No. 868,585. PATENTED OCT. 15, 1907.

A. A. STELTING.

FORCE FEED LUBRICATOR.

APPLICATION FILED SEPT. 26, 1905.

2 SHEETS—SHEET 1.

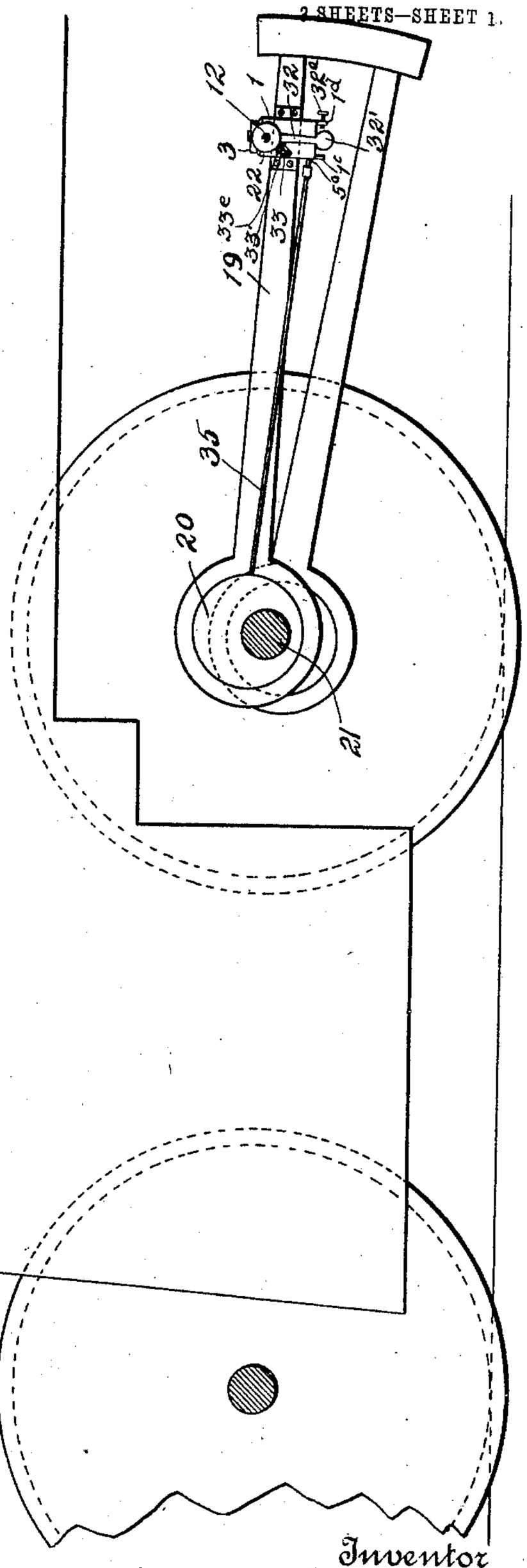

Fig. 2.

Witnesses
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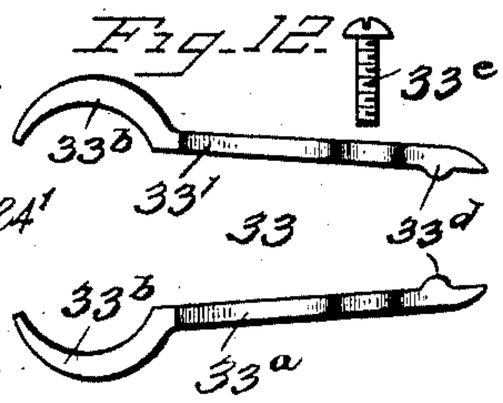
3 SHEETS—SHEET 2.

Fig. 12.



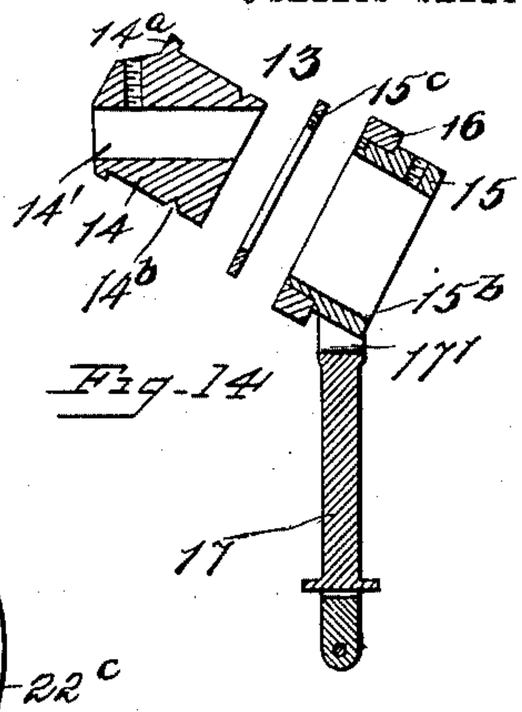


Fig. 14.

Fig. 11.

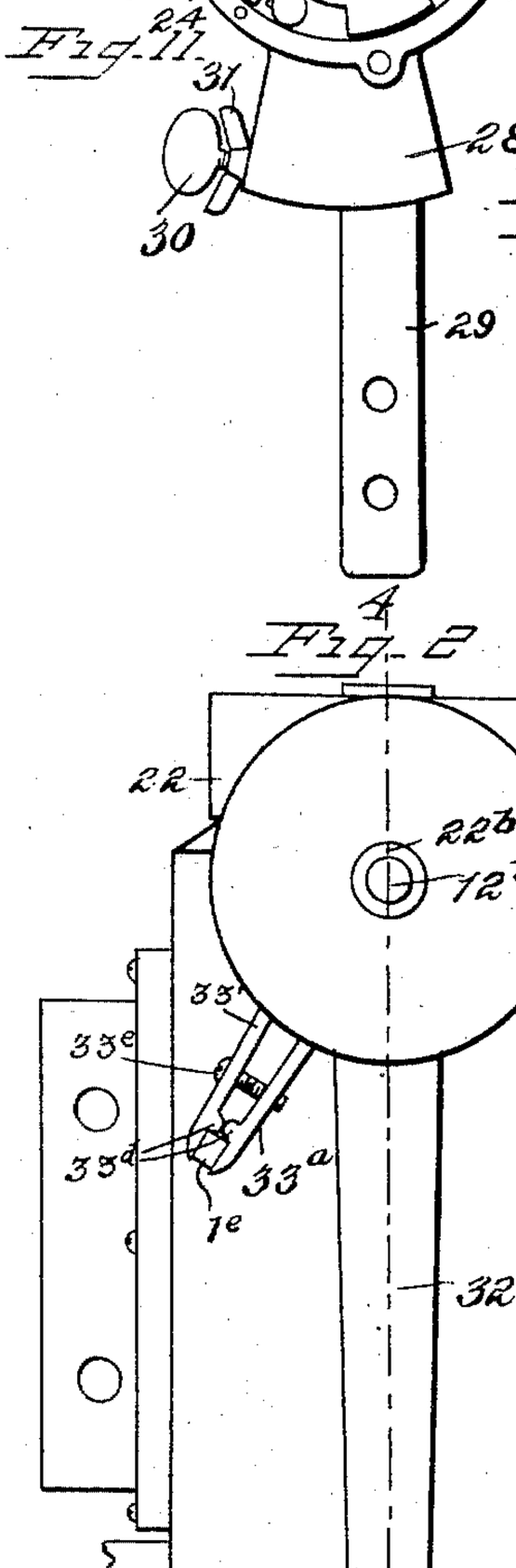


Fig. 13.

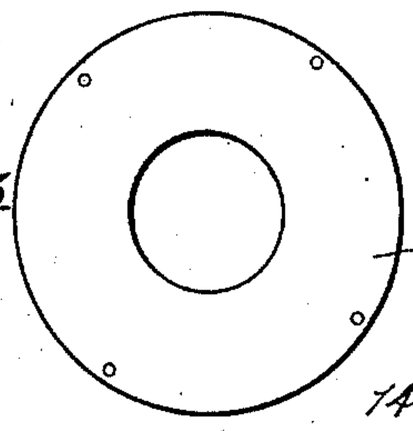


Fig. 15.

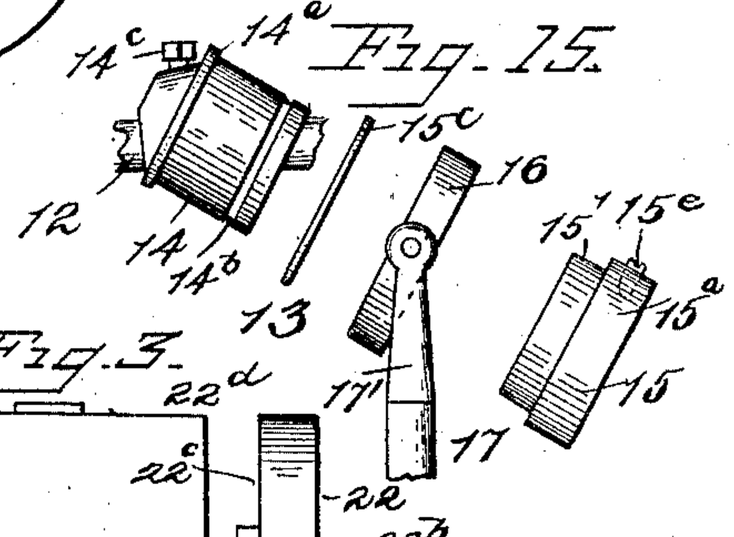


Fig. 2.

Fig. 3.

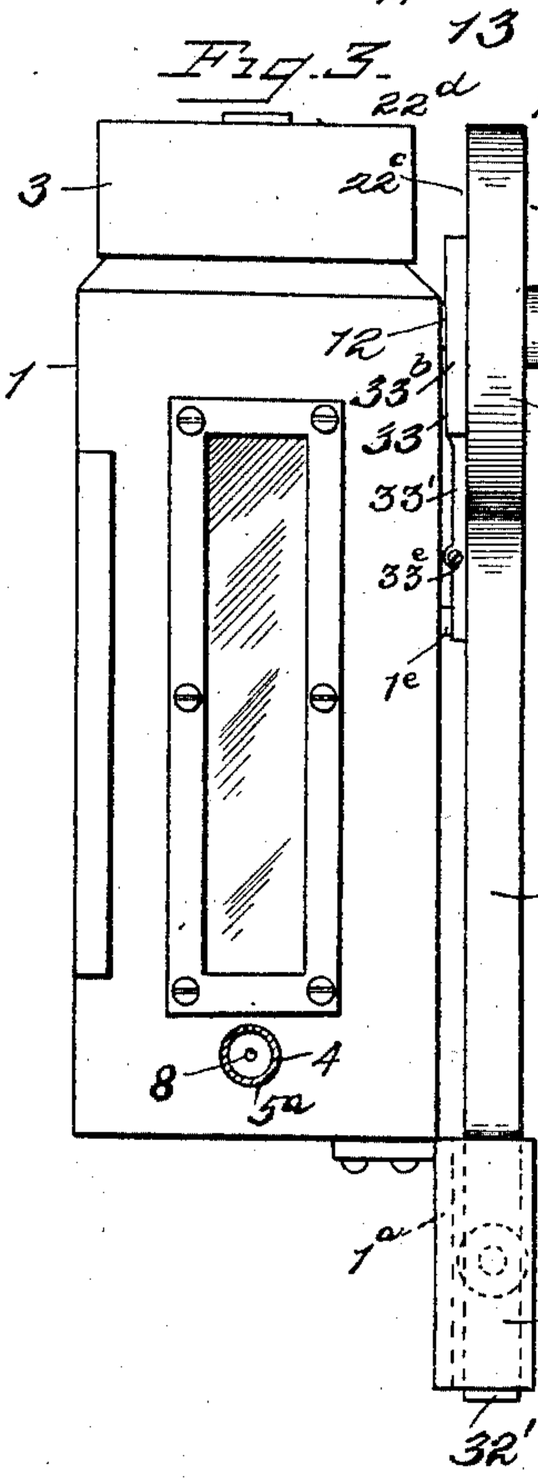


Fig. 16.

Witnesses
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3 SHEETS—SHEET 3.

Fig. 8.

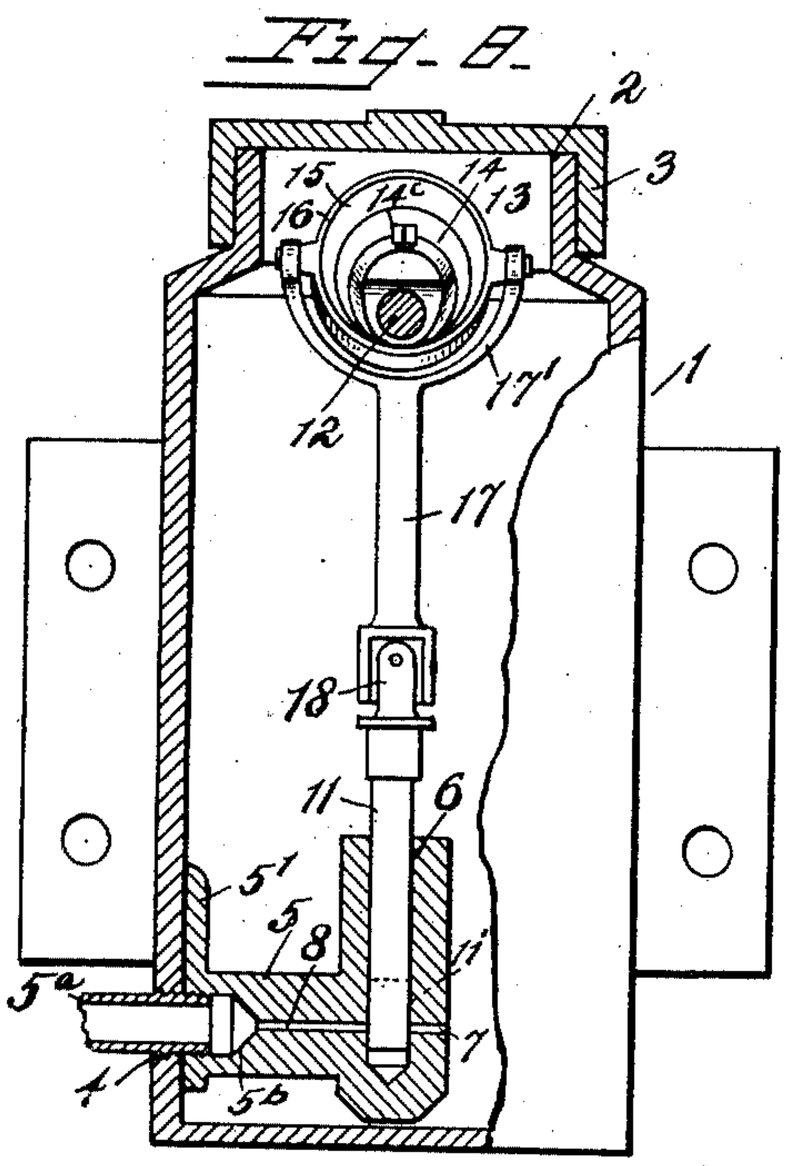


Fig. 9.

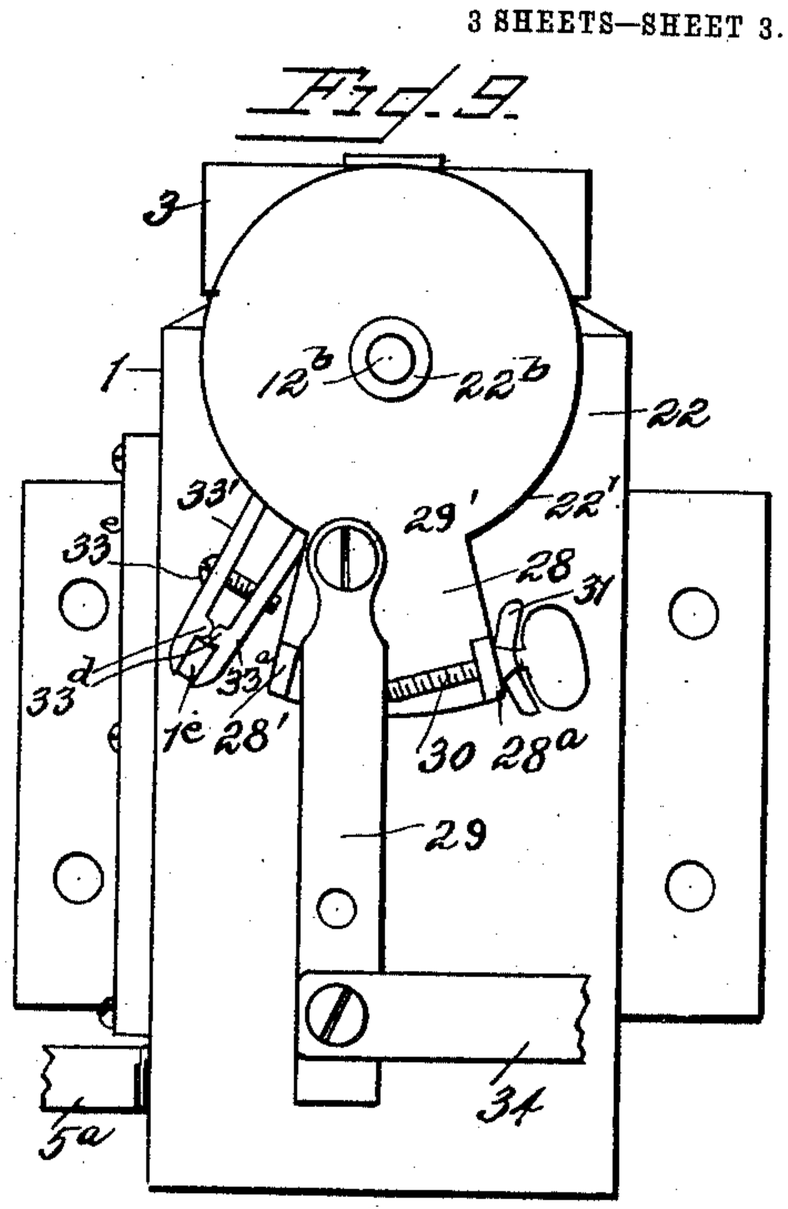


Fig. 10.

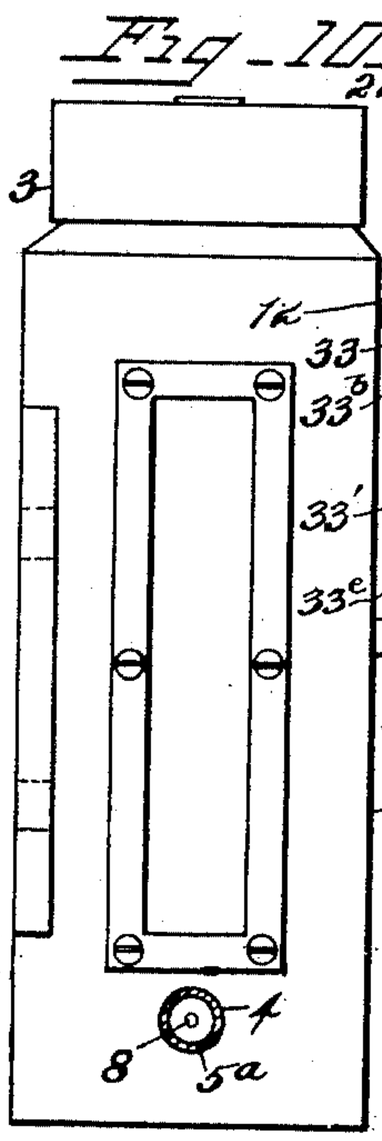


Fig. 5.

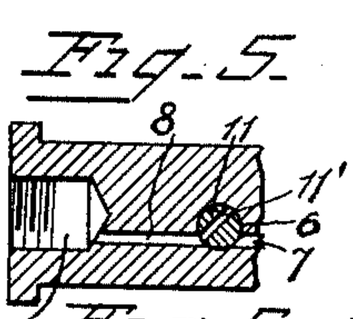


Fig. 6.

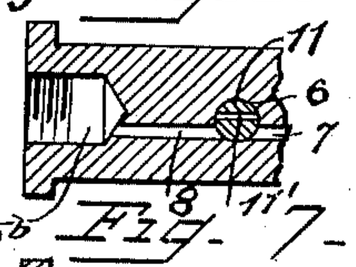


Fig. 7.

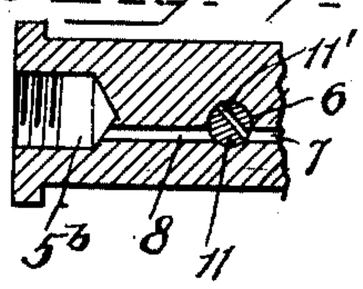
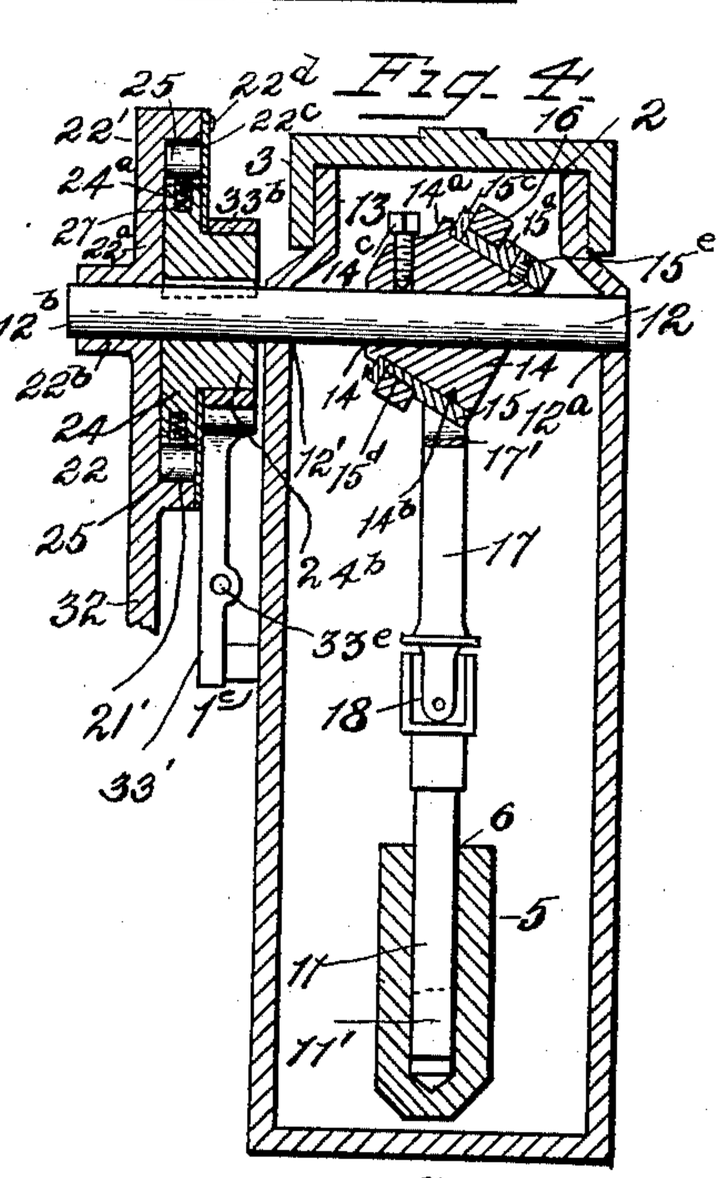


Fig. 4.



Witnesses

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W. Curtis Lammond

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UNITED STATES PATENT OFFICE.

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FORCE-FEED LUBRICATOR.

No. 868,585. Specification of Letters Patent. Patented Oct. 15, 1907.

Application filed September 26, 1905. Serial No. 280,148.

To all whom it may concern:

Be it known that I, ALBERT A. STELTING, a citizen of the United States, residing at Madison, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Force-Feed Lubricators, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in force feed lubricators. It pertains particularly to mechanism for actuating a pump plunger adapted to draw lubricant into and expel it from a pump cylinder.

Figure 1 is a diagrammatic view of a portion of a locomotive showing a lubricator embodying my improvements carried by one of the reciprocating rods of the valve gear. Fig. 2 is an enlarged side elevation of the lubricator shown in Fig. 8. Fig. 3 is an end view of the same. Fig. 4 is a vertical section on the lines 4—4, Fig. 2. Figs. 5, 6 and 7 are sectional views through the lubricant ducts communicating with the pumping cylinder and showing different positions of the pump piston or plunger relative to the said ducts. Fig. 8 is a view partly in side elevation and partly in section of the lubricator. Fig. 9 is a full side elevation of a lubricator embodying my improvements and showing a modification in the actuating apparatus. Fig. 10 is an end elevation of the same. Figs. 11 to 16 show details.

For the purposes of illustration I have shown my improvements applied to a lubricator of the type shown in Letters Patent No. 699,191, dated May 6th, 1902, to Oliver G. Kipp, but it will be understood that they are capable of application in other well known styles of pumping mechanism.

In the drawings 1 represents, as an entirety, an oil reservoir. It may be of any desired shape or size, and is preferably open at the top, as indicated at 2. 3 represents a cover fitted over the top of the said oil reservoir. 4 is an opening through one of the walls of the said reservoir, preferably near the bottom thereof.

5 indicates an oil cylinder block adapted to be held in place within the interior of the oil reservoir, and having a flange 5′ arranged to engage with the inner wall of the said reservoir and to be secured thereto by means of an oil delivery pipe 5^a screw threaded to engage the screw threaded walls of the hole 4 and also of the horizontal passage 5^b in the said block, or in any other suitable manner.

6 is a vertically arranged hole in the block 5, preferably cylindrical in form and arranged so as to be approximately in the center of the oil reservoir when the block 5 is fitted into place.

7 is a horizontally arranged oil inlet duct in the block 5 communicating at its inner end with the lower end of the hole 6 therein, and at its outer end with the interior of the oil reservoir.

8 is a horizontal oil outlet duct through the block 5 communicating at its inner end with the lower end of the hole 6, and at its outer end with an enlarged passageway 5^b in the block 5. The ducts 7 and 8 are preferably arranged in axial alinement with each other and eccentrically to the hole 6.

11 is a plunger or piston fitted into the hole 6 the walls of which serve as cylinder walls for the plunger. This plunger is longitudinally slotted at its lower end as indicated at 11′, the slot being arranged at one side of the plunger for a purpose to be hereinafter described.

12 is a power shaft extending horizontally through the oil reservoir near the top thereof, and having bearings 12′, 12^a in the walls of the reservoir at either side thereof. This shaft 12 preferably extends outwardly beyond one side of the wall of the oil reservoir as indicated at 12^b.

13 represents, as an entirety, an eccentric mechanism mounted on the shaft 12 and adapted to assist in converting rotary motion from the said shaft and imparting reciprocating and oscillating movement to the oil plunger 11, and also capable of adjustment to vary the amount of movement so converted and imparted to the plunger during one complete revolution of the driving shaft 12. This eccentric mechanism preferably consists of two parts, an inner eccentric 14 and an outer eccentric 15 fitted to the inner one. The inner eccentric 14 has a hole 14′ extending diagonally therethrough from end to end and adapted to receive the driving shaft 12, so that when the eccentric is mounted upon the said driving shaft it will be arranged diagonally to the axis of said shaft. At one end this eccentric has an outwardly extending flange 14^a, and near its other end it is recessed or grooved, as indicated at 14^b, for a purpose to be hereinafter described. The eccentric may be secured to the shaft in any well known way; for the purpose of illustration I have indicated a set screw 14^c arranged at one end of the eccentric outside of the flange 14^a and adapted to be adjusted to engage with the said driving shaft 12 and to secure the eccentric in position thereof.

The outer eccentric 15 may preferably be regarded as the adjusting part by means of which the throw of the eccentric mechanism as an entirety may be regulated. This part 15 preferably consists of a ring-like piece of metal having outer cylindrical walls 15′, 15^a, the latter being relatively of larger diameter than the former, for a purpose to be hereinafter described. 15^b indicates a cylindrical hole or passageway arranged eccentrically through the part 15. This hole is adapted to receive the eccentric 14, the said eccentric being adapted to fit snugly the walls of said hole or passageway 15^b. 15^c is a ring or plate of equal diameter to the part 15′, and having a hole eccentrically arranged

therethrough of the same diameter as the hole 15^b and adapted to register therewith, the said ring or plate 15^c being secured to the outer end of the part 15′ so as to form a groove or recess 15^d adapted to receive the eccentric strap 16, the periphery of the part 15^a forming the inner wall of said groove or recess. This strap may be made in any suitable manner. When the eccentric 14 is inserted into the eccentric part 15 its flange 14^a engages with the ring 15^c. 15^e is a lock screw fitted into the part 15^a and adapted to engage with the walls of the groove 14^b in the eccentric 14 and hold the said eccentric and the said throw-adjusting element 15 rigidly together. 17 indicates a connecting rod having at its upper end a yoke 17′, the upper ends of the arm of said yoke being pivotally connected to the eccentric straps 16 on opposite sides thereof on a horizontal axis in the same horizontal plane with the axis of the driving shaft 12. At its lower end this connecting rod is preferably connected to the upper end of the plunger rod 11 by means of a universal joint 18.

The driving shaft may be caused to rotate or an intermittent rotary movement may be imparted thereto in any well known manner, such, for example, as by means of the mechanism illustrated in the patent to Kipp, No. 699,191, above referred to. I have devised, however, a means for imparting intermittent rotary motion to said shaft in which use is made of the reciprocating movement of some part of the mechanism to which the lubricator is attached, to actuate a gravity controlled mechanism for imparting to the said driving shaft intermittent rotary motion in one direction.

For the purpose of illustration, I have shown the oil reservoir 1 rigidly secured to a reciprocating rod 19 of the valve gear of an engine or a locomotive, 20 indicating the eccentric on the driving shaft 21. With the oil reservoir mounted in this position it will be understood that it will move with the reciprocating rod forward and backward and up and down during the reciprocation of the said rod.

22 indicates as an entirety a driver to impart intermittent motion to the shaft 12.

22′ is a cylindrical casing having the outer wall 22^a with an outwardly turned hub 22^b loosely mounted on the outer end 12^b of the driving shaft. The inner detachable wall 22^c of the said casing is preferably secured to the inner side of the said casing by means of the screws 22^d. Motion is preferably imparted from the inner cylindrical walls of the said casing to the said driving shaft 12 through a ratchet and pawl mechanism which is indicated as an entirety by 23. This ratchet and pawl mechanism comprises a ratchet plate 24 fitted into the casing 22 between its outer and inner walls, rigidly secured to the shaft 12, and having its periphery notched or recessed at regular intervals, as shown at 24′. The bottom walls of these notches or recesses 24′ are curvilinear in shape, and are parts of circles of equal radii, having their centers eccentric to the axis of the plate 24 and preferably all lying in a common circle described with the center of said plate 24 as its center.

25 are rollers or cylindrical pawls, each arranged in one of the recesses 24′ in the plate 24, and adapted to engage with the inner cylinder wall of the casing 22′, and also with the inner or bottom curvilinear wall of one of the recesses 24′, the said rollers being larger in diameter than is the distance between the inner cylindrical wall of the said casing and the curvilinear wall of one of the said grooves at one end of the groove, and smaller in diameter than the distance between the inner cylindrical wall of the cylinder and the inner wall of the said groove in the ratchet plate at its other end.

26 are pins, each having heads 26′ adapted to bear against the periphery of one of said pawl rollers, and a shank fitted into a hole 24^a in the longitudinal center of the ratchet plate 24 in the longest end wall of its pawl-receiving recesses or grooves 24. 27 is a spring interposed between the head of said pin 26 and the adjacent end wall of the said recess or groove, and adapted to press the head of said pin forward into engagement with the pawl roller in the same groove or recess, so as to normally hold the said roller in engagement both with the cylindrical wall of the said casing 22′ and the inner or bottom curvilinear wall of the said recess or groove.

32 is a pendulum rod or arm either rigidly or detachably secured to the casing 22′ and having at its lower end a weight or bob 32′. This weight or bob is preferably arranged to oscillate at or near the bottom of the oil reservoir 1 and the extent of its oscillation may be regulated between certain limits. This regulation may be accomplished by providing at the lower end of the oil reservoir at either side thereof downward and forward extending arms 1^a, 1^b, having the parts 1^c, 1^d respectively arranged in the path of oscillation of the weight or bob 32′. 32^a is a regulating screw carried by the part 1^d and adapted to be adjusted to regulate the arc of oscillation of the said weight or bob.

Preferably the ratchet plate 24 has a hub 24^b extending inwardly between it and the adjacent wall of the oil reservoir 1. This hub serves as a brake wheel or pulley for the ratchet mechanism.

33 indicates a brake mechanism or resistant interposing mechanism for the ratchet mechanism. It consists preferably of two arms 33′, 33^a, having bowed or curved end portions 33^b, 33^b, adapted to fit snugly a portion of the periphery of the brake wheel or hub 24^b on the said ratchet plate 24. Near their lower ends each of these arms 33 has an inwardly turned lug 33^d, and above these inwardly turned lugs is a pressure adjusting screw 33^e extending loosely through the arm 33′ and fitted into a screw threaded aperture in the arm 33^a. 1^e is a lug on the oil reservoir adapted to be received between the lower ends of the brake arms 33′, 33^a, beneath the inwardly projecting lugs 33^d thereof. It will be seen that by adjusting the screw 33^e the pressure with which the curved portion 33^b, 33^b of the brake arms engage the brake pulley or hub 24^b is increased so as to oppose the turning of the said hub and the ratchet plate carrying it. The resistance applied to the said brake pulley or hub by these brake arms is essential to the proper operation of the ratchet and pawl mechanism within the casing 22′, for unless such a resistance to the turning of the ratchet plate 24 is applied, the normal pressure with which the roller pawls are held in engagement with the casing 22′ and the ratchet plate 24 may be sufficient to cause the ratchet plate to rotate or swing backward with the casing 22′ as well as forward and thus cause an oscillation of the shaft 12. But by interposing a slight resistance to the backward turning of the

said hub or brake pulley, the engagement between the rollers and both the casing 22′ and the ratchet plate 24 will not be sufficient to overcome the resistance to the backward turning of the ratchet plate 24 imposed by the pressure of the brake 33 on the hub 24ᵇ of said plate, and the casing will swing or rotate backward without causing the backward swinging or rotation of the ratchet plate and consequently of the driving shaft 12.

The lubricant delivered through the duct or passage 5ᵃ may be conducted in any well known manner to any part of the machine which it is desired to lubricate. For the purpose of illustration I have indicated the said duct 5ᵃ as connected to a duct 35 which in turn conducts the lubricant to the eccentric 20 and lubricates the bearing surfaces of the eccentric and its straps.

The operation of the mechanism will be readily understood. Assuming that the regulating screw 32ᵃ is adjusted to permit the greatest possible degree of oscillation of the weight or bob 32, and that the reciprocating rod 19 is at the end of its rear stroke, then as the lubricant reservoir 1 is moved or started forward as an entirety the pendulum-like part 32′ tends to lag behind and with the continued forward motion of the oil reservoir 1 to slightly turn the casing 22′ about the axis of the drive shaft 12 in a clockwise direction and thus turn the said shaft. Then as the said reservoir continues its forward stroke the rod 32 and bob 32′ swing rearward as far as possible and are given a forward motion by the engagement of the bob with the part 1ᵉ. When the reservoir has reached the end of its forward stroke and started rearward, the pendulum under momentum still continues to move or tends to move forward and the brake 33 now acts to prevent the operation of the ratchet and pawl mechanism and hence the drive shaft 12 is not rotated. But as the oil reservoir again starts on its forward stroke and the rod 32 and bob 32′ swing rearwardly tending to rotate the casing 22′, the ratchet and pawl mechanism 23 operates to impart rotary movement to the said drive shaft 12. After the mechanism is once started the oil reservoir will travel in one direction while the bob 32′ is tending to travel in the other and the extent of travel of the one relative to the other determines the degree of rotation imparted to the shaft 12. It will be seen that by adjusting the screw 32ᵃ the extent of motion of the bob 32′ relative to the reservoir 1 may be regulated. When the driving shaft 12 is turned it turns the eccentric mechanism 13, and this converts the rotary motion and transmits both reciprocatory and oscillatory motion to the plunger 11. Thus actuated the plunger on its upward stroke first opens the port to the duct leading to the oil reservoir by bringing its slot 11′ into communication therewith and draws oil into the oil cylinder, it then turns and cuts off the escape of oil or lubricant from the oil cylinder, and then when it reaches a certain point on its downward stroke it has turned sufficiently to establish communication between the oil cylinder and the port of the oil discharge duct 8 through the medium of the slot 11′ in the plunger.

When it is desirable that the oil reservoir be stationary on some part of the mechanism to be lubricated, oscillating motion may be applied to the casing 22′ of the ratchet and pawl mechanism in any well known manner, for example, as indicated in Figs. 9 and 10. Here the casing 22′ has formed integrally with it or rigidly secured to it a downwardly depending arm or plate 28, having near the opposite sides of its lower edge the outwardly projecting lugs 28′, 28ᵃ.

29 is a rod pivotally connected at its upper end to a stud or shaft 29′ detachably secured to the said plate 28, the said rod being free to swing between the lugs 28′, 28ᵃ, on the said plate.

30 is an adjusting screw fitted into the lug 28ᵃ and extending therethrough and adapted to have its inner end engage with one edge of the rod 29, and to limit the swing of the said rod toward the said lug 28ᵃ. This adjusting screw is of sufficient length to force the said rod up against the opposite lug 28′ and to hold it there so that it will not be free to swing about its pivotal connection at 29′.

31 is a locking screw on the adjustment screw 30 adapted to lock it in any position of adjustment in the well known manner.

The rod 29 is oscillated by a reciprocating bar or strap 34 which receives its motion from some moving part of the mechanism to be lubricated in any well known manner. In this case, of course, the lubricator itself as an entirety does not oscillate or reciprocate but is stationary on the machine, and the reciprocating rod 34 causes the necessary intermittent operation of the ratchet and pawl actuating mechanism.

In order to regulate the degree of rotation imparted to the driving shaft 12 through the ratchet and pawl mechanism with this style of casing drive, the adjusting screw 30 may be adjusted to allow more or less lost motion or play of the rod 29 between the lug 28′ and the inner end of the said adjusting screw, and according to the degree of lost motion thus permitted between the rod 29 and the casing 22′, the degree of rotation of the casing 22′ is governed or regulated during each oscillation of the said rod.

To regulate the travel of the plunger 11 the outer eccentric-like part or ring 15 of the eccentric mechanism may be adjusted relative to the axis of the inner eccentric-like part 14, so as to increase or decrease the actual throw of the eccentric mechanism by varying the eccentricity of the eccentric mechanism 13 to the axis of the drive shaft 12 as an entirety.

What I claim is:—

1. The combination with a rotary driving shaft and a plunger adapted to be reciprocated thereby, of an eccentric mechanism mounted on said driving shaft and comprising independent elements mounted on said shaft and eccentrically thereto and adapted to be adjusted relatively to each other to vary the eccentricity of said eccentric mechanism relatively to the axis of said driving shaft, and power transmitting devices interposed between said eccentric mechanism and the said plunger.

2. In a lubricator, the combination with a lubricant cylinder, a plunger therein, and a drive shaft, of means for imparting to the plunger combined reciprocatory and oscillatory movements comprising an eccentric mechanism on the said drive shaft, and means for varying the throw of the said eccentric mechanism, substantially as set forth.

3. In a lubricator, the combination with a lubricant cylinder, a plunger therein, and a driving shaft, of an eccentric mechanism mounted on said driving shaft and capable of adjustment to vary its eccentricity to the axis of said driving shaft, an eccentric strap closely fitted to the periphery of the said eccentric mechanism, and means connecting said eccentric strap with the said plunger.

4. In a lubricator, the combination with a lubricant cylinder, a plunger therein and a drive shaft, of an eccentric

mechanism comprising an inner eccentric adapted to be secured to said shaft, and an eccentric mounted on said inner eccentric, and power transmitting means interposed between said last described eccentric and said plunger.

5. In a lubricator, the combination with a lubricant cylinder, a plunger therein, and a driving shaft, of a two part eccentric mechanism mounted on said driving shaft and adapted to have its parts adjusted relatively to each other to vary its eccentricity to the axis of said driving shaft, an eccentric strap on said eccentric mechanism, and means connecting said eccentric strap with said plunger.

6. In a lubricator, the combination with the lubricant cylinder, a plunger therein and a drive shaft, of an eccentric mechanism comprising an inner eccentric mounted on said drive shaft with its axis diagonal to the axis of said shaft, and an outer eccentric mounted on said inner eccentric, and power transmitting means interposed between said outer eccentric and said plunger.

7. In a lubricator, the combination with the lubricant cylinder, a plunger therein and a drive shaft, of an eccentric mechanism comprising an inner eccentric mounted on said drive shaft with its axis diagonal to the axis of said shaft, and an outer eccentric mounted on said inner eccentric and having its axis parallel to the axis of said inner eccentric, and power transmitting means interposed between said outer eccentric and said plunger.

8. In a lubricator, the combination with a lubricant receptacle and means for feeding the lubricant therefrom, of a driving mechanism for said feeding mechanism, comprising a rotary driving shaft connected with and operating said feeding means, and means for rotating the said driving shaft, comprising a rod arranged to be oscillated, and a ratchet and pawl mechanism interposed between said rod and said driving shaft having a casing loosely mounted on said drive shaft and connected to said rod, a ratchet plate arranged within said casing and rigidly secured to said driving shaft, pawls arranged between said casing and said ratchet plate, and the retarding brake for the ratchet plate.

9. The combination with a forward and backward moving element on a mechanism to be lubricated, of an oil reservoir rigidly secured to said element, an oil cylinder carried by said reservoir, a duct leading from said reservoir to said oil cylinder, a plunger in said oil cylinder, a rotary driving shaft carried by said oil reservoir, a pendulum-like mechanism loosely mounted on said driving shaft, a ratchet and pawl mechanism interposed between said pendulum-like mechanism and said driving shaft, and a retarding brake for the ratchet and pawl mechanism carried by said oil reservoir.

10. The combination of the lubricant receptacle, a pump having a reciprocating plunger, and an eccentric adapted to have its center adjusted toward and from the axis of its shaft, substantially as set forth.

11. The combination of the receptacle, a pump having a reciprocating plunger, a driving shaft and the two-part eccentric having one part secured to the driving shaft, and the second part adjustably secured to the first, substantially as set forth.

12. The combination of the receptacle, a pump having a reciprocating plunger, the driving shaft and the two-part eccentric having an inner part eccentrically secured to the driving shaft, and an outer part eccentrically secured to the inner part, substantially as set forth.

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

ALBERT A. STELTING.

Witnesses:

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JOHN H. YOUNG.