COMMONWEALTH OF AUSTRALIA

Patents Act 1952

CONVENTION APPLICATION FOR A STANDARD PATENT

K/WE, YOSHIDA KOGYO K.K., a Japanese company of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan

hereby apply for the grant of a Standard Patent for an invention entitled:
WOVEN SLIDE FASTENER STRINGER

which is described in the accompanying complete specification.

This application is made under the provision of Part XVI of the Patents Act 1952 and is based on an application for a patent or similar protection made

in Japan on 27 December 1986
No. (61-199532)

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Dated this 2nd day of December 1987
YOSHIDA KOGYO K.K.

By: [Signature]
Registered Patent Attorney

To: The Commissioner of Patents
COMMONWEALTH OF AUSTRALIA
Commonwealth of Australia
The Patents Act 1952

DECLARATION IN SUPPORT

In support of the (Convention) Application made by: YOSHIDA KOGYO K. K.
of No. 1, Kanda Izumi-cho, Chiyoda-ku, Tokyo, Japan

for a patent for an invention entitled: "WOVEN SLIDE FASTENER STRINGER"

I, Ichiro Agata,
of and care of the applicant company do solemnly and sincerely declare as follows:

b) I am authorized by the applicant for the patent to make this declaration on its behalf.

Delete the following if not a Convention Application.
The basic application as defined by section 141 of the Act was made in Japan on December 27, 1986

by the present applicant company

The basic application referred to in this paragraph is the first application made in a Convention country in respect of the invention the subject of the application.

b) Masaatsu Ohfusa of 4022, Mikkaichi, Kurobe-shi, Toyama-ken, Japan

is the actual inventor of the invention and the facts upon which the applicant company is entitled to make the application are as follows: The applicant company is the assignee of the invention from the said actual inventor.

Declared at Tokyo, Japan this 20th day of November, 1987

Signed Ichiro Agata

Status Director

YOSHIDA KOGYO K. K.

F. B. RICE & CO PATENT ATTORNEYS
This form is suitable for any type of Patent Application. No legalization required.
1. A woven slide fastener stringer comprising:

(a) a tape woven of a plurality of foundation warp threads and a foundation weft thread and having a filament woven section defining a longitudinal edge portion;

(b) a continuous coil-shaped synthetic resin filament having a row of successive loops, each of said loops having a coupling head at one end thereof, upper and lower legs extending from the head in a common direction, and a heel portion remote from said coupling head and connecting said upper leg of each said loop and said lower leg of the next loop;

(c) a group of upper binding warp threads extending in parallel longitudinally of said tape and overlying said upper legs of said filament loops and interwoven with said foundation weft thread, and a group of lower binding warp threads extending in parallel longitudinally of said tape and underlying
said lower legs of said filament loops and interwoven
with said foundation weft thread, both said groups of
binding warp threads running as a whole substantially
along a straight path at the region which extends
substantially from the midpoint of each of said upper
and lower legs to said heel portions;

d) a plurality of loop-clamping warp threads
extending between said upper and lower binding warp
threads and alternately overlying said upper legs and
said foundation weft thread and underlying said lower
legs and said foundation weft thread at every other
adjacent loops;

e) a gap-filling warp thread disposed between
an outermost one of said upper binding warp threads and
the next upper binding warp thread and also between an
outermost one of said lower binding warp threads and
the next lower binding warp thread and extending under
said lower legs of said filament loops and alternately
over and under said foundation weft thread so as to
pull portions of said foundation weft thread between
the outermost upper binding warp threads and the next
upper binding warp thread toward a lower side of said
tape substantially halfway between said upper and lower
legs of the respective loops; and

f) a pair of space-retaining warp threads
disposed between the outermost upper binding warp
thread and the next upper binding warp thread and also
between the outermost lower binding warp thread and the
next lower binding warp thread and extending alternately
over said upper leg of one of said filament loops and
said foundation weft thread and under said lower leg of
the next filament loop and said foundation weft thread
so as to clamp said filament loops.
Complete Specification for the invention entitled:

WOVEN SLIDE FASTENER STRINGER

The following statement is a full description of this invention including the best method of performing in known to us:
The present invention relates to a slide fastener, and more particularly to a woven fastener stringer having a coiled continuous plastic filament woven into a longitudinal edge of a woven tape simultaneously with the wearing of the tape.

There have been proposed a number of slide fasteners of the type in which a row of fastener elements is woven into one longitudinal edge of a woven stringer tape simultaneously with the wearing of the tape. Usually the fastener element row is in the form of a helically coiled continuous plastic filament having a succession of loops.

In production, when it is bent into such a helical shape, the filament which is thicker and harder than the warp and weft yarns of the tape tends to yield back under its own resilience, thus not only causing the fastener stringer to stretch longitudinally but also causing the individual filament loops to tilt away from a proper upright posture with respect to the plane.
of the tape. This would result in staggering pitch of the filament loops, i.e. the fastener elements, which would hinder smooth closing and opening operation of the slide fastener.

A solution is disclosed in U.S. Pat. No. 4,623,004 for making the fastener stringer stable in the loop-to-loop pitch of the filament. According to this prior art, as shown in Figure 5, the outermost upper and lower binding warp threads A, B extend respectively over and under the loops E and are disposed substantially in registry with one another, and a gap-filling warp thread C is laid between the outermost upper binding warp thread A and the next upper binding warp thread A1 and extends under the loops E and alternately over and under the picks of a foundation weft thread D so as to pull the portions of the foundation weft thread D between the outermost upper binding warp thread A and the next upper binding warp thread A1 toward the opposite side of the tape substantially halfway between the upper and lower legs of the respective loops E. A problem with this prior art arrangement is that the positions at which the gap-filling warp thread C is interlaced with the foundation weft thread D can be easily changed as affected by possible small changes in tension of the warp and weft threads and/or in properties of the material of the filament. As a result, reliable and
accurate shaping of the filament loops is difficult to achieve.

The present invention seeks to provide a woven slide fastener stringer in which a plastic filament shaped into a continuous row of helically coiled loops can be woven into one longitudinal edge of a woven stringer tape stably without being misshaped as affected by possible small changes in tension of warp and weft threads of the tape and/or properties of the material of the filament. Therefore, the filament loops are normally kept in proper upright posture and free from staggering pitch.

According to the present invention, a woven slide fastener stringer comprising: a tape woven of a plurality of foundation warp threads and a foundation weft thread and having a filament woven section defining a longitudinal edge portion; a continuous coil-shaped synthetic resin filament having a row of successive loops, each of said loops having a coupling head at one end thereof, upper and lower legs extending from the head in a common direction, and a heel portion remote from said coupling head and connecting said upper leg of each said loop and said lower leg of the next loop; a group of upper binding warp threads extending in parallel longitudinally of said tape and overlying said upper legs of said filament loops and interwoven with said foundation weft thread, and a group of lower binding warp threads along a straight path substantially from said upper legs to said loop-clamping warp threads and lower binding warp threads underlying said upper leg and underlying said foundation weft thread at every other warp thread disposed between said respective loops; an upper binding warp thread and also a lower binding warp thread an upper binding warp thread disposed between said warp thread toward a lower foundation weft thread halfway between said respective loops; and a warp thread and the
group of lower binding warp threads extending in parallel longitudinally of said tape and underlying said lower legs of said filament loops and interwoven with said foundation weft thread, both said groups of binding warp threads running as a whole substantially along a straight path at the region which extends substantially from the midpoint of each of said upper and lower legs to said heel portions; a plurality of loop-clamping warp threads extending between said upper and lower binding warp threads and alternately overlying said upper legs and said foundation weft thread and underlying said lower legs and said foundation weft thread at every other adjacent loops; a gap-filling warp thread disposed between an outermost one of said upper binding warp threads and said next upper binding warp thread and also between an outermost one of said lower binding warp threads and said next lower binding warp thread and extending under said lower legs of said filament loops and alternately over and under said foundation weft thread so as to pull portions of said foundation weft thread between the outermost upper binding warp threads and the next upper binding warp thread toward a lower side of said tape substantially halfway between said upper and lower legs of the respective loops; and a pair of space-retaining warp threads disposed between the outermost upper binding warp thread and the next upper binding warp thread and also between the outermost lower binding warp threads and the next lower binding warp thread so as to pull portions of said foundation weft thread between the outermost upper and lower binding warp threads and the next upper and lower binding warp threads toward the lower side of the tape substantially halfway between said upper and lower legs of the respective loops.

As shown in Figure 1, stringer 10 constitutes a stringer for a slide.
also between the outermost lower binding warp thread and the next lower binding warp thread and extending alternately over said upper leg of one of said filament loops and said foundation weft thread and under said lower leg of the next filament loop and said foundation weft thread so as to clamp said filament loops.

Other advantages, features and additional objects of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which preferred structural embodiments incorporating the principle of the present invention are shown by way of illustrative example.

Figure 1 is a fragmentary perspective view of a woven slide fastener embodying the present invention; Figure 2 is an enlarged transverse cross-sectional view of Figure 1; Figure 3 is a view similar to Figure 1, but showing a modified woven slide fastener stringer; Figure 4 is an enlarged transverse cross-sectional view of Figure 3; and Figure 5 is a fragmentary perspective view of a woven slide fastener stringer according to the prior art.

As shown in Figures 1 and 2, a slide fastener stringer 10 constitutes one part of a pair of identical stringers for a slide fastener. The stringer 10 generally includes a partially flat web section defining a major portion of a tape, as shown in Figures 1 and 2. The web section includes a plurality of foundation weft threads forming the tape into web sections 11a and 11b. Each loop 14 of the tape into web section 11b defines a major portion of a woven section 12 of the tape into web section 11b, preferably a monofilament double pick and is woven having a row of successive fastener elements.

Each loop 14 of the tape into web section 11b defines a major portion of a woven section 12 of the tape into web section 11b, preferably a monofilament double pick and is woven having a row of successive fastener elements.

As shown in Figures 1 and 2, a slide fastener stringer 10 constitutes one part of a pair of identical stringers for a slide fastener. The stringer 10 generally includes a partially flat web section defining a major portion of a tape, as shown in Figures 1 and 2. The web section includes a plurality of foundation weft threads forming the tape into web sections 11a and 11b. Each loop 14 of the tape into web section 11b defines a major portion of a woven section 12 of the tape into web section 11b, preferably a monofilament double pick and is woven having a row of successive fastener elements.

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The web section generally includes a partially flat web section defining a major portion of a tape, as shown in Figures 1 and 2. The web section includes a plurality of foundation weft threads forming the tape into web sections 11a and 11b. Each loop 14 of the tape into web section 11b defines a major portion of a woven section 12 of the tape into web section 11b, preferably a monofilament double pick and is woven having a row of successive fastener elements.

The web section generally includes a partially flat web section defining a major portion of a tape, as shown in Figures 1 and 2. The web section includes a plurality of foundation weft threads forming the tape into web sections 11a and 11b. Each loop 14 of the tape into web section 11b defines a major portion of a woven section 12 of the tape into web section 11b, preferably a monofilament double pick and is woven having a row of successive fastener elements.
generally includes a woven tape 11 having a substantially flat web section (only partly shown) 11a defining a major portion of the tape 11 and a filament woven section 11b defining a longitudinal edge portion 12 of the tape into which a synthetic resin filament 13, preferably a monofilament of polyester, is laid in double pick and is woven in the shape of a helical coil having a row of successive loops 14 each serving as a fastener element.

Each loop 14 of the filament 13 has a coupling head 14a at one end thereof, upper and lower legs 14b, 14c extending from the head 14b in a common direction, and a heel portion 14d remote from the coupling head 14a and connecting the upper leg 14b of each loop 14 and the lower leg 14c of the next loop 14. The coupling head 14a is dimensioned so as to be releasably coupled with a corresponding head of a loop 14 on a mating stringer to open and close the slide fastener in a well known manner.

The web section 11a of the tape 11 is woven of a plurality of foundation warp threads 15 and a foundation weft thread 16. The structure of the web section 11a is not relevant to the invention, and therefore its detailed description is omitted here for clarity.

The filament woven section 11b of the tape 11 includes a group of upper binding warp threads 17 extending in parallel overlying the upper loops 14 and a group extending in parallel underlying the lower loops 14, both groups of binding warp threads 17a, as a whole substantially region of the legs 14 from the midportion 14b, 14c to the heel 14d. In the filament weft thread 16 interloop binding warp threads between the adjacent inter-loop spaces 19 extend from a first or outermost 18a between a first or outermost 18b, and extends under filament loops 14 and picks of the foundation weft thread 16 is to 20. Since the gap-filling lower legs 14c and the
extending in parallel longitudinally of the tape 11 and overlying the upper legs 14b of the successive filament loops 14 and a group of lower binding warp threads 18 extending in parallel longitudinally of the tape 11 and underlying the lower legs 14c of the successive loops 14, both groups of binding warp threads 17, 18 running as a whole substantially along a straight path at the region of the legs 14b, 14c which extends substantially from the midportion of each of the upper and lower legs 14b, 14c to the heel portions 14d. The foundation weft thread 16 is laid in double pick and is interwoven with the foundation warp threads 15 to form the web section 11a. In the filament woven section 11b, the foundation weft thread 16 interwoven with the upper and lower binding warp threads 17, 18 to form loops in the spaces between the adjacent loops 14, i.e. in the successive inter-loop spaces 19.

A gap-filling warp thread 20 is disposed between a first or outermost upper binding warp thread 17a and a second or next upper binding warp thread 17b and also between a first or outermost lower binding warp thread 18b, and extends under the lower legs 14c of the filament loops 14 and alternately over and under the picks of the foundation weft thread 16. The foundation weft thread 16 is tensioned by the gap-filling thread 20. Since the gap-filling warp thread 20 underlies the lower legs 14c and the foundation weft thread 16, but does not overlie the respective loops in the interloop space spatially halfway between 14c of the respective loops 14 in Figure 2. As a result, the adjacent loops 14 are all the loops 14 substantially with respect to the portion of the plane of the tape open area required for engagement of the coupling loops 14 of the opposite.

The first upper disposed substantially corresponding first 16a that the portions 16a which span between the loops 14 and are oriented to lie in the plane of the tape 11 are. A plurality of in the illustrated embodiment the second upper binding or next upper binding the second lower binding or next lower binding successive loops 14 of the opposing displacement which would...
does not overlie the upper legs 14b, upper portions of the respective loops of the foundation weft thread 16 in the interloop spaces 19 are drawn to sink substantially halfway between the upper and lower legs 14b, 14c of the respective filament loops 14, as best shown in Figure 2. As a result, the spaces 19 between adjacent loops 14 are closed to some extent to retain all the loops 14 substantially in an upright posture with respect to the plane of the tape 11.

The first upper binding warp thread 17a is disposed substantially in registry with the corresponding first lower binding warp thread 18a so that the portions 16a of the foundation weft thread 16 which span between these binding warp threads 17a, 18a are oriented to lie substantially perpendicularly to the plane of the tape 11, thereby clearly defining an open area required for smooth and accurate coupling engagement of the coupling heads 14a of the filament loops 14 of the opposed stringers 10, 10.

A plurality of loop-clamping warp threads (two in the illustrated embodiment) 21 are disposed between the second upper binding warp thread 17b and the third or next upper binding warp thread 17 and also between the second lower binding warp thread 18b and the third or next lower binding warp thread 18 for clamping the successive loops 14 of the filament 13 in place against displacement which would otherwise take place when the bending or other exte...
bending or other external stresses are exerted on the slide fastener. The loop-clamping threads 21 extend alternately over the upper leg 14b of the respective loop 14 and the foundation weft thread 16 and under the lower leg 14c of the next loop 14 and the foundation weft thread 16 so as to be interwoven in a pattern of 1/1 with the filament 13 and in a pattern of 2/2 with the foundation weft thread 16. As better shown in Figure 2, the loop-clamping warp threads 21 bring the upper and lower legs 14b, 14c of each filament loop 14 closely together so that the loops 14 may assure a stable posture with respect to the tape 11. Thus each pair of loop-clamping warp threads 21 extend in a symmetric pattern.

A plurality of anchoring warp threads (two in the illustrated embodiment) 22 underlie the lower legs 14c of the filament loops 14 adjacent to the coupling heads 14a and are interwoven with the foundation weft thread 16 for anchoring the filament loops 14 so that the latter from leaning downwardly away from the plane of the tape 11.

Most important, a pair of space-retaining warp threads 23 is disposed between the first and second upper binding warp threads 17a, 17b and also between the first and second lower binding warp threads 18a, 18b for keeping the inter-loop spaces 19 in proper dimensions. The space-retaining warp threads 23 extend alternately over the upper filament loop 14 and under the lower leg 14c of the next loop 14 and the foundation weft thread 16 so as to be interwoven in a pattern of 1/1 with the filament 13 and in a pattern of 2/2 with the foundation weft thread 16. Further, the two space-retaining warp threads 23 are disposed between the points of interlacings of the warp and weft threads 13, 16 so as affected by possible increased degree of stockiness of the material of the filament 13 as illustrated in Figures 3 and 4.

With the space-retaining warp threads 23 in a symmetric pattern as illustrated in Figures 3 and 4, the points of interlacings of the warp and weft threads 13, 16 are normally free from staggering and the space-retaining warp threads 23 are disposed between the points of interlacings of the warp and weft threads 13, 16 as illustrated in Figures 3 and 4.
alternately over the upper leg 14b of the respective filament loop 14 and the foundation weft thread 16 and under the lower leg 14c of the next loop 14 and the foundation weft thread 16 so as to be interwoven in a pattern of 1/1 with the filament 13 and in a pattern of 2/2 with the foundation weft thread 16. As better shown in Figure 2, the space-retaining warp threads 23 bring the upper and lower legs 14b, 14c of each filament loop 14 closely together so that the loops 14 assure a stable posture with respect to the tape 11.

Further, the two space-retaining warp threads 23 extend in a symmetric pattern.

With the space-retaining warp threads 23, since the points of interlacing of the gap-filling warp thread 20 and the foundation weft thread 16 are located uniformly between the successive inter-loop spaces 19, the filament 13 can be woven into the tape with an increased degree of stableness without being misshaped as affected by possible small changes in tension of the warp and weft threads of the tape and/or properties of the material of the filament. Therefore, the filament loops 14 are normally kept in proper upright posture and free from staggering pitch.

Figures 3 and 4 show a modified slide fastener stringer 30 which is resemblant to the stringer 10 of Figures 1 and 2 except that an additional pair of space-retaining warp threads 23 is inlaid between the first and second upper b
first and second upper binding warp threads 17a, 17b and also between the first and second lower binding warp threads 18a, 18b in the same manner as the space-retaining warp threads 23 in the stringer 10 of Figures 1 and 2. The two pairs of space-retaining warp threads 23, 23 and 23, 23 are symmetrical with respect to the gap-filling warp thread 20.

As it appears obvious from the scope of the appended claims and to those skilled in the art, there may be made various changes and modifications in the specific embodiments herein shown and described. For example, the number of the binding warp threads or the loop-clamping warp threads may be varied according to the size or the slide fastener.
between the outermost lower binding warp thread and the
next lower binding warp thread and extending alternately
over said upper leg of one of said filament loops and
said foundation weft thread and under said lower leg of
the next filament loop and said foundation weft thread
so as to clamp said filament loops.

The following statements to us:

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A woven slide fastener stringer comprising:
   (a) a tape woven of a plurality of foundation
   warp threads and a foundation weft thread and having a
   filament woven section defining a longitudinal edge
   portion;
   (b) a continuous coil-shaped synthetic resin
   filament having a row of successive loops, each of said
   loops having a coupling head at one end thereof, upper
   and lower legs extending from the head in a common
direction, and a heel portion remote from said coupling
head and connecting said upper leg of each said loop
and said lower leg of the next loop;
   (c) a group of upper binding warp threads
   extending in parallel longitudinally of said tape and
   overlying said upper legs of said filament loops and
   interwoven with said foundation weft thread, and a
   group of lower binding warp threads extending in
   parallel longitudinally of said tape and underlying
   said lower legs of said filament loops and interwoven
   with said foundation weft thread, both said groups of
   binding warp threads running as a whole substantially
   along a straight path at the region which extends
   substantially from the midpoint of each of said upper
   and lower legs to said heel portions;
   (d) a plurality of loop-clamping warp threads
   extending between said upper and lower binding warp
   threads and alternately over and under said upper
   and lower legs and said foundation weft thread and
   said adjacent loops;
   (e) a gap-filling filament disposed between the
   outermost one of the next upper binding warp threads
   and the next lower binding warp threads and said foundation
   weft thread and under said lower leg of said lower loop
   and said foundation weft thread

2. A woven slide fastener stringer comprising:
   (a) a tape woven of a plurality of foundation
   warp threads and a foundation weft thread and having a
   filament woven section defining a longitudinal edge
   portion;
   (b) a continuous coil-shaped synthetic resin
   filament having a row of successive loops, each of said
   loops having a coupling head at one end thereof, upper
   and lower legs extending from the head in a common
direction, and a heel portion remote from said coupling
head and connecting said upper leg of each said loop
and said lower leg of the next loop;
   (c) a group of upper binding warp threads
   extending in parallel longitudinally of said tape and
   overlying said upper legs of said filament loops and
   interwoven with said foundation weft thread, and a
   group of lower binding warp threads extending in
   parallel longitudinally of said tape and underlying
   said lower legs of said filament loops and interwoven
   with said foundation weft thread, both said groups of
   binding warp threads running as a whole substantially
   along a straight path at the region which extends
   substantially from the midpoint of each of said upper
   and lower legs to said heel portions;
   (d) a plurality of loop-clamping warp threads
   extending between said upper and lower binding warp
   threads and alternately over and under said upper
   and lower legs and said foundation weft thread and
   said adjacent loops;
   (e) a gap-filling filament disposed between the
   outermost one of the next upper binding warp threads
   and the next lower binding warp threads and said foundation
   weft thread and under said lower leg of said lower loop
   and said foundation weft thread

2. A woven slide fastener stringer comprising:
   (a) a tape woven of a plurality of foundation
   warp threads and a foundation weft thread and having a
   filament woven section defining a longitudinal edge
   portion;
   (b) a continuous coil-shaped synthetic resin
   filament having a row of successive loops, each of said
   loops having a coupling head at one end thereof, upper
   and lower legs extending from the head in a common
direction, and a heel portion remote from said coupling
head and connecting said upper leg of each said loop
and said lower leg of the next loop;
   (c) a group of upper binding warp threads
   extending in parallel longitudinally of said tape and
   overlying said upper legs of said filament loops and
   interwoven with said foundation weft thread, and a
   group of lower binding warp threads extending in
   parallel longitudinally of said tape and underlying!i
   said lower legs of said filament loops and interwoven
   with said foundation weft thread, both said groups of
   binding warp threads running as a whole substantially
   along a straight path at the region which extends
   substantially from the midpoint of each of said upper
   and lower legs to said heel portions;
   (d) a plurality of loop-clamping warp threads
   extending between said upper and lower binding warp
   threads and alternately over and under said upper
   and lower legs and said foundation weft thread and
   said adjacent loops;
   (e) a gap-filling filament disposed between the
   outermost one of the next upper binding warp threads
   and the next lower binding warp threads and said foundation
   weft thread and under said lower leg of said lower loop
   and said foundation weft thread

2. A woven slide fastener stringer comprising:
   (a) a tape woven of a plurality of foundation
   warp threads and a foundation weft thread and having a
   filament woven section defining a longitudinal edge
   portion;
   (b) a continuous coil-shaped synthetic resin
   filament having a row of successive loops, each of said
   loops having a coupling head at one end thereof, upper
   and lower legs extending from the head in a common
direction, and a heel portion remote from said coupling
head and connecting said upper leg of each said loop
and said lower leg of the next loop;
   (c) a group of upper binding warp threads
   extending in parallel longitudinally of said tape and
   overlying said upper legs of said filament loops and
   interwoven with said foundation weft thread, and a
   group of lower binding warp threads extending in
   parallel longitudinally of said tape and underlying
   said lower legs of said filament loops and interwoven
   with said foundation weft thread, both said groups of
   binding warp threads running as a whole substantially
   along a straight path at the region which extends
   substantially from the midpoint of each of said upper
   and lower legs to said heel portions;
   (d) a plurality of loop-clamping warp threads
   extending between said upper and lower binding warp
   threads and alternately over and under said upper
   and lower legs and said foundation weft thread and
   said adjacent loops;
   (e) a gap-filling filament disposed between the
   outermost one of the next upper binding warp threads
   and the next lower binding warp threads and said foundation
   weft thread and under said lower leg of said lower loop
   and said foundation weft thread

The following statement is a full description of this invention including the best method of performing in known to us:

13. threads and alternately overlying said upper legs and said foundation weft thread and underlying said lower legs and said foundation weft thread at every other adjacent loops;

15. (e) a gap-filling warp thread disposed between an outermost one of said upper binding warp threads and the next upper binding warp thread and also between an outermost one of said lower binding warp threads and the next lower binding warp thread and extending under said lower legs of said filament loops and alternately over and under said foundation weft thread so as to pull portions of said foundation weft thread between the outermost upper binding warp threads and the next upper binding warp thread toward a lower side of said tape substantially halfway between said upper and lower legs of the respective loops; and

17. (f) a pair of space-retaining warp threads disposed between the outermost upper binding warp thread and the next upper binding warp thread and also between the outermost lower binding warp thread and the next lower binding warp thread and extending alternately over said upper leg of one of said filament loops and said foundation weft thread and under said lower leg of the next filament loop and said foundation weft thread so as to clamp said filament loops.

2. A woven slide fastener stringer according to claim 1, further including an additional pair of
space-retaining warp threads disposed between the outermost upper binding warp thread and the next upper binding warp thread and also between the outermost lower binding warp thread and the next lower binding warp thread and extending alternately over said upper leg of one of said filament loops and said foundation weft thread and under said lower leg of the next filament loop and said foundation weft thread so as to clamp said filament loops.

3. A woven slide fastener stringer according to claim 2, wherein the two pairs of space-retaining warp threads are symmetrical with respect to said gap-filling warp thread.

4. A woven slide fastener stringer substantially as hereinbefore described with reference to Figs 1 and 2 or 3 and 4 of the accompanying drawings.

Dated this 2nd day of December 1987

YOSHIDA KOGYO K.K.

Patent Attorneys for the Applicant
F.B. RICE & CO.
extending in parallel longitudinally of said tape and overlaid by said upper loops of said foundation loop and interwoven with said foundation warp thread and threads disposed between respective loops and extending in parallel longitudinally of said tape and overlaid by said upper loops of said foundation loop and interwoven with said foundation warp thread and threads disposed between respective loops.

FIG. 1
respective loops; and a pair of space-retaining warp threads disposed between the outermost upper binding warp thread and the next upper binding warp thread.
As shown in Figures 1 and 2, stringer 10 constitutes one part of a pair of identical stringers for a slide fastener. The stringer 10 includes a group of filaments for a slide fastener.
The filament woven section IIb of the tape includes a group of upper binding warp threads 17. Since the gap between the lower legs 14c and 14b of the tape is 25 mm, threads 15 and 16 are separated by a distance of 20 mm. If the gap is 25 mm, the distance between threads 15 and 16 is 20 mm.