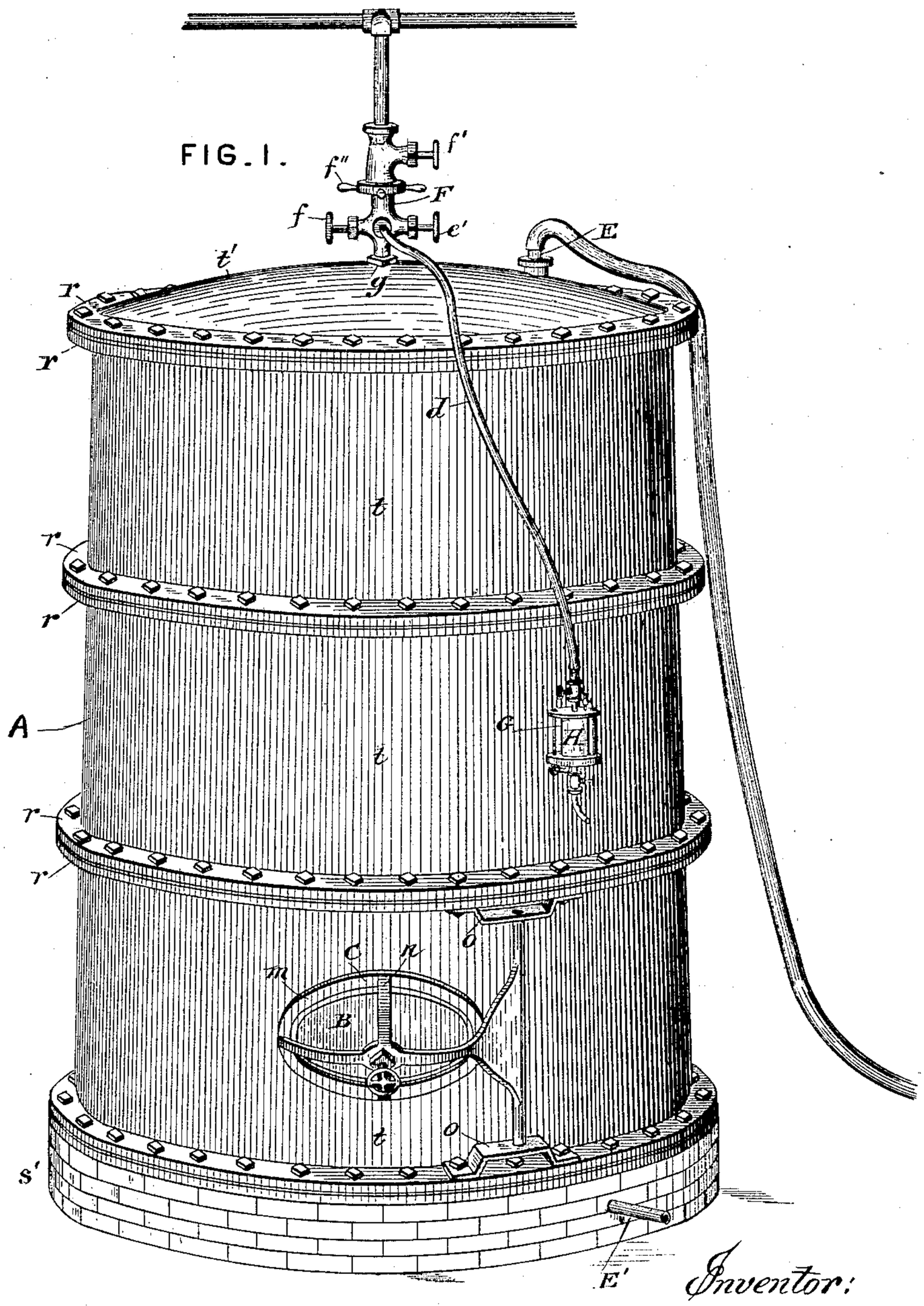
(No Model.) 4 Sheets—Sheet 1.

C. C. PUFFER.

CASK FOR FERMENTING.

No. 346,066. Patented July 20, 1886.

FIG. 1.



Attest:

Geo. T. Smallwood.
W. A. Acker

Inventor:

C. C. Puffer

By Dyer & Forth & Dyer
attys

(No Model.) 4 Sheets—Sheet 2.

C. C. PUFFER.

CASK FOR FERMENTING.

No. 346,066. Patented July 20, 1886.

FIG. II.

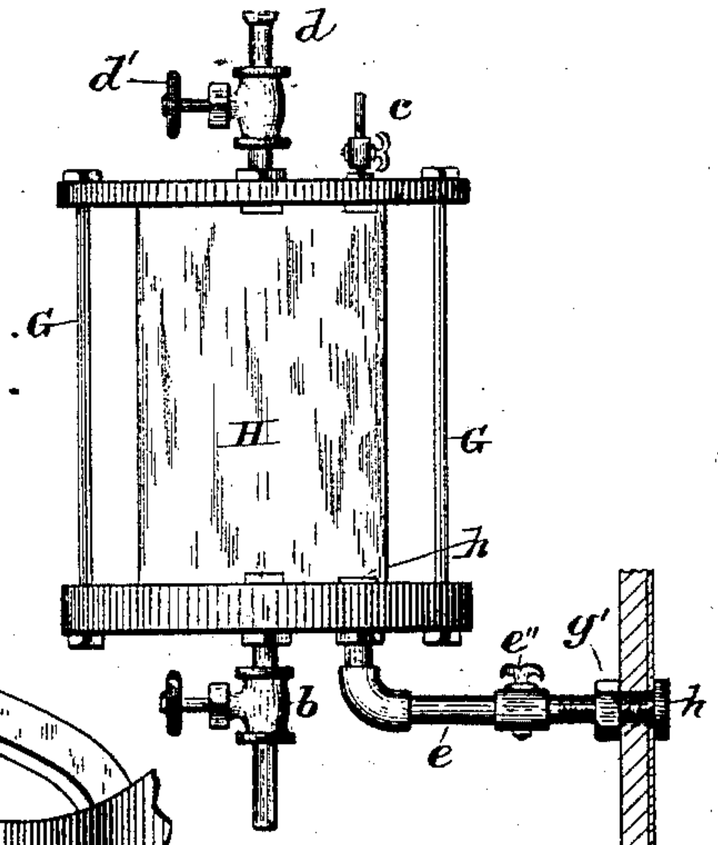


FIG. IV.

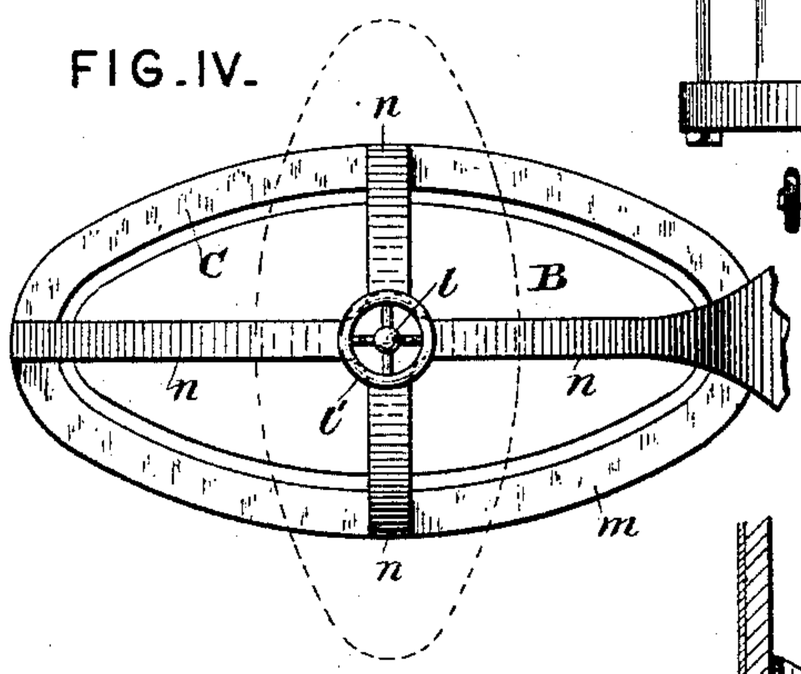
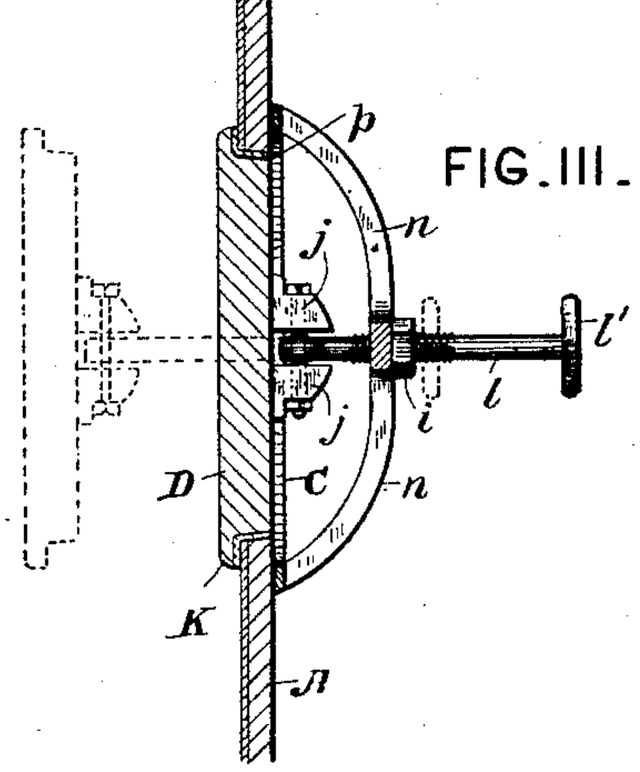


FIG. III.



Attest:
Geo. T. Smallwood
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Inventor
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(No Model.)

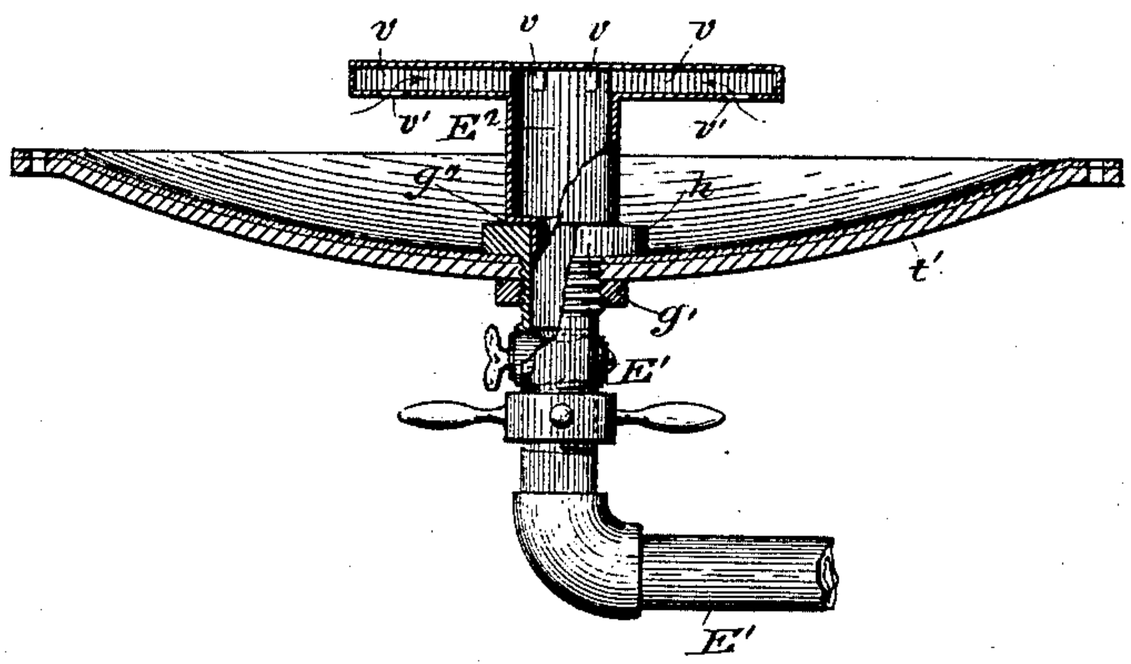
4 Sheets—Sheet 3.

C. C. PUFFER.

CASK FOR FERMENTING.

No. 346,066. Patented July 20, 1886.

FIG . V .



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(No Model.)

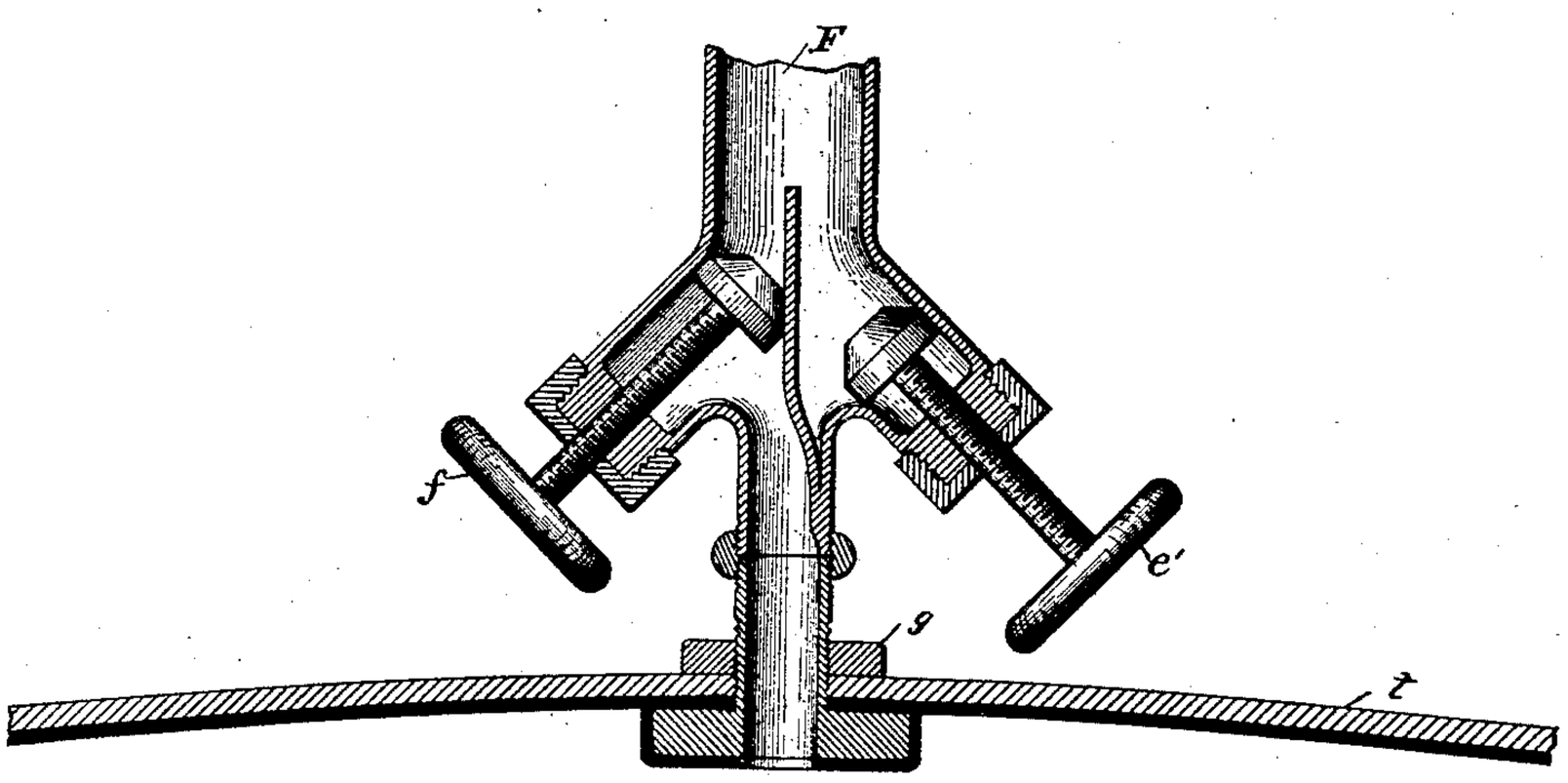
4 Sheets—Sheet 4.

C. C. PUFFER.

CASK FOR FERMENTING.

No. 346,066. Patented July 20, 1886.

FIG. VI.



ATTEST.

J. Henry Kaiser
H. C. Scott

INVENTOR

Charles C. Puffer,
by Dyerforth & Dyerforth,
Attys.

UNITED STATES PATENT OFFICE.

CHARLES C. PUFFER, OF ROCHESTER, NEW YORK, ASSIGNOR OF ONE-HALF TO JAMES SARGENT, OF SAME PLACE.

CASK FOR FERMENTING.

SPECIFICATION forming part of Letters Patent No. 346,066, dated July 20, 1886.

Application filed January 11, 1886. Serial No. 188,170. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. PUFFER, a citizen of the United States, residing in Rochester, in the county of Monroe, in the State of New York, have invented certain new and useful Improvements in Casks for Fermenting; and I hereby declare the following to be a full, clear, and exact description of the same.

The invention relates to casks of the character which are used for the retention of liquid or aeriform fluids which contain more or less of a corrosive acid, and particularly for the retention of such fluid *in vacuo;* and it relates more especially to casks to be used in a process of fermentation in the manufacture of fermented beverages.

It has been the custom heretofore in making metal casks of the character above described to form them of cast metal, in sections or otherwise, and provide them, at the time of or after the casting, with an internal lining or coating of enamel, glass, or the like, to render them proof against the action of the acid contained in the fluid. I have found, however, that the formation of these vessels by casting presents serious objections. It is practically impossible, when the cast-metal cask is made in sections, to adjust the parts together with sufficient nicety to provide a perfect joint without the use of objectionable packing, (which is itself acted upon to a material degree by the acid,) which, even with the packing, will not admit more or less atmospheric air between the joints. Cast metal, moreover, is porous, and forbids the formation of a reasonable vacuum in the interior of the cask. The porosity of the metal is increased by the operation of enameling. For the reasons stated I have found the use of cast metal undesirable and insufficient for the purpose of forming a cask which at the same time will be acid-proof and impermeable.

I have invented a cask which is free from the objections above cited, being acid-proof and at the same time perfectly air-tight; and it consists in forming the cask of sections of wrought metal, preferably wrought-iron or steel, having flanges formed thereon, and provided with a coating of enamel on its interior surface, which entirely covers one side of the sheet, including part of the surface of the flanges formed thereon. By providing a coating of enamel upon the inner surface of the flanges I am able to present to the action of the acid an unbroken surface, which is not liable to corrosion. The elasticity of the metal permits the flanges to be drawn together, so as to be in perfect contact and absolutely air-tight.

As will thus be seen, the primary feature of my invention is a cask made in sections practically air-tight, and having an interior coating of enamel, and it is carefully to be distinguished from vessels like the one described in the patent to Folsom, granted November 11, 1884, and the English patent to Burke, No. 3,422 of 1869, both of which describe a device made of a continuous sheet of wrought metal, and having an interior enamel coating, but neither of which is intended to be air-tight, and neither of the said inventions, if made in sections, but otherwise in accordance with the description in the said patents, would be air-tight.

A further object of my invention is to provide a cask of the above character with convenient means of access to its interior, for the purpose of cleaning; to which end it consists in the peculiar construction of man-hole and door hereinafter more fully described.

A further object of my invention is to provide a cask of the foregoing character with means for abstracting atmospheric air therefrom; to which end I provide the mechanism hereinafter described and shown.

A further object of my invention is to provide means for abstracting a quantity of the contained fluid from the cask without disturbing the vacuum formed therein; and to this end it consists in providing a cask of the above character with an external receptacle provided with suitable inlets and outlets protected by air-tight cocks, and connecting the interior of the said receptacle with the interior of the cask, and with the outlet through which the air and gas are abstracted from the cask.

Besides the foregoing general features, my invention consists in certain details of construction and combinations of parts, all as hereinafter more fully described.

Referring to the drawings, Figure I is a perspective view of a cask provided with my im-

provements; Fig. II, an elevation of the receptacle and attachments for drawing off fluid from the cask while retained *in vacuo;* Fig. III, a central vertical section, and Fig. IV a view in elevation, of the man-hole; and Fig. V, a view, partly in section, of the discharge-pipe; and Fig. VI, a view in section of a part of the upper wall of the cask, showing the connection of certain pipes.

A is the cask, formed in sections, two or more in number.

For manufacturing casks of large dimension a convenient construction is illustrated in the drawings, and consists in providing two or more sections, *t*, for the vertical part of the cask, and separate sections *t'* for the top and bottom. I prefer also, in many cases, so to construct the sections that when applied together the cask will present a gradually-reduced diameter from the bottom to top. By this construction greater facility is afforded for abstracting atmospheric air and gas from above the fluid contained in the vessel, and it thus contributes to the formation of a more perfect vacuum. I prefer also to construct the top and bottom *t'* of a convex form, as shown, which thereby renders the ends more durable against external atmospheric pressure. The number of sections *t* is subject to variation, and so also is their form, according to the disposition of the mechanic; and I may say, in general, that the preferred construction shown and described does not mark the scope of my invention, as the convex ends may be flat or otherwise, the tapering sides may be straight, and the horizontal flanges may be vertical, or vertical and horizontal, so that the sections will be in squares instead of rings. These obvious changes, as well as others that will suggest themselves to the mechanic, come within the scope of my invention. The cask may be mounted upon masonry *s'* or other convenient supports.

In forming the cask the sections *t* are made separately, and provided with the flanges *r*, and the interior of each section, throughout its surface, is coated with enamel, glass, or other acid-proof composition, the said coating being made continuous from the outer edge of one flange to the outer edge of the other, or nearly so. Suitable bolt-holes are provided in the flanges, and the sections are thereupon adjusted together and secured by means of bolts. If desired, asbestus or other suitable packing may be placed between the flanges. By this construction it will be readily apparent that an unbroken surface of an acid-proof composition is presented to the fluid contained in the cask, and the latter itself may be made absolutely impervious to the admission of air.

It is obvious that instead of providing separate sections for the top and bottom, the upper and lower sections, *t*, may be provided with closed convex ends, thereby rendering the uppermost and lowermost flanges *r* unnecessary.

Admission to the interior of the cask, for the purpose of cleaning and the like, is obtained through a man-hole, *p*, Fig. III, preferably of an oval configuration. The man-hole *p* is closed by means of a door, B, of peculiar construction, (illustrated in Figs. I, III, and IV,) which I will now describe.

Hinged vertically in suitable bearings, *o*, upon the exterior of the cask, is a frame, C, comprising bent arms *n*, having a common center and united together at their ends by means of an annular oval plate, *m*, having an interior diameter greater than the diameter of the man-hole. The common center of the arms *n* is provided with a bolt-hole, through which passes the operating-handle *l*, screw-threaded in part of its length, and having at its outer end the wheel *l'*.

D is the man-hole door proper, formed of oval shape, as shown, with the annular flange *k*. The interior surface and edges of the door are provided with a coating of an acid-proof composition. On the outer surface of the door are provided bearings *j*, in which is pivotally secured the inner end of the handle *l*, which may be slotted for the purpose. A nut, *i*, moves upon the handle on the outside of the frame C.

The operation is as follows: The door D being adjusted to cover the man-hole, the nut *i* is turned to bear tightly against the frame C, drawing the flange of the door against the interior surface of the cask surrounding the man-hole, thus completely closing the cask against the admission of air. To open the door, the nut is unscrewed and the handle and door forced inward. The handle is then given a quarter revolution, and the door tipped upon the pivot provided at the inner end of the handle, when it may be withdrawn through the man-hole by moving the frame C outward upon its hinges, and access to the interior of the cask through the man-hole permitted. To close the man-hole, the door is passed through the opening in an inclined or horizontal position, the handle is given a quarter-turn and drawn outward, and the nut tightened, as before.

While I prefer to make the man-hole and door of an oval configuration, it is obvious that this is not essential, it being only necessary that they be of an unequal diameter in cross-sections; and it is also clear that the frame C, the sole purpose of which is to constitute a support for the operating mechanism of the door, may be changed in form, the one described being adopted solely for its convenience.

The cask is provided with a fluid-inlet, E, and an outlet, E'.

For the purpose of abstracting the atmospheric air and gas from the cask, to render the same vacuous, I provide the device illustrated in Fig. I, a description of which is as follows: A pipe, F, Fig. I, is inserted into the upper part of the cask, and is provided at its lower end with a flange, *h*, of the character shown

in another connection in Fig. II of the drawings. The exposed surface of the flange is provided with a coating of an acid-proof composition. The exterior of the pipe upon the outside of the wall of the cask is provided with a screw-thread and encircled by a nut, *g*, by tightening which the flange may be drawn closely against the inner wall of the cask to prevent the admission of air. The passage in the pipe F is controlled by suitable valves, *f* and *f'*, and the pipe connected at its upper end with a lateral pipe leading to the exhaust-pump. The air and gas are exhausted through this pipe through the medium of an air-pump, which may be of any desired construction, and is not shown here. If desired, the pipe F may be made of sections coupled together in the well known manner, as shown at *f''*.

For the purpose of abstracting a part of the contents of the cask without interfering with the vacuum formed therein, I have contrived the mechanism shown in Figs. I and II. A frame-work of metal, G, consisting of an upper and lower plate and connecting-rods, supports a cylinder, H, of glass, the extremities of which are hermetically sealed by the plates of the frame. The frame G is supported upon the lateral pipe *e*, Fig. II, having a suitable valve, which enters the side of the cask, and is provided at its inner extremity with the enameled flange *h*, before described, which impinges against the inner wall of the cask, and is further provided with the screw-thread and the nut *g'*, by tightening which the flange may be drawn closely against the inner wall of the cask. The opposite end of the lateral pipe *e* enters the bottom of the cylinder H through the metal base, and is provided with the flange, screw-thread, and nut the same as the other end. The exhaust-pipe F at the upper end of the cask is provided with a lateral branch and projection of common construction, controlled by a valve, *e'*, to which lateral branch is connected a pipe, *d*, leading down and into the upper part of the cylinder H, through the top plate of the same, and is provided with a flange and nut of the character before described. The pipe *d* may be provided with a suitable valve at its lower end. The cylinder H is provided also with an air-inlet, *c*, Fig. II, and a discharge-tube, *b*, both of which are controlled by suitable valves.

The operation of the device last described is as follows: The pipe F being connected with the suction-pump, and the air-inlet *c*, Fig. I, and discharge *b* being closed, the valve *e'* and *d'* and the valve *e''* are opened, whereupon the contents of the cask are drawn into the cylinder H through the pipe *e* by the suction exerted through the pipe *d*. When the cylinder H is full, the valves *d'* and *e''* are closed, and the air-inlet *c* and outlet *b* are opened, and the contents of the cylinder discharged.

While I have described the pipes *e* and F as removable, it is obvious that this is not essential, and it is equally non-essential that the cylinder H shall be of glass, or that other features described shall be made in the identical form shown. I have adopted the various constructions described, however, as they present many advantages in the way of convenience and simplicity.

Among the most important of the purposes to which the cask which I have invented is applicable is its use in the fermentation of beer, in which it will be found of great value in the main and subsequent fermentations. The danger of magnetic action, which has heretofore prevented the employment of metal in these casks, is obviated by the provision of an internal enamel coating, while the greater strength and cleanliness of wrought metal satisfies an important desideratum. In this connection, however, it is found necessary to provide means for racking off the beverage, in the use of which the liquid may be drawn off clear of sedimentary matter, and for this purpose I have devised the construction of discharge-pipe, illustrated in Fig. V, of which a description is given below. I may say, however, that the device is not limited in its use to fermentation-casks, but is applicable to the drawing off of the liquid from vessels of various descriptions.

Fig. V represents my discharge-pipe and connection applied to a cask of the general character above described. The pipe E' enters the bottom of the cask, and is provided with a flange, *h*, and screw-thread and nut *g'*, heretofore described, to provide a tight joint at the point of entrance into the cask. I prefer to form the pipe in sections coupled together, as shown. E^2 is a separate cylindrical vessel reduced in diameter toward its lower end, to provide a shoulder, g^2, and provided at its upper end with the hollow lateral arms *v v v*, one or more in number, said arms being provided on their under side with inlet-openings *v'*. I prefer to form the vessel E^2 as a closed cylinder, except for the openings *v* and *v'* and the lower outlet.

The operation is as follows: The upper section of the pipe E' is passed downward through the opening in the cask, and the nut *g'* applied and screwed home, and the lower section coupled on. The vessel E^2 is then set into the pipe E', the external diameter of the reduced portion of the vessel E^2 being equal to the internal diameter of the pipe E'. The beer or other beverage is then fed into the cask. The sediment collects at the bottom of the cask, below the level of the arms *v*, so that when communication is opened through the pipe E' (which is previously closed by a suitable cock) the beverage, clear of sediment, will pass into the apertures *v'* outward through the pipe. It is well-known that where a liquid is discharged through a reduced outlet it has a tendency to swirl about, stirring up the sediment and inducing its discharge with the clear liquor. This fact has proved a serious annoyance to brewers, and has led to various inventions with a view to obviating its objectionable effects. By providing the lateral arms *v*, I entirely prevent this swirl, the arms serving

to interrupt the rotating action of the liquor. The steady discharge of the beverage without rousing the sediment is assisted by the provision of the outlet v' in the under side of the arms. After discharging the clear liquor the vessel E^2 and lower section of the pipe E′ are removed, and the sediment abstracted through the outlet E′. Where the outlet is used in connection with an enameled cask of the kind above described, I prefer to enamel the exposed surface of the vessel E^2 and flange *p*. It is apparent that the inlet v' may be provided in the upper side or at the end of the pipe *v*.

I claim—

1. An air-tight cask comprising flanged separately enameled sections of wrought metal joined together by their flanges, whereby a practically continuous internal coating of enamel is provided, substantially as described.

2. The combination, with a cask, of a man-hole door, D, impinging against the interior of the cask, and operating mechanism comprising a frame removably supported upon the outside of the cask, provided with a central eye, a horizontally-shifting supporting-rod, *l*, screw threaded in part of its length and passing through the eye of the frame, a nut upon the supporting-rod, a pivotal connection for the supporting-rod and door, and a handle upon the opposite end of the rod, whereby the door may be removed from the man-hole by being tilted upon the rod which remains in the frame, substantially as described.

3. The combination, with a cask made of sections joined together and provided with an interior coating of enamel, and having a man-hole of varying diameter, of a flanged door coated on its interior surface with enamel, an operating-handle pivotally connected to the door and screw-threaded in part of its length, a frame supporting the operating-handle and hinged in bearings upon the exterior of the cask, and a nut moving upon the screw-threaded handle and bearing against the frame, the whole being arranged to operate substantially as described.

4. The combination, with a cask provided with a man-hole of varying diameter, of a door and operating mechanism comprising the following elements, viz: the door D, having a flange, *k*, operating-rod *l*, pivotally connected with bearings on the door and screw-threaded in part of its length, a hinged frame, C, supported in bearings on the exterior of the cask and having a central aperture to receive the operating-handle *l*, and a nut, *i*, moving upon the handle and bearing against the frame C, substantially as described.

5. The combination, with a cask made of wrought-metal sections joined together, and made air-tight at its joints, and provided with an interior coating of enamel, of an exhaust-pipe communicating with the interior of the cask, a flange upon the inner end of the exhaust-pipe within the cask, coated on its exposed surface with enamel, and means, substantially as described, for impinging the flange against the interior surface of the cask surrounding the aperture through which the exhaust-pipe enters the cask, as set forth.

6. The combination, with an air-tight cask, of an exhaust-pipe having a valved communication with the interior of the cask, a valved branched pipe communicating with an exhaust-pipe above the valve at one end, and with the interior of the cask below the level of the fluid contained therein at the other, substantially as described.

7. The combination, with a cask having its interior surface coated with enamel, of an exhaust-pipe having a valved communication with the interior of the cask, and having at its inner end within the cask a flange coated with an acid-proof composition and means, substantially as described, for impinging the flange against the interior surface of the cask, a valved pipe communicating at one end with the exhaust-pipe above its valve and at the other with the interior of the cask below the level of the fluid contained therein, provided at its inner end within the cask with a flange, and means, substantially as described, for impinging the flange against the interior surface of the cask, all as set forth.

8. The combination, with a cask having its interior surface coated with enamel, of a valved exhaust-pipe, F, communicating with the interior of the cask and screw-threaded in part of its length, a flange on the inner end of the pipe coated throughout its exposed surface with enamel, a nut moving upon the screw-thread, a pipe, *d*, communicating with the pipe F at one end, above its valve, and with the interior of a fluid-receptacle at the other, a fluid-receptacle, the pipe *e*, communicating with the fluid-receptacle at one end, and with the interior of the cask below the level of the fluid contained therein at the other, and valves in the pipes *d* and *e*, all as set forth.

9. The combination, with an air-tight cask having its surface coated with enamel, of a valved exhaust-pipe, *e*, communicating with the interior of the cask at one end, and provided at its inner end with a flange coated with enamel, and means for impinging the flange against the inner surface of the cask, a fluid-receptacle, a pipe affording communication between the fluid-receptacle and the exhaust-pipe above its valve, and a pipe affording communication between the fluid-receptacle and the interior of the cask below the level of the fluid therein, and provided with a flange at its inner end coated with enamel, and means for impinging the flange against the interior of the cask, all as set forth.

10. The combination, with a cask having its surface coated with enamel, and a valved exhaust-pipe leading into the same, and means, substantially as described, for preventing the admission of air into the cask through the aperture formed to receive the exhaust-pipe, a fluid-discharge pipe entering the cask below

the level of the fluid contained therein, and means, substantially as described, for preventing the admission of air through the apertures formed to receive the said discharge-pipe, of a fluid-receptacle communicating with the exhaust-pipe above its valve, and with the discharge-pipe provided with air-inlet and fluid-discharge tubes, and valves controlling the passage of fluid out of the cask, all as set forth.

11. The combination, with a cask having an outlet at its bottom, of a pipe, E, closed at its top, and provided with the branching tubular arms *v*, having perforations *v'* in their under side, said pipe having a reduced part toward its lower end, whereby it may be inserted into the outlet and cover the same, substantially as and for the purpose set forth.

12. A discharge-pipe for fermenting-casks, comprising a shell or pipe, E, adapted to be inserted in the discharge-outlet of the cask, closed at the top and having tubular branches *v*, having perforations *v'* in their under side, as and for the purpose set forth.

CHARLES C. PUFFER.

In presence of—
JAMES SARGENT,
EDWARD G. MINER, Jr.