Figure of Abstract : Figure 2a

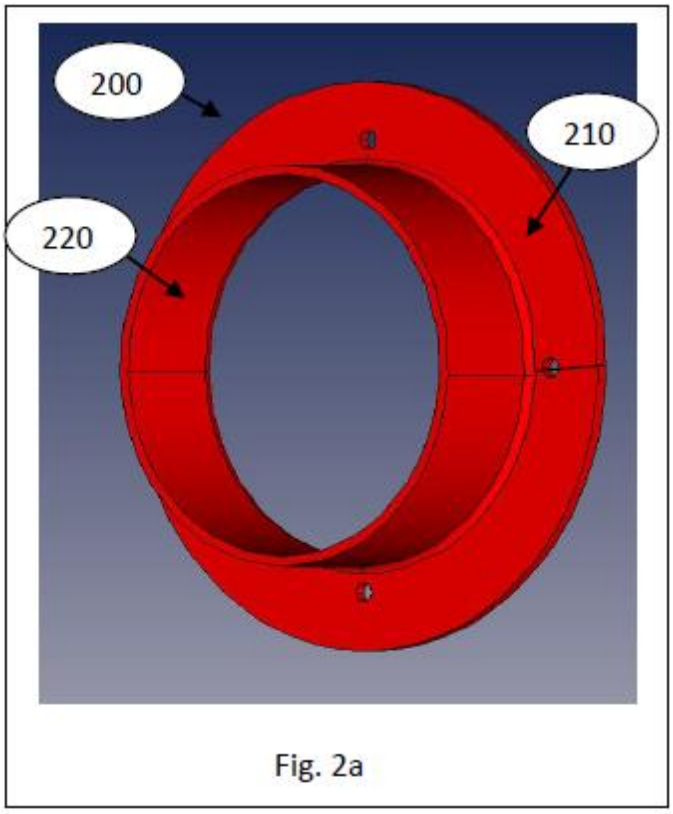

Fig. 2a

FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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THE PATENTS RULES, 2003

COMPLETE SPECIFICATION

[See section 10, Rule 13]

IMPROVED TWO-PIECE COVER FOR SEAL;

MAHINDRA & MAHINDRA LIMITED, A REGISTERED COMPANY WHOSE ADDRESS IS GATEWAY BUILDING, APOLLO BUNDER, MUMBAI – 400 001, MAHARASHTRA, INDIA

THE FOLLOWING SPECIFICATION PARTICULARLY DESCRIBES THE INVENTION AND THE MANNER IN WHICH IT IS TO BE PERFORMED.

FIELD OF INVENTION

This invention relates generally to vehicles with an axle gasket or a seal. More particularly the invention relates to a protective cover for preventing entry of unwanted particles in the seal.

BACKGROUND OF INVENTION

Seals are used in variety of applications including internal combustion engines, heavy duty construction equipment, and other applications that may subject a seal to corrosive materials, abrasive particles, or less / non-lubricated environments. In these applications, seals are placed between objects while allowing the objects to move relative to one another, either through linear motion, rotational motion, or a combination thereof.

Wearing is the degradation that can occur to a bearing, seal and other parts through extended use. Wear is often caused by an increase in friction, which is the resistance to relative motion between objects. Some causes of friction that contribute to wear include loose particles plowing (e.g. cutting, rotating) into the seal and asperity (e.g., surface irregularities) interactions at the surfaces of the seals. These wears are caused due to the accumulation of foreign debris in the contacting surface. Such friction and accumulation of the foreign debris ultimately lead to breakage of seals which is undesirable.

In a known art to reduce the problem of undesirable or foreign materials entering a seal, the industry has generally adapted the use of overlapping shields which provide a tortuous route for the materials to penetrate the contacting surfaces of the seals. While an overlapping shield arrangement does keep the larger particles and objects away from the periphery of such annular seals, finer particles of dirt and mud and ice still accumulate in the labyrinth passages and become firmly packed in place. Since these seals

are normally disposed between relatively rotating members, a very close working clearance is established between the elements and packed debris so that with relatively limited axial or eccentric movement of the elements the packed and relatively entrapped material is pressurized so that a force is transmitted to the periphery of the seals. This force acts adversely on the seals and causes seal failure. Also cleaning for removal of such entrapped material is inconvenient in known arrangements. Therefore, while conventional labyrinth shield arrangements are successful in part, they entrap material there within that can ultimately damage the seals.

One of the prior arts as shown in Fig 1 discloses a seal protection guard (10) for an annular seal assembly which picks up mud, rocks, and other debris disposed between a pair of relatively rotatable members to minimize the entry of extraneous material into the seal assembly, comprising a barrier means (80, 72) disposed in closely radially spaced relation to such a seal assembly and having a plurality of circumferentially spaced shielded openings (78) formed therein to minimize tightly constrained packing of such material outwardly adjacent to the seal assembly by permitting the material to be squeezed substantially directly radially outwardly through the circumferentially spaced openings upon the imposition of an externally applied force tending to press such material into the seal assembly.

Most of such conventional shield arrangements or seal guards do not offer convenience in respect of fitment/assembly or cleaning.

Thus, there is a need for a protective cover which may be readily and conveniently used with the seal assembly to prevent foreign material entering the seal contact surfaces.

SUMMARY OF INVENTION

Accordingly, the present invention provides a protective cover for cassette seal to avoid or deflect direct exposure of unwanted particles like mud, water, slurry etc into the seal disposed between a pair of rotatable members in a vehicle.

In an embodiment the protective cover for a seal of vehicle axle to prevent entry of unwanted particles includes an outer annular body portion and a radial inner body portion connected to the outer annular body portion wherein the cover is devised in at least two piece construction to enable easy assembling or disassembling of the cover for removing the unwanted particles without extricating the seal of the vehicle axle.

In an embodiment, the present invention provides a seal assembly disposed on a vehicle axle. The assembly includes a retainer seal disposed between a cassette seal and a protective cover.

In an embodiment, the present invention provides a protective cover in a two-piece construction which allows it to be opened in two parts without disturbing the assembly, thereby enabling easy removal for accumulated particles and re-assembling the assembly conveniently.

In an embodiment, the present invention provides radial holes in said protective cover to avoid or deflect the accumulation of mud, water, slurry and foreign mater in the seal and to facilitate to clean cavity area periodically.

In one embodiment, the present invention provides a protective cover which rotates along with the seal and could be easily retro-fitted (onto an already existing finished product) to said seal assembly.

In another embodiment, the present invention provides a protective cover which rotates along with axle that throws mud, water, slurry and foreign mater by centrifugal action and avoids accumulation of said foreign materials.

BRIEF DESCRIPTION OF DRAWINGS

Reference will be made to embodiments of the invention, examples of which may be illustrated in the accompanying figures. These figures are intended to be illustrative, not limiting. Although the invention is generally described in the context of these embodiments, it should be understood that it is not intended to limit the scope of the invention to these particular embodiments.

Fig. 1 shows a prior art of a seal guard.

Fig. 2a shows a protective cover for a seal of a vehicle axle in accordance with an embodiment of the present invention.

Fig. 2b shows a protective cover in a two-piece arrangement for a seal of a vehicle axle in accordance with an embodiment of the present invention.

Fig. 3 shows a seal assembly for a vehicle axle in accordance with an embodiment of the present invention.

DESCRIPTION OF THE INVENTION

The embodiments herein and the various features and advantageous details thereof are explained further with reference to the non-limiting embodiments that are illustrated in the accompanying drawings and detailed in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which

the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein.

Various embodiments of the present invention provide a protective cover for a seal of a vehicle axle and a seal assembly to avoid or deflect exposure of mud, water, slurry and foreign mater into the seal disposed between a pair of rotatable members in a vehicle.

In an embodiment the present invention provides a protective cover 200 for a seal of a vehicle axle to prevent entry of unwanted particles in accordance with an embodiment of the present invention. Referring to Fig. 2a, the cover 200 includes an outer annular body portion 210 and a radial inner body portion 220 connected to the outer annular body portion 210. The cover 200 is devised in at least two piece arrangement to enable easy assembling or disassembling of the cover for removing the unwanted particles without extricating the seal of the vehicle axle.

In preferred embodiment, the present invention provides the protective cover 200 in two-piece arrangement as shown in Fig2b, which facilitates convenient assembly and disassembly (removal) for convenient cleaning, thus allowing convenient removal of accumulated undesired foreign mater such as mud, water, slurry, dried debris in and around the seal assembly.

As shown in Fig. 2a & 2b, the two-piece protective cover includes an outer annular body portion 210 in a two piece arrangement as 210a and 210b. The two-piece protective cover 200 further includes a radially inner body portion 220 in a two piece arrangement as 220a and 220b.

In other embodiments, the protective cover 200 can suitably be provided in more than two pieces (or halves) for specific purposes and advantages.

Also the multiple pieces (halves), whether two or more, can be of unequal sizes / asymmetric.

The present invention provides a seal assembly 300 disposed on a vehicle axle 310 to prevent entry of unwanted particles in accordance with an embodiment of the present invention as shown in Fig. 3. The seal assembly 300 includes a retainer seal 320 disposed between a cassette seal 330 and the protective cover 200. The cover 200 disposed on the retainer seal 320 prevents the entry of unwanted particles into the cassette seal 330. The cassette seal 330 is disposed between the retainer seal 320 and shaft of axle 310. The protective cover 200 of the present invention is removably secured to said retainer seal 320.

In one embodiment the seal 330 is assembled with the retainer seal 320 by interference fit.

In another embodiment, the protective cover 200 provides a radial sealing arrangement to the retainer 210. This would help provide further enhanced sealing effect towards avoiding ingress of undesired foreign material. In one embodiment the protective cover 200 rotates along with the axle shaft. In another embodiment the protective cover 200 is made of material selected from a group consisting of low carbon steels.

In an embodiment, the radial inner body portion 220 is integrally formed with the outer annular body portion 210.

In an embodiment, the cover 200 is made from low carbon steel and it has an L type construction. The protective cover 200 is made of L-type construction to removable secure the retainer 210.

In an embodiment, a plurality of holes is provided on the cover for fastening the cover to the vehicle axle.

In an embodiment the protective cover 200 rotates along with a shaft of the vehicle axle 310.

The foregoing description of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification(s) within the scope of the embodiments as described herein and the appended claims.

We Claim:

1. A protective cover for a seal of vehicle axle to prevent entry of unwanted particles, comprising:

an outer annular body portion; and

a radial inner body portion connected to the outer annular body portion;

wherein the cover is devised in at least two piece construction to enable easy assembling or disassembling of the cover for removing the unwanted particles without extricating the seal of the vehicle axle.

2. The protective cover as claimed in claim 1 wherein the radial inner body portion is integrally formed with the outer annular body portion.

3. The protective cover as claimed in claim 1, wherein said seal is a cassette seal.

4. The protective cover as claimed in claim 1 is made from low carbon steel.

5. The protective cover as claimed in claim 1 has an L type construction.

6. The protective cover as claimed in claim 1 wherein a plurality of fastening means is provided for fastening the cover to the vehicle axle.

7. The protective cover as claimed in claim 1 wherein the unwanted particles are dust, mud, dirt, debris and the like.

8. A seal assembly disposed on a vehicle axle, the assembly comprising:

a retainer seal disposed between a cassette seal and a protective cover;

wherein the protective cover includes:

an outer annular body portion; and

a radial inner body portion connected to the outer annular body portion;

wherein the cover is devised in at least two piece construction to enable easy assembling or disassembling of the cover for removing the unwanted particles without extricating the seal of the vehicle axle.

9. The seal assembly as claimed in claim 8, wherein the protective cover rotates along with a shaft of the vehicle axle.

Dated this 31st day of January, 2014

FOR MAHINDRA & MAHINDRA LIMITED
By their Agent

(GIRISH VIJAYANAND SHETH) (IN/PA 1022)
KRISHNA & SAURASTRI ASSOCIATES

ABSTRACT

TITLE.: IMPROVED TWO-PIECE COVER FOR SEAL

The present invention provides a protective cover for a seal to avoid or deflect direct exposure of mud, water, slurry and foreign mater into the seal disposed between a pair of rotatable members in a vehicle is disclosed. The protective cover rotates along with the seal and could be easily retro-fitted to said seal. In an embodiment the present invention provides a seal assembly for a vehicle axle.

Ref. Fig 2a

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App. No.: 359/MUM/2014 **Total Sheets .: 3**

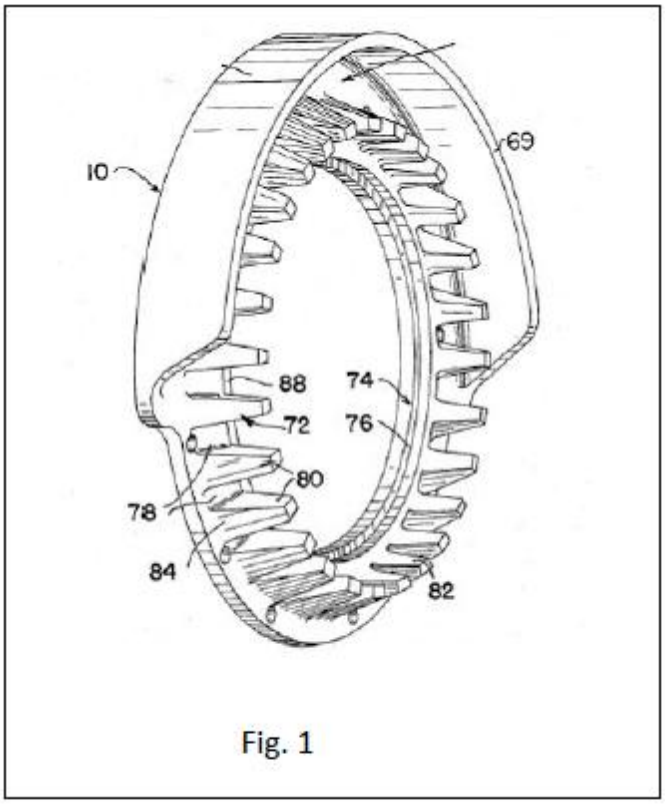

Fig. 1

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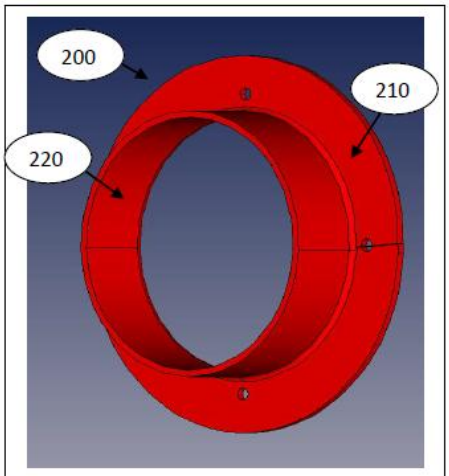

Fig. 2a

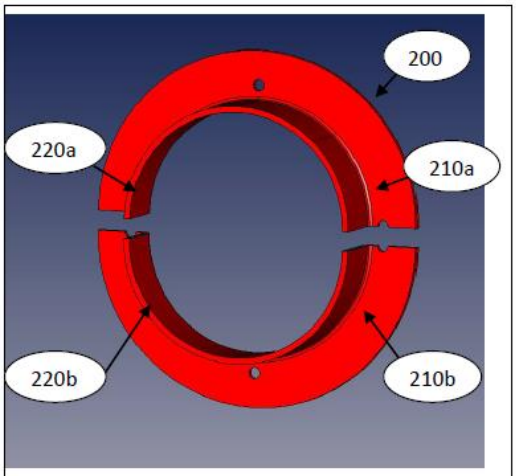

Fig. 2b

(GIRISH VIJAYANAND SHETH) – (IN/PA 1022)
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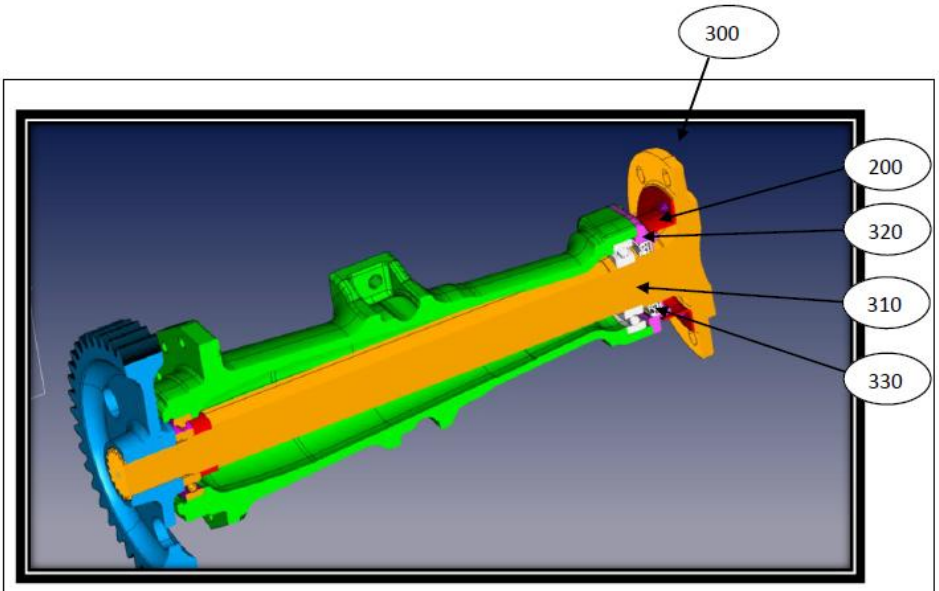

Fig. 3

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