

No. 672,384.

Patented Apr. 16, 1901.

F. W. MARVIN.
LUBRICATOR.

(Application filed Nov. 14, 1900.)

(No Model.)

2 Sheets—Sheet 1.

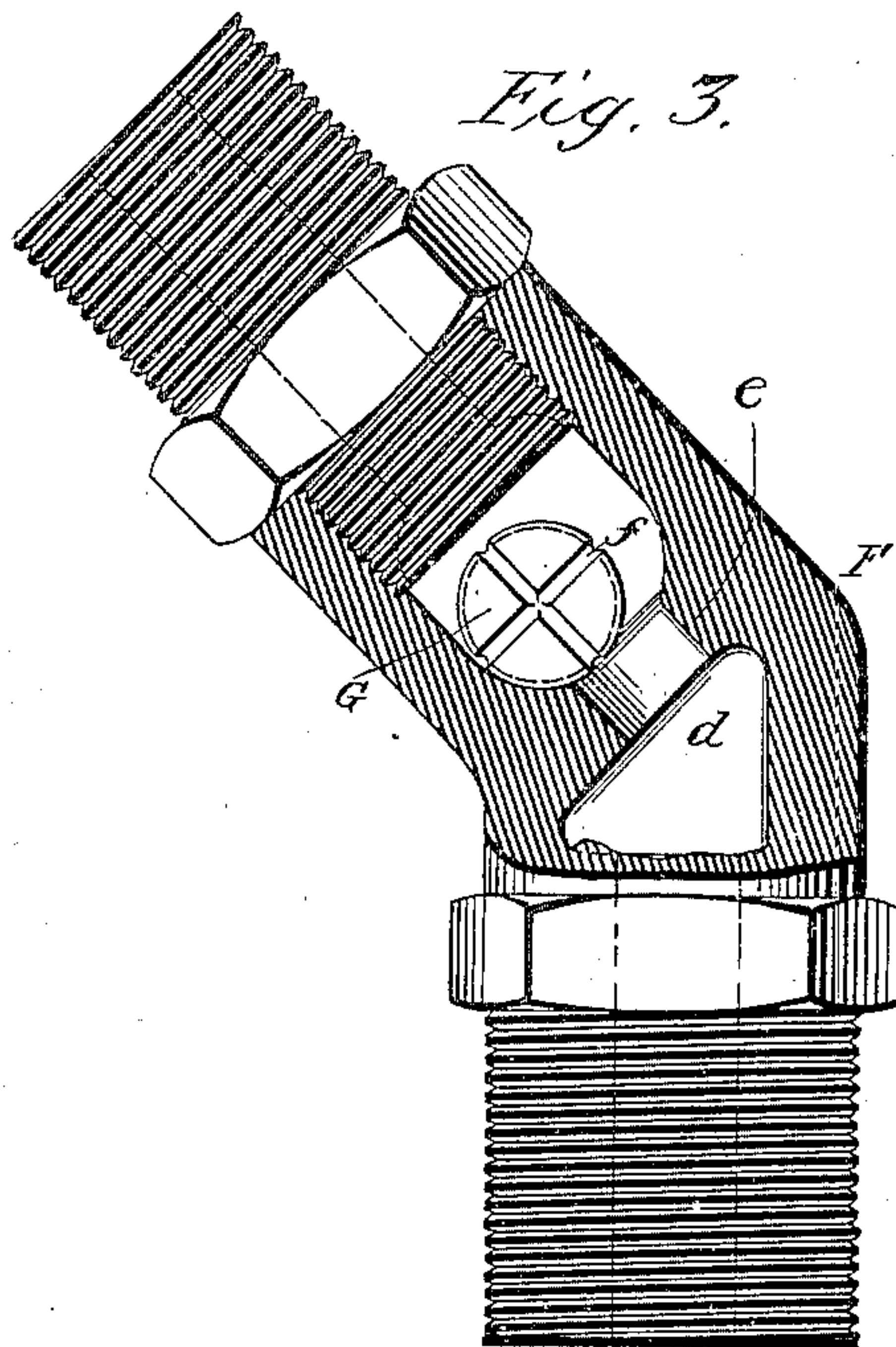
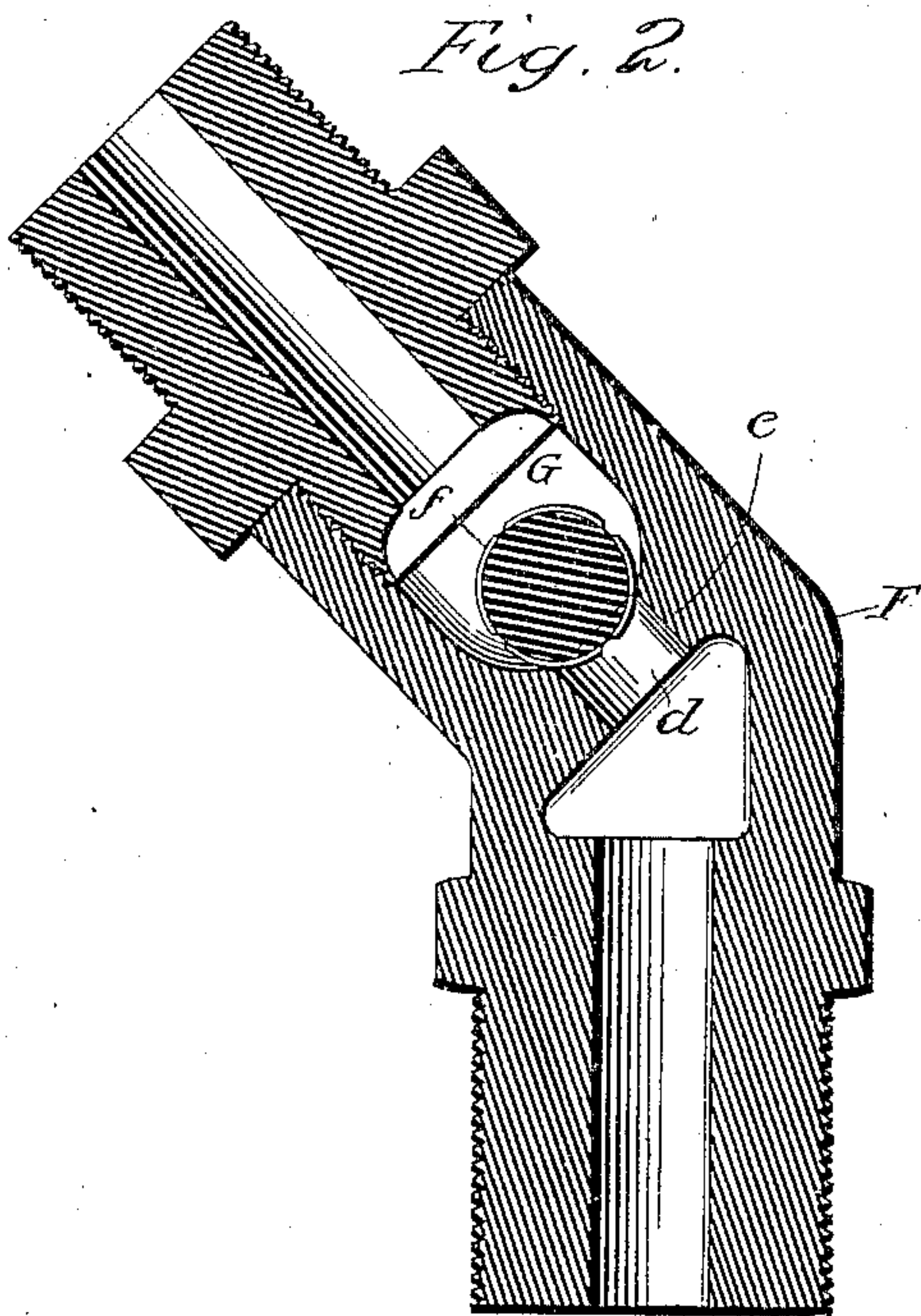
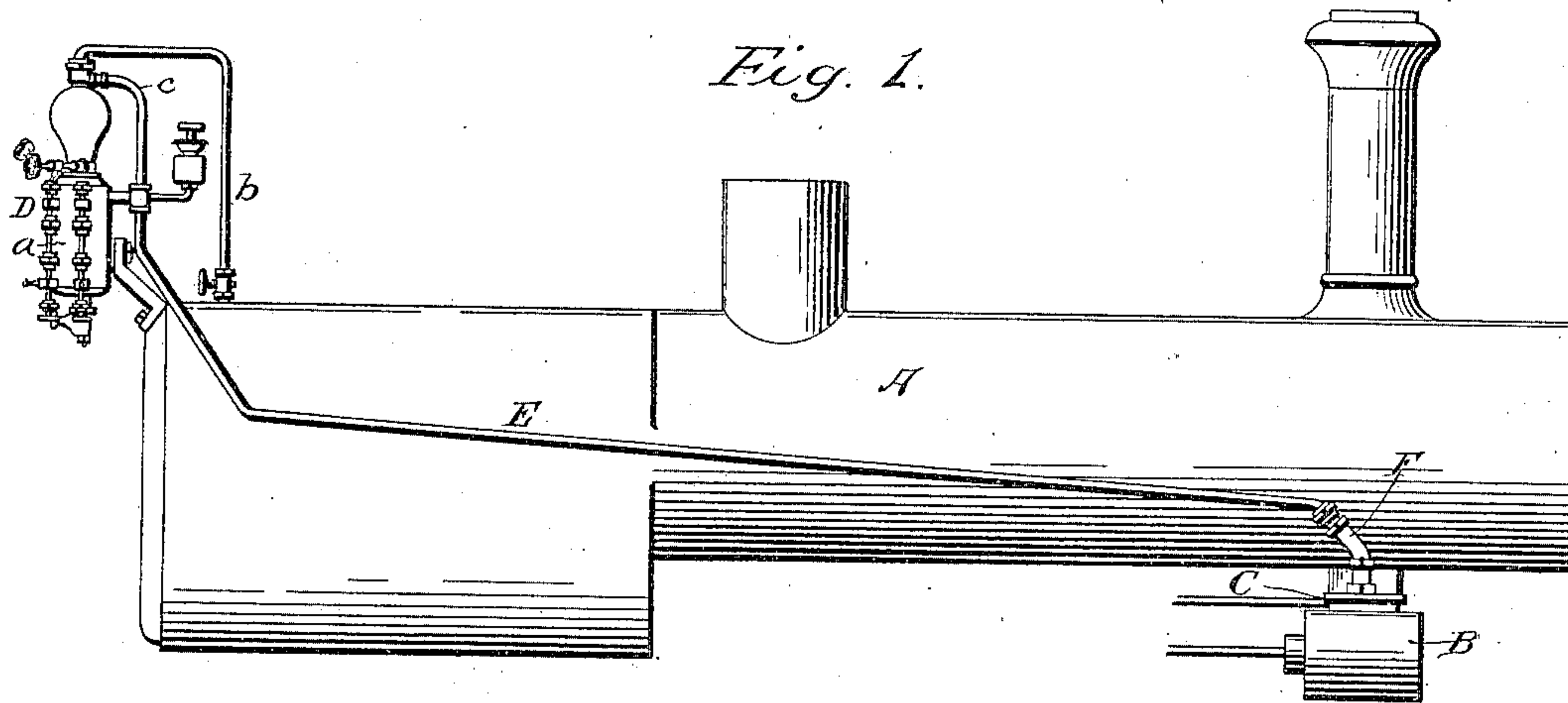
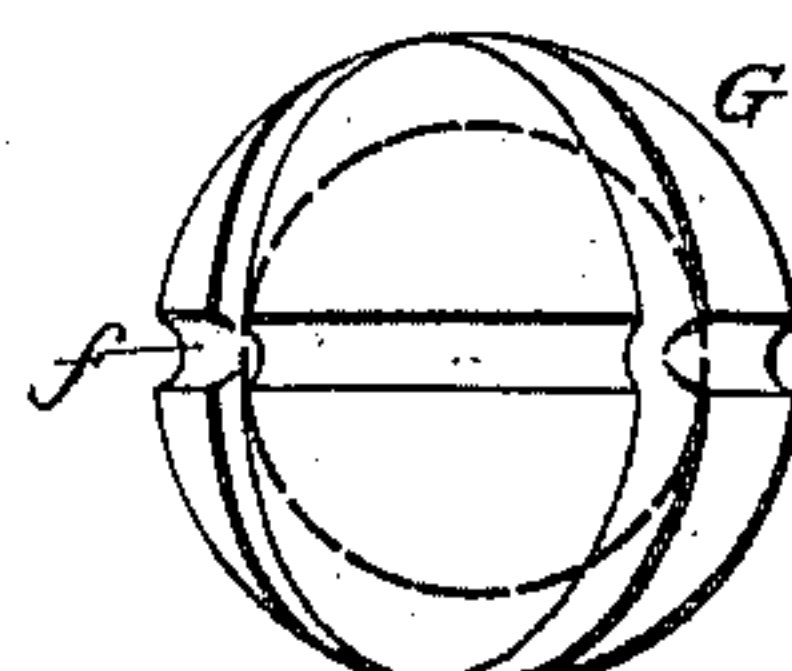
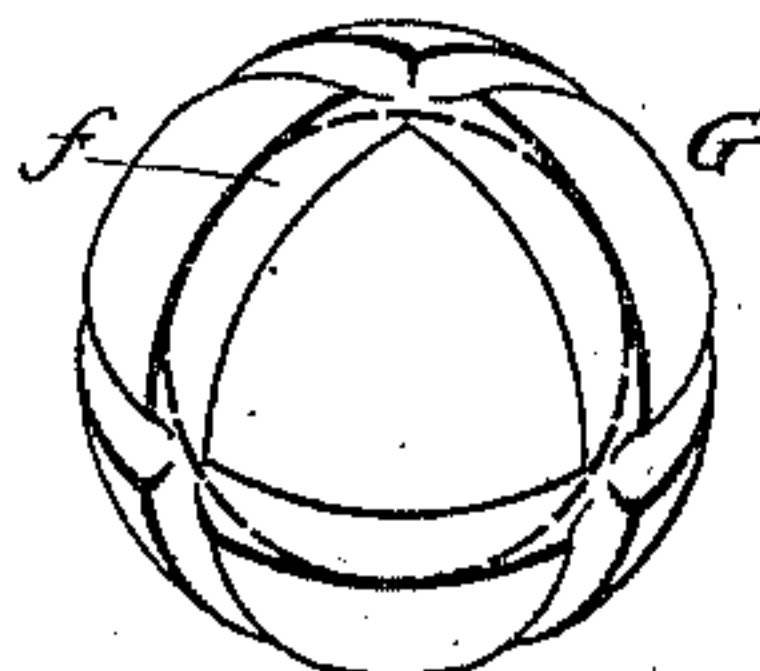
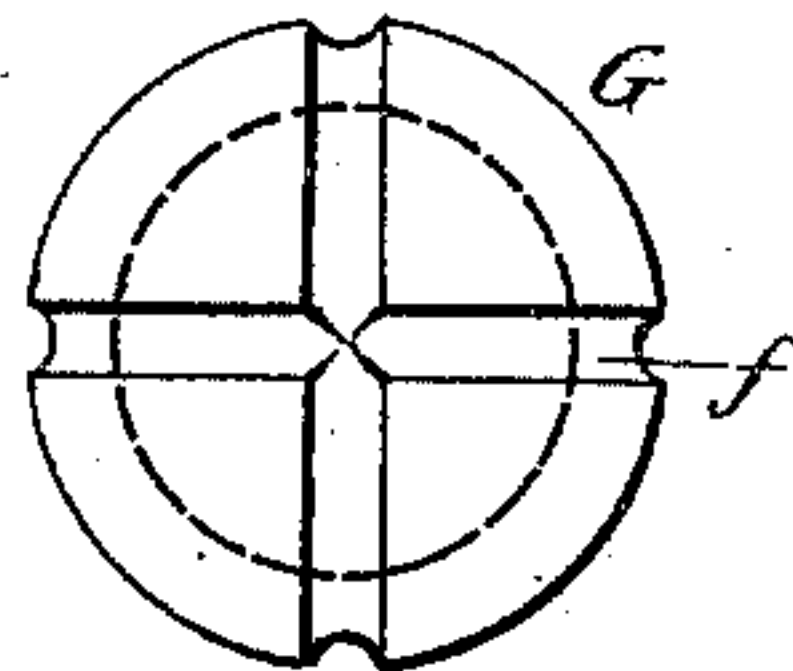


Fig. 4

Fig. 5

Fig. 6

Witnesses
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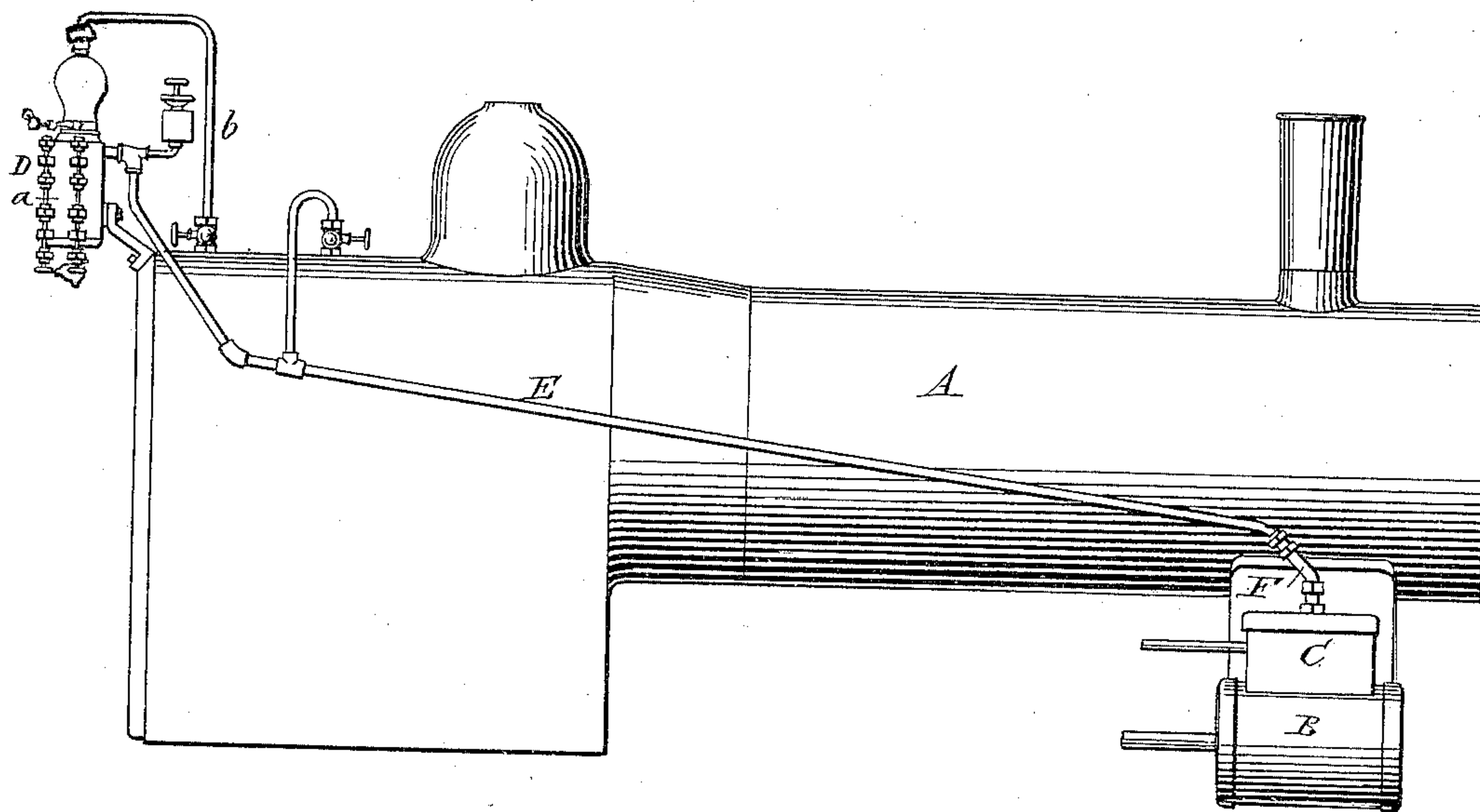
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2 Sheets—Sheet 2.

Fig. 7.



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UNITED STATES PATENT OFFICE.

FRANK W. MARVIN, OF DETROIT, MICHIGAN.

LUBRICATOR.

SPECIFICATION forming part of Letters Patent No. 672,384, dated April 16, 1901.

Application filed November 14, 1900. Serial No. 36,516. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. MARVIN, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Lubricators, of which the following is a specification.

My invention pertains to lubricating apparatus for steam-engines, and is designed more particularly for use in connection with modern locomotives.

The invention consists in various novel features, details, and combinations hereinafter set forth.

The primary object of the invention is to provide lubricating mechanism for locomotive-cylinders of such construction and arrangement as shall insure a continuous and uniform flow of oil through the tallow-pipe to the steam-chest under all conditions of load and pressure, obviating the accumulation of water of condensation in said tallow-pipe and balancing the pressures within the tallow-pipe and from opposite ends thereof, so as to prevent the possible retention of any water of condensation therein through back pressure from the steam-chest or through any increase in the force or rapidity of pulsations therein. There is also provided an automatically-controlled choke to prevent emptying the contents of the reservoir of the lubricator into the tallow-pipe and undue passage of steam through said pipe when the throttle is closed or when there is an excessive forward pressure in said pipe by way of the lubricator. Through the construction and arrangement thus outlined perfect feeding of the oil at all times is insured.

In the accompanying drawings, Figure 1 is a diagrammatic side elevation of a locomotive-boiler and its valve-chest and cylinder, showing the lubricating apparatus in its proper relation thereto; Fig. 2, a longitudinal central section through the "plug" or valve containing shell introduced into the lubricator pipe or duct between the oil or tallow cup and the valve-chest, the valve being shown seated; Fig. 3, a side elevation of the same, partially broken away and showing the valve unseated; Figs. 4, 5, and 6, views showing the ball-valve in different positions relatively to its seat, which latter is indicated by a dotted circle in

each figure; Fig. 7, a view similar to Fig. 1, but showing a modified arrangement of the apparatus.

In a patent bearing date the 18th day of September, 1900, and numbered 657,924, granted upon an application filed in the name of George B. Essex and to which reference may be made for details not forming part of this invention, and hence not herein contained, there is shown and described a lubricating apparatus of the general character of the present one, but providing two distinct passages for oil and steam, or both, from one to the other side of a diaphragm or partition in the duct or pipe which conveys lubricant from the reservoir to the point of application or at some point between the lubricant-reservoir and such point of application. One of these passages was of relatively large area and the other was relatively small, serving as a by-pass or permanently open way for the passage of steam and oil when, the throttle being closed, pressure from the lubricator side caused the valve to be seated and to close the main passage-way or opening. The permanently open way or passage was designed to and did serve to permit a constant flow of steam, and with it lubricant, in quantity sufficient to meet the requirements of the engine while temporarily at rest, keeping it in condition to start at any instant in a properly-lubricated condition. An opening of such small size is liable at times to become choked or clogged by impurities carried by the lubricant or by any small object or particle of matter entering the duct or the valve-chamber. Lastly, the walls of all small passages are liable to be cut away and enlarged by the wiredrawing of the steam. For these reasons it is deemed desirable to avoid the use of the small separate opening or by-pass, while retaining the other features of the former construction, including the simple and peculiarly efficient ball-valve, seating under excess of forward pressure and unseating automatically when such excess ceases, though the use of this form of valve is not obligatory. With these objects in view I groove the outer surface of the valve or form depressions or cavities therein or otherwise cut away its surface so that in whatever position it may be placed upon its seat at least one groove, cavity, facet, or depression shall afford passage for steam

and lubricant to the passage-way through the diaphragm or partition in the tallow-pipe or lubricant-duct. The arrangement of the grooves, facets, or depressions may vary somewhat, but should be such that, however the valve may be turned or seated, the aggregate area or capacity of the grooves, facets, or depressions communicating with the passage-way shall not be excessive and that the minimum by-pass afforded by such grooves shall not be inadequate to the needs of the apparatus.

I have found by practical test and observation that with the parts of proper dimensions and proportions for actual working conditions and with a spherical valve three circumferential grooves intersecting each other at an angle of ninety degrees give very satisfactory results.

Referring now to the drawings, A indicates a boiler or steam-generator, B a cylinder, and C a valve-chest, designed to contain the ordinary slide-valve or other type of steam-valve. Other parts of the engine or locomotive are omitted as unnecessary to the present explanation.

D indicates a lubricator of any usual or approved construction, but provided with the customary oil or tallow reservoir *a* and boiler pipe or connection *b*.

E indicates a pipe or duct communicating with the lubricant-reservoir *a* and with the valve-chest C or other place to which the lubricant is to be delivered. At a suitable point in the length of this pipe or duct E, which is commonly designated the "tallow-pipe," there is introduced a shell F, commonly called a "choke-plug," which has a diaphragm or partition *e*, preferably set at an angle of forty-five or fifty degrees to the horizon and containing a passage-way *d*.

The upper end of the opening *d*, the mouth of which preferably has its edge slightly beveled or rounded, constitutes a seat for a ball-valve G. Owing to the relative diameters of the valve-seat and valve the ball takes but a shallow seating in the former, and owing to the inclination of the diaphragm or partition in which the seat is formed and to the weight of the ball it tends to fall by gravity from said seat when not held thereto by excess of pressure from the lubricator side of the diaphragm.

The ball or valve G is provided with circumferential grooves *f*, the size, number, and arrangement of which may be varied as circumstances require. In the drawings I have shown three grooves, each passing entirely around the ball, said grooves intersecting one another at right angles. In other words, if we assume the ball to have a vertical axis then there would be two grooves passing in vertical planes about the ball or valve and intersecting at right angles at the axial poles thereof and a third groove passing horizontally around the ball and corresponding to the earth's equator. By their intersection

the grooves will form twelve groove-sections, each passing one-quarter of the way around the ball. With the grooves so arranged and with a valve-seat proportioned as here represented it will be found that ordinarily four groove-sections will communicate with the opening *d* and afford the necessary by-pass or constantly open way, while there can never be more than four nor less than three groove-sections thus communicating with said opening *d*. This will be understood upon referring to Figs. 4, 5, and 6, in which the dotted circle indicates the boundary of the valve-seat, which for convenience of explanation may be assumed to be between the valve and the observer. In Fig. 4, where the ball is so set that two grooves intersect at the center of the valve opening or passage, four groove-sections open into said passage. In Fig. 5 three groove-sections communicate therewith. In Fig. 6, as in Fig. 4, four groove-sections open into the passage-way. These three adjustments, it is believed, represent all possible variations of position so far as change can affect the number of groove-sections communicating with the passage *d*. The difference between the area afforded by three and by four such groove-sections is so slight as to be negligible, as has been ascertained by practical working tests under service conditions.

By dispensing with the separate and distinct passage of the Essex construction I not only cheapen and simplify the manufacture of the device and lessen or prevent liability of stoppage or clogging, but by reason of the constantly-changing position of the ball in use any deposit of foreign matter in a groove-section is speedily removed by full exposure to the passing steam and oil. So, too, the said frequent change of position precludes all danger of cutting the grooves by wire-drawing the steam, since no one groove is continuously subjected for any great length of time to this action.

It is to be understood that the foregoing description sets forth the preferred embodiment of my invention and that which practical experience indicates as best; but the number, character, and arrangement of the grooves, the relative diameters of the valve and its seat, the plane of said seat, whether inclined, vertical, or horizontal, and other matters of detail are all subject to variation at will without departing at all from the spirit or scope of my invention.

In the drawings I have represented a sight-feed lubricator of the hydrostatic-feed variety provided with an equalizing-pipe *c*; but while in practice I may and frequently prefer to use a lubricator of this character provided with the equalizer-pipe this is not essential. The tallow-pipes may be directly tapped into the boiler and the oil-delivery arms of the lubricator tapped into said tallow-pipes, thereby rendering the equalizer-pipes unnecessary. In other words, the equalizer-pipe *c* of Fig. 1 can be omitted and

direct communication made from the boiler to the tallow-pipe, (shown in Fig. 7,) all else remaining unchanged. The equalizing effect will under such construction and arrangement be attained by the free passage of steam into the tallow-pipe from both ends when the throttle is open, and the flow will at other times be restricted by the automatic seating of the valve.

In the foregoing description I have referred to a ball-valve, and in the drawings I have shown such. This form is advantageous for various reasons and will under ordinary circumstances be employed. I do not, however, mean to restrict myself absolutely to the spherical form, as other forms may be employed with quite satisfactory results.

It will be observed that while the reduced passage or way is always open it is still a part of or is contained within the main opening or way through the diaphragm or partition and is not separate and distinct therefrom in the sense that the Essex reduced passage is separate and distinct.

The spherical or substantially spherical form of the valve permits it to make at least a partial rotation in any direction or about different axes, so that a large wearing-surface is insured, and the wear being thus distributed over a relatively large area will be slow and even. While a perfectly free ball capable of completely rotating in all directions affords the most satisfactory results and is rendered possible by the employment of the intersecting grooves or channels, quite good results are obtainable where that portion of the valve which comes in contact with the seat is of spherical or partially-spherical form, so as to permit a rocking or turning of the valve about different axes. So long, therefore, as this feature is retained and provision is made for keeping a groove or channel always within the limits or boundaries of the valve-seat I consider the construction as within the spirit and scope of my invention.

I believe myself to be the first to construct a choke-plug of this description with a valve having one or more ducts or passages formed in its body free to rock or tip about the different axes or transversely to the plane of the diaphragm in which the valve-seat is formed and also about the axis of the plug whatever be the form of the passage or passages, and I therefore mean to be understood as claiming this construction broadly.

Having thus described my invention, what I claim is—

1. In a lubricating apparatus for engines, the combination of a lubricant-reservoir; a pipe for connecting the reservoir with a steam boiler or generator; a pipe or duct connecting the reservoir with the chamber to which lubricant is to be supplied; an equalizer-pipe; a diaphragm or partition in the pipe or duct through which the lubricant is delivered, provided with a passage for lubricant and with a valve-seat; and a valve

mounted to move to and from said seat and to rock or turn about different axes, and having its surface grooved or cut away so as to permit a limited quantity of steam and lubricant to pass, in whatever position the valve is seated.

2. In a lubricating apparatus for engines, the combination of a lubricant-reservoir; a pipe for connecting said reservoir with a steam boiler or generator; a pipe or duct connecting the reservoir with the chamber to which lubricant is to be supplied; a diaphragm or partition between the lubricant-reservoir and the chamber to which the lubricant is to be delivered, provided with a passage for the lubricant; and a valve free to rock or tip about different axes and serving to partially but not wholly close said passage in whatever position the valve may be seated, the outlet for escape of lubricant from the reservoir being distinct from the inlet for steam or water thereto, substantially as described.

3. A choke-plug for the tallow-pipes of engines, provided with a diaphragm or partition having a passage through it and a valve-seat; and a valve mounted to freely move to and from said seat and to rock or turn about different axes, and circumferentially grooved so as to permit a limited passage of steam, lubricant, or both, in whatever position the valve is seated.

4. A choke-plug for the tallow-pipes of engines, provided with a diaphragm having a passage through it; and a valve mounted to freely move to and from the mouth of said passage and to rock or tip about different axes, and having its surface provided with a series of intersecting grooves, substantially as and for the purpose set forth.

5. In combination with a choke-plug for the tallow-pipes of engines, provided with a diaphragm or partition having a passage or opening through it; a valve free to rock or tip about different axes and having its surface partially cut away so that it is adapted to reduce the area of the passage but is precluded from completely closing it in whatever position the valve is seated.

6. In a lubricating apparatus for engines, the combination of a pipe for communicating with the steam-space of a boiler or generator, and with the valve-chest or place to be supplied with lubricant; a diaphragm in said pipe provided with an opening or passage through it, and with a valve mounted to move to and from said opening and free to rock or tip upon different axes; and a lubricant cup or reservoir applied to and communicating with the pipe at a point between the connection of said pipe with the boiler, and the diaphragm, the valve being provided with grooves or depressions of such extent as to afford restricted passages for steam and oil in whatever position the valve is seated.

7. A choke-plug for the tallow-pipes of engines, provided with a partition having a pas-

sage through it, and with a valve free to seat
over and unseat from said passage and to
rock about an axis transverse with respect to
said passage, said valve having a duct, pas-
5 sage, or opening so arranged as to provide
communication between spaces on opposite
sides of the partition in whatever position the
valve may be seated.

In testimony whereof I have signed my
name to this specification in the presence of 10
two subscribing witnesses.

FRANK W. MARVIN.

Witnesses:

FRANK D. ANDRUS,
RAY B. MORGAN.