No. 698,129. Patented Apr. 22, 1902.

H. E. NIESE.

STORAGE TANK.

(Application filed Dec. 13, 1900.)

(No Model.) 3 Sheets—Sheet 1.

FIG. 1.

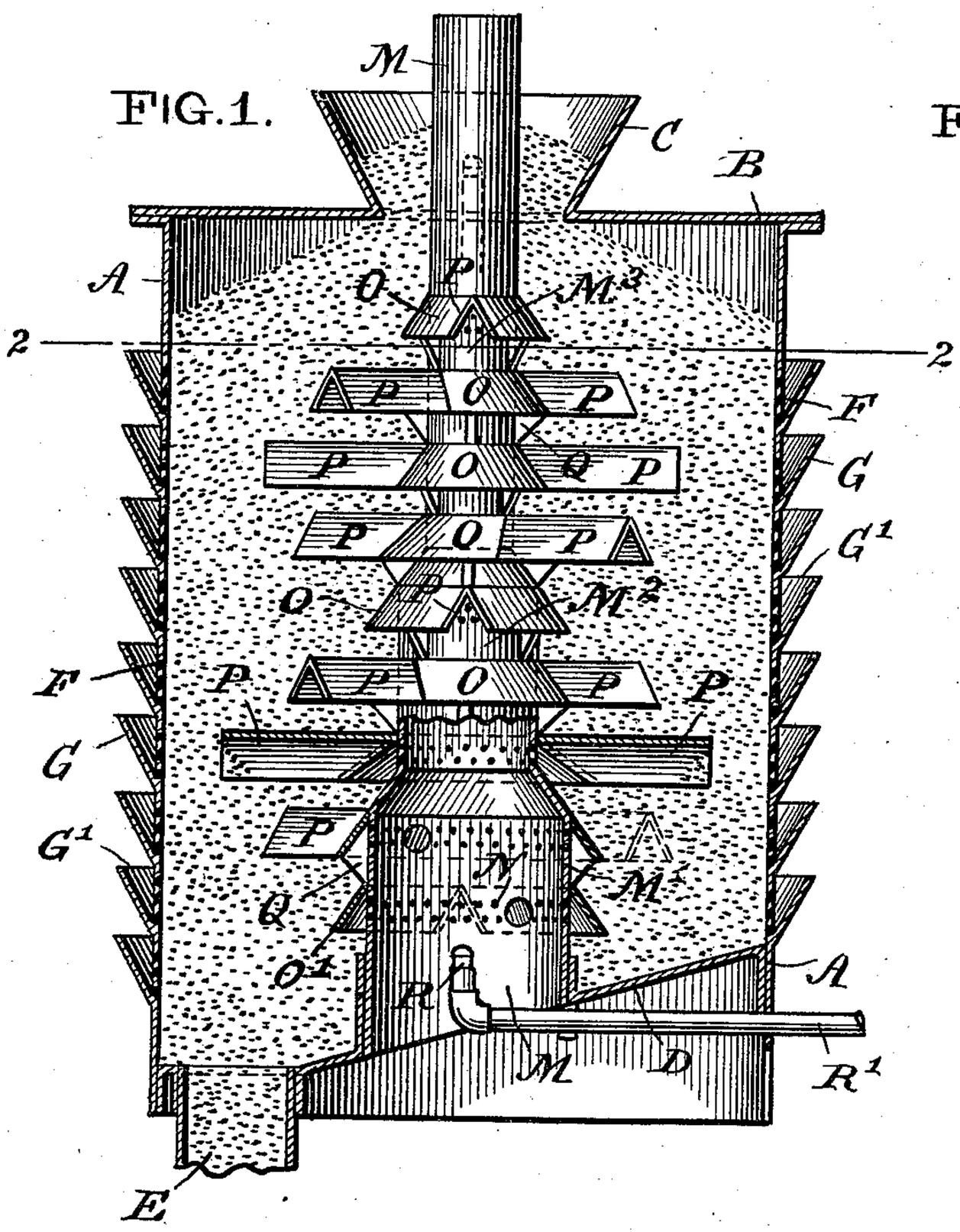


FIG. 10.

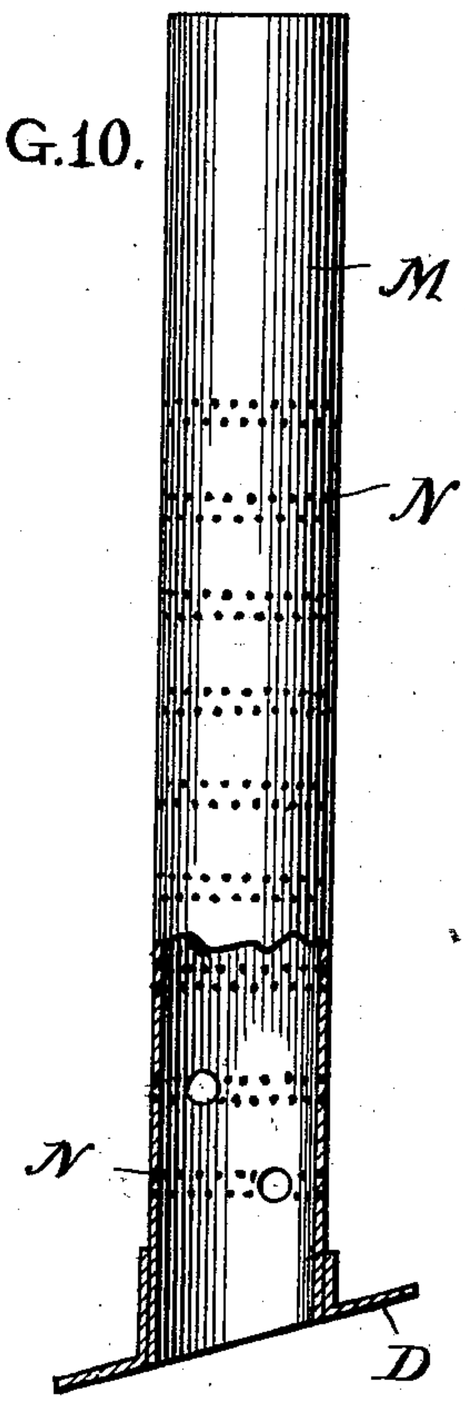


FIG. 3.

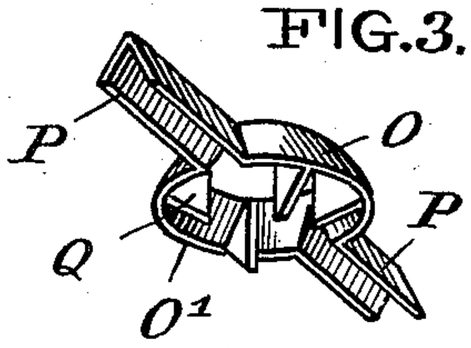


FIG. 2.

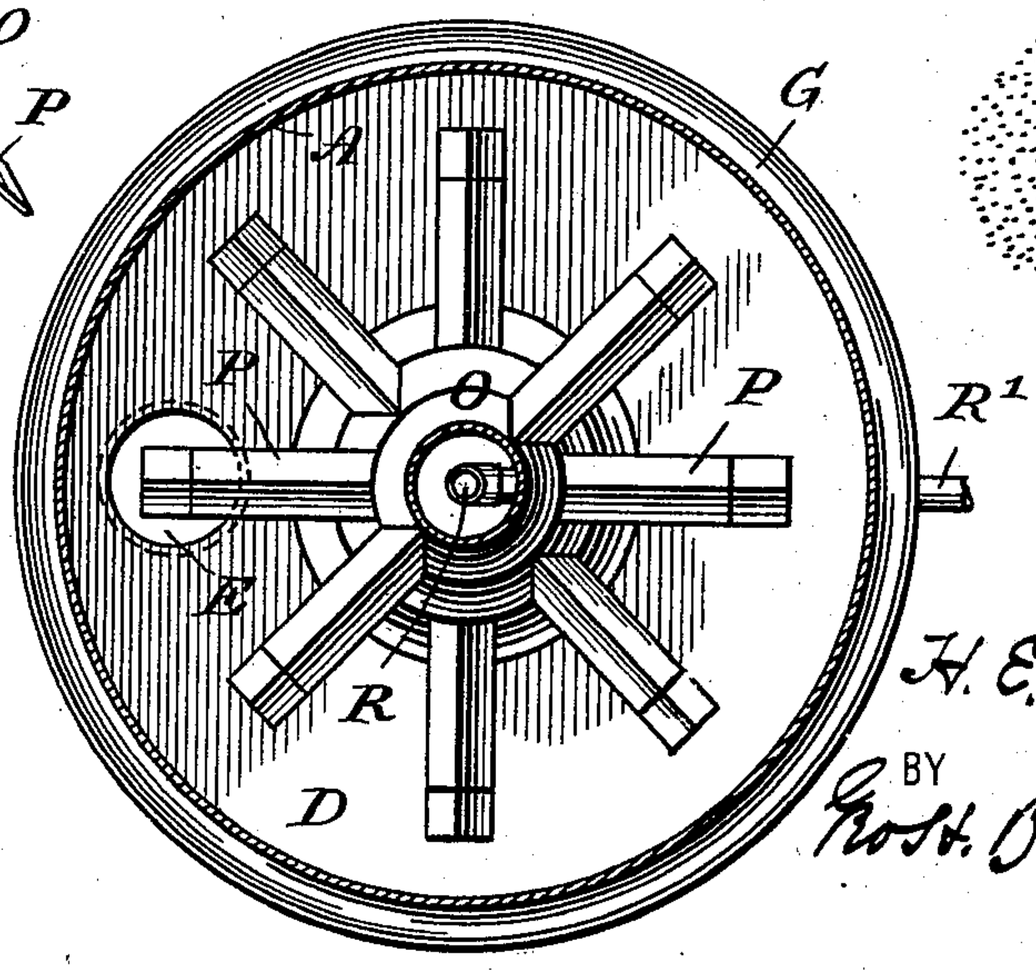
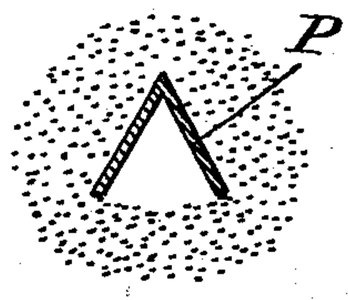


FIG. 4.



WITNESSES:

J. E. Pearson

C. E. Stecher

INVENTOR

H. E. Niese

BY

Geo. H. Benjamin

ATTORNEY

No. 698,129. Patented Apr. 22, 1902.

H. E. NIESE.

STORAGE TANK.

(Application filed Dec. 13, 1900.)

(No Model.) 3 Sheets—Sheet 2.

FIG. 5.

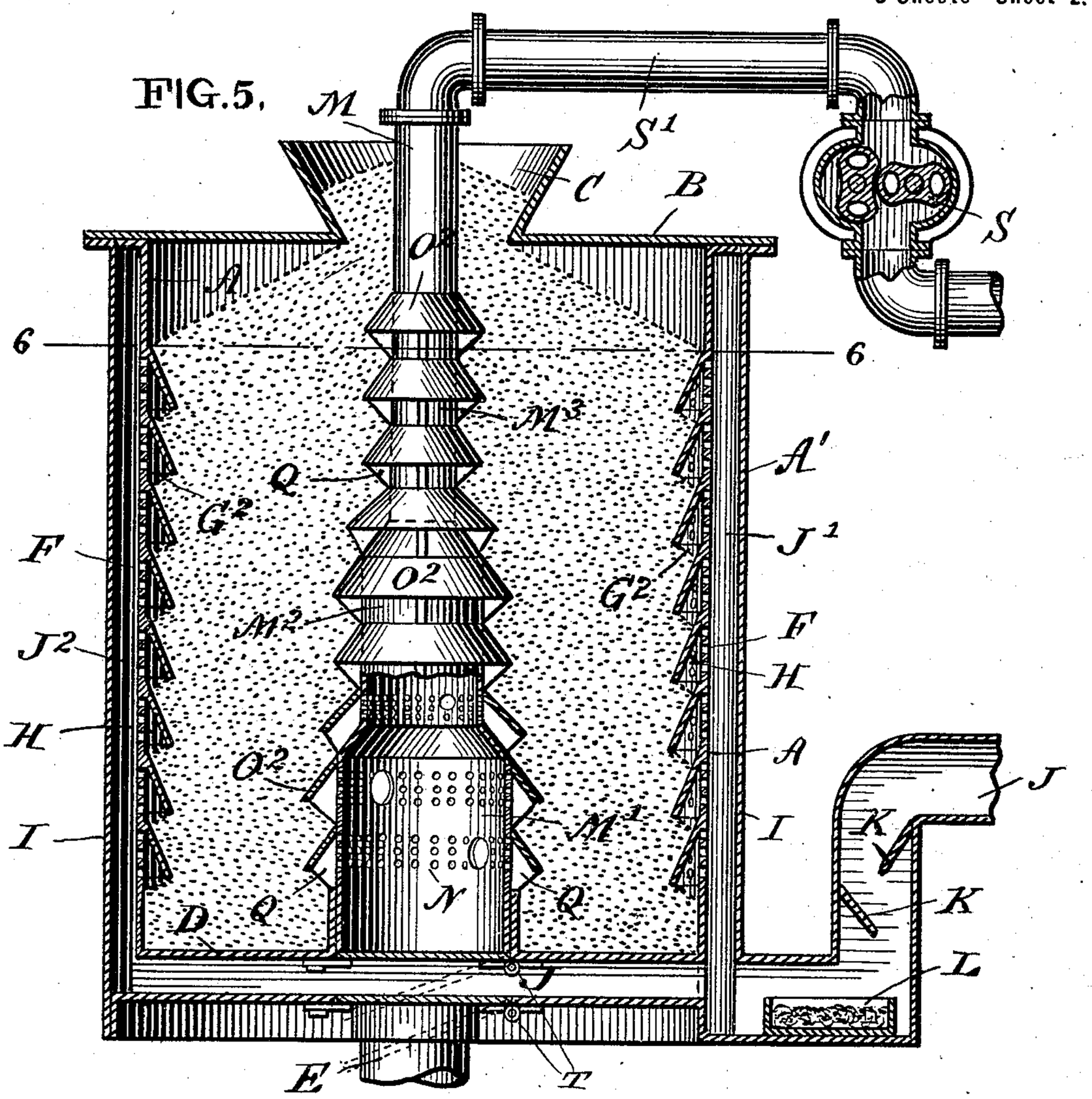


FIG. 7.

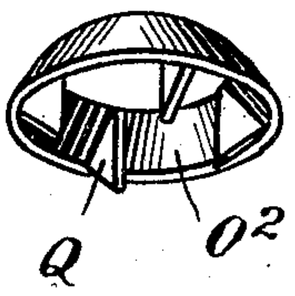
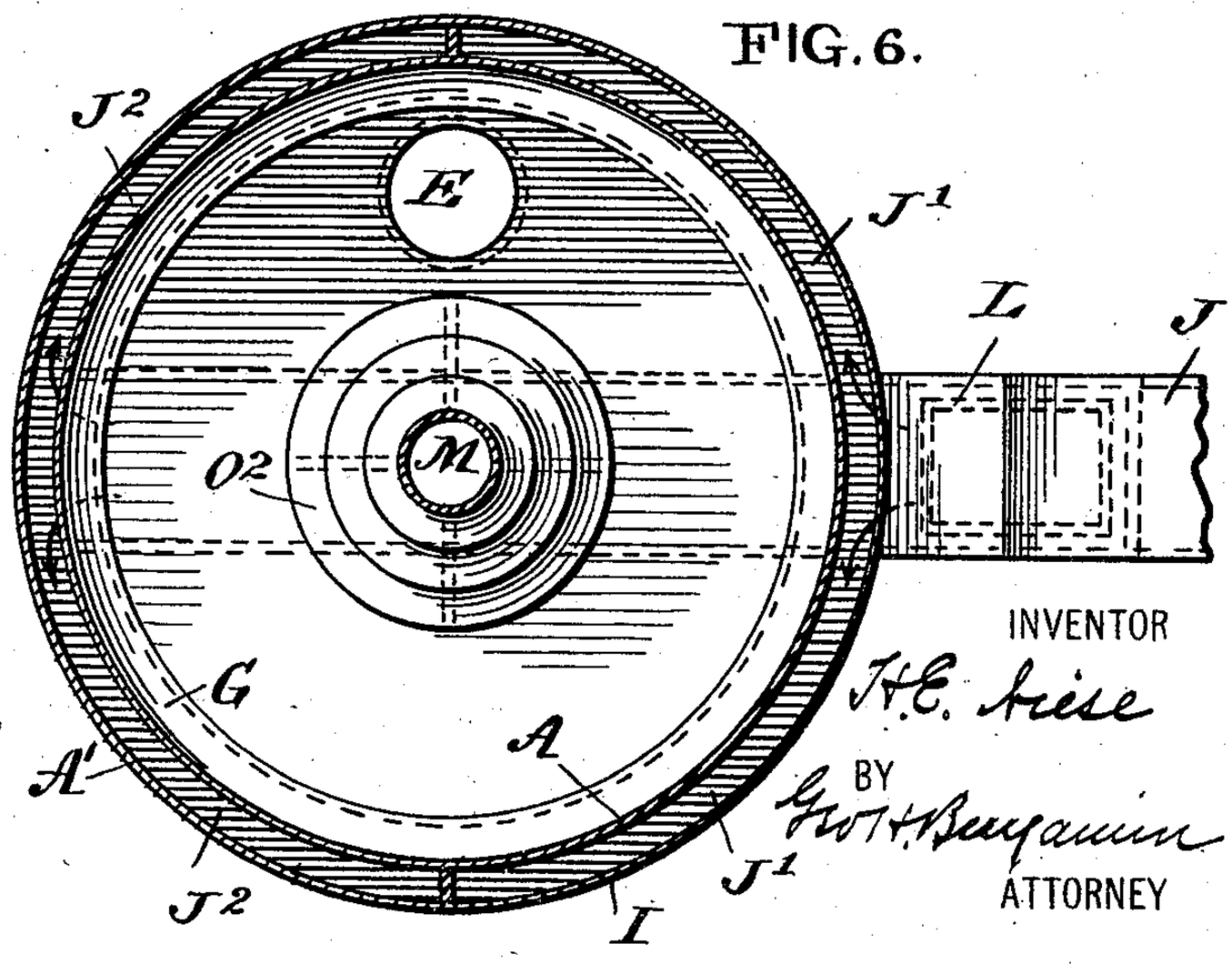


FIG. 6.



WITNESSES:

J. E. Pearson

J. A. Cavanagh

INVENTOR

H. E. Niese

BY

Geo. H. Benjamin

ATTORNEY

No. 698,129. Patented Apr. 22, 1902.

H. E. NIESE.

STORAGE TANK.

(Application filed Dec. 18, 1900.)

(No Model.) 3 Sheets—Sheet 3.

FIG. 8.

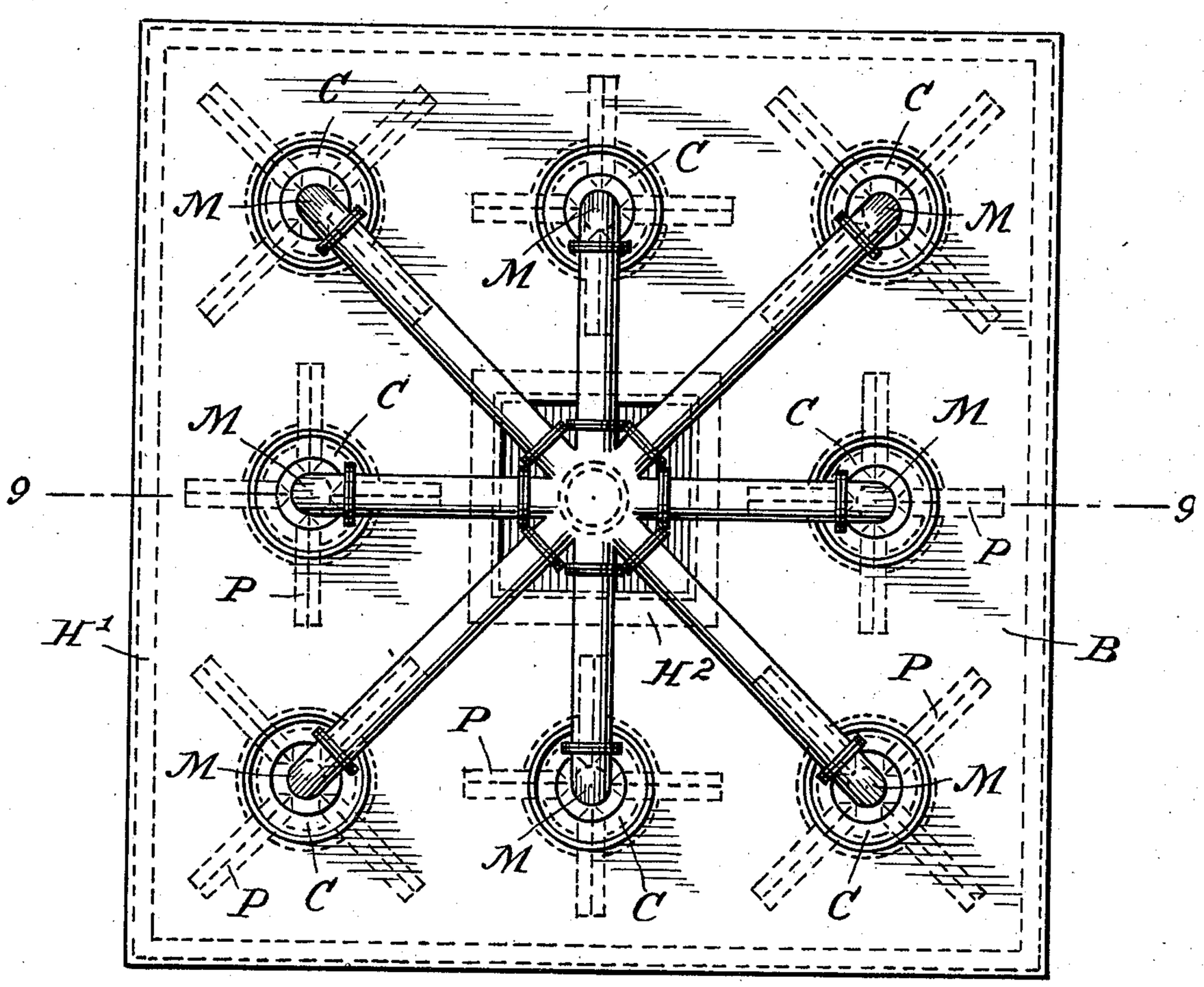
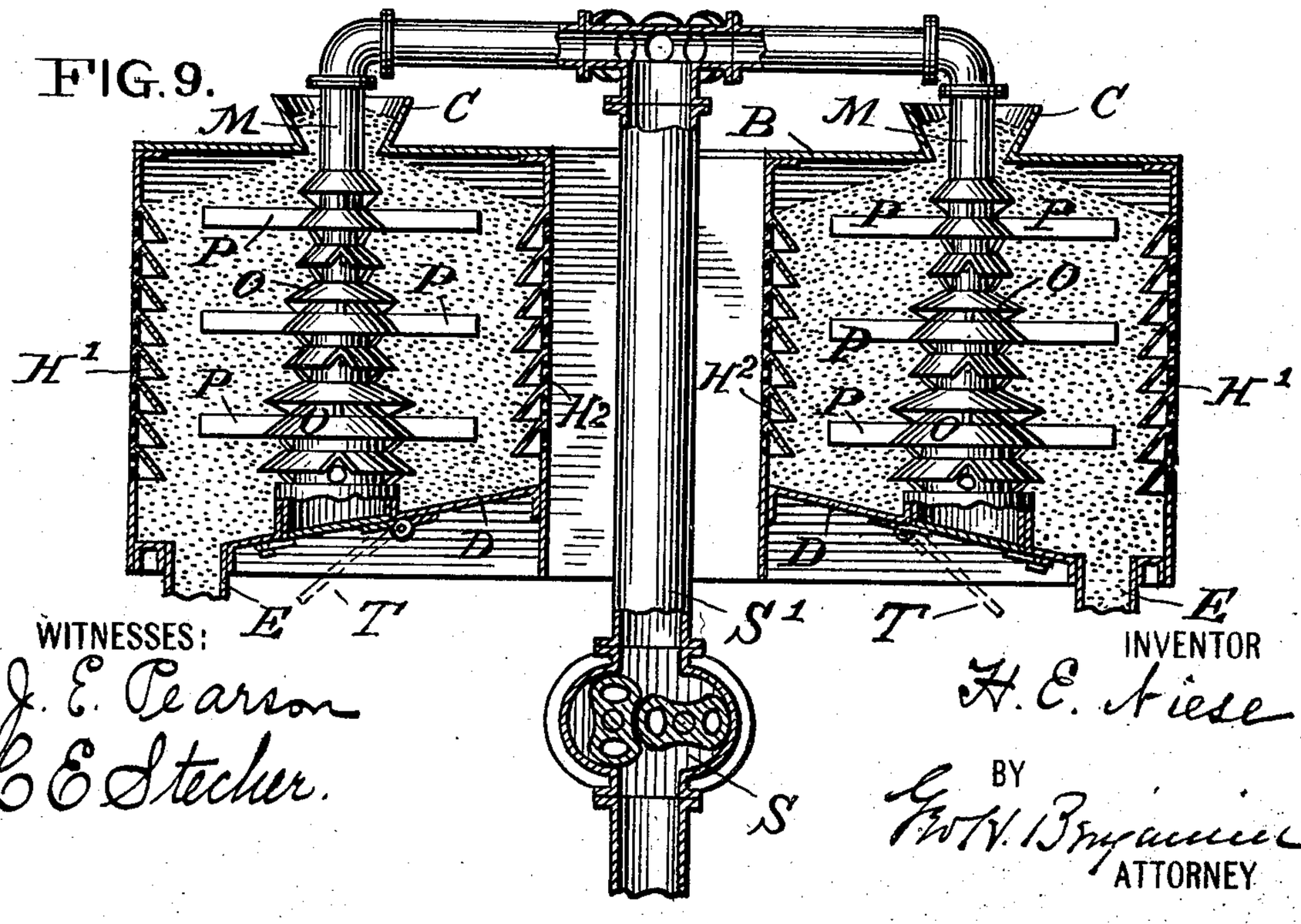


FIG. 9.



WITNESSES:
J. E. Pearson
C. E. Stecher.

INVENTOR
H. E. Niese
BY
Geo. V. Bryan
ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY ERNST NIESE, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN SUGAR REFINING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

STORAGE-TANK.

SPECIFICATION forming part of Letters Patent No. 698,129, dated April 22, 1902.

Application filed December 13, 1900. Serial No. 39,653. (No model.)

To all whom it may concern:

Be it known that I, HENRY ERNST NIESE, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Storage-Tanks, of which the following is a specification.

My invention relates to tanks for the storage of material in large quantities—such, for instance, as sugar, wheat, barley, coal, or the like—and which, as is well known, if placed in a closed tank are liable to heat, cake, or otherwise spoil.

My invention consists, essentially, of a tank provided with means for creating a circulation of air through it and for permitting access to different portions of the body contained within the tank for the purpose of inspection or otherwise.

The object of my invention is a construction of tank within which material in a more or less heated condition may be stored and any original heat conveyed away and the materials maintained at such a temperature as to prevent subsequent heating, caking, or spoiling.

The accompanying drawings will serve to illustrate my invention.

Figure 1 is a vertical section and partial elevation of a ventilated storage-tank, the sides of which are open to the atmosphere and air circulation effected through a central ventilating-pipe. Fig. 2 is a plan view and partial section on the line 2 2 of Fig. 1. Fig. 3 is a perspective view of one form of ventilating-ring with wings. Fig. 4 is a transverse section of one of the ventilating-wings and is intended to illustrate the relation of such wing to the material within the tank. Fig. 5 is a vertical section and partial elevation of a ventilated storage-tank with an inclosing casing and a central ventilating-pipe or passage-way connected to an exhaust-blower. Fig. 6 is a plan view and partial section on the line 6 6 of Fig. 5. Fig. 7 is a perspective view of one form of ventilating-ring—*i. e.*, that shown in Fig. 5. Fig. 8 is a plan view of a modified form of tank provided with a series of ventilating-pipes connected to a central exhaust pipe and blower. Fig. 9 is a vertical section taken on the line 9 9 of Fig. 8, with the pipe connecting with the blower shown in elevation. Fig. 10 is an elevation and partial section of a modified form of ventilating-pipe.

Referring to the drawings, A represents the casing or body of the tank, provided with the top B, having a feed hopper or hoppers C.

D is the bottom of the tank, preferably inclined toward a delivery chute or chutes E. The sides or casing of the tank are perforated, as shown at F, and surrounding the tank are a series of projecting flanges G. These flanges may either be arranged external to the tank and project upward and outward and be open at the top G′, as shown in Fig. 1, or internal of the tank and turned downward and inward and open on their under side G^2, as shown in Figs. 5 and 9. The flanges G serve to direct the air from the exterior of the tank to its interior. When the flanges are turned downward, as shown in Figs. 5 and 9, air-spaces H are created between the flanges G and the body A of the tank, which spaces are not filled by the material contained within the tank.

In the construction shown in Fig. 5 the casing A is inclosed by an imperforate casing A′, which is continued over the bottom of the tank. These casings are separated to form an air-space which communicates with the air-duct J. The air-duct J is divided after entering the tank into two passage-ways J′ J^2, which respectively feed air to opposite sides of the tank. Further subdivisions may be made, if desired. Located in the air-duct J are screens K, by means of which the entering-air may be freed from dust. Any number or character of screens may be employed. Located under the screens K or in any other convenient position, but preferably in the air-duct J, is a suitable vessel L, adapted to contain a body of calcium chlorid in a dry state or any other chemical having an affinity for moisture, the object of this arrangement being for the purpose of extracting moisture from the air entering through the air-duct J.

In the construction shown in Figs. 8 and 9 the exterior of the tank is rectangular, and an opening corresponding in shape is provided

through the center of the tank. By means of this arrangement two sets of air-spaces H' H² are provided under the flanges G, through which air may enter the tank.

Arranged centrally in the tank is a ventilating-pipe M. In Figs. 1 and 5 a single pipe is shown. In Figs. 8 and 9 eight of such pipes are shown. This pipe or pipes may be a cylindrical perforated pipe of uniform diameter throughout its length and communicating with the atmosphere at the top and bottom, as shown in Fig. 10, or closed at the bottom and communicating through a suitable pipe with an exhaust apparatus, as shown in Figs. 5, 8, and 9. Preferably, however, I divide the ventilating-pipe M into sections M'M² M³ of decreasing diameter from the bottom upward, the purpose of which arrangement is to maintain the heated air-currents at a constant velocity when passing through the ventilating-pipe. The ventilating pipe or pipes M are preferably of a size sufficient to allow the entrance of a man within them.

In Figs. 1 and 10 the bottom of the ventilating-pipe is shown as open. In Figs. 5 and 9 the bottom of the ventilating pipe or pipes is shown as provided with a door or doors T, adapted to be closed when the device is in operation. The ventilating-pipes M are also provided with perforations N, through which access may be obtained to the body of material within the tank. The size of these perforations I prefer to be such as will readily permit the entrance of a man's hand or the introduction of a rod for the purpose of dislodging any material which may become clogged or packed within the tank.

Surrounding the ventilating pipe or pipes and freely removable are the independent ventilating-rings O. These rings I prefer should consist of a central cone-shaped portion O', the base of the cone being at the bottom, and two side wings P, projecting radially in opposite directions. The wings I prefer to give a V-shaped section. I wish it understood, however, that I do not limit myself to the employment of a cone-shaped ring with the base of the cone at the bottom or to a cone-shaped ring having V-shaped wings, as I contemplate the employment of a ring or ring with wings where the shape of the ring is an inverted cone and where the shape of the wings may have a section other than V-shaped.

Projecting from the interior portion of the ring O are legs Q, which project downward somewhat below the lower surface of the ring and serve to elevate the open bottom of the ring above and separate the rings from adjacent rings. The rings are superposed one upon the other and preferably in such a manner that the radial wings P of successive rings are disposed equidistant from each other in vertical height and horizontally around the interior of the tank.

The object of providing the rings with wings and arranging the rings as described is twofold: first, as a means of aiding in the uniform distribution or spreading of the material fed into the tank and also to aid in sustaining the weight of the material in the tank. It will be readily understood that in a tank of, for instance, fifty feet in diameter and thirty feet in height the crushing weight of the material will be materially lessened if it is partially supported by a series of radial arms arranged equidistant vertically and circumferentially; second, as a means of providing channels through which circulation of air may take place and through which access may be obtained to any portion of the body of material within the tank.

In Fig. 5 the rings O² have substantially the form of the rings O in Figs. 1 and 3, but are not provided with the wings P. In describing the rings and wings I have described but two radial arms. Manifestly the number of radial arms may be increased. The interior diameter of the rings O and O² will of course correspond to the diameter of the portion of the ventilating-pipe M over which they are placed.

Located at the bottom of the pipe M is a source of heat—*i. e.*, a gas-burner R—communicating through the pipe R' with any suitable source of supply. The gas-burner R may be located, as indicated by the dotted lines, at the top of the pipe M. Under ordinary circumstances, where the material contained in the tank is of a character which will set free sufficient heat to create a circulation of air in the pipe M, no additional source of heat or extraneous means for creating a circulation of air will be required. If, however, it is desired to create a more rapid circulation of air in the ventilating-pipe M, the burner R may be lighted, or instead of using a burner I may make use of an exhaust-blower, such as is shown at S, Figs. 5 and 9. This blower may be operated by any suitable source of power and is connected through a pipe S' to the top of the ventilating pipe or pipes M. When such an artificial method of increasing the rapidity of the circulation of air in the ventilating-pipe M is employed, I prefer to close the bottom of such pipes through doors, as shown in Figs. 5 and 9.

In Figs. 1 and 9 the circulation of air takes place through the perforations F in the body of the tank, through the material in the tank, thence through the wings and rings to the ventilating-pipe M, and thence directly to the external atmosphere, Fig. 1, or through a blower, Fig. 9.

In Fig. 5 the circulation of air takes place through the air-duct J to air-spaces J' J², perforations F to air-spaces H or H' H², wings and rings through the body of material in the tank, through ventilating-pipe M, thence through the blower to the external atmosphere.

A storage-tank constructed in accordance with the foregoing specification will, if an up-

wardly-moving current of air is maintained in the ventilating pipe or pipes, serve not only to carry off the original heat of the material stored in the tank and so reduce the heat of the material to that of the atmosphere, but prevent any subsequent heating of the material by effecting a constant circulation of air through the material.

I do not limit myself to any special means or apparatus for creating a moving-upward current of air through the ventilating pipe or pipes M. Neither do I limit myself to the special construction of the ventilating-ring or wings, as it is evident that many changes may be made in the construction of these parts without in any wise departing from the intent of my invention.

Having thus described my invention, I claim—

1. A storage-tank, comprising a perforated casing, a perforated ventilating-pipe located within the tank, and a series of conical rings surrounding said pipe and superposed one upon the other.

2. A storage-tank, comprising a perforated casing, a perforated ventilating-pipe located within the tank, and a series of conical rings having radial wings projecting therefrom and surrounding said pipe and superposed one upon the other.

3. A storage-tank, comprising a perforated casing, a perforated ventilating-pipe within the tank, a series of ventilating-rings provided with wings superposed one upon the other and around said pipe and having said wings spaced as regards each other and the interior of the tank.

4. A storage-tank, comprising a perforated casing, and a perforated ventilating-pipe formed of sections of decreasing diameter from the bottom upward and located within the tank.

5. A storage-tank, comprising a perforated casing, a perforated ventilating-pipe formed of sections of decreasing diameter from the bottom upward, and a series of ventilating-rings superposed one upon the other and surrounding said perforated pipe.

6. A storage-tank, comprising a perforated casing, a top having a feed-opening, an inclined bottom having a delivery-pipe, and a perforated ventilating-pipe of decreasing diameter from the bottom upward within the tank.

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

HENRY ERNST NIESE.

Witnesses:
J. E. PEARSON,
J. A. CAVANAGH.