

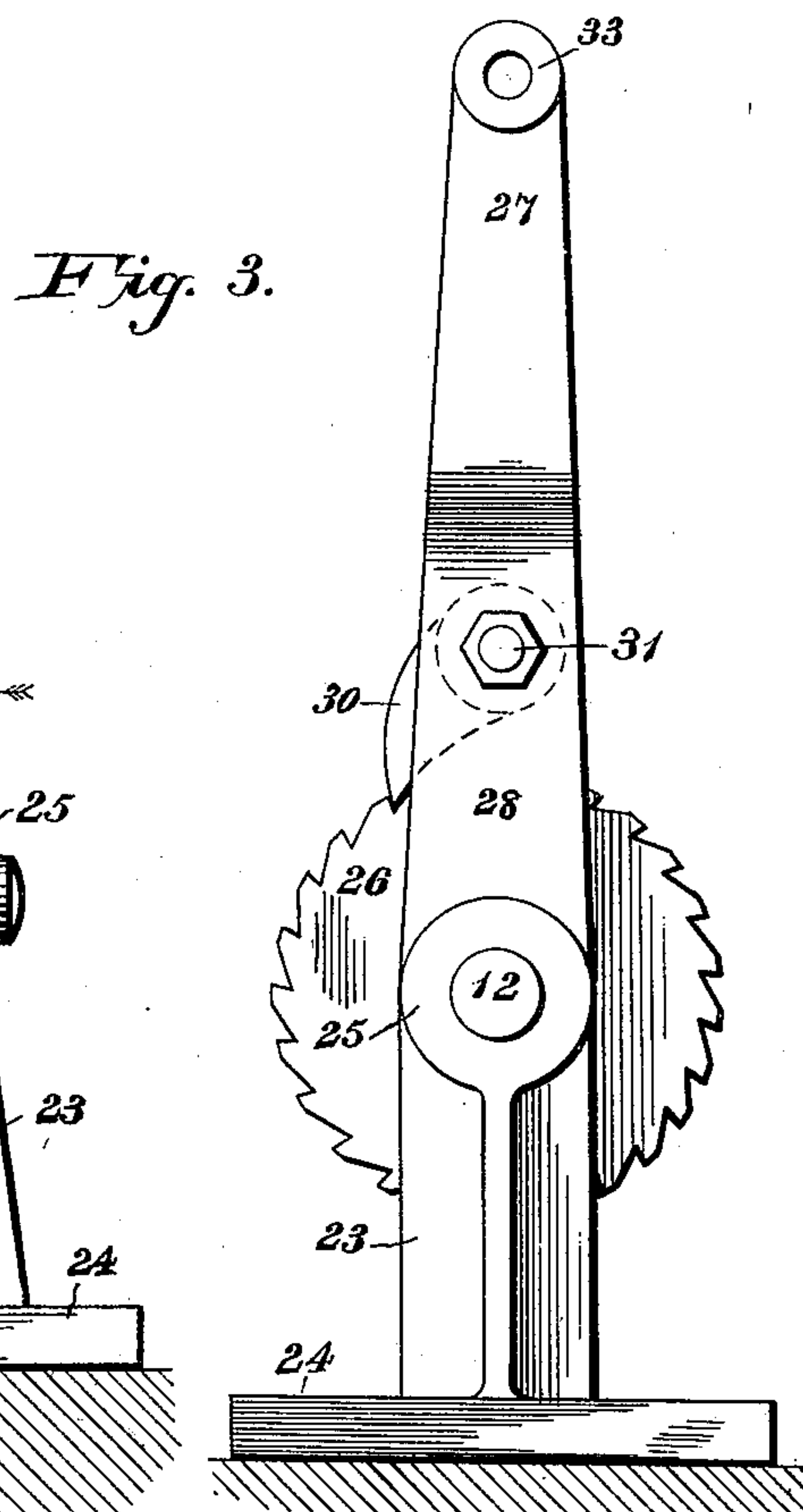
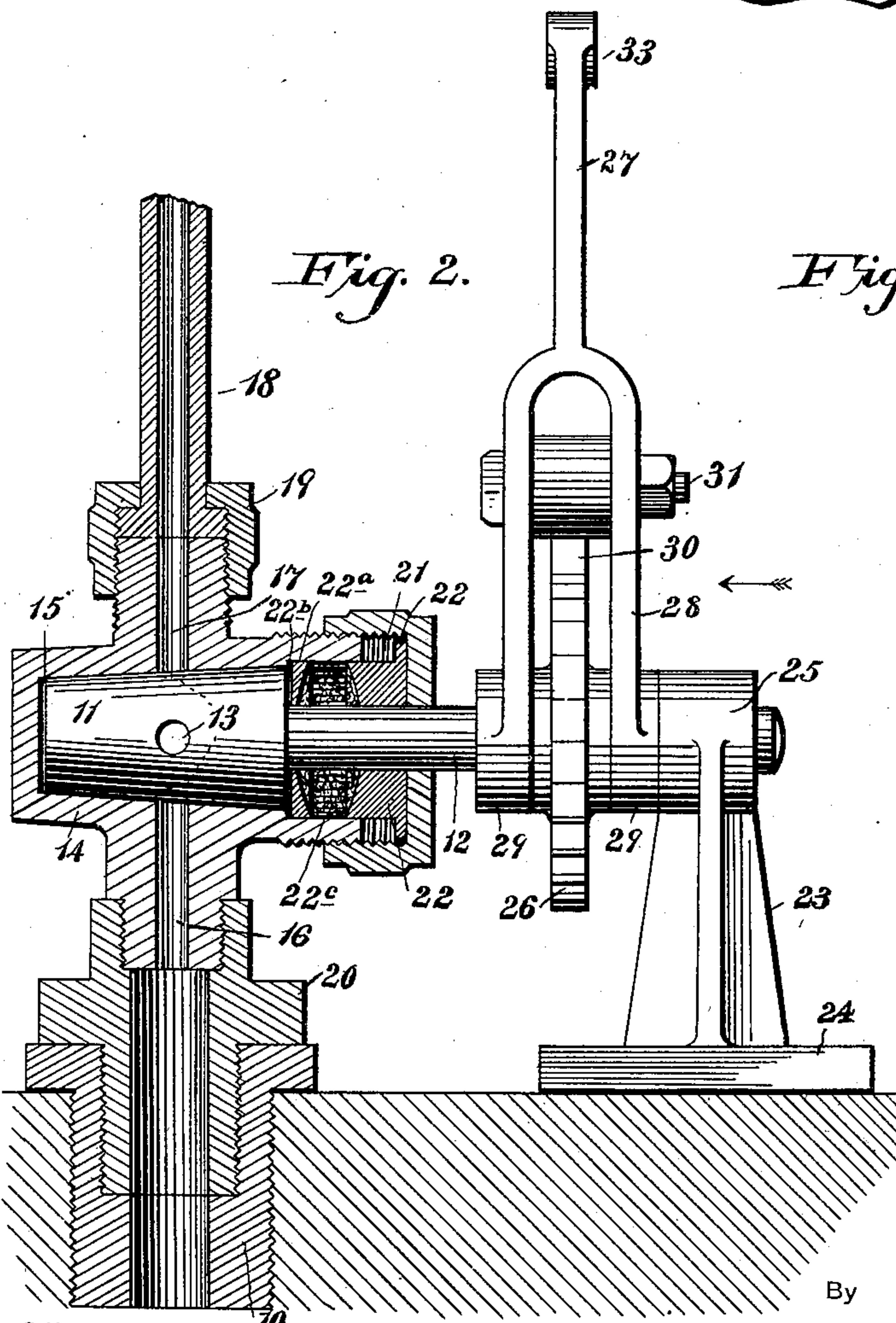
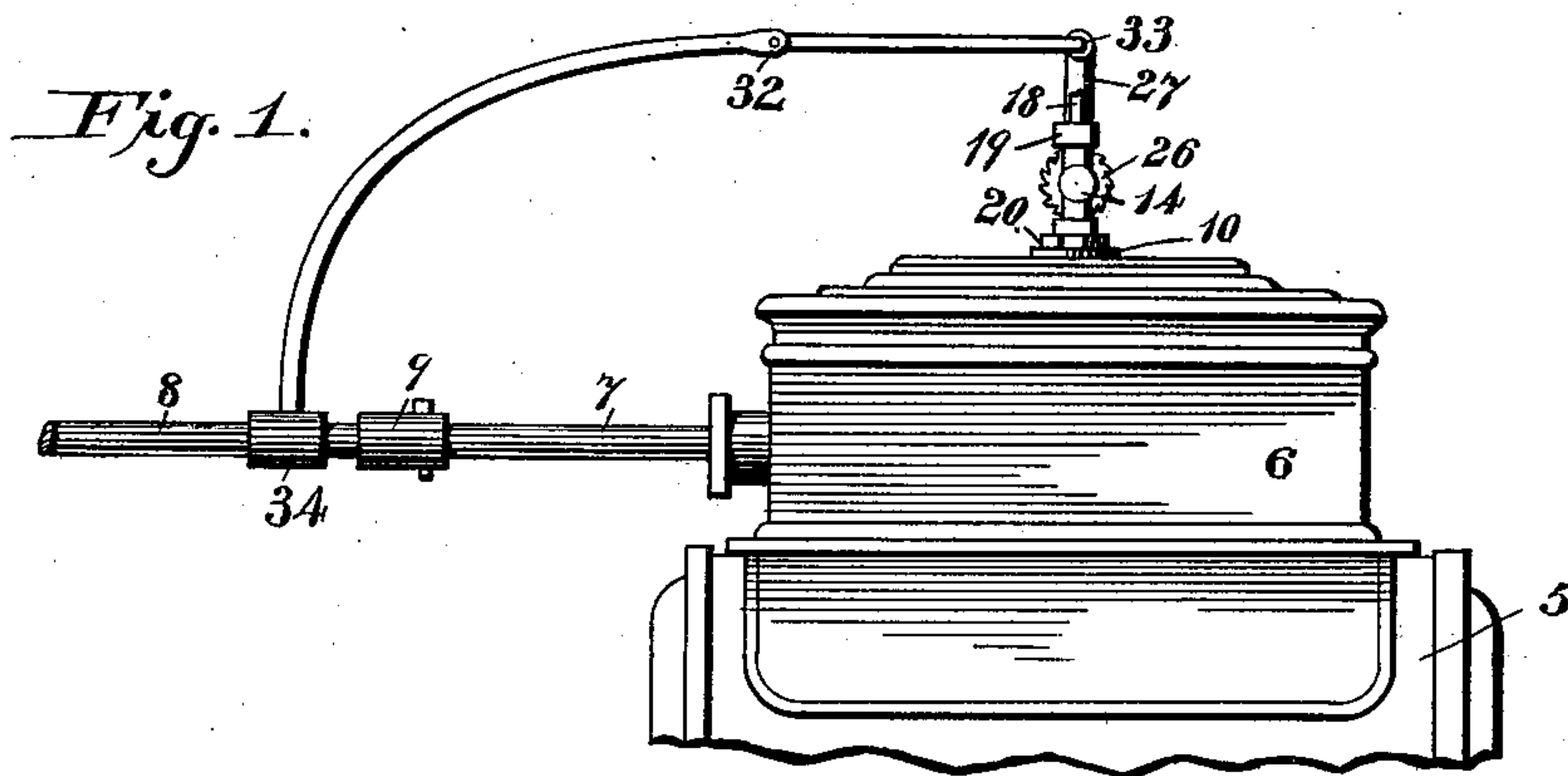
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Patented Sept. 18, 1900.

W. F. JOHNSTON.  
LUBRICATOR ATTACHMENT FOR STEAM ENGINES.

(Application filed Mar. 9, 1900.)

(No Model.)



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# UNITED STATES PATENT OFFICE.

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## LUBRICATOR ATTACHMENT FOR STEAM-ENGINES.

SPECIFICATION forming part of Letters Patent No. 657,941, dated September 18, 1900.

Application filed March 9, 1900. Serial No. 8,069. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. JOHNSTON, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented a new and useful Lubricator Attachment for Steam-Engines, of which the following is a specification.

My invention relates to an improved lubricator attachment for steam-engines, specially designed for use in connection with the valve-chest and piston-cylinder of the engine.

Heretofore it has been common to provide an oil-cup on the steam-chest, and it has also been proposed to provide means for utilizing the steam-pressure in a manner to carry the lubricant along with the steam into the working parts of the chest. Practical experience with some of the types of lubricating devices on a locomotive-engine has shown that the lubricator is not effective at the period of operation of the engine when the lubricator would become most available—as, for example, when the locomotive is engaged in hauling a heavy train up a steep grade and over mountainous sections of the track.

The object that I have in view is to provide a lubricator in which the parts are positively and automatically actuated by a moving element of the engine—such, for example, as the valve-rod—and the parts of my lubricator are so constructed and combined that leakage of steam is minimized in the operation of the lubricator by the valve-motion of the engine.

The elements of the lubricator are arranged for operation in a manner to wholly avoid displacement of the lubricant by the pressure of the steam in the valve-chest, and as the lubricator is positively actuated the necessary supply of liquid lubricant is fed into the valve-chest, so as to be taken up by the steam and carried to all the surfaces of the valve and the piston which require constant and thorough lubrication.

The invention consists in the novel construction and arrangement of parts, which will be hereinafter fully described and claimed.

In the drawings, Figure 1 is a side elevation of a portion of a steam-cylinder and a valve-chest therefor, showing my improved lubri-

cator applied to the chest. Fig. 2 is an enlarged sectional elevation through the lubricator appliance of my invention. Fig. 3 is a side elevation looking toward the left in the direction of the arrow in Fig. 2.

The same numerals of reference are used to indicate like and corresponding parts in each of the several figures of the drawings.

In order that others may understand the application of my lubricator to an engine, I have illustrated a portion of the piston-cylinder at 5, the valve-chest at 6, the valve-rod at 7, and a section of the valve-operating rod at 8, the latter being coupled at 9 to the protruding end of the valve-rod. All of these parts are ordinary in the art. Hence no novelty therefor is claimed in this application.

In applying my lubricator to the valve-chest I employ a threaded bushing 10, which is screwed into a tapped opening which is ordinarily provided in the upper side of the valve-chest for the reception of an ordinary lubricator-cup.

The essential part of my lubricator is a feed-plug revoluble on a horizontal axis and provided with a series of pockets adapted to successively discharge a liquid lubricant in predetermined quantities into the valve-chest, combined with a casing in which the plug is fitted in a steam-tight manner and means operable by the valve-motion for rotating the feed-plug with a step-by-step motion, as I will now proceed to describe. This feed-plug 11 is essentially circular in cross-section and tapered from one end to the other, so as to secure the appearance of a cone, and said plug is provided with an axial stem 12 and a series of comparatively-shallow pockets 13, which are formed centrally in the plug on lines radial to the axis thereof and disposed equidistant from each other, each pocket opening through the circular face of said feed-plug. A shell or casing 14 is provided with a conical chamber 15 for the accommodation or seating of the revoluble plug, and this shell or casing is provided on the under side with an outlet-passage 16 and on its opposite side with an inlet or feed passage 17, said passages being arranged in alinement with each other and in the plane of the pockets



13 in the revoluble feed-plug, whereby the liquid lubricant may be supplied by the passage 17 to one of the pockets, and on the rotation of the feed-plug the lubricant contained in the pocket is discharged into the passage 16. A supply-pipe 18 is united by a coupling 19 to the upper threaded nipple, which forms the feed-passage 17 to the chamber of the shell or casing. Another coupling 20 has threaded connection with another nipple on the lower side of the shell or casing, which nipple is provided with the passage 16. This coupling 20 is hollow to communicate with the passage 16, and said coupling is furthermore screwed into the bushing 10, whereby the shell and plug of the lubricator are united to the bushing 10, so as to be mounted on the steam-chest 6 in a manner to communicate with the valve-chamber thereof. A cap 21 has threaded engagement with the enlarged end of the casing or shell 14, and this cap has a central opening there-through for the passage of the stem 12 of the revoluble feed-plug. The cap 21 provides for the adjustment of the flanged gland 22, working within the open end of the shell 14 in opposition to the bushing-ring 22<sup>a</sup>, seated within the shell against the interior shoulder 22<sup>b</sup>, located approximately in the plane of one end of the feed-plug. Suitable packing 22<sup>c</sup> is confined between the gland and the bushing-ring, and these parts constitute an effective stuffing-box for one end of the shell or casing to prevent leakage of steam or oil. I desire to remark that the interior surface of the shell or casing and the exterior surface of the plug are ground or finished in any of the usual ways known to those skilled in the art in a manner to make the plug accurately fit the chamber of the shell, thus producing a steam-tight joint between the shell and plug, which minimizes the leakage of steam and wholly overcomes any tendency of the liquid lubricant to be displaced by the steam-pressure in the valve-chest. This is a very important feature of my invention, because it insures the proper feed of the lubricant to the valve-chest and normally overcomes the leakage of the steam, with a consequent reduction in the steam-pressure at the place where its energy is to be utilized in the propulsion of the engine.

A supporting-bracket 23 is provided with a plate 24 for the purpose of securely fastening the same upon the top of the valve-chest at a point alongside of and close to the casing of the feed-plug, thus providing means for bracing the operative parts of the valve attachment directly from the top of the valve-chest and at a point remote from the lubricator-cup, which is arranged in the cab of the locomotive or other accessible point remote from the engine. This supporting-bracket is provided at its upper end with a journal-bearing 25, which is disposed in axial alinement with the plug 11, and the stem 12 of this plug is of suf-

ficient length to extend from the cap or gland 21 and find its support in the journal-bearing 25 of said bracket. The extended protruding part of the plug-stem 12 is provided with a ratchet 26 at a point between the bearing 25 and the cap or gland 21. A vibratory feed-lever 27 is bifurcated or forked at one end to provide the legs 28, having the sleeves or collars 29. This forked end of the lever is arranged for its sleeves or collars 29 to fit loosely on the plug-stem 12 at points on opposite sides of the ratchet 26, whereby the feed-lever is fulcrumed on the stem of the plug in a manner to embrace the ratchet. A feed-pawl 30 is arranged within the fork of the lever, so as to be pivotally mounted at its heel by means of the bolt 31, which passes through said lever and the pawl. This pawl is disposed over the ratchet for its nose to drop by gravity into engagement with the teeth of said ratchet, and in the operation of the lever the pawl travels therewith for the purpose of turning the ratchet when the lever is moved in one direction; but on the reverse movement of the lever the pawl slips idly over the teeth on said ratchet.

Any suitable means may be provided for connecting the free end of the feed-lever directly with a part of the valve-motion; but as one means for the operation of the lever I have shown a jointed rod or arm 32, one end of which is connected by a pin or bolt with an eye-formed upper end 33 of the feed-lever. A cuff or sleeve 34 is clamped to the valve-operating rod 8, preferably at a point adjacent to the pivotal connection 9 between the valve-stem and the said valve-operating rod 8, and to this cuff or sleeve is fastened the other end of the angular rod 32.

In operation the swinging and reciprocating movement given by the valve-motion to the rod 8 operates the jointed arm 32, as well as the stem 7 of the slide-valve, the latter controlling the supply and exhaust of steam to and from the piston-cylinder. The movement of the feed-lever 27 in one direction causes the pawl to turn the ratchet and the stem 12 a suitable distance—say one-fourth of a revolution. The pockets 13 of the feed-cup are brought into coincidence successively with the supply-passage 17, so that each pocket will receive a limited or predetermined quantity of the liquid lubricant. On the rotation of the stem and plug by the action of the pawl-and-ratchet feed mechanism, which is operated automatically by the valve-motion of the engine, the liquid lubricant is carried by the pockets of the feed-plug from the passage 17 and discharged into the passage 16, from whence the lubricant drops by gravity into the steam-chest, whereby the lubricant is taken up by the steam and carried to all of the surfaces which require lubrication.

An oil cup or reservoir may be provided in the cab of the locomotive or located at any other accessible point remote from the engine,



so as to be arranged in a position for the pipe 18 to be connected therewith, so that the lubricant will be supplied by gravity from the cup into the pipe 18 and thence to the feed-  
 5 plug. One advantage of placing the lubricant-reservoir in the cab resides in the fact that the lubricant is kept by the heat from the boiler in a liquefied condition to permit of its free flowing to the distributing mechanism  
 10 of the lubricator. It is evident that any suitable means may be employed for heating the lubricant, and thereby insuring its liquefaction.

From the foregoing it will be understood  
 15 that it is essential to the successful carrying out of the invention that the lubricant be permitted to be supplied by gravity into and through the pipe 18, thus adapting the attachment for use in connection with that type of  
 20 gravity or drop feed lubricators which are now commonly employed in connection with locomotive-engines. This desirable result is accomplished by providing a steam-tight joint between the valve casing or shell and the ro-  
 25 tatable plug therein, so that the said plug acts as a steam cut-off to prevent the back pressure of steam within the valve-chest from displacing the liquid lubricant in the pipe 18 or interfering with the action of the lubricator  
 30 connected with said pipe. Of course a gravity-feed lubricator is necessary to the successful carrying out of the invention; but any of the ordinary forms of such lubricators may be employed—such, for instance, as shown in  
 35 Patents Nos. 291,847, 324,339, or 645,026, certain of these patents disclosing what is commonly known in the art as the "Nathan" lubricator.

It has already been explained that one ad-  
 40 vantage of placing the lubricant-reservoir in the cab resides in the fact that the lubricant is kept in a heated condition, thereby insuring the free flowing thereof by gravity into and through the pipe 18. While this would  
 45 be a special advantage in connection with any form of reservoir located within the cab of a locomotive, still it is of special importance in view of the fact that the present invention is designed for use in connection with that type  
 50 of lubricators known as "gravity" or "sight" feed lubricators. In other words, the invention is in the nature of an automatically-actuated feed-valve attachment for an oil-conducting pipe which admits of the use of a  
 55 gravity-feed lubricator in connection with the valve-chest of a locomotive-engine.

I am aware of the fact, as already stated, that it is common in the art to provide an oil-cup on the valve-chest and also to employ lu-  
 60 bricant cups or receptacles which are supported on top of the valve-chest and associated with automatically-controlled valves; but it would be impracticable to employ a gravity-feed lubricator in such position. In  
 65 the first place, economy in the use of oil is a requirement which locomotive engineers

must carefully observe, and lubricators which are not immediately accessible and under control occasion unnecessary waste on ac-  
 count of a surplus supply of oil being usually  
 70 delivered to the part to be lubricated. Therefore any lubricating device for the working parts of the engine within the cylinder and valve-chest should be under the direct con-  
 75 trol of the engineer, and consequently one of the important advantages of arranging the gravity-feed lubricator within the cab is that the feeding of the oil is always visible to the engineer, and he can readily manipulate the  
 80 gravity-feed lubricator to provide for controlling or entirely cutting off the supply of oil to the pipe 18, irrespective of the oil-feed plug interposed in the line of the said pipe 18. It may not be necessary at all times to feed  
 85 the lubricant to the valve-chest, and consequently by locating the gravity-feed lubricator within the cab this can be entirely controlled by the engineer, which result has not  
 heretofore been possible in that type of lubricators providing means for automatically  
 90 delivering measured quantities of oil into the valve or steam chest of the engine. Furthermore, a gravity-feed lubricator upon the valve-chest would be very objectionable, not only on account of being beyond the im-  
 95 mediate control of the engineer, but also on account of the fact that the same would be rendered entirely ineffective by cold weather, which causes such a thickening of the oil in  
 100 lubricators of that type as to interfere seriously with their operation.

From the foregoing description it will be apparent that the lubricator of my invention operates under all conditions in the service  
 of the engine to supply the liquid lubricant  
 105 in predetermined quantities and in a regular manner, so that the lubricant is available to be taken by the steam under the most adverse conditions in the service of the engine, where-  
 110 by in hauling heavy trains over steep grades the valve mechanism and the piston-cylinder will be lubricated at the periods when the lubricant is most required.

Having thus described the invention, what I claim is—

A lubricator attachment for locomotive-en-  
 115 gines comprising a valve-casing having oppositely-located inlet and outlet passages for the lubricant, and having a direct rigid coupling connection with the valve-chest, an oil-con-  
 120 ducting pipe leading from a remotely-located lubricator and connected with the inlet-passage of the valve-casing upon the side opposite its connection with the valve-chest, an auto-  
 125 matically-actuated oil-feed plug having a steam-tight fit within the casing and provided with a stem projecting exterior thereto, valve-actuating means cooperating with the stem outside of the valve-casing, and a separate ex-  
 130 terior supporting and bracing bracket rigidly connected with the valve-chest of the engine and having a bearing receiving the extreme



outer end of the plug-stem, whereby the valve-casing and the valve-actuating means are mutually braced from the chest and vibrate in harmony therewith to insure the maintenance of an operative relation of the parts of the attachment, substantially as set forth.

In testimony that I claim the foregoing as

my own I have hereto affixed my signature in the presence of two witnesses.

W. F. JOHNSTON.

Witnesses:

JOHN H. SIGGERS,

EDWIN E. VROOMAN.