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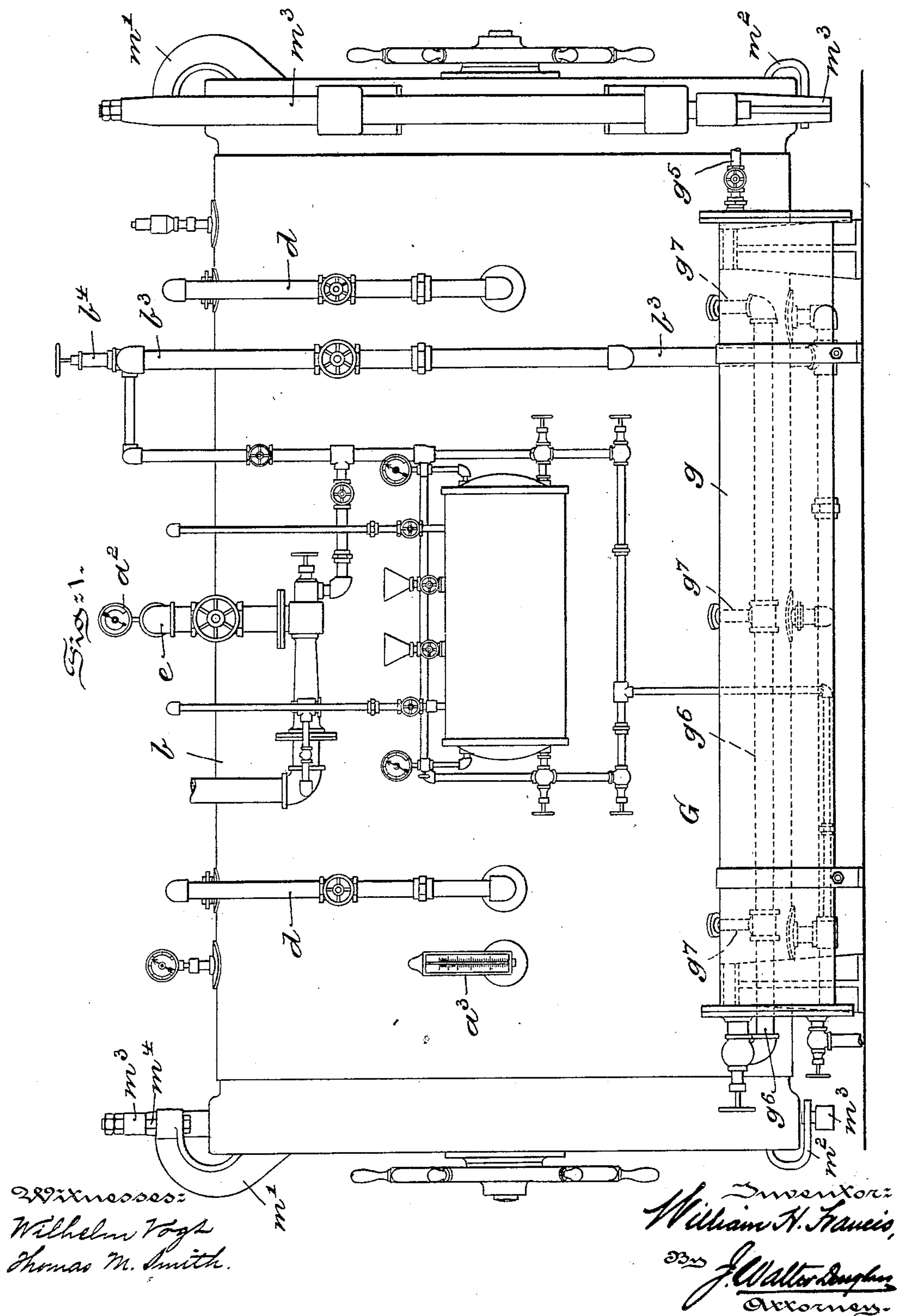
Patented July 8, 1902.

W. H. FRANCIS.
DISINFECTING APPARATUS.

(Application filed May 7, 1901.)

(No Model.)

4 Sheets—Sheet 1.



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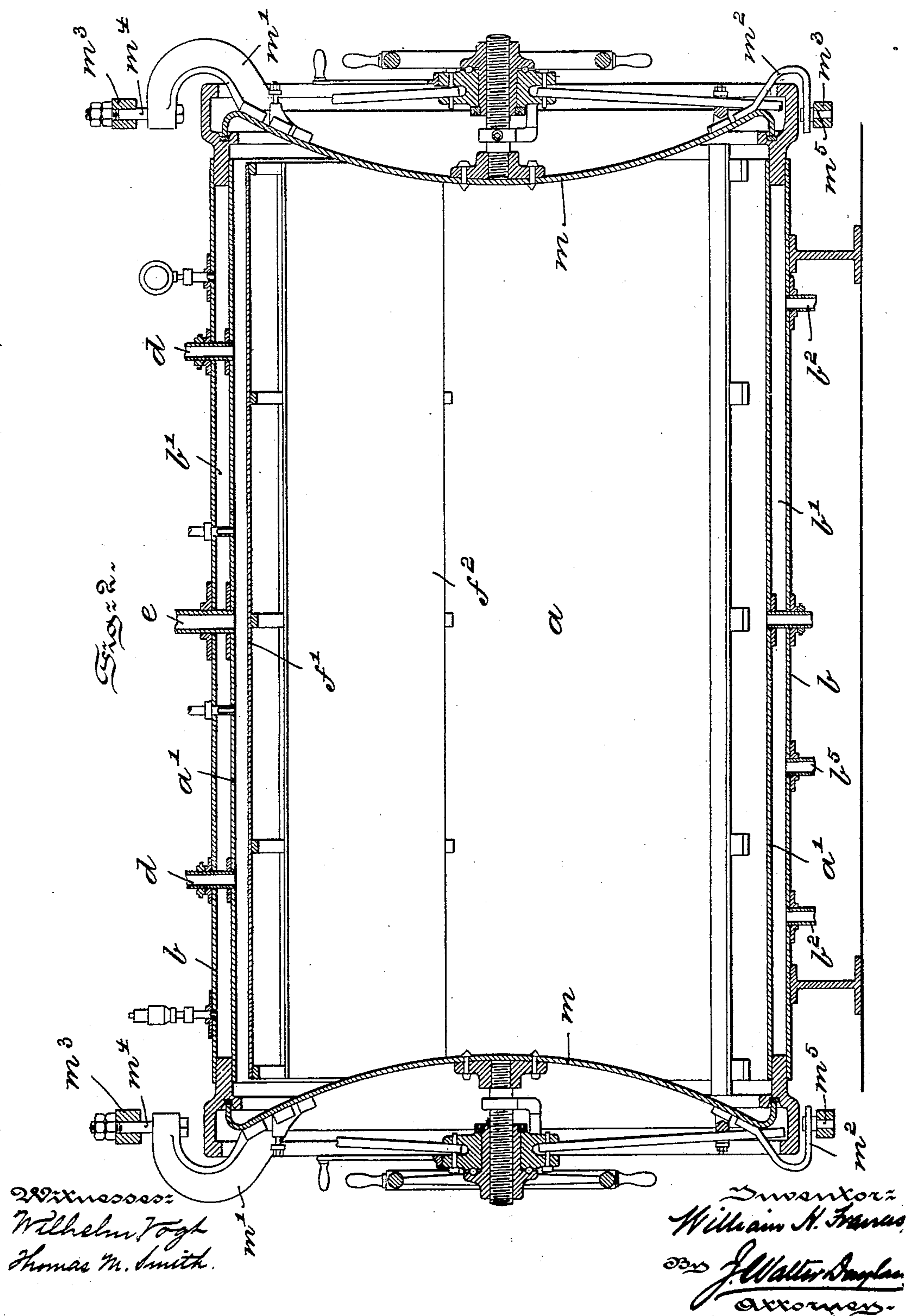
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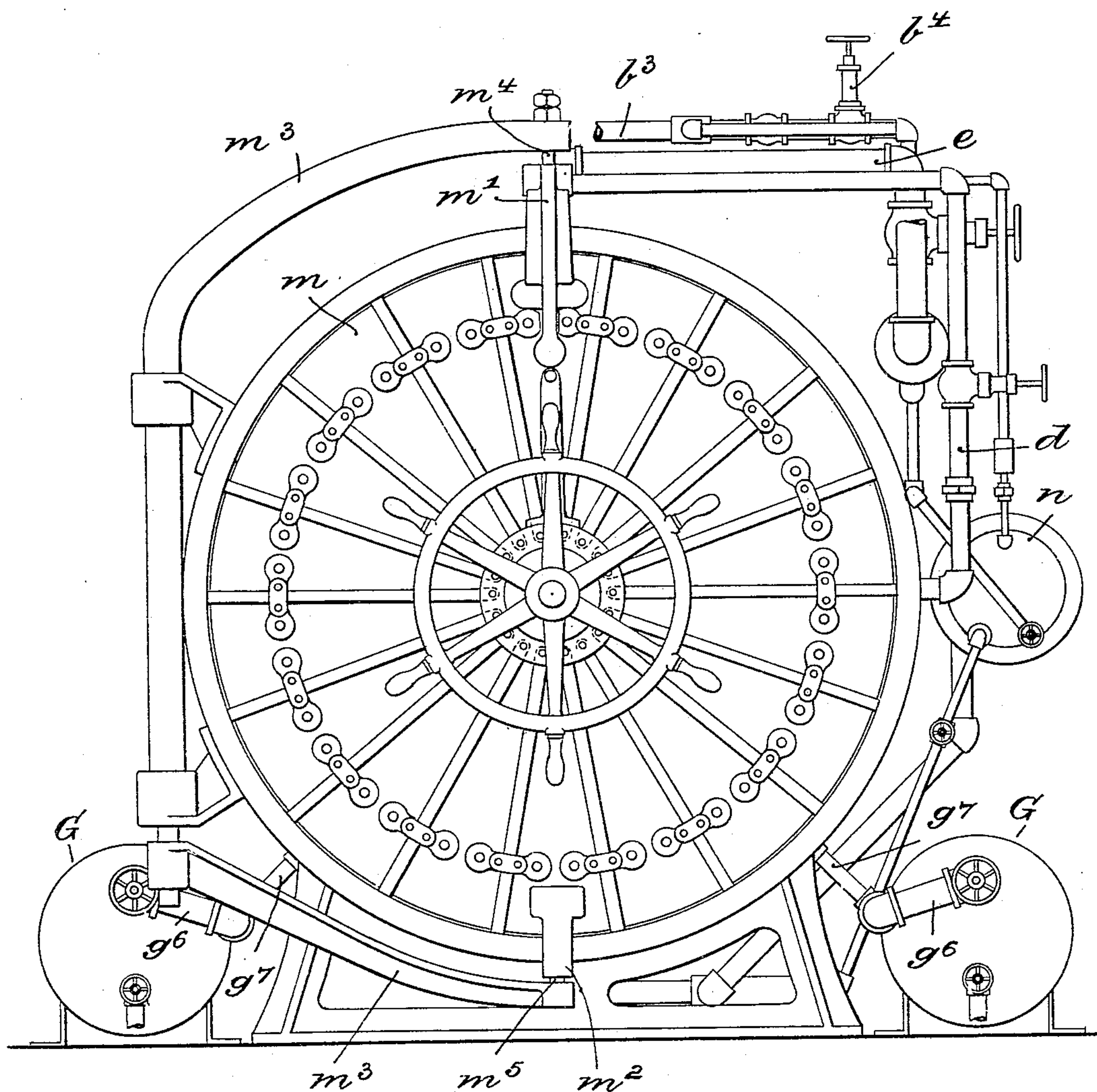
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Fig. 3.



Witnesses
Wilhelm Vogt
Thomas M. Smith.

Inventor
William H. Francis,
by J. Walter Douglas
Attorney.

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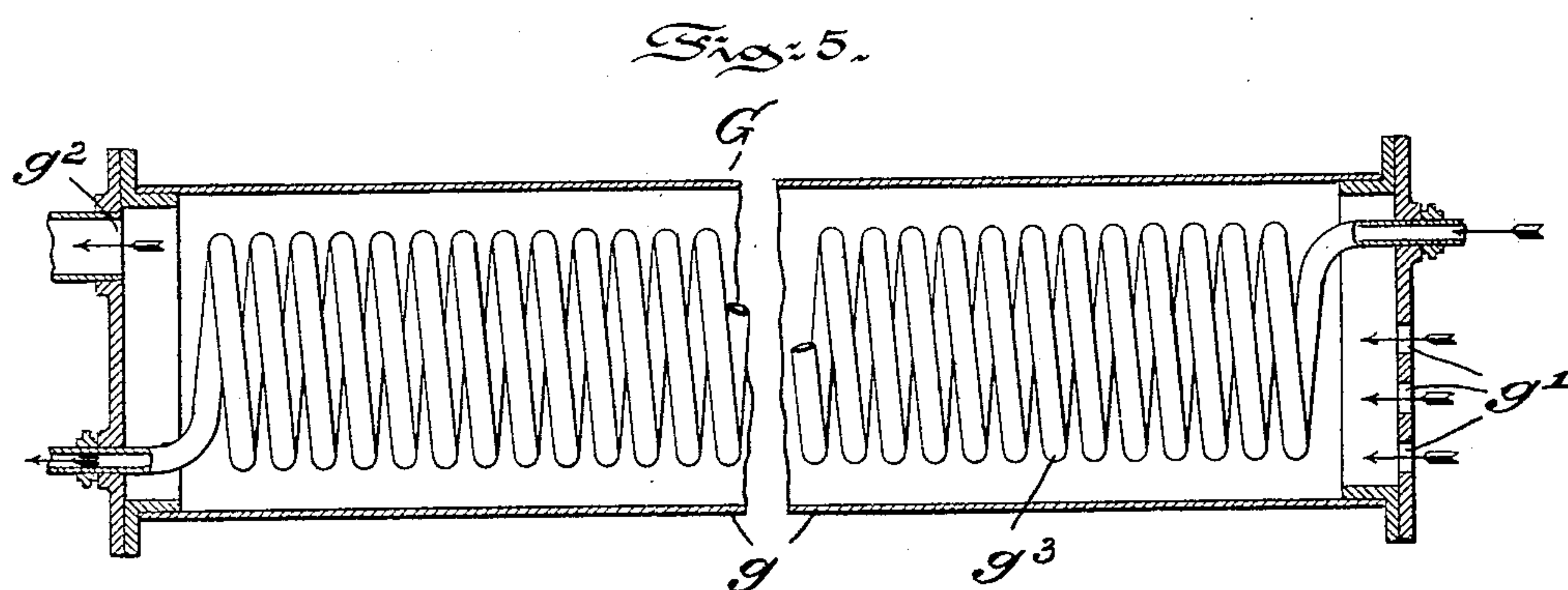
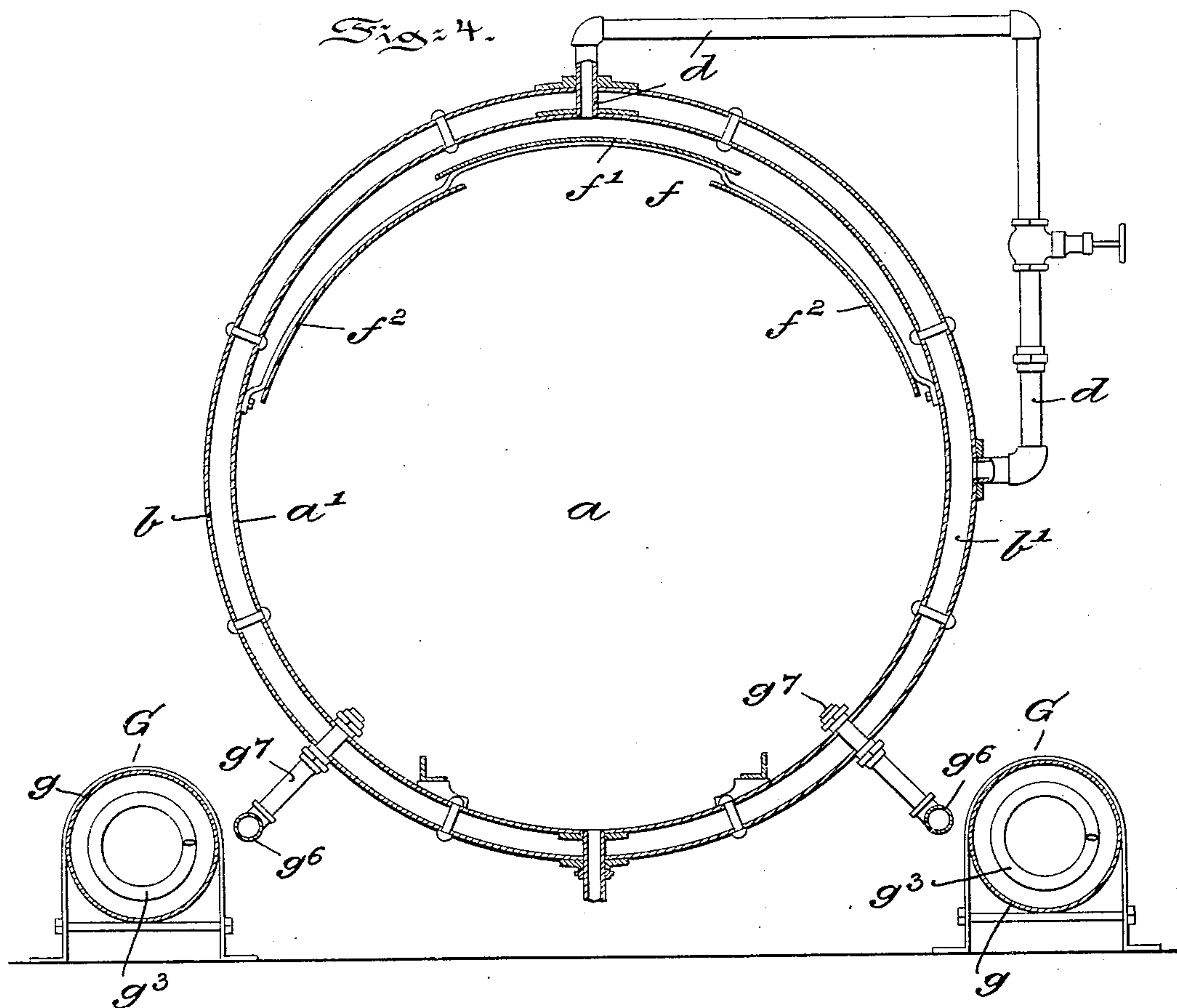
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4 Sheets—Sheet 4.



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Wilhelm Vogt
Thomas M. Smith.

Inventor:
William H. Francis,
by J. Walter Douglas
Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM H. FRANCIS, OF PHILADELPHIA, PENNSYLVANIA.

DISINFECTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 704,182, dated July 8, 1902.

Application filed May 7, 1901. Serial No. 59,121. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. FRANCIS, 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 Disinfecting and Sterilizing Apparatus, of which the following is a specification.

My invention has relation to an apparatus designed to quickly disinfect or sterilize infected articles or articles suspected of being infected, and in such connection it relates to the construction and arrangement of such an apparatus.

The principal objects of my invention are, first, to provide, in a disinfecting or sterilizing apparatus, a chamber for the articles to be disinfected, said chamber being jacketed, a valved connection between the source of steam-supply and the jacket of the chamber, a valved connection between the jacket of the chamber and the chamber itself, and a valved connection between the chamber and an exhaust apparatus, whereby when required the vapor, air, or steam within the chamber may be exhausted; second, to provide, in conjunction with a chamber to receive the infected articles or articles to be treated, a jacket for the chamber, means for forcing steam under pressure into the jacket to heat the chamber externally, means for leading steam under pressure from the jacket directly into the chamber, means for exhausting the chamber at intervals prior to the admission of steam and thereafter, and means for heating and forcing air into and through the chamber after the articles therein have been subjected to the action of the steam, and, third, to provide within the chamber in which the articles to be treated are placed a hood or shed of improved construction interposed between the entrance of the steam and the articles to be treated, said hood or shed adapted to collect and lead off the condensation or moisture in the steam to the sides of the chamber and to prevent the dry steam from swirling or circling around the walls of the chamber when it enters the same.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the ac-

companying drawings, forming part hereof, in which—

Figure 1 is a side elevational view of a disinfecting and sterilizing apparatus embodying main features of my invention. Fig. 2 is a central longitudinal sectional view of the same. Fig. 3 is an end elevational view of the apparatus. Fig. 4 is a cross-sectional view of said apparatus, and Fig. 5 is an enlarged longitudinal sectional view of the means for heating air prior to its discharge to the disinfecting and sterilizing chamber.

Referring to the drawings, *a* represents the disinfecting or sterilizing chamber, preferably arranged as shown and of cylindrical or other form. The exterior or wall *a'* of the chamber *a* is surrounded by a shell *b*, the space between the walls *a'* and *b* constituting a jacket *b'*. The jacket *b'* is connected by one or more pipes *b²* with a steam-pipe *b³*, in which is located a reducing-valve *b⁴*, and this pipe *b³* connects the jacket *b'* with a source of steam-supply. (Not shown.) The pipes *b³*, leading from the main steam-pipe *b³* to the jacket *b'*, enter said jacket, preferably, at the bottom of the jacket. A suitably-controlled drip-pipe *b⁵* also serves to drain off the water condensing in the jacket *b'* from the base of said jacket. The jacket *b* is connected by valve-controlled pipes *d* with the interior of the chamber *a*, said pipes *d* entering said chamber *a*, preferably, at the top. The chamber *a* is also connected with a vacuum apparatus (shown in Fig. 1) by a valve-controlled exhaust-pipe *e*, which is preferably located at the top of the chamber *a*. Below the outlet ends of the pipes *d*, within the chamber *a*, is located a hood or shed *f*, which follows the form of the upper portion of said chamber and is constructed in three sections—a central upper curved section *f'* and two end curved sections *f²*, located below the upper section *f'*, the upper section *f'* overlapping the adjacent ends of the other sections *f²*. The steam as it enters the chamber *a* from the pipes *d* first comes in contact with the hood-sections *f'* and *f²*, which collect any moisture in the steam and lead it off toward the sides of the chamber *a*. The goods to be treated are located below the hood *f*, and hence the steam before it reaches the goods

has been relieved of most of its moisture by its contact with the hood. The arrangement of the hood in three sections permits the steam to be diverted or divided upon its entrance to the chamber *a*, and hence swirling or circular movement of the steam along the wall of the chamber *a*.

Preferably along either side of the base of the disinfecting and sterilizing chamber *a*, outside the jacket *b'*, is arranged an air-heating apparatus *G*, which consists, essentially, of a box or shell *g*, having at one end a series of openings or perforations *g'* for the admission of air and an outlet *g''* at the opposite end for the discharge of the heated air. Within each box or shell *g* is located a steam-coil *g'''*, connected, preferably at the inlet end of the box or shell *g*, with a valve-controlled pipe *g''''*, leading directly from the source of steam-supply. The air entering the openings *g'* of each box or shell *g* travels around and through the coil *g'''* and leaves each box or shell *g* through the outlet *g''*. This outlet *g''* is connected by a valve-controlled pipe *g''''* with branch pipes *g'''''*, which traverse the jacket *b'* and discharge directly into the chamber *a*.

The operation of the apparatus as above described is as follows: Steam is generated in a boiler or other source of steam-supply (not shown) at a high pressure, preferably eighty pounds. It then passes through the pipe *b'''* and reducing-valve *b''''* and enters the jacket *b'* at a reduced pressure of, preferably, ten pounds. If the chamber *a* is cold upon starting, steam should be admitted to the jacket *b'* slowly to prevent sudden expansion and possible damage to the parts. When the jacket *b'* and chamber *a* have been thoroughly heated, the articles to be treated are introduced into the chamber *a*. The chamber *a* and jacket *b'* are still further heated for a few minutes, when the valve-controlled exhaust-pipe *e* is opened and the interior of the chamber *a* exhausted until an exhaust-gage *a''* indicates a vacuum of, preferably, fifteen inches in the chamber *a*, when the exhaust is closed. The valve-controlled pipes *d* are now opened slightly and steam permitted to pass from the jacket *b'* into the chamber *a* until the pressure in the chamber *a* has risen somewhat. The pipe *d* is now closed and the exhaust-pipe *e* opened until the gage *a''* again indicates a fifteen-inch vacuum in the chamber *a*. The exhaust is now closed and the steam-pipes *d* opened to admit steam again from the jacket *b'* to the chamber *a*. The steam from the jacket *b'* is permitted to circulate in the chamber *a* until the chamber is heated to a temperature (indicated by the thermometer *a'''*) of about 238° Fahrenheit. The exhaust-pipe *e* is then opened, the pipes *d* closed, and the interior of the chamber *a* exhausted of the steam and vapor. The jacket *b'* is still heated, however, and after the steam and vapor are exhausted from the chamber *a* the hot air from the pipes *g'''''* is admitted into the chamber *a* and assists

the heat of the jacket *b'* in thoroughly drying the articles in the chamber. When thoroughly dried, the articles are removed from the chamber. The conducting of steam from the jacket *b'* to the chamber *a* instead of supplying the chamber with steam direct from the source of steam-supply possesses several distinct advantages. In the first place there is a circulation of steam maintained in the jacket *b'* and chamber *a*, which permits live steam to enter the jacket *b'* from time to time, so that said jacket will be highly heated and its high temperature constantly maintained. Again, by taking the steam from the jacket *b'* comparatively dry steam will enter the chamber *a*, since the steam is partially relieved of its water of condensation in the jacket *b'* before it leaves the jacket, and, finally, the feeding of steam from an external source to the jacket *b'* and its circulation therein enables the operator to raise the temperature in the jacket and therefore in the chamber *a* to a sufficiently high degree, which will assist in maintaining the high temperature and dryness of the steam in chamber *a*. Where the articles to be treated are clothing and other fibrous material, the passage of wet steam through the chamber *a* will wet or soak the articles, and to thoroughly dry the same thereafter requires a long time. In this connection the use of the auxiliary hot air from the boxes or shells *g* is also advantageous, especially where the articles are in bulk, and their interiors must be thoroughly dried.

A further feature of my present invention resides in the improved construction of the doors or covers which close the ends of the disinfecting and sterilizing chamber. In a previous patent, No. 655,070, granted to me July 31, 1900, a door or cover is described and illustrated which in construction and arrangement is substantially the same as the cover or door *m* of the present invention, the main exception, however, residing in the means for supporting the cover or door. In my former patent the door or cover was suspended from a hook located at the top of a crane or davit swinging in a frame connected with the side of the apparatus. In my present construction the door or cover *m* is provided at diametrically opposite points and in a vertical line with an upper bracket or arm *m'* and a lower bracket or arm *m''*. The crane or davit *m'''* is substantially C-shaped, and the upper arm or bracket *m'* of the door or cover *m* is pivotally connected, as at *m''''*, with the upper free end of the davit *m'''*, whereas the lower bracket or arm *m''* of the door *m* is similarly pivoted, as at *m'''''*, to the lower free end of said davit *m'''*. The door or cover thus supported will not swing by its upper end from the davit or crane, as in the former construction, but will turn in the supports and swing with the crane.

If desired, the contents of the chamber *a* may be treated with disinfecting-gases instead of with steam and hot air. In this in-

stance the gas-retort and connections may be utilized precisely in the manner described and illustrated in my previous patent, No. 655,070, and if so utilized then the steam connections hereinbefore described should be cut off.

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 disinfecting or sterilizing apparatus, a chamber wherein the articles to be treated are adapted to be introduced, a jacket surrounding said chamber, a valve-controlled steam-pipe leading from a source of steam-supply directly to the base of the jacket, a valve-controlled pipe leading from the jacket above the base of said jacket to the upper portion of the chamber and constituting the sole means for introducing steam into said chamber, a box open at one end to the external atmosphere, a steam-coil supplied from the source of steam-supply and inclosed in said box, a pipe leading from the closed end of said box and entering said chamber, said pipe and box constituting the sole means for

introducing hot air into said chamber, and an exhaust apparatus connected directly with the chamber and operated by steam from the source of steam-supply.

2. In a disinfecting or sterilizing apparatus, a chamber, wherein the articles to be treated are adapted to be introduced, a curved hood following closely the interior of the chamber and arranged within and some distance from the top or roof of said chamber, said hood, consisting of a central curved upper section and two end curved sections concentric with and overlapped by said central section, and means for introducing steam to the chamber directly above the upper curved section.

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

WILLIAM H. FRANCIS.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.