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[54] **MECHANICAL LUBRICATING DEVICE AND METHOD**

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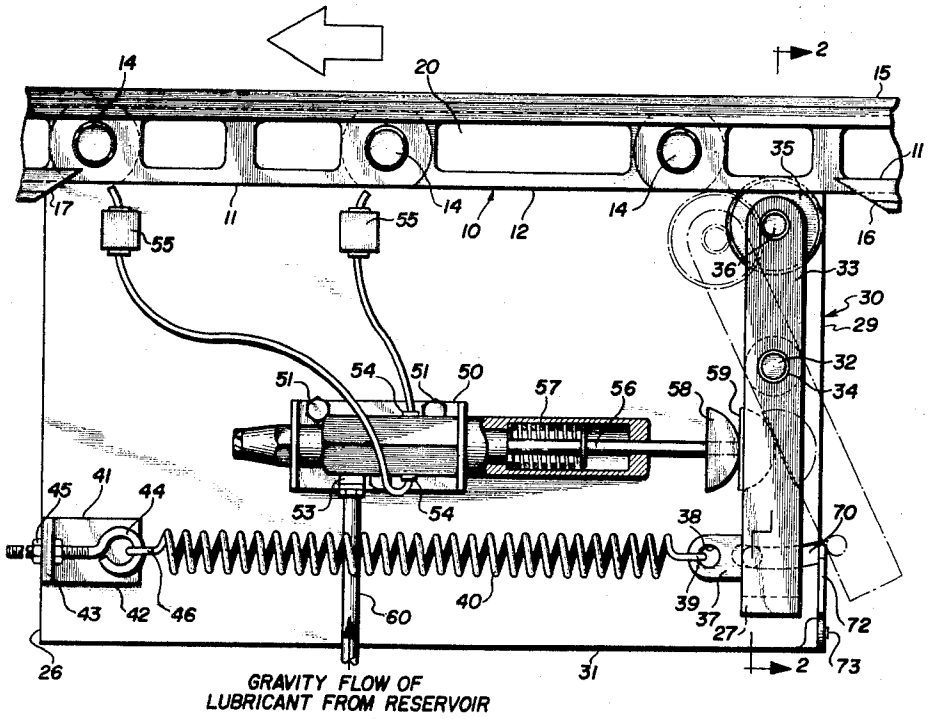
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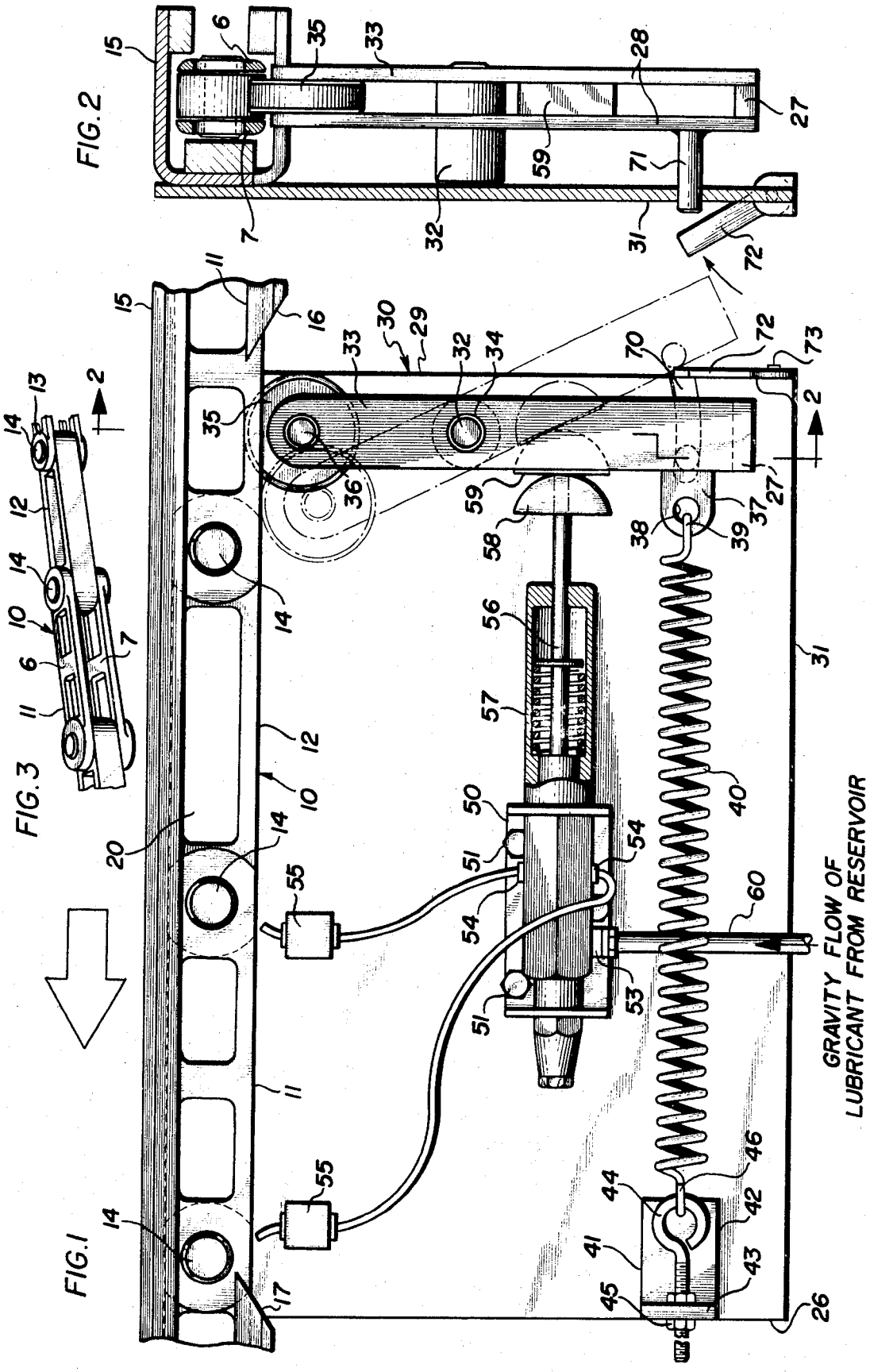
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[57] **ABSTRACT**

A mechanically actuated lubricating device for conveyor systems and the like wherein energy from the system is transmitted to an energy storing means which releases the stored energy in an impulse manner to actuate a pump which dispenses clean shots of lubricating fluid to the system.

8 Claims, 3 Drawing Figures




FIG. 2
FIG. 3
FIG. 1
GRAVITY FLOW OF LUBRICANT FROM RESERVOIR

MECHANICAL LUBRICATING DEVICE AND METHOD

This invention relates to a new and improved means for lubricating conveyor equipment and the like and more particularly relates to a lubricating device which can mechanically lubricate a conveyor chain or other system while the chain or system is in operation.

In the lubrication of conveyor systems, it is important that the lubricating device be able to provide a clean shot of lubricating fluid on a particular part of the conveyor chain and trolleys as the chain travels past the lubricating station in the course of the conveyor operation. If the lubricant is not deposited properly on the conveyor, disadvantages arise in that an excess of lubricating fluid will cause problems of drippage and will necessitate accessory devices to catch the excess lubricating fluid. Additionally, if the lubricating fluid is dispensed as a mist or spray, too much of the conveyor system will be coated with the lubricating fluid which, in some applications, is entirely unacceptable. Accordingly, it is important that a lubricating system provide what is known as a clean shot which is a repeatable solid amount of fluid of predetermined volume which is ejected with a particular velocity. The velocity is capable of propelling the amount of fluid in any specific direction for a selected distance with a relatively flat trajectory such that the amount of fluid can be directed at a point in space-time and repeatedly contact this point independent of external factors such as chain speeds, fluid viscosity, ambient temperature and the like.

While it is known in the art to provide lubricating systems in which various portions of the device are either electrically or pneumatically actuated, there are some applications where the expense of providing and maintaining the necessary source of electrical or pneumatic power supply to actuate the lubricating device is too costly. Accordingly, it is desired to have the conveyor system serve as the source of power from which the lubricating device can be actuated. In other instances, it is desired to have a unit which can be readily installed and at the same time is adapted for portable movement to various locations in the conveyor system without concern for location of pneumatic and electrical lines. At the same time a unit, which must depend upon the operation of the conveyor system for its actuation, must be able to provide a clean shot of lubricating fluid to the parts on the conveyor system to be lubricated as opposed to either being erratic in its operation or dispensing mist, fog or spray.

SUMMARY OF THE INVENTION

With the view of overcoming the various problems associated with the prior art of lubricating devices, the invention disclosed and claimed herein relates to a lubricating system which delivers clean shots of lubricating fluid to the parts to be lubricated. At the same time, the present invention does not require an electrical or pneumatic source of power supply but rather the unit is self-contained with the source of power necessary to actuate the lubricating system of the present invention being supplied by the movement of a conveyor system past the lubricating station.

Briefly, the invention relates to a device comprising a base plate upon which is located an arm adapted to be pivoted about a pivot post. One end of the arm is adapted to contact and be actuated by the conveyor chain, trolley wheel or some other repetively protruding object as the object passes the lubricating station in the course of the operation of the conveyor system. The remaining end of the arm is connected to an extension spring. The arm is also in contact with a manually operated piston metering pump which is supplied lubricant by means of gravity flow from a reservoir of lubricating fluid located above the lubricating device of the present system.

In operation, as a conveyor chain passes the lubricating device, the arm is cammed to pivot about the pivot post. Pivoting of the arm causes the remaining end of the arm to swing outward causing the extension spring to be pulled in tension thereby serving to store potential energy in the spring means. As the conveyor chain continues to move past the lubricating device, the arm is permitted to swing back to its normal position at which time the spring will seek to release its energy as it seeks to return to its normal extended position. As the spring means returns to its normal position, the energy which is released in impulse fashion causes the arm to act against a piston rod in a piston metering pump. The pump will permit lubricating fluid to be released in a proper metered amount through nozzles which are oriented to direct the discharged fluid to those portions of the conveyor chain or system to be lubricated.

The lubricating system of the present invention provides the desired shot of lubricating fluid without any dripping due to over-lubricating. Because of the rapid dissipation of stored energy in the spring, the arm is caused to impart an impulse action against the piston rod of the metering pump whereby the fluid is discharged as a clean shot as opposed to being a drip, spray, fog or mist.

DETAILED DESCRIPTION OF THE DRAWINGS

The invention will be better understood from the following detailed description thereof, taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a plan view of the lubricating device of the present invention in which the actuating arm is shown in actuated and nonactuated positions;

FIG. **2** shows a section view along lines **2—2** of FIG. **1**; and

FIG. **3** shows a partial perspective view of the conveyor chain of FIGS. **1** and **2.**

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings, there is shown a conveyor chain **10** composed of links **11** and **12** connected together at **13** by means of pivot pin **14.** The chain is adapted to be carried in a conveyor channel **15** past lubricating station **20** where the lubricating device **30** of the present invention is located.

Device **30** comprises a base plate **31** which is welded or attached by other suitable means to conveyor channel **15.** While the plate is shown as being welded, it can be attached for easy removal to other areas of the conveyor system. A portion of channel **15** is cut away at **16** and **17** so that access to conveyor chain **10** is permitted. Pivot post **32** is located contiguous to end **29** of plate **31.**

Arm **33** is adapted to pivot about post **32** at **34.** One embodiment of arm **33** includes two spaced bars **28** connected at one end by strip **27.** It is appreciated that

the arm could be solid if desired. Roller **35** is pinned at **36** between bars **28** of arm **33.**

At the opposite end of arm **33** there is located a lug **37.** Lug **37** has an opening **38** in which one end of extension spring **40** is located. An "L" shaped bracket **41** is located at the end **26** of plate **31.** Leg **42** of bracket **41** is attached to base plate **31** by welding or other suitable means. Leg **43** projects vertically from bracket **41** and an eyebolt **44** is adjustably fastened at **45** to leg **43.** The remaining end **46** of extension spring **40** is attached to eyebolt **44** as shown in FIG. **1.**

Adjusting of spring **40** is accomplished by moving eyebolt **44** relative to leg **43.** The spring is adjusted initially to provide the pre-tension necessary to achieve a clean shot taking into consideration various factors which will affect the shot such as fluid viscosity, chain speed, number of ejection nozzles and ambient temperatures. While subsequent changes in the operating conditions can affect the shot, the initial adjustment of the spring is sufficient to insure that a clean shot is maintained even during a wide variation in these operating conditions.

A manually actuated piston pump **50** is bolted at **51** to base plate **31.** Pump **50** has an inlet port **53** and two exit ports **54** which leads to lubricant ejecting nozzles **55.** Pump **50** includes a piston rod **56** and spring **57.** Cap **58** is located at the end of rod **56.** A rubber bumper **59** is attached to arm **33** and is in contact with cap **58.** The bumper serves to reduce the noise which would occur if metal cap **58** contacted arm **33.** Pump **50** is adapted to receive lubricant which is stored in a reservoir (not shown) located above base plate **31.** Lubricant is adapted to flow by means of gravity from the reservoir through supply line **60** to the inlet port **53** of pump **50.** The pump **50** is a conventional pump. While a number of pumps could be utilized for this particular application, one pump which has been found to be satisfactory is a manually operated pump which is available from Lincoln St. Louis, 4010 Goodfellow Blvd., St. Louis, Missouri, a Division of McNeil Corporation. The pump is illustrated and described in Section A, page 4 of a brochure designated Form 5354-2. While the pump shown in the drawings utilizes two exit ports **54,** it is appreciated that any number of ports could be utilized both for intake and exit purposes.

In operation as conveyor chain **10** passes by lubricating station **20,** link **12** will cause roller **35** and arm **33** to be pivoted about post **32** to the position shown in dotted lines in FIG. **1.** As arm **33** is pivoted about post **32,** extension spring **40** is placed in tension thereby storing potential energy.

When link **12** passes the location of arm **33** on base **31,** the arm will be permitted to be returned to its normal position by link **11.** As shown in FIG. **3,** link **11** comprises two spaced members **6** and **7.** The space between members **6** and **7** is wider than the width of roller **35** as seen more clearly in FIG. **2.** When arm **33** is permitted to travel in the space between numbers **6** and **7,** the potential energy in spring **40** is converted to kinetic energy and serves to pivot arm **33** about post **32.** As arm **33** pivots about post **32,** spring **40** seeks to return to its normal position and serves to give an impulse to arm **33** which contacts bumper **59.** The impulse action against arm **33** is transmitted through bumper **59** to cap **58** and rod **56** which, in turn, actuates piston pump **50.** Actuation of piston pump **50** will allow lubricating fluid to be ejected from exit ports **54** and lubricating ejection stations **55** as clean shots onto conveyor chain **10** at the location of pivot pins **14.**

The operation will be repeated as conveyor chain **10** moves past lubricating station **20.** The entire operation of the piston pump **50** is by mechanical actuation of arm **33** and spring **40** seeking to return arm **33** to its normal position wherein spring **40** is in its normal state of pre-extension. Utilization of spring **40** serves to assure that clean shots of lubricating fluid are directed to the appropriate points of lubrication on conveyor chain **10.** The precise delivery of lubricant to the conveyor system is independent of how erratically the potential energy might be stored in spring **40.**

No pneumatic or electrical source of supply is required. Accordingly, the lubricating unit of the present invention can be used at many locations in a conveying system without the need of considering the location of an electrical power supply or a source of pneumatic power supply.

In some instances it will be desired that after a period of lubrication, the lubricating device of the present invention should be placed in an inoperative position. With the view of accomplishing this objective, a slot **70** is located in base plate **31.** Pin **71** is welded to bar **28** of arm **33.** Pin **71** is adapted to ride in slot **70** during operation of the lubricating device. When it is desired to place the lubricating device in an inoperative position, lock member **72** which is pinned for rotation about base plate **31** at **73** is rotated in position. This is accomplished by moving arm **33** to the position shown in dotted lines in FIG. **1.** Subsequently, lock member **72** is rotated in the direction of the arrow shown in FIG. **2** so that when arm **33** is released and is pivoted about post **32** as spring **40** seeks to return to its normal position, pin **71** will abut lock member **72** and will be held in a locked, biased position until such time as lock member **72** is released.

The device of the present invention is relatively easy to install. While an arm adaptable with the conveyor chain shown in FIG. **3** has been shown, it is readily appreciated that the invention of the present device can be used with various other conveyor chains utilized in conveyor systems presently available. Similarly, while the arrangement shown herein has employed an extension spring, it is appreciated that other types of energy storing means such as a compression spring could be utilized. Further, other types of locking devices to retain the lubricating device in an inoperative position can be employed.

The lubricating system of the present invention has been shown in one plane where the base plate **31** is in a horizontal position. If desired, the lubricating system could be oriented in other planes. Moreover, while gravity flow has been shown as the means for delivering lubricant to the pump, the lubricant could be supplied by other means such as a spring means to force feed the lubricant to pump **50.**

What is desired and is accomplished with the present invention is to utilize available energy from the conveyor system, transmit that energy to the lubricating device as potential energy, and release the potential energy in an impulse action to actuate a pump means whereby clean shots of lubricating fluid are ejected from the lubricating device absent any requirement for pneumatic or electrical power sources. Moreover, the device of the present invention can be moved about in

a portable fashion, if desired, and can be retained in a locked, inoperative position when necessary.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom as modifications will be obvious to one skilled in the art.

What is claimed is:

1. The method of lubricating a conveyor system which passes a lubricating station according to the steps of:

contacting said conveyor system intermittently with a member as said system passes said lubricating station;

transmitting energy from said system through said member to an energy storage means in the period of contact with a conveyor system;

releasing the energy stored in said storage means in an impulse action to drive pump means; and,

dispensing fluid from said pump means to said conveyor system;

whereby said conveyor system can be lubricated.

2. A lubricating device for use with a moving conveyor system in which said system is to be lubricated by said device, said lubricating device comprising:

a base member adjacent to the conveyor system to be lubricated;

a mounting post located on said base member;

an arm having two ends, said arm being disposed for movement with respect to said post from a normal position in which the arm is out of contact with the conveyor system to a biased position when one of said arm ends contacts said conveyor system;

a spring means having two ends and adapted to be deflected and thereby store potential energy;

one spring end being connected to said base member and the other spring end being connected to said arm to maintain said arm in its normal position of non-contact with a conveyor system;

said spring means being adapted to be extended when said arm is moved with respect to said post from its normal position to the biased position whereupon said spring is extended and potential energy is stored;

a manual pump means for pumping lubricating fluid said means including at least one fluid dispensing port and a piston rod adapted for contact with and movement with said arm;

whereby, when said lubricating device is in operation, one end of said arm contacts said conveyor system intermittently to move with respect to said mounting post whereby potential energy is first stored in said spring means as said spring means is deflected and then released substantially instantaneously whereby said pump means is actuated to release a clean shot of lubricating fluid from said fluid dispensing port.

3. A lubricating device in accordance with claim **2** wherein said mounting post serves as an attachment for said arm whereby said arm rotates about said post when urged from the normal position by said moving conveyor system.

4. A lubricating device in accordance with claim **2** and further including a locking means attached to said arm to maintain said arm in an inoperative position.

5. A lubricating device in accordance with claim **2** and further including means for adjusting said spring means.

6. A lubricating system in accordance with claim **2** wherein said spring is an extension spring.

7. A lubricating device in accordance with claim **2** and further including a locking means pivotally mounted on said base and selectively movable to engage said arm and thereby lock said arm in a position free of contact with the conveyor system.

8. A lubricating device in accordance with claim 7 wherein said locking means is maintained in a biased position when said locking means is in locking engagement with said arm.

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