[26] According to one example, the friction face may comprise a chamfered edge extending between the leading edge and the trailing edge, the second portion of the at least one main collection groove being located at least partially beneath the chamfered edge.

[27] The chamfered edge is, for example, located facing the flange of the rotating element. Contact between this chamfered edge and the rotating element generally occurs later than contact between the rest of the pad and the rotating element. Therefore, wear of the chamfered edge begins later than wear of the rest of the pad when the friction face comes into contact with the rotating element. Because the second portion of the at least one main collection groove is located at least partially beneath the chamfered edge, particles collected in the main collection groove are prevented from escaping across the chamfered edge, which is not yet in contact with the rotating element when other parts of the pad are already in contact with that rotating element. At the same time, due to the presence of the second portion, the collection groove extends over a larger surface area.

[28] In one example, the entire second portion of the at least one collection groove is located beneath the chamfered edge.

[29] The chamfered edge may connect the leading and trailing edges. For example, the chamfered edge may be substantially perpendicular to each of the leading and trailing edges. The leading and trailing edges may, for example, be substantially parallel to each other.

[30] According to one example, the lining may comprise a first main collection groove located near the leading edge and a second main collection groove located near the trailing edge.

[31] In this text, “near the leading/trailing edge” is understood to mean located at a distance from the leading/trailing edge that is less than or equal to 20% of the distance separating the leading and trailing edges, preferably less than or equal to 10% of the distance separating the leading and trailing edges.

[32] The presence of the first and second main collection grooves near the leading and trailing edges of the pad lining makes it possible, regardless of the direction of rotation of the rotating element, to collect particles resulting from abrasion of the lining and of the rotating element, in at least one collection groove. Suction of the polluting particles is therefore possible regardless of the direction of rotation of the rotating element.

[33] According to one example, the lengthwise dimension of the first main collection groove may extend substantially parallel to the leading edge, and the lengthwise dimension of the second main collection groove may extend substantially parallel to the trailing edge. The first and second collection grooves may thus be respectively adjacent to the leading and trailing edges along their entire length. The lengthwise dimension of each collection groove is understood here to be the dimension of that groove that lies within the plane of the friction face of the lining.

[34] According to one example, the depthwise dimension of the first main collection groove may not be parallel to the leading edge, and the depthwise dimension of the second main collection groove may not be parallel to the trailing edge.

[35] Indeed, in some cases, the first collection groove may not be parallel to the leading edge of the lining along its entire depthwise dimension, and/or the second collection groove may not be parallel to the trailing edge of the lining along its entire depthwise dimension (depthwise dimension being understood here as the dimension of the first and second collection grooves extending from the friction face to the mounting face of the lining). This may occur even when the first collection groove is substantially parallel to the leading edge and/or the second collection groove is substantially parallel to the trailing edge, along their entire lengthwise dimension (understood here, as indicated above, as the dimension of the first and second grooves contained within the plane of the friction face). In this manner, the portions of the lining between the leading edge and the first collection groove, and/or between the trailing edge and the second collection groove, gradually increase between the friction face and the mounting face, thereby reducing stresses on the lining and thus the risk of breakage in these portions. In one non-limiting example, it is possible for the first and second collection grooves not to be parallel to the leading and trailing edges along their entire depthwise dimension when the leading and/or trailing edges are inclined between the friction face and the mounting face of the lining.

[36] According to one example, the pad may further comprise a secondary collection groove located between the first and second main collection grooves, the secondary collection groove being at least partially open on the friction face.

[37] The presence of the first and second main collection grooves, and of the secondary collection groove, has the advantage of ensuring that, regardless of the radius of curvature of the lining's friction face, the contact of the lining's friction face with the wheel during braking phases occurs while facing one of the collection grooves. A greater amount of polluting particles emitted by abrasion of the pad and wheel can thus be collected in the collection grooves. Moreover, as indicated above, the presence of the first and second main collection grooves near the leading and trailing edges, respectively, ensures the collection of polluting particles regardless of the wheel's direction of rotation.

[38] The secondary collection groove may be located in a central position on the lining. A "central position" is understood here to mean a position located approximately equidistant from the leading and trailing edges of the lining. Alternatively, the secondary collection groove could be closer to one among the leading or trailing edges of the lining than to the other.

[39] The secondary collection groove may extend substantially parallel to the first and second main collection grooves, but this is not a limitation. For example, the secondary collection groove could be substantially parallel to only one of the two main collection grooves. In another example, the secondary collection groove may extend in a direction that is not parallel to the first or second main collection grooves.

[40] According to one example, the secondary collection groove may comprise a first portion that is open on the friction face and a second portion that is covered by friction material of the friction face.

[41] As with the main collection grooves, due to the second portion being covered by friction material, this second portion of the secondary collection groove is open to the friction face only after the friction

material that covers it has been completely worn away by abrasion of the pad in contact with the rotating element during braking phases. In particular, the second portion of the secondary collection groove is initially buried in the lining. As the friction face of the brake pad is worn down by contact with the rotating element, the second portion of the secondary collection groove is exposed and becomes open on the friction face. This prevents the second portion of the secondary collection groove from being open on the friction face before the level of wear of the pad becomes sufficient for the rotating element to seal it off during braking. This thus reduces the risk that particles, originating from wear of the brake pad and rotating element and collected in the secondary collection groove, will escape through the second portion of the groove before being suctioned in by the negative-pressure source. In other words, the secondary collection groove becomes sealed off more quickly. The efficiency of the collection and suctioning of the polluting particles is thus improved, since fewer particles are lost than if the secondary collection groove were initially fully open on the friction face.

[42] The second portion of the secondary collection groove may be entirely beneath the chamfered edge. Alternatively, part of the second portion of the secondary collection groove may be buried in the friction material of the lining's friction face, with the remainder of the second portion of the secondary collection groove being buried beneath the chamfered edge. At a certain level of lining wear, the buried second portion of the secondary collection groove can be exposed, i.e., be open on the lining's friction face.

[43] In some cases, the secondary collection groove is fully open on the lining's friction face even when the pad is new. In such cases, advantageously the secondary collection groove is shorter, for example, no part of it extends into the chamfered edge.

[44] Of course, the lining may comprise a plurality of secondary collection grooves as described herein.

[45] According to one example, the secondary collection groove is fluidly connected to the first main collection groove and to the second main collection groove.

[46] According to one example, channels may be provided within the lining, fluidly connecting the secondary collection groove to the first main collection groove and to the second main collection groove. Alternatively, the secondary collection groove may extend so as to be directly connected to the first main collection groove and to the second main collection groove.

[47] According to one example, the pad further comprises a first transverse collection groove fluidly connecting the first main collection groove to the secondary collection groove, and a second transverse collection groove fluidly connecting the second main collection groove to the secondary collection groove.

[48] By means of these transverse collection grooves, the entire length of the lining between the first main collection groove and the second main collection groove can be traversed by at least one collection groove, thereby increasing the amount of polluting particles resulting from abrasion of the lining and wheel that are collected in the collection grooves. This reduces the amount of polluting particles released into the environment.

[49] According to one example, the first transverse collection groove is at least partially open on the friction face and extends obliquely between the first main collection groove and the secondary collection groove, and the second transverse collection groove is at least partially open on the friction face and extends obliquely between the second main collection groove and the secondary collection groove.

[50] In this text, when it is stated that the transverse collection grooves extend “obliquely,” it is understood that they form a non-zero, non-right angle with each of the grooves that they connect. In the current case, the first transverse collection groove forms a non-zero, non-right angle with the first main collection groove and the secondary collection groove, while the second transverse collection groove also forms a non-zero, non-right angle with the second main collection groove and the secondary collection groove.

[51] The fact that the first and second transverse collection grooves extend obliquely allows the radially outer surface of the wheel to wear evenly during braking, without generating areas of excess thickness on this radially outer surface, as will be described in more detail below.

[52] The first transverse collection groove may extend between one end of the first main collection groove, located next to the axially outer edge of the lining, and one end of the secondary collection groove, located next to the chamfered edge.

[53] The second transverse collection groove may extend between one end of the second main collection groove, located next to the axially outer edge of the lining, and the end of the secondary collection groove, located next to the chamfered edge.

[54] The first and second transverse collection grooves may be open on the friction face along their entire length. However, it is possible to have buried portions in each of the first and second transverse collection grooves.

[55] According to one example, the pad comprises a single suction hole with its mouth being in one among the secondary collection groove, the first main collection groove, and the second main collection groove.

[56] Thus, from a single suction hole, it is possible to suction in the particles collected in the secondary collection groove, first main collection groove, and second main collection groove. Manufacture of the pad is thereby facilitated. Moreover, the overall size of the assembly formed by the negative-pressure source, the communication means, and the pad is reduced.

[57] According to one non-limiting example, the suction hole is arranged at one end of one of the main collection grooves or of the secondary collection groove. This thus concentrates the suction of particles at that end. According to one example, the mouth of the suction hole is at the end of the secondary collection groove that is next to the axially outer edge of the lining.

[58] The suction hole is arranged, for example, in the pad lining so as to fluidly connect one of the collection grooves to the external environment.

[59] According to another example, an individual suction hole may be provided for each of the main collection grooves and for the secondary collection groove. This configuration is particularly useful when the main and secondary collection grooves are not fluidly interconnected, but it could also be used when all the collection grooves are fluidly interconnected. According to one non-limiting example, the individual suction hole is located at one end of the respective collection groove, thus concentrating the particle suction at that end.

[60] In some cases, the lining may further comprise at least one orifice that passes through the chamfered edge. Each orifice may open into one of the main collection grooves or into the secondary collection groove. A flow of air can thus enter the collection grooves through the orifice. By the action of the negative-pressure source, this flow then circulates through the collection grooves until it reaches the suction hole and the pneumatic hose, thereby allowing the particles collected in the lining's collection grooves to be evacuated. Due to this or these orifices, the particle suction performance is independent of the lining's level of wear.

[60a] In an aspect, the present disclosure refers to a brake pad (18), the pad (18) comprising a lining (20) made of friction material and having a friction face (22A) intended to come into contact with a rotating element (12), a leading edge (22E), and a trailing edge (22F), the lining being provided with at least one main collection groove (30, 32), the pad (18) further comprising at least one suction hole intended to be in fluid communication with the at least one main collection groove (30, 32), the at least one suction hole also being intended to be connected to a negative-pressure source, wherein the at least one main collection groove (30, 32) comprises a first portion (34) that is open on the friction face and a second portion (36) that is covered by friction material of the friction face (22A).

Brief description of drawings

[61] Other features, details and advantages will become apparent from the detailed description below, and from an analysis of the accompanying drawings, in which:

Fig. 1

[62] [Fig. 1] shows a schematic perspective view of a braking system according to one exemplary embodiment.

Fig. 2

[63] [Fig. 2] shows a schematic side view of a brake assembly of the braking system of FIG. 1.

Fig. 3

[64] [Fig. 3] shows a schematic front view of details of the braking system of FIG. 1.

Fig. 4A

[65] [Fig. 4A] shows a schematic side view of a rotating element and a brake pad of the braking system of FIG. 1, in a first configuration.

Fig. 4B

[66] [Fig. 4B] shows a schematic side view of a rotating element and a brake pad of the braking system of FIG. 1, in a second configuration.

Fig. 5A

[67] [Fig. 5A] shows a schematic perspective view of a brake pad of the braking system of FIG. 1, according to a first exemplary embodiment.

Fig. 5B

[68] [Fig. 5B] shows a schematic cross-section view of the pad of FIG. 5A.