Description

SEWING MACHINE

The present invention relates to a sewing machine for producing a clothing item, such as trousers or the like, and particularly for making specific sewing operations.

A sewing machine is a mechanical or electromechanical equipment used to join fabric, cloth, leather or the like by sewing, passing one or more threads of cotton or other materials through a needle that alternately oscillates from up downwards or vice versa.

Different types of sewing machines are known in the prior art, each of them being able to perform one or more sewing operations or one or more types of seams or stitches (chain stitches, manual stitches, lockstitches, double chain stitches, whipstitches, or interlock).

Therefore said sewing machines are different in the type of stitch, in their structure and in their possible use.

In the apparel sector several differences exist between the various models of garments, and especially between men and women's garments.

In addition to the cutting and modeling of the garments, which tend to follow the different body profile of men and women, also the disposition of some clothing elements or accessories, such as pockets, small pockets, buttons, slots and the like, may vary.

For example, in the case of trousers, the models for men and women may differ in the position of the fly (trouser element) and in the seams near the closing portion where the zipper or buttons are normally positioned.

Normally, trousers are produced by sewing four portions, a right-hand back portion, a left-hand back portion, a right-hand front portion and a left-hand back portion, said portions respectively defining the right leg and the left leg of the trousers.

Generally, in men's trousers the fly is disposed on the left-hand front portion, whereas the fly-front is applied on the right-hand front portion. On the

contrary, in women's trousers, the fly and the fly-front are respectively applied on the right-hand front portion and on the left-hand front portion.

Such a simple difference requires the use of two different sewing machines, of which one is dedicated to sew men's trousers and the other one is dedicated to sew women's trousers.

In order to better understand the limitations of the sewing machines according to the prior art, this description continues with reference to Figs. 1 and 2, which show a sewing machine that is traditionally used to sew said portions intended to produce trousers for men or for women:

- Fig. 1 is a diagrammatic top view of a sewing machine according to the prior art;
- Fig. 2 is a perspective view of the sewing machine of Fig. 1;

Moreover, it must be noted that any dimensional or spatial term (such as "lower", "upper", "internal", "external", "front", "back" and the like) refers to the position according to which the elements are substantially disposed in real conditions.

For illustrative, not limiting purposes, reference is made to the sewing of a fly on a portion of trousers, it being understood that the description can be advantageously extended to the sewing of any other element or accessory for clothing items, such as pockets, small pockets, buttons, slots or the like, on a generic clothing item for men or for women.

Said seams may have a functional purpose, such as joining different parts, or simply a decorative purpose.

As diagrammatically shown in Fig. 1 and 2, a sewing machine according to the prior art comprises a bearing frame provided with a sewing head (10) that cooperates with a sewing template (100), a loading clamp (110) of the portion (20) coupled with a supporting and moving means (7), control means, a work surface (14) whereon the portion (20) to be sewn is positioned and moved, as described in detail below.

Said sewing machine can additionally comprise an automatic unloading system of the semi-finished piece, said semi-finished piece being the clothing item and/or its parts (for example the aforesaid portion) which are submitted to

a functional or decorative sewing operation, and/or a stacking unit intended to stack the semi-finished piece after sewing in order to submit it to additional working operations.

Two portions of fabric (20, 30) are positioned in Fig. 1, the first one (20) having a diagrammatic "J"-shaped seam, as usually provided in men's trousers, whereas the second one (30) has a diagrammatic "overturned-J" seam, as usually provided in women's trousers; said second portion (30) is only shown for illustrative purposes in order to make the reader understand that said second portion (30) cannot be sewn by the sewing machine because of its structural configuration, as described in detail below.

As it is known, the sewing template (100) acts as guide and reference to produce the model and the shape of the desired seam and it is advantageously fixed to a moving mechanism (101), with which it cooperates in order to stop and hold the semi-finished piece still during the sewing operation.

Instead, the supporting means (7) is normally positioned on one side of the work surface (14), and it is provided with suitable guide and moving means that allow said loading clamp (110) to translate on said work surface (14), in such a way to bring the portion to be sewn in correspondence of the sewing head (10).

Normally, the work surface (14) has a substantially rectangular shape with four sides:

- a first side (140) wherein the sewing head (10) is substantially positioned and operates;
- a second side (141), opposite to said first side (140), where the operator works, that is to say where said operator is positioned in order to load and position the portion (20) of trousers to be sewn on the work surface (14);
- a third side (142) wherein a portion (20) to be sewn is positioned and wherefrom said portion is automatically unloaded by means of an unloading means or manually by an operator, after being sewn;
- a fourth side (143), opposite to said third side (142), whereon the

supporting and moving means (7) of the loading clamp (110) is installed.

The portion (20) to be sewn has a first part that is positioned and laid on the work surface (14) and a second part that protrudes from said third side (142) of the work surface (14).

The position of the supporting and moving means (7) limits the space available for the operator and generates an impediment that does not permit the positioning of the excessive fabric near the fourth side (143), which is occupied by said supporting and moving means (7).

In other words, said supporting means (7) occupies said fourth side (143), constraining and limiting its use; for example, said fourth side (143) cannot be used for other functions or purposes, for example as an alternative or additional unloading side.

In view of the above, because of the structural configuration and of the position of said supporting and moving means (7) such a machine can only perform certain sewing operations; in order to perform all types of sewing operations, it is currently necessary to purchase two identical machines that only differ in the position of said supporting and moving means (7), which is provided in the third side (142) in one machine, and in the fourth side (143) in the other machine; specifically, one of said machines is intended to perform sewing operations on clothing items for men, whereas the other one is intended to perform sewing operations on clothing items for women (which have specular seams compared to the ones provided on the corresponding clothing item for men).

In other words, the configuration of the machines according to the prior art does not allot for sewing clothing items for men and clothing items for women with the same machine because they may be distinguished by an asymmetrical arrangement of clothing elements or accessories.

For example, in the case of men's trousers, the fly (40) is positioned on the left-hand front portion (20), whereas in the case of women's trousers it is positioned on the right-hand front portion (30).

For illustrative not limiting purposes, the sewing machine of Figs. 1 and

2 is designed and configured to perform sewing operations on portions of men's trousers, and in particular to perform a "J"-shaped seam of a fly.

With reference to the portion (30) of women's trousers - which is shown in Fig. 1 to highlight the limitations of the sewing machine according to the prior art - the distance between the needle (103) of the sewing head (10) and the locking element (102) that is used to fix the template (100) to the moving mechanism (101) is normally lower than the width of the portion (30) to be sewn, thus preventing the performance of the traditional "overturned-J" shaped seam in the portion (30) of women's trousers with the same sewing machine used to sew a portion (20) of men's trousers.

In other words, in order to use the same machine, it would be necessary to rotate the portion (30) of women's trousers in order to let it protrude from the fourth side (143), which is occupied by the supporting and moving means (7).

Evidently, a portion (20) of men's trousers and a portion (30) of women's trousers cannot be sewn with the same sewing machine for the following reasons:

- the distance between the needle (103) of the sewing head (10) and the locking element (102) that is used to fix the template (100) to the moving mechanism (101) is lower than the width of the portion (30) of women's trousers;
- the fourth side (143) is occupied by the supporting and moving means (7).

In view of the above, it is impossible to bring the portion (30) of women's trousers to be sewn under the sewing head because of the impediment generated by the moving mechanism of the template (100), in particular of the locking element (102) to which said template (100) is fixed.

Moreover, even assuming that the portion (30) of women's trousers was correctly positioned for sewing the fly, the presence of the supporting and moving means (7) on the fourth side (143) would prevent said portion (30) of women's trousers from protruding freely from said fourth side (143), thus making the translation and the sliding of the portion (30) of women's trousers on the work surface (14) uncomfortable, if not impossible.

WO 2011138805 discloses an equipment (1) and the relevant method for realizing the seam of staggered pockets overlapped in a wallet or document case with a sewing machine.

EP 0627518 discloses an automatic machine for sewing pre-ironed patch pockets.

US 3474747 discloses an apparatus for manipulating a workpiece along an irregular contour path through a workstation, said apparatus being a sewing unit.

US 3789781 discloses and shows and apparatus for sewing preformed pocket-like fabric blanks, comprising first and second sewing stations.

US 358887 discloses a desk characterized by a sliding top that can be opened or closed according to the specific requirements.

WO 8600944 discloses a method and apparatus for performing a sewing operation on a marginal portion of a limp fabric.

DE 4422811 discloses a method and a device for dividing the band of a pair of trousers in belt-loop fastening positions on the sewing station of a sewing machine.

None of the aforementioned seven patents contains precepts to solve the aforementioned problems with reference to the sewing machine according to the prior art as shown in Fig. 1 and 2.

The main purpose of the present invention is to remedy the aforementioned drawbacks by providing a sewing machine that is capable of indistinctly producing women and men's clothing items or relative parts.

An additional purpose of the present invention, at least for one or more executive variants, is to provide a sewing machine capable of indistinctly producing women or men's trousers.

An additional purpose of the present invention, at least for one or more executive variants, is to provide a sewing machine capable of indistinctly sewing the fly on a front portion of women's trousers or men's trousers.

This and other purposes, which will become clearer from the description below, are achieved with the sewing machine shown in the following description and in the attached claims, which are an integral part of the

description.

The sewing machine for sewing clothing items or relative parts, according to the invention, comprises:

- a bearing frame;
- a work surface supported by said bearing frame;
- a sewing station disposed on a first side of the work surface;
- a sewing head disposed on the first side;
- a sewing template disposed on the first side under the sewing head;
- a loading station disposed on a second side of the work surface, opposite to the first side;
- a loading clamp disposed on the second side above the loading station;
- a support arm that supports the loading clamp; said support arm extending above the work surface in such a way to leave the surface of said work surface free from obstacles and/or impediments;

  wherein said work surface comprises a third and a fourth side in opposite position; the third and the fourth side of the work surface being free from impediments in such a way that the clothing item can protrude freely from the work surface towards the third and/or the fourth side;

  wherein said sewing machine comprises:
- a first unloading station disposed near the third side of the work surface.
- a second unloading station disposed near the fourth side of the work surface.

Additional characteristics of the present invention will appear clear from the following description of a preferred embodiment that is shown in the attached drawings for merely illustrative, not limiting purposes, wherein:

- Fig. 1 is a diagrammatic top view of a sewing machine according to the prior art;
- Fig. 2 is a perspective view of the sewing machine of Fig. 1;
- Fig. 3 is a diagrammatic view of the sewing unit according to the present invention while sewing a fly on a portion of men's trousers;
- Fig. 4 is a detailed view of the sewing unit of Fig. 3, wherein the loading clamp acts as stop for positioning said portion of men's

trousers;

- Fig. 5 is a view of a working step of the sewing unit of Fig. 3, wherein the loading clamp stops said portion of men's trousers;
- Fig. 6 is a view of a working step of the sewing unit of Fig. 3;
- Fig. 7 is a view of a working step of the sewing unit of Fig. 3;
- Fig. 8 is a view of a working step of the sewing unit according to the present invention when sewing a fly on a portion of women's trousers;
- Fig. 9 is a view of a working step of the sewing unit of Fig. 8;
- Fig. 10 is a view of a working step of the sewing unit of Fig. 8;
- Fig. 11 is a view of a working step of the sewing unit of Fig. 8;

With reference to Figs. 3 to 11, a variant of the sewing machine according to the present invention is described for illustrative, not limiting purposes, which is capable of overcoming and remedying the aforementioned problems.

The sewing machine (1) comprises a bearing frame (16) whereon a sewing head (10), which is advantageously provided with a sewing template (100), a loading clamp (110), a work surface (14), and control means (15) are suitably installed.

Said sewing machine (1) comprises an unloading machine (12) and a stacking unit (13).

The unloading system (12) allows for picking and removing a portion of trousers from the work surface (14) after sewing, and positioning it on the stacking unit (13).

Said unloading system (12) comprises devices and means of known type and is not different from the solutions that are currently used.

Alternatively, the sewn portions may be unloaded manually.

The stacking unit (13) allows for stacking the sewn portions and comprises devices and means of known type.

Said control means (15) may comprise activation/deactivation means, adjustment means, display means or the like.

Advantageously, said control means (15) may comprise touch screens that are used by the operator to select the type of seam to be made, set the

operating parameters of the sewing machine (1), display the work progress of the sewing step, and the number of sewn parts.

Such functions and devices, which can be inferred and implemented by a person skilled in the art, are not described in detail, since they are not a specific object of the present invention.

According to the invention, said loading clamp (110) is advantageously installed in a support arm (11).

Said support arm (11) is fixed to said frame (16) and extends in projecting position above the work surface (14), in particular said support arm (11) is raised with respect to said work surface (14).

For illustrative, not limiting purposes, said support arm (11) acts as guide track for a sliding trolley (111) whereon the loading clamp (110) is constrained; the trolley (111) slides on a parallel plane with respect to the plane where the work surface (14) lays, in such a way that said loading clamp (110) can move and translate, substantially sliding on said work surface (14).

Said trolley (111) can be coupled to the support arm (11) by means of a screw-female screw coupling, or with suitable hydraulic means, such as for example pneumatic pistons or the like.

Said loading clamp (110) can be advantageously provided with suitable lifting means in order to be moved in orthogonal direction with respect to the work surface (14).

The sewing head (10) cooperates with the sewing template (100) to obtain the desired sewing pattern.

For illustrative, not limiting purposes, Figs. 3, 4, 5, 6, 7 describe the main working steps for sewing a fly on a portion of trousers using the sewing machine (1) of the present invention.

The portion (20) to be sewn is a left-hand front portion of men's trousers. Said sewing operation can comprise the following steps:

- an operator suitably places said portion (20) of men's trousers on the work surface (14); the loading clamp (110) acts as stop and reference for the correct positioning of said portion (20) of men's trousers (Fig. 3, 4);

- the loading clamp (110) is raised, translates towards said portion (20) of men's trousers, and is lowered in such a way to stop and press said portion (20) of men's trousers against the work surface 14 (Fig. 5);
- said loading clamp (110) translates towards the sewing head (10), where the template (100) stops said portion (20) of men's trousers (Fig. 6);
- by cooperating with said template (100), the sewing head (10) makes the seam, whereas the loading clamp (110) returns to the initial position in such a way that the operator can load a new portion (20) of men's trousers (Fig. 7).

When the seam is completed, the template (100) frees said portion (20) of men's trousers that, by means of the unloading system (12) or manually in the simplest variants, is removed from the work surface (14) and positioned on the stacking unit (13) or in a basket.

The above also applies to the case in which said portion is a right-hand portion of women's trousers.

In fact, if a fly is to be sewn on women's trousers, it being positioned on the right-hand front portion (30) with respect to the men's model, the sewing machine (1) of the invention is capable of performing such an operation.

In fact, the sewing machine (1) is capable of producing men's trousers and women's trousers by simply replacing the template (100).

The template (100) does not necessarily need to be replaced for some types of "standard" seams.

Evidently, variations of thread or of other sewing parameters do not refer to the machine setup because they are the exclusive result of stylistic and aesthetic choices.

Otherwise said, for example, by simply replacing the template (100), the sewing machine (1) can indistinctly perform sewing operations on men's trousers and women's trousers because the work surface (14) is completely free, without any obstacles and the third (142) and the fourth side (143) allow the portions (20,30) to be sewn protruding freely from both sides of the work surface (14).

In other words, the support arm (11) is suitably fixed to the frame (16) and extends in projecting position above the work surface (14), leaving its sides free.

In this way, in addition to a first side (140) whereon the sewing head (10) is positioned and a second side (141) whereon the operator works, just like in the machines of the prior art, a third side (142) is provided for positioning the portions (20) used for men's trousers and an opposite fourth side (143) is provided for positioning the portions (30) used for women's trousers.

As a matter of fact, the sewing machine of the present invention is characterized in that the third and the fourth side (142 and 143) are free and without obstacles (for example, the support means of the loading clamp described with reference to the prior art); for this reason, they allow for producing men's clothing items or women's clothing items or can be used as alternative or additional unloading sides.

The following steps are substantially identical to the ones described with reference to men's trousers.

With reference to Figs. 8, 9, 10 and 11, the sewing steps of a fly on a portion (30) of women's trousers provide for:

- an operator suitably places the portion (30) of women's trousers on the work surface (14), the loading clamp acts as stop and reference for the correct positioning of said portion (30) of women's trousers (Fig. 8);
- the loading clamp (110) is raised, translates towards said portion (30) of women's trousers, is lowered in such a way to stop and press said portion (30) against the work surface 14 (Fig. 9);
- said loading clamp (110) translates towards the sewing head (10), where the template (100) stops said portion (30) of women's trousers (Fig. 10);
- the sewing head (10), by cooperating with said template (100) that guides it in the sewing movement, performs the seam, whereas the loading clamp (110) returns to the initial position in such a way that the operator can load a new portion (30) of women's trousers to be sewn (Fig. 11).

The sewing machine according to the present invention allows for indistinctly making men's clothing items or women's clothing items, or relative parts.

Moreover, the sewing machine according to the present invention allows for making seams that can have a functional and/or decorative purpose on any men's clothing items, or women's clothing items, or relative parts.

The above can be advantageously extended to any other type of sewing operation for elements or parts of clothing items, such as for instance pockets, small pockets, buttons, slots or the like, to be sewn or obtained on a generic clothing item, for men or women.

With reference to Fig. 12, according to a preferred embodiment, the machine of the invention comprises:

- a bearing frame (16);
- a work surface (14) supported by said bearing frame (16);
- a sewing station (SS) disposed on a first side (140) of the work surface;
- a sewing head (10) disposed on the first side (140);
- a sewing template (100) disposed on the first side (140) under the sewing head (10);
- a loading station (SC) disposed on a second side (141) of the work surface, opposite to the first side (140);
- a loading clamp (110) disposed on the second side (141) above the loading station (SC);
- a support arm (11) that supports the loading clamp (110); said support arm extending above the work surface (14) in such a way to leave the surface of said work surface (14) free from obstacles and/or impediments;

  wherein said work surface (14) comprise a third (142) and a fourth side (143) in opposite position; the third (142) and the fourth side (143) of the work surface (14) being free from impediments in such a way that the clothing item can protrude freely from the work surface (14) towards the third (142) and/or the fourth side (143);

  wherein said sewing machine comprises:

- a first unloading station (SX) disposed near the third side (142) of the work surface (14);
- a second unloading station (DX) disposed near the fourth side (143) of the work surface (14).

It must be noted that, in order to obtain a versatile sewing machine capable of rapidly sewing portions (20, 30) for men or women, said sewing template (100) has two different slots (A). In particular, if the seam is intended to make said fly, one of said two slots (A) has a "J"-shaped profile and the other one has an overturned "J"-shaped profile.

Advantageously, said two slots (A) are specular and/or in communication, as shown in Fig. 12A.

Alternatively, said two slots (A) can be distinct and separate, one being intended to make said fly on said men's portions (20) and the other being intended to make said fly on said women's portions (30), as shown in Fig. 12B.