E. G. RIPLEY.

PUMP LUBRICATOR.

APPLICATION FILED NOV. 4, 1916.

1,397,548.

Patented Nov. 22, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

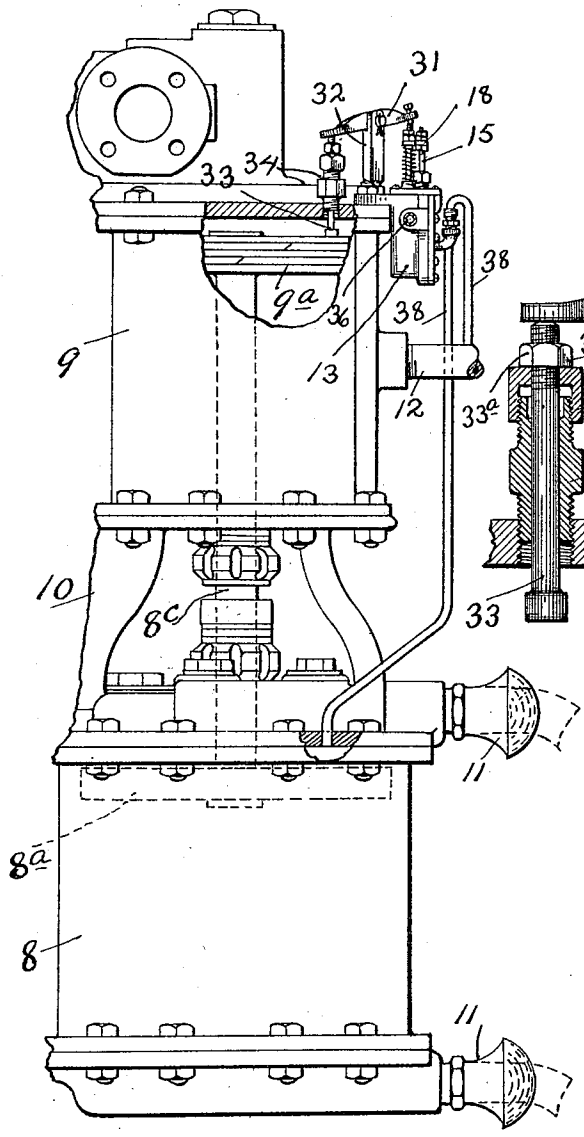
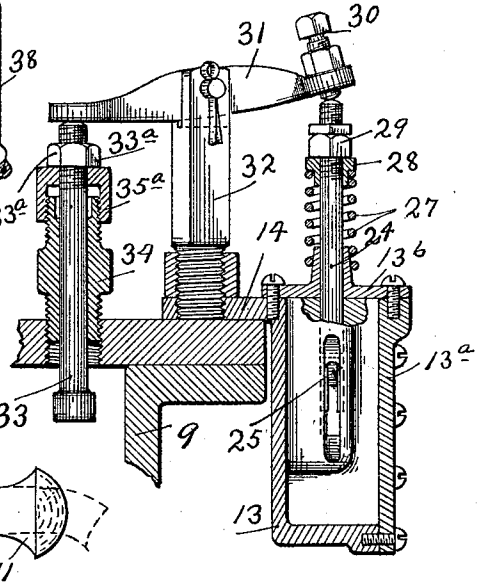


Fig. 2.



Witnesses

H. L. Opsahl.

E. C. Wells

Inventor

E. G. RIPLEY

By his Attorneys

Williamson & Mudgett

E. G. RIPLEY.

PUMP LUBRICATOR.

APPLICATION FILED NOV. 4, 1916.

1,397,548. **Patented Nov. 22, 1921.**

2 SHEETS—SHEET 2.

Fig. 3

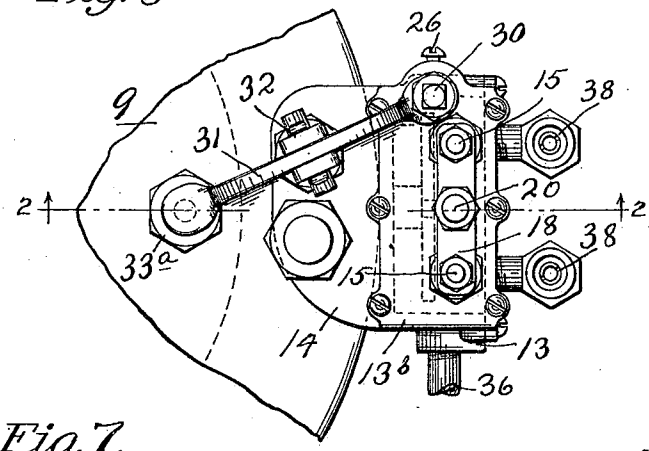


Fig. 7.

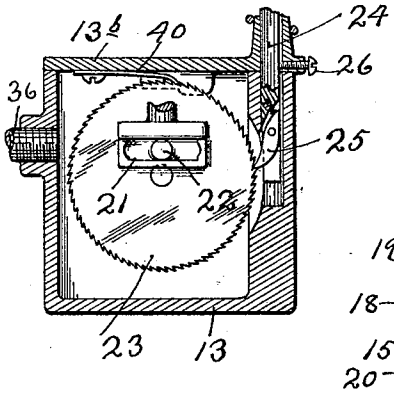


Fig. 4.

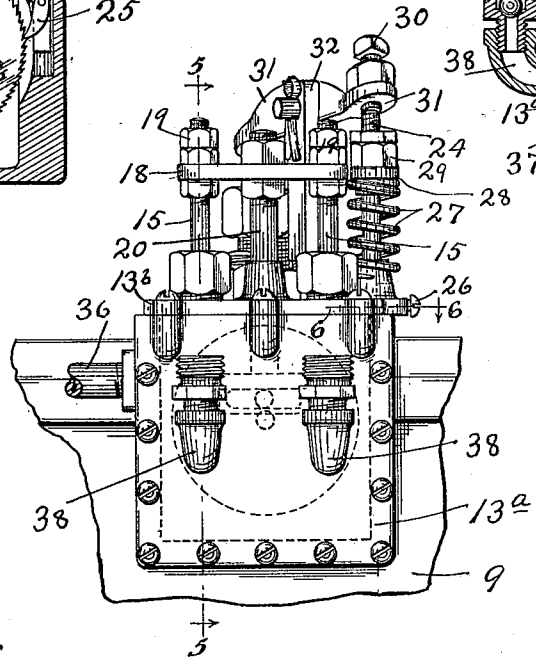


Fig. 5.

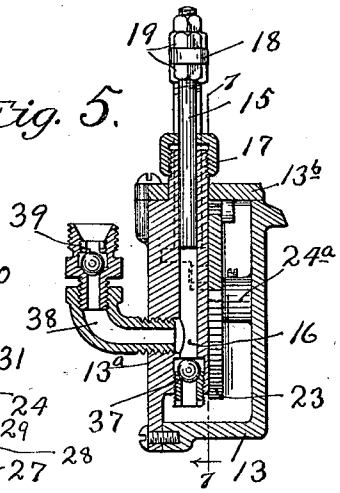
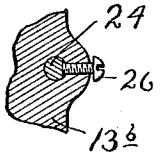


Fig. 6.



Witnesses
H. L. Opsahl.
E. G. Wells

Inventor
E. G. RIPLEY
By his Attorneys
Williamson & Merchant

UNITED STATES PATENT OFFICE.

EDWARD G. RIPLEY, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO HENRY L. McCULLOUGH, OF MINNEAPOLIS, MINNESOTA.

PUMP-LUBRICATOR.

1,397,548. Specification of Letters Patent. Patented Nov. 22, 1921.

Application filed November 4, 1916. Serial No. 129,493.

To all whom it may concern:

Be it known that I, EDWARD G. RIPLEY, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Pump-Lubricators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention has for its object to provide an improved pump lubricator, and to such ends, generally stated, it consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

More particularly, my invention relates to steam-actuated air pumps of the type wherein steam cylinders and air cylinders are connected in axial alinement, and the pistons that work therein are connected to a common piston rod, and hence, partake of common reciprocating movements. The air pumps used on locomotives afford an instance of the particular type of pump for which my improved lubricator is especially designed. In steam actuated air pumps of this type, it seldom, if ever, happens that the exposed intermediate portion of the piston rod in actual length, equals the stroke of the piston, and hence, it is impossible to actuate the pump lubricator from the exposed portion of such piston rod. In fact, the construction of such pumps is such that there is no exposed movable part that can be used to operate my pump lubricator. Obviously, the oil supply action of the lubricator should be proportioned to the speed of the pistons of the air pump.

My invention provides a lubricator having an oil pump and pump actuating connections that extend into one of the cylinders of the air pump and is subject to the co-operating piston which works therein. This oil pump actuating connection may be extended into either the steam cylinder or the air cylinder of the air pump, but in either event, the action of the lubricator will be controlled by and proportioned to the piston movements of the air pump.

Particularly, the invention is directed to an improved means whereby, instead of imparting one pumping movement to the lubricator piston for each reciprocation of the main steam piston, each reciprocation of the steam piston is caused to operate through a pawl and ratchet device, or the like, to produce a step movement to the lubricator piston. Otherwise stated, the lubricator piston will be given a complete reciprocation by a predetermined number of reciprocations of the steam piston. However, in the preferred arrangement, there is provision made whereby the predetermined number of movements of the steam piston required to impart the complete reciprocation to the lubricator piston, may be varied.

In the accompanying drawings which illustrate the invention in its preferred form, like characters indicate like parts throughout the several views.

Referring to the drawings,

Figure 1 is a view in elevation with some parts sectioned and some parts broken away, showing an air pump and my improved lubricator applied thereto;

Fig. 2 is a vertical section taken approximately on the line 2—2 of Fig. 3, some parts being shown in full;

Fig. 3 is a plan view of the parts shown in Fig. 2, some parts being broken away;

Fig. 4 is a front elevation of the parts shown in Fig. 3;

Fig. 5 is a section taken on the line 5—5 of Fig, 4, some parts being shown in full;

Fig. 6 is a fragmentary section on the line 6—6 of Fig. 4; and Fig. 7 is a vertical section taken through oil well housing on a line that exposes to view the pawl and ratchet mechanism.

The air pump shown in the drawings is of the simple type and as the parts thereof are of well known construction, they may be briefly noted as follows:

The numerals 8 and 9 indicate, respectively, the steam and air cylinders rigidly connected by brackets 10. The pistons that work in the cylinders 8 and 9, respectively, are designated by the characters 8^a and 9^a, and the rod that connects the two pistons is designated by the character 8^c. The numeral 11 indicates the air intake nozzles of the air cylinders 8, the valve mechanism and air discharge conduit of the said cylinder not being illustrated since they are of well known construction. Steam is supplied to the steam cylinder 9 through a steam supply pipe 12, but a valve mechanism of the said steam cylinder not being illustrated since the construction thereof, also is well known.

The lubricator comprises an oil well 13,

shown as a rectangular form having a detachable side plate 13^a and a detachable top plate 13^b, and also having a laterally projecting flange 14 that is bolted, or otherwise, rigidly, but detachably secured to the upper head of the cylinder 9. The oil pump illustrated is a duplex pump, and hence, has two pump rods or pistons 15, and coöperating cylindrical seats 16. The pump rods 15 work in stuffing boxes 17 applied at the upper extremities of the seat 16, and both of said rods 15 are connected to a bar or head 18, by means of nuts 19 that make the same independently adjustable in respect to the said head. An operating plunger 20 is secured at its upper ends to the intermediate portion of the head 18, and works through a bearing in the top of the head 13^b. At its lower end, this plunger 20 is provided with a transverse head having a horizontal slot 21 that is engaged by the crank pin 22 of the peripheral ratchet toothed crank wheel or disk 23 that is journaled to a boss 24^a on the back plate of the well 13.

Working through a vertical seat formed in one end wall of the well 13 and alined with the ratchet wheel 23, is a reciprocating pump actuating bar or slide 24, which at its lower end, is equipped with a spring-pressed dog 25 that engages the teeth of the said wheel 23. This actuating slide 24, as shown, is in the form of a cylindrical bolt or rod that is flattened at one side and loosely engaged by a set screw 26 (see Figs. 6 and 7) that is screwed through one edge of the top plate 13^b and holds the said rod against rotation, and hence, keeps the dog 25 always in a plane of the wheel 23. The said actuating slide 24 is yieldingly pressed upward, as shown, by a coiled spring 27 that surrounds the same and is compressed between the top plate 13^b and a washer 28 that is adjustably held on the said slide 24, by nuts 29.

The extreme upper end of the actuating slide 24 is engageable with the end of a tappet screw 30 carried by one end of a lever 31 that is intermediately pivoted to a fixed post 32 shown as anchored to the flange 14 of the oil well 13. The other end of the lever 31 engages the upper and outer end of a so-called tappet bolt 33 that works through a bearing sleeve 34, which, as shown, is screwed into the upper head of the cylinder 9 and has a suitable stuffing box 35 to prevent leakage of steam around the said tappet bolt. The head of the inner end of the tappet bolt 33 is arranged to be engaged by the piston 9^a.

Oil may be supplied to the oil well 13 through an oil supply pipe 36. The oil will be drawn from the well into the piston seats 16 past check valves 37, and will be discharged in the said piston seats through oil delivery pipes 38 having check valves 39 that check the backward flow of the oil.

In the arrangement shown, one of the oil pipes 38 leads to the upper portion of the air cylinder 8, while the other pipe 38 leads to the steam supply pipe 12 of the steam cylinder 9. Backward rotation of the ratchet tooth wheel 23 is prevented by a spring leaf retaining dog 40 shown in Fig. 7.

Operation.

With the above described and preferred arrangement of the pump lubricator, the operation is as follows:

At the extremity of each upward movement of the combined piston 8^a and 9^a, the said piston 9 will strike the lower end of the tappet bolt 33 and through lever 31, will depress the slide or actuating bar 24, causing the dog 25 to impart one step of rotary movement to crank wheel 23. Under downward movement of the piston, the spring 27 will retract or throw upward the actuating bar 24 and its dog 25. Under repeated reciprocations of the said actuating bar, the crank wheel 23 will be rotated step by step and at a speed that is proportioned to and determined by the speed of the pump piston. Under rotation of the said crank wheel, the pump rods or pistons 15, through head 18, and plunger 20, will be moved, first step by step downward and then step by step upward. Under upward movement, oil will be drawn into the seat 16, and under downward movements of said pump rods oil will be forced from the seat 16 through the oil delivery pipes 38 and to the points of delivery, to-wit, as shown directly to air cylinder 8 and the steam cylinder 9, through its steam supply pipe 12.

Obviously, each reciprocation of the steam cylinder produces a reciprocation of the pump actuating bar 24 and each reciprocation of said bar 24, through the dog 25, produces a step of rotation of the ratchet wheel 23. The length of the reciprocation given to bar 24 will determine the number of reciprocations of said bar 24 and of the steam cylinder required to impart a complete rotation to the ratchet wheel 23, and hence, will also determine the number of such movements required to impart a complete reciprocation to the lubricator pump rods or pistons 15. By adjustments of the nuts 33^a the normal projection of the tappets 33 into the steam cylinders may be varied and it will be understood that the greater the normal projection that is given to these tappets, the greater will be the movement imparted to actuating bar 24 for each reciprocation of the steam cylinder. Adjustment of the set screws 30 will serve to take up the slack between the tappets 15 and actuating bar 24.

In practice, it has been found that it is

impossible to obtain the desired relatively slow and finely graduated delivery of oil by the direct action of a tappet operated upon by the steam cylinder of the pump, for example. Otherwise stated, it is impossible to obtain the desired supply of oil with an arrangement in which the lubricator piston is given a complete reciprocation of the tappet and steam cylinder. By the use of the pawl and ratchet device which operates as an intermittent or step by step motion reducing device, the desired relatively slow and fine graduation of the delivery of oil is accomplished.

What I claim is:

1. The combination with a main cylinder and coöperating piston working therein, of a lubricator pump cylinder and piston, a tappet extending through a head of said main cylinder and subject to contact and movement with said main piston, and an intermittent step by step transmission device including a pivoted tappet lever interposed between said tappet and the piston of said lubricator, whereby said lubricator piston will be given one reciprocation by a multiplicity of reciprocations of said main piston and tappet.

2. The combination with a main cylinder and a coöperating piston working therein, of a lubricator pump cylinder and piston, a tappet working through a head of said main cylinder and subject to contact and movement with said main piston, and an intermittent driving mechanism including a pivoted tappet lever and a pawl and ratchet device connected between said tappet and the piston of said lubricator pump, whereby said lubricator pump piston will be given one reciprocation by a multiplicity of reciprocations of said main piston and tappet.

3. The combination with a main cylinder and a coöperating piston working therein, of a lubricator pump cylinder and piston, a tappet working through a head of said main cylinder and subject to contact and movement with said main piston, a plunger connected to the piston of said lubricator pump, a crank for reciprocating said plunger, a ratchet wheel rotatable with said crank, a reciprocating actuating bar provided with a dog operative on said ratchet wheel, and a connection for reciprocating said actuating bar from said tappet.

4. The combination with a main cylinder and coöperating piston working therein, of a lubricator pump cylinder and piston, a tappet extending through a head of said main cylinder and subject to contact and movement with said main piston, an intermittent step by step transmission device interposed between said tappet and the piston of said lubricator, whereby said lubricator piston will be given one reciprocation by a multiplicity of reciprocations of said main piston and tappet, and a spring yieldingly projecting said tappet into said main cylinder, the outward movement of said tappet under the action of said main piston serving to positively produce the lubricator piston movement.

5. The combination with a main cylinder and a coöperating piston working therein, of a lubricator pump cylinder and piston, a tappet working through a head of said main cylinder and subject to contact and movement with said main piston, a plunger connected to the piston of said lubricator pump, a crank for reciprocating said plunger, a ratchet wheel rotatable with said crank, a reciprocating actuating bar provided with a dog operative on said ratchet wheel, a connection for reciprocating said actuating bar from said tappet, and a spring yieldingly projecting said tappet into said main cylinder, the outward movement of said tappet under the action of said main piston serving to positively produce the lubricator piston movement.

6. The combination with a reciprocating engine comprising a main cylinder and coöperating piston working therein, which has exposed reciprocating parts of much less length than the length of the stroke of said piston, of a lubricator pump cylinder and piston, means extending through the head of said main cylinder and operable by the piston therein, and an intermediate step-by-step transmission mechanism including a pivoted tappet lever operated by and disposed between said means and the piston of said lubricator whereby said lubricator piston will be operated at a speed proportional to the speed of reciprocation of said main piston.

7. The combination with a main cylinder and coöperating piston working therein, of an oil casing secured to said cylinder and disposed immediately adjacent the side thereof, of a lubricator pump, cylinder and piston, carried by said casing, a tappet extending through the head of said main cylinder and adapted to be moved by contact with said main piston, an oscillating lever mounted on said main cylinder for engagement with said tappet, and a reciprocating member for operating said pawl and ratchet mechanism extending into said oil casing and with which said oscillating lever also contacts, said pawl and ratchet mechanism being located in said oil casing.

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

EDWARD G. RIPLEY.

Witnesses:

BERNICE G. WHEELER,

HARRY D. KILGORE.