

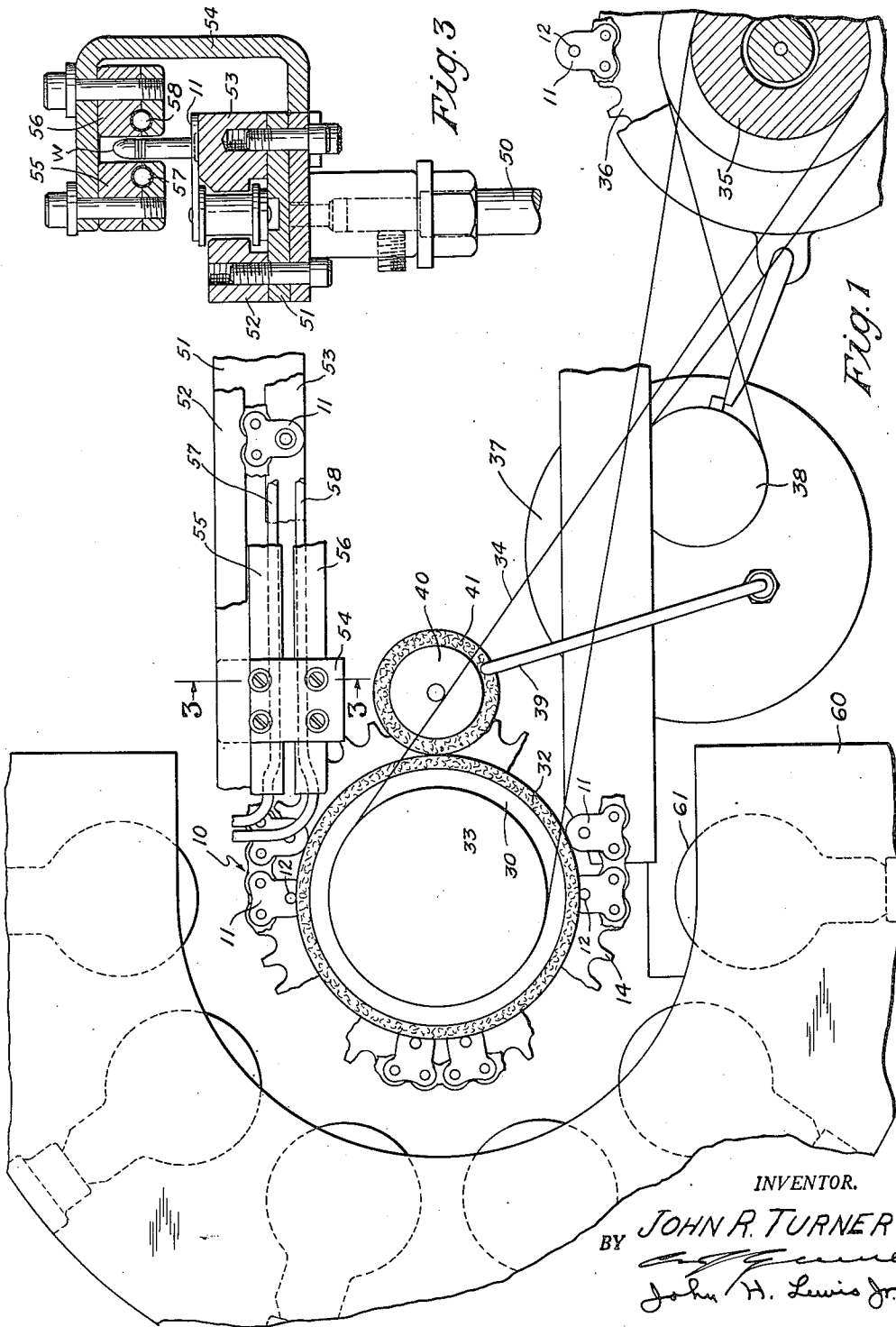
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J. R. TURNER
AMMUNITION LUBRICATION

2,547,548

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2 Sheets-Sheet 1



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2 Sheets-Sheet 2

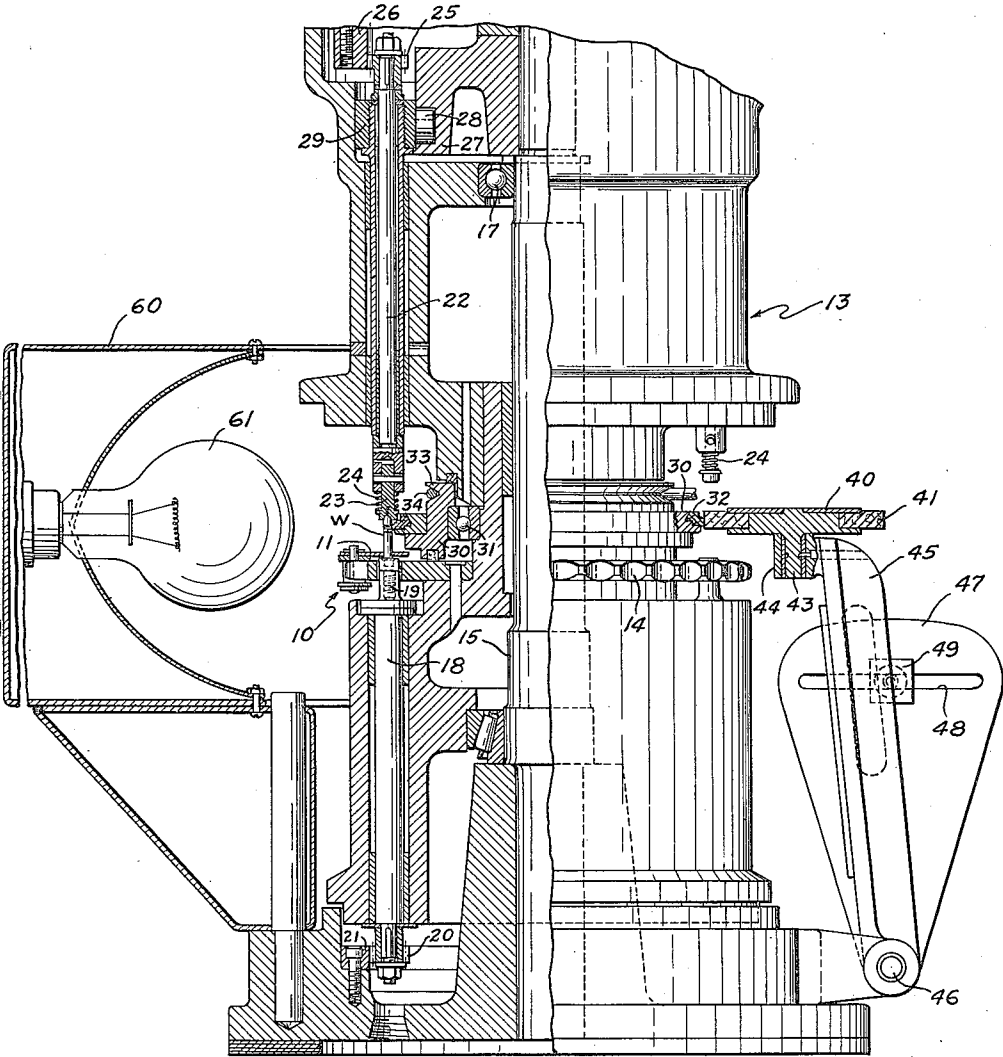


Fig. 2

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AMMUNITION LUBRICATION

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This invention relates to apparatus for continuously applying a lubricant to a series of articles which are intermittently or continuously moved into contact with the lubricant applicator, and particularly to means for preheating the lubricant-receiving portion of such articles and applying thereto a lubricant which is solid at normal temperatures but which for the purpose of application has been heated to fluidity.

The invention has been illustrated as applied to the lubrication of the bullets or projectiles of loaded cartridges, which cartridges are continuously moved through a preheater and past the lubricant applicator. Such a lubricating apparatus may form one unit of a compound machine for the continuous loading of cartridges, such as .22 caliber rimfire cartridges.

In the drawings:

Fig. 1 is a somewhat diagrammatic plan view of one form of apparatus embodying the invention.

Fig. 2 is an elevation, partly in section, of the lubricant applying turret and directly associated parts.

Fig. 3 is a sectional elevation of the preheater, substantially on the line 3—3 of Fig. 1.

The machine comprises a conveyor, such as a chain, identified generally by the numeral 10, having secured thereto at appropriate intervals laterally extending arms 11 apertured as shown at 12 to form receptacles for workpieces such as loaded cartridges. Said conveyor chain revolves a turret, identified generally by numeral 13, having secured thereon, for engagement with chain 10, a sprocket wheel 14. The turret is supported from a fixed central post or pedestal 15 through suitable bearings, one of which is shown at 17. Mounted for rotation in the peripheral portion of the lower part of the turret are a plurality of workpiece supporting stems 18, the upper ends of which, as shown at 19, project through apertures in the sprocket wheel 14 and may be slightly recessed to properly receive workpieces, such as a cartridge, identified as W. The stems 18 are rotated through the engagement of pinions 20, secured to the lower ends of such stems, with the internal teeth of a ring gear 21 secured to the fixed pedestal 15.

Mounted for rotation in the upper portion of turret 13 are a plurality of workpiece holding punches 22 respectively in vertical alignment with the stems 18. The lower end of each punch 22 comprises a recessed workpiece engaging head 23, having a pin-and-slot connection with its punch and urged downwardly with respect to

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its punch by yieldable means such as spring 24. Like the stems 18, the punches 22 are rotated, through the engagement of pinions 25 thereon with the internal teeth of ring gear 26 secured to the upper portion of the fixed pedestal 15. Means are also provided for vertically reciprocating punches 22. Such means may comprise a cylindrical cam 27 secured to pedestal 15 and a cam following roller 28 projecting radially inward from a head structure 29 which carries one or more of the punches 22. It is common practice to arrange the punches 22 in pairs, using one head structure 29 and cam following roller 28 for each pair.

The conveyor chain 10 may engage sprocket 14 of the turret through any desired arc of movement. An engagement of about 180° has been illustrated. During the time that the cartridges or other workpieces are moving in an arcuate path about the turret a lubricant is applied to them or to any desired part of them. In the lubrication of ammunition it is desirable that lubricant be applied only to the cylindrical or driving band portion of the bullets. It is at this portion only that the lubricant serves the useful purpose of reducing friction between the bullet and the barrel of a firearm through which the bullet is projected. The presence of a lubricant on the nose or ogive of the bullet is both useless and undesirable, since it makes the bullet and cartridge greasy to handle and tends to collect any foreign matter with which it comes in contact. The means for applying lubricant to the driving band portion only of bullets traversing the turret comprises an applicator wheel 30 mounted for revolution concentric with but independent of the turret. The mounting may comprise bearings 31. While the entire applicator disk may be of metal, the rim or workpiece engaging portion thereof is preferably of felt, leather or other soft lubricant-retaining material 32, the periphery of disk 30 being suitably recessed to securely hold a band of such material. The diameter of the applicator band 32 as supported upon the disk is such as to effectively engage the driving band portion of the bullets of cartridges traversing the turret and deliver lubricant thereto. Disk 30 is driven at an appropriate speed through a pulley 33 associated therewith, which pulley is engaged by a belt 34 driven by a belt wheel 35 associated with an idler sprocket 36 rotated by the conveyor chain. The arrangement is such that the linear speed of the bullet surfaces, as determined by the rotation of stems 18 and punches 22, differs

from the linear speed of the lubricant applying rim 32, so that the lubricant is adequately brushed into the grooved and serrated driving band portion of each bullet.

Lubricant is supplied to the applicator 32 from a suitable reservoir 37. The lubricant is preferably one which is solid at ordinary temperatures, and there is associated with the tank or reservoir 37 suitable heating means for liquefying the lubricant. The liquid lubricant is delivered from reservoir 37 by a pump of conventional design, indicated at 38, which pump is actuated by appropriate connections to any moving element, such as the idler sprocket 36. The reservoir, heating means, pump, and pump driving means, have not been illustrated in detail, since they are ordinary commercial articles, not per se forming part of the present invention. The operation of the pump 38 effects the delivery of lubricant at a desired rate through the spout 39 to a distributor disk 40. Distributor disk 40 is preferably provided with a rim or peripheral ring portion 41 of soft lubricant-retaining material, such as felt, leather, etc. Said distributor ring 41 is in peripheral engagement with the applicator ring 32 on disk 39 and is rotated by such engagement. The mounting of disk 40 is preferably of such a character as to provide for an adjustment in the force of engagement of ring 41 with ring 32. For this purpose, disk 40 may be provided with a trunnion 43 received in a hollow boss 44 extending laterally from an arm 45 pivoted at 46 to a fixed part of the machine. Associated with the arm 45 is a weighting member 47 which may be slotted as shown at 48 to adjustably receive a supplemental weighting member 49.

To insure consistent application of a regulated quantity of lubricant to each bullet and adequate adhesion to the bullet it has been found desirable to preheat the bullets or the surfaces thereof, and to cause them to traverse the lubricating turret in a heated condition. For this purpose, a preheater is associated with the reach of the conveyor chain 10 which is approaching the lubricating turret. While preheating may be effected by placing about said reach of the conveyor chain an elongated chamber heated by any suitable means, I prefer heating by induction. Apparatus for this purpose may be constructed as follows:

The reach of the conveyor chain with which the preheater is associated preferably has a straight line, rather than an arcuate, movement. About such a reach of chain is arranged a suitable chain guide and workpiece support—a section of such chain guide being illustrated in Fig. 3. Appropriately spaced supports 50 are provided, and such supports carry an elongated chain supporting base 51 to which are secured lateral chain guide pieces 52 and 53. The upper surface of the guide piece 53 forms a support for the workpieces carried in the chain arms 11. Members 51, 52 and 53 are preferably non-metallic and of low heat conductivity. Secured to the base plate 51 at appropriate intervals, or to supports 50, are a series of brackets 54 which serve as supports for a pair of insulating bars 55 and 56, which bars are spaced from each other by a distance only slightly exceeding the maximum diameter of the cartridges or other workpieces which traverse the space between them. Embedded in the insulating bars 55 and 56 respectively are electrical conductors 57 and 58, which conductors are positioned opposite the driving

band portion of the bullets and as close thereto as practicable. Conductors 57 and 58 are preferably of the usual induction heating copper tubing, through which cold water is circulated, and are connected to a suitable source of high frequency alternating current, not shown, since per se it forms no part of this invention. The passage formed by insulating bars 55 and 56 terminates closely adjacent the point at which the conveyor chain 10 begins to traverse the sprocket wheel 14, and, while traversing this passage, the bullets and particularly the driving band portion thereof are inductively heated by the high frequency current in conductors 57 and 58. It is noted that, since induction heating is a function of electrical resistance, and since the lead of the bullets is of much greater resistance than the copper, gilding metal or brass of the cartridge cases, the heating of the bullet and particularly the surface portion thereof is substantial, while the heating of the more highly conductive cartridge case metal is negligible. Thus, in the manner described, the lubricant receiving portions of lead bullets can be heated to the extent necessary for requisite lubricant adhesion without such heating of the cartridge case as will be detrimental either to the case or to its contents. Moreover, the amount of lubricant delivered to each bullet being a function of the concentration of lubricant in the applicator ring 32, such amount can be accurately controlled by controlling the rate of delivery of lubricant to the distributor disk 40 by the pump 38. Very rapid and accurately controlled delivery and application and even distribution of an adequate but not excessive quantity of lubricant to each bullet is thus insured.

The lubricant being one which is solid at normal temperatures and being delivered for use in the manner described at a temperature only slightly above its melting point, it becomes desirable that the working parts of the turret be maintained at a temperature at or slightly above the lubricant melting point, in order to avoid the congealing of lubricant thereon and consequent interference with proper functioning. For this purpose, any suitable means of maintaining a slightly elevated temperature about the working parts of the turret may be provided. The form of turret heater which is illustrated in the drawings comprises a housing 60 surrounding an appropriate part of the turret and containing such heaters as a series of infrared lamps indicated at 61.

What is claimed is:

1. Apparatus for the continuous lubrication of the bullets of loaded cartridges, comprising a continuously moving conveyor for such cartridges, a pair of elongated electrodes adjacent a reach of such conveyor and on opposite sides of the bullets of a line of cartridges therein, and means adjacent one end of said electrodes for applying a liquid lubricant to the bullets of cartridges emerging from the passage between said electrodes.

2. Apparatus for the continuous lubrication of the bullets of loaded cartridges, comprising a continuously moving conveyor for such cartridges, inductive preheating means associated with a reach of such conveyor and adapted to heat the bullets only of such cartridges, and means adjacent said inductive preheating means for applying a liquid lubricant to the bullets of cartridges emerging therefrom.

3. Apparatus for the continuous lubrication

of the bullets of loaded cartridges comprising a continuously moving chain conveyor for such cartridges, inductive preheating means comprising a pair of elongated electrodes in close proximity to a reach of said conveyor to inductively heat the surface portion of the bullets only of cartridges carried by such conveyor, a turret located closely adjacent said induction heater and driven by said chain conveyor, means driven by the motion of said turret for individually rotating cartridges in said chain conveyor as such cartridges traverse said turret, and means for applying a lubricant to the bullet of each such cartridge while so rotated.

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