C. R. BRIGGS.

LUBRICATOR.

APPLICATION FILED OCT. 28, 1909.

978,819.

Patented Dec. 13, 1910.

2 SHEETS—SHEET 1.

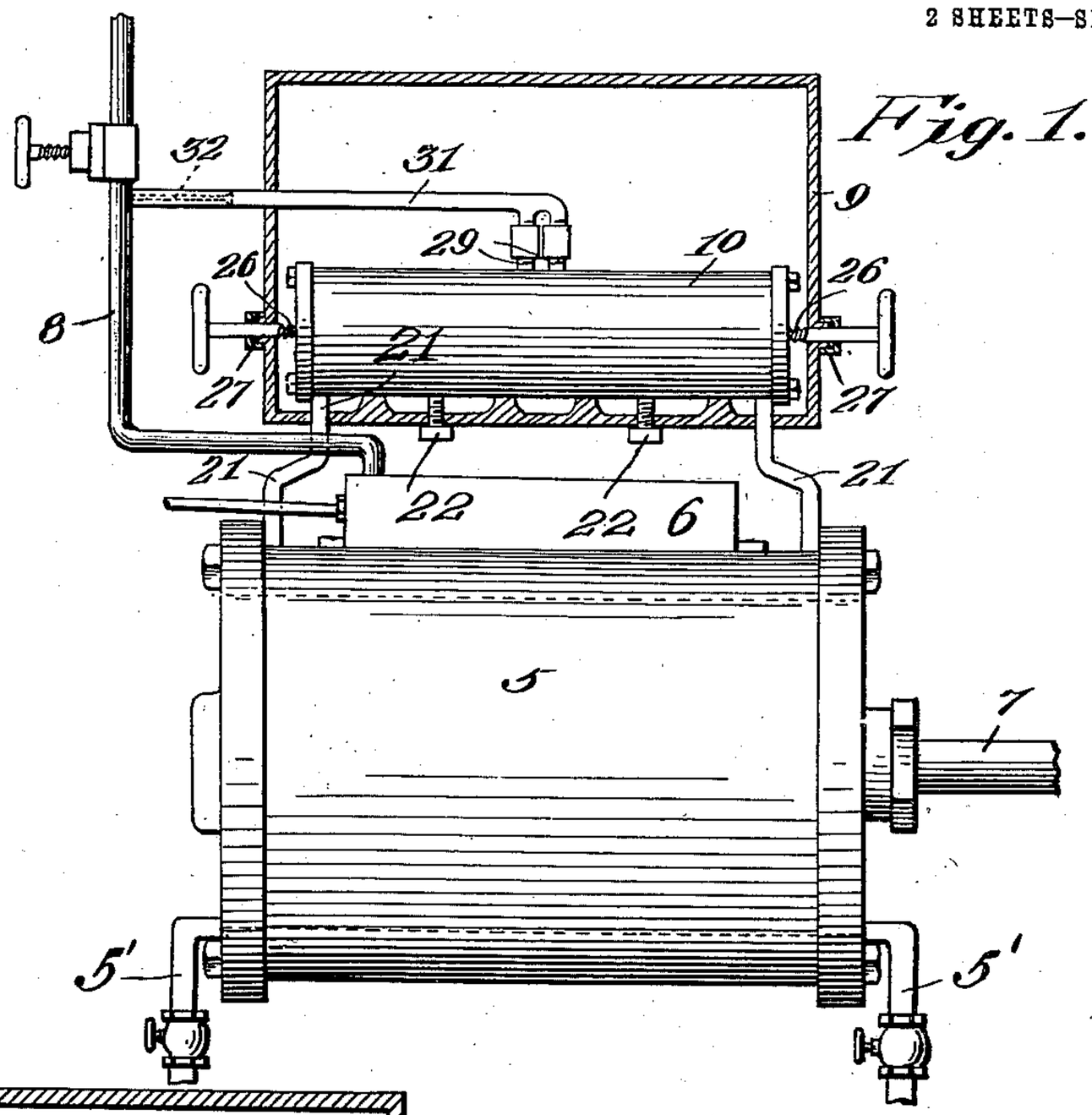

Fig. 1.

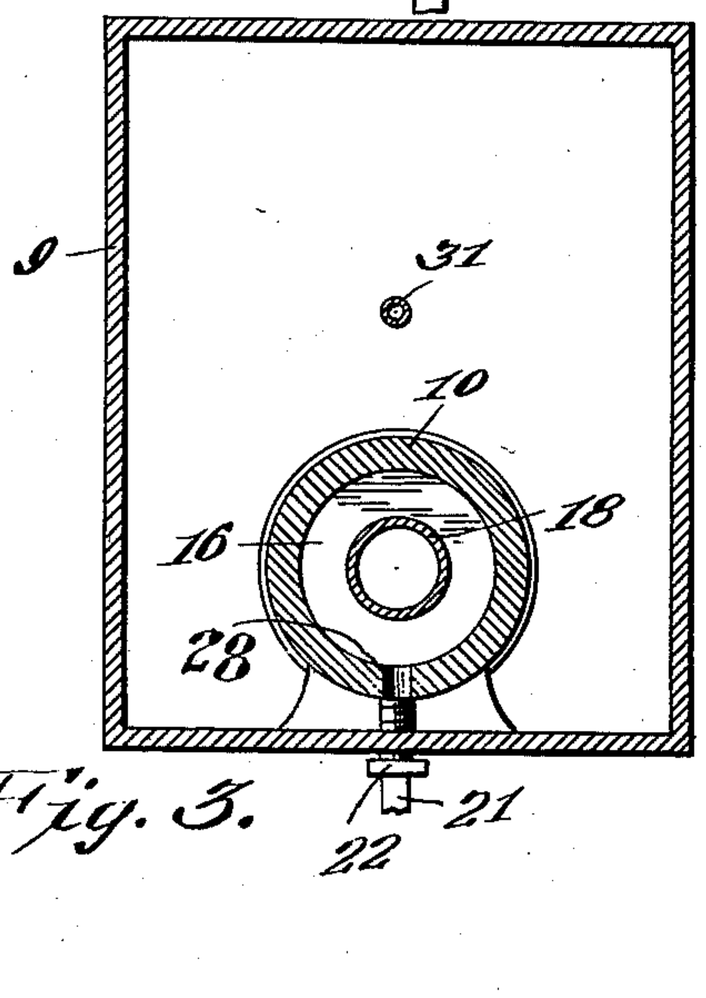

Fig. 3.

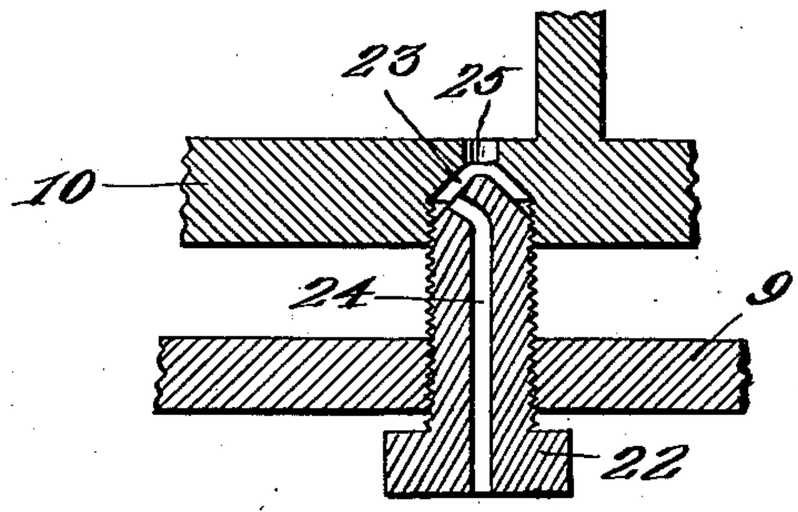

Fig. 5.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

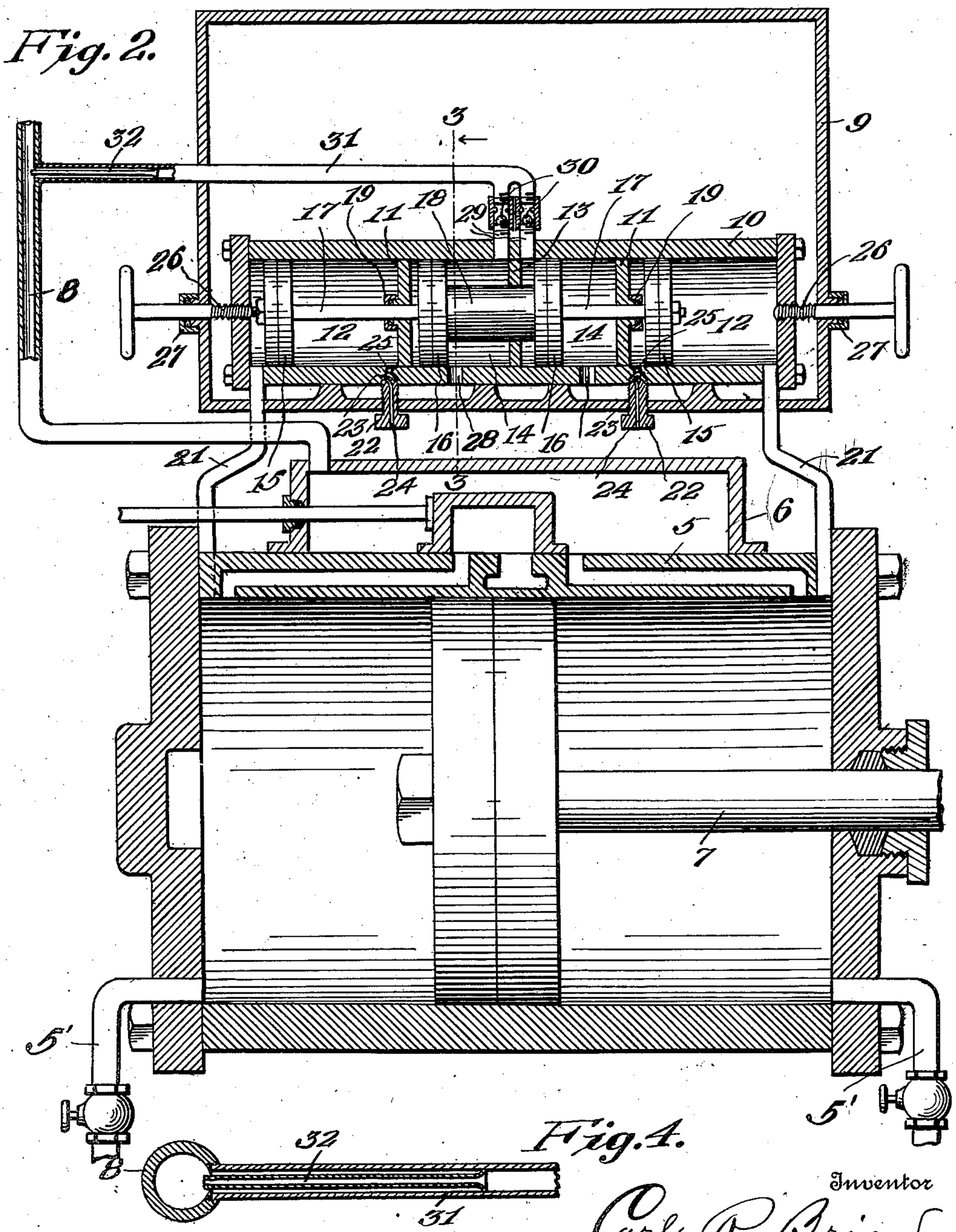

Fig. 4.

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UNITED STATES PATENT OFFICE.

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LUBRICATOR.

978,819. Specification of Letters Patent. Patented Dec. 13, 1910.

Application filed October 28, 1909. Serial No. 525,082.

To all whom it may concern:

Be it known that I, CARL R. BRIGGS, a citizen of the United States, residing at Ravenna, in the county of Portage and State of Ohio, have invented certain new and useful Improvements in Lubricators, of which the following is a specification, reference being had to the accompanying drawings.

This invention has relation to certain new and useful improvements in grease pumps and more particularly to a device of this character which is adapted to be utilized as a lubricator for the steam chests and piston cylinders of locomotives.

The primary object of the invention is to provide a steam actuated pump disposed within a reservoir containing lubricating material, and connected to an engine cylinder for the utilization of the steam to reciprocate the pump pistons.

Another object is to provide a grease pump disposed within a tank or reservoir mounted above the engine cylinder, the opposite ends of said pump having communication with the corresponding ends of the engine cylinder and adapted to alternately receive steam therefrom whereby the lubricating material will be discharged in a liquid state from the pump to the main line steam pipe whence it is carried together with the steam to the steam chest.

A further object is to provide a steam actuated grease pump comprising a cylinder having a plurality of steam and grease chambers, and a reciprocating piston within each of said chambers, said pistons being connected for simultaneous reciprocatory movement in a common direction and adapted to discharge the lubricating fluid from the grease chambers through suitable conducting pipes, suitable means being provided for preventing the congealing of the liquid before it is discharged into the steam pipe to be carried to the cylinder steam chest.

A still further object is to provide suitable means for providing an air cushion for the reciprocating steam pistons, and means disposed through the ends of the pump cylinder whereby the extent of the reciprocatory movement of the pistons may be regulated at will.

With these and other objects in view, the invention consists of the novel construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of an engine cylinder, showing the tank or reservoir arranged above the same, said reservoir being shown in section to disclose the pump arranged therein; Fig. 2 is an enlarged longitudinal section through the pump and engine cylinder; Fig. 3 is a section taken on the line 3—3 of Fig. 2; Fig. 4 is an enlarged detail section showing the connection of the conducting pipe to the steam pipe, and the heating tube disposed within the conducting pipe; and Fig. 5 is an enlarged detail section of the air valve.

Referring to the drawings 5 indicates the engine cylinder, and 6 the steam chest which is adapted to supply steam thereto, a suitable slide valve being arranged in said chest to intermittently admit steam to the opposite ends of the cylinder and reciprocate the piston 7 which is arranged therein. The steam is admitted to the valve chest from a main supply pipe 8.

Supported above the cylinder in any suitable manner there is a tank or reservoir 9. This reservoir is adapted to contain grease or other lubricating fluid which is adapted to be supplied to the steam chest to prevent undue friction resultant from the sliding movement of the valve therein. In order to properly supply this lubricating fluid in sufficient quantities, it is essential that the lubricant should be maintained within the reservoir at a required consistency at all times so that it will freely flow through the conducting pipes to the steam pipe whence it is carried to the steam chest. To this end I provide a cylinder 10 which is suitably supported within the reservoir 9 and is divided by means of the heads 11 into two isolated steam chambers 12. These chambers are disposed in the opposite ends of the cylinder and between the heads 11 another head 13 is centrally secured within the cylinder and provides a grease chamber or compartment 14 on the opposite sides thereof between the heads 11 and 13. A piston 15 is mounted in each of the steam chambers 12, and a similar piston 16 is likewise disposed in each of the grease or fluid chambers. The pistons 15 and 16 are connected by the rods 17 which extend and move through the heads 11. The pistons 16 are also connected by a cylindrical portion 18 which extends through the head 13. Thus

the piston heads are connected to each other for simultaneous reciprocatory movement in a common direction within the cylinder. To prevent the entrance of grease from the chambers 14 into the steam chambers 12, the stuffing boxes 19 are provided and surround the piston rods 17. These boxes may be of any approved construction.

A steam pipe 21 extends from each end of the engine cylinder 5 to the corresponding end of the pump cylinder 10, communicating with the steam chambers 12. Thus as the cylinder piston 7 is reciprocated by the entrance of steam into the opposite ends of the cylinder 5, live steam on either side of the piston will traverse the pipe 21 on that side and be forced through this comparatively contracted passage alternately into one of the steam chambers 12. During this movement of the steam it attains an extreme velocity and impinges upon the piston 15 moving the same to the opposite end of the steam chamber 12.

As the pistons 15 and 16 are connected to each other, it will be obvious that they will be simultaneously moved in their respective chambers and that the other of the pistons 15 will then be disposed in position to receive the impact of the steam admitted to that end of the pump cylinder upon the reverse movement of the engine piston. The steam which was previously admitted to the other of the end chambers 12 is exhausted from said chamber by the reverse movement of the pistons 15, and discharged back into the engine cylinder. This exhaust steam will be partially condensed in its return to the engine cylinder, the waters of condensation being drained off from each end of the cylinder through suitable pipes 5′ communicating therewith as shown in Fig. 1 of the drawings.

In order to obviate the liability of the disruption of the various parts from the shock or jar incident to the reciprocatory motion of the piston, I provide an adjustable air valve 22. As shown this valve comprises a threaded shank having a knurled head on its outer end. This shank has threaded engagement through the bottom of the oil reservoir and is formed with a conical extremity which has seated engagement in a similarly formed seat 23 in the wall of the cylinder 10. An air passage 24 extends through the shank and head and has its inner end laterally directed to discharge the air current to one side of the opening 25 in the valve seat. As this shank is screwed outwardly or inwardly, it will be seen that the distance between the end thereof and the valve seat will be proportionately increased or decreased and greater or less space for the movement of the air permitted, whereby the rapidity of its entrance and discharge to and from the steam chamber may be regulated as desired. These air inlets to the steam chambers are preferably located adjacent to the heads 11, and are adapted to provide a cushion for the pistons 15 to absorb the shock or jar which is occasioned by the expansive action of the steam thereon during their reciprocatory movement.

In order to regulate the supply of lubricating fluid, suitable means must be provided for regulating the reciprocatory movement of the pistons so that a greater or less amount of fluid may be discharged from the pump. This result I accomplish by providing the adjusting screws 26 which are disposed through the stuffing boxes 27 on the opposite ends of the reservoir 9 and have threaded engagement in the opposite ends of the pump cylinder 10. Thus as the pistons 15 and 16 are reciprocated in the cylinder, the ends of the rods 17 will be engaged with the inner ends of the screws 26 and limit such reciprocatory movement. The impact of the rods 17 with the screws will be cushioned by the air which has been drawn into the steam chambers through the air valves 22, whereby the liability of violent shock being imparted to the pump cylinder and probable injury to the various parts thereof, will be avoided.

As the pistons 16 are reciprocated within their respective chambers, the lubricating oil is discharged therefrom and conveyed through suitable conducting pipes to the main steam pipe which extends to the steam chest. This action takes place in the following manner: The oil enters the chambers 14 through the openings 28 in the cylinder wall, and as the pistons 16 move in the chambers, this oil is forced therefrom through one of the pipes 29 in which a ball valve 30 is interposed and prevents the back pressure of the fluid into the pipes. At their upper ends these pipes 29 are merged into one laterally extending conducting pipe 31 which extends exteriorly of the oil reservoir and is connected at its outer end to the steam pipe 8.

Owing to the fact that the steam chambers 12 are highly heated by the steam therein it will be obvious that the lubricating oil will be maintained at a uniform consistency within the vicinity of the pump cylinder so that it will freely flow through the openings 28 and enter the grease chambers. The rapidity of the discharge of the lubricating fluid is controlled by the valve gearing which in turn controls the admission of the steam to the engine cylinder, and as the amount of oil discharged from the chambers with each reciprocation of the piston may be regulated by adjusting the screws 26, it will be apparent that the exact amount of lubricant which should be supplied to the steam chest is at all times maintained in relation to the rapidity of operation of the engine.

To prevent the fluid from congealing in

the pipe 31 after moving exteriorly of the reservoir, I provide the tube 32 longitudinally disposed in the outer end of the pipe 31. This tube provides what is in effect a contracted portion of the conducting pipe, although it is inclosed within the same. The outer end of the tube is disposed in the steam pipe 8 its inner end being suitably secured to the inner wall of the pipe 31. Thus a portion of the steam in the pipe 8 will enter the pipe 31 and circulate around the tube 32 through which the oil passes. In this manner the maintenance of the proper fluid state of the oil is insured and as it is discharged from the end of the tube, it is taken up by the steam in its passage and carried in minute particles to the steam chest and thoroughly lubricates the sliding valve disposed therein and renders its operation accurate and positive without unnecessary friction.

From the foregoing it will be seen that a pump constructed as above set forth is especially desirable for lubricating purposes and as the necessary power to operate the same is obtained from the cylinder of the engine, it will be obvious that the cost of maintenance and operation is extremely small.

The various elements included in the construction of the device are easily assembled in operative position, there being no delicate mechanical elements employed so that the device will not be liable to disarrangement of the parts in operation.

The pumping action is absolutely positive and a constant supply of the lubricating fluid to the steam chest of the engine is assured under all conditions.

The arrangement and combination of the elements above described, define what is the preferred embodiment of my invention, although it will be understood that numerous minor modifications may be resorted to without departing from the essential features or sacrificing any of the advantages of the invention and I reserve the right to make such changes as may fairly fall within the scope of the claims.

Having thus described the invention, what is claimed is:

1. In a steam actuated lubricating pump, the combination of a cylinder having a plurality of steam chambers and fluid chambers, said cylinder being supported within a reservoir adapted to contain a lubricating fluid, a piston disposed in each of said chambers, said pistons having simultaneous reciprocatory movement in a common direction, means for alternately admitting steam to said steam chambers, means disposed in the opposite ends of said cylinder for regulating the length of stroke of the pistons, discharge pipes communicating with the fluid chambers, each of said pipes having a check valve interposed therein and adapted to alternately receive the fluid from said chambers upon the reciprocatory movement of said pistons, means extending through the bottom of said reservoir and the cylinder wall adapted to admit air to the steam chambers to cushion the pistons therein at the ends of their strokes, the steam in said steam chambers being adapted to retain the lubricating fluid at the proper consistency, and means disposed within said discharge pipes to provide a heated passage for the fluid.

2. In a steam actuated lubricating pump, the combination of a cylinder having a steam chamber in its opposite ends, a head arranged centrally in the cylinder dividing the intermediate portion thereof into two separated fluid containing chambers, said cylinder being mounted within a reservoir adapted to contain the lubricating fluid, inlet openings to said fluid chambers, a piston disposed in each of the steam and fluid chambers, said pistons having simultaneous reciprocatory movement, supply pipes communicating with the outer ends of the steam chambers adapted to supply steam alternately thereto, the steam in said chambers being adapted to heat the cylinder and retain the lubricating fluid at a uniform consistency, discharge pipes extending through the wall of the cylinder and communicating with said chambers on opposite sides of the central head arranged therein, the reciprocatory movement of the pistons being adapted to alternately force the lubricating fluid into said pipes, means disposed through said reservoir and the ends of the cylinder to regulate the length of stroke of the pistons and determine the amount of lubricating fluid discharged, said discharge pipes being connected at their outer ends to form a single conducting pipe extending laterally through said reservoir, a steam supply pipe for said cylinder, said conducting pipe being connected thereto, and a tube disposed concentrically within the conducting pipe exteriorly of the reservoir, the end of said tube extending into said steam pipe, the steam therefrom entering the conducting pipe and circulating around the tube to heat the same and maintain the lubricant in a fluid state.

3. The combination with an engine cylinder and steam chest, said chest having a steam supply pipe communicating therewith, of a reservoir supported above said cylinder, a pump cylinder arranged in said reservoir, a plurality of reciprocating pistons in said cylinder, said cylinder having steam chambers in its opposite ends, the intermediate portion of the cylinder being adapted to receive the lubricating fluid contained in said reservoir, the pistons within said cylinder having simultaneous recipro-

catory movement, steam supply pipes communicating with the steam chambers and with the engine cylinder, said pipes being adapted to receive the steam from said cylinder upon the reciprocation of the engine piston and to alternately discharge the same into said steam chambers, a discharge pipe communicating with the fluid chamber, a check valve interposed in said pipe, said pipe extending exteriorly of the reservoir and communicating at its outer end with the steam supply pipe of the steam chest, and means disposed within the exterior portion of said pipe to provide a passage for the lubricating fluid and receive a portion of the steam from said pipe to maintain the lubricant in a fluid state.

4. The combination with an engine cylinder and valve chest, and a supply pipe communicating with said chest, of a reservoir supported above said cylinder, a pump cylinder arranged within said reservoir, said cylinder having steam chambers in its opposite ends, the intermediate portion of said cylinder having a plurality of fluid chambers formed therein, each provided with an inlet opening to receive the lubricating fluid contained within the reservoir, steam supply pipes communicating with the outer ends of the steam chambers and with the engine cylinder, said pipes being adapted to convey the steam from the engine cylinder and alternately discharge the same into said chambers, a piston disposed in each of said chambers, said pistons being connected for simultaneous reciprocatory movement, means for regulating the length of stroke of the pistons, a discharge pipe communicating with each fluid chamber of said cylinder and adapted to alternately receive the lubricating fluid upon the reciprocation of said pistons, a check valve interposed in each of said pipes, said pipes communicating at their outer ends with a laterally extending conducting pipe, said pipe extending exteriorly of the reservoir and communicating with the steam supply pipe of the valve chest, a tube concentrically arranged in the exterior portion of said pipe adapted to provide a contracted passage for the lubricant, the steam from the supply pipe extending into the conducting pipe about said tube to maintain the lubricant in a fluid state.

5. The combination with an engine cylinder and valve chest, and a steam supply pipe communicating with said valve chest, of a reservoir supported above the cylinder, a pump cylinder arranged within said reservoir, said cylinder having steam chambers in its opposite ends, pipes connecting said steam chambers with the engine cylinder and adapted to alternately discharge steam from said cylinder into said chambers, pistons disposed in said steam chambers, a central head secured in said cylinder dividing the intermediate portion thereof into two fluid chambers, pistons disposed in each of said chambers, rigid connections between each of said pistons, each of said fluid chambers having an inlet opening through the wall thereof to receive the fluid contained within said reservoir, an air valve disposed through the bottom of the reservoir and through the cylinder wall at the inner end of each of the steam chambers, said valves being adapted to regulate the air supplied to said steam chambers and to exhaust the same therefrom whereby an air cushion is provided for the stroke of said pistons, a discharge pipe communicating with the fluid chambers adjacent to the central head, the outer ends of said pipes being connected to a laterally positioned conveying pipe, means for regulating the stroke of said pistons to determine the quantity of fluid discharged, said conducting pipe extending exteriorly of the reservoir and communicating with the steam supply pipe of the valve chest, said conveying pipe having a contracted passage therein extending into the steam pipe, the steam from said latter pipe circulating about said passage whereby the lubricant will be maintained in a fluid state.

6. The combination with an engine cylinder and steam chest, and a steam supply pipe communicating with said chest, of a reservoir supported above said cylinder, a pump cylinder arranged in said reservoir provided with fluid and steam receiving chambers, a steam supply pipe communicating with each of the last named chambers and with the engine cylinder, a discharge pipe communicating with each of the fluid chambers, reciprocatory pistons in said chambers adapted to discharge the lubricating fluid alternately through said discharge pipes, said discharge pipes being connected and extending to the steam supply pipe and means in said discharge pipe for discharging the oil into the path of the steam and permitting of the entrance of the steam into said steam pipe to maintain the lubricant in a fluid state.

7. The combination with an engine cylinder and valve chest, and a steam supply pipe communicating with said valve chest, of a reservoir supported above the cylinder, a pump cylinder arranged within said reservoir, said cylinder having a steam chamber in each end and intermediate fluid receiving chambers, each of said fluid chambers having an inlet opening through the wall thereof, a piston disposed in each of said chambers, a pipe connecting each of said steam chambers with the engine cylinder and adapted to alternately discharge steam from said cylinder into said chambers, a discharge pipe communicating with each of the fluid

chambers adapted to alternately receive fluid upon the reciprocation of said pistons, a conducting pipe connecting said discharge pipe extending exteriorly of the reservoir, the end of said conducting pipe being disposed in the steam supply pipe of the valve chest and adapted to discharge the lubricant into the path of the steam and means for heating said conducting pipe exteriorly of the reservoir to maintain the lubricant in a fluid state.

8. The combination of an engine cylinder and valve chest, and a steam supply pipe communicating with said valve chest, of a reservoir supported above the cylinder, a pump cylinder arranged within said reservoir, said cylinder having a plurality of heads therein to provide separate chambers, pistons in said chambers connected to each other for simultaneous reciprocatory movement, means adjustable through the end heads of said cylinder and the walls of the reservoir to regulate the stroke of said pistons, means for admitting the steam alternately into the end chambers of the pump cylinder from the engine cylinder, the intermediate chambers of said pump cylinder being adapted to receive lubricating fluid from the reservoir, a fluid conducting pipe communicating with each of said intermediate chambers adapted to alternately receive the fluid therefrom upon the reciprocation of said pistons, said pipe communicating with the steam supply pipe of the valve chest, and means within said conducting pipe to maintain the lubricant in a fluid state.

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

CARL ROBERTS BRIGGS.

Witnesses:
H. L. BEATTY,
A. M. SEIBEL.