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(71) Applicants:
- **Kestelyn NV**
  8790 Waregem (BE)
- **Renson, Paul**
  8790 Waregem (BE)

(72) Inventor: **Abeel, Bart Pieter Jules**
8880, SINT-ELOOIS-WINKEL (BE)

(74) Representative: **Ostyn, Frans**
K.O.B. NV
President Kennedypark 31 C
8500 Kortrijk (BE)

(54) **Screening device**

(57) The invention relates to a screen (1) which can be wound onto and unwound from a screen roller using a maximum of N rotations, in which flexible thickenings (3) with a thickness d are guided in screen guides during the winding and unwinding movement, in which creasing of the screen (1) and folding over of the thickenings (3) during winding and unwinding is prevented:
- by screen roller end pieces (4) provided with a narrowing (5) with a drop (6), having a drop width b and drop height h, in which the partial drop width bl, in which the drop height is 75% of h, is at least 5 mm and at most $\frac{35}{0{,}18\,N + 0{,}7\,d}$ and with diameters which decrease with respect to the diameter ø of the screen roller,
- and by tensioning the screen (1) in the unwinding direction by using a tensioning system.

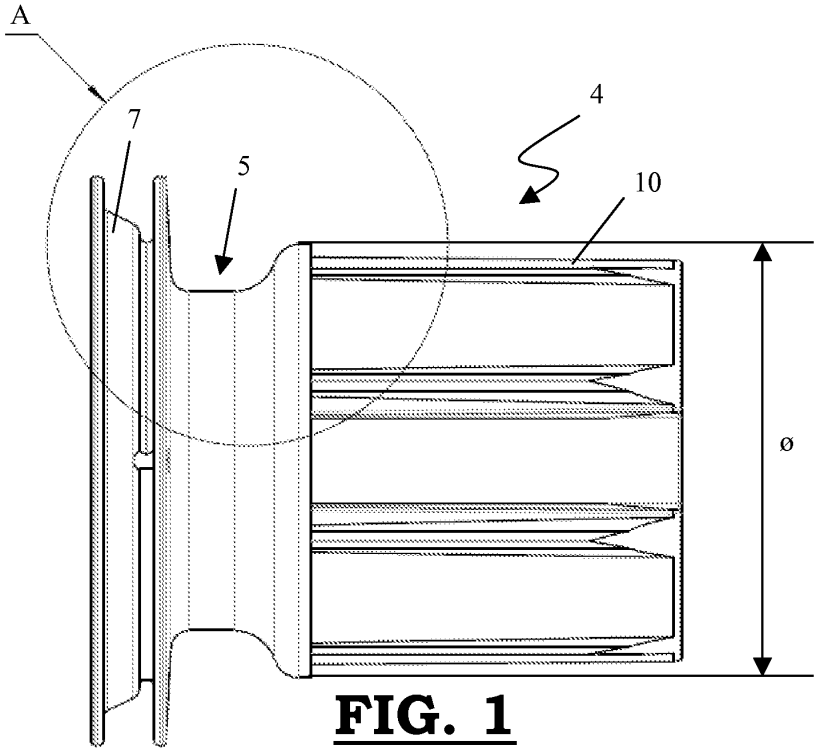

FIG. 1

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Description

[0001] The present invention relates to a screen device comprising:

- a screen roller having a diameter ∅;
- a screen which can be wound onto and unwound from this screen roller using a maximum of N rotations, in which the lateral sides of this screen comprise a continuous flexible thickening having a thickness d;
- one or more screen guides which are provided for guiding the continuous flexible thickening during the winding and unwinding movement of the screen;
- a screen roller end piece at each end of said screen roller which is provided with a narrowing having at least one drop on the side of said screen roller with diameters which decrease with respect to said diameter ∅ of the screen roller, this drop comprising a specific drop width b and a drop height h.

[0002] Screen devices comprising a screen which can be wound onto a screen roller which is provided with continuous thickenings on the lateral sides which are guided in screen guides during the winding and unwinding movement of the screen have already been described repeatedly in patent literature, for example inter alia in FR 2 602 539 A1, NL 1 029 104 C, EP 1 669 537 A2, NL 1 014 061 C, EP 1 491 712 A2 and EP 0 272 733 A1. Such thickenings are often designed in the form of half zip fasteners, by providing the screen with half zip fasteners on the lateral sides.

[0003] These thickenings have to be of a sufficiently thick design in order to hold such a screen securely in these guides, so that the sides thereof cannot readily break free when sudden gusts of wind occur, and to prevent flapping of the screen as much as possible. As is indicated in EP 0 272 733 A1 and NL 1 029 104 C, a problem which occurs when providing such relatively thick thickenings on the lateral sides of the screen is that these thickenings also result in relatively thick areas when the screen is being wound up, for which space has to be provided.

[0004] In EP 0 272 733 A1, the lateral sides of the screen which are provided with the thickenings therefore extend beyond the ends of the screen roller in order to prevent the thickenings of the screen piling up on the screen roller. However, it is a drawback of this solution that the screen creases and wrinkles at the abrupt transition where the screen roller ends.

[0005] Preferably, a space is therefore provided for the thickenings of the screen in the form of narrowings on the ends of the screen roller, as is described in NL 1 029 104 C, in order to prevent the formation of creases in the screen and folding of the thickenings when winding the screen onto the screen roller. With regard to this problem and the solution described in NL 1 029 104 C we also refer to this patent publication.

[0006] However, when a screen is only guided on the lateral sides, problems will still occur, albeit to a limited degree, in the case of gusts of wind and other possible external influences, resulting in the screen starting to flap, wrinkle, knot, etc. As has been described in EP 1 566 518 A1, the provision of a tensioning system in addition to the guiding of the lateral sides in order to tension the screen in the unwinding direction is also indicated. This can be done by using known tensioning systems, such as for example the tensioning systems described in EP 1 566 518 A1, EP 0 918 118 A1, NL 1 007 572 C, etc. In order to prevent the problem of wrinkling and folding of the thickenings when winding the screen onto the screen roller, the screen from EP 1 566 518 A1 is not provided with thickenings on its lateral sides along its entire length, but is provided only discontinuously and at clear intervals with reinforcing rope on these lateral sides. However, the drawback thereof is that the zones between these discontinuous thickenings are still prone to wrinkling, knotting and flapping when gusts of wind occur and are susceptible to tearing of the screen. In addition, this solution in EP 1 566 518 A1 cannot be used for blackout screens, as light can penetrate along the lateral sides and between these discontinuous thickenings. In addition, such a screen can no longer act as insect screen, since the lateral sides are not completely closed to prevent the intrusion of insects.

[0007] The use of such a tensioning system with the screen device from EP 0 272 733 A1 increases the problem of creasing of the screen at the ends of the screen roller.

[0008] However, simply using a tensioning system to tension the screen in the unwinding direction in the case of a screen device as described in NL 1 029 104 C does not appear to be readily possible in practice either without the thickenings folding again when the screen roller is wound up due to this combination.

[0009] It is therefore an object of the present invention to provide a screen device in accordance with the preamble of the first claim, in which, on the one hand, guiding continuously thickened lateral sides of the screen in screen guides and, on the other hand, tensioning of the screen in the unwinding direction can be combined without the screen creasing and without the thickened lateral sides turning over on the screen roller during winding.

[0010] This object of the invention is achieved by providing a screen device, comprising:

- a screen roller having a diameter ∅;
- a screen which can be wound onto and unwound from this screen roller using a maximum of N rotations, in which the lateral sides of this screen comprise a continuous flexible thickening having a thickness d;
- one or more screen guides which are provided for guiding the continuous flexible thickening during the winding and unwinding movement of the screen;
- a screen roller end piece at each end of said screen

roller which is provided with a narrowing having at least one drop on the side of said screen roller with diameters which decrease with respect to said diameter ∅ of the screen roller, this drop comprising a specific drop width b and a drop height h;

in which the screen device comprises a tensioning system for tensioning the screen in the unwinding direction and in which the partial drop width b1, in which the drop height is 75% of the total drop height h, is at least 5 mm and at most $\frac{35}{0{,}18\,N + 0{,}7\,d}$, with b1 and d being in mm.

[0011] In contrast to what could be concluded from the prior art as described in NL 1 029 104 C, it appears that when a screen in a screen device, as is also described in NL 1 029 104 C, is to be fitted with a tensioning system for tensioning the screen in the unwinding direction, the drop of the narrowing on the side of the screen roller has to be quick and at least as quick as the relationship given above between the relevant parameters, in order to prevent folding of the zip. This drop should therefore not, as is indicated in NL 1 029 104 C, be designed as having a very slow transition.

[0012] At the same time, this drop has to have a certain width in order to prevent wrinkling. To this end, the partial drop width b1 at which the drop height assumes 75% of the total drop height is at least 5 mm.

[0013] Preferably, however, in the case of a screen device according to the present invention here said drop of the narrowing of the screen roller end piece on the side of said screen roller also comprises a convexly curved outer surface which faces this side in order to prevent wrinkling at the transition between the screen roller and the screen roller end piece. Adjoining said convexly curved outer surface, here said drop also comprises a preferably concavely curved outer surface, turned away from the screen roller.

[0014] Preferably, said diameter ∅ of the screen roller of a screen device according to the present invention is ≤ 100 mm in order to limit the dimensions of the housing of the screen device, and more specifically < 80 mm. Also, the thickness d of the continuous flexible thickening is preferably 1,6 < d < 3,5 mm, so that, on the one hand, it is sufficiently thick and does not readily come away from the screen guides in the event of gusts of wind and, on the other hand, is not too thick, so that flexible winding and unwinding of the screen remains possible.

[0015] The tensioning system of a particular embodiment of a screen device according to the present invention comprises a tension cable, with this tension cable running on a reel which tensions the screen in the unwinding direction by means of a reversing wheel and a spring system, with said reel forming part of a screen roller end piece and being situated on the side turned away from the screen roller. The term tension cable is in this case understood to mean both a tension cable in the strict sense of the word as well as, for example, a tension rope, tension strip or tension chain.

[0016] With a specific screen device according to the present invention, said continuous flexible thickening is designed as a half zip fastener. Such a half zip fastener can be attached to the lateral side of a screen as a single part in a simple manner.

[0017] The present invention will now be explained in more detail with reference to the following detailed description of a preferred embodiment of a screen device according to the present invention. The aim of this description is solely to give illustrative examples and to indicate further advantages and particulars of these screen devices, and can therefore not be interpreted as a limitation of the area of application of the invention or of the patent rights claimed in the claims.

[0018] Reference numerals are used in this detailed description to refer to the attached drawings, in which:

- ***Fig. 1*** shows an embodiment of an end piece of a screen device according to the present invention;
- ***Fig. 2*** shows the part of the end piece from Fig. 1 indicated by A in detail;
- ***Fig. 3*** shows a part of a lateral side of a screen from a screen device according to the present invention with a half zip fastener as thickening.

[0019] The preferred embodiment of a screen device according to the present invention, some parts of which are illustrated in Figs. 1 to 3, comprises:

- a screen roller with a diameter ∅ which has not been shown;
- a screen (1) as illustrated in Fig. 3 which can be wound onto and unwound from this screen roller using a maximum of N rotations, in which the lateral sides (2) of this screen (1) comprise a half zip fastener (3) having a thickness d as continuous flexible thickening;
- one or more screen guides, which have not been shown, which are provided for guiding the half zip fastener (3) during the winding and unwinding movement thereof;
- a screen roller end piece (4), as illustrated in Figs. 1 and 2, at each end of said screen roller, which is provided with a narrowing (5) having a total width b2, having at least one drop (6) on the side of said screen roller with diameters which decrease with respect to said diameter ∅ of the screen roller, this drop (6) comprising a specific drop width b and a drop height h;
- a tensioning system for tensioning the screen (1) in the unwinding direction, of which only the reel (7) has been shown in Figs. 1 and 2.

[0020] In this case, the diameter ∅ of the screen roller is preferably ≤ 100 mm and still more preferably < 80

mm. Preferably, the screen roller is in this case selected to be as large as possible. The dimensions are in this case preferably chosen as a compromise in order, on the one hand, to be able to wind this screen roller onto the screen (1) or unwind it therefrom in a smooth manner and without using an excessive number of rotations N and, on the other hand, to be able to install the screen roller, including a screen (1) which can be wound onto and unwound from the latter, in a compact manner in a housing of limited dimensions.

[0021] The illustrated end piece (4) is designed to be fitted by its end (10) in a hollow tube serving as a screen roller.

[0022] According to the present invention, the partial drop width b1, in which the drop height is 75% of the total drop height h, is preferably at most $\frac{35}{0{,}18\,N + 0{,}7\,d}$, with b1 and d being in mm.

[0023] On the side of the screen roller, the drop (6) of the narrowing (5) is provided with a convexly curved outer surface (8) with a radius of curvature R1 and facing this side. Adjoining this convexly curved outer surface (8), this drop (6) comprises a hollow curved outer surface (9) with a radius of curvature R2, turned away from the screen roller.

[0024] The partial drop width is at least 5 mm. This partial drop width is selected to be between 5 mm and $\frac{35}{0{,}18\,N + 0{,}7\,d}$ mm in such a manner that the narrowing (5) has a sufficiently fast drop (6) to prevent turning over of the zip fastener (3) during winding of the screen (1) onto the screen roller and, on the other hand, to provide a sufficiently smooth transition to prevent creasing of the screen (1) at this drop (6).

[0025] The thickness d of the half zip fastener (d) is preferably 1,6 mm < d < 3,5 mm. This thickness d is preferably chosen to be sufficiently thick, so that the screen (1) cannot readily break away from the screen guides, for example during sudden gusts of wind.

[0026] The illustrated reel (7) forms part of the screen roller end piece and is situated on the side which is turned away from the screen roller. In addition to the illustrated reel (7), the tensioning system of this preferred screen device comprises a tension cable (not shown), a reversing wheel (not shown) and a spring system (not shown). The tension cable in this case runs on the reel (7) and, via the reversing wheel and the spring system, tensions the screen (1) in the unwinding direction. As has been explained above, the term tension cable can also be understood to mean a tension rope, tension strip or tension chain.

Claims

1. Screen device, comprising:

- a screen roller having a diameter ∅;
- a screen (1) which can be wound onto and unwound from this screen roller using a maximum of N rotations, in which the lateral sides (2) of this screen (1) comprise a continuous flexible thickening (3) having a thickness d;
- one or more screen guides which are provided for guiding the continuous flexible thickening during the winding and unwinding movement of the screen (1);
- a screen roller end piece (4) at each end of said screen roller which is provided with a narrowing (5) having at least one drop (6) on the side of said screen roller with diameters which decrease with respect to said diameter ∅ of the screen roller, this drop (6) comprising a specific drop width b and a drop height h;

characterized in that the screen device comprises a tensioning system for tensioning the screen (1) in the unwinding direction and **in that** the partial drop width b1, in which the drop height is 75% of the total drop height h, is at least 5 mm and at most $\frac{35}{0{,}18\,N + 0{,}7\,d}$, with b1 and d being in mm.

2. Screen device according to Claim 1, **characterized in that** said drop (6) of the narrowing (5) of the screen roller end piece (4) on the side of said screen roller comprises a convexly curved outer surface (8) which faces this side.

3. Screen device according to Claim 2, **characterized in that** said drop (6), adjoining said convexly curved outer surface (8), comprises a hollow curved outer surface (9), turned away from the screen roller.

4. Screen device according to one of the preceding claims, **characterized in that** said diameter ∅ of the screen roller is ≤ 100 mm and more specifically < 80 mm.

5. Screen device according to one of the preceding claims, **characterized in that** 1,6 mm < d < 3,5 mm.

6. Screen device according to one of the preceding claims, **characterized in that** the tensioning system comprises a tension cable, with this tension cable running on a reel (7) which tensions the screen (1) in the unwinding direction by means of a reversing wheel and a spring system, with said reel (7) forming part of a screen roller end piece (4) and being situated on the side turned away from the screen roller.

7. Screen device according to one of the preceding claims, **characterized in that** said continuous flex-

ible thickening (3) is designed as a half zip fastener.

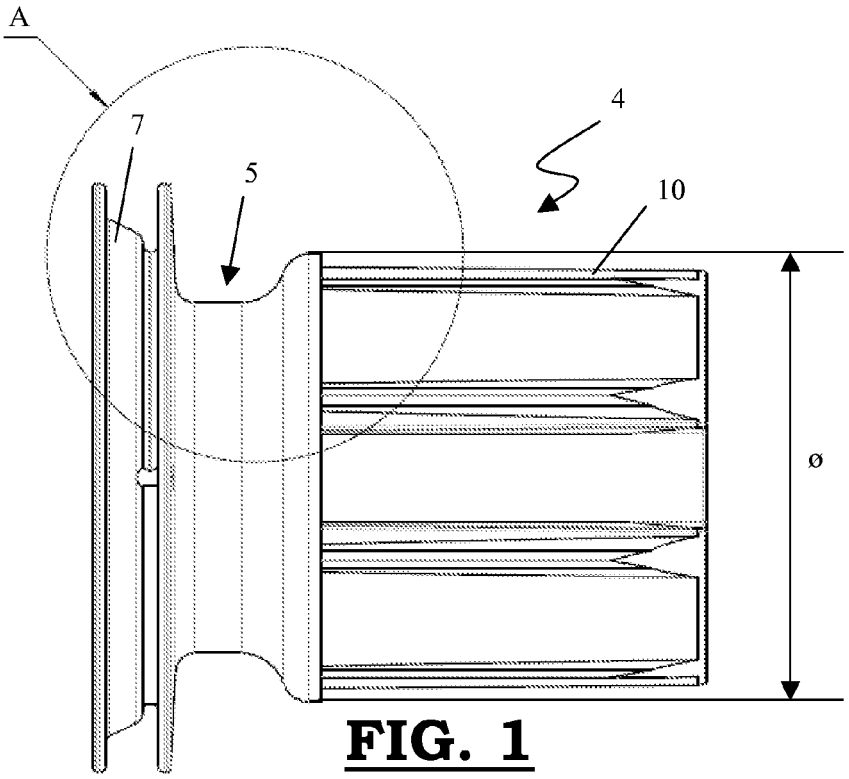

FIG. 1

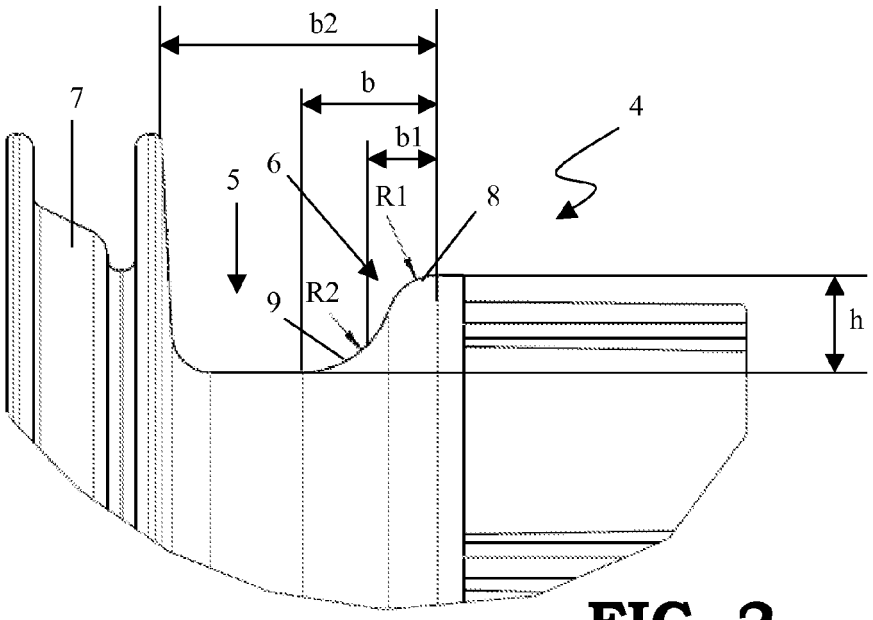

FIG. 2

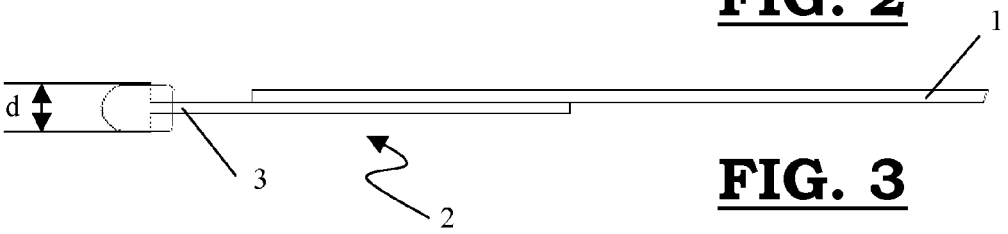

FIG. 3

REFERENCES CITED IN THE DESCRIPTION

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