Patented Mar. 21, 1944 2,344,886

UNITED STATES PATENT OFFICE

2,344,886

LUBRICANT COMPOSITION

Eugene Lieber, Staten Island, N. Y., assignor to Standard Oil Development Company, a corporation of Delaware

No Drawing. Application January 2, 1941, Serial No. 372,889

6 Claims. (Cl. 252—51)

The present invention relates to improvements in lubricants and especially to the improvement of lubricating oils principally useful for internal combustion engines operating under severe conditions. The invention will be fully understood from the following description.

Lubricating oils which exhibit improved performances under all types of operating conditions when used for the lubrication of heavy duty gasoline engines and for Diesel engines are coming into greater and greater demand. The requirements for such oils are being steadily made more stringent and it has been proposed to add various ingredients to these oils to improve their behavior in such services. The present invention relates to the production of superior lubricating oil compositions by adding to a base oil an ingredient which will improve the properties of the oil in various ways, particularly in improving the lubricity of the oil, in increasing its resistance to oxidation and consequent formation of corrosive substances, and in reducing its tendency to leave objectionable deposits in the engine. These lubricating oil blends are especially adapted for use under the high temperature conditions prevailing in the cylinders of internal combustion engines, i. e., at temperatures of 200° C. or higher.

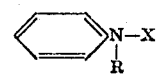
The new addition agents of the present invention include the various quaternary ammonium compounds, particularly the bases and the salts of such bases with organic acids. Various metallic compounds have been proposed for use in lubricating oils to improve their lubricating properties, but such compounds leave an objectionable residue. The quaternary ammonium bases and their salts with weak acids have the ability to impart lubricity to oils and at the same time the great advantage of not leaving residues on engine parts. By reducing oxidation the compounds also aid in preventing the formation of corrosive substances in the oil. The compounds can be made very soluble in lubricating oils by providing one or more sufficiently long hydrocarbon chains which are attached directly to the nitrogen atom or form a part of the acid radical. Compounds quite insoluble may, however, be used by being dispersed in the oil or when dissolved by the aid of a mutual solvent.

The new class of addition agents may be defined in its broadest scope as consisting of compounds having the quaternary ammonium base radical—

$$RmN—$$

where R is a hydrocarbon radical, for example, an alkyl, cycloalkyl, aryl or aralkyl radical, and m is an integer, four or less, the number being chosen according to the valencies of the R groups to satisfy four bonds of the nitrogen atom. The various R groups may be similar or dissimilar. The radicals R may contain substituent atoms, for example, halogen, nitrogen, phosphorus, oxygen, or sulfur, or substituent groups, for example, hydroxyl, aroxy, alkoxy, keto, amino, or mercapto groups. The preferred compounds are those in which the above defined quaternary ammonium base radical is attached to a hydroxyl group or to an organic radical, and in which the R's are alkyl groups. Where an acid radical is joined to the quaternary base radical, such radical may be that of a carboxylic acid, either aliphatic or aromatic, or a radical of widely different type, such as alcoholate, enolate, phenolate, xanthate, carbamate, or the analogous radicals in which sulfur is substituted for part or all of the oxygen.

The most preferred addition agents which are used in accordance with the present invention are those which have a solubility in oil to the extent of at least 0.05% at temperatures above 30° F. Compounds containing alkyl radicals having a total number of carbon atoms in all of such alkyl radicals equal to 12 or more and preferably at least 16, if available, are especially suitable, and branched structures are in general preferred. Typical examples of compounds which are suitable for use in accordance with this invention are those having monovalent alkyl radicals attached to the nitrogen atom, for example, tetramethyl ammonium naphthenate, tetraethyl ammonium naphthenate, tetraethyl ammonium hydroxide, tetraethyl ammonium oleate, tetramethyl ammonium cresylate, tetramethyl ammonium lactate, tetra-n-butyl ammonium oleate, tetrabutyl ammonium tribromophenolate, tetrabutyl ammonium-2,4-dinitrophenolate, tributyl methyl ammonium octylphenolate, the tribenzyl amyl ammonium salt of diisobutyl phenol sulfide, the tetraethyl ammonium salt of wax-alkylated phenol sulfide, tetramethyl ammonium butyl thioxanthate, tetramethyl ammonium ethyl xanthate; those having alkylol or aralkylol groups attached to the nitrogen atom, for example, butyl triethanol ammonium naphthenate, ethyl phenyl diethanol ammonium cresylate and tetrahexanol ammonium oleate; those in which the nitrogen of the quaternary base forms part of a pyridine, quinoline or nicotine group, for example, compounds of the formula



where R is a hydrocarbon radical and X is an acid radical, e. g., methyl pyridonium oleate. In addition to the examples given above, many other examples of suitable compounds may be derived by combining the quaternary ammonium base radical with various acid radicals, both straight and branched chain, saturated and unsaturated, aromatic and aliphatic, monobasic and

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TELESCOPIC RANGE FINDER

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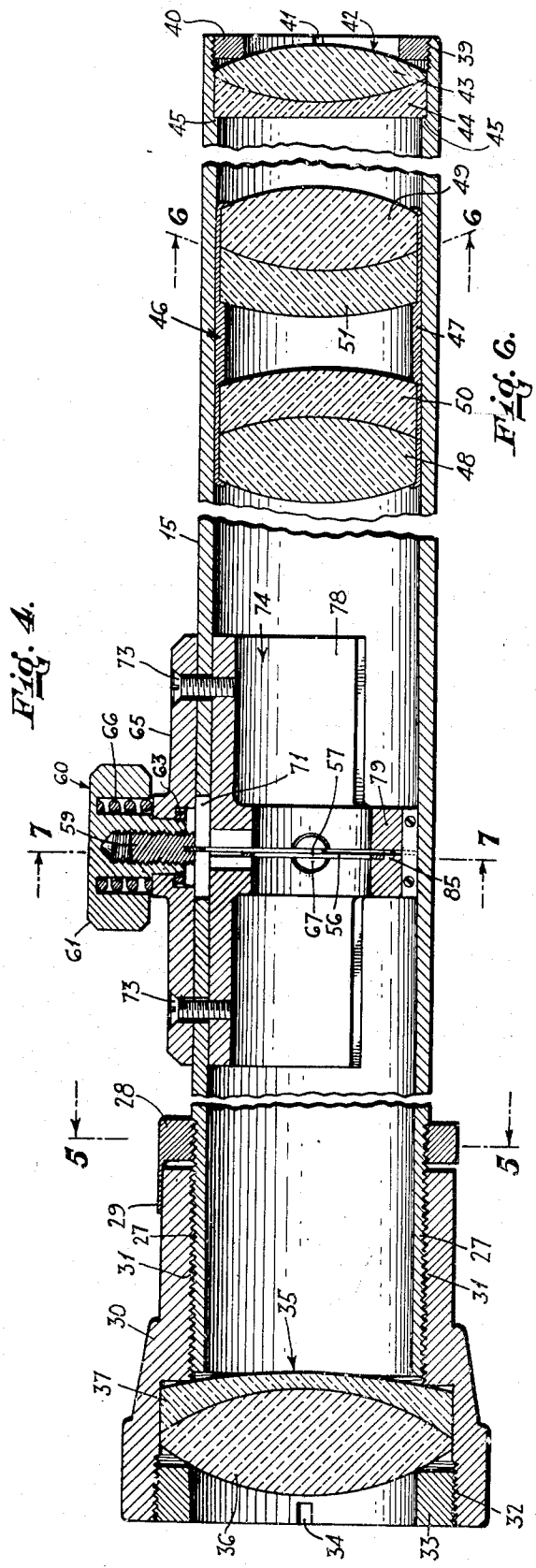


Fig. 4.

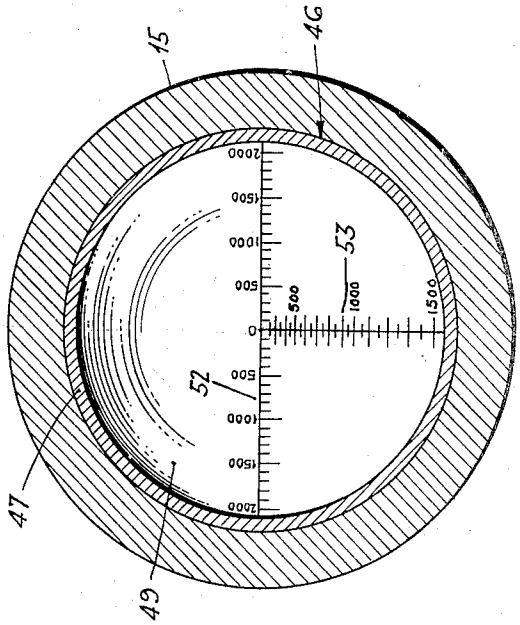


Fig. 6.

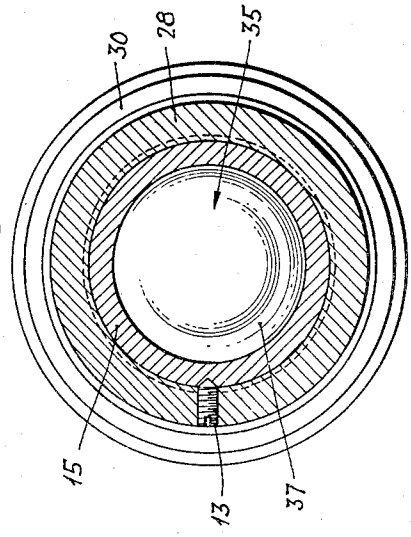


Fig. 5.

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TELESCOPIC RANGE FINDER

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Fig. 7.

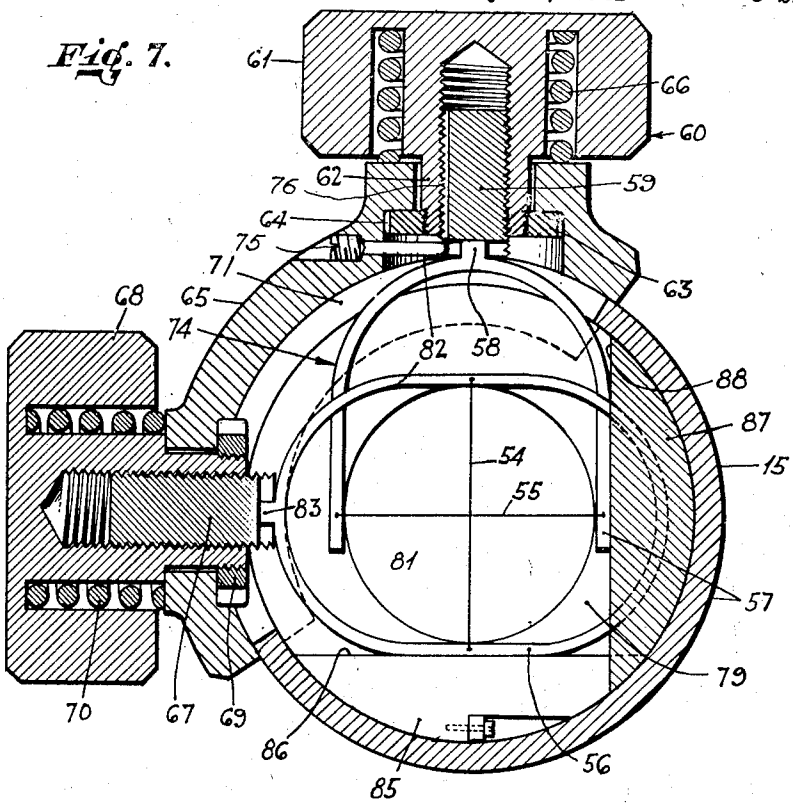


Fig. 8.

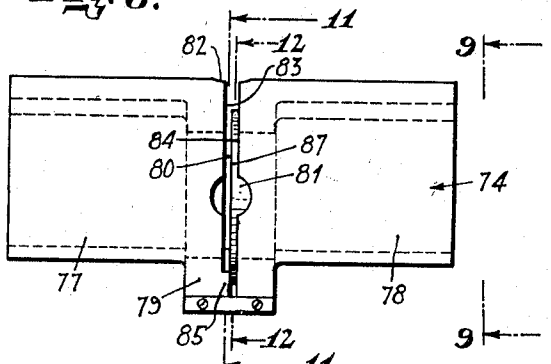


Fig. 9.

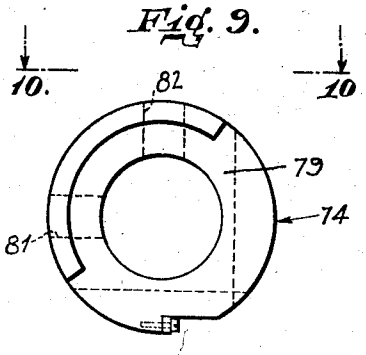


Fig. 10.

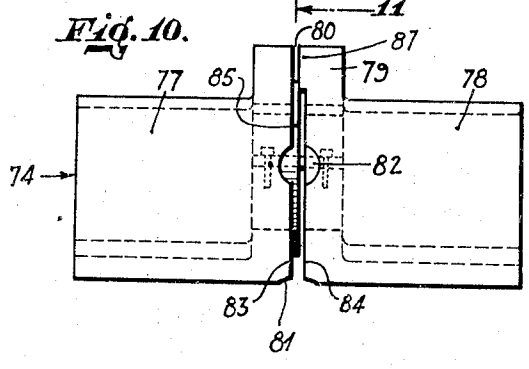


Fig. 11.

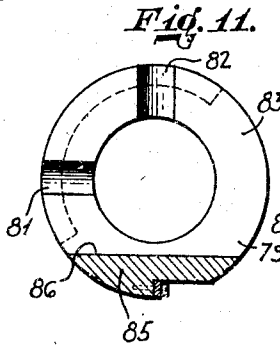
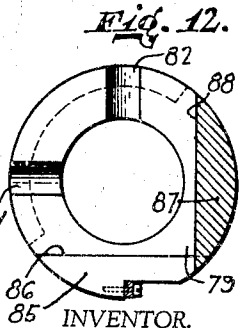


Fig. 12.



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TELESCOPIC RANGE FINDER

George Liebl, Fairlawn, N. J.

Application May 21, 1941, Serial No. 394,456

4 Claims. (Cl. 33—50)

This invention relates to a telescopic range finder for rifles and other firearms and ballistic instruments.

An object of the present invention is the provision of a telescopic range finder which includes a lens provided with a scale etching and which is capable of simple manual adjustment for the purpose of correcting all errors of range, such as errors due to the trajectory of the missile and to external deviating forces, such as wind and the like.

Another object is the provision of a range finder which is simple in construction and operation and the corrections of which are more exact than those of prior art range finders.

A further object of the invention is the provision of a telescopic range finder which is capable of integrating separately errors resulting from forces of gravity acting upon a projectile and errors resulting from forces exerting a side wise pressure upon the projectile, such as wind forces.

Other objects of the present invention will become apparent in the course of the following specification.

The objects of the present invention may be realized through the provision of a cross-hair reticule having two separate frames, each of the two sight elements, such as cross-hairs, being carried by a separate frame. Separate means are provided for shifting the two frames within a reticule mounting, so that the horizontal adjustment may be carried out separately from the vertical adjustment. The frame shifting means consist, preferably, of resiliently mounted nuts engaging bolts, which are connected with the frames. The reticule mounting is attached to a cover plate and is situated within the casing of a range finder. This casing which is attached by brackets to the gun barrel also carries an eyepiece provided with a range scale, an objective lens, and a front lens.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing, by way of example, a preferred embodiment of the inventive idea.

In the drawings:

Figure 1 shows in side elevation a rifle provided with a range finder constructed in accordance with the principles of the present invention.

Figure 2 is a top view or plan view of the range finder on a larger scale.

Figure 3 shows the range finder in side elevation,

Figure 4 is a longitudinal section through the range finder along the line 4—4 of Figure 2, on an enlarged scale.

Figure 5 is a transverse section along the line 5—5 of Figure 4, on a larger scale.

Figure 6 is a transverse section along the line 6—6 of Figure 4, on a larger scale.

Figure 7 is an enlarged transverse section along the line 7—7 of Figure 4.

Figure 8 shows the reticule mounting in front elevation.

Figure 9 shows the reticule mounting in side elevation, looking in the direction of arrows 9—9 of Figure 8.

Figure 10 is a top plan view of the reticule mounting, looking in the direction of arrows 10—10 of Figure 9.

Figure 11 is a transverse section along the line 11—11 of Figure 8; and

Figure 12 is a transverse section along the line 12—12 of Figure 8.

Figure 1 of the drawings shows a range finder comprising an elongated tubular casing 15 which is attached to a rifle 17 having a barrel 16 by a mounting consisting of brackets 18 and 19. As shown more clearly in Figures 2 and 3, each of the brackets 18 and 19 comprises an arcuate portion 20 engaging the tubular casing 15 and flanges 21 and 22. The flanges 21 and 22 are firmly connected with a support 24, by the bolts 25; screws 23 extend through bore holes formed in the support 24 and are screwed into threaded holes provided in the rifle, thereby firmly attaching the range finder to the rifle.

As shown more clearly in Figure 4 of the drawings, the casing 15 of the range finder is provided at its inner end with outer screw threads 27 which carry a ring 28 having a pointer 29 and held in place by a set screw 13 (Fig. 5).

An eye piece casing 30 has inner screw threads 31 meshing with the screw threads 27 of the casing 15 (Fig. 4).

The eye piece casing 30 encloses an enlarged inner chamber having screw threads 32 meshing with the screw threads of a ring 33 which is provided with a slot 34 and which serves as a closure member for the ocular lens 35. The lens 35 consists of a bi-convex crown glass element 36 and a concavo-convex flint glass element 37.

As shown in Figure 2, the eye-piece casing 30 is provided with a range scale 38 situated below the pointer 29.

As shown in Figure 4, the outer end of the casing 15 has inner screw threads 39 engaging a closure ring 40 provided with a slot 41. The ring

40 is used to hold in place the front lens 42 including a bi-convex crown glass element 43 and a plano-concave flint glass element 44. Preferably, the front lens 42 is pressed against a shoulder 45 of the casing 15.

The casing 15 also contains an objective lens 46 comprising a tubular holding element 47, which is firmly connected to the casing, two outer bi-convex crown glass elements 48 and 49, and inner concavo-convex flint glass elements 50 and 51.

As shown in Figure 6, the bi-convex lens element 49 is provided with an etching and which constitutes two scales 52 and 53 used in conjunction with the cross hairs 54 and 55 (Fig. 7).

The cross hairs 54 and 55 are carried by frames 56 and 57, respectively. The frame 57 is provided with a projection 58 soldered to an inner bolt 59 which is screwed into a threaded bore hole of a nut 60.

The nut 60 has an outer head portion 61 which is manipulated by the user to adjust the hair 55, and an inner sleeve 62 which is firmly connected with a nut or washer 63 having slots 64 and situated in a recess provided within a cover plate 65. A coiled spring 66 is situated within an annular space provided within the nut 60, and presses against the cover plate 65. The bolt 59 is prevented from turning by a pin 75 projecting into a groove 76 provided in the bolt 59 (Fig. 4).

The frame 56 carrying the hair 54 is actuated by a similar mechanism including a projection 89 and a bolt 67 screwed into a nut 68 which is connected with a nut or washer 69 and is engaged by a spring 70 (Fig. 7).

The cover plate 65 extends over an opening 71 provided in the casing 15 and is firmly attached to the casing by screws 72 (Fig. 2).

Bolts 73 extend through openings formed in the cover plate 65 and the casing 15 and are used to hold the reticule mounting 74 within the casing 15 (Fig. 4).

The reticule mounting 74 is shown in greater detail in Figures 8 to 12 of the drawings. It may consist of one or two separate pieces and has the form of two ring segments 77 and 78 situated on both sides of a ring 79. The ring 79 is provided with a transverse slot 80 which is in communication with two cylindrical passages 81 and 82 and which is limited by two side surfaces 83 and 84. As shown in Figure 11, the side surface 83 of the ring 79 includes a shoulder 85 having an abutting edge 86 serving as an abutment for the vertical frame 57 (Fig. 7). The side surface 84 includes a shoulder 87 extending at right angles to the shoulder 85 and provided with an abutting edge 88 serving as an abutment for the horizontal frame 56.

The two frames 56 and 57 are situated one next to the other in the slot 80 and can move within the slot 80 in directions extending at right angles to one another. The projection 58 of the frame 57 and the adjacent end of the bolt 59 extend through the passage 82 of the reticule mounting 74. The projection 89 of the frame 56 and the adjacent end of the bolt 67 extend through the passage 81.

The device is operated as follows:

The user who is looking at an object through the ocular lens 35 (Fig. 4), turns the eye piece 30 until the outlines of the object are clearly visible. Then the distance of the object from the user may be determined by reading the scale 38 in relation to the pointer 29 (Fig. 2).

The vertical correction necessitated by gravity forces, is carried out by shifting the cross hair 55 downwardly from its central position shown in Figure 7. This is accomplished by turning the nut 60 which will rotate along with the nut 63. The rotation of the bolt 59 is prevented by the pin 75 (Fig. 7), so that the bolt 59 will move lengthwise within the threaded bore hole of the nut 60. The frame 57 will be moved along with the bolt 59 and the adjustment is carried out until the cross hair 55 is situated opposite a reading on the scale 53 which corresponds to the distance between the object and the user.

The horizontal adjustment is carried out when there is a wind by turning the nut 68 and thereby causing a movement of the bolt 67 and the frame 56 in a direction opposite to that in which the wind is blowing. The cross hair 54 may be shifted from its central position along the scale 52 (Fig. 6).

The user moves the rifle 17 until the image of the object he is aiming at appears at the intersection of the cross hairs 54 and 55 occupying their new positions. Then he is ready to shoot.

It is apparent that the specific illustration shown above has been given by way of illustration and not by way of limitation, and that the structures above described are subject to wide variations and modifications without departing from the scope or intent of the invention. All of such variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. In a telescopic range finder, in combination with a casing, two sight elements extending in different directions and situated within said casing at different distances from an observer, and adjusting means carried by said casing and connected with said sight elements for moving each sight element separately from the other sight element in a direction which is substantially perpendicular to that in which the other sight element is movable, said adjusting means comprising a separate bolt for each sight element, means firmly connecting the bolt with the sight element, means preventing the rotation of the bolt, a separate manually operable nut meshing with each bolt, and a cover carried by the casing and carrying said nuts upon an outer surface thereof, whereby said nuts may be turned manually by the user to move said sight elements.

2. In a telescopic range finder, an elongated casing, a cross hair frame situated within said casing, another separate cross hair frame extending at right angles to the first-mentioned frame and situated within said casing at a different distance from an end of the casing, a separate adjusting mechanism for each frame, each of the adjusting mechanisms comprising a projection connected with a separate frame, a bolt connected with said projection, a nut meshing with said bolt, a washer connected with said bolt, and a spring engaging said nut; and a cover carried by said casing and carrying said nuts, said springs engaging said cover, said cover having recesses formed therein and receiving said washers.

3. In a telescopic range finder, an elongated casing, a cross hair frame situated within said casing, another separate cross hair frame extending at right angles to the first-mentioned frame and situated within said casing at a different distance from an end of the casing and close to the first-mentioned frame, adjusting means carried by said casing and connected with said

frames for moving each frame separately from the other frame in a different direction, and a reticule mounting carried by said casing and including a central annular portion and two ring segment portions on both sides of said annular portion, said annular portion having a slot formed therein transversely to said casing and receiving said frames, the walls of said slot having abutting edges situated in the paths of said frames and adapted to be engaged by them.

4. In a telescopic range finder, a casing, two sight elements extending in different directions and situated within said casing at different distances from an observer, adjusting means carried by said casing and connected with each sight element for moving the sight elements separately in different directions, and an objective lens situated within said casing consisting of crown glass and flint glass elements, one of said elements carrying scales formed therein for said sight elements.

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