



PHO 93.519

1

14.02.1994

Method of manufacturing a magnetic-tape cassette having at least one antifriction foil separated from an antifriction-foil stack, magnetic-tape cassette manufactured by such a method, antifriction-foil stack for use in such a method of manufacturing such a magnetic-tape cassette, and method of manufacturing such an antifriction-foil stack.

5 The invention relates to a method of manufacturing a magnetic-tape cassette, in which method an antifriction foil, which is adapted to guide a magnetic tape which can be wound onto at least one reel hub, is inserted into at least one housing section of the housing of the magnetic-tape cassette, which antifriction foil is separated from an antifriction-foil stack comprising a multiplicity of antifriction foils and has at least two raised portions spaced at a distance from one another.

10 The invention further relates to a magnetic-tape cassette manufactured by a method of the type defined in the opening paragraph, which cassette comprises at least one antifriction foil separated from an antifriction-foil stack comprising a multiplicity of antifriction foils, which antifriction foil has at least two spaced-apart raised portions.

15 The invention further relates to an antifriction-foil stack for use in a method of the type defined in the opening paragraph for manufacturing a magnetic-tape cassette in accordance with the second paragraph, which stack comprises a multiplicity of antifriction foils, each antifriction foil having at least two spaced-apart raised portions.

20 The invention further relates to a method of manufacturing an antifriction-foil stack of the type defined in the third paragraph, in which method a multiplicity of antifriction foils having at least two spaced-apart raised portions are manufactured and stacked to form the antifriction-foil stack.

25 A method of manufacturing a magnetic-tape cassette of the type defined in the opening paragraph is known. In this known method the antifriction foils are separated from an antifriction-foil stack, each antifriction foil having only two rectilinear channel-like or arch-like raised portions and the nominal distances of the two channel-like or arch-like raised portions of the antifriction

8-3034-35



foils from one another being the same for all the antifriction foils. With the known method this results in all the antifriction foils being closely in contact with one another over their entire surface areas, which may give rise to problems when the antifriction foils are separated to insert them into a magnetic-tape cassette during production of such a cassette, because a so-called glass-plate effect may occur, so that with the known method the undesired situation arises that instead of only one antifriction foil more than one antifriction foil is removed from the antifriction-foil stack and inserted into the magnetic-tape cassette. With the known method of manufacturing a magnetic-tape cassette this results in an unserviceable or at least incorrectly or unsatisfactorily functioning magnetic-tape cassette, which is unfavourable and undesirable.

A magnetic-tape cassette of the type defined in the second paragraph is also known. This known magnetic-tape cassette, which comprises two antifriction foils which extend substantially parallel to the cassette main walls to guide the tape edges of the magnetic tape, which extends between two juxtaposed reel hubs, at the location of the tape spool, has only one cassette variant as regards the construction of the antifriction foils because each antifriction foil - in accordance with this cassette variant - has only two rectilinear channel-like or arch-like raised portions and the nominal distances between the two channel-like or arch-like raised portions of the antifriction foils are equal for all the antifriction foils.

An antifriction-foil stack of the type defined in the third paragraph is also known. This known antifriction-foil stack comprises antifriction foils in only one foil variant, each antifriction foil having only two rectilinear channel-like or arch-like raised portions and the nominal distances between the two channel-like or arch-like raised portions of the antifriction foils being equal for all the antifriction foils.

A method of manufacturing an antifriction-foil stack of the type defined in the fourth paragraph is also known. With this known method of manufacturing an antifriction-foil stack only antifriction foils in a single foil variant are stacked in order to form the antifriction-foil stack, only two rectilinear channel-like or arch-like raised portions being provided and the



nominal distances between the two channel-like or arch-like raised portions of the .
antifriction foils being equal for all the antifriction foils in accordance with this
single foil variant.

5 It is an object of the invention to provide an improved method of
manufacturing a magnetic-tape cassette of the type defined in the opening
paragraph, which precludes the above-mentioned problems and which ensures a
correct separation of the antifriction foils from the antifriction-foil stack during
the manufacture of magnetic-tape cassettes. To this end the invention is
characterised in that the antifriction foil is separated from an antifriction-foil
10 stack comprising antifriction foils in at least two different foil variants, which
foil variants differ from one another as regards the distance between at least two
raised portions, the distances between at least two raised portions of two
contiguous antifriction foils of the antifriction-foil stack differing in accordance
with two different foil variants. In this way it is achieved that, as a result of the
15 differently spaced raised portions of two antifriction foils which are disposed one
on top of the other at least the antifriction foils situated at the top of an
antifriction-foil stack are not closely in contact over their entire surface areas but
owing to the different spacing of the raised portions these raised portions produce
a spring effect by which at least the uppermost antifriction foil is slightly lifted
20 off the antifriction foil underneath it, which ensures a correct separation of the
uppermost antifriction foil from the antifriction-foil stack and which precludes the
incorrect manufacture of a cassette as a result of the erroneous insertion of more
than one antifriction foil during the production of a magnetic-tape cassette.

25 It has proved to be particularly advantageous for the method in
accordance with the invention for manufacturing a magnetic-tape cassette if the
antifriction foil is separated from an antifriction-foil stack in which the difference
of the distances between at least two raised portions of two contiguous
antifriction foils of the antifriction-foil stack is in the range from 0.2 mm to
0.6 mm. In practice this has proved to be very favourable because with such a
30 dimensioning only the upper antifriction foils of an antifriction-foil stack are
lifted off one another owing to the spring effect between the differently spaced
raised portions, but the underlying antifriction foils are almost wholly in contact



as a result of the pressure exerted by the antifriction foils situated above them, without the raised portions being deformed. This minimises the overall stack height despite the differently spaced raised portions.

5 A magnetic-tape cassette in accordance with the invention is characterised in that each antifriction foil has been separated from an antifriction-foil stack comprising antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distance between at least two raised portions, the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack differing in
10 accordance with two different foil variants, and the magnetic-tape cassette is constructed in accordance with at least two different cassette variants, including one cassette variant comprising at least one antifriction foil having at least two raised portions spaced by a given distance and another cassette variant comprising at least one antifriction foil having at least two raised portions spaced
15 by another given distance which differs from the first-mentioned given distance. Such a magnetic-tape cassette in accordance with the invention can be manufactured simply by means of a method in accordance with the invention for manufacturing such a magnetic-tape cassette.

For the magnetic-tape cassette in accordance with the invention it
20 has proved to be particularly advantageous if the differences of the distances between at least two raised portions of an antifriction foil of one cassette variant and of an antifriction foil of the other cassette variant is in the range from 0.2 mm to 0.6 mm.

An antifriction-foil stack in accordance with the invention is
25 characterised in that the antifriction-foil stack comprises antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distances between at least two raised portions, and the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack differ in accordance with two different foil variants. Such
30 an antifriction-foil stack in accordance with the invention is intended for use in a method in accordance with the invention for manufacturing a magnetic-tape cassette in accordance with the invention.



For the antifriction-foil stack in accordance with the invention it has proved to be particularly advantageous if the difference of the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack is in the range from 0.2 mm to 0.6 mm.

5 A method in accordance with the invention for manufacturing an antifriction-foil stack is characterised in that the antifriction-foil stack is manufactured by stacking a multiplicity of antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distances between at least two raised portions, and the antifriction foils are
10 stacked in such a manner that directly adjoining antifriction foils of the antifriction-foil stack each correspond to a different foil variant. Such a method in accordance with the invention for manufacturing an antifriction-foil stack enables an antifriction-foil stack to be manufactured in a simple manner.

In a method in accordance with the invention for manufacturing an
15 antifriction-foil stack, in which method a number of N foil webs are fed to embossing stations disposed above one another in a stack-like arrangement and are provided with at least two spaced-apart raised portions by embossing operations in the embossing stations, after which the foil webs provided with the raised portions are brought together in a stack-like fashion and are fed to a
20 punching station which punches N antifriction foils from the N foil webs in successive steps, the successively punched-out antifriction foils being subsequently stacked to form an antifriction-foil stack, it has proved to be advantageous if in two directly adjacent embossing stations the directly adjacent foil webs situated therein are each provided with at least two raised portions
25 whose distances from one another differ in accordance with the different foil variants.

In this respect it has proved to be particularly advantageous if in
two directly adjacent embossing stations the directly adjacent foil webs situated therein are each provided with at least two raised portions for which the
30 difference between their mutual distances is in the range from 0.2 mm to 0.6 mm.



The invention will now be described with reference to two exemplary embodiments which are shown in the drawings but to which the invention is not limited. Fig. 1 shows diagrammatically a part of an assembly arrangement by means of which the relevant steps of a method in accordance with the invention for manufacturing a magnetic-tape cassette in accordance with the invention can be carried out, in which method an antifriction foil is separated from an antifriction-foil stack in accordance with the invention and is inserted into a housing half of a magnetic-tape cassette in accordance with the invention. Fig. 2 shows diagrammatically and to a larger scale than Fig. 1 a first variant of an antifriction-foil stack in accordance with the invention for use in the method in accordance with the invention described with reference to Fig. 1. Fig. 3 shows diagrammatically an arrangement for carrying out a method in accordance with the invention for manufacturing the antifriction-foil stack in accordance with the invention shown in Fig. 2. Part A of Fig. 4 shows a first cassette variant of a magnetic-tape cassette in accordance with the invention and part B shows a second cassette variant of a magnetic-tape cassette in accordance with the invention to a larger than full-size scale, which magnetic-tape cassettes have been manufactured by means of the method in accordance with the invention, described with reference to Fig. 1, for manufacturing magnetic-tape cassettes. Fig. 5, in the same way as Fig. 2, shows a second variant of an antifriction-foil stack in accordance with the invention.

Fig. 1 shows very diagrammatically a part of an assembly arrangement 1, which may comprise, for example, a round assembly table. In such an assembly arrangement 1 successive steps of a method for manufacturing a magnetic-tape cassette are carried out in different work stations. Those steps of such a method which are relevant in the present context will be described hereinafter.

The assembly arrangement 1 has a pneumatic work station 2 comprising a slide 3 which is movable between a separating position shown in solid lines in Fig. 1 and an insertion position shown in dash-dot lines in Fig. 1. The slide 3 is moved from its separating position to its insertion position as indicated by the arrows 4a, 5 and 4b in Fig. 1. Four suction pads are connected



to the slide 3, two of said pads 6 and 7 being shown in Fig. 1. In the separating position of the slide 3 the suction pads 6 and 7 enable the uppermost antifriction foil 8 to be lifted off, *i.e.* to be separated from, an antifriction-foil stack 9 consisting of a multiplicity of antifriction foils $8_1, 8_2, 8_3, 8_4, \dots 8_{2n}$ and shown diagrammatically and to an enlarged scale in Fig. 2. After the slide 3 has been moved to its insertion position the previously separated antifriction foil 8 is inserted into a housing half 10 of the housing 11 of a magnetic-tape cassette, which housing half has first been fed to the work station 2. The antifriction foil 8 serves for guiding a magnetic tape which can be taken up by at least one reel hub of the magnetic-tape cassette, which will be described in detail with reference to Fig. 4. In the method of manufacturing a magnetic-tape cassette, which includes a multiplicity of other steps, which will not be described for the sake of simplicity, and which is carried out by means of the assembly arrangement 1, an antifriction foil 8 is separated from an antifriction-foil stack 9 consisting of a multiplicity of antifriction foils $8_1, 8_2, 8_3, 8_4, \dots 8_{2n}$ and is inserted into a housing half 10 of the housing 11 of a magnetic-tape cassette.

As is apparent from Fig. 2, each antifriction foil $8_1, 8_2, 8_3, 8_4, \dots 8_{2n}$ of the antifriction-foil stack 9 has four rectilinear channel-like or arch-like raised portions $13_1, 14_1, 15_1, 16_1; 13_2, 14_2, 15_2, 16_2, \dots 13_{2n}, 14_{2n}, 15_{2n}, 16_{2n}$, which extend parallel to a longitudinal axis of symmetry $12_1, 12_2, \dots 12_{2n}$. The two raised portions 15_1 and $16_1; 15_3$ and 16_3 etc., and 15_2 and $16_2; 15_4$ and 16_4 etc. are situated at distances a_1 and a_2 , respectively, from one another. The two distances a_1 and a_2 are not equal. The raised portions 13_1 and $15_1; 13_3$ and 15_3 etc., and 13_2 and $15_2; 13_4$ and 15_4 etc. are situated at distances b_1 and b_2 , respectively, from one another. The two distances b_1 and b_2 are also unequal. The raised portions 16_1 and $14_1; 16_3$ and 14_3 etc., and 16_2 and $14_2; 16_4$ and 14_4 etc. are also situated at distances b_1 and b_2 , respectively, from one another. As can be seen in Fig. 2, the antifriction-foil stack 9 consequently comprises antifriction foils $8_1, 8_2, 8_3, 8_4, \dots 8_{2n}$ in two foil variants, which foil variants differ from one another as regards the distances a_1, a_2, b_1, b_2 between four raised portions $13_1, 14_1, 15_1, 16_1, 13_2, 14_2, 15_2, 16_2, \dots 13_{2n}, 14_{2n}, 15_{2n}, 16_{2n}$, the distances a_1, b_1, a_2, b_2 between the raised portions $13_1, 14_1, 15_1, 16_1; 13_2,$



14₂, 15₂, 16₂ etc. of two contiguous antifriction foils 8₁ and 8₂ etc. of the antifriction-foil stack 9 being different in accordance with the two different foil variants. The upper antifriction foils 8₁, 8₂ etc. of the antifriction-foil stack 9 are, for example, practically in point contact with one another only at the location of the differently spaced raised portions 15₁ and 16₁ as well as 15₂ and 16₂ etc., whilst in the other areas they are slightly spaced apart because the differently spaced raised portions produce a spring effect by which the upper antifriction foils 8₁, 8₂ etc. are slightly moved apart. The lower situated antifriction foils of the antifriction-foil stack 9 are almost wholly in contact under the influence of the weight of the antifriction foils situated above them without an undesired deformation of the raised portions. However, for the clarity of the drawing the distance relations in the direction of the stack height are now shown in Fig. 2.

In the method of manufacturing a magnetic-tape cassette as described with reference to Fig. 1 each antifriction foil 8₁, 8₂, 8₃, 8₄, ... 8_{2n} is separated from an antifriction-foil stack 9 consisting of antifriction foils 8₁, 8₂, 8₃, 8₄, ... 8_{2n} in two different foil variants, which foil variants differ from one another as regards the distances a₁, b₁ and a₂, b₂ of their respective raised portions 13₁, 14₁, 15₁, 16₁; 13₂, 14₂, 15₂, 16₂, ... 13_{2n}, 14_{2n}, 15_{2n}, 16_{2n}, from one another, the distances a₁, b₁, a₂, b₂ between the raised portions 13₁, 14₁, 15₁, 16₁; 13₂, 14₂, 15₂, 16₂, ... 13_{2n}, 14_{2n}, 15_{2n}, 16_{2n}, respectively, being different in accordance with two different foil variants. The clearance obtained between the upper antifriction foils of the antifriction-foil stack 9 as a result of the spring effect produced by the differently spaced raised portions guarantees that the uppermost foil can always be removed without any problem.

It is to be noted that in the method of manufacturing a magnetic-tape cassette an antifriction foil is also inserted into the second housing half of the housing 11 of the magnetic-tape cassette. During assembly this second housing half together with its antifriction foil is mounted onto the first housing half 10 and the antifriction foil in this second housing half is held in this second housing half, for example, under the influence of a static charge.



In a practical embodiment of an antifriction-foil stack 9 as shown in Fig. 2 the raised portions 15₁ and 16₁ as well as 15₃ and 16₃ etc. are situated at a distance a₁ of 13.2 mm from one another. The raised portions 15₂ and 16₂ as well as 15₄ and 16₄ etc. are situated at a distance a₂ of 12.8 mm from one another. The difference of the distances a₁ and a₂ between two raised portions 15₁, 16₁ and 15₂, 16₂ etc. of two contiguous antifriction foils 8₁ and 8₂ etc. is therefore 0.4 mm. The distances b₁ between the raised portions 13₁ and 15₁; 16₁ and 14₁ as well as 13₃ and 15₃; 16₃ and 14₃ etc. of the antifriction foils 8₁, 8₃ etc. are the same and have a value of 5.4 mm. The distances b₂ between the raised portions 13₂ and 15₂; 16₂ and 14₂ as well as 13₄ and 15₄; 16₄ and 14₄ etc. of the antifriction foils 8₂, 8₄ etc. are also equal and have a value of 5.6 mm. As a result of these values of the distances a₁ and b₁, and a₂ and b₂, respectively, it follows that the distances c₁ and c₂ between the raised portions 13₁ and 14₁, 13₃ and 14₃ etc. and 13₂ and 14₂, 13₄ and 14₄ etc. of the antifriction foils 8₁, 8₃ etc. and 8₂, 8₄ etc. are equal and have a value of 24.0 mm. It is to be noted that the distances a₁ and a₂ and, consequently, also the distances c₁ and c₂ are divided into two equal distance halves a₁/2, a₂/2, c₁/2 and c₂/2 by the longitudinal axes of symmetry 12₁ and 12₂. The highest point of the raised portions 15₁, 16₁, 15₂, 16₂ etc. is situated approximately 0.2 mm above the level of the antifriction foils 8₁, 8₂ etc. at the location of the longitudinal axes of symmetry 12₁, 12₂ etc. The highest point of the raised portions 13₁, 14₁, 13₂, 14₂ etc. is situated approximately 0.7 mm above the level of the antifriction foils 8₁, 8₂ etc. at the location of the longitudinal axes of symmetry 12₁, 12₂ etc. As a result of the offset arrangement of two contiguous antifriction foils of the antifriction-foil stack said raised portions produce a spring effect which causes at least the uppermost foil to be slightly lifted off the foil underneath it, which guarantees that the uppermost antifriction foil is always separated perfectly from the antifriction-foil stack and thus only one antifriction foil is inserted into a housing half of the housing of a magnetic-tape cassette, which substantially precludes the manufacture of a defective cassette by the insertion of more than the desired one antifriction foil.



A method of manufacturing an antifriction-foil stack 9 as shown in Fig. 2 will now be described with reference to Fig. 3. In accordance with this method a multiplicity of antifriction foils $8_1, 8_2$ etc. each having four raised portions $13_1, 14_1, 15_1, 16_1$ and $13_2, 14_2, 15_2, 16_2$ etc. which are situated at distances a_1, b_1 and a_2, b_2 , respectively, from one another are manufactured and stacked to form the antifriction-foil stack 9. The antifriction-foil stack 9 is formed by stacking a multiplicity of antifriction foils $8_1, 8_2$ etc. in two different foil variants, which foil variants differ from one another as regards the distances a_1, b_1 and a_2, b_2 between the four respective raised portions $13_1, 14_1, 15_1, 16_1$ and $13_2, 14_2, 15_2, 16_2$ etc., the antifriction foils $8_1, 8_2$ etc. being stacked in such a manner that directly adjoining antifriction foils $8_1, 8_2$ etc. of the antifriction-foil stack 9 each correspond to a different foil variant.

As is shown diagrammatically in Fig. 3, a number of N foil webs $17_1, 17_2, 17_3, 17_4, 17_5, 17_6, 17_7$ and 17_8 , N being an even integer, *i.e.* 8, are each fed from a foil-web reel $18_1, 18_2, 18_3, 18_4, 18_5, 18_6, 18_7$ and 18_8 to embossing stations $19_1, 19_2, 19_3, 19_4, 19_5, 19_6, 19_7$ and 19_8 disposed above one another in a stack-like arrangement. In the embossing stations 19_1 to 19_8 the foil webs are each provided with the four raised portions situated at distances a_1, b_1 and a_2, b_2 from one another, the distances a_1, b_1 and a_2, b_2 being different in accordance with the two different foil variants. Subsequently, the foil webs $17_1, 17_2$ to 17_8 provided with the raised portions $13_1, 14_1, 15_1, 16_1$ and $13_2, 14_2, 15_2, 16_2$ etc. are brought together in a stack-like fashion and fed to a punching station 20. In successive steps the punching station 20 punches N, *i.e.* 8, antifriction foils from the N, *i.e.* 8, foil webs $17_1, 17_2$ to 17_8 . The eight antifriction foils $8_1, 8_2$ to 8_8 punched out in successive steps are fed out of the punching station 20 in the direction indicated by an arrow 21 and are finally fed in the direction indicated by an arrow 22 to be stacked onto an antifriction-foil stack 9. Such a method enables an antifriction-foil stack 9 as shown in Fig. 2 to be manufactured in a particularly simple manner because for this purpose it is merely necessary to emboss two adjacent foil webs so as to provide them with differently spaced raised portions.



Fig. 4 shows a magnetic-tape cassette 23_1 , 23_2 which can be manufactured by means of a method as described with reference to Fig. 1 using an antifriction-foil stack 9 as shown in Fig. 2. Part A of Fig. 4 shows a magnetic-tape cassette 23_1 in accordance with a first cassette variant and part B shows a magnetic-tape cassette 23_2 in accordance with a second cassette variant. The first cassette variant 23_1 comprises two antifriction foils 8_1 in accordance with a first foil variant having four raised portions 13_1 , 14_1 , 15_1 and 16_1 , which raised portions are situated at distances a_1 and b_1 from one another. The second cassette variant 23_1 shown in part B of Fig. 4 comprises two antifriction foils 8_2 in accordance with a second foil variant having four raised portions 13_2 , 14_2 , 15_2 and 16_2 , which raised portions are situated at distances a_2 and b_2 from one another.

Fig. 4 does not show the magnetic tape, neither for the magnetic-tape cassette 23_1 in accordance with the first cassette variant nor for the magnetic-tape cassette 23_2 in accordance with the second cassette variant. However, the Figure does show reel hubs 24_1 and 24_2 . Each of the magnetic-tape cassettes 23_1 and 23_2 has two such reel hubs 24_1 and 24_2 , which are juxtaposed in the direction of the longitudinal axes of symmetry 12_1 and 12_2 of the antifriction foils 8_1 and 8_2 , respectively, and which are disposed mirror-symmetrically relative to the respective axis 12_1 or 12_2 . Each of the two reel hubs 24_1 and 24_2 cooperates with the channel-like or arch-like raised portions 15_1 , 16_1 and 15_2 , 16_2 , respectively, of the antifriction foils 8_1 and 8_2 , respectively, which raised portions extend parallel to the longitudinal axes of symmetry 12_1 and 12_2 and ensure an exact axial positioning of the reel hubs 24_1 and 24_2 . The magnetic tape, not shown in Fig. 4, can be wound onto the reel hubs 24_1 and 24_2 , the tape edges of the magnetic tape being guided by the two antifriction foils 8_1 and 8_2 of the magnetic-tape cassettes 23_1 and 23_2 , respectively, at the locations of the channel-like or arch-like raised portions 15_1 , 16_1 and 15_2 , 16_2 , which extend parallel to the longitudinal axes of symmetry 12_1 and 12_2 , respectively, during winding from one reel hub 24_1 or 24_2 to the other reel hub 24_2 or 24_1 , because these raised portions 13_1 , 14_1 and 13_2 , 14_2 , respectively, exert a gentle pressure on both tape edges of the magnetic tape.



Fig. 5 shows an antifriction-foil stack 9 in accordance with a second variant. The antifriction foils $8_1, 8_2, 8_3, 8_4, \dots 8_{2n}$ of the antifriction-foil stack 9 shown in Fig. 5 also have four raised portions $13_1, 14_1, 15_1, 16_1; 13_2, 14_2, 15_2, 16_2, \dots 13_{2n}, 14_{2n}, 15_{2n}, 16_{2n}$, respectively. In this antifriction-foil stack 9 the raised portions $15_1, 15_3$ etc. of the antifriction foils $8_1, 8_3$ etc. are situated at a distance g_1 from the longitudinal axis of symmetry $12_1, 12_3$ etc. and the raised portions $16_1, 16_3$ etc. of the antifriction foils $8_1, 8_3$ etc. are situated at a distance h_1 from the longitudinal axis of symmetry $12_1, 12_3$ etc. The raised portions $15_2, 15_4$ etc. of the antifriction foils $8_2, 8_4$ etc. are situated at a distance $g_2 = h_2$ from the longitudinal axis of symmetry $12_2, 12_4$ etc. The raised portions $16_2, 16_4$ etc. of have a distance $h_2 = g_1$ from the longitudinal axis of symmetry $12_2, 12_4$ etc. Consequently, the raised portions 15_1 and $16_1, 15_3$ and 16_3 etc. have a distance f_1 and the raised portions 15_2 and $16_2, 15_4$ and 16_4 etc. have a distance $f_2 = f_1$ from one another, which means that the distances between the raised portions 15_1 and $16_1, 15_3$ and $16_3; 15_2$ and $16_2, 15_4$ and 16_4 etc. of the antifriction foils $8_1, 8_2$ to 8_{2n} of the antifriction-foil stack 9 shown in Fig. 5 are equal. Nevertheless, the distances d_1 and d_2 between the raised portions 13_1 and $15_1, 13_3$ and 15_3 etc. and between 13_2 and $15_2, 13_4$ and 15_4 etc. as well as the distances e_1 and e_2 between the two raised portions 14_1 and $16_1, 14_3$ and 16_3 etc. and 14_2 and $16_2, 14_4$ and 16_4 etc., respectively, differ. The distances c_1 and c_2 between the raised portions 13_1 and $14_1, 13_3$ and 14_3 etc. and 13_2 and $14_2, 13_4$ and 14_4 etc., respectively, are equal and these two equal distances c_1 and c_2 are divided into two equal halves $c_1/2$ and $c_2/2$ by the respective longitudinal axes of symmetry $12_1, 12_3$ etc. and $12_2, 12_4$ etc.

When an antifriction-foil stack 9 as shown in Fig. 5 is used in a method for manufacturing a magnetic-tape cassette as described with reference to Fig. 1 the offset arrangement of the raised portions $13_1, 14_1, 15_1$, and $16_1; 13_2, 14_2, 15_2$ and 16_2 to $13_{2n}, 14_{2n}, 15_{2n}$ and 16_{2n} also ensures that these raised portions produce a spring effect which causes at least the uppermost foil to be slightly lifted off the foil underneath it, which guarantees that the uppermost antifriction foil is always separated perfectly from the antifriction-foil stack and thus substantially precludes the manufacture of a defective cassette by the



insertion of more than the desired one antifriction foil in a method of manufacturing a magnetic-tape cassette.

5 The invention is not limited to the two exemplary embodiments described in the foregoing. An antifriction-foil stack may also include three or more foil variants. Likewise, a magnetic-tape cassette may be constructed in accordance with three or more cassette variants. Moreover, a magnetic-tape cassette in accordance with a cassette variant may comprise two different foil variants. Instead of rectilinear channel-like or arch-like raised portions raised portions of other shapes may be used, for example dome-shaped raised portions or channel-like or arch-like raised portions shaped as annular sectors.

10

CLAIMS:

This Sheet Has Been Replaced



1. A method of manufacturing a magnetic-tape cassette, in which method an antifriction foil, which is adapted to guide a magnetic tape which can be wound onto at least one reel hub, is inserted into at least one housing section of the housing of the magnetic-tape cassette, which antifriction foil is separated
5 from an antifriction-foil stack comprising a multiplicity of antifriction foils and has at least two raised portions spaced at a distance from one another, characterised in that the antifriction foil is separated from an antifriction-foil stack comprising antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distance between at least two
10 raised portions, the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack differing in accordance with two different foil variants.
2. A method as claimed in Claim 1, characterised in that the antifriction foil is separated from an antifriction-foil stack in which the difference
15 of the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack is in the range from 0.2 mm to 0.6 mm.
3. A magnetic-tape cassette comprising at least one antifriction foil separated from an antifriction-foil stack comprising a multiplicity of antifriction
20 foils, which antifriction foil has at least two spaced-apart raised portions, characterised in that each antifriction foil has been separated from an antifriction-foil stack comprising antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distance between at least two raised portions, the distances between at least two raised portions of
25 two contiguous antifriction foils of the antifriction-foil stack differing in accordance with two different foil variants, and the magnetic-tape cassette is constructed in accordance with at least two different cassette variants, including



PHO 93.519

15

14.02.1994

one cassette variant comprising at least one antifriction foil having at least two raised portions spaced by a given distance and another cassette variant comprising at least one antifriction foil having at least two raised portions spaced by another given distance which differs from the first-mentioned given distance.

5 4. A magnetic-tape cassette as claimed in Claim 3, characterised in that the differences of the distances between at least two raised portions of an antifriction foil of one cassette variant and of an antifriction foil of the other cassette variant is in the range from 0.2 mm to 0.6 mm.

5. An antifriction-foil stack comprising a multiplicity of antifriction
10 foils, each antifriction foil having at least two spaced-apart raised portions, characterised in that the antifriction-foil stack comprises antifriction foils in at least two different foil variants, which foil variants differ from one another as regards the distances between at least two raised portions, and the distances between at least two raised portions of two contiguous antifriction foils of the
15 antifriction-foil stack differ in accordance with two different foil variants.

6. An antifriction-foil stack as claimed in Claim 5, characterised in that the difference of the distances between at least two raised portions of two contiguous antifriction foils of the antifriction-foil stack is in the range from 0.2 mm to 0.6 mm.

20 7. A method of manufacturing an antifriction-foil stack, a multiplicity of antifriction foils having at least two spaced-apart raised portions being manufactured and being stacked to form the antifriction-foil stack, characterised in that the antifriction-foil stack is manufactured by stacking a multiplicity of antifriction foils in at least two different foil variants, which foil variants differ
25 from one another as regards the distances between at least two raised portions, and the antifriction foils are stacked in such a manner that directly adjoining antifriction foils of the antifriction-foil stack each correspond to a different foil variant.

8. A method as claimed in Claim 7, in which method a number of N
30 foil webs are fed to embossing stations disposed above one another in a stack-like arrangement and are provided with at least two spaced-apart raised portions by embossing operations in the embossing stations, after which the foil webs



PHO 93.519

16

14.02.1994

provided with the raised portions are brought together in a stack-like fashion and are fed to a punching station which punches N antifriction foils from the N foil webs in successive steps, the successively punched-out antifriction foils being subsequently stacked to form an antifriction-foil stack, characterised in that in

5 two directly adjacent embossing stations the directly adjacent foil webs situated therein are each provided with at least two raised portions whose distances from one another differ in accordance with the different foil variants.

9. A method as claimed in Claim 8, characterised in that in two directly adjacent embossing stations the directly adjacent foil webs situated
- 10 therein are each provided with at least two raised portions for which the difference between their mutual distances is in the range from 0.2 mm to 0.6 mm.