

Sept. 28, 1965

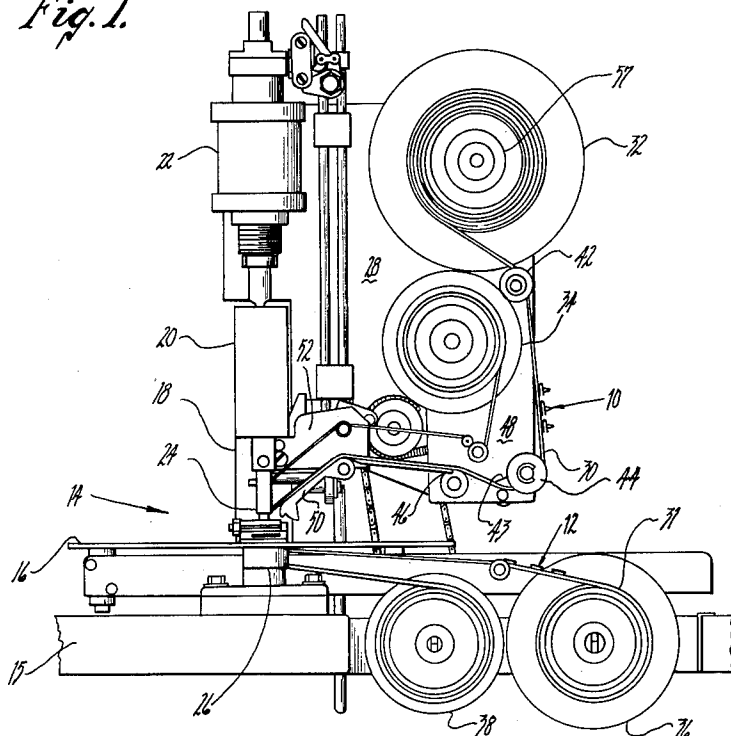
M. COHN
TAPE TENSIONING AND FEEDING MECHANISM
FOR A FASTENER APPLYING MACHINE

3,208,657

Filed March 18, 1963

2 Sheets-Sheet 1

Fig. 1.



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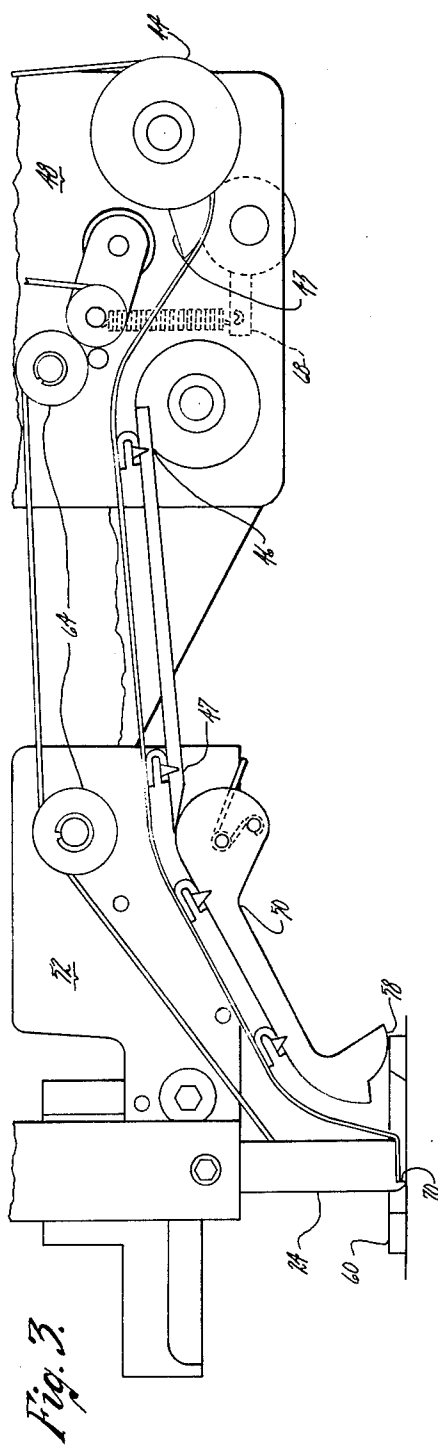
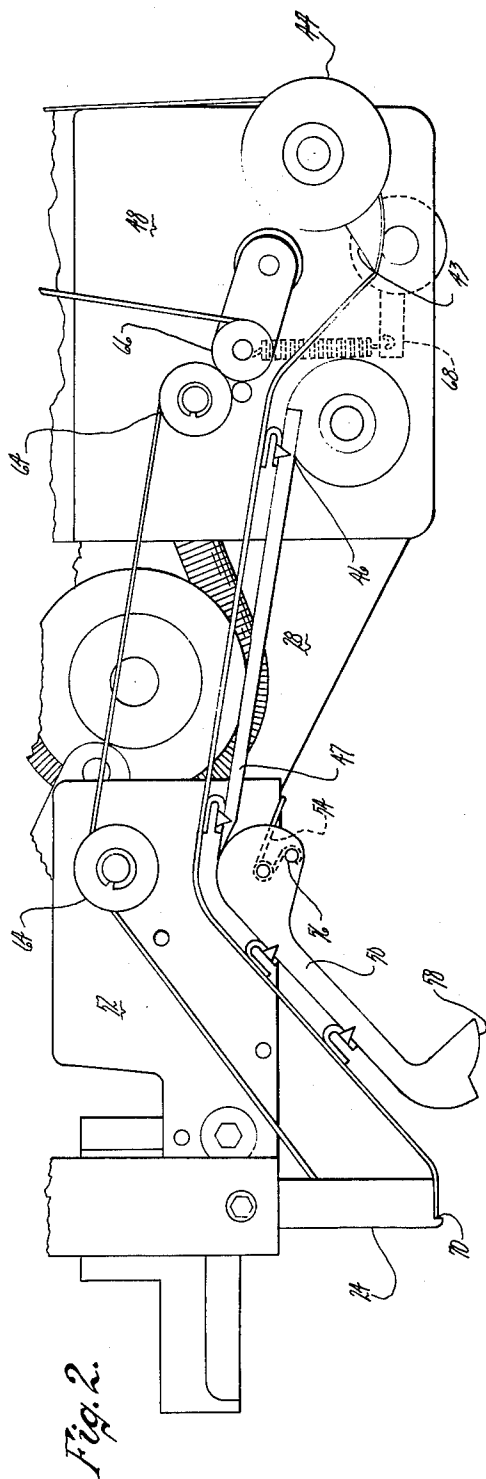
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TAPE TENSIONING AND FEEDING MECHANISM FOR A FASTENER APPLYING MACHINE

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7 Claims. (Cl. 227-136)

This invention relates to improvements in a machine for applying fastening devices to fabric articles, and it relates more specifically to a mechanism for tensioning the tape on which the fastening devices are adhesively held and for intermittently feeding these devices in a step-by-step fashion toward the clinching station of such a machine.

It is the general object of the invention to provide such a tape tensioning and feeding mechanism in a form which can easily be applied to existing machines or incorporated in their initial manufacture and which mechanism can be automatically driven by such a machine to assure more reliable positioning of the particular device to be clinched.

The drawings show a preferred embodiment of the invention and such embodiment will be described, but it will be understood that various changes may be made from the construction disclosed, and that the drawings and description are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

FIG. 1 is a front elevational view of a machine incorporating the tape tensioning and feeding mechanism of the present invention;

FIG. 2 is a view of the clinching station of the FIG. 1 machine drawn to a larger scale and showing the relationship of the mechanism of the present invention with respect thereto; and

FIG. 3 is a view similar to FIG. 2 and showing the tape tensioning and feeding mechanism of the present invention and its affect on the tape after the ram and punch have descended during a clinching operation.

As mentioned, the tape feeding mechanism of the present invention is especially suitable for use on machines which apply fastening elements to fabric articles. Such a machine is amply disclosed in Patent No. 2,852,777 issued September 23, 1958 and Patent No. 2,922,162 issued January 26, 1960 to the inventor herein. Reference may be had to the aforementioned patents for a more complete disclosure of such a machine including parts and operations thereof which form no part of the present invention.

These patents disclose machines which are especially adapted to apply hook and eye type fastening devices to fabric articles, such as articles of clothing. Hook and eye type fastening devices are widely used in the waistbands of trousers, a hook element being applied at one end of the waistband and an eye element to the other end thereof. Each such element is provided with a pair of clinching prongs which are thrust through the waistband by a punch on the machine and then clinched by the cooperation of an anvil to engage the other side of the fabric or to engage a metallic backing plate interposed between the fabric and the anvil. The machines shown in the aforementioned patents can be used either to apply the hook element and its associated backing plate or the eye element and its associated backing plate. The machine to be described herein is shown as being employed to secure garment fastening hooks 10 and their associated backing plates 12 to a fabric article manually positioned at the clinching station 14. The hooks 10 are adhesively held to a tape 30 which is fed to the clinching station where the hook is clinched to the fabric. The backing

plates 12 are similarly transported on a second tape 31.

As shown in FIG. 1, the machine illustrated is seen to include a table 15 having a plate 16 thereon over which a fabric article or the like (not shown) may be manually fed to the clinching station 14. A press frame 18 is rigidly secured to the table and slidably supports a vertically movable ram 20 and its actuating cylinder 22. A hook setting punch 24 is secured to the bottom end of the ram for movement relative to a cooperating anvil 26 mounted below the plate 16 as shown.

A vertically arranged and forwardly facing plate 28 provides the principal fixed support for the hook tape transport mechanism including the tensioning and feeding mechanism to be described more fully hereinafter. A hook supply reel 32 is rotatably mounted on the plate 28 and carries the supply of hooks, prongs projecting inwardly, on a tape 30 wound, adhesive side facing inwardly, on said reel 32. Also rotatably mounted on the plate 28 is a powered take-up reel 34 for the hook tape 30. In the operation of the machine, vertical movement of the ram 20 is utilized to rotate the hook take-up reel 34 and thus draw the hook tape 30 through the machine. The backing plate supply and take-up reels, 36 and 38, respectively, are similarly arranged below the table. A backing plate tape 31 is fed to the anvil 26 by the take-up reel 38 in a manner similar to the hook tape 30.

Since the present invention resides in the hook tape transport means, this portion of the machine will now be described in more detail. The tape 30 is unwound from the supply reel 32 in a counterclockwise direction as viewed from the front and passed clockwise over a pulley 42 which may be driven as disclosed in the aforementioned patents, but need not be so driven in a machine constructed in accordance with the present invention. Thus, the pulley 42 may be an idler serving only to change the direction of the path of the tape 30. The tape then extends over a slack take-up guide 44 in a counterclockwise direction with the adhesive side of the tape and the hooks 10 facing outwardly with respect to said guide. Unlike the pulley 42, this guide does not rotate but instead has a projecting portion 43 which acts on the section of said tape just beyond said guide to bias the same downwardly under its weight. The tape then extends over a pivotally supported elongated guide bar 46, moving from right to left, with the adhesive side of the tape, and the hooks, facing the said bar. The width of the bar 46 is such that the prongs of the hooks straddle it and its length is such that it spans the gap between its inner or right-hand pivoted end and the next tape supporting means as best shown in FIGS. 2 and 3.

The aforementioned components of the hook tape transport means are pivotally or rotatably supported in fixed structure of the machine. The pulley or idler 42 is mounted on the plate 28, and the slack take-up guide 44 and guide bar 46 on a smaller plate 48 also attached to the vertical plate 28.

From the guide bar 46 the tape 30 is supported by a feed bar 50, the tape passing generally counterclockwise or from right to left thereover with the adhesive side of the tape and hooks facing inwardly. The feed bar 50 is pivotally support at its right-hand end and its width is such that the prongs of the hooks straddle it. The extending left-hand end 47 of the guide bar 46 rests upon the pivoted right-hand end of the feed bar 50, and it will be seen that the bar 50 is supported by a plate 52 which moves with the ram 24. The feed bar 50 is biased upwardly by a spring 54 engaged between the plate 52 and a pin 56 on the bar, thereby tensioning the tape 30 as shown in FIG. 1, and the tape extends from the feed bar 50 to the lower end of the reciprocating punch 24 in a

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nonsagging manner as best shown in FIG. 2. It should perhaps be noted that the spring 54 is designed to exert only enough force on the feed bar 50 to overcome the weight of the bar plus the hook laden tape between the punch and the pivoted right-hand end of the bar. Thus, the spring 54 can be said to tension the hook laden portion of the tape only to the extent necessary to prevent sagging thereof as shown in FIG. 2. The bar 50 will therefore remain in the FIG. 2 position because its upward motion is stopped by reason of the tension in the tape which is created by the powered take-up reel 34. The spring 54 does not provide sufficient force to overcome this tape tension.

After being relieved of its hooks, the stripped tape 30 extends through the punch 24 and over two small pulleys 64, 64 in a clockwise direction, and thence under a pivotally supported pulley 66 in a counterclockwise direction to the take-up reel 34. This path of the stripped tape from beneath the punch to the take-up reel is identical to the path disclosed in the aforementioned patents and need not be described in detail here. For the purposes of the present invention, it is sufficient to note only that the stripped tape is wound on the powered take-up reel 34 which rolls the tape thereon through a friction clutch whereby to permit optimum tensioning of the stripped tape between stop means on the punch 24 and the said reel 34. Each of the tape transport elements engaging and supporting the hook laden portion of the tape 30 between the supply reel 32 and the punch 24 will now be described in more detail.

As amply set forth in the aforementioned patents, the supply reel 32 is rotatably supported in the machine and an adjustable friction clutch 57 is provided to optimize the tension in this hook laden portion of the tape 30. As there disclosed a powered pulley was required to pull the tape from said reel 32, the powered take-up reel 34 being too remote therefrom to provide the requisite force for feeding the hook laden tape to the punch 24. As shown in FIGS. 2 and 3, the present invention incorporates a more efficient tape tensioning and feeding mechanism obviating the need for critically adjusting the friction clutch against the bias of a powered pulley.

As presently preferred, the friction clutch is still utilized but need not be either as sensitive as or as strong as that required in the earlier machine. The present invention contemplates an improved tape tensioning mechanism located adjacent the punch itself and comprising at least the feed bar 50 and preferably the guide bar 46 and the slack take-up guide 44. The powered pulley may be retained or replaced by an idler 42, the latter being used primarily to change the direction of the path of movement of the tape 30 as it leaves the reel 32.

The slack take-up guide 44 is rotatably supported on a pin in the smaller plate 48 which is attached to the main support plate 28 as aforesaid. Although pivotally supported, the said guide 44 does not rotate, in fact the projection 43 acts on the adjacent section of the tape 30 to prevent sagging thereof. It should perhaps be noted that the projection 43 is designed to exert only enough force on the adjacent section of hook laden tape between the guide 44 and the right-hand end of the guide bar 46 to prevent slack from developing therebetween. Although the projection 43 is biased downwardly under the force of gravity as shown, other biasing means could be employed without departing from the scope of the invention.

Like the guide 44, the guide bar 46 is pivotally mounted on a pin fixed in the plate 48 and therefore its axis is fixed in the framework of the machine. This guide bar provides a bridge for the tape 30 between said fixed framework and that part of the machine which moves vertically with the ram 20. As previously mentioned, the feed bar 50 is pivotally received on a pin in a plate 52 which plate is attached to said ram and therefore will move vertically as said ram reciprocates. The left-hand end of the guide bar 46 rests on the right-hand pivoted end of the feed

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bar 50 and supports the section of feed tape therebetween as the ram reciprocates.

It will be apparent that the tension in the tape 30 must vary as a result of ram movement. The original machine as disclosed in the aforementioned patents included means 68 for tensioning the stripped portion of the tape 30. This was deemed necessary to properly maintain the position of the fastening device to be clinched against the stop means 70 at the lower end of the punch. As to the hook laden portion of the tape, however, no tape tensioning means was employed, it was deemed to be sufficient that a powered pulley adjacent the supply reel would feed the hook laden tape at a sufficient rate to accommodate the punch. The stop means on the punch, coupled with said stripped tape tensioning means, would position the device to be clinched only if excess slack in the hook laden portion did not develop. Excess slack would cause the stop means to fail to engage the device to be clinched. Since the powered pulley previously used to feed the punch was remotely located from the clinching station 14, excess slack was always a real possibility in the original machine.

The present invention not only provides sufficient tension to assure proper positioning of the device to be clinched, but simultaneously feeds the hook laden tape toward the clinching station by the proper amount obviating the need for critical adjustments in the friction clutch as aforesaid.

The feed bar 50 is an important element in feeding the hook laden tape from the supply reel 32. In performing this function, a camming surface 58 at the left-hand end of said feed bar 50 engages a fabric hold down plate 60 as best shown in the clinching operation of FIG. 3. The stripping operation of the hold down plate 60 is amply described in the aforementioned patents and for present purposes it need only be noted that said hold down plate does not reciprocate with the punch 24 and will always be positioned as in FIG. 3 when the punch has descended as shown, thereby to provide a means for camming the feed bar 50 upwardly with respect to the punch, as the latter descends just prior to said clinching operation.

As so constructed and arranged, the feed bar 50 will engage the hold down plate 60 prior to the clinching operation. Any slack in the hook laden feed tape adjacent the punch will thereby be eliminated even before the tension in the tape reaches a high enough value to overcome the restraining force of the friction clutch 57 on the supply reel 32. Thus it will be apparent that more accurate and reliable positioning of the device to be clinched is thereby assured, the slack in said tape portion which had heretofore been encountered being eliminated. Not so apparent, but also a decided improvement over the disclosed machine in the aforementioned patents, is the tape feeding function achieved by the feed bar 50. As the bar is cammed upwardly with respect to the downwardly moving punch 24, the section of hook laden tape between a point below said ram and a second point above the pivotal point of attachment of said feed bar will be lengthened from the generally straight section of FIG. 2 to the shape of FIG. 3. It will be apparent that the latter results in a longer tape section therebetween according to the extent to which the shape thereof departs from the straight line arrangement of FIG. 1. The preferred shape of the feed bar 50 is so chosen that the hook laden tape is fed from its supply reel during each downward thrust of the punch by an amount equivalent to the length of one of the fastening devices on said tape. In this manner the entire hook laden portion of the tape 30 is kept properly tensioned, and in addition the tape tensioning mechanism functions as a tape feeding mechanism to provide a more reliable fastener applying machine than has heretofore been available.

The invention claimed is:

1. In a machine for applying a fastening device to fabric or the like in a clinching operation wherein the

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machine includes a punch reciprocably movable toward and away from a cooperating anvil supported in the fixed framework thereof and includes means for storing a plurality of the fastening devices on a feed tape, the combination comprising a feed bar pivotally supported in the reciprocable portion of the machine, a non-reciprocating part of the machine which remains generally in fixed relationship to the framework thereof as said punch reciprocates, and camming means carried by said feed bar and cooperating with said non-reciprocating part to tension a section of feed tape adjacent the punch and to advance the portion of feed tape between said tape storing means and said punch toward the latter.

2. The combination in a tape fed machine for applying fastening devices as set forth in claim 1 wherein said non-reciprocating part of the machine also functions as a fabric hold down means for engaging the fabric as said punch moves away from the anvil to strip a clinched device from the feed tape.

3. The combination in a tape fed machine for applying fastening devices as set forth in claim 1 and further characterized by biasing means for urging said feed bar against said section of feed tape adjacent the punch to further tension the same.

4. In a machine for applying a fastening device to fabric or the like in a clinching operation wherein the machine includes a punch reciprocably movable toward and away from a cooperating anvil and a tape supply reel for storing a plurality of the fastening devices supported on said tape, and wherein the tape is advanced from the reel to the punch by reciprocation of the punch, the combination comprising fabric hold down means for engaging the fabric to strip a clinched device from the tape as the punch moves away from the anvil, and a tape tensioning and feeding mechanism for the portion of tape between said punch and said tape supply reel which mechanism includes a feed bar pivotally supported in the reciprocable portion of the machine, said feed bar having a camming means cooperating with said fabric hold down means to tension a section of tape adjacent the punch and to advance said portion of tape from the supply reel toward the punch.

5. In a machine for applying a fastening device to fabric or the like in a clinching operation wherein the machine includes a punch reciprocably movable toward and away from a cooperating anvil and a tape supply reel for storing a plurality of the fastening devices supported

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on said tape, and wherein the tape is advanced from the reel to the punch by reciprocation of the punch, the combination comprising a hold down plate for engaging the fabric to strip a clinched device from the tape as the punch moves away from the anvil, a take-up reel for storing the stripped tape, stop means on said punch and engageable with the device to be clinched to retain the same for movement with the punch, stripped tape tensioning means to hold said device against said stop as said punch reciprocates, and a tape tensioning and feeding mechanism for the portion of tape between said punch and said tape supply reel which mechanism includes a feed bar pivotally supported on the reciprocable portion of the machine and having a camming surface at one end for engaging said hold down plate as the punch moves toward the anvil in a clinching motion and having an intermediate portion which supports a section of tape adjacent the punch and tends to move said tape section in a direction opposite to said clinching motion whereby to advance said portion of tape from the supply reel toward the punch.

6. The combination in a tape fed machine for applying fastening devices as set forth in claim 5 wherein said tape tensioning and feeding mechanism also comprises a guide bar pivotally supported at one end thereof in the fixed framework of the machine and having its other end supported on the said feed bar adjacent the pivoted end thereof, and said guide bar also having an intermediate bridge portion to prevent sagging of the tape as the feed bar reciprocates and oscillates.

7. The combination in a tape fed machine for applying fastening devices as set forth in claim 6 wherein said tape tensioning and feeding mechanism also comprises a slack take-up guide pivotally supported in the fixed framework of the machine and having a projecting portion thereof extending generally radially outwardly from the axis of rotation thereof to engage an adjacent section of said feed tape, which projecting portion is gravity biased so as to tension said adjacent tape section.

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