, and is thereby prevented from coming into contact with fresh articles. As a consequence of this arrangement the articles when first placed in the drier are heated only by the radiation from the smoke-flue below the floor of the chamber a , and hence will dry more slowly and give off their moisture more readily. The articles, not being subjected to drafts of hot air, are thus not liable to either crack, warp, or case-harden.

As illustrated in Fig. 12, the stack f is separated into two sections by a vertical strengthening partition or wall f' , and each section of the stack is in direct communication by means of the respective vapor-chambers g with half of the series of drying-chambers. The various smoke-flues b' do not discharge directly into the stack f , but enter a horizontally and transversely arranged enlargement f^2 , below the base of the vapor-chamber on either side of a vertical partition f^3 . Along the sides and the pent-roof of the vapor-chamber g are arranged flues f^4 , which lead from the enlargement f^2 to the base of the stack f . The vapor-chamber g is thus blanketed or jacketed by the smoke-flues f^2 and f^4 . The heated air traversing the chambers a normally escapes from the top of said chambers a into the pent-roof g' of the vapor-chamber g and thence rises directly into the stack f from below the smoke-flues f^4 . This is what is known as an "up-draft" and is used where the articles are to be subjected to a constant volume of highly-heated air. To regulate and, if desired, entirely shut off this updraft, the chambers a are provided with dampers a^7 at or near their roofs, as illustrated in Fig. 12. In devices of this character it is frequently desirable to change in the chambers a the updraft to a downdraft. To enable this to be done, in the floor of the vapor-chamber g is located at the base of each chamber a a grating or opening k , leading into a horizontally and transversely arranged compartment or air-flue k' , located between the smoke-compartment f^2 and the

floor of the vapor-chamber g . This air-flue k' communicates by means of the inclined flues k^2 , located along the pent-roof g' of the vapor-chamber g below the corresponding smoke-flues f^4 , with the stack f at points below the entrance of the flues f^4 into said stack. When now the dampers a^7 are closed, the air in the chambers a passes down through the openings k into the air-flues k' and is from thence discharged by the flues k^2 into the stack f .

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—
 1. In a drying-kiln, a drying-chamber, a furnace and its smoke-flue adapted to heat said drying-chamber directly by radiation, a series of air-ducts located alongside the furnace and leading from the exterior of the kiln to the base of the drying-chamber at points more or less remote from the exit end thereof, and a secondary air-duct having both ends open to the external atmosphere and an inlet between its ends in communication with the interior of the drying-chamber, said secondary air-duct surrounding and blanketing the smoke-flue, substantially as and for the purposes described.

2. In a drying-kiln, a drying-chamber, a smoke-flue arranged along the base of said

drying-chamber, a vapor-chamber formed at the entrance end of the drying-chamber and having a roof for the collection of vapor arising in said chamber, a combination-stack in direct communication with the roof of the vapor-chamber, flues adapted to conduct smoke from the smoke-flue to said stack and flues independent of the smoke-flues adapted to conduct heated air from the drying-chamber to the stack without commingling the same in the drying or vapor chambers, substantially as and for the purposes described.

3. In a drying-kiln, a series of separate drying-chambers each adapted to be independently heated by radiation and by separate air-ducts heated by an individual furnace and smoke-flue, an offtake-stack divided into two sections by a vertically-arranged strengthening-partition, each section of the stack being in direct communication with the smoke-flues and interior of one-half only of the drying-chambers, substantially as and for the purposes described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

GEO. W. SHARER.

Witnesses:

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