March 31, 1959 J. J. KUPKA 2,879,864

LUBRICATION OF POWER HAMMERS

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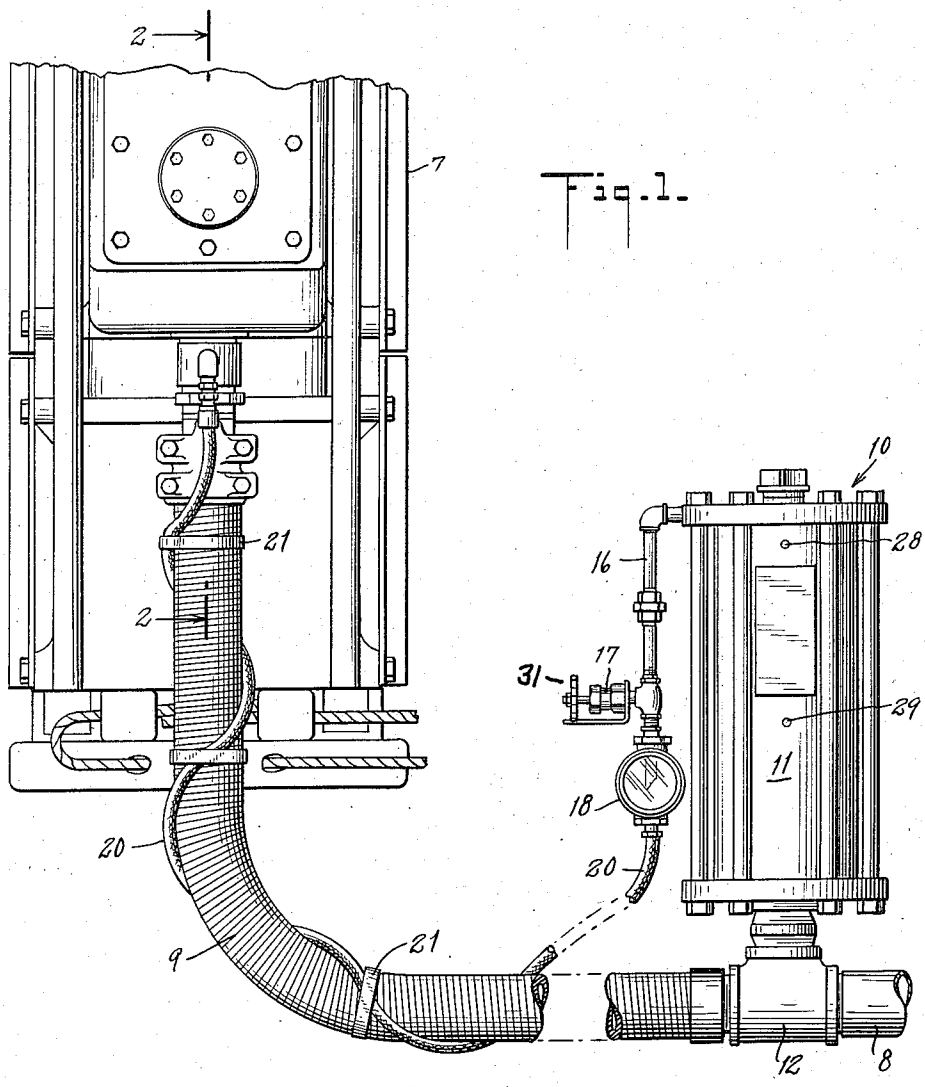


Fig. 1.

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Fig. 2.

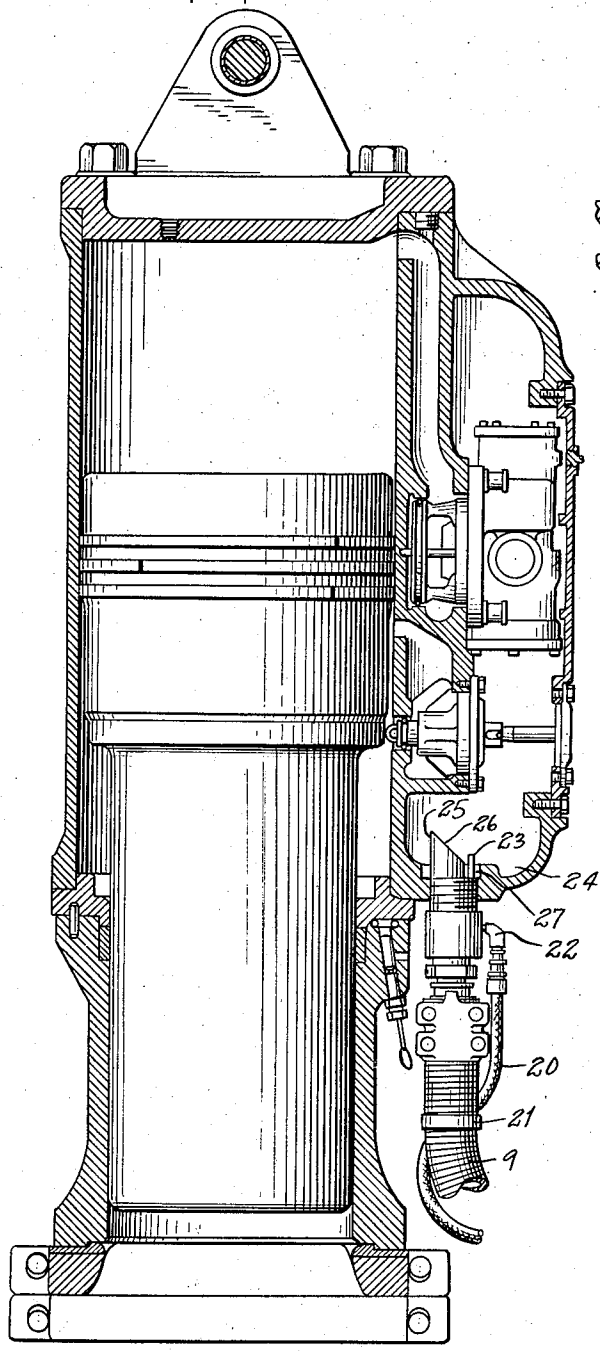
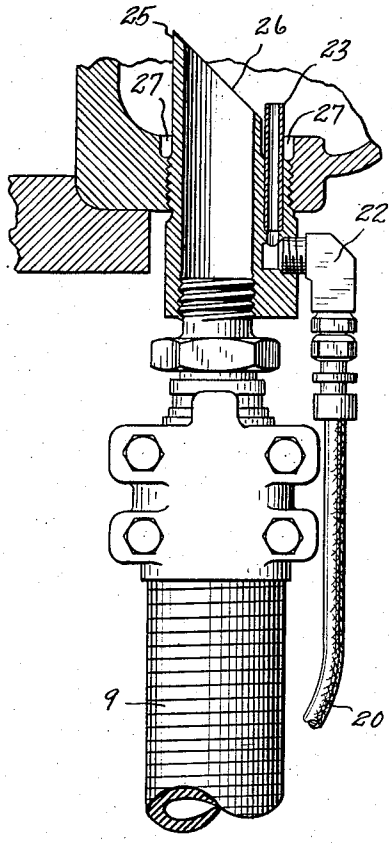


Fig. 3.



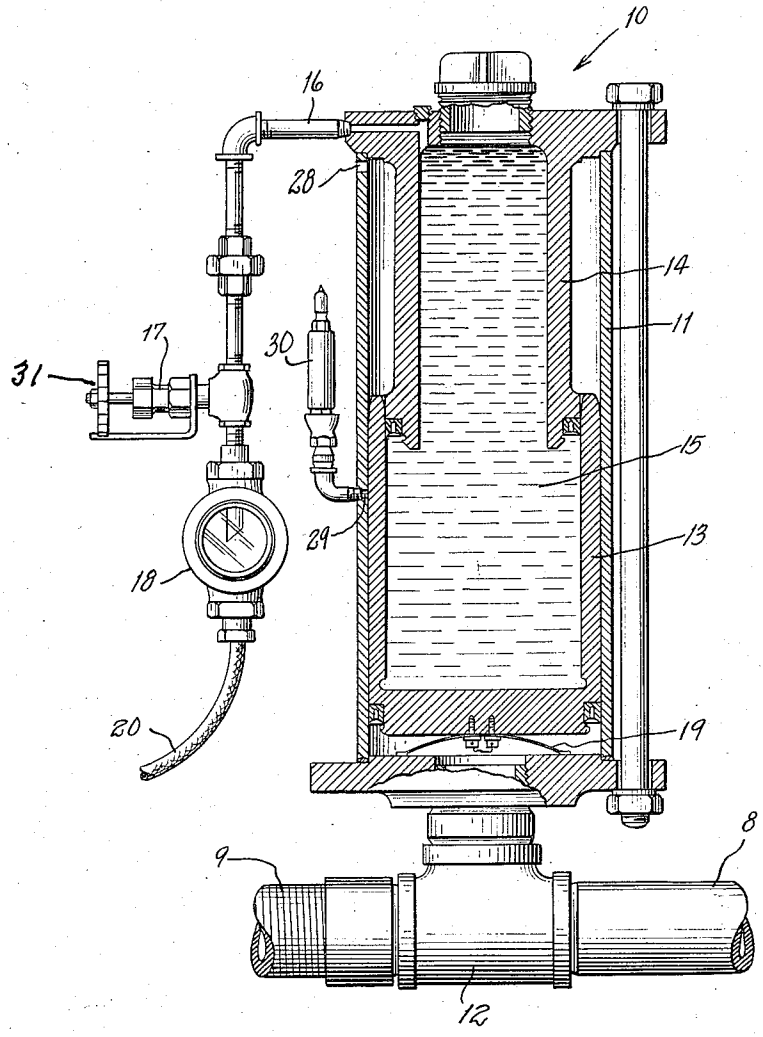
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Fig. 4.



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LUBRICATION OF POWER HAMMERS

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Application July 28, 1958, Serial No. 751,506

10 Claims. (Cl. 184—7)

The invention herein disclosed relates to the lubrication of steam and compressed air operated power hammers and machines of like character.

Because of their bulk and weight and the fact that they are subjected to all kinds of weather conditions these machines present special lubricating problems.

Given proper attention these machines require warming up and a coating of the extensive bearing areas of the heavy ram and cylinder with lubricant before attempting to start.

Accordingly it has become accepted practice to inject a certain amount of oil into the steam line leading to the machine under pressure reduced to coat the bearing surfaces with a film of oil without actually starting the machine and then to apply pressure sufficient to start after a preliminary warming up period, as disclosed in copending patent application Serial No. 644,829, filed March 8, 1957, now Patent #2,865,468, dated December 23, 1958.

In this manner the oil conveyed to the hammer is heated by the steam or compressed air and conditioned and made available to the hammer as soon as it is ready to start.

It has been found that under heavy, extended service a gradual deterioration takes place in the hose leading to the hammer, creating a polymerization product of oil and rubber decomposition, destroying lubrication and in some cases actually stopping the hammer.

Objects of the present invention are to overcome these difficulties and to provide constant, lasting lubrication of such power hammers and like machines.

Briefly the invention is based on the realization that a superior, high quality steam hose will last indefinitely if there is no oil in it and the use of this hose to carry a separate oil feed hose, thus to impart the desired warmth to the oil, and the maintaining of the delivery of oil to the hammer separate from and prevented from getting into the steam hose.

The novel features of construction through which the above and related objects are attained are set forth and will appear in the course of the following specification.

The drawings accompanying and forming part of this specification are illustrative of present practical commercial embodiments of the invention. Structure however may be modified and changed as regards the immediate illustration all within the true intent and scope of the invention as hereinafter defined and claimed.

In the drawings, Fig. 1 is a broken front elevation of a power hammer having this improved lubrication system applied thereto.

Fig. 2 is a vertical sectional view of the hammer equipped with the special oil atomizing nozzle and oil retention trap of this invention.

Fig. 3 is an enlarged and broken sectional detail of the nozzle and trap construction.

Fig. 4 is a broken sectional view of the differential pressure lubricator used for feeding the oil to the machine.

In Fig. 1 a power hammer of approved design is illustrated at 7 having a steam supply line extended thereto, including piping 8 terminating in a length of flexible armored hose 9 directly connected with the hammer. This steam hose is of approved composition designed to last practically indefinitely, with clean steam free of oil.

The lubricator indicated at 10 is like that disclosed in the copending patent application identified comprising an upright cylinder 11 mounted on and connected with the steam line by a T fitting 12 and containing an inverted skirted piston 13 cooperating with a dependent fixed piston wall 14 to form an oil containing pressure chamber 15, delivering oil from the top thereof through a feed line 16.

From Fig. 4 it will be observed that with steam admitted to supply line 8 the piston 13 will be raised to put pressure on the oil in chamber 15 and force the same out through line 16 under control of valve 17 and visible at gage glass 18.

A bowed spring 19 on the bottom of the movable piston serves as a shock damper to prevent hammer of the piston on the bottom of the cylinder and to bias the piston into upward movement off the bottom of the cylinder.

The oil feed line is shown continued from the gage glass as a hose 20, carried by the steam hose 9 and flexible like that hose to yield and bend as need be in the operation and handling of the hammer.

This oil feed hose is of special composition to carry the lubricating oil required for operation of the hammer, hot as well as cold, without deterioration. Hence the oil feed hose separate and kept apart from the steam will serve practically indefinitely for its purpose.

The oil hose may be carried by the steam hose in different ways. In the illustration it is shown wrapped or coiled about the steam hose and secured thereto by clamping bands or tapes 21. With such construction the oil hose is supported by the steam hose and heated to impart heat to the oil flowing through the same. The coiling of the oil hose about the steam hose is of advantage in providing maximum heat conduction to the oil.

At the hammer end the oil hose 20 is connected by an angle fitting 22 with an injector tube 23, Figs. 2 and 3, extending up into the steam chest 24 of the hammer alongside the steam inlet nozzle 25. The nozzle is beveled at 26 toward the oil inlet to atomize and blow entering oil away from the steam inlet in admixture with the steam.

The steam nozzle and oil injection tube 23 are shown as surrounded by an annular well or cavity 27 forming a collector for any excess oil and serving to keep any such oil away from the steam inlet.

By this construction any excess or drainage oil is kept away and prevented from draining back into the steam line. Thus the steam hose is protected and guarded against any contaminating or deteriorating influence of oil. At the same time the oil feed line is kept away from and clear of steam. Thus both steam and oil lines can be of the highest effective materials for their individual purposes.

Because of the necessary length, usually one hundred feet or more, the steam hose is an expensive part of the power hammer equipment. The need for heating the oil to overcome congealing tendencies and the requirement for pressure to lift the oil through one hundred feet or more practically require that a differential pressure lubricator be employed, operated by the steam supplied to the hammer. This combination also insures that a coating of warmed lubricating oil will be applied to the surfaces to be lubricated before the hammer is started, that this supply of oil will be continued while the machine is in operation and that the flow of oil will be cut off when

the hammer is shut down, without any attention on the part of the operator.

The differential pressure lubricator is connected in on the steam line at the end of the stationary piping and at the commencement of the flexible hose connection, thus locating the lubricator at the closest available point of connection with the hammer and where it will pick up heat for initial starting conditions.

This novel combination of differential pressure lubricator connected at the end of the fixed portion of the steam supply line, with separate steam and lubricating oil connections extending therefrom to the power hammer meets objections heretofore encountered and provides practical, efficient and automatic means for lubricating power hammers presently in use.

It is contemplated that the oil feed line may be located inside instead of outside the steam hose, with suitable connections at the lubricator and hammer ends of the same and that other changes may be made all within the scope of the invention. The differential lubricator structure also may be varied to suit different requirements.

In the illustration the lubricator is shown in Fig. 1 as having an opening **28** at the top of the cylindrical shell of the same for oil to lubricate the skirted piston and as having an opening **29** below that for escape of actuating steam or air to indicate that the piston is at the top of its stroke, calling for replenishment of oil.

Fig. 4 shows how a whistle **30** may be connected with the escape port **29** to give a low oil level signal indication.

In Figs. 1 and 4 the control valve **17** has been illustrated as a metering valve by which the flow of oil can be regulated, with hand wheel **31** indicating the exact amount of oil being fed. This is important where there is a long line of hose leading upward and where the gauge glass will be filled with oil and therefore unable to indicate by drip the amount of oil being passed to the hammer. In such case it is only necessary to adjust the needle valve to the position indicating the desired amount of oil feed.

The power hose **9**, whether the hammer is operated by steam or compressed air, is usually known as a steam hose so the expression has been used in that sense in this specification.

While the steam and oil are shown entering at the bottom of the surge chamber **24** it is contemplated that either or both may be entered above this point, as in the side or top of the surge chamber and that other changes may be made, coming within the scope and intent of the invention.

What is claimed is:

1. Automatic preheating lubricating system for a power hammer having a power supply line terminating in a flexible steam hose connected to the hammer and comprising an automatic differential pressure lubricator connected in pressure and heat receptive relation with said supply line to be thereby actuated and heated from said supply line, said steam hose being resistant to heat and steam but less resistant to oil, and a flexible oil feed hose extending from said lubricator and connected to said hammer, separate from said steam hose and of material resistant to oil and heat but less resistant to steam, said oil feed hose being carried by and in heat receptive relation to said steam hose, all whereby oil preheated for lubrication will be automatically supplied to the hammer when steam is turned on, without contaminating the steam hose with oil or subjecting the oil feed hose to steam.

2. The invention according to claim 1 with means at said hammer for preventing entry of oil into said steam hose.

3. The invention according to claim 1 with means at said hammer for preventing entry of oil into said steam hose, including an oil injector tube and a steam inlet nozzle arranged to blow oil entering by said injector tube away from said steam nozzle.

4. The invention according to claim 1 with means at said hammer for preventing entry of oil into said steam hose, including an oil injector tube and a steam inlet nozzle arranged to blow oil entering by said injector tube away from said steam nozzle and a well about said injector tube and steam nozzle for holding and trapping excess oil.

5. The invention according to claim 1 with means at said hammer for preventing entry of oil into said steam hose, including an inlet nozzle at the end of the steam hose and an oil collecting trap about said nozzle.

6. The invention according to claim 1 with means at said hammer for preventing enery of oil into said steam hose, including an oil injector tube at the end of said oil feed hose and an inlet nozzle at the end of said steam hose inclined toward said oil injector tube.

7. The invention according to claim 1 with means at said hammer for preventing entry of oil into said steam hose, including an oil injector tube at the end of said oil feed hose and an inlet nozzle at the end of said steam hose inclined toward said oil injector tube and an oil trap well about said injector tube and nozzle.

8. Lubricating system for a power hammer having a flexible steam hose, said hose being resistant to heat and steam but less resistant to oil, and a flexible oil feed hose separate from said steam hose and of a material resistant to oil but less resistant to steam, said oil feed hose being coextensive with and carried by said steam hose in heat receptive relation therewith, said steam hose and oil feed hose terminating in steam and oil delivery nozzles extending into said hammer in adjacent but separated relation spaced to prevent entry of oil from the oil feed hose into the steam hose.

9. Lubricating system for a power hammer having a flexible steam hose, said hose being resistant to heat and steam but less resistant to oil, and a flexible oil feed hose separate from said steam hose and of a material resistant to oil but less resistant to steam, said oil feed hose being coextensive with and carried by said steam hose in heat receptive relation therewith, said steam hose and oil feed hose terminating in steam and oil delivery nozzles extending into said hammer in adjacent but separated relation spaced to prevent entry of oil from the oil feed hose into the steam hose and an oil collecting trap about said nozzles.

10. Lubricating system for a power hammer supplied by a flexible steam hose and comprising the combination of a flexible steam hose, a pressure feed lubricator, a flexible oil feed hose extending from said lubricator coextensive with and separate from but carried by said flexible steam hose and in heat receptive relation with said steam hose to thereby heat the oil in passage to the hammer, and said steam hose and oil feed hose terminating in steam and oil delivery nozzles extending into said hammer in adjacent but separated relation spaced to avoid oil from the oil delivery nozzle entering the steam delivery nozzle.

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