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(71) Applicant: **Schärer, Pierre Andre**
8118 Pfaffhausen (CH)

(72) Inventor: **Abouhanine, Reda**
8712 Stäfa (CH)

(74) Representative: **Oppermann, Mark**
Oppermann & Oppermann
Patentanwälte
Am Wiesengrund 35
D-63075 Offenbach (DE)

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(54) **ADJUSTABLE BUTTON CLAMP**

(57) An adjustable button clamp includes a main seat (100) and a pressure plate (600), with left and right grippers (310, 320) arranged below the main seat. An adjusting screw (800) penetrating the main seat presses against the pressure plate. Main seat and pressure plate are connected through a hinge joint piece, so that the pressure plate can rotate about a hinge joint shaft. A U-shaped spring (113) is provided that biases the left and right grippers toward each other. A return spring (114) is

arranged between main seat and pressure plate. As a result, while pinning down fabric with the pressure plate and clamping a button with the left and right grippers, one can make the pressure plate pivot downward through the adjusting screw, to thereby separate button and fabric and finally reach a spatial distance between fabric and button, desired for wrapping the button shank in particular.

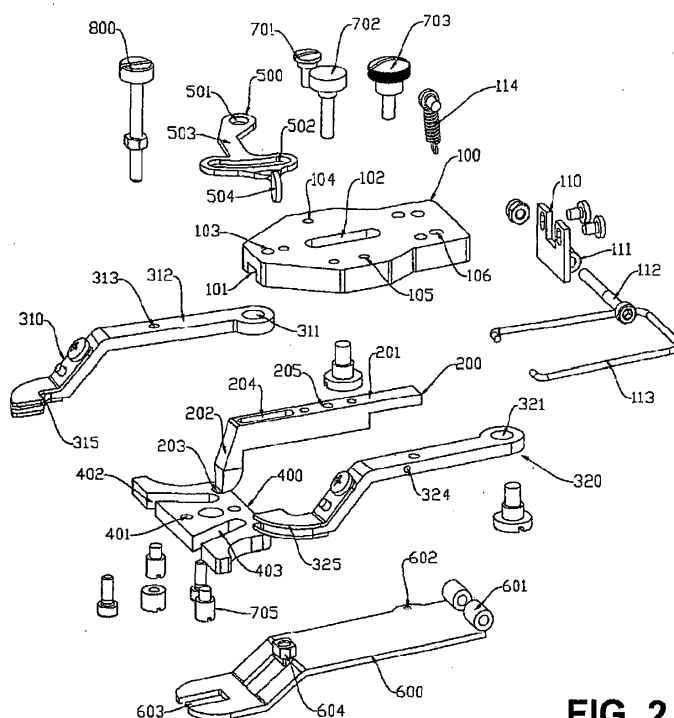


FIG. 2

Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention generally relates to a machine for attaching buttons. More particularly the present invention relates to an adjustable button clamp according to the preamble portion of claim 1, that has a main seat and a pressure plate, with a left gripper and a right gripper connected below the main seat on both sides.

BACKGROUND OF THE INVENTION AND PRIOR ART

[0002] A button attaching machine is a special purpose automatic sewing machine with a clamp for fixing buttons. The clamp in an existing button attaching machine of this type only has the function of buttoning. When the clamp is in use, the clamp rests on the surface of the garment, leaving no distance between the button and the fabric. As a result, it is impossible to wrap a shank for the buttons attached. Winding the connecting threads between the button and the fabric with a hot melt filament as available from Ascolite AG, CH-8126 Zumikon, Switzerland in particular, is referred to as shank wrap or button wrapping. Meanwhile, since the button and the fabric are tightly connected, it is not simple for the button wrapping filament to smoothly wind the original button attaching thread between the fabric and the button.

[0003] To make sure that a certain distance is kept between the button and the fabric, the most common solutions available on the market are as follows:

First solution: installing a take-up needle over the button, and taking up the suture with the needle to leave a space between the button and the fabric. However, there are two main disadvantages of installing a take-up needle. Firstly, under the tension generated by the suture tensioner, the take-up needle is easily deformed, and cannot work on a button with 3 or 5 holes. Secondly, the take-up needle cannot provide for a desired given space between the button and the fabric.

Second solution: increasing the thickness of the bottom of the clamp with a rubber pad. One disadvantage of this method consists in the fact that the rubber pad is fixed and cannot move upward or downward. Moreover, the rubber pad cannot press the fabric firmly, and thus the fabric easily moves upward or downward, ultimately resulting in the phenomenon of skipping thread (skipped stitches) in the process of button attaching.

OBJECT OF THE INVENTION

[0004] In view of the disadvantages of the existing technologies the object of the present invention is to provide an adjustable button clamp that creates an adjust-

able space, i.e. distance between the button and the fabric at the time of attaching buttons.

SUMMARY OF THE INVENTION

[0005] The above object is solved by the features specified in claim 1. Advantageous and appropriate developments of the invention form the subject matter of claims 2 to 8.

[0006] According to the invention an adjustable button clamp, including a main seat and a pressure plate, with a left gripper and a right gripper connected below the main seat on both sides, is proposed, in which an adjusting screw penetrating the main seat is provided to press against the pressure plate, wherein the main seat and the pressure plate are connected through a hinge joint piece, so that the pressure plate can rotate about a hinge joint shaft, wherein a closed end of a U-shaped spring is placed above the hinge joint shaft, and two free ends of the U-shaped spring are bent inwards and inserted into mounting holes on both sides of the left gripper and the right gripper, to position the left gripper and the right gripper through the U-shaped spring, and wherein a return spring is further arranged between the main seat and the pressure plate. While pinning down the fabric with the pressure plate of the adjustable button clamp and clamping the button with the left and right grippers, one can make the pressure plate move downward around the hinge joint shaft through the adjusting screw, to thereby separate the button and the fabric in the clamp and finally reach the desired spatial distance between the fabric and the button.

[0007] Since the adjusting screw presses against the pressure plate which leads to downward movement thereof, the left and right grippers where the button is fixed are kept at the original position. The U-shaped spring is used to position the left and right grippers and firmly hold the button. Meanwhile, the adjustment of any distance can be realized by infinite thread adjusting with the adjusting screw. The return spring arranged on the side can pull the pressure plate to the original position more steadily when adjusting the adjusting screw to rebound.

[0008] As a preferred option, the hinge joint piece includes a hanger block arranged behind the main seat, a projecting pin hole being fixed behind the hanger block, wherein a projecting discontinuous pin hole is provided on the pressure plate, the projecting pin hole matching with the discontinuous pin hole, and wherein the projecting pin hole and the discontinuous pin hole are connected as a whole through a hinge pin. This arrangement facilitates the rotation of the pressure plate.

[0009] As a further preferred option, a pusher is inserted at a bottom of the main seat, wherein an oblong hole is formed in the main seat, a pushing bolt being inserted within the oblong hole and fastened to the pusher, and wherein the pushing bolt is capable of sliding forward and backward in the oblong hole to drive the pusher for mov-

ing forward and backward. The specific position of the pusher can be changed by adjusting the installation points of the pushing bolt and the pusher, or adjusting the position of the pushing bolt in the oblong hole.

[0010] It is further preferred that a lowest end of a lowered front end of the pusher extends forward with a support projection, which is capable of contacting a lower surface of a button held between the left gripper and the right gripper. The support projection thus serves as a supporting point of the button and may be adjusted forward and backward with the pusher depending on the size of the button.

[0011] Furthermore, as a preferred option, a limit arm is provided above the main seat, one end of the limit arm being mounted on the main seat by means of an arm fixing bolt, the other end of the limit arm being formed with an arc-shaped oblong hole and can be clamped against the main seat by means of a limit bolt passing through the arc-shaped oblong hole, wherein the limit arm extends between the pushing bolt and the adjusting screw, so that a force can be applied on the pushing bolt through the limit arm to drive the pushing bolt. In this connection the limit arm can also be installed with a handle on the side of the arc-shaped oblong hole to facilitate the adjustment.

[0012] As a further preferred option, an expander guide plate is arranged below the pusher and the left and right grippers, and is connected to the pusher through the pushing bolt, wherein expansion slots are formed on both sides of the expander guide plate, expansion bolts being inserted into the two expansion slots to connect with a corresponding one of the left and right grippers, wherein the expansion bolts are capable of sliding in the expansion slots to drive the left gripper and the right gripper, respectively, to each rotate about a fixed point, that is the connecting point at which the left gripper and the right gripper, respectively, are connected to the main seat. Accordingly, the expansion bolts slide in the expansion slots to drive the grippers to rotate and control the distance between the two grippers in order to accommodate buttons of different sizes.

[0013] As a preferred option, the two expansion slots converge toward each other while extending backward, i.e. the two expansion slots move closer in opposite directions while stretching backward.

[0014] Finally, as a preferred option, the support projection is level, i.e. flush with the left gripper and the right gripper. Accordingly, the button is supported by the support projection, the left gripper and the right gripper.

[0015] As mentioned above, the proposed adjustable button clamp can accurately and quickly make adjustment to reach the desired spatial distance between the button and the fabric, whatever the thickness of the fabric and the adjustment requirements. Besides, the metal pressure plate in the proposed clamp can firmly press the fabric under it, solving the problem of fluctuation of the fabric. Hence, it completely solves the problem of skipping thread (skipping stitches) while precisely con-

trolling the height (length) of the button attaching threads.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Hereinbelow, the invention will be explained in more detail on the basis of a preferred example of embodiment and with reference to the appended, schematic drawings. In the drawings:

FIG. 1 is a side view of an adjustable button clamp according to the present invention;

FIG. 2 is an exploded view of the adjustable button clamp according to FIG. 1; and

FIG. 3 is a perspective view of the adjustable button clamp according to FIG. 1.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0017] The following is a description of an implementation of the present invention with reference to a certain specific example. Other advantages and functions of the present invention will become apparent to those who are familiar with this technical field on the basis of the information revealed in this specification.

[0018] It is noted that the figures attached to this specification represent the structure, scale and size drawn, and are only presented to be read by the persons familiar with this technical field in conjunction with the information disclosed by this specification, rather than being intended to define any limitations of the implementation of the present invention as defined by the appended claims. Therefore, these figures are not technologically meaningful, and any rendering of the structure, any change of the scale relationship or any size adjustment shall still fall under the technical contents disclosed by this specification. Meanwhile, the references to "up", "down", "left", "right", and "middle" in this specification are used for the purpose of description only rather than for limiting the scope of implementation of the present invention as defined by the appended claims.

[0019] Details of an adjustable button clamp according to the present invention can be taken from the figures as follows:

[0020] The adjustable button clamp shown in FIG. 1 mainly includes a main seat 100, a gripper mechanism 300 and a pressure plate 600. A limit arm 500 is arranged above the main seat 100, whereas a pusher 200 and the gripper mechanism 300 are arranged below the main seat 100. Further, the gripper mechanism 300 has a left gripper 310 and a right gripper 320 (see FIG. 2) distributed on both sides of the pusher 200. The main seat 100 and the pressure plate 600 are connected together through a hinge joint piece. An adjusting screw 800 is installed above the main seat 100 and goes through a threaded hole in the main seat 100 and an oblong hole

in the pusher 200 as seen from the top down, until it presses against the pressure plate 600. The distance between the pressure plate 600 and the gripper mechanism 300 can be adjusted by rotating the adjusting screw 800 which engages with the threaded hole in the main seat 100. Since a head of the gripper mechanism 300 holds the button and the pressure plate 600 presses against the fabric at the bottom, rotating the adjusting screw 800 leads to a situation in which the pressure plate 600 firmly holds down the fabric and the button is separated from the fabric until a spatial distance between the fabric and the button is finally reached. The adjustable button clamp of this example is provided with multiple groups of mounting holes which are arranged in a manner that will be described in the following.

[0021] According to FIG. 2, the main seat 100 of the adjustable button clamp has multiple groups of mounting holes, a pushing slot 101 formed at a lower surface of the main seat 100, and a first oblong hole 102 formed at an upper surface of the main seat 100 corresponding to the pushing slot 101. A first group of mounting holes 103 including the threaded hole for the adjusting screw 800 mentioned above, is arranged in front of the first oblong hole 102, a second group of mounting holes 104 and a third group of mounting holes 105 are arranged on both sides of the first oblong hole 102, and a fourth group of mounting holes 106 is arranged behind the first oblong hole 102, wherein at least two holes are provided in each group of mounting holes 103, 105, 106 on the main seat 100.

[0022] The pusher 200 is inserted into the pushing slot 101 of the main seat 100 and has a main body 201. A vertical end portion 202 is provided at a lowered front end of the main body 201 of the pusher 200. At the bottom the vertical end portion 202 projects forward with a small support projection 203 which in use of the adjustable button clamp supports the button. The main body 201 of the pusher 200 is inserted into the pushing slot 101 of the main seat 100, and comprises a second oblong hole 204 as already mentioned above, as well as a fifth group of mounting holes 205 arranged behind the second oblong hole 204.

[0023] The left gripper 310 and the right gripper 320 of the gripper mechanism 300 are arranged on both sides of the pusher 200 in symmetrical shape and position. A left gripper mounting hole 311 is provided as seen from the top down at a back end of the left gripper 310. Further, a mounting hole 313 is formed, again as seen from the top down, in a main arm 312 of the left gripper 310. On the side of the main arm 312 there is provided a support spring mounting hole that cannot be seen in the figures. A left gripper head 315 is provided at a lowered front end of the main arm 312. Likewise, a right gripper mounting hole 321 is provided as seen from the top down at a back end of the right gripper 320. Furthermore, a mounting hole is formed, once again as seen from the top down, in a main arm of the right gripper 320. On the side of the main arm of the right gripper 320 there is provided a sup-

port spring mounting hole 324. Finally, a right gripper head 325 is provided at a lowered front end of the main arm of the right gripper 320.

[0024] An expander guide plate 400 is arranged below the pusher 200 and the gripper mechanism 300. A sixth group of mounting holes 401 is provided in the middle of the expander guide plate 400 in front-end linear alignment. A left expansion slot 402 and a right expansion slot 403 are formed on both sides of the sixth group of mounting holes 401. The left expansion slot 402 and the right expansion slot 403 stretch backward from the front of the respective slot and gradually move closer, i.e. converge toward each other.

[0025] The limit arm 500 is arranged on the upper surface of the main seat 100. An arm mounting hole 501 is formed at one end of the limit arm 500. At the other end of the limit arm 500 an arched oblong hole 502 is provided. The arc-shaped oblong hole 502 and the arm mounting hole 501 are connected through a bent connecting rod 503. A vertical handle 504 is provided on the side of the arc-shaped oblong hole 502 to facilitate the adjustment of the limit arm 500.

[0026] A discontinuous pin hole 601 is formed at the end of the pressure plate 600. Further, a spring hole 602 is provided on the side of the pressure plate 600. At a lowered front end of the pressure plate 600 a routing notch 603 is formed, wherein the size of the routing notch 603 fits with the distance between the left gripper head 315 and the right gripper head 325. The slope angle of the front end of the pressure plate 600 fits with the slope angle of the front end of the main arm 312 of the left gripper 310 and the slope angle of the front end of the main arm of the right gripper 320. A recess is formed in the middle of the slope area of the pressure plate 600, adjacent a retaining nut 604 on the pressure plate 600 in this example.

[0027] The connecting pieces used in this example are mainly bolts. Specific installation is as follows:

[0028] The arm mounting hole 501 of the limit arm 500 is aligned with one hole of the second group of mounting holes 104 of the main seat 100, and fastened with an arm fixing bolt 701, thereby fixing the limit arm 500 on the main seat 100. The adjusting screw 800 matches and connects with the retaining nut 604 of the pressure plate 600 through the afore-mentioned threaded hole of the first group of mounting holes 103 of the main seat 100 and the second oblong hole 204 of the pusher 200. The bent connecting rod 503 of the limit arm 500 is located between the adjusting screw 800 and a pushing bolt 702, as can be seen in FIG. 3. The pushing bolt 702 passes through the first oblong hole 102 in the main seat 100, one mounting hole of the fifth group of mounting holes 205 in the pusher 200, and one mounting hole of the sixth group of mounting holes 401 in the expander guide plate 400. An end of the pushing bolt 702 is fixed with a nut, which is provided at the bottom of the expander guide plate 400 (see FIG. 2 below the sixth group of mounting holes 401 in the expander guide plate 400). Behind the

limit arm 500, the main seat 100, the pusher 200 and the expander guide plate 400 are fixed together through the pushing bolt 702, which can be fastened at anteroposterior positions of the first oblong hole 102 in the main seat 100 to set the anteroposterior position of the pusher 200. A limit bolt 703 extends through the arc-shaped oblong hole 502 in the limit arm 500 and is screwed into one threaded mounting hole of the third group of mounting holes 105 in the main seat 100. The left gripper mounting hole 311 is aligned with one threaded mounting hole of the fourth group of mounting holes 106 in the main seat 100, and the left gripper 310 is mounted on the main seat 100 with the aid of a bolt. Likewise, the right gripper 320 is mounted on the main seat 100 with the aid of a bolt. The lower surfaces of the mounted left gripper 310 and right gripper 320 are level with the small support projection 203 of the pusher 200. An expansion bolt 705 is inserted into the right expansion slot 403 of the expander guide plate 400, and screwed into the threaded mounting hole of the right gripper 320. The expansion bolt 705 can slide in the right expansion slot 403 of the expander guide plate 400. Accordingly, the position of the right gripper 320 can be adjusted via the expansion bolt 705 by movement of the expander guide plate 400 and the pusher 200 relative to the main seat 100. Likewise, the position of the left gripper 310 can be adjusted. The position of the left gripper 310 and the right gripper 320 is adjusted with the expander guide plate 400 to fit in with buttons of different sizes.

[0029] A U-shaped hanger block 110 is arranged behind the main seat 100. A projecting pin hole 111 is fixed on the back side of the U-shaped hanger block 110. Mounting holes are formed in the two legs of the U-shaped hanger block 110. The U-shaped hanger block 110 is fixed at the rear end of the main seat 100 by using bolts which extend through the mounting holes. The projecting pin hole 111 is inserted at a discrete position in the discontinuous pin hole 601 of the pressure plate 600. A shaft pin 112 is passed through the discontinuous pin hole 601 and the end of the projecting pin hole 111, and fixed in place with the aid of a nut. Accordingly, the main seat 100 and the pressure plate 600 are fastened together by means of the shaft pin 112 and the U-shaped hanger block 110. A closed section of a U-shaped support spring 113 is arranged above the discontinuous pin hole 601 and the projecting pin hole 111. The two free ends of the U-shaped support spring 113 are bent inwards and are inserted into the support spring mounting hole 324 of the right gripper 320 and the support spring mounting hole of the left gripper 310, respectively. The left gripper 310 and the right gripper 320 are positioned by means of the support spring 113. Finally, a spring 114 is fixed on the side of the main seat 100 through a bolt, wherein the lower end of the spring 114 is linked to the spring hole 602 on the side of pressure plate 600. The pressure plate 600 is returned through the spring 114.

[0030] The working principles of the adjustable button clamp of this example are as follows:

[0031] As shown in FIG. 3, the adjustable button clamp is assembled as described above. The fabric is located under the pressure plate 600 which is pressed against it, and the button is inserted between the left gripper 310 and the right gripper 320. Whilst the left gripper 310 and the right gripper 320 are positioned through the support spring 113, the pressure plate 600 is pressed downward by rotating the adjusting screw 800, to increase the spatial distance between the fabric under the pressure plate 600 and the button held between the left gripper 310 and the right gripper 320. By stepless rotation of the adjusting screw 800 a linear adjustment of the spatial distance between the fabric and the button can be realized.

[0032] The example described above is only intended to exemplarily illustrate the principles and functions of the present invention rather than restricting the present invention, the scope of which is defined by the appended claims.

[0033] An adjustable button clamp includes a main seat and a pressure plate, with left and right grippers arranged below the main seat. An adjusting screw penetrating the main seat presses against the pressure plate. Main seat and pressure plate are connected through a hinge joint piece, so that the pressure plate can rotate about a hinge joint shaft. A U-shaped spring is provided that biases the left and right grippers toward each other. A return spring is arranged between main seat and pressure plate. As a result, while pinning down fabric with the pressure plate and clamping a button with the left and right grippers, one can make the pressure plate pivot downward through the adjusting screw, to thereby separate button and fabric and finally reach a spatial distance between fabric and button, desired for wrapping the button shank in particular.

LIST OF REFERENCE NUMERALS

[0034]

100	main seat
101	pushing slot
102	first oblong hole
103	first group of mounting holes
104	second group of mounting holes
105	third group of mounting holes
106	fourth group of mounting holes
110	U-shaped hanger block
111	projecting pin hole
112	shaft / hinge pin
113	support spring
114	spring
200	pusher
201	main body
202	vertical end portion
203	small support projection
204	second oblong hole
205	fifth group of mounting holes
300	gripper mechanism

310 left gripper
 311 left gripper mounting hole
 312 main arm
 313 mounting hole
 315 left gripper head
 320 right gripper
 321 right gripper mounting hole
 324 support spring mounting hole
 325 right gripper head
 400 expander guide plate
 401 sixth group of mounting holes
 402 left expansion slot
 403 right expansion slot
 500 limit arm
 501 arm mounting hole
 502 arc-shaped oblong hole
 503 bent connecting rod
 504 vertical handle
 600 pressure plate
 601 discontinuous pin hole
 602 spring hole
 603 routing notch
 604 retaining nut
 701 arm fixing bolt
 702 pushing bolt
 703 limit bolt
 705 expansion bolt
 800 adjusting screw

Claims

1. An adjustable button clamp, including a main seat (100) and a pressure plate (600), with a left gripper (310) and a right gripper (320) connected below the main seat (100) on both sides, **characterized in that** an adjusting screw (800) penetrating the main seat (100) is provided to press against the pressure plate (600), wherein the main seat (100) and the pressure plate (600) are connected through a hinge joint piece, so that the pressure plate (600) can rotate about a hinge joint shaft, wherein a closed end of a U-shaped spring (113) is placed above the hinge joint shaft, and two free ends of the U-shaped spring (113) are bent inwards and inserted into mounting holes (324) on both sides of the left gripper (310) and the right gripper (320), to position the left gripper (310) and the right gripper (320) through the U-shaped spring (113), and wherein a return spring (114) is further arranged between the main seat (100) and the pressure plate (600).
2. The adjustable button clamp as claimed in Claim 1, **characterized in that** the hinge joint piece includes a hanger block (110) arranged behind the main seat (100), a projecting pin hole (111) being fixed behind the hanger block (110), wherein a projecting discontinuous pin hole (601) is provided on the pressure

plate (600), the projecting pin hole (111) matching with the discontinuous pin hole (601), and wherein the projecting pin hole (111) and the discontinuous pin hole (601) are connected as a whole through a hinge pin (112).

3. The adjustable button clamp as claimed in Claim 1, **characterized in that** a pusher (200) is inserted at a bottom of the main seat (100), wherein an oblong hole (102) is formed in the main seat (100), a pushing bolt (702) being inserted within the oblong hole (102) and fastened to the pusher (200), and wherein the pushing bolt (702) is capable of sliding forward and backward in the oblong hole (102) to drive the pusher (200) for moving forward and backward.
4. The adjustable button clamp as claimed in Claim 3, **characterized in that** a lowest end of a lowered front end (202) of the pusher (200) extends forward with a support projection (203), which is capable of contacting a lower surface of a button held between the left gripper (310) and the right gripper (320).
5. The adjustable button clamp as claimed in Claim 3, **characterized in that** a limit arm (500) is provided above the main seat (100), one end of the limit arm (500) being mounted on the main seat (100) by means of an arm fixing bolt (701), the other end of the limit arm (500) being formed with an arc-shaped oblong hole (502) and can be clamped against the main seat (100) by means of a limit bolt (703) passing through the arc-shaped oblong hole (502), wherein the limit arm (500) extends between the pushing bolt (702) and the adjusting screw (800), so that a force can be applied on the pushing bolt (702) through the limit arm (500) to drive the pushing bolt (702).
6. The adjustable button clamp as claimed in Claim 3, **characterized in that** an expander guide plate (400) is arranged below the pusher (200) and the left and right grippers (310, 320), and is connected to the pusher (200) through the pushing bolt (702), wherein expansion slots (402, 403) are formed on both sides of the expander guide plate (400), expansion bolts (705) being inserted into the two expansion slots (402, 403) to connect with a corresponding one of the left and right grippers (310, 320), wherein the expansion bolts (705) are capable of sliding in the expansion slots (402, 403) to drive the left gripper (310) and the right gripper (320), respectively, to each rotate about a fixed point, that is the connecting point at which the left gripper (310) and the right gripper (320), respectively, are connected to the main seat (100).
7. The adjustable button clamp as claimed in Claim 6, **characterized in that** the two expansion slots (402, 403) converge toward each other while extending

backward.

8. The adjustable button clamp as claimed in Claim 4, **characterized in that** the support projection (203) is level with the left gripper (310) and the right gripper (320). 5

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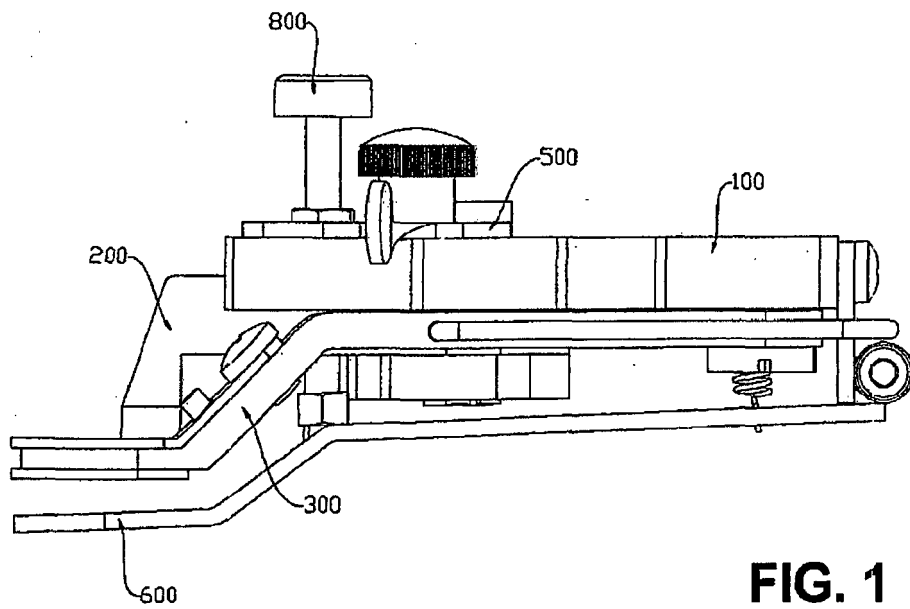


FIG. 1

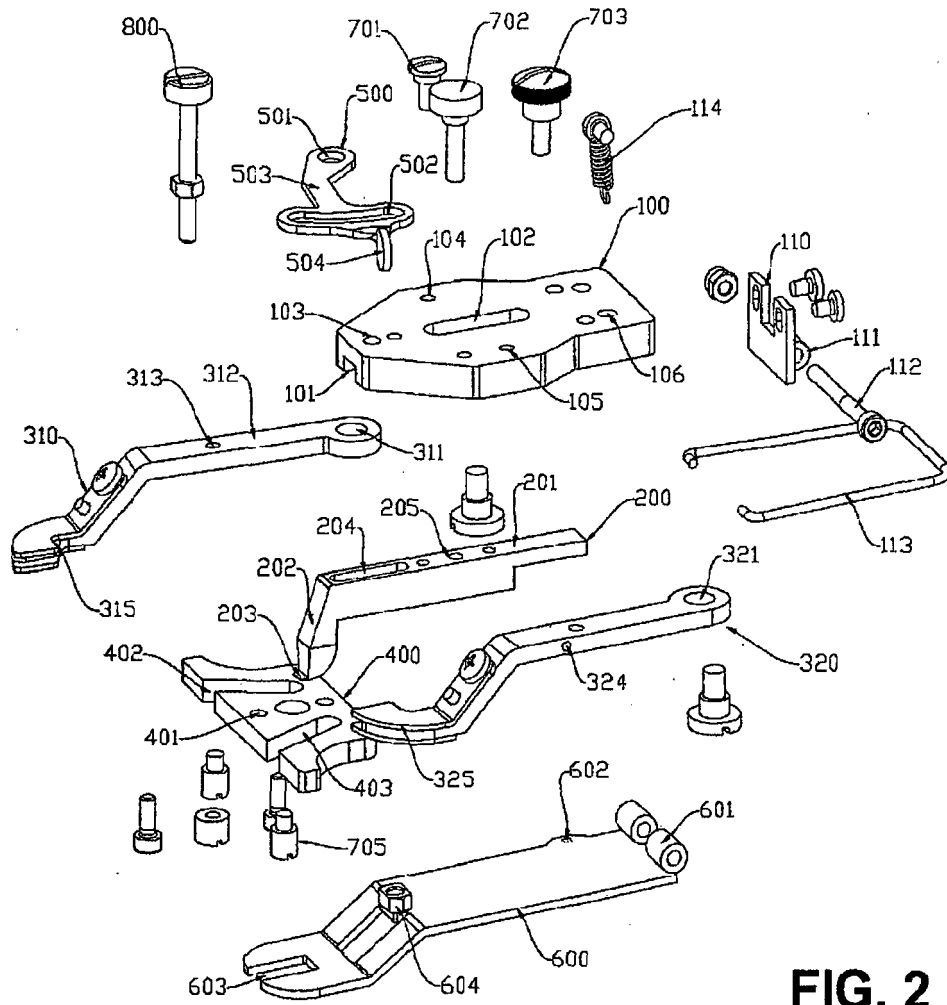


FIG. 2

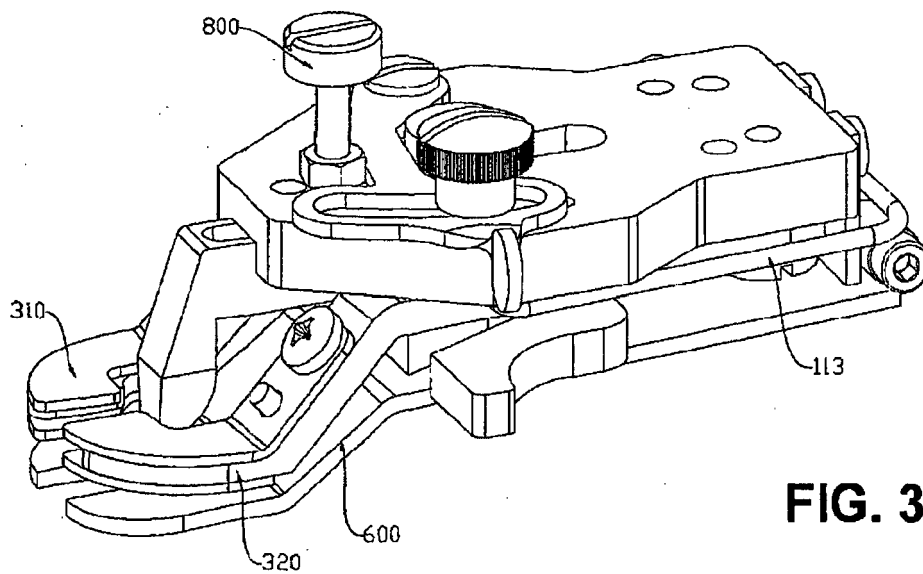


FIG. 3



EUROPEAN SEARCH REPORT

 Application Number
 EP 16 00 0943

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 6 September 2016	Examiner Herry-Martin, D
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 EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 00 0943

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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