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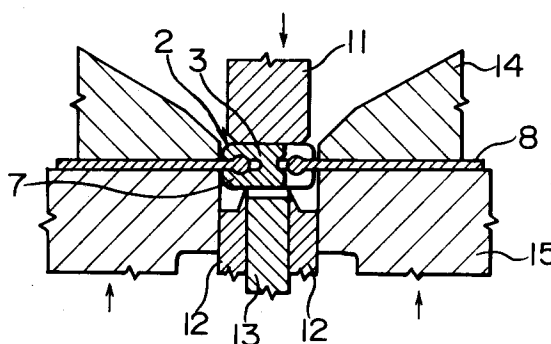
EUROPEAN PATENT APPLICATION(21) Application number: **92107882.0**(51) Int. Cl.⁵: **A44B 19/58**(22) Date of filing: **11.05.92**(30) Priority: **13.05.91 JP 202618/91**(43) Date of publication of application:
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W-8000 München 5(DE)(54) **Method for forming element-free spaces in slide fastener chain.**

(57) A method for forming element-free space sections (9) in a slide fastener chain (1) is provided that coupling elements (2) can be efficiently removed by a small force without damaging fastener tapes (8).

The method for forming element-free space sections (9) in the slide fastener chain (1) comprises the steps of,

cutting heads (3) of interengaged discrete coupling elements (2) of space sections (9) at one leg of forked legs of the individual coupling element (2),

pushing up the heads (3) of the coupling elements (2) in the direction orthogonal to the fastener tape faces from the cutting side, and gripping the remaining cut legs (4, 5) by grippers (23) to be drawn-out and removed in the direction orthogonal to the fastener tape faces.

FIG. 2

1. Field of the Invention:

This invention relates to a synthetic resin of partially removing coupling elements to form element-free space sections in a slide fastener chain including a pair of rows of interengaged discrete coupling elements mounted on confronting edges of a pair of fastener tapes.

2. Prior Art:

The conventional one method of forming element-free space sections in a slide fastener chain provided with synthetic resin coupling elements is disclosed for example, in JP, U no.55-109410 (Japanese unexamined utility Model Publication). With this citation, there is known the method of forming space sections free of coupling elements in a slide fastener chain comprising the step of, putting the slide fastener chain on a die provided with a through hole of the element width at the center position, descending a punch provided with two steps on side faces from an upward position toward heads of coupling elements to punch the heads, and still more descending the punch to catch and remove legs remained in the fastener tape by the punch step.

However, the above-mentioned element-free space section forming method have suffered from the drawbacks that since the punch is descended to punch the heads of the coupling elements by the punch and still more descended to catch and remove the remaining cut legs by the punching process, the stringer cores of the fastener tape were readily damaged and the chain crack was sometimes caused, and that a large force was required in order to punch and remove legs at one time.

SUMMARY OF THE INVENTION

It is therefore an object of this invention to overcome the aforementioned disadvantages and to provide a method of forming element-free space sections in a slide fastener chain, whereby coupling elements can be efficiently removed by a small force without damaging fastener tapes.

According to a first aspect of this invention, there is provided a method for forming element-free space sections in a slide fastener chain comprising the steps of, cutting heads of interengaged discrete coupling elements at space sections of the slide fastener chain provided with coupling elements by use of a punch and cutters to separate each head from one leg of forked legs of the individual coupling element, pushing up the heads of the coupling elements from the cutting side in the direction orthogonal to fastener tape faces by a

knock-out rod to remove the other leg and the heads of the coupling elements from the fastener tapes, and gripping the cut legs remaining on the fastener tapes by grippers to draw-out and remove the cut legs in the direction orthogonal to the fastener tape faces.

According to a second aspect of this invention, in removing cut legs remaining on fastener tapes, there is provided an other method for forming element-free space sections of a slide fastener chain comprising the steps of, gripping only the cut legs at both side ends of space sections by grippers to draw-out and remove the cut of both side ends in the direction orthogonal to the fastener tape faces, and scraping off the remaining cut legs by means of a rotary cutter and a rotary tumbler for leading the space sections toward the rotary cutter to remove the cut legs from the fastener tapes.

According to this invention, the heads and the cut legs of the coupling elements are respectively removed in the different processes. Then, the heads and the cut legs of the coupling elements are respectively drawn-out in the direction reverse to the direction of permeating a molten coupling element into the fastener tapes. Therefore, in this method, the heads and the cut legs of the coupling elements can be easily removed by the small force without damaging the fastener tapes and without causing the chain crack to form the element-free space sections efficiently.

In removing the cut legs, since the cut legs being one of principal parts are removed by means of a rotary cutter and a rotary tumbler after the cut legs are removed in the both side ends of the space sections, the cut legs can be efficiently removed without requirement of fine adjustment of the rotary cutter and the rotary tumbler and without damaging the remaining coupling elements.

This and other objects and advantages of this invention will be more apparent from the following detailed description of a preferred embodiment taken in conjunction with the accompanying drawings in which like reference numbers refer to like or corresponding parts throughout the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an apparatus for carrying out a method of this invention;

FIG. 2 is a sectional view at the state that a slide fastener chain is set in the apparatus, in orders for punching heads of coupling elements;

FIG. 3 is a sectional view at the state that legs of coupling elements are cut;

FIG. 4 is a sectional view at the state that cut heads of coupling elements are removed;

FIG. 5 is a schematic and perspective view of a

first coupling element leg removing means;
 FIG. 6 is a sectional view of principal parts of the first coupling element leg removing means;
 FIG. 7 is a side view of principal parts of a second coupling element leg removing means;
 FIG. 8 is a plan view of a slide fastener chain in which heads of coupling elements are removed;
 FIG. 9 is a plan view of a slide fastener chain in which cut legs are removed in both side ends of space-forming sections;
 FIG. 10 is a plan view of a slide fastener chain in which space sections are formed and completed.

DETAIL DESCRIPTION

An embodiment of this invention will be described with reference to the drawing figures.

Referring now to FIG. 1, there is shown an apparatus for carrying out a space section forming method of this invention comprising a coupling element punching means 10, a first coupling element leg removing means 20, and a second coupling element leg removing means 30.

Right and left fastener stringers are supplied at the interengaged state to remove heads 3 of interengaged coupling elements 2 in the coupling element punching means 10 as shown in FIG. 2.

Referring to FIG. 2 to FIG. 4 showing the orders for removing heads 3 of coupling elements 2 from fastener tapes 8, a slide fastener chain 1 is guided by a pair of right and left chain guides 14. When space sections of the slide fastener chain 1 reaches to the coupling element punching means 10, the transfer of the fastener chain is stopped and pressure pads 15, 15 are ascended from apertures of the chain guides 14. Then, space sections 9 of fastener tapes 8 are held between the chain guides 14. The heads 3 of the coupling elements 2 are pressed by means of a descending punch 11 and a pair of ascending cutters 12, 12 to cut lower forked legs 7 of the coupling elements 2 as shown in FIG. 3. Next, the cut head 6 of the individual coupling element 2 is held between the punch 11 and a knock-out rod 13 and ascended to remove the heads 3 and the upper legs of the coupling elements. The knock-out rod 13 has the same length as a space section 9 and disposed between the cutters 12. The knock-out rod 13 together with the cutters 12 is ascended to remove and discharge the heads 6 toward the outside as shown in FIG. 4. The slide fastener chain 1 is transferred into the first coupling element leg removing means 20 of the following process at the state that the cut legs are remained in stringer cores 8 as shown in FIG. 8.

FIG. 5 and FIG. 6 show the state for removing the cut legs 5 disposed in the both side ends of

the space section 9 in the first coupling element leg removing means 20. When the slide fastener chain 1 transferred from the coupling element punching means 10 being guided by a chain guide 16 reaches to the first coupling element leg removing means 20, it is stopped and a space section determining member 21 descends from the upward position to carry out the positioning of the slide fastener chain 1, as shown in FIG. 5. The chain guide 16 is disposed contacting the back face of the slide fastener chain 1 and is provided with a pair of apertures 24, 24 at the position corresponding to the both ends of the space section. A center guide 22 is set under the chain guide 16 and is ascended through working apertures 24 as shown in FIG. 5 and FIG. 6. The projected both ends of the center guide 22 are passed through the punched gaps of the heads 3 of the coupling elements in a slide fastener chain 1 and engaged in a positioning groove 25 which is formed in the back face of the space section determining member 21, so as to carry out the positioning. Right and left grippers 23, 23 are disposed on the both sides of the center guide 22 and ascended as shown by arrows in FIG. 6. After the grippers are contacted to the back faces of the fastener tape 8, they are moved toward each other to hold cut legs 5 at both side ends of space section 9 between the sides of the center guide 22 and the grippers 23, 23. The cut legs 5 are drawn-out downwardly in the direction orthogonal to the surfaces of the slide fastener tapes 8 as shown in FIG. 9, while holding the cut legs 5 between the center guide 22 and the grippers 23. In the first coupling leg element removing means 20, all cut legs 4, 5 adhered to the fastener tapes 8 are removed at one time to form the space section 9. Then, the all cut legs 4, 5 are held between a flat plate of center guide 22 and grippers having the approximate same length as the space section 9 and thereby are drawn-out downwardly. The working apertures 24 of the chain guides 16 are required to be punched at the approximate same length as the space section 9.

The slide fastener chain 1 in which the cut legs 5 are removed at the both side ends of the space sections 9, is transferred to the second coupling leg element removing means 30 by guide rollers. The second removing means 30 serves to scrape off and remove all of remaining cut legs 4 by means of a rotary cutter 31 and a rotary tumbler 33 as shown in FIG. 1 and FIG. 7.

The rotary tumbler 33 has the same elliptic shape as the conventional construction and are provided with a circular detector 36 for space section terminal which is always urged outwardly by a spring 34. The slide fastener chain 1 which is processed in the first coupling element removing means 20, is always moved and guided along the

space section terminal detector 36. When the head-removed portion of the space section 9 reaches to the detector, the space section terminal detector 36 is projected to the space section by the spring 34 as shown in FIG. 7, so that a tip stopper 35 is contacted with the heads of the coupling elements. Then, a notch (not shown) for preventing the rotation of the rotary tumbler 33 by a pulling force of the slide fastener chain 1 is released to rotate the rotary tumbler 34, so that the slide fastener chain 1 approaches to the rotary cutter 31. The remaining cut legs 4 are scraped off and removed by the blades 32 of the rotary cutter 31 as shown in FIG. 10. Since the cut legs 5 at the both side ends of the space section 9 are pre-removed from the slide fastener chain 1, the cut legs 4 are easily removed without requirement of fine adjustment and without damaging the coupling elements 2 arranged adjacent to the space section.

As described, according to this invention, the heads and the cut legs of the coupling elements are respectively removed in the different processes, so that the coupling elements can be efficiently and naturally removed from the fastener tapes without damaging the fastener tapes.

Claims

1. A method for forming element-free space sections (9) in a slide fastener chain (1) including a pair of rows of interengaged discrete coupling elements (2) mounted on confronting edges of a pair of fastener tapes (8), said method being characterised by,
 - cutting heads (3) of interengaged discrete coupling elements (2) at space sections of said slide fastener chain (1) provided with coupling elements by means of a punch (11) and cutters (12) to separate the each head from one leg of forked legs of the individual coupling element (2);
 - pushing up said heads (3) of said coupling elements (2) from the cutting side in the direction orthogonal to fastener tape faces by a knock-out rod (13) to remove the other leg and said heads (3) of said coupling elements (2) from said fastener tapes (8); and
 - gripping said cut legs (4, 5) remained in said faster tapes (8) by grippers (23) to draw-out and remove said cut legs (4, 5) in the direction orthogonal to said fastener tape faces.
2. A method according to claim 1, wherein said cut legs (4, 5) adhered to the fastener tapes (8) are removed at one time to form the space section (9).

3. A method according to claims 1 or 2 wherein said process of removing said cut legs (4, 5) remained in said fastener tapes (8) comprises the steps of,

gripping only said cut legs (5) at both side ends of space sections (9) by said grippers (23) to draw-out and remove said cut legs (5) of said both side ends in the direction orthogonal to said fastener tape faces, and

scraping off said remaining cut legs (4) by means of a rotary cutter (31) and a rotary tumbler (33) for leading said space sections (9) toward said rotary cutter (31) to remove said cut legs (4) from said fastener tapes (8).

FIG. 1

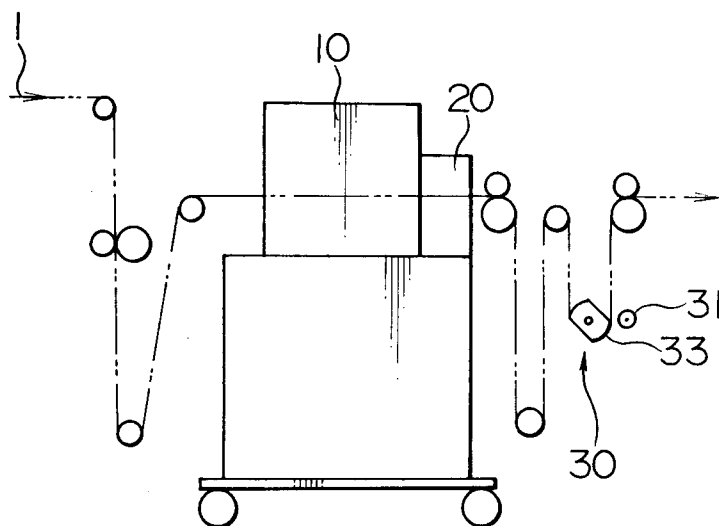


FIG. 2

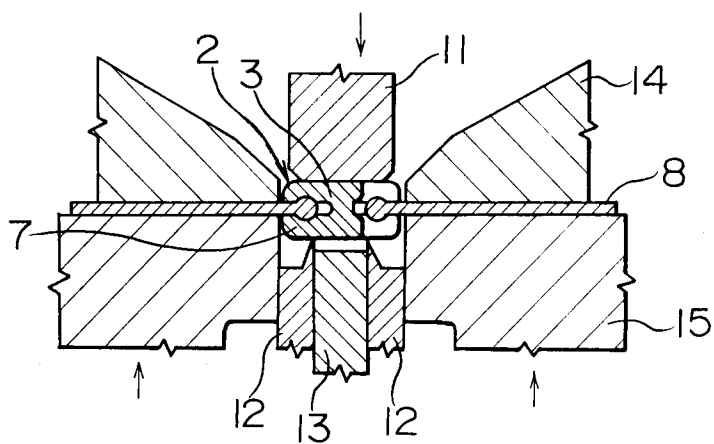


FIG. 3

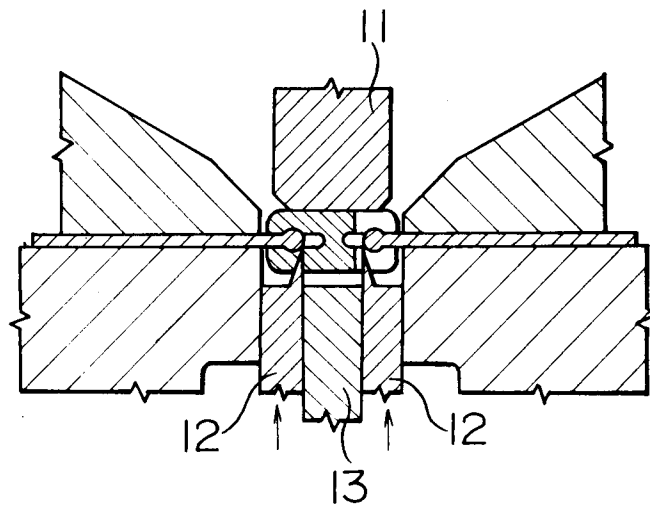


FIG. 4

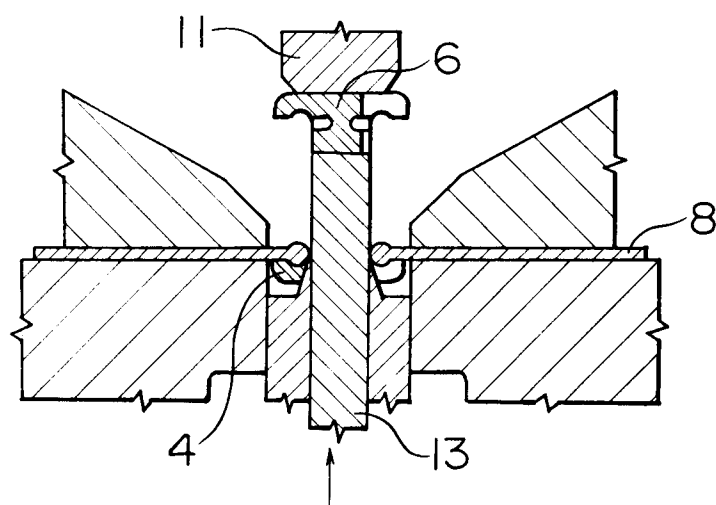


FIG. 5

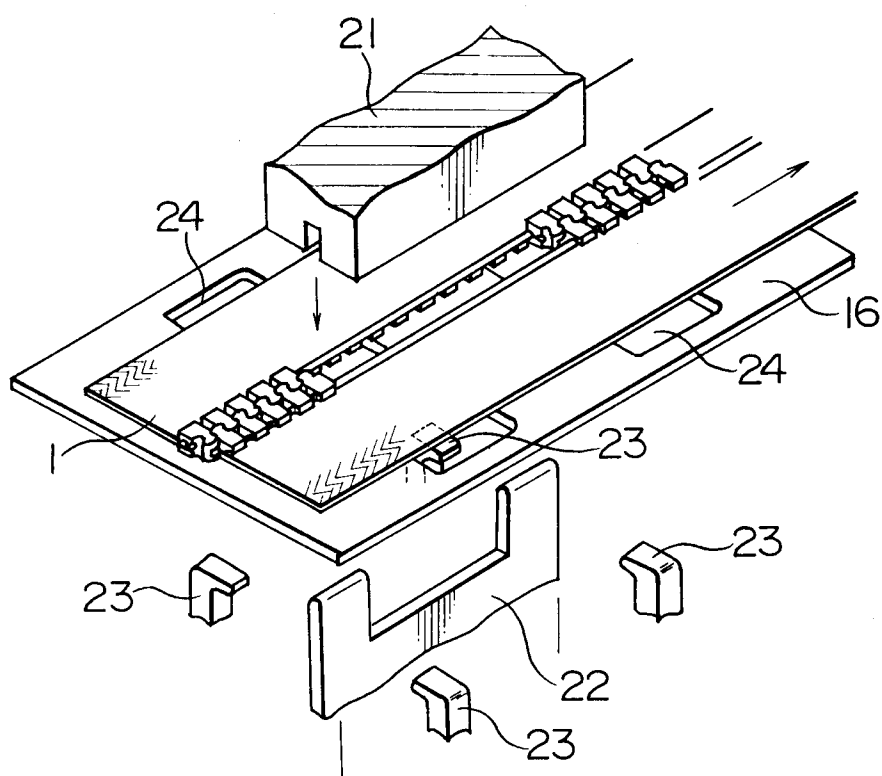


FIG. 6

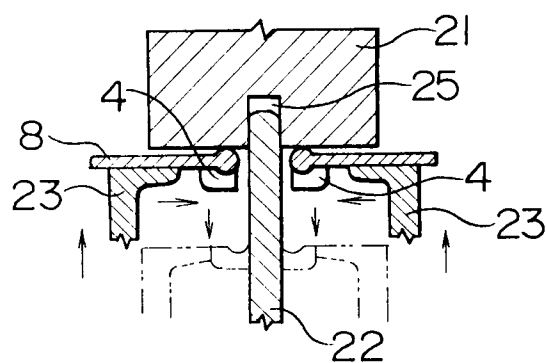


FIG. 7

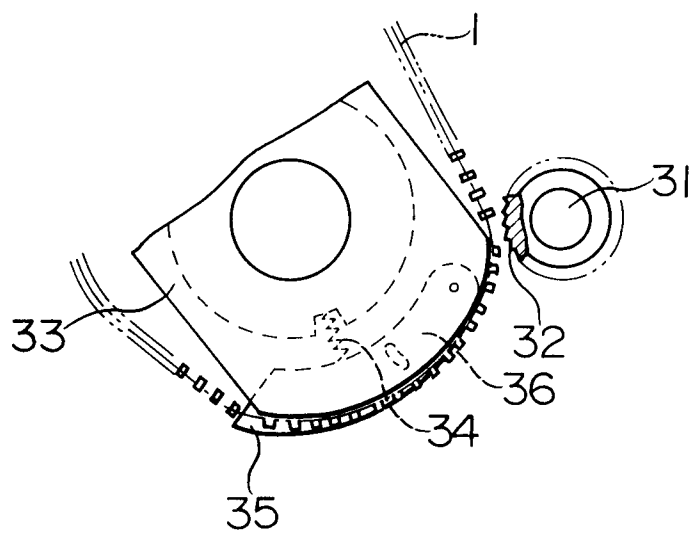


FIG. 8

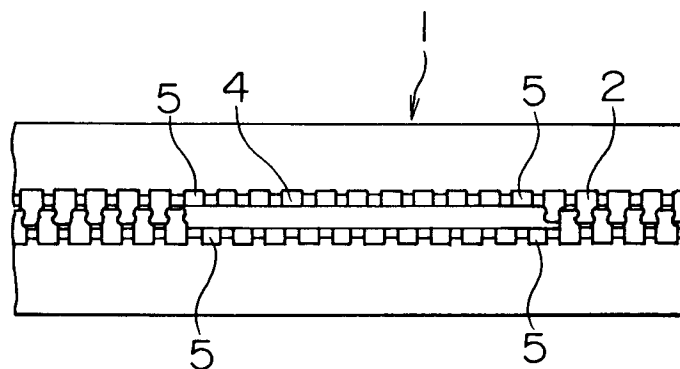


FIG. 9

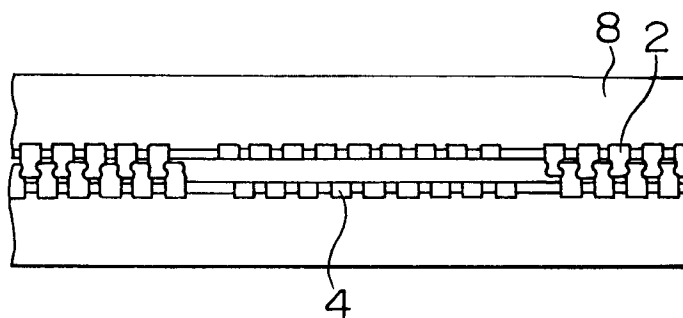
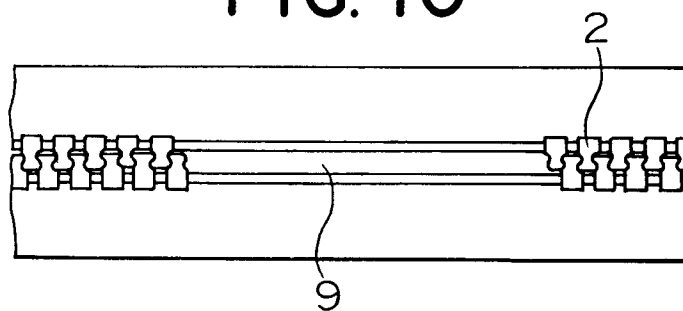


FIG. 10





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EUROPEAN SEARCH REPORT

Application Number

EP 92 10 7882

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	FR-A-2 207 664 (YOSHIDA KOGYO) * page 4, line 24 - page 9, line 27; figures 1-5H *	1	A44B19/58

A	US-A-3 225 430 (SCOVILL MANUFACTURING COMPANY) * column 1, line 69 - column 3, line 54; figures 1-6 *	1,2	

A	EP-A-0 021 286 (YOSHIDA KOGYO K. K.) * page 3, line 20 - page 7, line 25; figures 1-9 *	1,3	

E	EP-A-0 488 816 (YOSHIDA KOGYO K. K.) * the whole document *	1,2	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			A44B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 28 AUGUST 1992	Examiner GARNIER F. M. A. C.
CATEGORY OF CITED DOCUMENTS			
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