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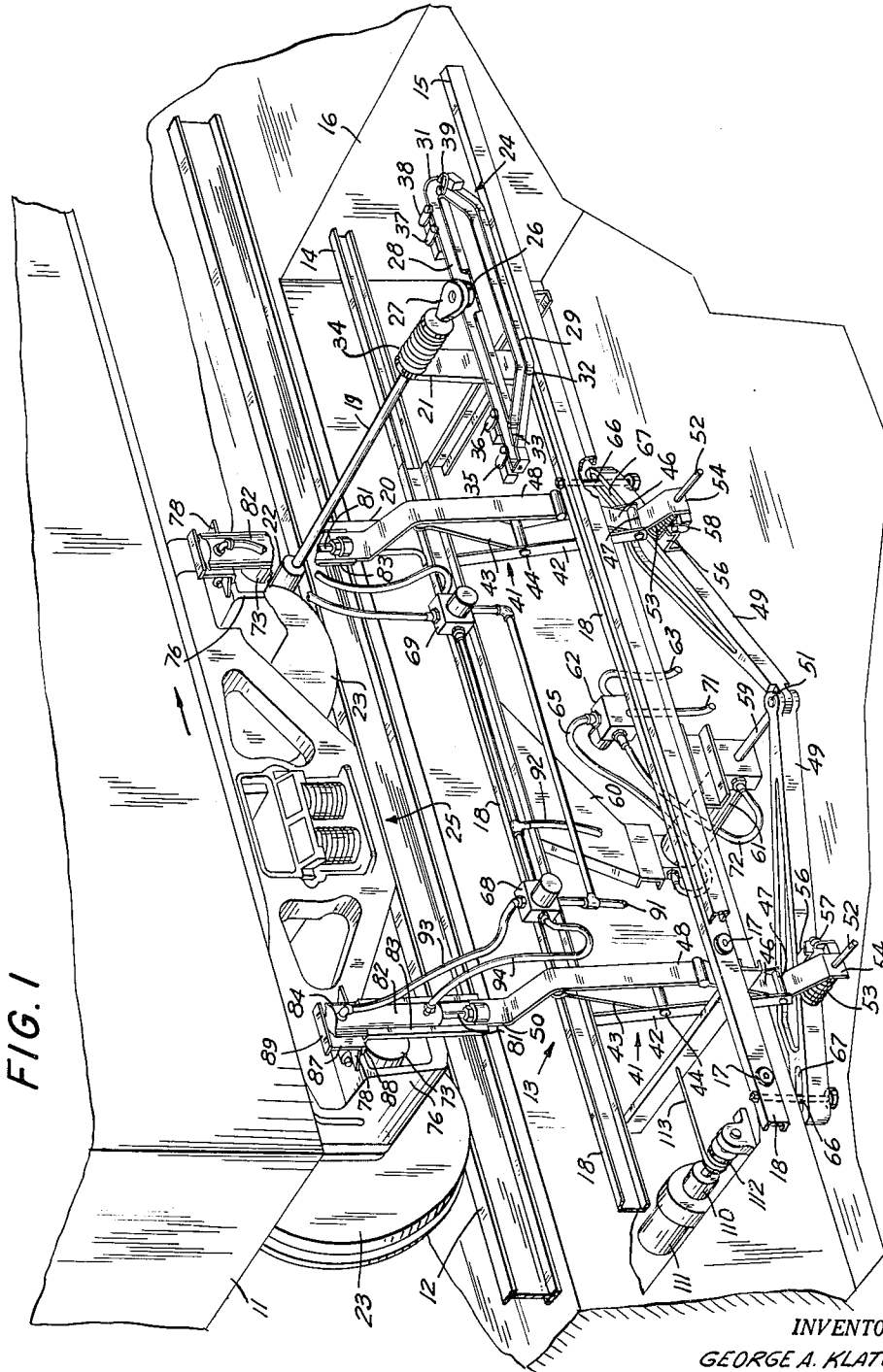
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LUBRICATING APPARATUS

Filed Feb. 24, 1961

2 Sheets-Sheet 1



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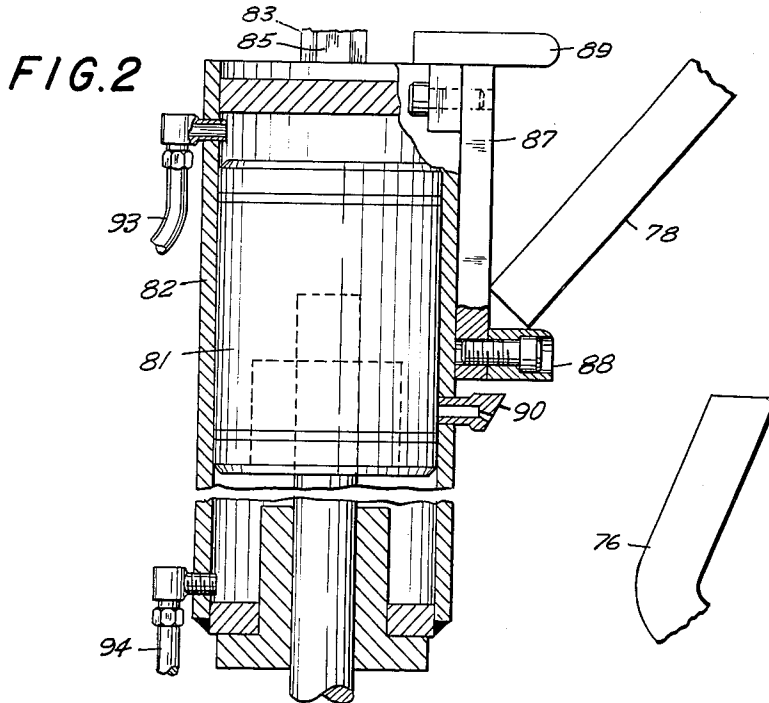
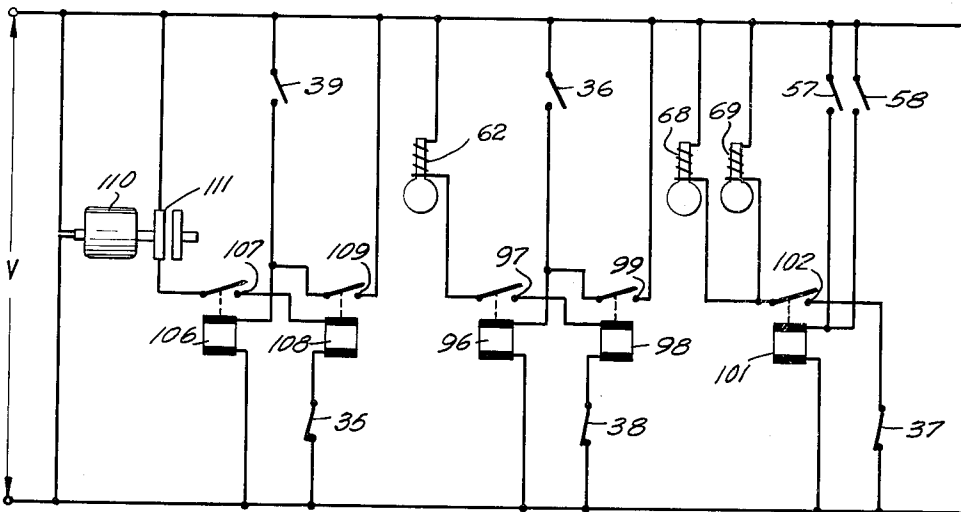


FIG. 3



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LUBRICATING APPARATUS

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This invention relates to a lubricating apparatus and more particularly to an apparatus for lubricating the journals of moving railroad cars.

It is well known that the journals of railroad cars must be inspected and lubricated periodically in order to avoid serious damage. Improperly lubricated journals result in what are generally known as hot boxes. It is important to keep the journals well lubricated not only to prolong service life but to avoid possible accidents caused by defective journals resulting from improper lubrication.

Journals are housed in a closed journal box and to lubricate and inspect them it is necessary to first lift the lid of the journal box. Various schemes have been devised for lubricating journals without raising the journal box lid. They are not satisfactory because it is still necessary to periodically open the journal box lid to inspect the journal and service the lubricating apparatus. The remaining alternative requires an operator known as an oiler to manually lift the journal box lid to inspect and lubricate the journal.

As the lids are closed tightly and sometimes freeze shut they are difficult to open. Also, it is difficult for an oiler to open the journal box lid and lubricate the journal while the railroad car is moving. So the journals can only be lubricated while the cars are at a standstill. With millions of railroad cars in operation today manual oiling and inspection of journals is a costly time consuming operation.

It is impossible to inspect and lubricate every journal of every car periodically. This poor maintenance results in many costly accidents every year.

There are other important reasons for opening journal boxes and lubricating the journals. Ultrasonic inspection techniques are used to nondestructively test railroad car journals for defects, cavities and cracks which cannot be detected visually. By detecting and replacing defective journals costly accidents are avoided. In my co-pending application Serial Number 34,074, filed June 6, 1960, now Patent 3,022,660, dated February 27, 1962 and entitled Nondestructive Testing Apparatus, I disclose apparatus for testing the journals of moving railroad cars.

To inspect the journals of moving railroad cars rapidly and reliably it is necessary to provide means for automatically opening the journal box lid and lubricating the journal prior to the ultrasonic inspection operation.

It is an object of this invention to provide a lubricating apparatus for automatically opening and lubricating the journals.

Another object of this invention is to provide automatic lid lifting apparatus for automatically positioning a journal box lid lifter with respect to a journal box of a moving railroad car.

It is still another object of this invention to provide automatic journal box lid lifting apparatus for lifting the lid and lubricating the journal simultaneously.

Yet another object of this invention is to provide an apparatus for lifting the lid of a journal box on a moving railroad car and lubricating the journal in a single continuous stroke.

Yet another object of this invention is to provide a control system for an automatic lid lifting and journal lubricating apparatus.

Apparatus for performing these and many other objects in accordance with my invention may include a traveling

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carriage adapted to engage and travel with a moving railroad car.

Lid lifting and journal lubricating means are mounted on the carriage. Control means actuated by the traveling carriage operate the lid lifting and journal lubricating means to raise the lid and lubricate the journal. Additional control means actuated by the carriage disengage the carriage from the moving car when the journal lubrication is completed. Means are provided for returning the carriage to its starting position for a next operation.

Other objects of my invention will become apparent from the following description when taken in view of the accompanying drawings in which

FIGURE 1 is a perspective view of my lubricating apparatus performing a lid lifting and lubricating operation;

FIGURE 2 is a cross sectional view of a lid lifting and journal lubricating cylinder according to the principles of my invention and

FIGURE 3 is an electrical schematic drawing of the control system of my invention.

Referring now to FIGURE 1 a railroad car 11 is shown moving on a track 12 past a lid lifting and journal lubricating station designated generally by the numeral 13. The lid lifting and lubricating station 13 comprises a pair of spaced parallel channel rails 14 and 15 extending over a pit 16 adjacent the railway. Rollers 17 rotatably attached to the side of a traveling carriage 18 ride in the channel of the channel rails 14 and 15.

A pickup arm 19 slidably extends through support members 20 and 21 secured to the traveling carriage 18. A roller 22 formed of rubber or the like is rotatably secured to one end of the pickup arm 19 and extends into the path of wheels 23 of a bogey or truck 25 of the railroad car 11. A truck in railroad terminology is a set of axles and their wheels on either end of the car. Arm 19, roller 22 and carriage 18 constitute means for aligning the journal box lid lifting and lubricating means with the car journals.

A circuitous cam raceway 24 is secured to the channel rail 15 and receives a cam follower 26 formed on an extension 27 of the pickup arm 19.

The circuitous cam raceway 24 comprises two straight parallel channel sections 28 and 29 connected by and opening into curved channel sections 31 and 32. A spring tensioned self-closing gate 33 is installed between the curved section 32 and the straight section 28 of the circuitous cam raceway 24. A spring 34 secured to the pickup arm 19 operates against support member 21 urging the pickup arm 19 outwardly away from the path of the wheels 23 of the railroad car 11.

However, the cam follower 26 riding in the straight channel portion 28 of the circuitous cam raceway 24 holds the pickup arm 19 and the roller 22 in the path of the wheels until the cam follower 26 reaches the curved section 31 of the cam raceway 26.

Then the spring 34 forces the cam follower 26 and thus the pickup arm 19 around the curved section 31 of the cam raceway into the straight channel section 29 of the cam raceway 24.

A continuously running motor 110 acting through a normally disengaged magnetic clutch 111 drives a capstan 112 when engaged to take up a cable 113 secured to the carriage 18. This withdraws the carriage 18 to the starting position.

As the carriage 18 is returned the cam follower 26 rides along the straight section 29 and the curved section 32 through the self-closing gate 33 into the straight section 28 completing a circuitous route. The gate 33 closes behind the cam follower 26 holding it in the straight section 28. A plurality of switches 35, 36, 37, 38 and 39 extend into the circuitous cam raceway 24 and

are actuated by the cam follower 26 as it travels in the cam raceway 24.

Two pantograph assemblies 41 are suspended from the traveling carriage 18. The pantograph assemblies 41 are identical and spaced on the traveling carriage 18 a distance corresponding to the distance between centers of the railroad car journals.

Each pantograph assembly 41 comprises a first pantograph arm 42 rigidly supported to and suspended from the carriage 18. A second pantograph arm 43 is pivotably mounted on a bolt 44 extending through the arm 42.

A third pantograph arm 46 having an angle therein is pivotably mounted on a bolt 47 extending through the arm 42 at the vertex of the angle arm 46. A fourth arm 48 having an angular offset end portion 50 is pivotably connected to the second and third arms 43 and 46, respectively, in a similar fashion.

In operation the straight portion of the arm 48 follows a prescribed path determined by the length and configuration of the arms 43 and 46.

Two actuator arms 49 are slidably and pivotably mounted on headed holding pins 66 bolted to the carriage 18 and which extend through slide-ways 67 formed in the arms 49. The actuator arms 49 are suspended from the traveling carriage 18 on the headed holding pins 66 and pivotably interconnected at their ends with a connector pin 51.

Bolts 52 are connected to and extend through the actuator arms 49, a spring 53 and a downturned lip 54 formed on the free end of the pantograph arms 46. Switch operator arms 56 mounted on the actuator arms 49 actuate switches 57 and 58, respectively.

A control rod 59 connected to a piston not shown in a double acting hydraulic cylinder 61 is secured to the connector pin 51. The double acting cylinder 61 is suspended from the traveling carriage 18 on a rigid support member 60 secured to the carriage.

A two-way solenoid control valve 62 connected to a source of hydraulic pressure not shown through an inlet 63 admits hydraulic fluid under pressure into the hydraulic cylinder 61 through a tube 65. This drives the connector rod 59 against the connector pin pivoting the actuator arms 49 outwardly against the springs 53. The actuator arms 49 pivot around and slide with respect to the holding pins 66 connected to the carriage 18.

Outward movement of the arms 49 against the springs 53 turns the pantograph arms 46 around the bolts 47, raising pantograph arms 48.

The hydraulic pressure in the cylinder 61 increases forcing the connector rod 59 and the actuator arms 49 outwardly overcoming the resistance of the springs 53. With this the switch operator arms 56 close the normally open switches 57 and 58, respectively. The switches 57 and 58 control solenoid control valves 68 and 69, respectively.

When the hydraulic pressure in the two way hydraulic cylinder 61 is reversed hydraulic fluid under pressure passes through a conduit 71 through the two way solenoid control valve 62 and conduit 72 to withdraw the piston and connector rod 59. The fluid in the cylinder 61 exhausts through the inlet 63. This action withdraws the actuator arms 49, lowers the pantograph arms 48, and opens switches 57 and 58.

The pantograph assemblies 41 are spaced on center with adjacent journals 73 of a truck of railroad wheels 23. The journals 73 are housed in journal boxes 76, each having a lid 78 normally in a closed position.

Identical fixed piston and connector rod assemblies are secured to each of the offset end portions 50 of the arms 48. Only one assembly 81 need be described. A piston 81 is received in double acting cylinder 82 slidably mounted in a guide 83 secured to an offset end portion 50. Ears 84 formed on the cylinder 82 are received in grooves 85 in the guide 83.

As shown in FIGURE 2 a frame 87 having an outwardly projecting lid lifting finger 88 and lid closing finger 89 is bolted to the cylinder 82. A nozzle 90 extends through the cylinder 82 directly beneath the lid lifting finger 88.

Referring to FIGURE 1, the solenoid control valves 68 and 69 are connected in parallel by a conduit 91 to a source of lubricant such as oil under pressure. A common exhaust 92 is provided for the control valves 68 and 69.

In operation oil under pressure is forced into the cylinders 82 through conduits 93. The oil operates against the pistons 81 to raise the cylinders 82 causing the lid lifting fingers 88 to engage and lift the journal box lids 78. To lower the cylinders 82 oil under pressure is forced into the cylinders 82 through conduits 94 by reversing the control valves 68 and 69. The oil under pressure operates against the stationary pistons 81 to lower the cylinders 82 causing the lid closing fingers 89 to engage and close the lids 78.

As the cylinders 82 rise with respect to the stationary pistons 81 the nozzles 90 are raised above the fixed pistons 81. The oil in the cylinders 81 squirts through the nozzles 90 onto the now exposed journals 73.

Referring now to FIGURE 3 the electrical control system for the lid lifting and lubricating apparatus is shown. An understanding of FIG. 3 can best be had by describing the operation of the apparatus. The operation is as follows:

The cam follower 26 is normally positioned in the straight portion 28 of the cam raceway 24 adjacent the self-closing gate 33, having just opened the switch 35. In this position the spring 34 permits the pickup arm 19 to be in a forward position so that the roller 22 is supported directly over the rail 12 in the path of the wheel of the oncoming railroad car 11.

When the leading wheel 23 engages the roller 22 it exerts a horizontal force on the pickup arm 19. The pickup arm 19 transmits this horizontal force to the traveling carriage 18 moving it on the rails 14 and 15. The cam follower 26 attached to the traveling carriage 18 advances along the straight portion 28 of the stationary cam raceway 24 to momentarily close the switch 36.

Closure of the switch 36 energizes a relay 96 to close normally open contact 97. This completes a circuit through normally closed switch 38 and a relay 98 to actuate the two-way solenoid control valve 62 arranged to operate in series with the relay 98. The relay 98 closes normally open contact 99 to complete a holding circuit for the relay 96. This keeps the solenoid control valve energized when the switch 36 opens.

Actuation of the solenoid control valve 62 passes fluid under pressure through the conduit 65 into the double acting hydraulic cylinder 61 forcing the connecting rod 59 outwardly against the actuator arms 49.

The actuator arms 49 operate against the pantograph arms 46 and against the compression springs 53 to raise the pantograph arm 48. This swings the cylinders 82 into position beneath the journal boxes 76 of the railroad car 11. Each lid lifting finger 88 engages the lower lip of the closed lid 78 on each journal box 76. The cylinders 82 are now in a position to rise upwardly causing the lifting fingers to raise the journal box lids 78.

Continued outward movement of the actuator arms 49 against the springs 53 causes the switch operator arms 56 to close normally open switches 57 and 58. Closure of either of the switches 57 and 58 energizes a relay 101 to close normally open contact 102. Closure of contact 102 completes a circuit through the normally closed switch 37 to energize parallel solenoid control valves 68 and 69. The switches 57 and 58 remain closed during the lid lifting operation.

The solenoid control valves 68 and 69 now admit oil under pressure into the cylinders 82. The pressure in the cylinders 82 operates against the stationary pistons 81

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causing the cylinders 82 to rise lifting the lid lifting fingers 88 which engage and lift the journal box lids 78.

Continued movement of the cylinders 82 and the lifting fingers 88 completely raises the journal box lids 78. When the nozzles 90 clear the pistons 81 oil squirts through the nozzles 90 onto the now exposed journals 73 and 74. Valves 68 and 69 are arranged so that one lid 78 will be lifted even if the other is frozen or stuck tight.

During this operation the cam follower 26 advances along the straight portion 28 of the cam raceway 24 and opens the normally closed switch 37. Opening of switch 37 deenergizes and reverses the solenoid control valves 68 and 69. The switch 37 is of the self-closing type and is arranged to close after the cam follower 26 opens the switch 38. This reverses the cylinder 61 to withdraw the actuator arms 49, opening the switches 57 and 58.

Reversal of the solenoid control valves 68 and 69 cuts off the oil pressure in the conduits 93 and admits oil under pressure into the cylinders through the conduits 94. This reverses the cylinders 82 causing the lid closing fingers 89 to engage and lower and close the journal box lids 78.

As the cam follower 26 advances along the straight portion 28 of the cam raceway 24 it momentarily opens the normally closed switch 38 to deenergize the relay 98. This opens the contact 99 to break the holding circuit for the relay 96. The relay 96 when deenergized opens the contact 97 to deenergize the two way solenoid control valve 62 reversing the hydraulic pressure in the cylinder 61.

Fluid under pressure now enters the cylinder 61 through the conduit 72 retracting the connecting rod 59. This withdraws the actuator arms 49 opening the switches 57 and 58. The switch 37 now closes. The pantograph arms 48 are withdrawn to the starting position.

Shortly thereafter the spring 34 forces the cam follower 26 around the curved section 31 and into the straight section 29 of the cam raceway 24. This withdraws the pick-up arm 19 disengaging the roller 22 from the leading wheel 23.

As the cam follower 26 travels around the curved section 31 it closes the normally open switch 39 to energize a relay 106 closing normally open contact 107.

This completes a circuit through a normally closed switch 35 and a relay 108 arranged to operate while in series with the magnetic clutch 111 to engage the magnetic clutch 111 of the continuously running motor 110 positioned in the pit 16 as shown in FIGURE 1. Engagement of the magnetic clutch 111 connects the driveshaft of the motor 111 to the capstan 112. The capstan 112 takes up the cable 113 connected to the traveling carriage 18 to withdraw the traveling carriage 18 on the rails 14 and 15.

As the traveling carriage 18 is withdrawn the cam follower 26 moves around the cam raceway 24 until it opens the self-closing gate 33 to momentarily open the normally closed switch 35. This deenergizes the relay 108 opening contact 109 to break the holding circuit for the relay 106. Contact 107 is opened, keeping the magnetic clutch 110 deenergized and uncoupling the capstan 112 from the drive shaft of the motor 111. The lid lifting and lubricating apparatus is now in a position for a next operation.

Although I have described my invention in detail, it will be appreciated that many changes and modifications may be made by those skilled in the art without departing from the spirit of my invention which is to be limited only by the scope of the appended claims.

I claim:

1. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said railroad car having journals housed in journal boxes, said journal boxes having lids; journal box lid lifting

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means mounted on said carriage; and means actuated by said actuating member on said traveling carriage for operating said journal box lid lifting means whereby said journal box lid is lifted.

2. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said railroad car having journals housed in journal boxes, said journal boxes having lids; journal box lid lifting and journal lubricating means mounted on said carriage; and means actuated by said actuating member on said traveling carriage for operating said journal box lid lifting and journal lubricating means whereby said journal box lid is lifted and said journal is lubricated.

3. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said railroad car having journals housed in journal boxes, said journal boxes having lids; journal box lid lifting means mounted on said carriage; journal lubricating means connected to and operated by said journal box lid lifting means; and means actuated by said actuating member on said traveling carriage for operating said journal box lid lifting means whereby said journal box lid is lifted and said journal lubricating means is operated lubricating said journal.

4. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said car having journals housed in journal boxes, said journal boxes having lids; journal box lid lifting and lowering means mounted on said carriage; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and lowering means, whereby said lid is lifted; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and lowering means whereby said lid is lowered; and means for disengaging said actuating member and consequently said carriage from said moving car in a limiting position of said actuating member.

5. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said car having journals housed in journal boxes having lids; journal box lid lifting and lubricating means mounted on said carriage; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and journal lubricating means whereby said lid is lifted and said journal lubricated; and means for disengaging said actuating member and consequently said carriage from said moving car in a limiting position of said actuating member.

6. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car, said carriage traveling with said moving car upon engagement of said actuating member, said car having journals housed in journal boxes having lids; journal box lid lifting and lowering and journal lubricating means mounted on said carriage; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and lowering and journal lubricating means whereby said lid is lifted and said journal lubricated; means actuated by said actuating member on said carriage for operating said lid lifting and lowering and journal lubricating means whereby said lid is lowered; and means for disengaging said actuating member and consequently said carriage from said moving car in a limiting position of said actuating member.

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7. Apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car in a first position and for traveling with said car from said first position upon actuation of said actuating member, said car having journals housed in journal boxes having lids; journal box lid lifting means mounted on said carriage; means actuated by said actuating member on said traveling carriage for operating said journal lid lifting means whereby said journal box lid is lifted; means for disengaging said actuating member and consequently said carriage from said moving car in a second position; and means for actuating said actuating member for returning the latter and said carriage to said first position.

8. Apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car in a first position, said carriage traveling with said moving car upon engagement of said actuating member, said car having journals housed in journal boxes having lids; journal box lid lifting and journal lubricating means mounted on said carriage; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and journal lubricating means whereby said lid is lifted and said journal lubricated; means for disengaging said actuating member and consequently said carriage from said moving car in a second position; and means for actuating said actuating member for returning the latter and said carriage to said first position.

9. Lubricating apparatus comprising a carriage having an actuating member thereon for operatively engaging a moving railroad car in a first position, said carriage traveling with said moving car upon engagement of said actuating member, said railroad car having journals housed in journal boxes, said journal boxes having lids; journal box lid lifting and lowering means mounted on said carriage; lubricating means controlled by said lid lifting means for lubricating said journal; means actuated by said actuating member on said carriage traveling with said car for operating said lid lifting and lowering means whereby said lid is lifted and said lid lifting means operates said lubricating means lubricating said journal; means actuated by

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said actuating member on said carriage for operating said lid lifting and lowering means whereby said lid is lowered; means for disengaging said actuating member and consequently said carriage from said moving car in a second position; and means for actuating said actuating member for returning the latter and said carriage to said first position.

10. Apparatus for lubricating the journals of moving railroad cars, said journals being housed in journal boxes having lids which comprises journal lid lifting and lubricating means; means for aligning said journal box lid lifting and lubricating means with at least one of said journals; and means actuated by said aligning means for operating said journal box lid lifting and journal lubricating means whereby the lid of said journal box is lifted and the journal therein lubricated.

11. Apparatus for lubricating the journals of moving railroad cars, said journals housed in journal boxes having lids, said apparatus comprising rails spaced from and parallel to the path of said moving railroad cars; a carriage for traveling on said rails; an actuating member mounted on said carriage for operatively engaging said carriage with said moving railroad car in a first position whereby said carriage travels with said car along said rails; lid lifting and journal lubricating means mounted on said carriage; means mounted on said rails and actuated by said actuating member on said carriage traveling along said rails for operating said lid lifting and journal lubricating means whereby said lid is lifted and said journal lubricated; and means for disengaging said carriage from said moving car in a second position.

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