

SPECIFICATION

A Braking Guide Device in a Sewing Machine for Attaching Slide Fastener Chains to Articles

The present invention relates to a braking guide device for controlling the feeding velocity of a slide fastener chain on a sewing machine whereby the slide fastener chain is attached to an article, e.g. fabric, plastic sheet, leather and the like, to be used with the slide fastener chain as fastened thereto.

Slide fasteners either of a continuous length or a unit length are usually sewn to articles, such as fabrics, plastic sheets, leathers and the like, using a sewing machine. The sewing of the fasteners to the articles is performed with a so-called fastener stringer which is one separable half of the fastener or with a fastener chain formed by interengaging a pair of the opposing fastener stringers. The fastener chain or stringer is fed under the presser foot of the sewing machine together with the article which is overlaid by the fastener chain or stringer.

In the feeding of the fastener chain and the fabric article, their travelling velocity should be desirably the same so that the phenomenon of puckering or waving does not take place. It is, however, generally difficult to obtain the same travelling velocity, and the finished fabrics or cloths having the slide fastener chain sewed in tend to suffer from the defective puckering or waving. Such difficulty may be obviated only by the skill of workers or operators who control the travelling velocity of the fabric article by either acceleration or retardation or alternately by hand.

Such manual accelerating or retarding operation may result in a tolerable matching of the travelling velocity when the properties of the carrier tape of the fastener chain and the article are closely similar to each other, but if the properties widely differ from each other, for example, the article being a shaggy or fuzzy corduroy, very elastic knit cloth, leather, fur or the like, it is very difficult to obtain conformity between the travelling velocity of one and that of the other by mere manual control. Particularly, when the article to which the fastener chain is to be sewed is a shaggy cloth, the travelling of the fastener tape is badly disturbed and the waving of the finished article or puckering of the fastener chain is unavoidable. A usual way thereby to solve this problem is such that braking action is given to the fastener chain to produce frictional resistance during the travelling of the fastener chain under the presser foot of the sewing machine.

One of the known means for producing frictional resistance to the fastener chain is to provide a braking device in the path of the continuous fastener chain from a magazine containing the fastener chain in a reeled form to the presser foot of the sewing machine so that the travelling velocity of the fastener chain is retarded by depressing the spring of the braking device. Alternatively, a special type of presser foot of a sewing machine is known which is equipped

integrally with a braking device at the inlet side of the fastener chain (see, for example, U.S. Patent No. 2,329,991 and Japanese Patent Disclosure No. 47-46050).

The above-described means for imparting frictional resistance to the fastener chain is utilized only when the fastener chain is of a continuous form. This is because, once the leading end of the fastener chain is inserted into the braking device, the travelling fastener chain is continuously under friction in the subsequent sewing. On the other hand, when the fastener chain is of a unit product length, it is required to insert and pull each fastener chain individually into or through the braking device, resulting in markedly reduced efficiency in the sewing work.

It is therefore an object of the present invention to provide a braking guide device in a sewing machine for attaching slide fastener chains to an article, wherein a means for adequately controlling the travelling velocity of the fastener chain fed under the presser foot of the sewing machine as overlying the article to which the fastener chain is to be attached so that the possibility of the waving or puckering of the fastener chain or the thus treated article can be obviated.

Another object of the invention is to provide a braking guide device installed in front of the presser foot on the sewing machine, imparting an adequate frictional resistance to the travelling fastener chain, whereby the progress of the fastener chain by the movement of the sewing machine feed under the presser foot is retarded, so that the travelling velocity of the fastener chain and the article is brought into conformity with each other, resulting in the uniform and smooth finish of the article having the slide fastener chain fastened thereto.

Still another object of the invention is to provide a braking guide device presenting a convenient and efficient means for controlling the travelling velocity of individual slide fastener chains having a unit product length by imparting a frictional resistance to each fastener chain without any obstacles to the sewing work.

A further object of the invention is to provide a braking guide device for controlling the travelling velocity of the fastener chain with very simple structure and inexpensiveness as well as easiness in installation and operation.

The braking guide device in accordance with the present invention comprises:

- (a) a supporting member fixedly positioned on the table of the sewing machine.
- (b) a pair of cantilever members supported by the supporting member and extending in front of the presser foot of the sewing machine one above the other, the lower cantilever member being arranged on or above the table of the sewing machine and the upper cantilever member being movable into contact with or apart from the lower cantilever member and at least one of the cantilever members being provided with a chain guide on the surface facing the other cantilever member whereby frictional resistance is imparted

to the slide fastener chain travelling between the upper and lower cantilever members when the upper cantilever member is at its lowermost position, and

- 5 (c) a driving means for driving the upper cantilever member into contact with or apart from the lower cantilever member.

The present invention will be described by way of example with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view illustrating a braking guide device embodying the invention, attached on the table of a sewing machine;

Fig. 2 is a rear view of the sewing machine with the braking guide device of Fig. 1;

Fig. 3 is a plan view of a front body of trouser pants overlaid by a slide fastener chain to be attached and travelling under the movable cantilever member;

Fig. 4 is a cross sectional view of the arrangement shown in Fig. 3 as cut along the line IV—IV;

Fig. 5 is an enlarged perspective view of the braking guide device of Fig. 1;

Fig. 6 is a front view of the braking guide device of Fig. 5 as set on a sewing machine; and

Fig. 7 is a front view of the lower and upper cantilever members having detachable chain guides.

In Figs. 1 and 2 illustrating the braking guide device of the invention installed on the table of a sewing machine, the braking guide device 1 is fixed on the table 3 of the sewing machine 2 at a position in front of the presser foot 4 of the sewing machine 2, i.e. between the presser foot 4 and the operator of the sewing machine 2 or the inlet side of the presser foot 4. The sewing machine 2 is provided, as usual, with a hand lever 5 for raising and lowering the presser foot 4 by hand, a remote driving mechanism 9 for the presser foot 4 composed of a knee lever 6 hanging below the machine table 3 also for raising and lowering the presser foot 4 as being pushed horizontally by a knee of the operator, a connecting rod 7 and a lever 8 extending at the back of the machine head with which the presser foot 4 and the knee lever 6 are linked together so that the presser foot 4 can be raised or lowered by pushing or releasing the knee lever 6 with the knee.

The braking guide device per se, as shown in Figs. 5 and 6, has a supporting member 10 which in turn is formed with a pair of uprights 10a, 10a with a distance from each other as erected on the base plate 10b, a lower cantilever member 11, a movable upper cantilever member 12 positioned above the lower cantilever member 11 and a means 20 for driving the movable cantilever member 12. Both of the lower and upper cantilever members 11 and 12 are supported pivotally by pivotal pins 13, 13 so as to be able to pivot or sway within a vertical plane and extending in front of the presser foot 4 of the sewing machine 2. When the movable upper cantilever member 12 is driven downwardly by

the driving means 20 around the pivotal pin 13, it is brought into press-contact with the lower cantilever member 11 at chain guides 14, 14 provided on the upper surface of the lower cantilever member 11 and on the lower surface of the movable upper cantilever member 12 facing each other.

Either one or both of the chain guides 14, 14 are each formed of a brake shoe member 15 which is in a form of one or more of line protrusions or a rugged surface on the cantilever member 11 or 12, where a carrier tape 31 of a travelling fastener chain 30 is pinched and imparted with a frictional resistance to retard its progress when the upper cantilever member 12 is laid down on the lower cantilever member 11, and a recessed guide groove 16 adjacent to the brake shoe member 15 along which the element row 32 of the travelling fastener chain 30 is guided, though a recessed guide groove 16 may be provided only in one of the cantilever members 11 and 12 according to the cross section of the fastener chain 30 to be guided by the chain guides 14, 14.

It is recommended that, when the braking guide device 1 is fixed on to the table 3 of the sewing machine, the device 1 is positioned in such a direction that the cantilever members 11 and 12 extend at right angles with the travelling direction of the fastener chain 30 and an article 33 to be sewed by the sewing machine 2. A gap 18 between the top of the table 3 and the lower surface of the cantilever member 11 is fixed with an adjustable width by means of an adjuster such as an adjustment screw 17 provided near the supported end of the cantilever member 11 according to the thickness of the article 33, so that the article 33 passing through the gap 18 receives no excessive frictional resistance from the cantilever member 11 and the top of the table 3.

It is also possible not to provide a gap between the table 3 and the cantilever member 11 when the article 33 and the fastener chain 30 are sewed together with the fastener chain 30 travelling below the article 33 passing above the movable cantilever member 12.

Further, the chain guides 14, 14 illustrated in the figures are designed to fit a fastener stringer which is a half body of an interengaged fastener chain but they may be designed so as to fit a fastener chain with two carrier tapes on both sides of the interengaged row of the elements by providing brake shoe members 15, 15 on both sides of the guide groove 16 to pinch the respective carrier tapes.

As is mentioned above, the guide groove 16 may be provided in either one or both of the cantilever members 11 and 12 but it is convenient to have the chain guides 14, 14 detachable and replaceable with each other or with another chain guide of different shape so that the versatility of the braking guide device is greatly increased. The detachment and reattachment of the chain guides to the

cantilevers can be effected, for example, by means of a screw 19 as shown in Fig. 7.

The movable cantilever member 12 is connected to a driving means 20 to move it forward toward the cantilever member 11 or to retract it apart from the cantilever 11 so that a carrier tape 31 of the travelling fastener chain 30 may be pinched between the brake shoe members 15, 15 of the two cantilever members 11 and 12 or may be released according to need.

Although not specifically limitative, the driving means 20 illustrated in the figures includes, for example, a supporting plate 21 connected to the supporting member 10 and extending over the movable cantilever member 12 and an air cylinder 22 facing the movable cantilever member 12 as supported on the above-mentioned supporting plate 21, a piston rod 23 of the air cylinder 22 being connected to the movable cantilever member 12 through a compression spring 24. The piston rod 23 is also provided with a limiting member 25 at an adjustable height, which comes into contact with a stopper 26 on the supporting member 10, the height of the stopper 26 being also adjustable, so that the down stroke of the piston rod 23 is limited by the contacting of the limiting member 25 and the stopper 26. When the air cylinder 22 is actuated and the piston rod 23 is moved downwardly, the downward compressive force of the spring 24 rotates the movable cantilever member 12 around the pivotal axis 13 in counteracting the pulling force of a tension spring 27 spanned between the supporting plate 21 and the movable cantilever member 12.

An air line hose 34 connected to the air cylinder 22 is provided with a rectangular unit 28 for compressed air composed of an air filter, a pressure regulator and a lubricator and an air microvalve 29 as a switching means between the air cylinder 22 and the regulator unit 28, which is operated by the transverse movement of the knee lever 6 for raising and lowering the presser foot 4 of the sewing machine 2 so as that the presser foot 4 and the movable cantilever member 12 are moved up and down at the same time by a single action of the knee lever 6 with the knee. Namely, an air supply to the air cylinder 22 is interrupted to raise the movable cantilever member 12 apart from the cantilever member 11 when the air microvalve 29 is operated with the movement of the knee lever 6 to raise the presser foot 4 as pushed by the knee. As an alternative one may have a foot switch separately for the control of air supply to the air cylinder 22 independently of the knee lever 6 in place of the air microvalve 29. It is of course optional for controlling the movement of the movable cantilever member 12 to utilize the power for driving the sewing machine 2 per se or to connect the movable cantilever member 12 directly to the knee lever 6 with a cable joint.

When a slide fastener chain 30 is to be sewed to an article, e.g. a front body of trouser pants 33 shown in Fig. 3, with a sewing machine having the braking guide device as described above, the

article 33 is passed through the gap between the cantilever member 11 and the table 3 of the sewing machine 2, the leading end of the fastener chain 30 is passed between the lower and upper cantilever members 11 and 12 when the latter is in a raised position apart from the former and the article 33 and the leading end of the fastener chain 30 are altogether brought under the presser foot 4 of the sewing machine 2 whereupon the presser foot 4 and the movable cantilever member 12 are lowered as shown in Fig. 4 or 6 before sewing together of the article and the fastener chain is started so as that a suitable frictional resistance is imparted to the travelling fastener chain 30 by the chain guides 14, 14 during the progress of sewing.

As is described above, the braking guide device used in sewing of a slide fastener chain to an article is composed of a pair of lower and upper cantilever members installed on the table of the sewing machine between the presser foot and the worker and each provided with a chain guide oppositely to the other chain guide, the upper movable cantilever member being operated by a driving means to come into contact with and apart from the lower cantilever member.

Thus, advantages are obtained in the ease of handling of both a continuous length fastener chain and fastener chains of unit length since the former is continuously imparted with a suitable frictional resistance over the whole length of the chain once the leading end of it is laid between the lower and upper cantilever members and the latter type of fastener chains can be inserted one by one without any troublesome handling of the device owing to the semi-automatic opening and closing of the movable upper cantilever member to efficiently give satisfactory results of sewing without puckering and waving. Further, the device is very advantageous due to the simpleness in its structure and versatility to be accommodated to many types of ready-made sewing machines.

Claims

1. A braking guide device for controlling the travelling velocity of a slide fastener chain in a sewing machine for sewing the slide fastener chain to an article which comprises:
 - (a) a supporting member fixedly positioned on the table of the sewing machine,
 - (b) a pair of cantilever members supported by the supporting member and extending in front of the presser foot of the sewing machine one above the other, the lower cantilever member being arranged on or above the table of the sewing machine and the upper cantilever member being movable into contact with or apart from the lower cantilever member and at least one of the cantilever members being provided with a chain guide on the surface facing the other cantilever member whereby frictional resistance is imparted to the slide fastener chain travelling between the upper and lower cantilever members when the upper cantilever member is at its lowermost position, and



cantilevers can be effected, for example, by means of a screw 19 as shown in Fig. 7.

The movable cantilever member 12 is connected to a driving means 20 to move it forward toward the cantilever member 11 or to retract it apart from the cantilever 11 so that a carrier tape 31 of the travelling fastener chain 30 may be pinched between the brake shoe members 15, 15 of the two cantilever members 11 and 12 or may be released according to need.

Although not specifically limitative, the driving means 20 illustrated in the figures includes, for example, a supporting plate 21 connected to the supporting member 10 and extending over the movable cantilever member 12 and an air cylinder 22 facing the movable cantilever member 12 as supported on the above-mentioned supporting plate 21, a piston rod 23 of the air cylinder 22 being connected to the movable cantilever member 12 through a compression spring 24. The piston rod 23 is also provided with a limiting member 25 at an adjustable height, which comes into contact with a stopper 26 on the supporting member 10, the height of the stopper 26 being also adjustable, so that the down stroke of the piston rod 23 is limited by the contacting of the limiting member 25 and the stopper 26. When the air cylinder 22 is actuated and the piston rod 23 is moved downwardly, the downward compressive force of the spring 24 rotates the movable cantilever member 12 around the pivotal axis 13 in counteracting the pulling force of a tension spring 27 spanned between the supporting plate 21 and the movable cantilever member 12.

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When a slide fastener chain 30 is to be sewed to an article, e.g. a front body of trouser pants 33 shown in Fig. 3, with a sewing machine having the braking guide device as described above, the

article 33 is passed through the gap between the cantilever member 11 and the table 3 of the sewing machine 2, the leading end of the fastener chain 30 is passed between the lower and upper cantilever members 11 and 12 when the latter is in a raised position apart from the former and the article 33 and the leading end of the fastener chain 30 are altogether brought under the presser foot 4 of the sewing machine 2 whereupon the presser foot 4 and the movable cantilever member 12 are lowered as shown in Fig. 4 or 6 before sewing together of the article and the fastener chain is started so as that a suitable frictional resistance is imparted to the travelling fastener chain 30 by the chain guides 14, 14 during the progress of sewing.

As is described above, the braking guide device used in sewing of a slide fastener chain to an article is composed of a pair of lower and upper cantilever members installed on the table of the sewing machine between the presser foot and the worker and each provided with a chain guide opposedly to the other chain guide, the upper movable cantilever member being operated by a driving means to come into contact with and apart from the lower cantilever member.

Thus, advantages are obtained in the ease of handling of both a continuous length fastener chain and fastener chains of unit length since the former is continuously imparted with a suitable frictional resistance over the whole length of the chain once the leading end of it is laid between the lower and upper cantilever members and the latter type of fastener chains can be inserted one by one without any troublesome handling of the device owing to the semi-automatic opening and closing of the movable upper cantilever member to efficiently give satisfactory results of sewing without puckering and waving. Further, the device is very advantageous due to the simpleness in its structure and versatility to be accommodated to many types of ready-made sewing machines.

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(c) a driving means for moving the upper cantilever member into contact with or apart from the lower cantilever member.

2. The braking guide device as claimed in claim 1 wherein the chain guide has a brake shoe.

3. The braking guide device as claimed in claim 1 wherein the upper cantilever member and the supporting member are joined by means of a pivotal pin around which the cantilever member is swayed.

4. The braking guide device as claimed in claim 1 or claim 3 wherein the driving means is provided with an operation rod at the output end thereof and the operation rod is connected to the upper cantilever member with a spring intervening therebetween so that the upper cantilever member is pushed down toward the lower cantilever member with the resilience of the spring.

5. The braking guide device as claimed in claim 4 wherein the supporting member is provided with a stopper at an adjustable position whereby the stroke of the operation rod of the driving means is limited.

6. The braking guide device as claimed in claim 1, claim 2, claim 3, claim 4 or claim 5 wherein a tension spring is provided as spanned between the upper cantilever member and the supporting member whereby the operation rod is restored to the position before pushing down the upper cantilever member.

7. The braking guide device as claimed in claim 1, claim 2, claim 3, claim 4, claim 5 or claim 6 wherein the driving means is provided with a switching means linked to the mechanism for raising and lowering the presser foot of the sewing machine.

8. The braking guide device as claimed in claim 1, claim 2, claim 3, claim 4, claim 5, claim 6 or claim 7 wherein the lower cantilever member is fixed above the table of the sewing machine with a gap sufficiently wide to pass the article therethrough.

9. The braking guide device as claimed in claim 8 wherein the lower cantilever member is provided with an adjuster near the supported end thereof whereby the width of the gap is adjusted.

10. The braking guide device as claimed in claim 1, claim 2, claim 3, claim 4, claim 5, claim 6, claim 7, claim 8 or claim 9 wherein at least one of the chain guides in the upper and lower cantilever members is provided with a recessed guide groove at a position adjacent to the brake shoe to fit the row of the fastener elements whereby the travelling slide fastener chain is guided along the recessed guide groove.

11. The braking guide device as claimed in claim 10 wherein the chain guide of at least one of the upper and lower cantilever members composed of the brake shoe and the recessed guide groove is detachable from the cantilever member.