to be achieved, the anchorages together with the strength of the material used are specifically decisive for the tensile load capacity.

[0004] In order to meet the performance specifications required in the construction industry, coordination is required with regard to the design of the metal fiber, on the one hand, and the fiber material to be used in terms of strength and strain on the other hand. In the context of the object of the invention, it is also particularly important to be able to use the simplest possible, most cost-effective manufacturing technology possible.

[0005] In a first aspect, the present disclosure provides the method for manufacturing metal fibers, in particular tempered or untampered steel fibers, from strip-shaped flat material, wherein the metal fibers have a substantially rectangular cross-section and at least one, preferably both, of the respective wider fiber side faces is/are provided with at least one V-shaped anchor notch extending in the longitudinal direction of the fibers, wherein, to form the metal fibers, a metal strip is provided in the longitudinal direction, preferably on both metal strip surfaces, with fracture notches, as a result of which separating webs are formed at the notch base thereof, which form low-burr and fracture-rough separating surfaces during subsequent separation, optionally also after a rolling process which deforms the separating webs by bending, characterized in that a material adapted to the strength required for the metal fiber in subsequent use is initially used as the metal strip, the metal strip being fed in a first production line in the form of a coil from a driven and controlled uncoiler (1) to a straightening and transport unit (3), which is provided with an overrunning clutch enabling freewheeling, a downstream crop shear (4) forming at least the beginning of the strip, whereupon the metal strip is fed to a profiling roll (6), which consists of an upper roll and a lower roll and is in the form of a rolling tool, for introducing both anchor notches, which are arranged axially offset from one another on the upper and lower sides, as well as the

fracture notches, wherein the two rolls can be provided with undercuts for forming anchor surfaces and/or anchors in the anchor notches and the fracture notches, respectively, which form anchor lines on the metal strip, for which purpose the rolls can be precisely adjusted in their synchronization properties for exact positioning of the anchor lines with respect to the upper and lower rolls and are additionally equipped with stable and adjustable axial guidance of the two rolls with respect to one another, and in that the metal strip then passes, if required, through a combined scoring and straightening unit (7) for deeper notching, scoring or leveling of the anchors in the fracture notches with one or more scoring roller pairs, and is finally wound up again as a coil by a coiling device (8) or is continued in the corresponding production line.

[0006] The progress achieved by the invention consists, among other things, in that an adapted material can be provided for the forming process of the metal fibers, i.e., in particular the profile rolling, as a result of which smaller rolls can be used due to the lower bending forming force for the anchor notches and thus a lower rolling force. The metal strip can be selected to be relatively thin, so that the webs of the fracture notches between the metal fiber strands can be designed to be very small and thus simplify the subsequent separation. The arrangement of the anchor notches on the upper and lower side of the metal strip, in which the inner anchors are provided, makes it possible to keep the axial forces within more easily controllable limits due to their mutual offset by means of a guide function, which significantly reduces the mechanical effort. Finally, the manufacturing process of notching, tempering, and separating described above allows for a very space-saving storage of the metal fiber strips, since the separation into metal fibers can be carried out as needed a later point in time, while metal fibers filled in a container, such as a big bag, take up significantly more space and their subsequent separation for admixture in concrete is complex and usually requires specially equipped devices for this purpose.

[0007] Within the scope of the disclosure, it is also possible, in particular, for the metal strip to optionally pass through a plurality of rolling stations in the optional scoring and straightening unit downstream of the scoring roller pairs, after which an optical detection of the anchors present in the anchor notches and arranged on anchor lines perpendicular to the direction of travel of the metal strip takes place, and herewith a control of a longitudinal dividing shear takes place, which, if necessary, carries out a pre-separation of the metal fiber strands of the anchors in the region of the fracture notch, whereupon a longitudinal dividing roll separates the pre-separated fibers from the metal strip substantially in the anchor region, whereby the profiled metal strip is drawn through the separating roll by a downstream drawing roll, but the latter also requires a supporting, controlled drive of its own, wherein, upstream of the coiling device, a straightening unit having a crop shear and a further

straightening unit for pre-bending the profiled metal strip are optionally provided before the coiling. Instead of coiling, however, the fibers can also be manufactured immediately, especially if no tempering is planned. Due to the relatively thin separating webs, even after a carried out tempering process of the metal strip, a particularly simple and low-interference slitting is possible by means of a dragged separating roll, which may optionally be provided with a supporting drive.

[0008] Following these process steps, depending on the starting material used or the properties of the desired end product, the profiled metal strip can then be subjected to a common and usual heat treatment process, which will therefore not be described in detail here.

[0009] Furthermore, the disclosure provides that in an alternative second production line, after the optional scoring unit and the pre-separation, the profiled and, if necessary, tempered metal strip is uncoiled from a driven and controlled uncoiler and fed into a straightening unit, which is in turn equipped with an overrunning clutch, for straightening and drawing in the beginning of the strip, the beginning of the strip being provided with a clean, flat section by a downstream crop shear, whereupon, after passing through a flat, narrow strip guide, an optical detection of the anchors present in the anchor notches and arranged on anchor lines perpendicular to the direction of travel of the metal strip takes place, which serves the subsequent control of a transverse dividing shear, and, after passing through a further flat, narrow strip guide, the complete separation of the metal fibers from one another takes place in dragged longitudinal dividing rolls or longitudinal dividing rolls provided with a supporting drive, for which purpose the separated metal fibers are drawn through a narrow guide with a high tensile load of a drawing roll, and, still longitudinally separated, are pushed closely guided into a transverse dividing shear and finally cut to length are fed into a collecting container for the separated metal fibers.

[0010] In a second aspect, the present disclosure provides a device for carrying out the method according to the first aspect, in which metal fibers, in particular steel fibers, are produced from strip-shaped flat material, the metal fibers having a substantially rectangular cross-section and at least one, preferably both, of the respectively wider fiber side faces being provided with at least one V-shaped anchor notch extending in the longitudinal direction of the fibers and, to form the metal fibers, a metal strip is provided with fracture notches in the longitudinal direction, preferably on both metal strip faces, whereby separating webs are formed at the notch base thereof, which form low-burr and fracture-rough separating surfaces during subsequent separation, optionally also after a rolling process which deforms the separating webs by bending, characterized in that a driven and controlled uncoiler (1) for the metal strip in the form of a coil is provided in a first production line, further (2) a straightening and transport unit (3) for the metal strip, which is provided with an overrunning clutch enabling a freewheeling, further a downstream crop shear (4) for forming at least the beginning of the strip, further a profiling roller (6), which consists of an upper roller and a lower roller and is in the form of a rolling tool unit, for introducing the anchor notches and the breaking notches into the metal strip, the synchronization properties of the two rollers and their axial guidance relative to one another being precisely adjustable, further comprising a combined scoring and straightening unit (7) having one or more pairs of scoring roller pairs for deeper notching, scoring or also, if desired, for leveling the anchors in the fracture notches in the metal strip, and finally with a coiling device for rewinding the metal strip as a coil.

[0011] In this case, it is advantageous and therefore preferred within the scope of the disclosure that a plurality of rolling stations for the metal strip are provided downstream of the scoring roller pairs, if necessary, that further an optical detection unit is provided for the anchors present in the anchor

notches and arranged on anchor lines perpendicularly to the direction of travel of the metal strip, by means of which a control of a longitudinal dividing roll is effected, which enables a pre-separation of the anchors of the metal fiber strands in the region of the fracture notch, wherein a downstream drawing roll is provided for

advancing the profiled metal strip, and that, upstream of the coiling device, a straightening unit having a crop shear for pre-bending the profiled metal strip is optionally arranged prior to the coiling, wherein, instead of coiling, the units required for longitudinal and transverse dividing can also be provided in accordance with a second production line.

[0012] For carrying out the second production line, it is advantageous if, for unwinding the now profiled and/or optionally tempered metal strip, a driven and controlled uncoiler is again provided, as well as a straightening unit, again equipped with an overrunning clutch, for straightening and drawing in the beginning of the strip, furthermore a crop shear for applying a clean, flat section to the beginning of the strip, furthermore an optical detection device for determining the anchors present in the anchor and fracture notches and arranged on anchor lines perpendicular to the direction of travel of the metal strip, wherein for guiding the metal strip in front of and behind the optical detection device, flat, narrow strip guides are provided for the metal fibers, which are partially separated from one another, in that furthermore dragged or optionally drive-supported longitudinal dividing rolls are provided for complete separation of the metal fiber strands from one another, as well as a drawing roll, wherein for the longitudinally separated metal fiber strands a narrow guide is to be provided to the transverse dividing shears, which are controlled by the optical detection device and cuts the metal fiber strands to length. The fibers are fed into a collecting container.

[0013] In this case, it has proven to be advantageous if the scoring and straightening unit is provided with a plurality of, preferably two, scoring roller pairs.

[0014] In a third aspect, the present disclosure relates to a metal fiber, in particular a steel fiber, according to the method in the first aspect and the device in the second aspect, formed from strip-shaped flat material, wherein the metal fiber has a substantially rectangular cross-section and at least one, preferably both, of the respective wider fiber side faces is/are

provided with at least one V-shaped anchor notch extending in the longitudinal direction of the fiber, the metal fiber

being formed from a metal strip which is provided in the longitudinal direction, preferably on both metal strip surfaces, with fracture notches, the notch bases of which form separating webs which, during subsequent separation, optionally also after a rolling process which deforms the separating webs by bending, form low-burr and fracture-rough separating surfaces, characterized in that the metal strip used consists of a material which is adapted with respect to the strength required for the metal fiber in subsequent use, wherein the anchor notches arranged axially offset from one another on the upper and lower sides as well as the fracture notches are introduced by a profiling roller (6), which consists of an upper roll and a lower roll and is in the form of a rolling tool, the two rollers of which, which have exactly synchronous running properties, can be provided with undercuts for forming anchor surfaces and/or anchors in the anchor notches or the fracture notches, wherein the fracture notches can be notched deeper, scored deeper or the anchors in the fracture notches may be leveled by the scoring roller pairs of a scoring and straightening unit (7).

[0015] The invention is explained in more detail below with reference to an exemplary embodiment in the form of a device, in which:

Fig. 1 shows a schematic representation of a production line according to the invention from cold strip to the profiled metal strip in a first embodiment,

Fig. 2 shows a representation corresponding to Fig. 1 of an alternative embodiment in plan view a) and section b), wherein also all of the structural units provided only optionally are shown,

Fig. 3 shows a detail of the notched metal strip with the anchor lines and the non-separated web region (web rest),

Fig. 4 shows the production line adjoining the subject matter according to Fig. 1 or 2 from the profiled metal strip to the profiled metal fiber in a side view,

Fig. 5 shows a metal fiber in section.

[0016] The arrangement shown in the drawing is provided for carrying out a method which serves to produce metal fibers, in particular steel fibers, from strip-shaped flat material. These metal fibers, shown by way of example in Fig.