

G. J. BINGHAM.
LUBRICATOR.

APPLICATION FILED JULY 6, 1907. RENEWED DEC. 7, 1909.

988,853.

Patented Apr. 4, 1911.

2 SHEETS—SHEET 1.

Fig. 2

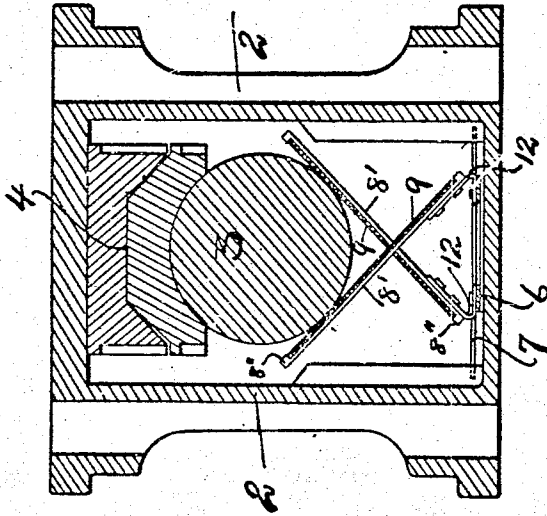
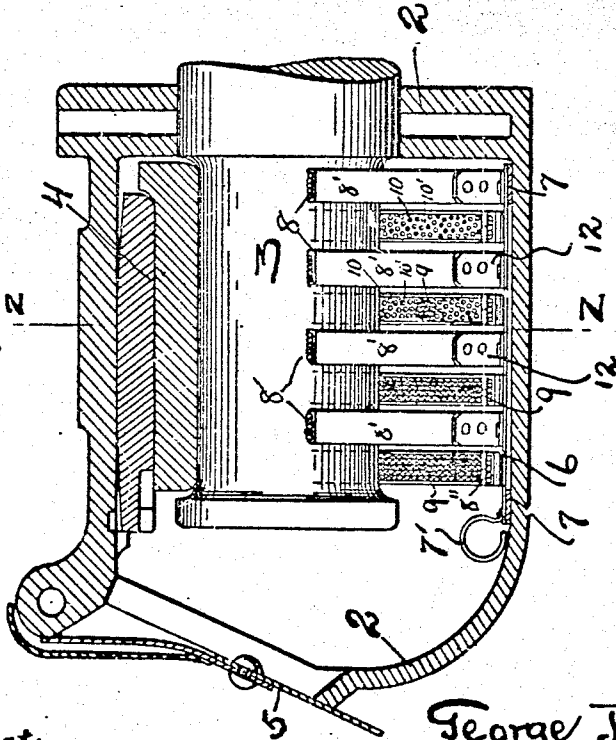


Fig. 1



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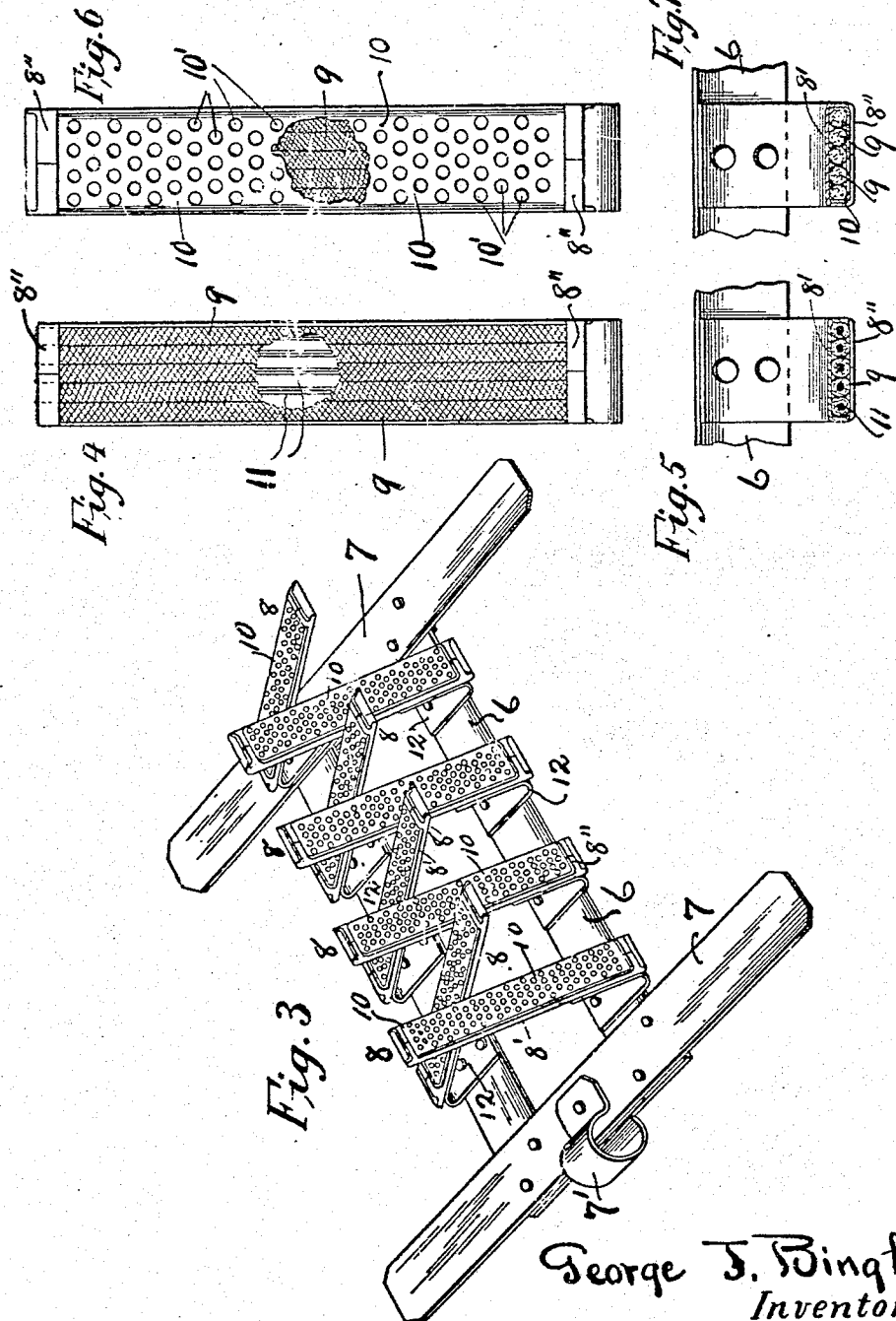
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UNITED STATES PATENT OFFICE.

GEORGE J. BINGHAM, OF NEW YORK, N. Y.

LUBRICATOR.

988,853.

Specification of Letters Patent.

Patented Apr. 4, 1911.

Application filed July 6, 1907, Serial No. 382,458. Renewed December 7, 1909. Serial No. 531,886.

To all whom it may concern:

Be it known that I, GEORGE J. BINGHAM, a citizen of the United States, residing at New York, county of New York, and State of New York, have invented certain new and useful Improvements in Lubricators, of which the following is a specification.

My invention pertains to lubricators, and more particularly to such as are designed for use with journals of rapidly revolving shafts.

It is designed for use with thick or viscid oils, grease, and relatively thick or heavy lubricants, as well as with thinner or lighter oils.

A leading object of the invention is the prompt delivery of the lubricant to a shaft or journal at the commencement of its rotation, and even after a considerable period of rest, and another prominent object is the softening or melting of the lubricant in cold or cool weather, where there is a tendency to congeal or solidify by reason of low temperature. It is desirable also that the rate of feed or delivery of the lubricant be as nearly uniform as practicable, or proportionate to the speed of rotation or movement of the lubricated part or parts. This result I likewise attain by my improved construction.

Prior to my present invention various lubricating devices have been contrived, many of which utilize the principle of capillary attraction for conveying the lubricant from a reservoir to the surface to be lubricated. In Letters Patent of the United States, granted to me February 5, 1901, and numbered 667,183, there is set forth a construction in which the lubricant is delivered to a rotating journal by means of fingers, each consisting of a plurality of copper wires twisted together, the several fingers being pivotally supported upon a rod or bearing, and elastically held or pressed against the journal by springs. Copper being a good transmitter of heat, it was found that the wire fingers resting against the journal, and becoming more or less heated by the rubbing friction therewith, would maintain in fluid state a lubricant which otherwise would tend to solidify at moderate temperature, and which but for such heating it would be difficult or impossible to deliver to the journal. This feature I find it desirable to employ in the present structure. I have

found, however, through more extended experience, that it is desirable to employ wider fingers, or to make contact with a larger portion of the surface of the journal, and also to provide means for maintaining a film or quantity of lubricant in contact with the journal at all times, so that even though the journal cease its rotation for a time, it shall be effectually lubricated from the moment it resumes such rotation. Accordingly, the wire fingers or rods are, under my improved construction, covered with fibrous material, woven, braided, or otherwise suitably fashioned, and the fingers composed of the wire members and the fibrous coverings are in turn covered with perforate metal wearing plates, which aid in transmitting heat to the lubricant, and in keeping it in a proper fluid condition.

The construction will be readily understood upon referring to the accompanying drawings, in which:

Figure 1 is a vertical longitudinal section of a car axle box provided with my improved lubricator, and showing the journal in position; Fig. 2, a transverse section on the line $z-z$ of Fig. 1; Fig. 3, a perspective view of the lubricating device or attachment removed from the journal box; Fig. 4, a face view of one of the fingers without the perforate metal plate, and with the fibrous covering partially broken away; Fig. 5, a cross section of the same; Fig. 6, a face view of the finger, the perforated cover being partially broken away to show the fibrous material back of it; Fig. 7, a transverse section of Fig. 6.

In said drawings 2 indicates a journal box of usual form and construction, and 3 the journal of a car axle or other rotating shaft or member, extending into said box and beneath the customary "brass" or bearing block 4, these parts being of ordinary construction. Box 2 is made of sufficient depth to form a reservoir beneath the journal for a lubricant, and the usual opening is formed in the outer end thereof as shown, and provided with a cover 5 to permit access to the journal, the brasses, and the lubricant chamber.

Within the box 2, and resting upon the bottom thereof, is placed my improved device, comprising a suitable base, and a series of spring-sustained fingers, alternately rising from opposite sides of said base, and

inclined in reverse directions, as seen in Figs. 1, 2 and 3. Though the construction of the base may vary without departing from the scope of my invention, I find it convenient to make the same as shown in Fig. 3, where it will be seen to consist of two longitudinal strips 6 of sheet metal, connected by cross strips 7 at the ends, the several pieces being suitably riveted together, and a loop or finger-piece 7' being riveted or otherwise made fast to the outer end of the strip 7 to facilitate handling of the base frame in inserting and removing the device.

Riveted or otherwise secured to the longitudinal strips 6, 6, are bent or V-shaped springs 12, of sheet steel or other resilient material, those of one bar 6 alternating with those of the other bar, under the arrangement here illustrated. Each spring 12 carries a plate or finger 8, which may be conveniently made of sheet metal, with upturned longitudinal edges or flanges for a purpose presently explained. Lying upon the upper or inner face of each plate or finger 8 is a fibrous body preferably formed of a series of woven or braided strands 9, laid side by side, and packed more or less closely between the upturned flanges or edges of the plate or finger 8, which flanges serve to maintain them in proper position. In order to maintain the fibrous body in position and keep it stretched taut and smooth, its ends are or may be clamped by sheet metal ears 8'', formed integral with the plate or finger 8, and bent over upon the upper and lower ends of the strands 9 forming said body, as shown in Figs. 4 and 5.

Within the woven or braided strands 9 are or may be placed wires 11. The wires serve not only to transmit heat from the journal to the lubricant to maintain it in proper fluid condition, but also to stiffen and support the strands 9, and aid in maintaining them in proper form and position. The wires also serve to carry up, or assist in carrying up, lubricant from the reservoir to the journal, as was the case in the construction set forth in my prior Patent No. 667,183. This action is believed to be due to capillary attraction incident to the proximity of the wires one to another, aided, it may be, by surface tension and viscosity of the lubricant. This seems clearly demonstrated by tests which have been made to determine the cause of the feeding of the lubricant. Whatever may be the scientific explanation of the physical operation, it is true that the lubricant is carried upward by the wires even in the absence of any fibrous sheath or covering, and this action is inherently present when the wires are employed and arranged as herein set forth. In fact, it has been found that without the fibrous sheath or covering the lubricant is

apt to be carried up faster than is desirable, since when in excess it travels along the lower edge of the saddle or bearing block resting on the journal, and works out of the box at the inner end thereof where the journal passes through the same, and is thus wasted. The fibrous sheath governs and controls the feeding action, preventing, on the one hand, excessive feed, and, on the other hand, maintaining sufficient oil always at the bearing point on the journal to enable the same to start from a condition of rest without danger of being without lubricant. In this way waste of lubricant through escape in the manner described is prevented, and a given supply of lubricant is found to maintain perfect lubrication under service conditions many times longer than where bare wires are used as in my earlier patent before referred to.

I find it advantageous to employ a metallic cover-plate 10 over or above the fibrous body or strands 9. This may advantageously be made of perforate sheet copper, as indicated in Figs. 3 and 6, where the perforations are shown at 10'. This cover-plate, particularly if made of copper as suggested, is found to transmit the heat from the journal to the lubricant sufficiently to keep the latter in a proper fluid state, and hence it is practicable to omit the wires from the strands 9. They may, however, be used in addition to the cover-plate. The cover-plate may be held in position by the ears 8'', in the same manner as are the strands 9 in Figs. 4 and 5.

As before stated, and as best shown in Figs. 2 and 3, the plates or fingers 8 are alternated, and each is inclined from its supporting bar toward or over the companion supporting bar 6, so that the fingers cross at approximately their midlength, and being pressed upward by the springs 12, bear with their upper faces against the lower sides of the journal 3, as shown in Fig. 2.

I have stated that it has been found desirable to make the fingers broader than under my former patented construction, or to bear against a more extended portion of the journal, and I have shown each finger as furnished with five strands 9, laid side by side. This, however, is suggestive rather than essential, the width of the finger as a whole being variable as required. So, too, I have shown and described the fingers as alternating, and passing or crossing each other, but this is not essential. It is, however, found to be a quite satisfactory arrangement.

The construction of the base frame out of thin sheet metal plates or strips 6 and 7 is advantageous, in that the resilience of such plates, which may conveniently be of spring steel or like metal, permits the frame to be flexed to facilitate introduction and removal of the device into and from the journal box,

and such introduction and removal are further facilitated by the crossing of the fingers 8, and their consequent capacity to be folded or pressed down into close proximity to the base frame.

The perforations 10' of the cover-plate 10 permit the lubricant to flow outward over the fibrous body, or the wires, or both, and they also serve to retain a small quantity of the lubricant, and prevent its return flow into the reservoir when the journal is at rest, as is found sometimes to occur where wires or like smooth bodies are solely relied upon to effect the delivery of the lubricant from the reservoir to the journal. The primary purpose, however, of the cover-plate is to prevent the fibrous covering or strands 9 from becoming hardened, glazed, or clogged at the point of contact with the journal or shaft, as might otherwise happen under certain conditions, more especially where the fibrous material is of a very hard or compact nature.

In any structure of this character it is difficult to state with certainty the precise mode or principle of its operation, because numerous factors enter into the problem. Whatever be the cause or causes, the result is certain, that is to say, constructed as herein set forth and shown, the device delivers the lubricant evenly and regularly to the journal, retains on the surface of the fingers and in contact with the journal a sufficient quantity of the lubricant to effect lubrication promptly upon the commencement of rotation of the journal, maintains the lubricant, or a sufficient portion thereof, in proper fluid condition, and produces efficient lubrication with the use or consumption of a relatively small quantity of lubricant.

Where the fingers are alternated or staggered, as here represented, the oil or lubricant delivered by each finger will gradually spread or diffuse itself over the surface of the journal lying between it and the fingers on either side. Though all the fingers will supply lubricant in a measure whichever way the journal may rotate, those bearing on the up-going side tend to deliver in greater quantity than those on the down-going side. This is believed to be due to the fact that the lubricant possesses a certain degree of viscosity or cohesion, and is drawn out in the form of a thin film by the rotating journal, which, making contact with the layer or film of lubricant on the face of the finger, pulls or draws upward thereon, causing the portion below by reason of the stated cohesion, to follow or flow after the portion adhering to the journal. This seems to be indicated by the fact that the upward flow of lubricant becomes more rapid as the speed of rotation of the journal increases.

The flat springs 12 serve to hold the fingers 8 in light contact with the journal, and

cause them to follow any movements of the journal incident to the bounding or jarring of the wheels in rolling over the track. They also prevent any lateral play or displacement of the fingers, and as above indicated, permit the pressing down of the fingers close to the base plate when introducing and removing the device into and from the journal box. The fibrous bodies 9 may be removed and replaced when necessary by bending outward the ears 8".

The fingers 8, considered as a whole, furnished with the fibrous body and a heat-transmitting body, constitute conductors for the lubricant, and for convenience of designation this term "conductor" will be employed in the claims, or some of them.

The broad idea of a lubricant conductor comprising a fibrous absorbent body and a heat transmitting body, and such other novel features as are shown and described herein but not specifically claimed, are reserved for and claimed in an independent application filed in my name December 4, 1909, Serial No. 531,412.

Having thus described my invention, what I claim is:

1. In a journal lubricator, a lubricant conductor mounted to be yieldingly pressed against the surface to be lubricated, and to be immersed at its lower end in the lubricant, said conductor comprising a fibrous lubricant feeding and holding body, and a heat conductor overlying the fibrous body, preventing contact thereof with the surface to be lubricated, and extending from said surface into the lubricant space.

2. In a journal lubricator, a lubricant conductor and a yielding support therefor, whereby the conductor is pressed against the surface to be lubricated, said conductor extending from the surface to be lubricated to the lubricant reservoir, and comprising a fibrous body, and a heat transmitting body overlying the fibrous body, the conductor as a whole serving to transmit heat from the journal to the lubricant, and to deliver lubricant from the reservoir to the journal.

3. In a journal lubricator, a lubricant reservoir; a yielding support within said reservoir; a lubricant conductor extending at its lower end into the lubricant reservoir, carried by the yielding support, and adapted to be pressed thereby against the surface to be lubricated, said conductor comprising a supporting plate or finger, strands of fibrous material carried by said finger, and a perforate metallic plate covering said fibrous material.

4. In a journal lubricator, the combination of a lubricant conductor consisting of a body of fibrous material and a heat transmitting body overlying the fibrous body, said fibrous material being adapted to serve as a lubricant holding and applying means;

and a yielding support for said conductor adapted to press and hold the same against the surface to be lubricated.

5. In a journal lubricator, the combination of a lubricant reservoir; a lubricant conductor consisting of a flat metallic plate with upturned edges and strands of fibrous material placed between said upturned edges, and adapted to serve as a lubricant supplying and holding means; a perforate metallic heat transmitting body for conducting heat from the moving surface to be lubricated to the lubricant in the reservoir; and a resilient support for the combined lubricant and heat conductor, adapted to yieldingly press the same against the surface to be lubricated, the conductor having its lower end extended into the lubricant reservoir where it will be immersed in the lubricant.

6. In a journal lubricator, the combination of a lubricant reservoir; a lubricant conductor consisting of a flat metallic plate with upturned edges and strands of fibrous material placed between said upturned edges, and adapted to serve as a lubricant supplying and holding means; a resilient support on which said conductor is mounted, and by which it is yieldingly pressed against the surface to be lubricated; and a perforate metallic plate overlying said fibrous material.

7. In a lubricator, the combination of a lubricant reservoir; a base or frame mounted therein; a series of lubricant conductors; a series of flat springs interposed between said conductors and the base or frame, and serving to yieldingly press the conductors against the surface to be lubricated, each of said conductors comprising fibrous lubricant supplying and holding means, and an overlying perforate metallic plate for transmitting heat from the journal to the lubricant in which the lower ends of said conductors are immersed when the reservoir is charged.

8. In a lubricator, the combination of a lubricant reservoir; a base or frame mounted therein; a series of lubricant conductors; a series of flat springs interposed between the base or frame and said conductors, and serving to press the latter into contact with the surface to be lubricated, each of said conductors comprising fibrous lubricant supplying and holding means, and a perforate metallic plate for transmitting heat from the journal to the lubricant in which the lower ends of said conductors will be im-

mersed when the reservoir is charged, said conductors being arranged in alternating, oppositely inclined series, substantially as 60 and for the purpose set forth.

9. In a lubricator, the combination of a journal box containing a lubricant reservoir; a frame or base plate mounted therein and provided with yieldingly supported 65 rigid plates or fingers; and a fibrous lubricant conductor and a metallic heat conductor overlying the fibrous body, and removably applied to said fingers.

10. In a lubricator, the combination of a 70 journal box containing a lubricant reservoir; a journal therein; a series of yieldingly supported rigid fingers within said box, provided with integral flexible ears or projections; a series of fibrous bodies ap- 75 plied to the respective fingers, and held in place thereon by the flexible ears or projections; and heat transmitting bodies applied to and overlying the several fibrous bodies, and extending from the journal to the lubricant reservoir, substantially as set forth. 80

11. A lubricant supplying and holding body for lubricators, comprising a fibrous body and an overlying metallic heat conductor, the fibrous body serving to supply 85 and hold the lubricant, and the metallic heat conductor lying between the surface to be lubricated and the fibrous body, and serving to protect the fibrous body against contact with and glazing by the surface to be 90 lubricated, and to transmit heat from said surface to the lubricant, and thus to maintain the lubricant in proper fluid condition.

12. In combination with a journal box and with a journal mounted therein, a lubricant supplying and holding device, comprising a fibrous body and a metallic heat conducting body overlying the fibrous body, the fibrous body serving to supply and hold the lubricant, and the metallic body serving to 100 prevent contact of the fibrous body with the journal and thus to prevent glazing of the fibrous body, and also serving to transmit heat from the journal to the lubricant, and thereby to maintain the lubricant in proper 105 fluid condition.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses, this 2d day of July 1907.

GEORGE J. BINGHAM.

Witnesses:

FREDERIC B. WRIGHT,
J. ALEXANDER VERNON.