

L. E. RODGERS.

DRIER.

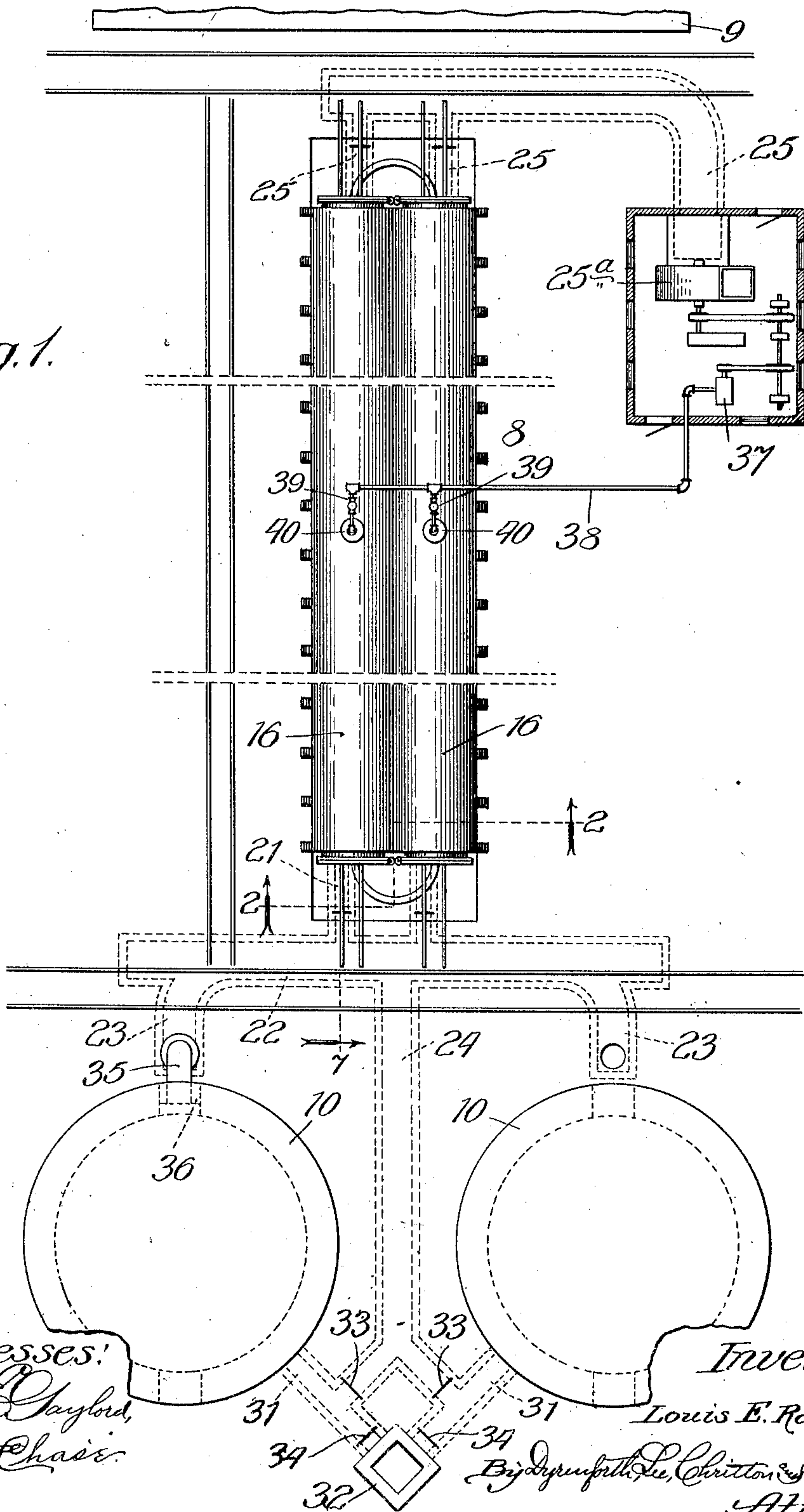
APPLICATION FILED JAN. 7, 1911.

996,943.

Patented July 4, 1911.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:  
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Inventor:

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By *Edmund L. Christon & Wiles*  
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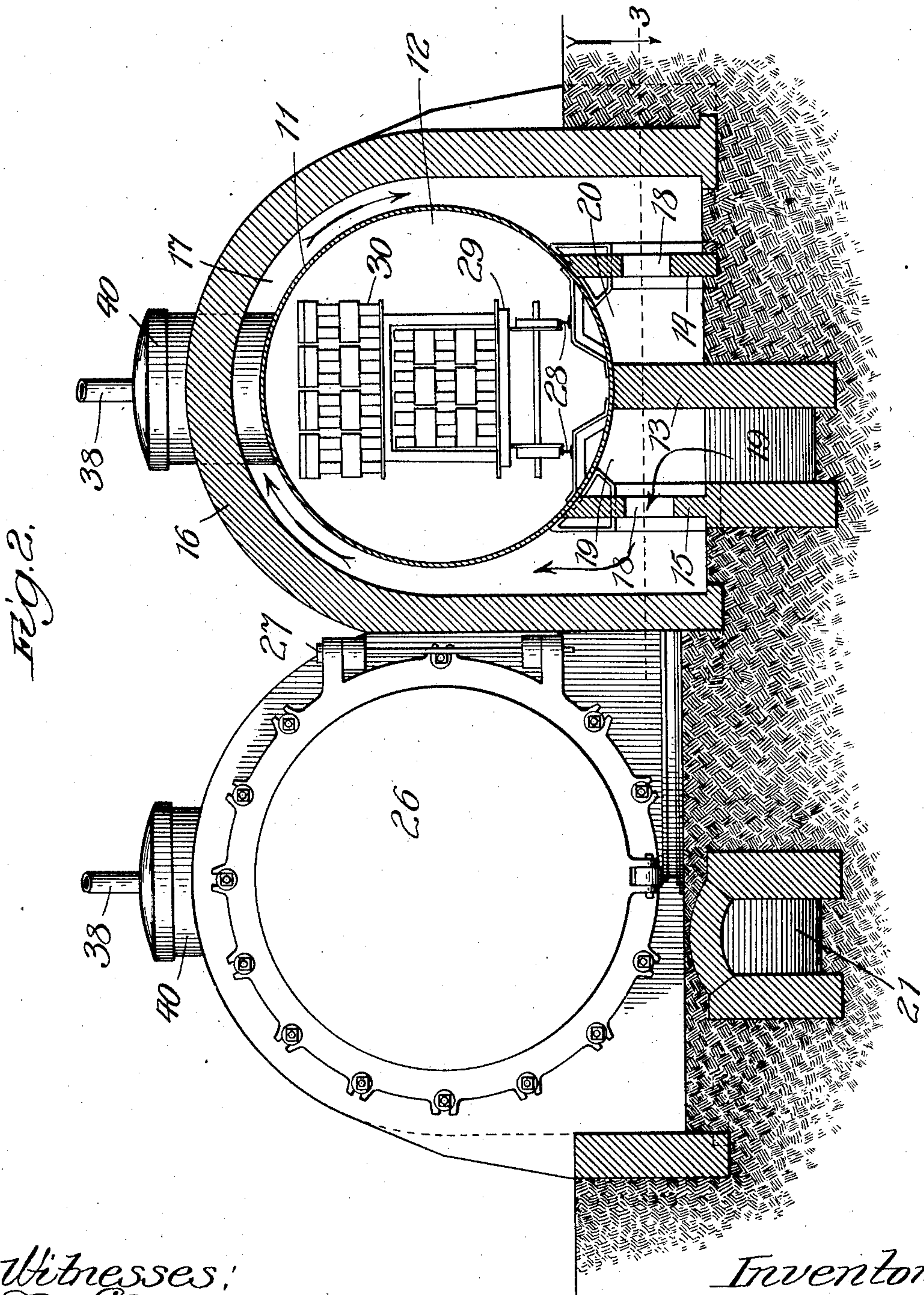
DRIER.

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5 SHEETS—SHEET 2.

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5 SHEETS—SHEET 3.

Fig. 3.

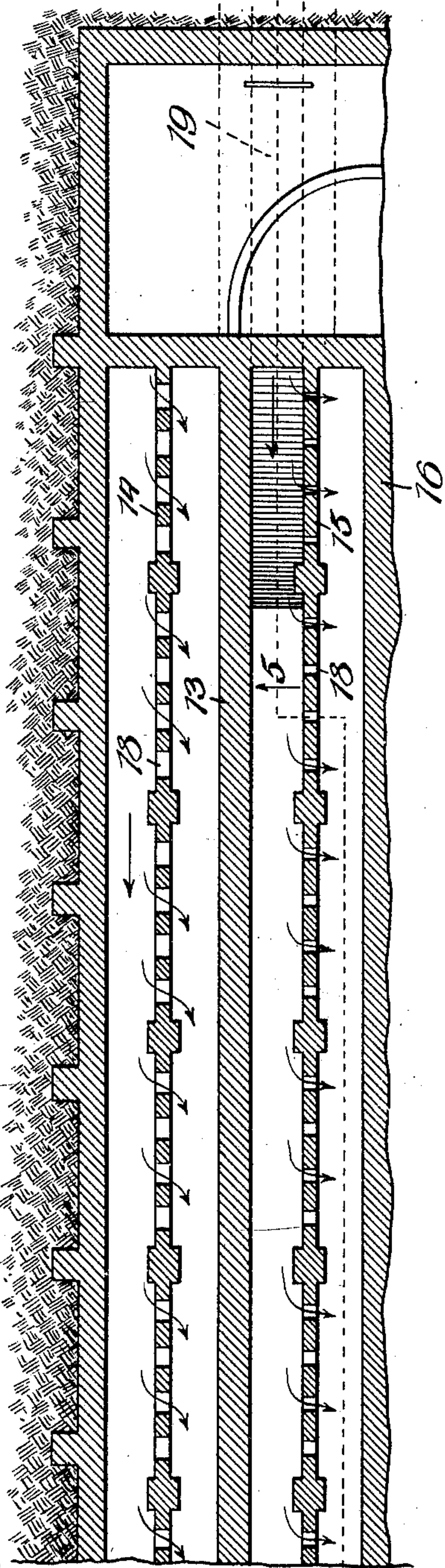
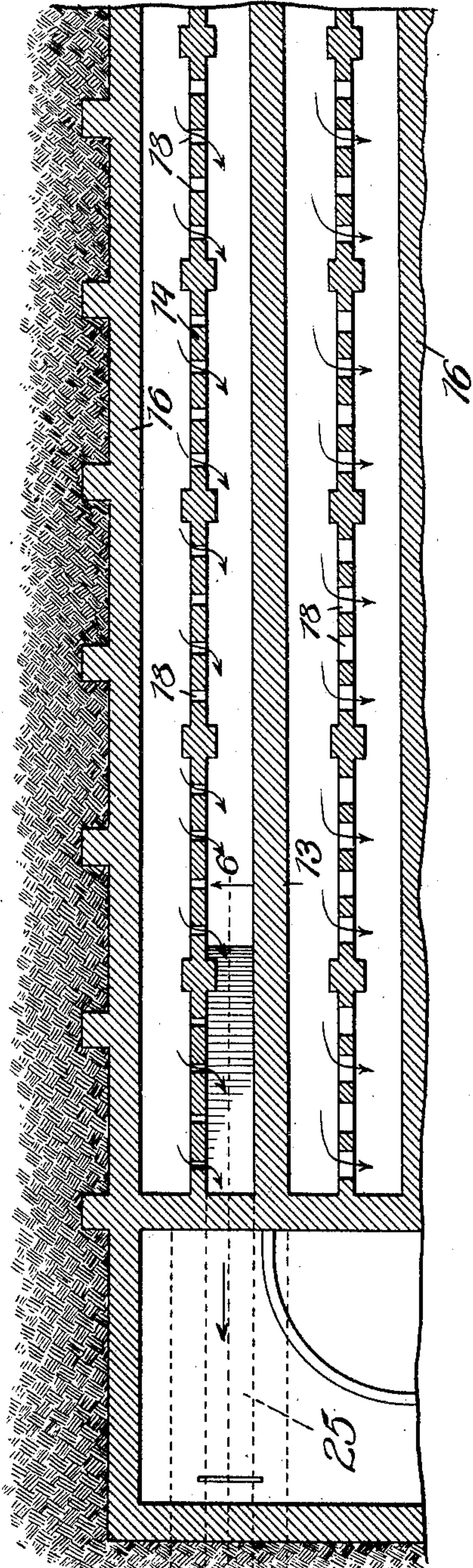


Fig. 4.



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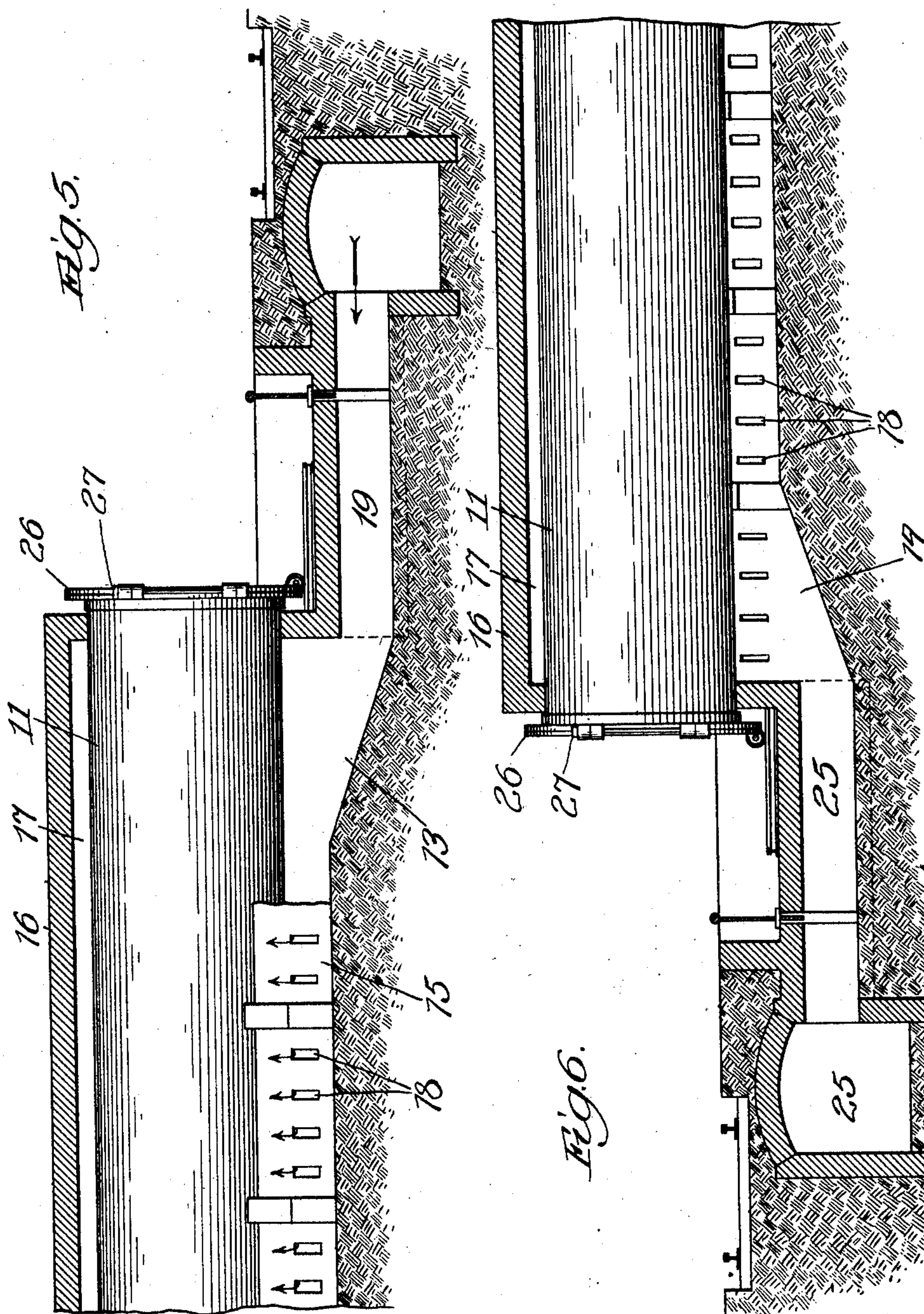
**DRIER.**

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6 SHEETS--SHEET 4.

**996,943.**



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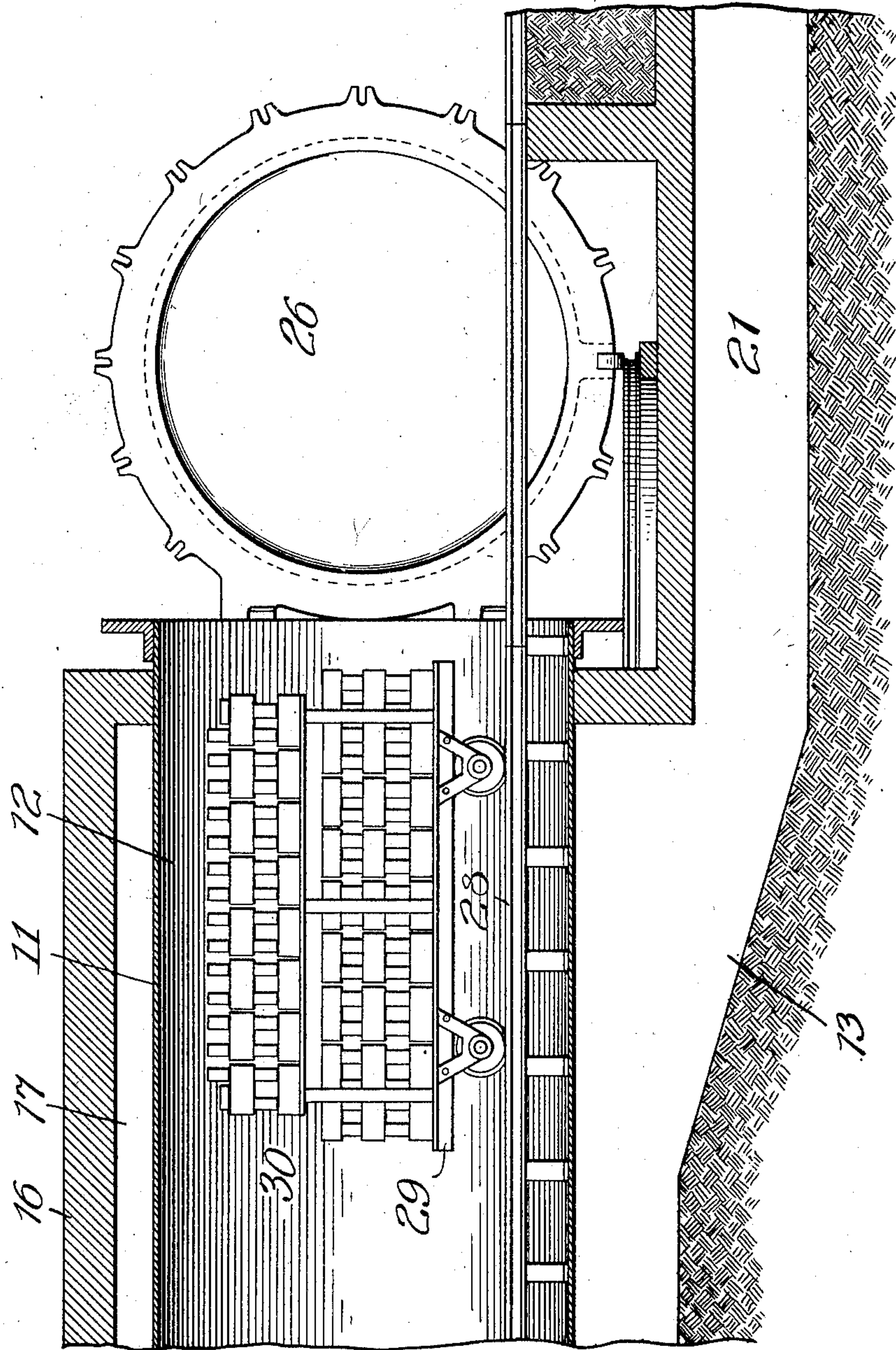
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5 SHEETS—SHEET 5.

Fig. 7.



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# UNITED STATES PATENT OFFICE.

LOUIS E. RODGERS, OF CHICAGO, ILLINOIS.

DRIER.

996,943.

Specification of Letters Patent.

Patented July 4, 1911.

Application filed January 7, 1911. Serial No. 601,445.

*To all whom it may concern:*

Be it known that I, LOUIS E. RODGERS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvements in Driers, of which the following is a specification.

My invention relates particularly to a new and useful method of drying clay products, as for example brick and tile, and other articles capable of being supported in spaced relation and requiring the elimination of the moisture therefrom; and to new and useful drying apparatus suitable for the carrying out of my improved method.

It has been found in practice that, in the drying of clay products by apparatus commonly used, especially when the articles to be dried are formed from certain varieties of clay, a relatively large proportion of the articles are damaged due to warping and checking, resulting from the subjection of the articles while in heated condition to currents of air introduced into the drying chambers, and to reduce as far as possible the loss from this cause it has been the practice, made necessary by the apparatus heretofore known, to subject the articles to relatively low heat, with the result of increasing the cost of manufacture by prolonging the drying operation.

My primary object is to overcome the objection above stated and to provide for the economical and rapid drying of articles without danger of impairment thereof.

Referring to the accompanying drawings in which I have illustrated an apparatus constructed in accordance with my invention, and which is practically well adapted for carrying out my improved method—Figure 1 is a plan view, partly broken, of a brick manufacturing plant, this view showing diagrammatically the outlet-end of a building in which the clay is molded into brick form, a series of kilns in which the bricks are to be burned, and intermediate these structures a drying apparatus constructed in accordance with my invention for receiving the bricks from the building

and drying the same prior to their introduction into the kilns, the latter in the arrangement shown serving to furnish to the drying apparatus the heat required for effecting the drying operation. Fig. 2 is an enlarged section taken at the irregular line 2 on Fig. 1 and viewed in the direction of the arrows, this view showing one of the drying chambers in end elevation, and the other chamber in sectional elevation. Figs. 3 and 4 are companion views, in section, showing the opposite end-portions of one of the drier structures, these views being taken at the line 3 on Fig. 2 and viewed in the direction of the arrow. Fig. 5 is an enlarged sectional view taken at the irregular line 5 on Fig. 3 and viewed in the direction of the arrow, this view illustrating the end of the drier apparatus adjacent to the kilns, or, in other words, the end of the apparatus into which the heat is charged. Fig. 6 is a section taken at the line 6 on Fig. 4 and viewed in the direction of the arrow showing the end of the drier apparatus opposite to that illustrated in Fig. 5; and Fig. 7, an enlarged broken section taken at the line 7 on Fig. 1, and viewed in the direction of the arrow, this view showing the door for controlling this end of the drier-chamber in open condition.

My improved method of drying articles consists, generally stated, in subjecting the articles, in spaced relation and in a substantially air-tight chamber, to heat applied to the chamber externally of the atmosphere therein and withdrawing the vapor from the articles as it is generated by maintaining a partial vacuum in the chamber.

In carrying out my improved method, I may employ any suitable construction of apparatus such, for instance, as the one illustrated in the drawings and of which the following is a description.

The accompanying drawings which show a very desirable arrangement of certain of the various structures in a brick-producing plant, illustrate at 8 my improved drying apparatus which is located intermediate the building 9 in which the clay is molded into



brick form, and the kilns 10 in which the brick, after the drying operation herein-after described, are burned, it being understood that the particular form of kilns in connection with which the drying apparatus is employed, is immaterial.

The drier apparatus of which two, alike in construction, are illustrated in the drawings, comprises, generally stated, an air-tight tube 11 of steel, or any other suitable material, affording a chamber 12 for receiving the articles to be dried; a series of walls 13, 14 and 15 spaced apart and extending longitudinally of the tube 11 and upon which the tube is supported; and a structure 16 in the form of a housing, preferably of brick, built about the tube 11 but spaced therefrom as clearly illustrated in Fig. 2 to provide a chamber 17 extending throughout substantially the entire length of the tube.

The walls 14 and 15 which are provided with openings 18 at intervals throughout their length, form with the lower portion of the tube 11 and the imperforate wall 13, two longitudinally extending flues 19 and 20, the flue 19 communicating at its end nearest the kilns 10 with a flue 21 opening into a cross-flue 22 which has branches 23 and 24 adapted to be connected with the interior of the kilns 10, in a manner herein-after set forth, for supplying to the flue 19 the heat necessary for effecting the drying operation. The flue 20 is closed at its end adjacent to the inlet-end of the flue 19 and opens at its opposite end into a flue 25 which, in practice, would contain some suction-producing means, as for instance a suction-fan 25<sup>a</sup> driven in any suitable manner, for the purpose of causing the heated medium introduced into the flue 19 to pass from the openings 18 in the wall 15, through the chamber 17 in a path transversely of the tube 11, and thence into the flue 20 through the openings 18 therein. Each of the tubes 11 is provided at its opposite ends with doors 26 hinged to the structure 16 as indicated at 27 and adapted when closed to render the tubes air-tight, the interior of each tube containing a suitably supported track 28 upon which cars, one of which is represented at 29, are supported, these cars forming the supporting-vehicles for the articles to be dried, such as the brick represented at 30, the latter being piled upon the cars in spaced relation as illustrated.

Where the articles in the tubes 11 are to be dried by heat furnished from the kilns, it is desirable that flues be provided for transmitting the heat from the kilns not only while the kilns are being operated for burning the articles, but also when the articles are being cooled in the kilns and to accomplish this result I connect the branch-flue 24 with the flues 31 of the kilns leading to the kiln-

stack 32, and provide dampers 33 and 34 in these flues, whereby the products of combustion from the kilns may be directed through the flue 24, or into the stack 32, as desired; and provide goose-necks 35 which may be connected with the branch-flues 23 and the interior of the kilns 10 by making openings in the temporary walls 36 built into the charging openings in the kilns after the kilns have been filled with articles to be burned. By this arrangement, the kilns while performing the burning operation may be caused to discharge their hot products of combustion into the flue 24 and thence into the drier apparatus, and when the fire in the kilns has been drawn the waste heat thrown out by the articles in the kilns during the cooling process may be drawn into the flues 23 for use as the heating medium for the driers.

It will be understood from the foregoing that in the operation of the apparatus the heating medium under the suction action produced at the end of the flue 20 farthest from the kilns 10, passes into the flue 19, thence through the openings 18 in the wall thereof and into the chamber 17, through which latter it passes transversely of the tube 11 into the flue 20 through the openings 18 in its wall, the openings 18 being so graduated in size as illustrated in Figs. 3 and 4 as to cause the suction action produced in the flues 19 and 20 to be substantially uniform throughout the entire length of these flues, whereby the heating medium will be distributed practically uniformly in the chamber 17.

In the construction illustrated, it is intended that the cars carrying the articles to be dried enter the ends of the tubes 11 adjacent to the building 9. After the cars have been positioned in the tubes 18 the doors for closing the ends of the latter are shut and the articles on the cars subjected to the heat radiated from the walls of these tubes. Heating of the articles as described, causes the moisture therein to be converted into vapor, and the vapor thus produced is drawn out of the tubes 11 by means of any suitable suction-device 37, which may be in the form of the well-known centrifugal vacuum pump, which communicates with the interior of the tubes 11 through the medium of a pipe 38 having valved branches 39 opening into the interior of these tubes through domes 40.

As the tubes 11 are air-tight, no air is drawn into them tending to produce drafts therethrough during the subjection of the vapors in the tubes to the suction action as described, and thus as high a degree of suction as is desired may be employed without danger of checking and warping the articles being dried. This is of great advantage, as it permits of very rapid drying of all



articles without danger of loss by warping and checking, even when the articles to be dried are formed of those varieties of clay which are peculiarly susceptible to injury, when in heated condition, by drafts of air.

While I have illustrated and described a particular form of apparatus, I do not wish to be understood as intending to limit my invention to such form, as various alterations and modifications therein may be made without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a kiln for burning clay articles, of a substantially air-tight drying chamber, a housing inclosing said chamber and spaced apart therefrom, a waste heat conduit connected with the kiln and provided with openings in said conduit whereby the heat is caused to circle exterior of the chamber and to communicate heat thereto, and means for maintaining a partial vacuum in the chamber to withdraw therefrom the vapor generated by the heat from the articles being dried therein.

2. Apparatus for the purpose set forth, comprising a chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot-fluid supplier, a flue in the space between the chamber and housing and connected with said supplier and having openings communicating with said space, and an outlet-flue having openings communicating with said space, the said flues being so arranged that the hot fluid from the inlet-flue openings moves around the said wall to the outlet-flue openings to heat the wall of the chamber.

3. Apparatus for the purpose set forth, comprising a chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot fluid supplier, and a pair of flues arranged side by side and extending longitudinally of said chamber, one of said flues being an inlet flue connected with said supplier and having openings communicating with the space between the chamber and housing, and the other of said flues being an outlet-flue having openings communicating with said space.

4. Apparatus for the purpose set forth, comprising a chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot-fluid supplier, and flues having openings therein and arranged side by side and extending longitudinally of the chamber, one of said flues being connected with said supplier and communicating with the space between the chamber and housing through openings at intervals along the same, and the other of

said flues being an outlet-flue and communicating with said space through openings at intervals along the flue, said last referred to openings increasing in size from the outlet-end of said last referred to flue toward its opposite end.

5. In combination with a kiln for burning clay articles, a preliminary drier for the articles comprising a chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a flue communicating with the interior of the kiln and having openings at intervals communicating with the space between the chamber and housing, and an outlet-flue having openings communicating with said space, the flues being located on opposite sides of said wall so that the hot fluid from the inlet-flue openings moves around the said wall to the outlet-flue openings to heat the wall, and means for maintaining a partial vacuum in the chamber to withdraw from the articles vapor generated therein by the heat radiated from the chamber-wall.

6. Apparatus for the purpose set forth, comprising a chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot-fluid supplier, a flue connected with said supplier and having openings communicating with the space between the chamber and housing, an outlet-flue having openings communicating with said space, and a suction-producing device communicating with the discharge-end of said outlet-flue, the flues being on opposite sides of said wall so that the hot fluid from the inlet-flue openings moves around the said wall to the outlet-flue openings to heat the wall.

7. Apparatus for the purpose set forth, comprising a substantially close chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot-fluid supplier, a flue connected with said supplier and having openings communicating with the space between the chamber and housing, an outlet-flue having openings communicating with said space, the flues being so arranged on opposite sides of said wall that the hot fluid from the inlet-flue openings moves around the said wall to the outlet-flue openings to heat the wall, and means for maintaining a partial vacuum in the chamber to withdraw from the articles vapor generated therein by the heat radiated from the chamber-wall.

8. Apparatus for the purpose set forth, comprising a substantially close chamber for containing the articles to be dried, a heat-conducting wall for said chamber, a housing about said wall and spaced therefrom, a hot-fluid supplier, a pair of flues ar-



ranged side by side and extending longitudinally of said chamber and having openings communicating with the space between the chamber and housing, one of said flues  
5 being connected with said supplier, the other of said flues being an outlet-flue, and means for maintaining a partial vacuum in the

chamber to withdraw from the articles vapor generated therein by the heat radiated from the chamber-wall.

LOUIS E. RODGERS.

In presence of—

R. A. SCHAEFER,  
JOHN WILSON.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

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