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RAIL LUBRICATOR DELIVERY AND APPLYING DEVICE

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4 Sheets—Sheet 2

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RAIL LUBRICATOR DELIVERY AND APPLYING DEVICE


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4 Claims. (Cl. 184—3)

The invention relates to lubricating devices for railway

7 rails and more particularly of the type shown in Heiden

dhal Patent 2,185,810, dated January 2, 1940, although

not limited to such use.

Rail lubricators of the Heidenhal type have been in

10 commercial use for many years and have given generally

satisfactory service. These devices comprise a wheel-

operated ramp on the running rail driving a series of

15 lubricant gear pumps located in the bottom of the lubri-
cant reservoir alongside the track. The pumps feed lubri-
cant to a lubricant delivery or applying device mounted

20 on the gauge side of the running rail, which delivers
lubricant to the wheel flanges in a long substantially con-
tinuous thin line.

The prior delivery device comprises essentially a series of

25 lubricant chambers adjacent the rail web, which cham-
bers deliver the lubricant through a substantially con-
tinuous longitudinal delivery slot formed between a bevel
on the cut-away rail head and a delivery member bolted
to the rail. Each pump feeds two adjacent lubricant

30 chambers through an externally branched piping sys-
tem. Each chamber is provided with a special equalizing
rib to equalize the lubricant feed to its respective delivery
slot.

Objects of the present invention are to improve the

35 uniformity of lubricant feed to the delivery and apply-
ing slot, to reduce the amount of external branched pip-
ing, and in general, to simplify the lubricant feed to the
delivery and applying devices.

According to a preferred form of the present inven-

40 tion, a delivery bar and delivery plate are bolted to-
gether and to the rail. The delivery bar is provided
with a primary longitudinal groove to whose mid-point the
pump delivers lubricant; the delivery bar is also pro-
vided with a pair of aligned secondary longitudinal
grooves whose mid-points are connected by junctions
to the ends of the primary groove.

Connecting with the secondary grooves at the top

45 edge of the bar are two sets of special grooves of re-
stricted cross section. Each set of special grooves
comprises a center group of smaller cross section adjoining
its particular junction, and end groups of larger cross
section on either side. The delivery plate has an upper
longitudinal rib with a beveled inner face which forms,
with the bevel on the rail head, a deep accumulation and
applying slot. This upper rib also has a beveled outer
face to clear the wheel flange.

The several grooves are so shaped and proportioned
that, when the pump is operated to force lubricant to the
delivery device, the lubricant is squirted through the re-
stricted orifices, formed by the restricted grooves and
delivery plate, into the deep accumulation slot where the
lubricant builds up and finally oozes out, and from which
it is wiped off by the wheel flanges in a substantially con-
tinuous long thin line.

Other objects and features of the invention will be
more apparent from the following description and claims
when considered with the accompanying drawings in
which:

FIG. 1 is a perspective of a running rail illustrating two
delivery units, according to the invention, each delivery
unit comprising a delivery plate and delivery bar;

FIG. 2 is a section on the line 2—2 of FIG. 1 taken
through a short machine bolt;

FIG. 3 is a section on the line 3—3 of FIG. 1 taken
through a long through bolt.

FIG. 4 is a section on the line 4—4 of FIG. 1 taken
through a lubricant supply nipple.

FIG. 5 is a side elevation of the delivery plate look-
at ing at the face which contacts the delivery bar;

FIG. 6 is a side elevation of the delivery bar looking
at its face which contacts the delivery plate;

FIG. 7 is an elevation of a single reinforcing strap
used when two applying units are used, as illustrated in
FIG. 1;

FIG. 8 is a side elevation of a reinforcing strap used
when a single applying unit is used;

FIG. 9 is a perspective of a section of delivery bar
illustrating the primary longitudinal groove, the sec-
ondary longitudinal grooves, and the restricted grooves;
and

FIG. 10 is a fragmentary cross section taken on the
line 10—10 of FIG. 9 illustrating the different size re-
stricted grooves.

In the following description and in the claims, various
details will be identified by specific names for conve-

ience, but they are intended to be as generic in their
application as the art will permit.

Like reference characters denote like parts in the sev-
eral figures of the drawings.

In the accompanying drawings and in the description
forming part of this specification, certain specific disclo-
sure of the invention is made for purposes of explana-
tion, but it will be understood that the details may be
modified in various respects without departing from the
broad aspect of the invention.

Referring now to the drawings and more particularly
to FIG. 1, two lubricant delivery or applying devices 8
and 9 are shown applied to running rail 10. The running
rail is a standard T-rail having base 13, web 14 and head
15. The side of head 15 is cut away to form bevel 16.
It will be understood that the number of delivery devices
used depends upon the amount of lubricant it is desired
to apply to the wheel flanges. Each applying device will
be supplied with lubricant by its own single gear pump
operated by suitable operating mechanism (not shown).

Since the lubricant applying devices 8 and 9 are identi-
cal, it is only necessary to describe one. Each lubri-
cant applying device comprises, in general, a delivery or
d-bar 11 and a delivery plate 12 suitably clamped to-
gether and to the running rail 10. The clamped plates
provide branched distributing ducts (FIGS. 2 and 4) to
deliver lubricant to a deep accumulating and applying
slot 28; slot 28 is formed by a bevel on the delivery plate
12 and by the bevel 16 on rail head 15. The applying
slot 25 applies lubricant to the flanges 17 of railway
wheels, as indicated particularly in FIG. 2.

Referring now to FIGS. 6, 9 and 10, the delivery bar
11 has a longitudinal primary groove 20 having an en-
larged mid-point 19. Bar 11 also has two longitudinal
secondary grooves 21. The secondary grooves 21 are
connected end-to-end to form a single groove, but may
be considered, for purposes of explanation, as two sepa-
rate grooves. The mid-point of each secondary groove 21
is connected to the end of the primary groove 20 by a
junction groove 22.

Delivery bar 11 also has a number of vertical restricted
slots 23 and 24 connecting secondary grooves 21 with
space above the bar. When the delivery bar 11 and de-

70 livery plate 12 are clamped together, as illustrated in
FIGS. 2 and 4, for example, these slots 23, 24 become,
in 70 effect, orifices which feed the deep applying slot 28.
It will be noted that primary groove 20 is both wider
and deeper than secondary groove 21 and that secondary
groove 21 is deeper than restricted slots 23 and 24. The relation between the cross sections of these ducts will be discussed more at length below.

Referring also to FIG. 5, the delivery plate 12 has an upper rib 26 having an outer beveled surface 29 and an inner beveled surface forming, with the head bevel 16, the deep slot 28. Delivery plate 12 also has a series of spacers 31 welded thereto which engage the rail head 15 to prevent the applying slot 28 from being closed by pressure of wheel flanges 17. Plate 12 also has openings for the short bolts 34 and through bolts 35, and an opening 36 for the oil nipple 30.

The delivery bar 11 has a longitudinal back slot 37 facing the rail web, which houses the square heads of the short bolts 34 to keep them from turning. In addition to the short bolts 34, through bolts 35 pass through the rail web and through reinforcing strap 38 to clamp the entire assembly together.

It will be understood that a grease-tight seal between the delivery plate 12 and delivery bar 11 is obtained by having smooth meeting surfaces and applying a light cost of plastic sealing compound to the surfaces. This seal, together with the fact that the two plates are drawn together by a series of short bolts 34 and through bolts 35, prevents any leakage of grease forced through the several branched ducts.

The nipple 30 is fed with lubricant by a single pump (not shown) of the positive discharge gear type, such as disclosed in Helenthal Patent 2,019,225 or 2,185,810. The operating mechanism (not shown) for driving the pump may be of the type shown in these patents; or, if desired, the operating mechanism for driving the pump may be of the type disclosed in copending application, Serial No. 729,735, filed April 21, 1956, in the name of Oscar F. Magnus, and assigned to the present assignee. The operating mechanism may be mounted on the track in any convenient or desirable location depending upon the particular operating mechanism and other requirements.

Since two applying devices 8 and 9 are illustrated, the reinforcing strap 38 of FIG. 7 is used, which extends substantially the entire length of the two units. In the event only one applying device is used, the shorter strap of FIG. 8 will be used, which extends substantially the length of the single unit.

Uniform distribution of lubricant along the deep delivery slot 28 depends upon the proportioning of the restricted orifices and the shapes and dimensions of the primary and secondary feed conduits and of the restricted orifices of group B.

Referring to FIGS. 6, 9 and 10, the restricted orifices may be divided into groups indicated by A to F in FIG. 6. “Center” groups B and E adjoining junctions 22 are smaller in cross section; whereas “end” groups A and C, on the one hand, and D and F, on the other, remote from junctions 22, are of larger cross section. Center groups B and E each contain eight orifices and end groups A, C, D and F each contain seven orifices, making forty-four orifices in all. As shown particularly in FIGS. 9 and 10, the restricted orifices are tapered or wedge shaped in cross section when viewed with the faces 24 being deeper and wider than the smaller orifices 23.

It will be understood that the number of restricted orifices 23, 24, their actual cross section, and the number of different cross sections may be varied, and still obtain desirable results.

In practice, excellent results have been obtained using only two sizes of orifices and with the number and arrangement illustrated. The smaller restricted wedge-shape orifices 23 were made .027 inch deep while the larger restricted orifices 24 were made .037 inch deep, with corresponding difference in width. In each case depth was measured from the surface of the bar 11 to the bottom of the grooves as indicated by X in FIG. 10. The angle of the wedge was 45° with respect to the center line Y of the wedge. The orifices were about one inch apart, from center to center.

The cross sections of the several feed ducts are also important to obtaining uniform lubricant distribution along the length of the applying slot. Taking the cross section of the three-quarter inch nipple 30 to one hundred percent, in practice the cross sectional area of the primary groove 20 was taken at about thirty-four percent and since the lubricant moves in both directions from the midpoint, the total effective cross section of both branches of primary groove 20 is sixty-eight percent. The cross section of the secondary grooves 21 was reduced to about sixteen percent of the original nipple, and since the lubricant moves in two directions from each junction point 22, the total effective cross sectional areas of the four branches of the secondary grooves 21 amounted to sixty-four percent of the cross section of the feed nipple, this is slightly less than the total effective cross section of the primary grooves 20.

The total effective cross sectional area of all forty-four restricted orifices of groups A to F amounted to about sixteen percent of the cross section of the nipple, or one-quarter of the total effective cross sectional area of the secondary grooves 21. This considerable reduction in area causes the lubricant to flow through the restricted orifices 23, 24 at a higher speed. It has been found that if the lubricant is not forced through these orifices quickly, the flow has a tendency to become sluggish and the distribution unequal.

The accumulating slot 28 is deliberately made deep so as to act as a sort of storage or accumulation space. This depth, together with the angularity between the orifices 23, 24 and the side of the rail head absorbs the squirts of lubricant from the restricted orifices 23, 24 and prevents them from squiring the lubricant too far where the lubricant can get on the wheel treads. The accumulation slot 28 thus retards or absorbs the squirts, preventing them from reaching the wheel treads and at the same time permits a certain longitudinal flow of lubricant, lengthwise of the rail, to equalize the feed along the length of the delivery slot. The lubricant oozes from the top of the slot 28 where it is picked up by the passing wheel flange 17 in a long thin line.

It will be understood that the velocity of flow of lubricant from the nipple 30 to the restricted orifices 23, 24 progressively increases, reaching a maximum velocity through the restricted orifices. Also, that the single gear type pump, which feeds the nipple with lubricant, is sufficiently large, and that the operating mechanism, which operates the pump, is sufficiently powerful to cause the desired velocity through the restricted orifices. It will be understood that the operating mechanism, operated by the passage of car wheels, operates the pump intermittently so that the lubricant is delivered to nipple 30 in a series of pulses.

Thus a rail lubricant delivery applying device is provided which is simple in construction and reliable in operation. It distributes the lubricant evenly and uniformly along the longitudinal delivery and applying slot. The delivery device applies the lubricant in a long thin line to the wheel flanges without any danger of getting the lubricant on the wheel treads in spite of the squiring action of the restricted orifices. The invention also reduces the amount of external branch piping and minimizes need for machining the running rail.

While certain novel features of the invention have been disclosed herein, and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a rail lubricator, a running T-rail, a delivery bar member adjacent the rail web, a delivery plate member fitting against said bar member and having an upper rib forming, with the rail head, a deep lubricant accumula-
tion and applying slot, the meeting surface of at least one of said members containing a primary longitudinal duct, a set of secondary longitudinal ducts above said primary duct, junction ducts at the ends of said primary duct, each junction duct connecting the primary duct with the mid-point of its respective secondary duct, a series of upright restricted orifices ducts connecting said secondary ducts with said accumulation slot, and feed means communicating with the mid-point of said primary duct.

2. In the rail lubricator of claim 1, a series of blocks located in said applying slot and spaced along the length thereof, said blocks being secured to a wall of said applying slot and acting to prevent car wheels from closing said slot.

3. In a rail lubricator, a running T-rail having a beveled surface at the under corner of its head, a D-bar adjacent the rail web and fitting the upper fillet of the rail, said D-bar having an upright face registering with the lower edge of said beveled surface, a delivery plate fitting against said D-bar and having an upper rib whose inner face carries a beveled surface to form, with said head beveled surface, a deep accumulation slot, said rib having a beveled outer surface to clear wheel flanges; said D-bar having a primary longitudinal groove, a set of aligned secondary longitudinal grooves above said primary groove, junction grooves at the ends of said primary groove, each junction groove connecting the primary groove with the mid-point of its respective secondary groove, a series of upright restricted orifices connecting said secondary grooves with said accumulation slot, those restricted orifices near said junction grooves being of smaller cross section than those remote from said junction grooves; said delivery plate having a feed opening communicating with the mid-point of said primary groove.

4. In the rail lubricator of claim 3, said restricted orifices being tapered in cross section.

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