(No Model.) 4 Sheets—Sheet 1.

O. INTZE.

FLUID RESERVOIR.

No. 348,912. Patented Sept. 7, 1886.

Fig. 1

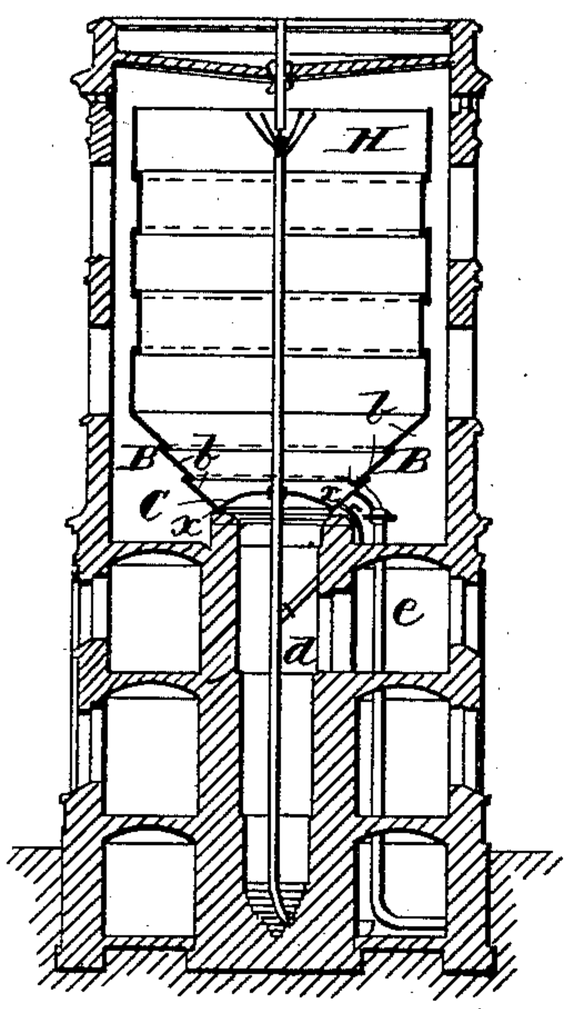


Fig. 3

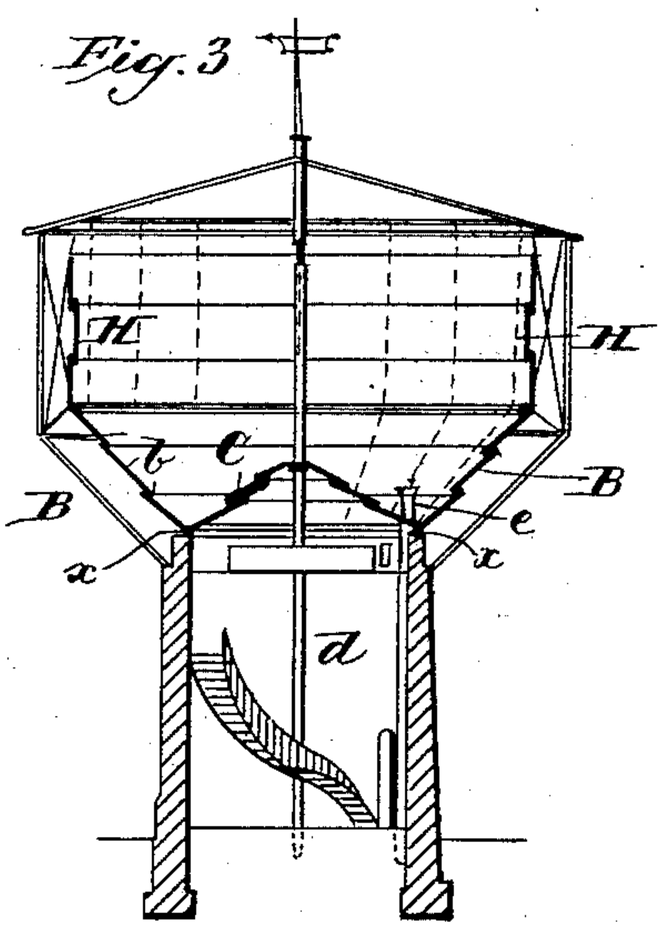
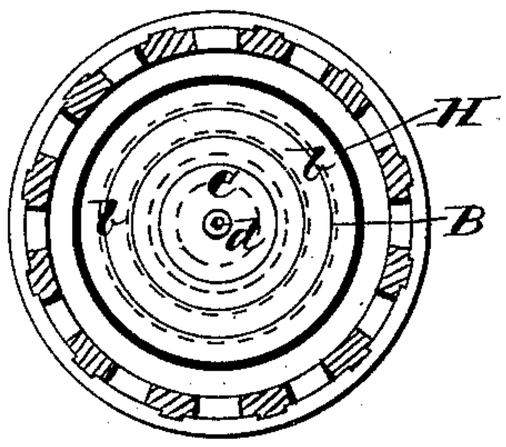


Fig. 4

Fig. 2



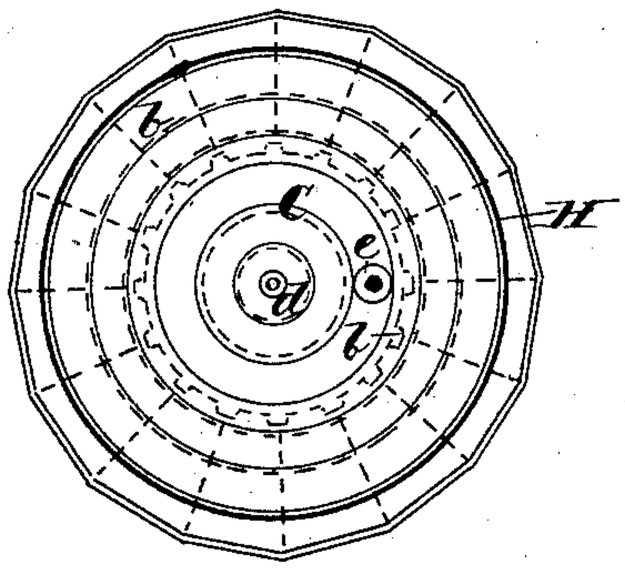
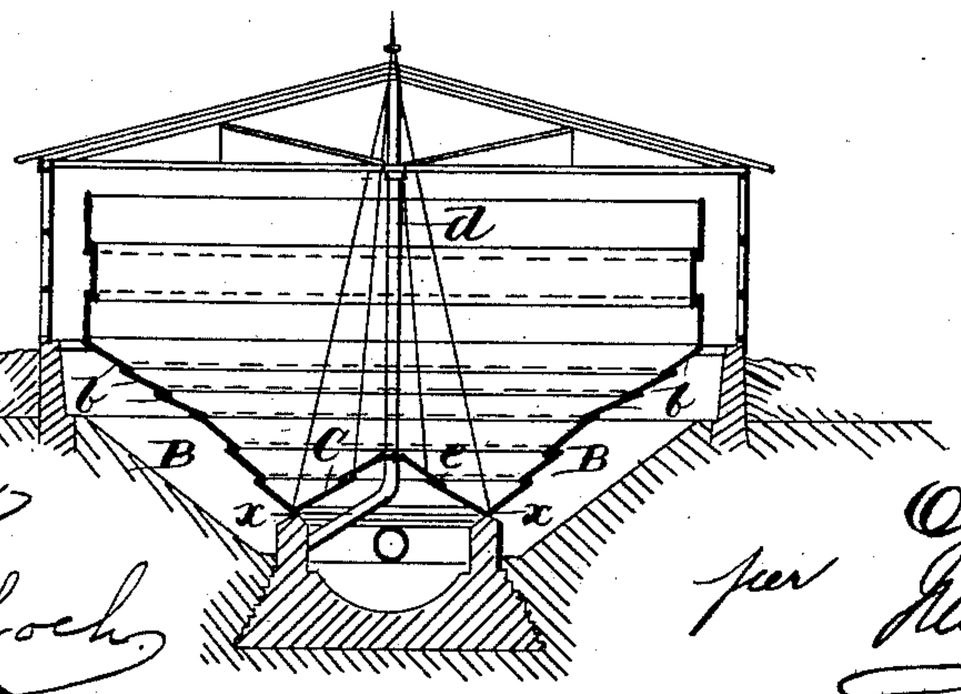


Fig. 5



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(No Model.)

4 Sheets—Sheet 2.

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FLUID RESERVOIR.

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Fig. 6

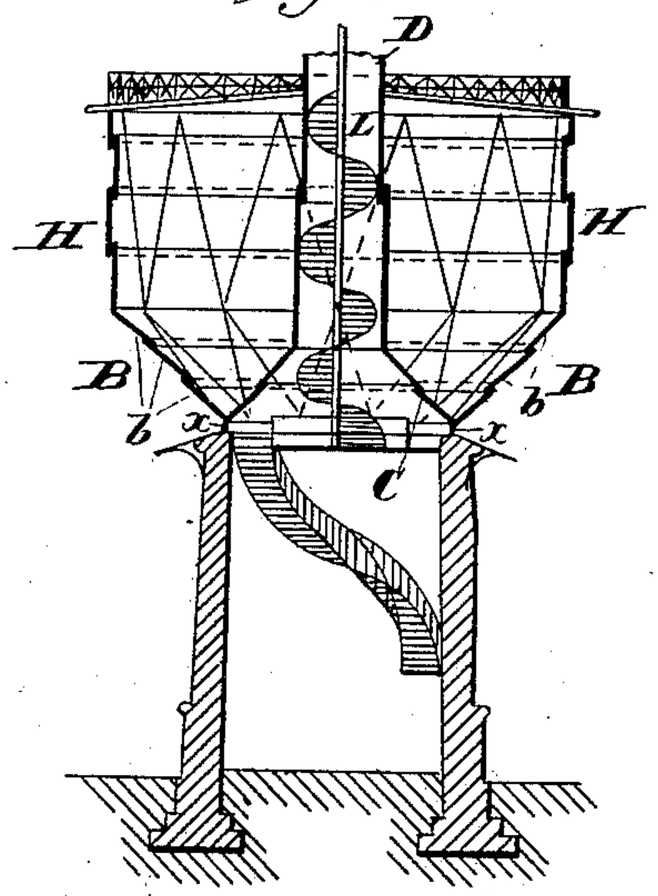


Fig. 7

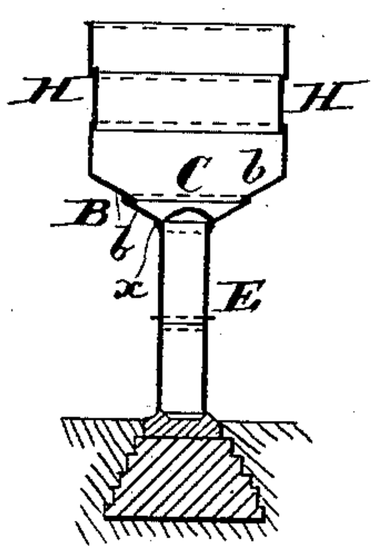


Fig. 8

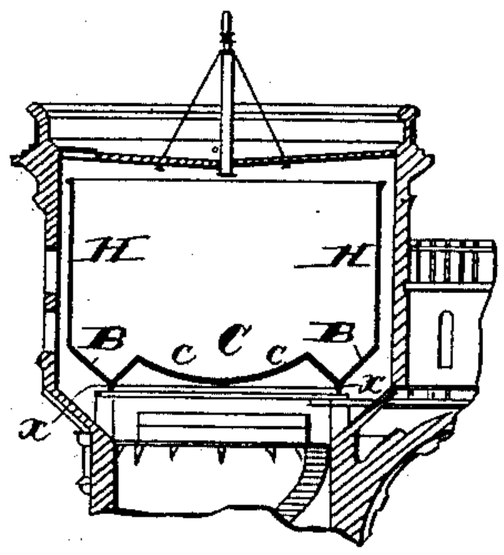
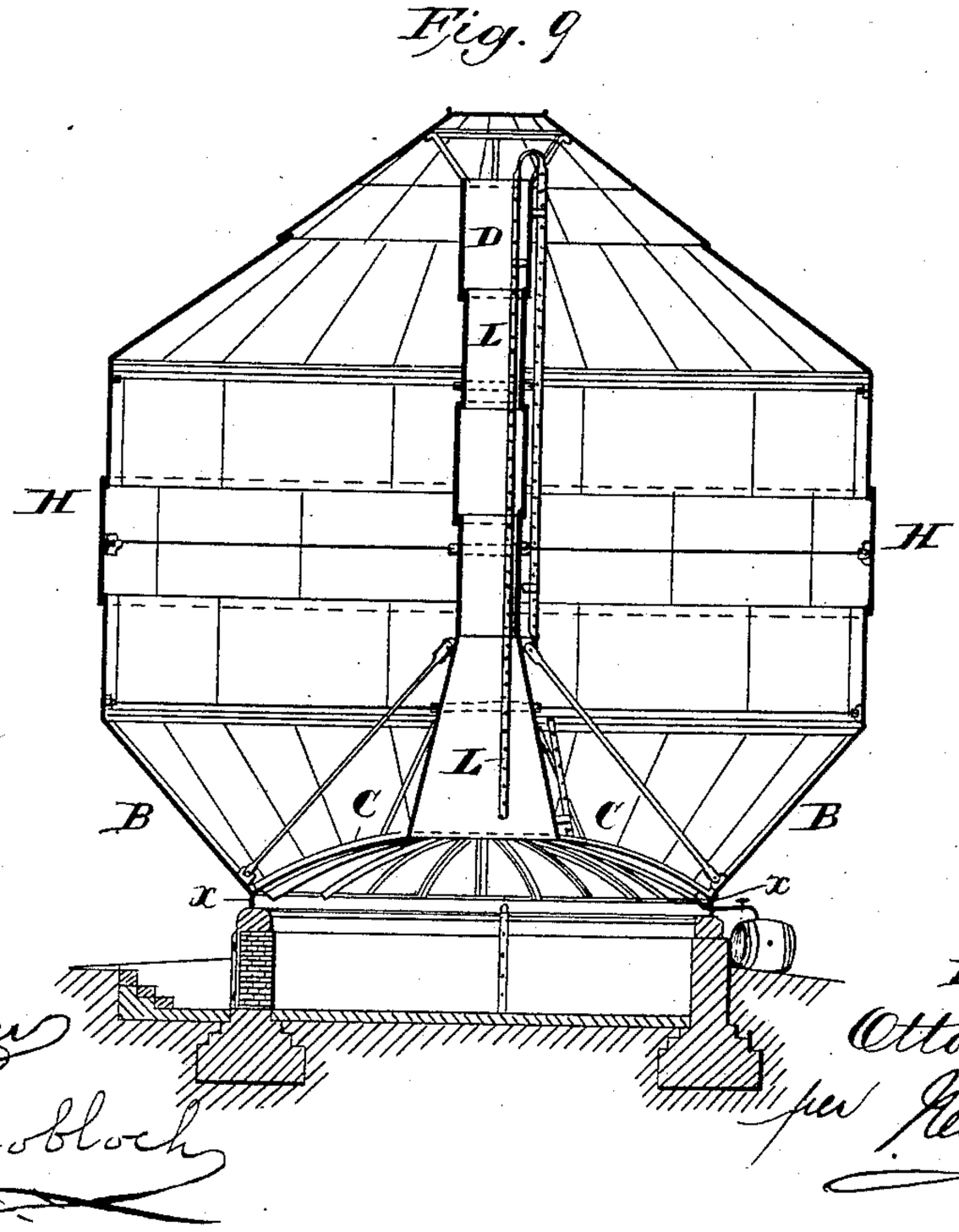


Fig. 9



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(No Model.) 4 Sheets—Sheet 3.

O. INTZE.

FLUID RESERVOIR.

No. 348,912. Patented Sept. 7, 1886.

Fig. 12

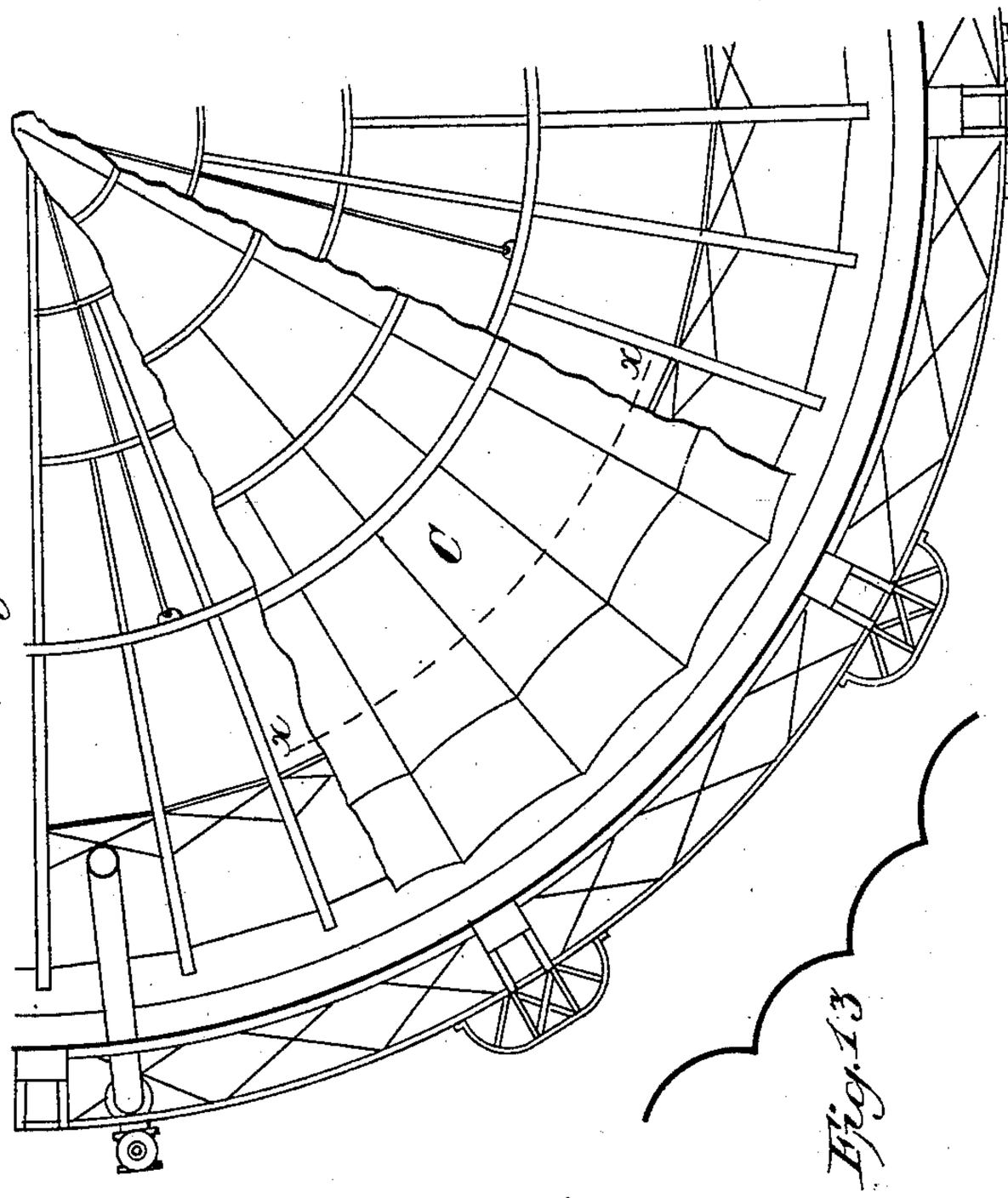


Fig. 13

Fig. 14

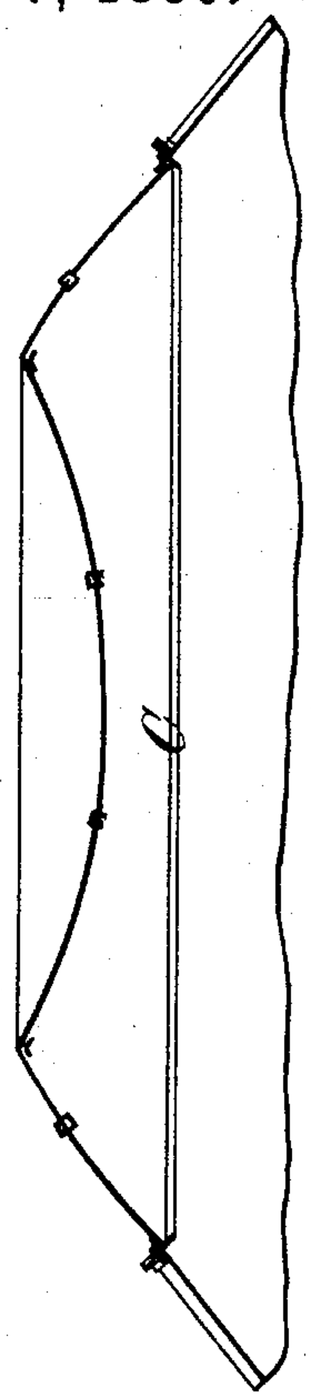
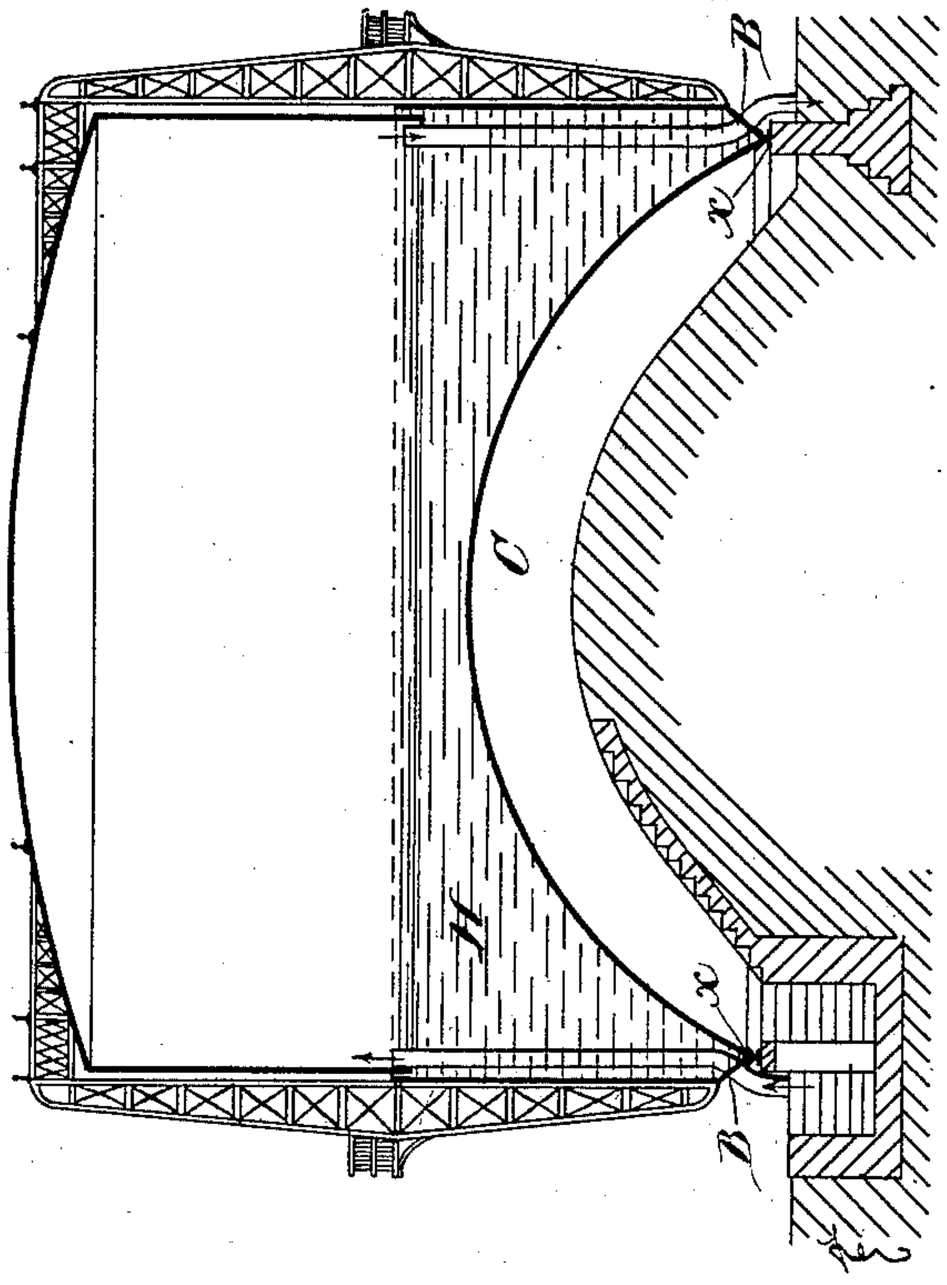


Fig. 10



Witnesses
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(No Model.)

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FLUID RESERVOIR.

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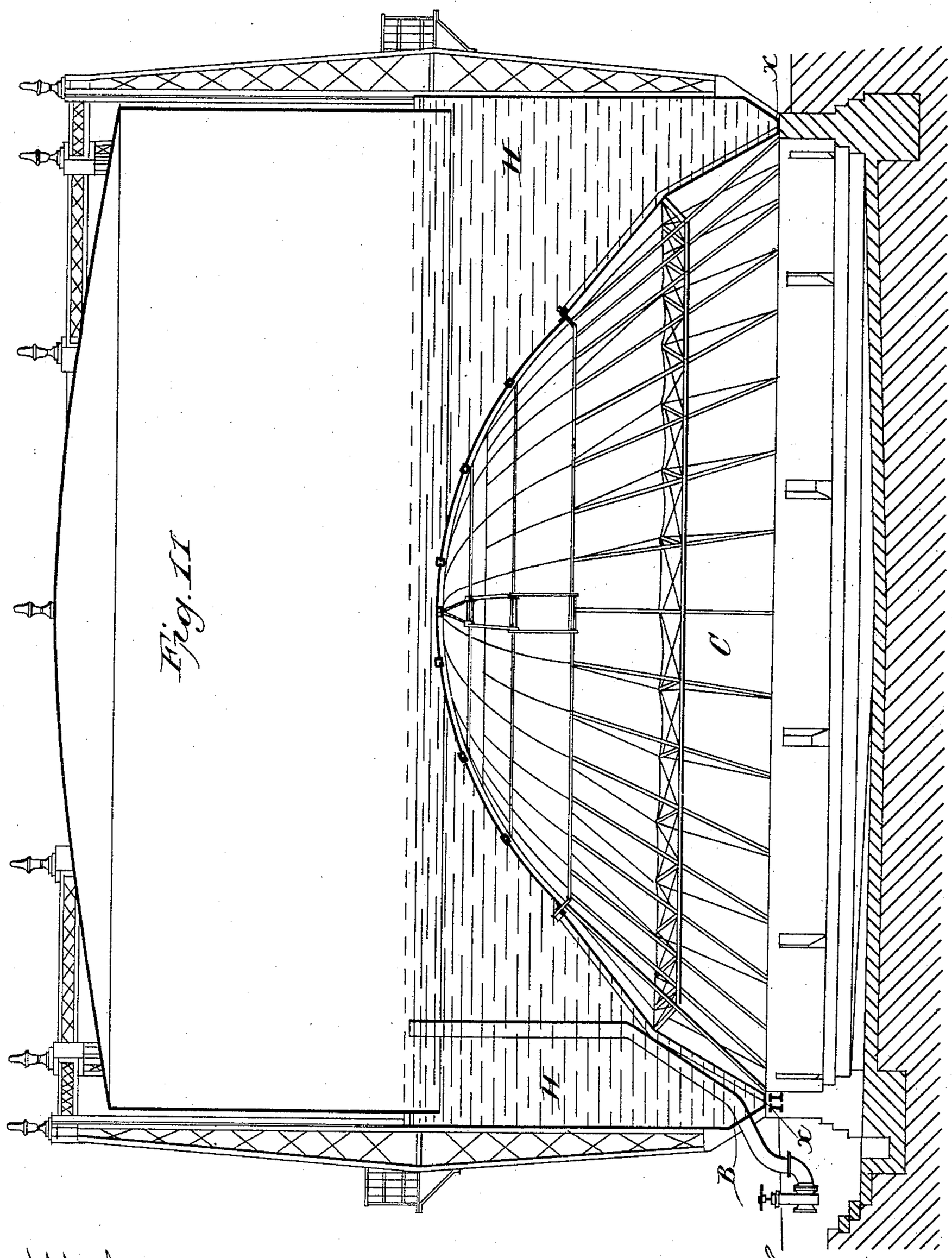

Fig. 1.

Witnesses
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UNITED STATES PATENT OFFICE.

OTTO INTZE, OF AACHEN, PRUSSIA, GERMANY.

FLUID-RESERVOIR.

SPECIFICATION forming part of Letters Patent No. 348,912, dated September 7, 1886.

Application filed June 13, 1885. Serial No. 168,613. (No model.) Patented in Germany February 4, 1883, No. 23,187; in Belgium May 18, 1885, No. 68,900, and in Italy January 16, 1886, XXXVIII, 159.

To all whom it may concern:

Be it known that I, OTTO INTZE, a subject of the King of Prussia, residing at Aachen, Prussia, German Empire, have invented certain new and useful Improvements in Reservoirs, (for which I have obtained Letters Patent in the following countries, dated and numbered as follows: Belgium, May 18, 1885, No. 68,900B; Germany, February 4, 1883, No. 23,187; Italy, January 16, 1886, XXXVIII, 159;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

In the construction of fluid-reservoirs of great capacity—as, for instance, such as are used as service or storage tanks for water or the large storage-tanks for storing hydrocarbons, or the tanks for gas-holders and other purposes—in order to effect economy in material and cost of construction it has lately been proposed to avoid the heavy flat or horizontal bottoms, which necessitates costly and strong supports and columns to impart to them the necessary resistance to the pressure of the fluid. To this end the cylindrical reservoirs have been constructed with hemispherical or convex bottoms supported by masonry at their peripheral edges.

In the construction of gas-holders it has also been proposed to employ sheet metal for the water tank or cylinder thereof, and these have heretofore been constructed with a flat or convex bottom seated on a solid foundation of masonry, so that no access can be had to the under side of the bottom to trace a leakage or to protect the bottom from corrosion. To support such a reservoir from a seat-ring, and to provide the desired room for supervision, it is necessary to surround the cylinder with inclosing-walls of great dimensions, which require very careful construction, and which entail necessarily a great expense. On the other hand the seat-ring in large reservoirs should not only be very strong and carefully built or constructed, but must be bolted to flanges or extensions of the cylinder-walls, since both the horizontal and radial pressures exerted by the weight of the reservoir and its contents is transferred through said ring to the supporting-walls. To attain this, sheet metal, cast metal, and masonry are combined under most unfavorable conditions when it is desired to apply a hemispherical or convex bottom to such reservoirs.

The object of my invention is to avoid the detrimental effect of the lateral pressure exerted by the weight of the reservoir and its contents upon its supports, in that I provide at the bottom of the reservoir an intermediate annular seat by forming the outer portion of the bottom conical, while the inner concave or convex or hemispherical or cone-shaped portion of the bottom forms a counter-bottom for the outer one.

The further object of my invention is to support the water-tank for gas-holders at such a distance from the ground as to afford ready access to the entire exterior surface of the bottom thereof, so that the said bottom may be readily protected from corrosion by suitably coating the same with a protective agent, and so that any leakage may be readily detected and located. By means of the described construction and by a judicious selection of attendant conditions or circumstances, the lateral pressure exerted by the weight of the cylinder and its contents upon the seat-ring or other support is entirely avoided, in that the combined pressures are exerted in a vertical direction upon the supporting-walls. Inasmuch as there is no lateral pressure exerted upon the support for the reservoir, foundation or supporting walls of considerably less strength than those necessary heretofore may be employed, and the mounting of the reservoir is simplified, while access to the bottom of the latter is greatly facilitated; and, lastly, the walls that support the reservoir are entirely disconnected from the outer masonry that constitutes or supports the inclosing-walls of said reservoir, so that sagging or other changes or displacements in the latter or in the ground can in nowise affect the reservoir itself.

In the accompanying drawings, forming a part of this specification, I have illustrated various constructions of reservoirs, showing

the manner in which my invention may be carried into practical effect, and in these drawings—

Figures 1 and 2 are vertical and horizontal sections, respectively, of a reservoir with outer conical sectional and inner hemispherical counter-bottoms. Figs. 3 and 5 show by like views a reservoir with an outer conical bottom and an inner conical counter-bottom. Fig. 5 is a vertical section of a reservoir provided with an outer conical bottom formed of conical overlapping and inwardly-bent sections and inner sectional conical bottom. Fig. 6 is a like view of a reservoir, from the conical counter-bottom of which projects a tubular extension. Figs. 7 and 8 show further modifications of the reservoir, the counter-bottom in the latter figure being shown concave. Fig. 9 shows a reservoir for storing oil and analogous liquids. Figs. 10 and 11 are like views illustrating my invention in its application to the water-tank of gas-holders. Fig. 12 shows a portion of the tank shown in Fig. 11 in horizontal section, and Fig. 13 is a section on line *x x* of Fig. 12. Fig. 14 shows a portion of the bottom shown in Fig. 11, the apex of the cone being concave.

In carrying out my invention various forms may be given to the bottom of the fluid-reservoir or the tank of a gas-holder; but whatever the form of such bottom may be it should always be such that the weight of the load carried by the support for the reservoir or tank will be exerted upon said support in a vertical direction. Thus, for instance, the conical bottom B of the cylinder H, Figs. 1 and 2, may be formed of cone-sections *b*, and connected to the inner or hemispherical or convex counter-bottom C, through which passes the central overflow-pipe, *d*.

The line of junction or intersection *x*, that forms the bearing-edges of the two bottoms B and C—that is to say, the lines at which the bottoms abut against each other, (which is likewise indicated by *x* in all the figures)—constitutes the seat for the reservoir, and rests upon the base or foundation wall, or on a seat-ring applied thereto, in such manner that the entire weight is exerted thereon or transmitted thereto in a vertical direction only.

The modified construction shown in Figs. 3 and 4 differs from that shown in Figs. 1 and 2, in that instead of a hemispherical or convex counter-bottom, a conical inner counter-bottom, C, is employed, which is connected with the outer conical bottom, B, of the cylinder H.

As shown in Fig. 5, the outer conical bottom, B, is bent inwardly on curved lines to illustrate that it is not absolutely necessary that the convex or conical form should be strictly adhered to. This bottom B is connected on the one hand with the cylinder H, and on the other with the inner counter-bottom, C.

As shown in Fig. 6, the inner conical bottom, C, has a tubular extension, D, that extends through the reservoir in which tubular extension is arranged a stairway or ladder, L. The outer conical bottom, B, is connected with the cylinder H and bottom C.

As shown in Fig. 7, the reservoir is supported from a tubular column, E, upon which rests the bearing edge or seat *x*, formed at the point of connection or intersection between the convex counter-bottom C and the conical outer bottom, B.

In Fig. 8 the reservoir H is shown with an outer conical bottom, B, connected with the cylindrical wall of the reservoir, and to this bottom is connected an inner conical bottom, C, the upper portion of which is concave, as shown at *c*.

The reservoir shown in Fig. 9 is provided with an inner convex bottom, C, provided with a tubular extension, D, which extends vertically therefrom, nearly through the upper closed end of the reservoir, and in which a flight of stairs or ladder, L, is arranged, by means of which access may be had to the reservoir H. To the inner bottom, C, is connected the outer conical bottom, B, and the latter is connected to the walls of the cylinder H. A reservoir of this construction is more especially designed for storing hydrocarbons and other like fluids.

In Figs. 10 and 11 I have shown the invention applied to the water-tank of gas-holders, and it is to be remarked that whatever the surface of the ground upon which the gas-holder or reservoir may be established, the bottom of the tank thereof may be constructed so as to approximately conform to such surface, so as to reduce the labor of first leveling the ground to provide an even surface for the reception of a foundation for the tank. Further than this, the supports for the tank or reservoir are in each case of such a height above the surface of the ground as to afford ready access to the entire exterior surface of the bottom of the tank or reservoir, a feature heretofore not known, so far as I am aware, in the construction of gas-holders, and the advantages of which will be readily understood by those conversant with these structures.

Figs. 12 and 13 illustrate one mode of constructing the inner or counter bottom, C. In tanks or reservoirs of great capacity it is desirable to brace or re-enforce the inner or counter bottom, C, which may be effected by struts or braces *f* and tie-rods *g*. If desired, the single plates of the bottom C may be constructed with curved edges, so as to produce undulating circumferential joints of the bottom section, as shown in said Figs. 12 and 13. The above-described construction of the bottom of the reservoirs, and the mode of seating or supporting the same, is applicable to reservoirs or tanks of cylindrical as well as other form in cross-section, as will be readily understood.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A reservoir for fluids having a bottom comprising the conical bottom B and the

counter-bottom C, together forming a seat, *x*, in combination with a support or bearing for said seat *x*, substantially as and for the purpose specified.

2. In gas-holders, the combination, with the bell of the holder and its supports, of a fluid reservoir or tank having a bottom comprising the conical bottom B and the counter-bottom C, together forming a seat, *x*, and a support or bearing for said seat *x*, to support the tank above the surface of the ground, substantially as and for the purpose specified.

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

OTTO INTZE.

Witnesses:
FR. CLODIUS SLUDARTH,
GEO. F. LINCOLN.