

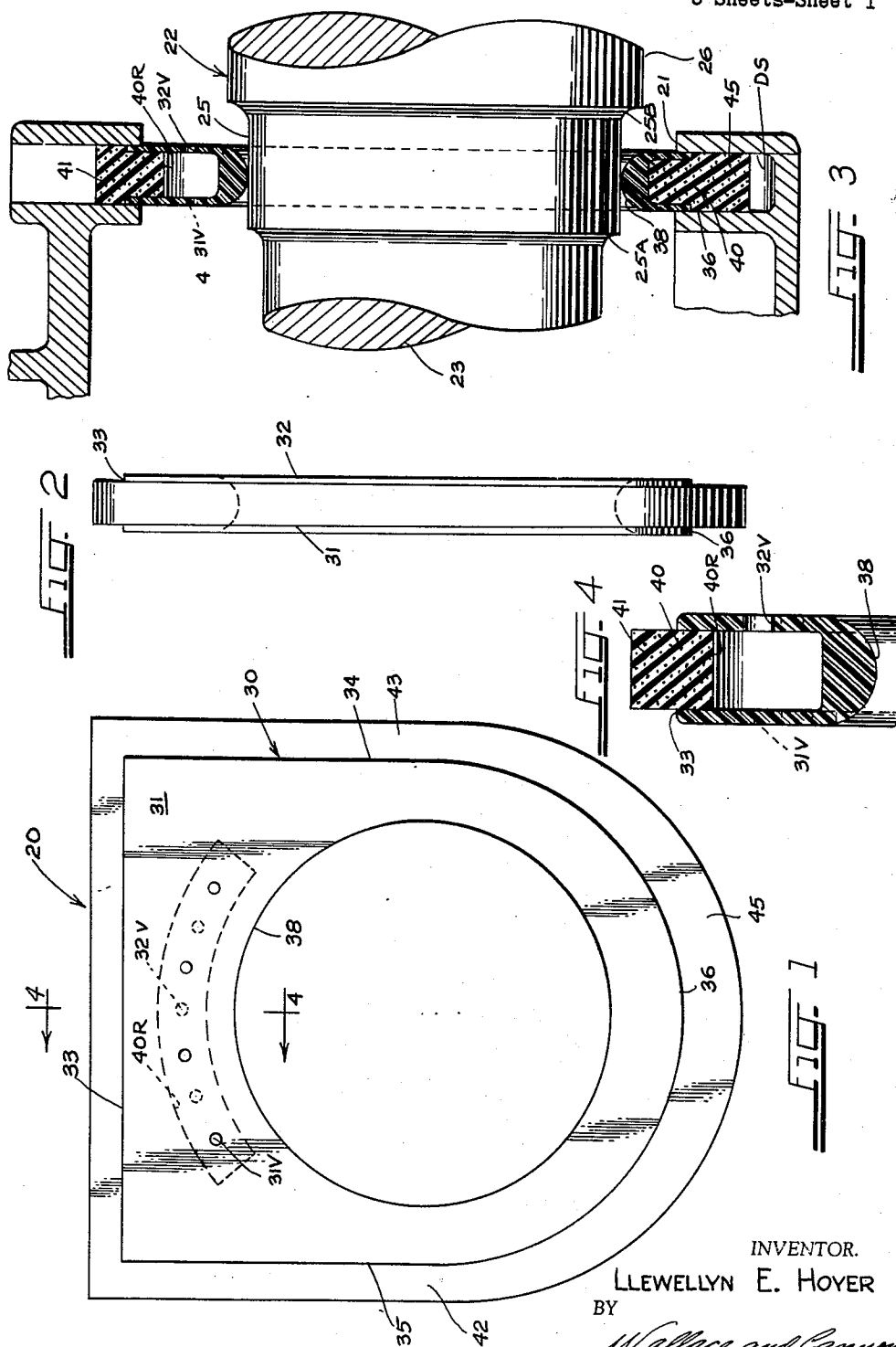
June 21, 1960

L. E. HOYER
DUST GUARDS

2,941,824

Filed Dec. 24, 1956

3 Sheets-Sheet 1



INVENTOR.

LLEWELLYN E. HOYER

BY

Wallace and Cannon

Att'ys.

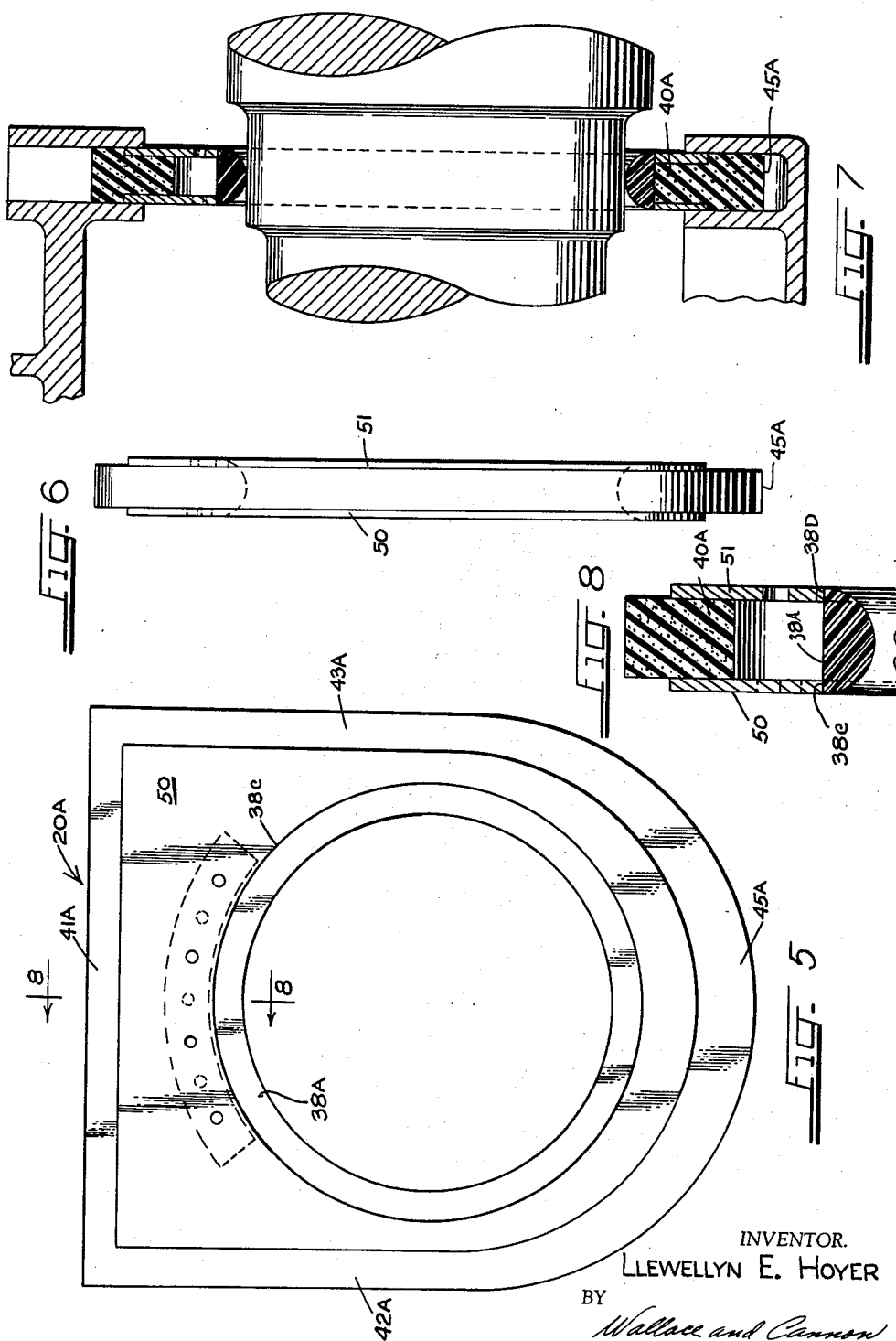
June 21, 1960

L. E. HOYER
DUST GUARDS

2,941,824

Filed Dec. 24, 1956

3 Sheets-Sheet 2



INVENTOR.
LLEWELLYN E. HOYER
BY
Wallace and Cannon
ATT'YS.

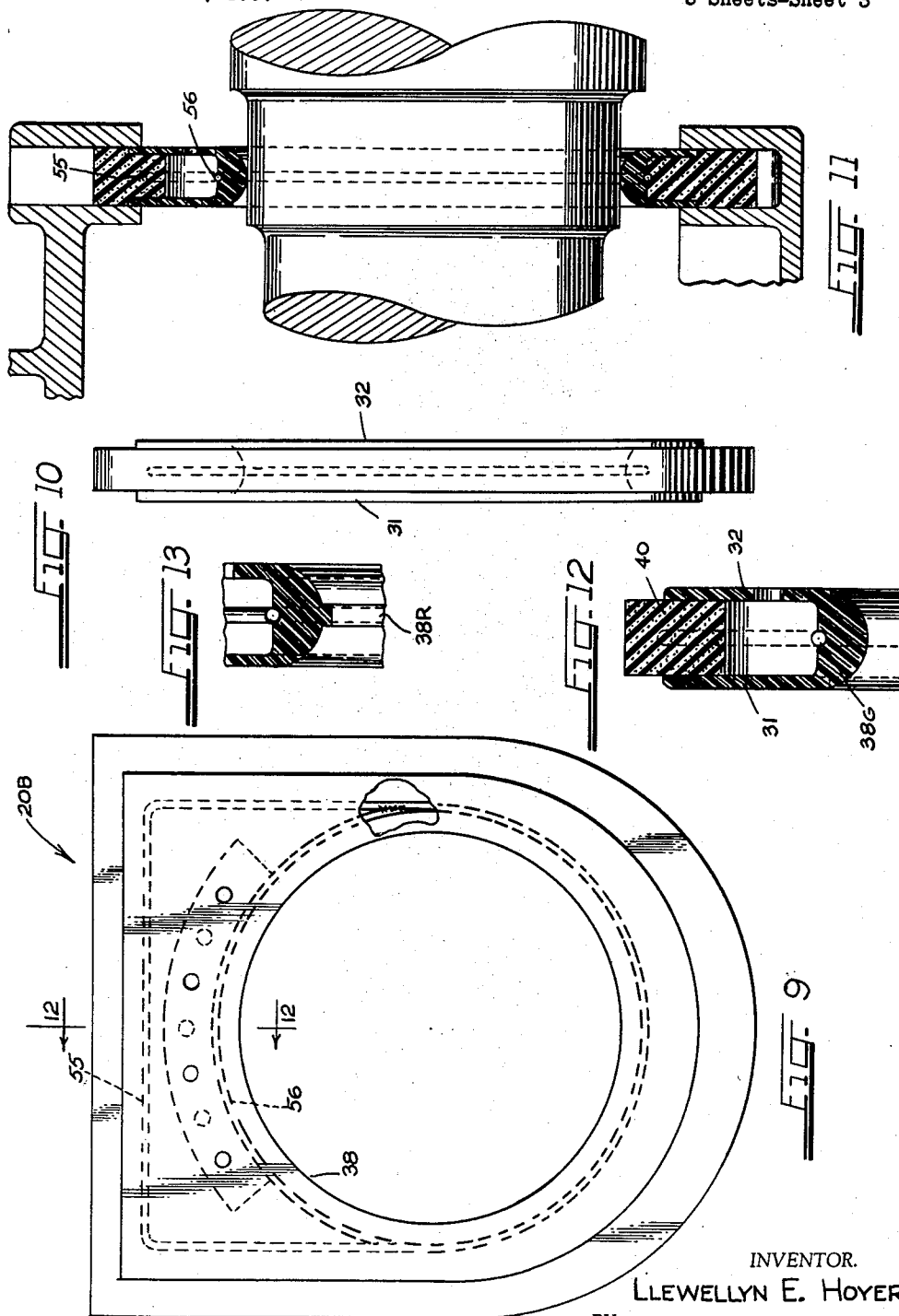
June 21, 1960

L. E. HOYER
DUST GUARDS

2,941,824

Filed Dec. 24, 1956

3 Sheets-Sheet 3



INVENTOR.

LLEWELLYN E. HOYER

BY

Wallace and Cannon
ATTYS.

1

2,941,824

DUST GUARDS

Llewellyn E. Hoyer, Wyckoff, N.J., assignor to American Brake Shoe Company, New York, N.Y., a corporation of Delaware

Filed Dec. 24, 1956, Ser. No. 630,204

3 Claims. (Cl. 286—6)

This invention relates to dust guard seals for railway journal boxes and is a continuation-in-part of my application Ser. No. 510,101, filed May 23, 1955, now abandoned.

In conformance with standard practice, the journal portion of the axle of a railway car rotates on a standard partial bearing in a journal box, the arrangement being such that the bearing is held by a wedge in the top of the box in engagement with the upper peripheral portion of the journal to carry the load of the car.

Normally, a lubricator of one kind or another is disposed in a cavity at the bottom of the box in contact with the journal, and a supply of fluid lubricant retained in the bottom of the journal box is relayed by the lubricator to the journal which in turn wipes the bearing. Considerable difficulties have been experienced in sealing off the end of the journal box that is adjacent to the car wheel against the loss of lubricant and the entrance of contaminating debris that would tend to wear or abrade the bearing or impair the lubricating qualities of the lubricant. In an attempt to thus seal off the journal box one of the more acceptable methods is to mount in the usual dust guard slot of the journal box a dust guard that includes a seal in the form of an annular flap portion so folded as to hug a seal diameter on the car axle.

The motions of the car axle under some circumstances are considerable both as to direction and force. Thus, the journal often partakes of sudden lateral motion which causes the aforementioned flap of the dust guard to ride off the seal diameter afforded therefor on the journal, and it is difficult, if not impossible under some conditions, for the seal flap of the dust guard to reseal itself in a normal operating relation when the journal realigns itself. Moreover, as will be apparent from the description to follow, the seal diameter or so-called dust guard seat on the car axle includes a relatively sharp forward edge, and substantial shearing or abrading forces are encountered by the flap of the aforementioned dust guard during realignment of the car axle after lateral motion.

It will be apparent that in addition to lateral motion, the car axle may also undergo considerable forward or rearward motion due to sudden accelerating or decelerating forces, and motions of this order tend to crush or shear the seal flap of the aforementioned dust guard particularly at the fold. Vertical motions are also imparted to the axle due in part to imperfections in the road bed and the common necessity of jacking the journal box for the purpose of examining or changing the journal bearing, and in either of these cases, a seal flap on the dust guard is again subjected to crush or shear.

Another motion of the car axle that tends to crush or shear the seal flap of the aforementioned dust guard is where the axle tilts or cants as enabled by the standard geometry of the wedge that holds the partial bearing in place. Moreover, this motion of the car axle stretches or distorts the seal flap into a somewhat oval configuration favorable to the loss of lubricant and the entrance into the journal box of foreign matter contaminating the lubricant. A similar condition arises when one side of the car

2

truck creeps ahead of the other side as where curves in the rail are encountered or variations occur in the diameters of the wheels on the same axle.

Another kind of dust guard that is commonly used is one composed of relatively rigid fiberboard, plywood or the like, necessarily having a thickness that is somewhat less than the distance separating the opposed walls of the dust guard slot provided in the journal box, and the bore of this dust guard is larger than the diameter of the dust guard seat or seal fit diameter on the axle. Resultantly, ruptures and failures are commonly encountered where the motion of the car causes the dust guard to be displaced from the dust guard seat on the car axle. It will be appreciated too that with a dust guard of this construction the seal fits are not tight; there is loss of lubricant both when the car is in motion and when the waste packing, where used, is rammed with lubricant; and foreign matter is readily entrained in the lubricant.

In view of the foregoing, the primary object of the present invention is to embody in a dust guard for journal boxes a seal adapted to accommodate all of the axle motions of the car without imposing any special constructions contrary to standard practices adopted and approved for the construction of journal boxes, wheels and axles of railway cars, and one that will tightly seal the periphery of the dust guard seat or seal fit of the car axle as well as that of the dust guard slot in the journal box in a positive manner both against the entrance of foreign matter that would contaminate the lubricant and the loss of lubricant from the journal box.

A further specific object is to embody in the dust guard of the present invention a relatively more soft or resilient outer peripheral seal adapted when the dust guard is in place to undergo relative expansion of an order that seals off the opposed walls of the dust guard slot in the journal box.

Yet a further object of the present invention is to include in a dust guard a primary seal ring having a radius capable of effectively sealing the dust guard seat on the car axle even though the dust guard seat may be of substantially reduced length as a consequence of re-machining the journal in accordance with normal practices entailed in the rehabilitation of a worn or damaged journal; and a further object in this connection is a primary seal for the car axle which permits maximum movement between the primary seal and the seal fit diameter of the axle without crushing or damaging in a similar way the primary seal.

Further objects of this invention are to seal the axle of a railway car in a journal box substantially on a circumferential line only about the axle rather than by an appreciable area contact by a seal flap or the like, thereby enlarging the extent of permissible lateral movement of the car axle and the amount by which the seal fit of the car axle may be reduced by re-machining the axle when worn; to prolong the life of the dust guard; to enable the dust guard to be mounted on the car axle without regard to which side of the dust guard is to be disposed toward the car wheel; to reduce to a minimum engagement between the car axle and the dust guard; to enable the dust guard to readily remount the dust guard seat on the car axle where lateral motion produces separation; and to so construct the dust guard that the interior of the journal box is advantageously vented.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show the preferred embodiments of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equiva-

lent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is an elevation of one dust guard constructed in accordance with the present invention;

Fig. 2 is a side elevation of the dust guard shown in Fig. 1;

Fig. 3 is a fragmentary section of a journal box and a car axle showing the way in which the dust guard of Fig. 1 is related thereto;

Fig. 4 is a detail sectional view on an enlarged scale taken on line 4—4 of Fig. 1;

Fig. 5 is an elevational view similar to Fig. 1 of a modified form of the invention;

Fig. 6 is a side elevation of the dust guard shown in Fig. 5;

Fig. 7 is a view similar to Fig. 3 but showing the modified form of the invention;

Fig. 8 is an enlarged fragmentary sectional detail view of the modified dust guard taken on line 8—8 of Fig. 5;

Fig. 9 is a front elevation of a dust guard similar to Fig. 1 which has been reinforced;

Fig. 10 is a side elevation of the dust guard shown in Fig. 9;

Fig. 11 is a sectional view similar to Fig. 3 showing the reinforced dust guard;

Fig. 12 is an enlarged fragmentary sectional detail view of the reinforced dust guard taken on line 12—12 of Fig. 9; and

Fig. 13 is a detail of a primary seal formed with a seal rib.

Under the present invention there is afforded a dust guard for the axle of a railway car which includes an annular primary seal consisting of a yieldable, that is, deformable low friction material capable of full recovery such as vinyl or Teflon plastic, neoprene or silicone synthetic rubber or other synthetic thermoplastic that is inherently resilient and oil-resistant, and this seal is so shaped as to have but a line contact only circumferentially about a portion of the car axle that extends into the journal box. Secured as by a heat bond to the primary seal for the car axle is an auxiliary or peripheral seal for the dust guard slot of the journal box, and this peripheral auxiliary seal consists of an oil-resistant synthetic which is more soft or resilient as compared to the primary seal. Preferably, the auxiliary seal consists of porous polyurethane or neoprene synthetic rubber, open or closed cell. The more resilient or softer auxiliary member of the dust guard need not necessarily be of cellular sponge or foam, but inasmuch as the sponge or foam type of synthetic plastic imparts high resiliency providing a tight seal about the walls of the dust guard slot such is preferred to non-cellular synthetic rubber or other rubber-like plastic. The dust guard in the present instance is continuous between the car axle and the dust guard slot of the journal box, and hence an intermediate seal is also afforded for closing off the opening in the journal box through which the car axle extends. As will be explained, the intermediate seal is perforate at areas thereof on both sides of the dust guard to prevent build up of pressure inside the journal box.

One form of the present invention is illustrated in Figs. 1 to 4 as embodied in a dust guard 20 which in the present instance is U-shaped in front and rear elevation complementary to the usual U-shaped dust guard slot DS, Fig. 3, which is provided at the end of the journal box JB adjacent the car wheel (not shown).

As is the usual practice, the journal box is provided at the end adjacent the car wheel with a relatively large opening 21 of oval contour, and the axle 22 of the car is extended through this opening into the journal box where the reduced portion or journal 23 is adapted to engage a

standard partial bearing (not shown) provided in the top of the journal box.

The portion of the car axle that is aligned with the dust guard slot DS is formed with a seal fit or so-called dust guard seat 25 having a diameter that is intermediate the diameter of the journal and the wheel fit 26 of the car axle. Where the seat 25 merges into the journal 23 and into the wheel seat 26, annular filleted surfaces 25A and 25B respectively are formed, and it is the dust guard seat 25 as thus provided on the car axle which is to be sealed in part by the dust guard 20.

The dust guard 20 in the modification shown in Figs. 1 to 4 includes a one-piece seal member 30 consisting of a pair of spaced apart members 31 and 32 that are U-shaped in front and rear elevation. Thus, the seal members 31 and 32 each include a straight top edge 33, parallel side edges 34 and 35 and a rounded bottom edge 36, these edges being dimensioned to define an area that is somewhat larger in extent than the area about the inner edge of the dust guard slots DS of the journal box. The members 31 and 32 are each of substantially the same outside dimension, but are relatively thin in nature and are interconnected by an integral web portion 38 which constitutes the primary seal ring for the car axle as will be explained in more detail hereinbelow. It will be observed in Figs. 3 and 4 that the ring 38 is thickened in comparison to the members 31 and 32. This in effect reinforces the ring 38 and imparts stability thereto.

As will be observed in Fig. 3, the web 38 serves to space the side walls or members 31 and 32 to the extent that a cavity of substantial width is afforded therebetween. This cavity serves to retain a highly resilient auxiliary seal member in the form of a pad 40 which, as will be described, includes an expandable marginal portion adapted to seal off the walls of the dust guard slot.

Under the present invention, the compound seal member 30 as thus afforded consists of a non-porous or solid sheet of synthetic such as molded vinyl or Teflon plastic or like non-porous thermoplastic material. These synthetics possess a relatively low coefficient of friction, and during the molding of the seal portion 30 the web 38 thereof is formed with a diameter substantially that of the diameter of the dust guard seat 25 on the car axle, thereby serving as a primary ring seal of low friction characteristics for engaging the car axle in an efficient sealing relation that prevents the ingress of particles of foreign matter and the egress of lubricant with respect to the interior of the journal box on the car wheel side without impairing rotation of, or causing wear on the car axle.

The pad 40 is of porous oil-resistant synthetic rubber which may be molded simultaneously with the molding of the primary seal so that the seal member 40 for the dust guard slot and the compound seal 30 are bonded together as a unitary member. It will be observed in Fig. 1 that the more resilient seal member 40 is formed to have the general shape of the seal member 30, but the marginal portions of the auxiliary seal extend beyond the aforementioned edges of the seal member 30. This affords an auxiliary seal defined by a free marginal portion 41 at the top of the dust guard, free marginal side portions 42 and 43, and a rounded bottom marginal portion 45 also free or unattached to the walls 31 and 32 of the compound seal. The auxiliary seal as thus provided undergoes what constitutes in effect an expansion within the dust guard slot as will now be described.

When unmounted, the width of the dust guard 20 between the outer faces of the walls 31 and 32 of the seal member 30 is somewhat greater than the width of the dust guard slot DS. Accordingly, to mount the dust guard in the dust guard slot DS it is necessary to compress the side members 31 and 32 so as to enable the dust guard to be inserted in to the journal box from the top or open side of the dust guard slot DS. The dust guard 20 is then pushed down into the dust guard slot to the extent that the rounded bottom edges 36 of the walls 31 and 32

5

repose in the bottom of the dust guard slot as shown in Fig. 3, the spaced apart opposed walls of the dust guard slot serving, of course, to guide entry of the dust guard in this manner. Inasmuch as it was necessary to compress the plates 31 and 32 as mentioned above, areas or portions of the pad coextensive with the plates 31 and 32 are under compression and at the same time the free or exposed marginal portions 41, 42, 43 and 45 of the seal member 40 in effect are expanded beyond the outer top, side and bottom edges of the walls 31 and 32 when the dust guard is fully positioned in the dust guard slot, and this assures that the periphery of the dust guard slot beyond the mounted dust guard 20 is effectively sealed off against the entrance of foreign matter by the expanded margin of the seal member 40.

Of particular importance in the present instance is the fact that the web portion 38, constituting the primary seal which engages the dust guard seat 25 of the car axle, is rounded so that in effect the contact between the web 38 and the periphery of the dust guard seat 25 is tangential about the car axle rather than being an engagement of appreciable axial magnitude as has heretofore been the case with many of the dust guards of the prior art having a lip or flap. Hence, the geometry of the dust guard at the primary sealing member 38 with respect to the dust guard seat 25 assures contact with the dust guard seat 25 during motion of the car axle in all directions. Moreover, in the event that lateral movement of the car axle results in displacement of the dust guard from the dust guard seat, re-entry or re-engagement will readily occur upon lateral movement of the car axle in the opposite direction, since again the rounded nature of the web 38 will serve to overcome what would otherwise be a sharp thrust of the forward fillet 25A of the dust guard seat re-engaging the web 38 of the primary seal. In those instances where the primary seal 38 receives a thrust from the inner fillet 25B, the radius of the primary seal again enables this to occur without damage to the dust guard. It was mentioned that the ring 38 is thickened in comparison to the side members 31 and 32. In other words, the inner face of the ring 38 is flattened and the outer face is arcuate in section, and so to do increases the ability of the ring 38 to resist the most severe forces tending to rupture or wear the ring 38.

It is conventional practice where the journal of the car axle has become worn or damaged, to re-machine the journal to a somewhat smaller diameter and as an incident to this the dust guard seat 25 is re-filletted at the forward edge, resulting in a dust guard seat 25 of reduced axial length. In this connection, it will be recognized that since the primary seal 38 has but a tangential contact with the dust guard seat 25, as afforded by the radius of the web 38, such enables the dust guard 20 to remain operative for every reduction in axial dimension of the dust guard seat.

Repeated lateral movement of the car axle is much in the nature of a pumping action having a tendency to cause pressure to build up within the journal box. This can be disadvantageous and under the present invention the dust guard is provided with passages that communicate with the atmosphere. Thus, vent openings 31V and 32V are formed through the plates 31 and 32 and the pad 40 is recessed at 40R in the area that is coextensive with the openings 31V and 32V. It will be observed in Fig. 1 that the openings 31V and 32V are staggered or misaligned and this produces a tortuous vent path which assures that there is no direct passage through the dust guard for lubricant or foreign matter. Moreover, the vent openings are located well above what represents the bottom of the journal box.

Under some circumstances it is advantageous to construct the walls as 31 and 32 of the intermediate seal of a non-porous material which is relatively more hard or rigid than the thermoplastic material of which the primary seal 38 is composed, and among such non-porous materials

6

found to be satisfactory are pressed board, fiberboard, oil-resistant hard rubber or the like material. In Figs. 5 to 7 this modification of the invention is illustrated in a dust guard 20A and inasmuch as the general construction and dimensions of the dust guard 20A are otherwise identical to that described above, reference will be made only to the modifications.

Thus, as shown particularly in Fig. 8, an annular primary seal 38A of a relatively soft synthetic of the kind mentioned above is first provided. The seal 38A is again of semicircular thickened cross-section to engage the car axle about a line only, and united to the outer circular edges 38C and 38D thereof are a pair of intermediate seal plates 50 and 51 consisting of a relatively rigid material such as composition board material, oil-resistant hard rubber or the like as mentioned.

The seal plates 50 and 51 which afford the intermediate seal comprise a straight top edge, parallel side edges and a rounded bottom edge as above described, and the dimensions are such that when the dust guard 20A is disposed in the dust guard slot of the journal box the free marginal portions 41A, 42A, 43A, and 45A of the auxiliary seal 40A are expanded to seal off the dust guard slot.

It will be appreciated that so far as molding procedures are concerned, the temperatures at which the plastic materials thus far described undergo thermal softening or flow are not excessive. Consequently, one procedure is to first mold the primary seal and the seal plates where these are both of the same material, and then to unite the auxiliary seal to the primary seal during the molding of the auxiliary seal. Suitable variations are possible. Thus, where separate intermediate seal plates as 50 and 51 are used, these may first be formed, and then united to the primary seal 38A and the auxiliary seal 40A during molding of the latter.

In the embodiment of Figs. 1 to 4, reinforcement of the dust guard may be desired under some circumstances, and in Figs. 9 to 11 wire reinforcement is provided in the auxiliary seal. Thus, it will be noted that the dust guard 20B illustrated in Fig. 9 is similar to the dust guard 20 of Fig. 1, including a primary seal 38 integral with the seal plates 31 and 32 of the intermediate seal affording a cavity for the auxiliary seal 40. A continuous or closed end wire reinforcement 55 is embedded in the auxiliary seal 40 so as to extend fully about the auxiliary seal in the perimetric portion thereof that is covered by the seal plates 31 and 32.

The wire reinforce 55 is complemented by a segmented wire reinforce 56 arranged as shown in Fig. 9 to complete reinforcement of the diametrical opening in the dust guard provided by the primary seal 38, and as shown in Figs. 11 and 12 it is advantageous to groove the inner liner face of the ring 38 at 38G to accurately center the reinforce 56.

The wire reinforcement as thus provided in the present instance may be inserted in the mold during the formation and uniting of the auxiliary seal to the primary seal 38 and the two seal plates 31 and 32. In this manner, the relatively more yieldable or soft portion of the dust guard as represented by the auxiliary seal may be effectively reinforced against distorting forces where these are likely to be of appreciable magnitude.

To further assure an effective sealing action of the primary seal with respect to the car axle, a small rib 38R, Fig. 13, may be molded or otherwise provided on the medial diameter of the primary seal, which is to say that the rib 38R will constitute the primary contact with the car axle. The edges of the rib 38R should be squared to provide a positive wiping action on the car axle.

It will be appreciated that the foregoing are but preferred embodiments of the invention. Thus, the dust guard in the present instance essentially comprises three seals. One of the seals is of rounded cross-section and is allocated to the car axle so as to engage the car axle

at but a tangent, that is, what in effect amounts to a line contact circumferentially about the dust guard seat of the car axle, such enabling the most violent movements of the car axle to occur without damage to the dust guard.

One further advantage of the tangential or circumferential line contact between the primary seal and the car axle is that engagement between these parts being at a minimum results in very little generation of heat that would otherwise be the case were there to be a contact area rather than a contact line about the car axle. The manifest advantage of this is that the generation of heat at the primary seal during running of the axle is at a minimum, so that the tendency for the primary seal to undergo thermal softening or breakdown is at the lowest possible state. The wear on the dust guard will be least and the life will be greatest.

The second seal of the dust guard is adapted to expansively engage and seal the dust guard slot thereby preventing entrance of foreign matter, either solid or liquid, from entering the journal box through the open portion at the top of the dust guard slot.

The third seal of the dust guard is provided by the seal plates that extend between the primary seal and the second or auxiliary seal. This third seal guards the opening at the end of the journal box through which the car axle is passed, and prevents the escape of lubricant that would be caused by splashing lubricant during motion of the car, or the tendency for lubricant to be squeezed out of the box during setting up of the waste packing in accordance with standard practice.

Further, the seal plates as 31 and 32 are vented, and this prevents build up or pressure within the journal box. All portions of the dust guard are symmetrical, so that it is of no moment which side of the dust guard faces inwardly of the journal box.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a journal box having a dust guard slot through which a journal is adapted to be inserted, a dust guard mounted in the dust guard slot of the journal box and comprising, a primary seal ring for the journal and being of substantially rounded cross-section so as to engage the journal about a circumferential line only, intermediate spaced apart seal plates united to the primary seal for closing off the opening in the journal box through which the journal extends, and an auxiliary one-piece seal pad arranged between said intermediate seal plates and including a free outer marginal portion free of and extended beyond outer edges of said intermediate seal plates about the entire peripheries of said seal plates so as to expand within the dust guard slot, said seal plates having outer marginal face portions engaging the opposed walls of the dust guard slot to compress the inner portion of the pad, the free marginal outer portion of the seal pad being expanded within the dust guard slot outwardly of outer edges of said seal plates, said pad having a recess formed therein and extending transversely through the pad, and said dust guard including vent openings formed in said seal plates to vent the interior of the journal box to the atmosphere, said openings communicating with said recess and being staggered to define a tortuous vent passage.
2. A dust guard according to claim 1 wherein the seal plates and the seal ring are a one-piece member.
3. A dust guard according to claim 1 wherein the seal plates are separate members and wherein the seal ring is a separate member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,152,937	Vigne et al.	Apr. 4, 1939
2,159,825	Stevens	May 23, 1939
2,257,119	Johannesen	Sept. 30, 1941
2,598,381	Hoffman	May 27, 1952
2,798,746	Hoyer	July 4, 1957
2,837,355	Johnson et al.	June 3, 1958