SPECIFICATION

Device for Preventing Skidding and for Increasing the Grip of Vehicle Tyres on Ice and Snow

The invention relates to a device for preventing skidding and for increasing the grip of vehicle wheels on ice and snow.

In addition to snow chains, winter tyres, also called adhesive tyres, are used for motor vehicles when travelling on snow-covered steep up and down gradients. Snow chains are not well liked because they are often difficult to fix to the vehicle tyres and because they must be used in such a way that the road is not damaged, i.e. they must be removed on dry sections of the road following snow or ice-covered sections of the road. In addition, when travelling on dry roads snow chains are subject to a high degree of wear and also do not permit travel at high speed. In particular when roads become covered with ice at short notice, e.g. ice surfaces produced by drizzle falling on frozen road coverings it is hardly possible to use snow chains and winter tyres. Tyres covered with spikes are also not always usable.

In addition to snow chains and winter tyres starting aids are known, but these are not a substitute for snow chains and winter tyres. These starting aids, which merely comprise clamp straps fitted to the tyres, merely serve to permit a vehicle to be driven a short distance out of mud or snow.

The object of the present invention is therefore to provide a device which can be built into or easily fitted to motor vehicle wheels and which can be used for preventing skidding and for increasing the grip of vehicle wheels on ice and snow, which can be used without difficulty whenever needed, whose manufacture is economic, which permits higher speeds than when driving with snow chains or spiked tyres and which is much more effective than winter tyres.

One aspect of the invention provides an anti-skid device, particularly for the wheels of vehicles fitted with pneumatic tyres, for use on icy and snow-covered surfaces, comprising a support housing which includes a base disc attachable to or provided by a wheel disc and a rotating disc rotatable relative to the base disc from a first to a second position and about its centre, the rotating disc being spaced from the base disc to form a gap therebetween, wherein the base disc pivotally supports adjacent its circumferential edge two or more resilient anti-skid arms spaced equidistantly from one another about the edge of the base disc and located in the gap between the base and rotating discs, wherein each anti-skid arm is connected to a respective one of two or more pivot levers and wherein one end of each pivot lever is pivotally connected to the rotating disc adjacent the circumferential edge thereof and the other end of each lever is connected pivotally to its associated anti-skid arm along the length thereof, whereby rotation of the rotating disc from its first to its second position causes the anti-skid arms to swing from inoperative positions to operative positions, the arrangement being such that the anti-skid arms are contained between the rotating disc and the basic disc in their inoperative positions and curved round a side wall and tread of a tyre on the wheel in their operative positions.

Advantageously the rotary disc is biassed to return to its first position by means of tension springs. Preferably the base disc carries a stop member lying in the area swept by each anti-skid arm and limiting the movement thereof. The rotary disc may with advantage carry a stop cam for limiting the inoperative position of each anti-skid arm.

As a result of the device according to the invention a skid protection is obtained for vehicle wheels, together with improved grip of the wheels on ice and snow. Due to the fact that in use at least two resilient anti-skid arms are curved round a sidewall and tread of a tyre on rotating the tyre the ends of the said arms engage between the tyre tread and the supporting surface, such as the road or other substrate. To further increase grip the ends of the anti-skid arms may be externally provided with a gripping profile which can also be in the form of spikes. Manual operation by means of a crank may be used for the rotation of the rotating disc. Alternatively, fully automatic swinging out of the anti-skid arms may be achieved by means of corresponding actuating and drive mechanisms operable by means of a switch on the vehicle dashboard. The anti-skid arms may also be retracted in the same way. If in the extended state of the anti-skid arms the rotating disc is under spring tension, then a fixing and arresting device may be provided for the rotating disc and operated, so that due to the spring tension the rotating disc is rotated and the anti-skid arms are swung in.

Manufacture of the anti-skid device is inexpensive because it comprises few parts. If the anti-skid arms are swung in they do not form a hindrance when driving. The travelling behaviour is in no way impaired. When the anti-skid arms are swung out it is still possible to drive at high speed. Owing to their resilience, the anti-skid arms automatically adapt to the pressing movements of the tyre. The anti-skid device permits quiet running and is neither prejudicial to the vehicle nor to the road. It takes up little space and can be constructed as a fitting for or as a part of most standard wheels.

Advantageous further developments of the invention can be gathered from the Subclaims.

According to a further development of the anti-skid device a manual operating mechanism for the rotating disc may be provided which comprises an insertion opening in the rotating disc for a gear crank and a pitch circle rack in the area of the opening on the base disc, whereby the gear crank has in its end area which passes through the opening a toothed gear which engages in the pitch circle rack. This operating

device permits an effortless manual swinging out of the anti-skid arms.

An automatic swinging out of the anti-skid arms may be made possible by an operating device for the rotating disc comprising a pitch circle-like rack arranged on the wall surface of the rotating disc facing the base disc and located in the space between the rotating disc and the base disc, said rack being in engagement with a toothed gear which passes through an opening provided in the base disc in the vicinity of the rack and connected to a drive mechanism fixedly connected to the wheel suspension.

According to a further embodiment of the invention the rotating disc may automatically be rotated from the swung out position of the anti-skid arms into its initial position.

For the purpose of securing the rotating disc with the anti-skid arms swung outwards a fixing and arresting device may be provided, which is operable manually by means of a correspondingly controlled drive mechanism.

Exemplifying and non-limitating embodiments of the invention are described hereinafter with reference to the drawings, which show:

Fig. 1 a plan view of a vehicle wheel with an anti-skid device with swung in anti-skid arms.

Fig. 2 a plan view of a vehicle wheel with an anti-skid device with swung out anti-skid arms.

Fig. 3 a vehicle wheel in a partial view with anti-skid arms in various positions.

Fig. 4 the anti-skid device comprising a rotating disc and a base disc with a manually operable rotating disc operating mechanism, partly in partial view and partly in vertical section.

Fig. 5 the anti-skid device comprising a rotating disc and a base disc with an automatic rotating disc operating mechanism, partly in partial section and partly in vertical section.

Fig. 6 the anti-skid device with the rotating disc fixing and arresting device, partly in partial section and partly in vertical section.

Fig. 7 a tyre anti-skid device forming an integral part of a wheel with an unloaded and a loaded tyre, partly in elevation and partly in vertical section.

Fig. 8 a tyre anti-skid device detachably connected to a wheel and constructed as a component, in the case of an unloaded and a loaded tyre, partly in elevation and partly in vertical section.

Fig. 9 an anti-skid arm with a profile body in a view of the surface facing the tyre tread.

Fig. 10 a side view of the anti-skid arm of Fig. 9.

Fig. 11 a further embodiment of an anti-skid arm with a profile body in a view of the surface facing the tyre tread.

As can be gathered from the drawings the anti-skid device 10 according to the invention comprises a casing 15 receiving anti-skid arms 41, 42, 43, 44, 45 and 46 which can be swung in and out and which is partly provided by or is fixed to the wheel disc 11 of a vehicle wheel having a tyre 13. Wheel disc 11 is provided with a brake part 12 (Figs. 7 and 8). The tread area of tyre 13 is designated by 14.

Casing 15 constructed in hub cap-like and disc-like manner comprises a circular base disc 20 and a rotating disc 30 which is rotatable about the centre of said base disc. Base disc 20 is provided by the wheel disc 11 (Fig. 7) or attached thereto (Fig. 8).

Rotating disc 30, which is held on base disc 20 by means of guides or the like and is rotatable in the direction of arrows X and X1 (Fig. 3) is constructed in cap-like manner.

In the centre rotating disc has a circular opening 39 and an annular edge portion 33 bent downwards at the edge 39a of opening 39 in the direction of base disc 20 (Figs. 7 and 8). Rotating disc 30 is mounted on base disc 20 so that a space 35 is formed between rotating disc 30 and base disc 20. The inner wall surface of the rotating disc 30 which faces base disc 20 is designated as 32.

For the reliable guidance of rotating disc 30 on base disc 20, rotating disc 30 is guided on base disc 20 by means of a ball or roller bearing 37. For the purpose of receiving the ball or roller bearing 37 the edge of the downwardly bent portion 33 of rotating disc 30 has an annular groove or a plurality of grooves 36 facing annular recess or recessed portions 26 on base disc 20. The balls or rollers of the ball or roller bearing 37 are arranged in the inner space formed by the groove 36 and the recess 26. However the possibility also exists of providing rotating disc 30 in the area of its edge 30a with the downwardly bent portion 33, so that a closed housing is formed with base disc 20. Corresponding openings are then provided in the downwardly bent portion 33 for the extension and retraction of the anti-skid arms 41 to 46. The grooves 36 and the recessed portions 26 are preferably provided in the swung in area of the pivoted levers.

As can be gathered from Figs. 1 and 2 six anti-skid arms 41 to 46 are provided in the casing in the present embodiment. However, the number of anti-skid arms can be selected at random. However, there must be at least two anti-skid arms. All anti-skid arms have the same relative spacing.

The end 41a, 42a, 43a, 44a, 45a and 46a of each individual anti-skid arm 41 to 46 is articulated to the base disc 20 at 21, 22, 23, 24, 25 and 26. The articulation points 21 to 26 are provided in the vicinity of the edge of the base disc.

In order to be able to swing in or out the anti-skid arms 41 to 46 pivoted levers 51, 52, 53, 54, 55 and 56 connected to the anti-skid arms 41 to 46 are provided. Each anti-skid arm is connected in crank mechanism-like manner with a pivoted lever. The end 51a, 52a, 53a, 54a, 55a and 56a of each pivoted lever 51 to 56 is fixed to the rotating disc 30 in the vicinity of its rotating edge 30a at 61, 62, 63, 64, 65 and 66 (Fig. 2). The in each case other pivoted lever end 51b, 52b, 53b, 54b, 55b and 56b is articulated at 71, 72, 73, 74,

75 and 76 to the anti-skid arm 41 to 46, so that the latter and the pivoted levers 51 to 56 assume the position shown in Fig. 1 with the anti-skid arms in the swung in position. If, however, rotating disc 30 is pivoted in the direction of arrow X1 (Fig. 3), anti-skid arms 41 to 46 are swung out of casing 15 by means of pivoted levers 51 to 56 and assume the position shown in Fig. 2.

The swinging in and out of anti-skid arms 41 to 46 is demonstrated in Fig. 3 relative to anti-skid arm 41 and the associated pivoted lever 51. In position A the anti-skid arm and the pivoted lever assume a swung in position. If the rotating disc 30 is rotated in the direction of arrow X1, the anti-skid arm 41 is pivoted beyond position B into the swung out position C, so that anti-skid arm 41 comes to rest laterally alongside tyre 13 and by its free end 41b zonally engages over the tread 14 of tyre 13 (Figs. 7 and 8). In order to prevent (in the case of rotation of rotating disc 30 in direction X1) the anti-skid arms 41 to 46 passing beyond position C, each anti-skid arm has associated with it a stop member 27 on the base disc for engaging its end 41a to 46a. So that said stop member 27 is fully effective each anti-skid arm 41 to 46 is constructed as a two-armed lever, as shown in Fig. 3. Portion 41c of arm 41 extending beyond pivot or articulation point 21 and bears in the stop member 27. All the other anti-skid arms are constructed in the same way as anti-skid arm 41. In the swung out position the anti-skid arms 41 to 46 engage by means of their free ends 41b, 42b, 43b, 44b, 45b and 46b over the tread 14 of tyre 13 (Fig. 2).

Each anti-skid arm 41 to 46 is made from a resilient-elastic material, such as for example spring steel, so that in addition to an adequate inherent elasticity it is also possible to bend down the free end portion 41b to 46b of each anti-skid arm 41 to 46 in the area of the tread 14 of the tyre 13 by means of pivoted lever 51 to 56 so that the anti-skid arms can also be swung into the casing 15, because as a result of the resilient-elastic construction of the arms the latter can spring or deform back from the downwardly bent shape in the position of use into a rectilinear and planar shape on reaching the position of non-use.

In order to achieve this deformation of the anti-skid arms 41 to 46 in their end areas 41b to 46b, pivoted levers 51 to 56 are under a great initial tension, i.e. their length is made such that in the swung out state of the anti-skid levers 41 to 46 the latter assume the tyre deformation positions shown at A and B in Figs. 7 and 8.

However, it is also possible to preshape the anti-skid arms 41 to 46, so that they have from the outset a slightly downwardly bent end position and consequently the anti-skid arm ends come to rest in the vicinity of tyre tread 14 when the anti-skid arms 41 to 46 are extended. Due to the use of spring steel preshaped in this way it is possible to pivot back the arms into the casing 15, whereby they then assume an elongated shape. If the anti-skid arms are then swung out again they are deformed into an arcuate shape due to the resilience of the spring steel used.

It is also possible to use materials other than spring steel, so that pivoted levers 51 to 56 can also be made from spring wire or corresponding suitable synthetic materials.

The anti-skid arms 41 to 46 are detachably articulated to base disc 20, so that damaged or worn arms can be changed effortlessly.

At free ends 41b to 46b the anti-skid arms 41 to 46 have externally gripping profiles 40, so that an excellent grip is obtained. The gripping profile 40 shown in Fig. 7 and 8 may be constructed as spikes.

The rotating disc is provided with an operating mechanism 80 for the manual rotation thereof for the purpose of swinging in or out the anti-skid arms 41 to 46. According to Figs. 3 and 4 the operating mechanism 80 has an insertion opening 81 in rotating disc 30 into which can be inserted a gear crank 82. In the vicinity of insertion opening 81 base disc 20 is provided with a pitch circle rack 83 engageable by a toothed gear 84 at the free end of the gear crank portion inserted through opening 81. If gear crank 82 is passed through opening 81, so that gear 84 engages with the pitch circle rack 83 rotating disc 30 can be rotated in the direction of arrow X or X1 in the case of a corresponding operation of gear crank 82 (Fig. 3).

Fig. 5 shows an automatic operating mechanism 80. In this embodiment the pitch circle rack 83 is arranged on the inner wall surface 32 of rotating disc 30. Rack 83 engages with toothed gear 85, mounted at 87 on base disc 20 and which by means of one portion engages through an opening 28 in base disc 20. Gear 85 is driven by means of a drive mechanism 86. The drive can be of an electromotive type, but other drives are possible. By means of the drive mechanism rotating disc 30 can be rotated in the direction of arrow X or X1.

Tension springs 100 permit an automatic return of rotating disc 30 from the swung out position of the anti-skid arms into the swung in position thereof. These tension springs 100 are distributed over the circumference of rotating disc 30 and/or base disc 20 in such a way that each spring 100 is fixed by its one end 101 to rotating disc 30 and by its other end 102 to base disc 20 (Fig. 6). If rotating disc 30 has a position in which the anti-skid arms 41 to 46 are swung in, tension springs 100 are not under tension. If by means of gear crank 82 or drive mechanism 86 rotating disc 30 is rotated in the direction of arrow X1, so that the anti-skid arms 41 to 46 are swung out springs 100 are tensioned and attempt to spring back into their initial position, thereby rotating back rotating disc 30. To prevent an automatic rotating back of rotating disc 30 into its initial position a fixing and arresting device 90 is provided in casing 15. Device 90 comprises a stop cam 91 shaped onto the inner wall surface 32 of rotating disc 30 and a two-armed stop lever 92 pivotably mounted on base disc 20 at 93. In

position A of Fig. 6 this two-armed stop lever 92 prevents a backward rotation of rotating disc 30 by acting on the stop cam 91. If, however, stop lever 92 is moved into position B, stop cam 91 is released from stop lever end 92a, so that tension springs 100 rotate rotating disc 30 in the direction of arrow X until the anti-skid arms 41 to 46 are pivoted into the casing. Stop lever 92 can be actuated by mechanical (structural tension), pneumatic, hydraulic or electromagnetic devices, indicated at 94 in Fig. 6. This automatic control mechanism 94 is in working connection with the other stop lever end 92b. It is also possible to use an operating mechanism 94, which is transmitter-controlled.

Casing 15 with base disc 20, rotating disc 30 and anti-skid arms 41 to 46, as well as pivoted levers 51 to 56 can be constructed as a single unit, which is then fixed to wheel disc 11 using wheel nuts as indicated in Fig. 8. It is also possible for fixing to take place by other means. The construction of Fig. 8 permits a subsequent fitting of the anti-skid device according to the invention to commercial wheels. In this case the operating mechanism 94 for returning the rotating disc 30 is connected by means of a feedline 95 with a switching mechanism arranged on a vehicle dashboard, so that it is possible to operate rotating disc 30 from inside the vehicle, thereby giving the possibility of retracting the anti-skid arms 41 to 46 at any time. The anti-skid device is fixed to wheel disc 11 by means of base disc 20 being mounted on the screws on wheel disc 11 and tightened by means of wheel nuts.

In the embodiment of Fig. 7 the anti-skid device forms an integral part of the wheel in that base disc 20 is provided by the wheel disc. Rotating disc 30 is then held and rotated in rotary manner on the wheel disc which provides the base disc.

The outside of rotating disc 30 can be constructed as a decorative cap.

Due to the resilient-elastic construction of each anti-skid arm 41 to 46 the end areas thereof adapt to the particular tyre profile, independently of the deformation of the tyre. Figs. 7 and 8 show at A the deformation of the anti-skid arm in the case of an unloaded tyre, with at B the adaptation thereof in the case of a loaded tyre. Furthermore the end position of each anti-skid arm 41 to 46 is limited by means of stop cams 38 provided on rotating disc 30 (Fig. 2) against which the arms bear when fully in their inoperative positions.

In order to obtain the adhesion between anti-skid arms 41 to 46 and the tyre tread the end area of the arms facing the tread is provided with a figuring or profiling 200 (Figs. 9 to 11), extending over the entire length of the engagement surface of each anti-skid arm with the tyre tread and the tyre sidewall, made from rubber or synthetic materials and in the form of profile bodies 201. The latter can be constructed as raised ribs running at right angles to the longitudinal direction of the anti-skid arm and are fitted to the latter (Figs. 9 and 10). Furthermore profile sections 201a can be attached to the anti-skid arms 41 to 46 in such a way that they engage in the tyre profile, i.e. into the profile grooves of said profile, so that the anti-skid arms are secured to the tyre when said arms are in the operating position. The latter embodiment is particularly advantageous in the case of tyres with large post profiles, such as e.g. winter tyres.

Claims

1. An anti-skid device, particularly for the wheels of vehicles fitted with pneumatic tyres, for use on icy and snow-covered surfaces, comprising a support housing which includes a base disc attachable to or provided by a wheel disc and a rotating disc rotatable relative to the base disc from a first to a second position and about its centre, the rotating disc being spaced from the base disc to form a gap therebetween, wherein the base disc pivotally supports adjacent its circumferential edge two or more resilient anti-skid arms spaced equidistantly from one another about the edge of the base disc and located in the gap between the base and rotating discs, wherein each anti-skid arm is connected to a respective one of two or more pivot levers and wherein one end of each pivot lever is pivotally connected to the rotating disc adjacent the circumferential edge thereof and the other end of each lever is connected pivotally to its associated anti-skid arm along the length thereof, whereby rotation of the rotating disc from its first to its second position causes the anti-skid arms to swing from inoperative positions to operative positions, the arrangement being such that the anti-skid arms are contained between the rotating disc and the basis disc in their inoperative positions and curved round a side wall and tread of a tyre of the wheel in their operative positions.

2. A device according to Claim 1, wherein the rotary disc is biassed to return to its first position by means of tension springs.

3. A device according to Claims 1 or 2, wherein the base disc carries a stop member lying in the area swept by each anti-skid arm and limiting the movement thereof.

4. A device according to any one of Claims 1 to 3, wherein the rotary disc carries a stop cam for limiting the inoperative position of each anti-skid arm.

5. A device according to any one of Claims 1 to 4, including a manually operable mechanism for rotating the rotary disc from its first to its second position, the mechanism comprising an aperture in the rotary disc for accommodating a geared crank handle and a curved, toothed rack on the base disc adjacent the aperture, the end of the crank handle insertable through said aperture comprising a gear wheel for engaging with said rack.

6. A device according to any one of Claims 1 to 4, including an automatic mechanism for moving the rotary disc from its first to its second position, the mechanism comprising a curved toothed rack on the wall surface facing the base disc and lying

position A of Fig. 6 this two-armed stop lever 92 prevents a backward rotation of rotating disc 30 by acting on the stop cam 91. If, however, stop lever 92 is moved into position B, stop cam 91 is released from stop lever end 92a, so that tension springs 100 rotate rotating disc 30 in the direction of arrow X until the anti-skid arms 41 to 46 are pivoted into the casing. Stop lever 92 can be actuated by mechanical (structural tension), pneumatic, hydraulic or electromagnetic devices, indicated at 94 in Fig. 6. This automatic control mechanism 94 is in working connection with the other stop lever end 92b. It is also possible to use an operating mechanism 94, which is transmitter-controlled.

Casing 15 with base disc 20, rotating disc 30 and anti-skid arms 41 to 46, as well as pivoted levers 51 to 56 can be constructed as a single unit, which is then fixed to wheel disc 11 using wheel nuts as indicated in Fig. 8. It is also possible for fixing to take place by other means. The construction of Fig. 8 permits a subsequent fitting of the anti-skid device according to the invention to commercial wheels. In this case the operating mechanism 94 for returning the rotating disc 30 is connected by means of a feedline 95 with a switching mechanism arranged on a vehicle dashboard, so that it is possible to operate rotating disc 30 from inside the vehicle, thereby giving the possibility of retracting the anti-skid arms 41 to 46 at any time. The anti-skid device is fixed to wheel disc 11 by means of base disc 20 being mounted on the screws on wheel disc 11 and tightened by means of wheel nuts.

In the embodiment of Fig. 7 the anti-skid device forms an integral part of the wheel in that base disc 20 is provided by the wheel disc. Rotating disc 30 is then held and rotated in rotary manner on the wheel disc which provides the base disc.

The outside of rotating disc 30 can be constructed as a decorative cap.

Due to the resilient-elastic construction of each anti-skid arm 41 to 46 the end areas thereof adapt to the particular tyre profile, independently of the deformation of the tyre. Figs. 7 and 8 show at A the deformation of the anti-skid arm in the case of an unloaded tyre, with at B the adaptation thereof in the case of a loaded tyre. Furthermore the end position of each anti-skid arm 41 to 46 is limited by means of stop cams 38 provided on rotating disc 30 (Fig. 2) against which the arms bear when fully in their inoperative positions.

In order to obtain the adhesion between anti-skid arms 41 to 46 and the tyre tread the end area of the arms facing the tread is provided with a figuring or profiling 200 (Figs. 9 to 11), extending over the entire length of the engagement surface of each anti-skid arm with the tyre tread and the tyre sidewall, made from rubber or synthetic materials and in the form of profile bodies 201. The latter can be constructed as raised ribs running at right angles to the longitudinal direction of the anti-skid arm and are fitted to the latter (Figs. 9 and 10). Furthermore profile sections 201a can be attached to the anti-skid arms 41 to 46 in such a way that they engage in the tyre profile, i.e. into the profile grooves of said profile, so that the anti-skid arms are secured to the tyre when said arms are in the operating position. The latter embodiment is particularly advantageous in the case of tyres with large post profiles, such as e.g. winter tyres.

Claims

1. An anti-skid device, particularly for the wheels of vehicles fitted with pneumatic tyres, for use on icy and snow-covered surfaces, comprising a support housing which includes a base disc attachable to or provided by a wheel disc and a rotating disc rotatable relative to the base disc from a first to a second position and about its centre, the rotating disc being spaced from the base disc to form a gap therebetween, wherein the base disc pivotally supports adjacent its circumferential edge two or more resilient anti-skid arms spaced equidistantly from one another about the edge of the base disc and located in the gap between the base and rotating discs, wherein each anti-skid arm is connected to a respective one of two or more pivot levers and wherein one end of each pivot lever is pivotally connected to the rotating disc adjacent the circumferential edge thereof and the other end of each lever is connected pivotally to its associated anti-skid arm along the length thereof, whereby rotation of the rotating disc from its first to its second position causes the anti-skid arms to swing from inoperative positions to operative positions, the arrangement being such that the anti-skid arms are contained between the rotating disc and the basis disc in their inoperative positions and curved round a side wall and tread of a tyre of the wheel in their operative positions.

2. A device according to Claim 1, wherein the rotary disc is biassed to return to its first position by means of tension springs.

3. A device according to Claims 1 or 2, wherein the base disc carries a stop member lying in the area swept by each anti-skid arm and limiting the movement thereof.

4. A device according to any one of Claims 1 to 3, wherein the rotary disc carries a stop cam for limiting the inoperative position of each anti-skid arm.

5. A device according to any one of Claims 1 to 4, including a manually operable mechanism for rotating the rotary disc from its first to its second position, the mechanism comprising an aperture in the rotary disc for accommodating a geared crank handle and a curved, toothed rack on the base disc adjacent the aperture, the end of the crank handle insertable through said aperture comprising a gear wheel for engaging with said rack.

6. A device according to any one of Claims 1 to 4, including an automatic mechanism for moving the rotary disc from its first to its second position, the mechanism comprising a curved toothed rack on the wall surface facing the base disc and lying

in the gap between the rotary and base discs and which engages with a gear wheel which passes through an aperture in the base disc to a drive device.

7. A device according to any one of Claims 1 to 6, wherein the rotary disc is biassed to its first position by a tension spring one end of which is attached to the rotary disc and the other end of which is attached to the base disc.

8. A device according to any one of Claims 1 to 7, wherein when in its second position the rotary disc interacts with a locking device consisting of a stop cam on the wall surface of the rotary disc facing the base disc and engageable with a two-armed lever pivoted on the base disc, an end of said lever which interacts with the stop cam being led into the base disc through a perforation therein.

9. A device according to Claim 8, wherein the stop lever is disengageable by means of an automatic actuating mechanism.

10. A device according to any one of Claims 1 to 9, wherein the anti-skid arms are replaceably connected to the base disc.

11. A device according to any one of Claims 1 to 10, wherein the support housing including the base disc, the rotaty disc and the anti-skid arms is formed as a unit attachable to a wheel disc.

12. A device according to any one of Claims 1 to 11, wherein the rotary disc has in the centre a circular aperture and a circumferential edge limiting the aperture and angled towards the base disc.

13. A device according to any one of Claims 1 to 12, wherein the rotary disc is supported on the base disc by a ball or roller bearing.

14. A device according to Claim 13, wherein the rotary disc has a circumferential groove or sections of groove and the base disc has in the area opposite to the groove or sections of groove a circumferential indentation or indented sections to accommodate ball bearings.

15. A device according to Claim 14, wherein the grooved sections and indented sections lie in the area swept by the swivelling arms.

16. A device according to any one of Claims 1 to 15, wherein the exterior of the rotary disc is designed as a decorative hub cap.

17. A device according to any one of Claims 1 to 16, wherein the outsides of the free ends of the anti-skid arms bear gripping profiles, spikes or the like.

18. A device according to any one of Claims 1 to 17, wherein each anti-skid arm consists of a pre-curved semi-U-shaped section of spring steel.

19. A device according to any one of Claims 1 to 18, wherein the anti-skid device has six anti-skid arms and six pivot levers.

20. An anti-skid device substantially as herein described with reference to the accompanying drawings.

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