

REINFORCING PIECE PASTING APPARATUS FOR BINDING HOLE

The present invention relates to a reinforcing piece pasting apparatus for pasting an annular reinforcing piece around a binding hole punched in a document.

5 Reinforcing piece pasting apparatus is known which pastes an imperforate reinforcing piece onto a document, and then punches a binding hole through both the reinforcing piece and the document in a single punching action.

10 However, such reinforcing piece pasting apparatus cannot be used satisfactorily for pasting a reinforcing piece already provided with a punched hole on a document in which likewise there already exists a punched hole for binding. Not only must the holes in
15 the document and reinforcing piece be aligned one with the other but also these holes must be aligned exactly with the position of the binding hole to be punched anew by the apparatus, and such precise alignment is extremely difficult to achieve. However, if the new binding hole
20 is punched at a position which is not in register with the existing holes, a clumsy binding of the document results.

In order to overcome such drawbacks, reinforcing piece pasting apparatus has been disclosed,
25 for example in Japanese Utility Model Laid Open Publication No. 61-34251, which is designed to paste an annular patch to a document with a binding hole previously punched.

In this prior patch pasting apparatus, a
30 stacked body of a large number of reinforcing pieces coated with a pressure-sensitive adhesive is supported by a pin erected in a patch supporting part so as to penetrate through the central holes of the reinforcing pieces. By bringing a document into a pressurized

contact with the top one of the stacked patches via a patch peeling ring that has its inner circumferential edge shaped in the form of a claw, it is arranged that the topmost patch should be pasted on the document and then the pasted patch separated by means of the claw from the rest of the patches in the stack by letting the pasted patch pass through the patch peeling ring. However, in this patch pasting apparatus it is very difficult to peel off the topmost patch alone, and often what results is either a failure to realize a smooth separating action due to the complete inability of the topmost patch to pass through the peeling ring or else a separation of several patches due to the simultaneous passage of the patches through the peeling ring, depending upon the force applied.

Moreover, there are other drawbacks to this prior apparatus, such as a deterioration in the detachability of the patches due to increased adhesion between the patches as a result of forces applied to the stacked body of patches, or a decrease in the stickiness of the patches due to adherence of dust on the exposed patch surfaces.

The present invention has been made from a consideration of these disadvantages of the prior art reinforcing piece pasting apparatus.

In accordance with the present invention there is provided a reinforcing piece pasting apparatus for pasting an annular reinforcing piece around a binding hole on a document, which apparatus comprises:

- a base having a base end part and a tip part;
 - a frame having a base end part;
 - a handle having a base end part and a tip part,
- wherein the base end parts of said base, frame and handle are pivotally connected so that said base, frame and handle are relatively turnable with respect to each other;

a first spring acting between said base and frame;

a second spring acting between said frame and handle,

5 whereby said base and said handle are urged by said springs in the direction to separate their tip parts, the urging force of said spring between said base and said frame being smaller than the urging force of said spring between said frame and said handle;

10 a pasting table provided on the tip part of said base and equipped with a positioning projection for engaging with a binding hole on a document;

a feeding mechanism provided on said frame for feeding reinforcing pieces coated with pressure-sensitive adhesive one piece at a time, interlocked with the relative rotation between said frame and said base;

a supporting part provided on said frame for supporting a reinforcing piece which has been fed by said feeding mechanism at a position corresponding to said positioning projection on said pasting table; and

20 an annular presser provided on the tip part of said handle for pushing the reinforcing piece on said supporting part onto said positioning projection on said pasting table and for pressing and pasting the reinforcing piece around a binding hole on a document that is set on said pasting table.

In the apparatus of this invention, the feeding mechanism is actuated to send a reinforcing piece onto the supporting part by the application of pressure to turn the base and the frame in the closing direction against the action of the first spring. The reinforcing piece is moved toward the pasting table by being pushed by the annular presser which is brought into operation by further pressure closing the frame and the handle against the stronger second spring. This action pushes the reinforcing piece onto and down the positioning

projection on the pasting table as the projection penetrates through the hole at its centre, so that even if the position of the reinforcing piece on the supporting part is off-centre to some extent, its position is automatically adjusted by virtue of the projection during the pressing process, eventually being pasted correctly around the binding hole.

Advantageously, the reinforcing pieces are releasably mounted at a prescribed spacing on a peeling tape which has engaging holes for feeding and which is desirably housed in a cassette which can be releasably loaded in the pasting apparatus, suitably in the frame. With this arrangement, stacking of a large number of reinforcing pieces is no longer required so that it becomes not only easy to load the reinforcing pieces into the reinforcing piece pasting apparatus but also it becomes possible to reliably feed the reinforcing pieces to a prescribed position, one by one, by means of the feeding mechanism. The preferred embodiment of the present apparatus has means for reliably separating the reinforcing pieces from the peeling tape which operates by causing the peeling tape to be abruptly bent back at a position where the tape leaves the cassette.

The feeding mechanism for feeding the reinforcing pieces on the peeling tape preferably comprises a tape feeding roller which has on its periphery engaging projections that are to engage with the engaging holes on the peeling tape, a ratchet which is fixed to the feeding roller and which has on its periphery claws equal in number to the number of the engaging projections on the feeding roller, and a lever which turns the ratchet by an angle corresponding to the radial separation between adjacent claws by engaging with the ratchet, when the base and the frame are relatively turned in the direction to bring them together.

A preferred embodiment of a reinforcing piece pasting apparatus will now be described with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of the reinforcing piece pasting apparatus;

Fig. 2 is a partial plan view of a peeling tape which can be used in the apparatus of Fig. 1;

Fig. 3 and Fig. 4 are perspective views of important parts of the apparatus of Fig. 1 in different operating conditions;

Fig. 5 is a sectional view of an alternative form of tape cassette which can be used in the apparatus of Fig. 1; and

Fig. 6 and Fig. 7 are sectional views of the reinforcing piece pasting apparatus of Fig. 1 in different operating conditions.

Fig. 1 illustrates a reinforcing piece pasting apparatus which is constructed in a hand-operated form. The apparatus is equipped with a base 1, a frame 2 and a handle 3 which are mounted pivotally at their base end parts on a common shaft 4 to permit them to turn relatively to each other.

The base 1 is oblong in the lengthwise direction, having a box-form with its top surface and the base end surface opened, and is provided on its tip with a pasting table 9 for pasting a reinforcing piece. On the pasting table 9 there are formed a positioning projection 10 tapered toward the tip which fits into a binding hole punched beforehand on a document, a flat pressure receiving face 11 formed around the projection 10, and an annular recess 12 that encircles the pressure receiving face 11.

The frame 2 is rectangular and of oblong shape in the lengthwise direction, with the top and the bottom faces opened. The frame 2 has a width which is sufficiently narrow to permit its fitting to the base 1

and the handle 3, and on the tip of the frame 2 there is formed a narrow width part 2d obtained by cutting away the lower parts of side wall 2a and front wall 2b.

Further, on the base end part of the frame 2 there is
5 formed a recessed step part 2e by cutting away the top parts of side wall 2a and rear wall 2c.

On the frame 2 there is installed a cassette 14 having a peeling tape 15 in roll-form, which is freely attachably and detachably in and from the apparatus. As
10 shown in Fig. 2, on the peeling tape 15 there are punched in the lengthwise direction with a predetermined separation between them engaging holes 15a for conveying that have the same size as that of the holes 16a in the reinforcing pieces 16, and in addition there are pasted
15 on the tape annular reinforcing pieces 16 coated with a pressure-sensitive agent with their holes precisely positioned over the engaging holes 15a.

As shown in Fig. 1, the peeling tape 15 is conveyed by a feeding mechanism 17 with a predetermined
20 pitch. It is first led out of a bill part 14a formed on the tip of the cassette. It is then bent back and introduced into a guiding groove 14c formed by ribs 14 protruded from both side walls to the bottom surface of the cassette 14 which has the effect of abruptly
25 reversing its direction of movement. It next passes over a feeding roller 23 of the feeding mechanism 17 and finally is ejected to the outside from the base end part of the base 1. Each reinforcing piece 16 pasted on the peeling tape 15 is separated in turn from the tape 15 at
30 the bending portion of its path of travel, i.e. at the bill part 14a, since it proceeds in the original direction, without being bent back and following the tape 15, to be sent to a supporting part 18 formed on the tip of the narrow width part 2d opposite to the bill part
35 14a.

As may be best seen from Figs. 3 and 4, the supporting part 18 consists of a pair of placing pieces 19 on which are placed opposite parts of the reinforcing piece 16, and a positioning stopper 20 to which the forward tip of the reinforcing piece 16 is brought to a contact. The pair of placing pieces 19 are disposed on the inside of the side walls of the frame 2, opposite to each other with a separation which is smaller than the outer diameter of the reinforcing piece 16 but which is sufficiently larger than the diameter of the hole 16a of the reinforcing piece 16. Further, the role of the stopper 20 is played by the front wall 2b of the frame 2. By means of these placing pieces 19 and the stopper 20, each reinforcing piece 16, as it is peeled off the tape, is supported with its hole 16a at the position corresponding to the position of the projection 10 on the base 1, as shown in Fig. 4.

Referring again to Fig. 1, the feeding mechanism 17 consists of a tape feeding roller 23 attached rotatably to the side wall 2a of the frame 2 by means of a shaft 22, a ratchet 24 fixed coaxially to the feeding roller 23, and a ratchet lever 25 fixed to the base 1 with a predetermined direction of rotation. On the outer periphery of the feeding roller 23 there are provided engaging projections 27 for engaging with the engaging holes 15a on the peeling tape 15, with a separation equal to that between the engaging holes 15a. Also, on the periphery of the ratchet 24, the same number of claws 24a as there are engaging projections 27 are formed with a predetermined spacing. When the frame 2 and the base 1 are moved relatively in the direction of closing their tips, the ratchet 25 is turned in the direction of the arrow by the ratchet lever 25 by an angle that corresponds to the radial spacing between adjacent claws. As a result, the feeding roller 23 is turned and feeds the peeling tape 15 by a length

corresponding to one spacing between the engaging holes 15a, that is the spacing between the reinforcing pieces 16.

The handle 3 positioned above the frame 2 has a box-form oblong in the lengthwise direction, formed with its bottom face opened, and its width being comparable to that of the base 1. At the base end part of the handle 3 there is provided a semicircular linking piece 3a which bulges out downward from the side wall, and the shaft 4 is pivotably mounted on the linking piece 3a, while an annular presser 29 is provided on the tip of the handle 3. When the handle 3 is turned relative to the base 1 and the frame 2 in the direction to close the handle 3 on the base 1, the presser 29 pushes out a reinforcing piece 16 supported on the supporting part 18 toward the position of engagement with the projection 10 on the pasting table 9, and then pastes the reinforcing piece 16 by pressing onto the periphery of the binding hole of the document which is set on the pasting table 9. The presser 29 is formed to have an outer diameter which is slightly smaller than the gap between the pair of opposing placing pieces 19, and further, its bottom face is an annular surface for pressing the reinforcing piece 16 to the document 5 placed on the pressure receiving face 11 of the pasting table 9.

The base 1, frame 2 and handle 3 are urged by means of springs 31 and 32 that are provided between them, in the direction of separating their tip parts. The coil spring 31 which separates the frame 2 from the base 1 is provided between the bottom wall 1a of the base 1 and a spring shoe 33 that projects from the frame 2. The flat or rodlike spring 32 which keeps the handle 3 away from the frame 2 is arranged between the ceiling wall of the handle 3 and the top surface of the cassette 14 loaded in the frame 2, with its end on the handle 3 side fixed, and serves also as a pressing member for the

cassette 14. The urging forces of the springs 31 and 32 are set to maintain the relation that the urging force of the spring 31 between the base 1 and the frame 2 is smaller than the urging force of the spring 32 between the frame 2 and the handle 3.

In order to paste a reinforcing piece around a binding hole in a document by the use of the reinforcing piece pasting apparatus described above, first the cassette 14 is loaded from above into the frame 2 whilst the handle 3 and the frame 2 are separated sufficiently wide, then the engaging holes 15a in the peeling tape 15 which is bent back along the guiding groove 14c are engaged with the engaging projections 27 on the feeding roller 23, and finally the handle 3 is returned to the state as shown in Fig. 1. By so doing, the cassette 14 is engaged with the rear wall 2c of the frame and with ribs 34 which project from the lower end of the side walls, and makes a sliding contact with the portions other than the engaging projections 27 on the outer periphery of the feeding roller 23 in such a way not to obstruct the rotation of the roller 23, while being maintained in the prescribed position by being pressed by the spring 32 on its top surface.

Fig. 5 shows an alternative embodiment of cassette 14 which is designed so as to realize an automatic engagement of the engaging holes 15a of the peeling tape 15 with the engaging projections 27 of the feeding roller 23 when it is loaded into the frame 2. For this purpose, there is provided an engaging elastic piece 40 having on its tip a projection 40a which engages with an engaging hole 15a of the peeling tape 15, within the guiding groove 14c in the cassette 14. With this arrangement, when the cassette 14 is loaded in the state where the projection 40a is engaged with the peeling tape 15, an engaging projection 27 of the feeding roller 23 collides with the projection 40a to deform the engaging

piece 40 and to push the projection 40a out of the engaging hole 15a, so as to be engaged in turn with the engaging hole 15a.

Moreover, it is desirable to suppress unwanted
5 rotation of the feeding roller 23 by having its rotational resistance at a level sufficiently great to achieve this objective.

To return to the description of the operation of the illustrated embodiment of the invention, a
10 document 5 with a previously punched hole 6 is now inserted into the space between the base 1 and the frame 2 and the binding hole 6 is fitted onto the projection 10 on the pasting table 9.

When now the base 1 and the handle 3 are
15 pressed from both sides, the base 1 and the frame 2 are turned relatively to the position where the narrow width part 2d of the frame is pushed against the pasting table 9 by compressing the spring 31, whilst maintaining the relative distance between the frame 2 and the handle 3,
20 as shown in Fig. 6, because the urging force of the spring 31 between the base 1 and the frame 2 is smaller than the urging force of the spring 32 between the frame 2 and the handle 3. At the same time, the tip of the ratchet lever 25 pushes against a claw 24a of the ratchet
25 24 to turn the ratchet 24 by an angle corresponding to the radial spacing between adjacent claws. As a result, the peeling tape 15 is sent out by a distance corresponding to the spacing between adjacent engaging holes 15a, causing a reinforcing piece 16 pasted on the
30 tape to be separated from the tape and sent out onto the pair of placing pieces 19 at the supporting part 18 and abutting the stopper 20.

Moreover, by further pressing the base 1 and the handle 3, the handle 3 and the frame 2 are turned in
35 the direction to come relatively closer by compressing the spring 32, with the result that the presser 29 pushes

down the reinforcing piece 16 on the supporting part 18 along the surface of the projection 10, as illustrated in Fig. 7. As a result of this action, the reinforcing piece 16 is pushed against the document 5 on the pressure receiving face 11 which is formed around the projection 10 by the bottom surface of the presser 29, and is thereby caused to be bonded around the circumference of the binding hole 6. In this action, even if the position of the reinforcing piece 16 on the supporting part 18 is off-centre to some extent, its position is adjusted by the projection 10 during the process of being pushed down along the projection 10, so that the piece 16 can be pasted correctly around the binding hole 6.

When the pressure on the base 1 and the handle 3 is released, they return to the position shown in Fig. 1 due to the urging forces of the springs 31 and 32. At this time, the spring shoe 33 pushes against the bottom face of the pasting table 9 by which a further rotation of the frame is regulated.

It is desirable to provide a check against a reverse rotation of the feeding roller 23 which might occur at the time of releasing the pressure on the base 1 and the handle 3. However, the reverse rotation may be arranged to be checked by increasing the rotational resistance of the feeding roller 23, rather than by the provision of a separate checking mechanism.

By repeating the operation as described in the foregoing, it is possible to paste reinforcing pieces 16 one by one around a binding hole of a document 5.

Used peeling tape 15 which is devoid of reinforcing pieces 16 is sent out successively from the rear end part of the base 1. To facilitate cutting off of the used tape 15 a cutting blade 50 is provided at the rear end edge of the base 1 as shown in Fig. 1. The cutting blade 50 may also be provided elsewhere on the base 1 or alternatively on the frame 2 or the handle 3.

In the foregoing there was described an embodiment of a pasting apparatus adapted to be operated by hand for reinforcing a single binding hole. However, by providing a plurality of sets of pasting table 9, 5 supporting part 18, presser 29, cassette 14, and so forth side-by-side within the apparatus, instead of the single set shown, it is possible to obtain an apparatus by which a plurality of binding holes can be reinforced simultaneously.



CLAIMS:

1. A reinforcing piece pasting apparatus for pasting an annular reinforcing piece around a binding hole on a document, which apparatus comprises:

a base having a base end part and a tip part;

a frame having a base end part;

a handle having a base end part and a tip part,

wherein the base end parts of said base, frame and handle are pivotally connected so that said base, frame and handle are relatively turnable with respect to each other;

a first spring acting between said base and frame;

a second spring acting between said frame and handle,

whereby said base and said handle are urged by said springs in the direction to separate their tip parts, the urging force of said spring between said base and said frame being smaller than the urging force of said spring between said frame and said handle;

a pasting table provided on the tip part of said base and equipped with a positioning projection for engaging with a binding hole on a document;

a feeding mechanism provided on said frame for feeding reinforcing pieces coated with pressure-sensitive adhesive one piece at a time, interlocked with the relative rotation between said frame and said base;

a supporting part provided on said frame for supporting a reinforcing piece which has been fed by said feeding mechanism at a position corresponding to said positioning projection on said pasting table; and

an annular presser provided on the tip part of said handle for pushing the reinforcing piece on said supporting part onto said positioning projection on said pasting table and for pressing and pasting the



reinforcing piece around a binding hole on a document that is set on said pasting table.

2. Apparatus as claimed in Claim 1, wherein said supporting part comprises a pair of opposing placing pieces separated by a distance smaller than the outer diameter of the reinforcing piece but greater than the diameter of the central hole in the reinforcing piece, and a stopper with which the tip of the reinforcing piece is brought into abutment.

3. Apparatus as claimed in Claim 1 or Claim 2, wherein said reinforcing pieces are releasably mounted at a prescribed separation on a peeling tape which is housed in a cassette releasably loaded in said frame, and wherein said feeding mechanism is adapted to feed said peeling tape out from said cassette on each operation of said apparatus by a distance equal to said prescribed separation.

4. Apparatus as claimed in Claim 3, wherein means are provided for abruptly bending back the peeling tape as it leaves the cassette, whereby said reinforcing pieces are caused to be separated in turn from the peeling tape.

5. Apparatus as claimed in Claim 3 or Claim 4, wherein said feeding mechanism comprises a tape feeding roller having on its periphery engaging projections for engaging with engaging holes in the peeling tape, a ratchet fixed to the feeding roller, and having on its periphery claws equal in number to the number of said engaging projections of said feeding roller, and a lever for turning the ratchet by an angle corresponding to the radial separation between adjacent claws by engaging with the ratchet when said base and frame are turned relatively in the direction to bring them together.



6. Apparatus as claimed in Claim 5, wherein the rotational resistance of the tape feeding roller is at a level sufficient to prevent unwanted rotation.

7. Apparatus as claimed in any one of Claims 3-5, wherein a cutting blade for cutting a portion of the used peeling tape is provided on one of said base, frame and handle.

8. Apparatus as claimed in any one of Claims 3-7, wherein said spring acting between said handle and said frame is arranged between said handle and said cassette and serves also as a pressing member for holding the cassette in position in said frame.

9. Apparatus as claimed in any preceding claim, wherein a plurality of sets respectively of the pasting tables, supporting parts, feeding mechanisms, and annular pressers are provided for simultaneously pasting a plurality of reinforcing pieces around a plurality of binding holes on a document.

10. A reinforcing piece pasting apparatus, substantially as hereinbefore described with reference to Figs. 1-4, 6 and 7 of the accompanying drawings, optionally as modified as described with reference to Fig. 5 of the accompanying drawings.
