Sept. 2, 1969 N. SCHEUBA ET AL 3,464,476

ANTI-SKID ELEMENT

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FIG. 1

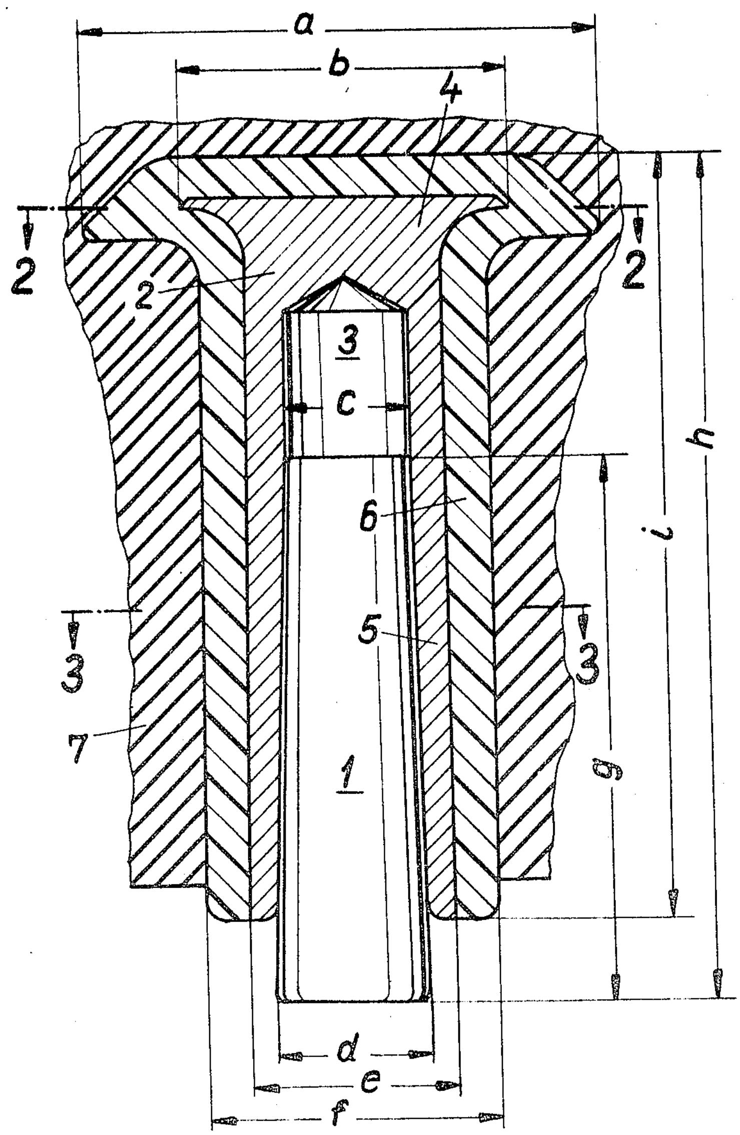

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FIG. 2

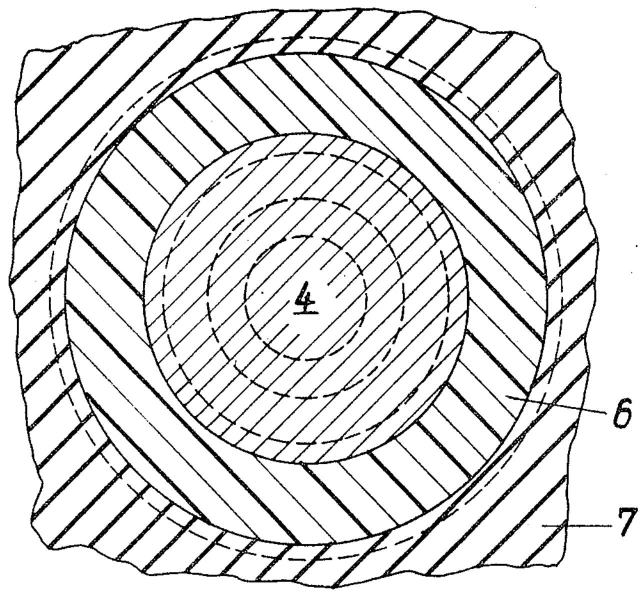
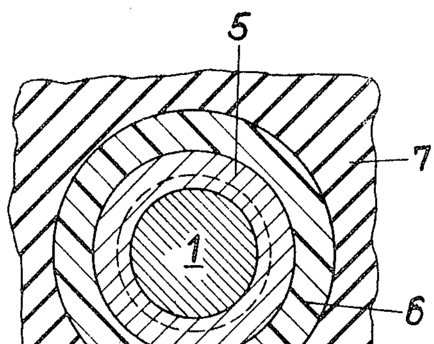


FIG. 3



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ANTI-SKID ELEMENT

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U.S. Cl. 152—210 9 Claims

ABSTRACT OF THE DISCLOSURE

An anti-skid element for tires, in the form of a pin made of wear-resistant material, a sleeve within which the pin is arranged and from one end of which the pin projects, and a sheath surrounding the sleeve. The sleeve is made of a material which is a good heat conductor while the sheath is made of an elastic material which is a poor heat conductor.

BACKGROUND OF THE INVENTION

There exist various types of anti-skid elements, or so-called spikes, that are used to improve the traction afforded by motor vehicle tires, these spikes being embedded in the tire. One such spike consists of a pin made of a wear-resistant material which is arranged, generally by way of a press-fit, in a sleeve, the latter in turn being arranged within a sheath. The pin projects out of the sleeve, and the sleeve and sheath have an enlarged head at the end opposite to that at which the pin projects out of the sleeve.

In heretofore conventional anti-skid elements of the above type, the sheath is made of a ceramic material having negligible elasticity, while the sleeve is made of a light metal and the pin, which occupies the blind bore of the sleeve, is made of a wear-resistant material. This arrangement reduces the amount which the rubber surrounding the spike is heated up, as compared to spikes where there are no sheathing means at all and where the light metal, which itself is a good heat conductor, is in direct contact with the rubber. On the other hand, such spikes have the drawback that the outermost layer of the spike, i.e., the layer which is in direct contact with the rubber, is made of a material having negligible elasticity. This means that foreign particles, such as dust, dirt, sand, grit, salt, and the like, will inevitably work their way between the spike and the rubber, and this will ultimately grind away the rubber so that the bore within which the spike is seated will become enlarged, with the result that the spike will be loosened to the point where it can fall out of the tire, especially under the influence of the centrifugal force to which the spike is subjected as the wheel rotates. The same thing happens when the outermost layer of the spike is made of a material which, though possessing some elasticity, is a good conductor of heat, because the heat generated by the spike will be transmitted directly to the tire, thereby deteriorating the rubber and causing parts of it to break away.

SUMMARY OF THE INVENTION

It is, therefore, the primary object of the present invention to provide a spike or anti-skid element which overcomes the above-described drawbacks of the heretofore known spikes, namely, to provide a spike which will not allow the rubber within which the spike is embedded to be heated up unduly to the point where the rubber would deteriorate, and which resists the entry of foreign particles between the spike and the rubber.

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With the above object in view, the present invention resides, basically, in an anti-skid element for tires, which element comprises a pin made of wear-resistant material, a sleeve made of a material which is a good conductor of heat, which pin is arranged in the sleeve and projects from one end thereof, the other end of the sleeve having an enlarged head, and a sheath which surrounds the sleeve, including its head. According to the present invention, the sleeve is made of an elastic material which is a poor conductor of heat.

In practice, the sheath will be made of a polymer, generally one having a heat conductivity of between approximately 0.1 and 0.4 kcal./m. h. °C., while the sleeve will be made of a material having a heat conductivity of between approximately 100 and 400 kcal./m. h. °C. The ratio of the heat conductivity of the polymer to the heat conductivity of the material of which the sleeve is made will generally be between 1 to 500 and 1 to 2000, and preferably about 1 to 1000.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a longitudinal view through an anti-skid element according to the present invention, the same being shown in a tire carcass.

FIGURE 2 is a transverse sectional view taken on line 2—2 of FIGURE 1.

FIGURE 3 is a transverse sectional view taken on line 3—3 of FIGURE 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, the same show an anti-skid element according to the present invention, the same comprising a pin **1** which is slightly conical and which is made of a hard, wear-resistant metal. The pin **1** is press-fit into a sleeve **2** made of a light metal and projects from the lower end of the sleeve **2**. As shown in FIGURE 1, the pin **1** is shorter than the blind bore **3** of the sleeve **2** and can, if necessary, press itself further into the bore **3**.

The opposite end of the sleeve **2**, i.e., the end which is located within the rubber tire **7**, is in the form of an enlarged head **4**, and both the head **4** and the entire length of the shaft portion **5** of the sleeve **2** are surrounded by a sheath **6**, the entire anti-skid element incorporating the pin, sleeve and sheath being anchored in the tire **7**.

According to the present invention, the sheath **6** is made of a material that has two significant characteristics: it is elastic and it is a poor conductor of heat, as compared to the material of which the sleeve is made, the latter being, for example, aluminum, copper, silver, or an alloy of any of these metals. In practice, the sheath is made of a suitable polmer, such as polyethylene, polyvinyl chloride, a polyamide such as Perlon or nylon, polystyrene, polycarbonate, polypropylene, an acrylic resin such as Plexiglas, Orlon or Pan, polyisobutylene, polyvinyl ether, or polytetrafluoroethylene. These plastics have been found to possess the ability to prevent excessive heat from flowing from the antiskid element to the rubber mass within which the element is embedded, while at the same time these plastics are sufficiently elastic to prevent the entry of foreign particles between the sheath and the inner wall of the opening in the rubber within which the element is located. In this way, the reasons for which heretofore known anti-skid elements became loose are no longer present, so that the anti-skid elements according to the present invention will remain safely embedded in the tire, even at high speeds. This not only prevents the loss of traction, but also makes for a smoother and more quiet ride.

Thanks to the fact that the blind bore **3** of the sleeve **2** is at least as long as the pin **1**, the press-fit can continue to be reinforced, which also contributes to the quiet running of a tire equipped with anti-skid elements according to the present invention, as well as to increased mileage which can be obtained from the tire.

Expressed in terms of measurable physical characteristics, the material of which the sleeve is made will have a heat conductivity of between approximately 100 and 400 kcal./m. h. °C., while the heat conductivity of the material of which the sheath is made will be much lower, namely, approximately 0.1 to 0.4 kcal./m. h. °C. In practice, the ratio of the heat conductivity of the material of which the sheath is made to the heat conductivity of the material of which the sleeve is made will be between 1 to 500 and 1 to 2000, the preferred ratio being of the order of approximately 1 to 1000.

The following Table 1 sets forth several exemplary anti-skid elements according to the present invention and gives the heat conductivities of the materials of which the sleeve and sheath are made, as well as the resulting ratio of heat conductivities.

TABLE 1

Anti-skid element No.	Sleeve material and heat conductivity (kcal./m. h. ° C.)	Sheath material and heat conductivity (kcal./m. h. ° C.)	Heat conductivity ratio
1	Copper, 343	Polyethylene, 0.32	1–1,072
2	do	Polyamide, 0.23	1–1,491
3	do	Polyisobutylene, 0.30	1–1,143
4	Silver, 350	Polyethylene, 0.32	1–1,093
5	Aluminum, 200	Polyvinyl chloride, 0.12.	1–1,665
6	do	Polystyrene, 0.13	1, 1–539
7	do	Polyvinyl ether, 0.11 [1]	[1] 1–1,820
8	Alloy of 80% aluminum, 20% silicon, 140.	Polypropylene, 0.14	1–1,000
9	do	Polycarbonate, 0.15	1–933
10	do	Polyamide, 0.23	1–609
11	Bronze (97% copper, 3% tin), 101.	Polytetrafluoroethylene, 0.14.	1–722
12	do	Acrylic resin, 0.16	1–631
13	Brass (90% copper, 10% zinc), 155.	Polyvinyl chloride, 0.12.	1–1,290
14	do	Polyvinyl ether, 0.11 [1]	[1] 1–1,410
15	do	Polypropylene, 0.14	1–1,108

[1] Estimated.

Table 2 sets forth exemplary dimensions, in millimeters, of anti-skid elements according to the present invention, the dimensions being those depicted in FIGURE 1. It will be understood that anti-skid elements of these and similar dimensions may possess the characteristics of any of the anti-skid elements whose data are given in Table 1.

TABLE 2

[Dimensions in millimeters]

Anti-skid element No.	a	b	c	d	e	f	g	h	i
16	10.0	7.5	2.35	2.85	4.7	7.0	10.0	14.0	13
17	9.0	6.5	2.35	2.78	4.5	6.5	8.5	13.0	12
18	8.0	6.7	2.35	2.70	4.5	6.0	7.0	10.0	9.5

It will be understood that the above description of the present invention is susceptible to various modifications, changes, and adaptions, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

We claim:

1. An anti-skid element for tires, comprising, in combination:

(a) a pin made of wear-resistant material having a slight taper;

(b) a sleeve made of a material which is a good conductor of heat and having a blind bore which is longer than said pin and said pin being press-fit into said blind bore and projecting from one end thereof, the other end of said sleeve having an enlarged head; and

(c) a sheath surrounding said sleeve including said head thereof and being made of an elastic material which is a poor conductor of heat.

2. An anti-skid element as defined in claim **1** wherein said sheath is made of a polymer.

3. An anti-skid element as defined in claim **2** wherein said polymer is a polyethylene, polyvinyl chloride, polyamide, polystyrene, polycarbonate, polypropylene, acrylic resin, polyisobutylene, polyvinyl ether, or polytetrafluoroethylene.

4. An anti-skid element as defined in claim **2** wherein said sleeve is made of aluminum, copper, silver, or an alloy of any of the foregoing.

5. An anti-skid element as defined in claim **2** wherein the material of which said sleeve is made has a heat conductivity of between approximately 100 and 400 kcal./m. h. °C.

6. An anti-skid element as defined in claim **2** wherein said polymer has a heat conductivity of between approximately 0.1 and 0.4 kcal./m. h. °C.

7. An anti-skid element as defined in claim **2** wherein the ratio of the heat conductivity of said polymer to the heat conductivity of the material of which said sleeve is made is between 1 to 500 and 1 to 2000.

8. An anti-skid element as defined in claim **7** wherein said ratio is approximately 1 to 1000.

9. An anti-skid element as defined in claim **2** wherein said sheath extends throughout the entire length of said sleeve.

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