

F. M. STINES.  
VALVE STRUCTURE.  
APPLICATION FILED JULY 6, 1905.

Patented Dec. 21, 1909.

2 SHEETS—SHEET 1.

944,219.

Fig. 1.

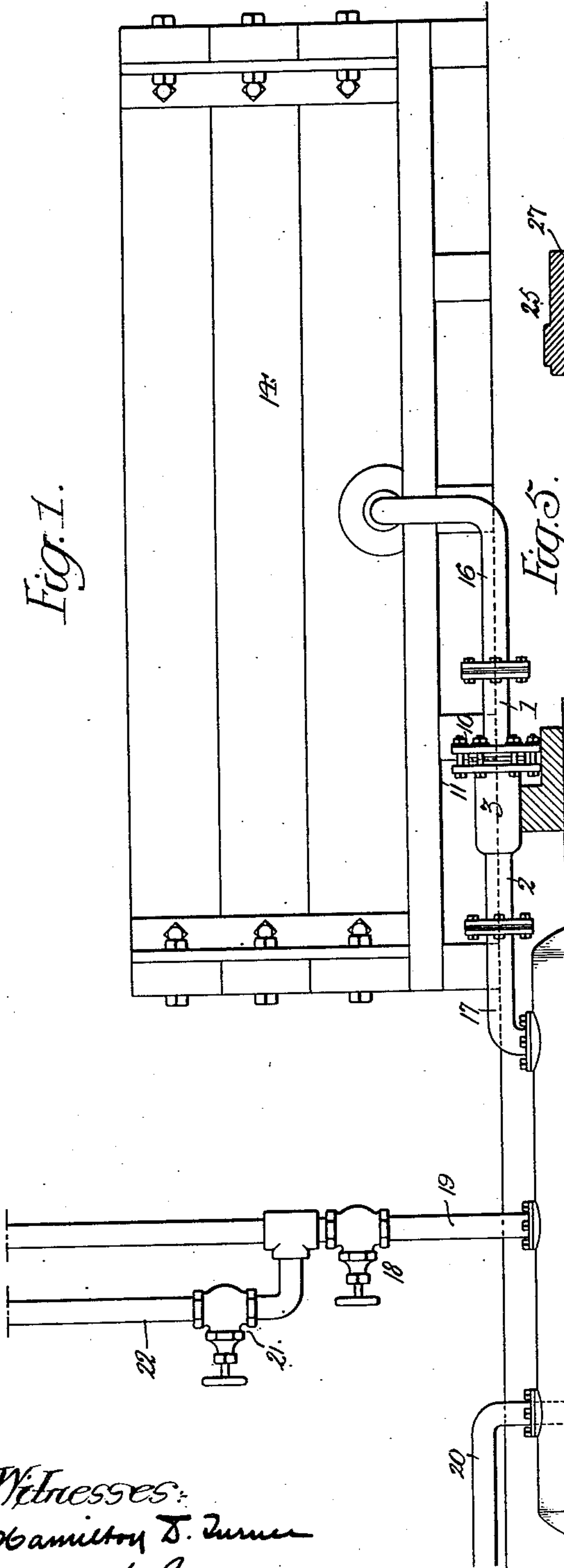


Fig. 5.

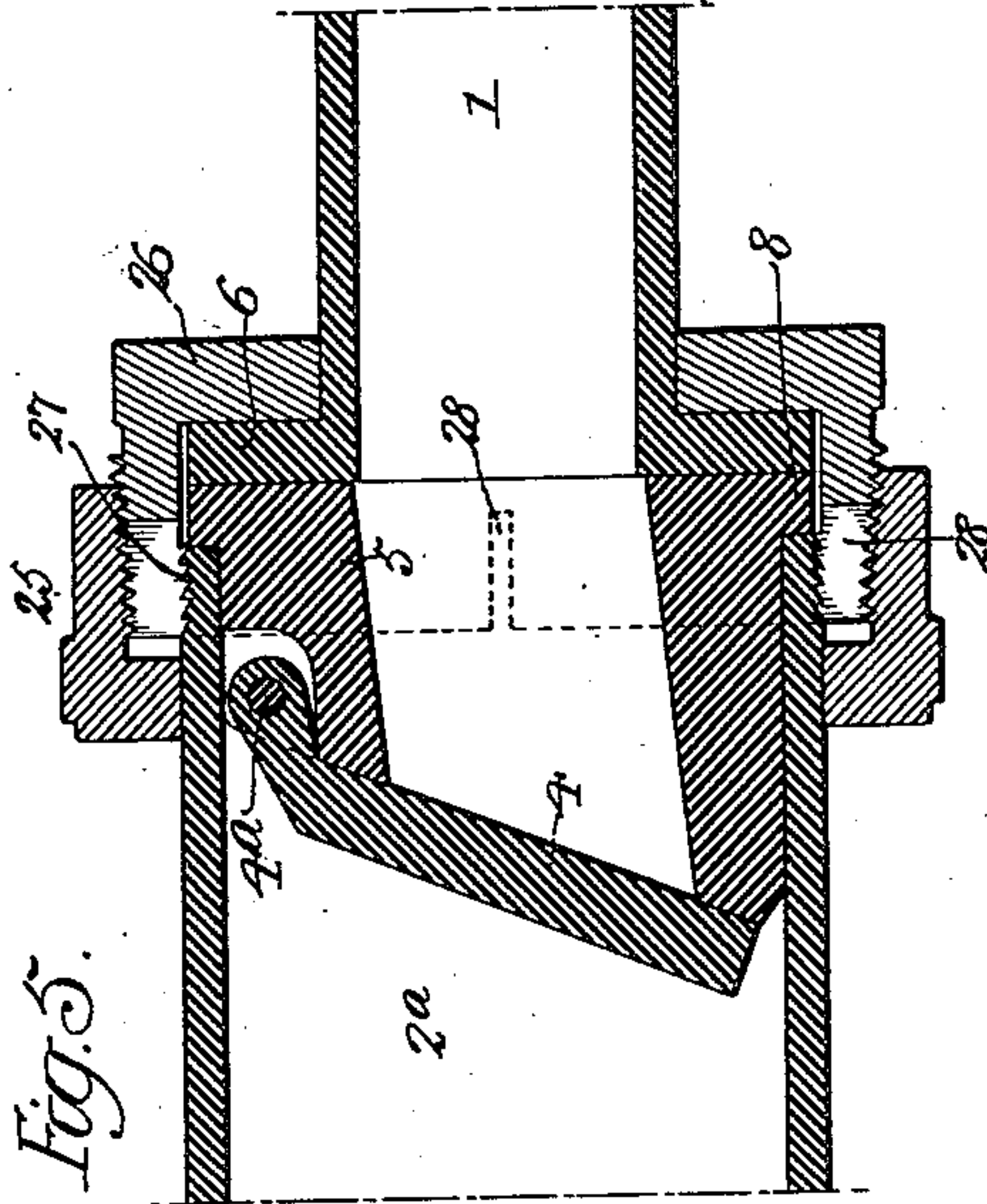
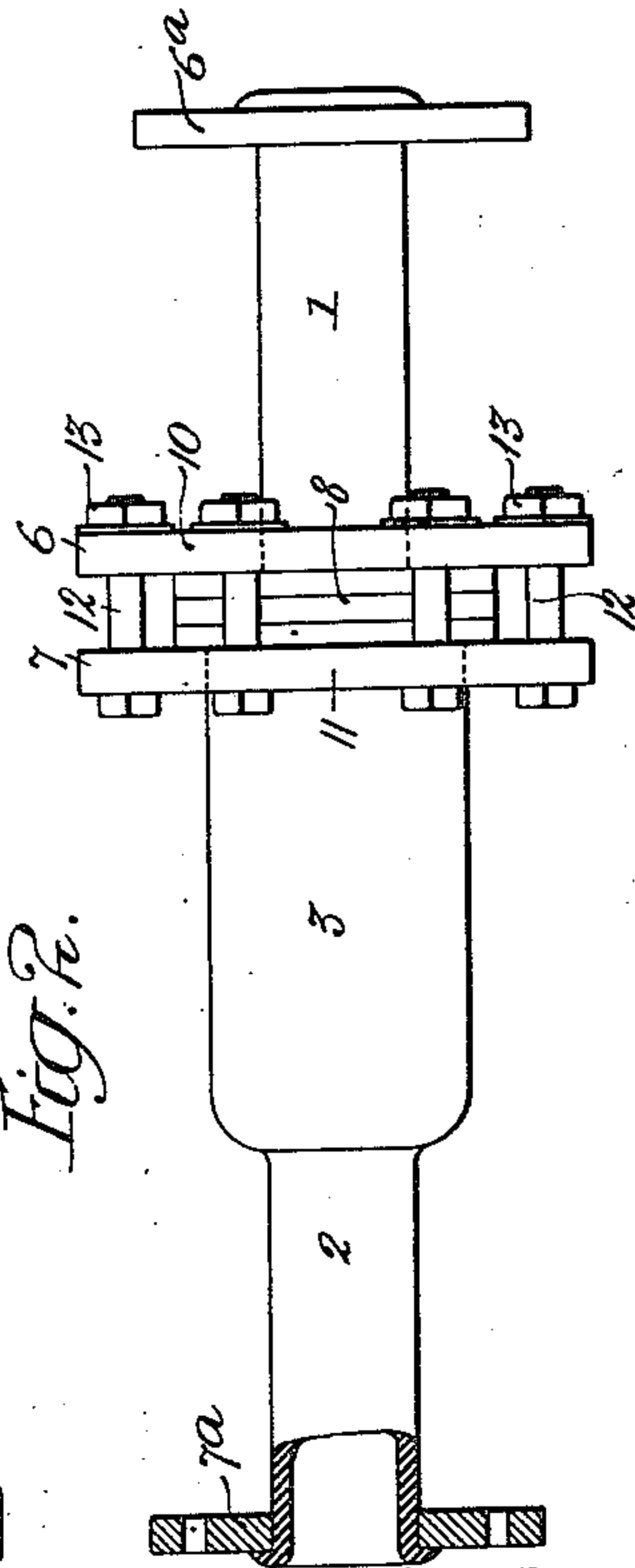


Fig. 2.



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Litus H. Gads.

Inventor:  
Frank M. Stines.  
by his Attorneys,  
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Fig. 3.

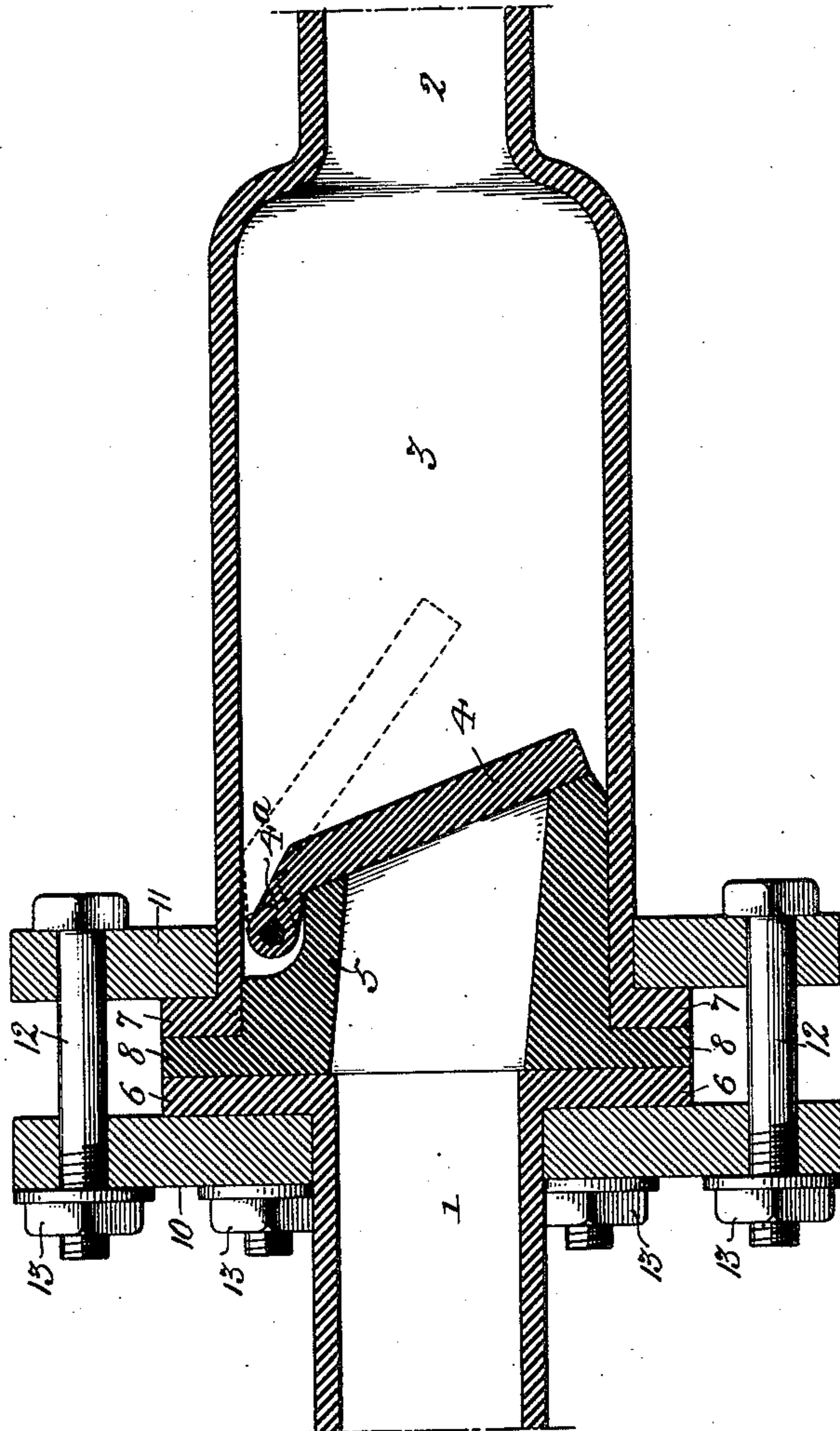
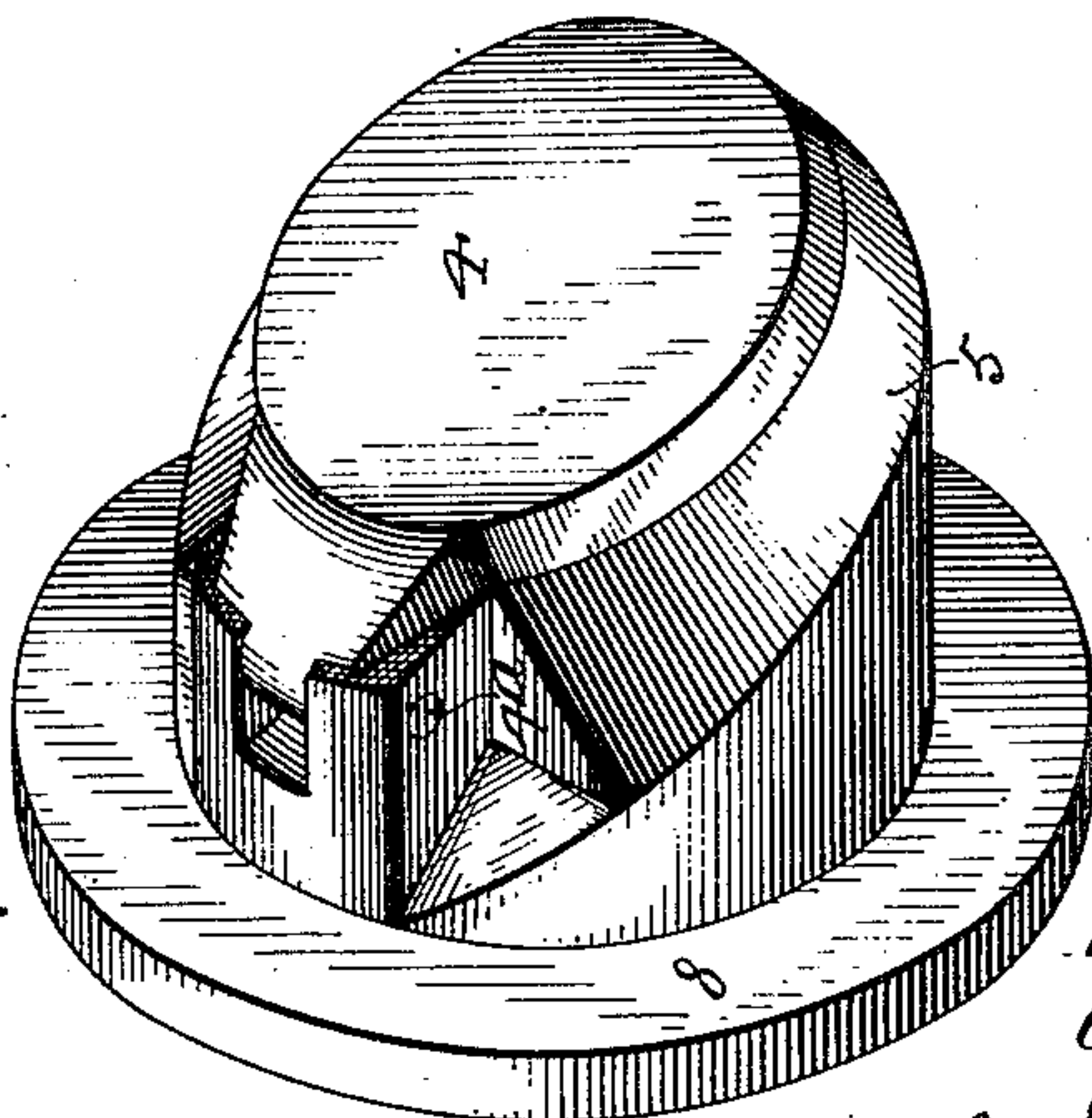


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## VALVE STRUCTURE.

944,219.

Specification of Letters Patent.

Patented Dec. 21, 1909.

Application filed July 6, 1905. Serial No. 268,437.

*To all whom it may concern:*

Be it known that I, FRANK M. STINES, a citizen of the United States, and a resident of Paulsboro, Gloucester county, New Jersey, have invented certain Improvements in Valve Structures, of which the following is a specification.

My invention relates to valve structures designed for use with heavy acids, notably sulfuric and other vitriolic bodies.

The object of my invention is to provide a self closing valve carried by suitable tubular sections which may be disposed in a pipe line leading from a storage tank to a measuring receptacle or auxiliary chamber, from which latter chamber the acid is pumped or forced by air pressure; the valve closing under such pressure and preventing any further flow from the storage tank until the auxiliary receptacle has been emptied.

My invention is fully shown in the accompanying drawing, in which:

Figure 1, is a diagrammatic view of the apparatus with which my improved valve is employed, showing the same in the proper relative position; Fig. 2, is a view of the tubular sections forming the mounting for the valve, shown partly in section; Fig. 3, is an enlarged sectional view of the valve mounting; Fig. 4, is a perspective view of the valve and the sleeve carrying the same which provides its seat, and Fig. 5, is a sectional view illustrating a modification of the structure shown in Fig. 3 and embodying my invention.

In pumping heavy acids of a corrosive nature such as those noted above, it is absolutely essential that the valve shall be entirely automatic in its action and as nearly unaffected by the fluid passing through the same as possible. Provision must also be made for readily renewing the valve and valve seat whenever such action becomes necessary.

In the structure forming the subject of my invention, I provide a sleeve carrying a valve and having a seat therefor, combined with a suitable mounting attachable to a pipe line; the sleeve with the valve being of such a character as to be readily detachable from its mounting for cleaning or renewal.

In the drawing herewith, 1 represents a

section of a pipe through which the acid flows by gravity in the direction of the arrow *a* to a suitable receptacle, and 2 a pipe section connected to the section 1 and having an enlarged portion 3 in which the valve 4 is disposed. The valve is carried by a sleeve 5 having a through opening in line with the pipe sections, and its end is faced to form a seat for said valve. Both of the pipe sections are provided with flanges 6 and 7, and the sleeve 5 is also provided with a flange 8 adapted to lie between the flanges 6 and 7, as clearly shown in the drawing, and be confined in this position. In order to confine the valve in place, I provide the collars 10 and 11 adapted to rest against the flanges 6 and 7 of the pipe sections, which collars are held together, confining said flanges to the flange of the sleeve, by means of a series of bolts 12 and nuts 13. These collars are preferably of iron, while the rest of the structure is of lead; the valve and sleeve being preferably a mixture of lead and antimony, an alloy in well-known use for such structures. The opposite ends of the pipe sections are also flanged at 6<sup>a</sup> and 7<sup>a</sup>, respectively, to enable them to be readily secured in the pipe line leading from the storage tank 14 to the measuring receptacle or auxiliary chamber 15.

The opening through the sleeve is inclined, as shown, so as to provide sufficient metal at the side to receive the pivot pin 4<sup>a</sup> of the valve, the latter being free to move under the normal pressure of flow for the passage of the acid, to the position approximately shown in dotted lines. The valve also lies at an angle when shut and is self-closing therefore under the force of gravity or back pressure. The pin connecting these parts should preferably be of a metal substantially unaffected by the acid in order that the valve may work freely and be in position to properly seat itself at all times. In the apparatus to which this valve is applied the acid flows by gravity from a storage tank 14 to a measuring receptacle 15, commonly called an "egg". When this receptacle is filled, the acid therein is to be forced out, usually by air under pressure, to the desired point of use. This is generally accomplished by means of the apparatus shown in Fig. 1 of the drawing. The pipe section 1 of the valve structure is connected



to a pipe 16 leading from the storage tank, and the pipe section 2 of the valve structure is connected to a pipe 17 leading to the receptacle 15. When this receptacle is full, which fact may be readily determined by an examination of the acid in the storage tank, the valve 18 of an air pipe 19 is opened and air entering the receptacle 15 through such pipe, forces the acid out through a pipe 20 to the point of use; the valve 4 controlling the flow into the receptacle 15, being held tightly closed by this air pressure. It will be seen therefore, that the action of this valve is entirely automatic, permitting a flow of acid into the receptacle 15 and stopping said flow when the acid in said receptacle 15 is emptied, the valve 21 of a pipe 22 which leads to the atmosphere is opened, providing an escape for the air pressure, and the valve 18 may then be closed and the receptacle 15 will again fill by gravity. This may continue indefinitely as long as acid is left in the storage tank. The compression of the flanges 6 and 7 of the pipe sections upon the flange of the sleeve 5 is sufficient to make a fluid-tight joint at this point, preventing absolutely all danger of leakage and there is consequently no danger of the acid destroying such joint or affecting the iron collars.

When it is desired to remove the sleeve and valve, it is only necessary to remove the nuts and bolts and move the collar 10 a sufficient distance to permit the displacement of the pipe 1, an action readily accomplished owing to the flexibility of the pipe section. When this has been done, the valve and sleeve may be taken out and new ones slipped into place, or if any grit rests on the seat, it may be removed. The pipe 1 may then be returned to its normal position, the collars again clamped to the flanges 6 and 7 and the structure is ready for further use.

Instead of employing flanged pipe sections as shown in Figs. 1, 2 and 4, I may connect the sleeve and valve in the manner shown in Fig. 5, in which the pipe section 1 is flanged in the usual manner, while the other section 2<sup>a</sup> fits the wall of the sleeve 5 and is held in place by threaded collars 25 and 26, the latter having a ribbed surface 27 to engage the end of the pipe section 2<sup>a</sup>, and being split at 28. It will be readily seen, therefore, that I have produced a structure compact in itself, of few parts and one that will stand up to the work and at the same time one that may be readily attached, detached or renewed.

Having thus described my invention, I

claim and desire to secure by Letters Patent:

1. The combination of a pair of pipe sections having bores of different diameter, a sleeve mounted in the end of the larger section and having a through opening substantially the same diameter as the smaller section, an integral flange carried by said sleeve and interposed between the abutting ends of said pipe sections, means for holding said sections together, such means confining the sleeve in proper position relatively to the same, and a self-closing valve hung from said sleeve and disposed within the larger pipe section, said pipe sections being made of a compressible metal and the confining means including elements of a harder metal whereby a fluid-tight joint is assured.

2. The combination, in a valve structure, of a pair of pipe sections each having a flanged end, one of said sections having a greater internal diameter than the other, a sleeve mounted in the larger pipe section and having a flange disposed between the flanges of the pipe sections at the meeting ends of the same, said sleeve having a beveled end, a valve pivotally mounted to said beveled end of said sleeve and inclined in the direction of flow, and means for clamping the said pipe sections together and supporting the flanged sleeve between the same, said pipe sections, sleeve and valve being made of an acid-resisting metal capable of being compressed under the action of the clamping means which comprise elements of a different and harder metal.

3. As a new article of manufacture, a valve sleeve arranged to be mounted between a pair of pipe sections having bores of different diameter and closely fit the internal wall of the larger section, said sleeve having an angularly disposed through opening registering with the bore of the smaller section with a flange at one end and having its opposite end beveled, the flange of said sleeve lying between the ends of said pipe sections, in combination with a self-closing valve pivotally hung from the sleeve at the beveled end of the same, said pipe sections, sleeve and valve being made of a compressible acid-resisting metal whereby they may be assembled in fluid-tight condition for use in conveying acid.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRANK M. STINES.

Witnesses:

WILLIAM J. ADAMSON,  
ELIAS W. STINES.