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HAND-OPERATED STAPLER-PUNCH COMBINATION

This invention relates to operative combinations each of a hand stapler and a hand punch, and more particularly to such a stapler-punch combination with a capability of simultaneously perforating two or more holes, in addition to that of stapling in the usual manner.

I have proposed in my Japanese Patent No. 809 831 (Publication No. 50-24460) and United States Patent 3 907 190 a hand stapler combined with a punch mechanism which perforates a single hole at a time. My Japanese Utility Model Application No. 51-23164 (Laid-Open No. 52-128185) and Japanese Utility Model Publication No. 48-43190 suggest similar stapler-punch combinations, but with facilities for perforating two holes at a prescribed distance from each other in two separate operations. All these prior art devices are not entirely satisfactory, however, in demanding two punching operations for creating two holes.

Stapler-punch combinations capable of perforating two holes at a time have also been known, as disclosed for example in Japanese Utility Model Publication No. 41-22884. This known device is a mere aggregate of a conventional two-hole punch and a pair of staplers, with a common operating lever and provisions for selective use of the device for either stapling, punching, or concurrent stapling and punching. Another example is my Japanese Patent Application No. 51-146716 (Laid-Open No. 53-71379). According to this prior application of mine a pair of hand staplers, each with a one-hole punch mechanism, are juxtaposed on a base. Also included is a mode selector mechanism for setting the device either in stapling mode, for simultaneously fastening paper or the like with two staples, or in a

punching mode for simultaneous perforation of two holes. Drawbacks common to both of these conventional devices are that they are bulky and complex in construction, difficult of manufacture, and expensive.

5 This invention overcomes the noted problems of the prior art and enables a simplified device to be provided capable of both fastening paper or the like with one staple at a time and also capable of perforating two or more holes simultaneously.

10 The invention consists in a hand-operated stapler-punch combination comprising:

(a) a base having an anvil adjacent one end;

15 (b) a staple magazine for receiving a bar of staples, the staple magazine being coupled to the base for pivotal motion about a first axis adjacent the other end of the base;

20 (c) a handle having a staple ejector movable with respect to the staple magazine transversely of the bar of staples for forcing the successive staples out of the staple magazine against the anvil on the base;

(d) a bed hingedly coupled to the base for relative hinging movement thereof away from and towards the base about a second axis at right angles to the first axis; and

25 (e) a set of spaced-apart perforating punches on and movable with either of the base and the bed and being received by respective bores in the other of the base and the bed for cooperative punching operation upon the relative hinging movement between the bed and base.

Normally, there are two perforating punches in a set.

In some preferred embodiments of this invention a platen is secured to the stapler base, and the bed is hinged to this platen for relative hinging movement thereof away from and towards the base about the second axis. The perforating punches are then formed on either of the platen and the bed, and the bores are formed in a die or dies mounted to the other. Thus the hinging movement of the platen, together with the stapler mechanism mounted thereon, relative to the bed results in the creation of two holes at a time in the paper or the like placed between platen and bed. In one embodiment the stapler base and the punch platen are removably connected to each other, so that the stapler-punch combination is readily separable into the stapler assembly and the punch assembly.

Preferred embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:-

Figure 1 is a side elevation of a preferred form of the stapler-punch combination embodying the principles of this invention;

Figure 2 is a vertical, longitudinal section through the stapler-punch combination of Figure 1;

Figure 3 is a perspective view of the stapler-punch combination of Figure 1, shown with the platen hinged away from the bed in the use of the punch assembly;

Figure 4 is an enlarged section taken along the line IV-IV of Figure 2;

5 Figure 5 is an enlarged perspective view of one of the two identical perforating punches in the stapler-punch combination of Figure 1;

Figure 6 is a side elevation of another preferred form of the stapler-punch combination in accordance with this invention;

10 Figure 7 is a vertical, longitudinal section through the stapler-punch combination of Figure 6;

Figure 8 is a perspective view of the stapler-punch combination of Figure 6, shown with the platen hinged away from the bed in the use of the punch assembly;

15 Figure 9 is an enlarged section taken along the line IX-IX of Figure 7;

Figure 10 is a side elevation of still another preferred form of the stapler-punch combination in accordance with this invention;

20 Figure 11 is a vertical, longitudinal section through the stapler-punch combination of Figure 10; and

25 Figure 12 is a perspective view of the stapler-punch combination of Figure 10, shown with the platen hinged away from the bed in the use of the punch assembly.

A first preferred embodiment of this invention will now be described with reference to Figures 1 to 5. With reference first and in particular to Figures 1 and 2 the stapler-punch combination shown in these drawings integrally comprises a hand stapler assembly 10 and a hand punch assembly 12. The stapler assembly 10 can itself be of any known or suitable design, so that the illustrated stapler assembly merely represents an example of numerous hand-operated staplers adoptable in the practice of this invention. The exemplified stapler assembly 10 broadly comprises:

1. an elongate base 14 having an anvil 16 at or adjacent its front end, shown directed to the right in Figures 1 and 2;
2. a staple magazine 18 for housing a bar of U-shaped wire staples S interconnected in a readily separable manner; and
3. a handle 20 carrying a staple ejector 22 for driving the successive staples S out of the staple magazine 18 against the anvil 16 on the base 14.

In the illustrated embodiment of this invention, the base 14 is formed integrally with a pair of upstanding lugs 24 at its rear end. The rear end portion of the staple magazine 18 is interposed between these lugs and pivotally coupled thereto via a pivot pin 26 oriented transversely of the base 14. A cantilever spring 28 on the base 14 biases the staple magazine 18 in a counter-clockwise direction, as viewed in Figures 1 and 2, normally holding the front end portion of the magazine a preassigned distance away from the base.

Generally in the shape of an open-top box, the staple magazine 18 has an opening 30 at the front end of its bottom, from which the successive foremost ones of the staples S are forced out of the magazine. A pusher 32 is mounted in the staple magazine 18 for sliding motion in its longitudinal direction as guided by a pair of guide slots 34 in the opposite side walls of the magazine. The front end of the pusher 32 makes abutting engagement with the staple bar within the magazine. One of the ends of a helical tension spring 36 is hooked onto a retainer 38 at the front end of the pusher 32 and is folded over the rear end of the pusher, and its other end is hooked onto a retainer 40 at the front end of a cover 42 openably closing the top of the staple magazine 18. Thus the pusher 32 urges the bar of staples S forwardly under the bias of the stretch of the tension spring 36.

The handle 20 has the staple ejector 22 depending therefrom and normally projecting into the staple magazine 18 at its front end. The staple ejector 22 is integral with a cantilever spring 44 biasing the magazine top cover 42 away from the handle 20. Both the handle 20 and the cover 42 are pivotable independently about the pin 26. The cover 42 has a tongue 46 projecting forwardly from its front end and slidably engaged in a slot 48 in the staple ejector 22. Consequently, with its tongue 46 normally urged against the lower end of the slot 48 by the force of the cantilever spring 44, the cover 42 is pivotable relative to the handle 20 within the limits determined by the length of the slot. As the handle 20 together with the cover 42 is manually turned counter-clockwise to a position approximately 180 degrees away from the staple magazine 18, the tension spring 36 becomes unfolded and straightened to pull the pusher 32 to its rearmost retracted position within the magazine.

The subsequent turning of the handle 20 back to the illustrated position causes the tension spring 36 to move the pusher 32 forwardly of the staple magazine 18. The bar of staples S can therefore be loaded in the magazine
5 by mere manipulation of the handle 20.

The hand stapler of this type is described and claimed in my aforesaid U.S. Patent 3 907 190, dated September 23, 1975, under the title of "Stapler with a Punch Mechanism".

10 With reference directed also to Figure 3 the punch assembly 12 broadly comprises:

1. a head or platen 50 secured to the base 14 of the stapler assembly 10 and having a pair of perforating punches 52 affixed thereto; and

15 2. a bed 54 hingedly coupled to the platen 50 for relative hinging movement thereof away from and towards the platen about the second axis and having mounted therein a pair of dies 56 defining bores 58 for receiving the perforating punches 52.

20 In this particular embodiment of the invention, the platen 50 and the bed 54 are a unitary molding of plastics material. In order to allow hinging movement of the platen 50 relative to the bed 54 about an axis extending longitudinally of the punch assembly (i.e., at
25 right angles with the pivot pin 26 of the stapler assembly 10), a V-shaped groove 60 is formed internally at the boundary between platen and bed, as best illustrated in Figure 4. The platen 50 is riveted or otherwise fastened to the stapler base 14 as at 62 in
30 Figures 2 and 3. The pair of perforating punches 52 are spaced a prescribed distance from each other in the

longitudinal direction of the platen 50. For the best results, as best pictured in Figure 5, each perforating punch 52 has three or more, four in the illustrated example, cutting teeth 64 each having a pointed crest 66.

5 Figure 3 also shows a permanent magnet 68 embedded in the platen 50, in the vicinity of each perforating punch 52, for attracting one of the dies 56 which are of sheet iron or like magnetic material. The permanent magnets 68 coact with the dies 56 to normally hold the
10 platen 50 and the bed 54 closed against each other as in Figures 1 and 2. Seen at 70 is a stripper in the form of a cantilever spring, also disposed adjacent each perforating punch 52, for ready separation of perforated paper or the like from the punches.

15 The bed 54 is in the form of an open-top box, with two transverse partitions 72. Each in the shape of an inverted U, the dies 56 are mounted in spaces 74 bounded in the bed 54 by the partitions 72 on their outer sides, so that these spaces serve to accommodate punchings.
20 Another space 76 between the partitions 72 is intended to hold in stock a spare bar or bars of staples S'.

For positively perforating thin or special-purpose paper or the like with the punch assembly 12 the perforating punches 52 should move into and out of the
25 bores 58 in the dies 56 with minimal clearances. The attainment of this objective demands careful placement of the axis about which the punches 52 pivot in moving into and out of the die bores 58. Thus, as depicted in Figure 4, the V-shaped groove 60 serving as the hinge
30 joint between platen 50 and bed 54 is located between a plane A containing the entrance ends of the die bores 58 and a plane B containing the pointed crests 66 of the punches 52 fully received in the bores. These planes A

and B are parallel to each other and normal to the axis C of each punch fully received in one of the die bores. This placement of the V-shaped groove 60 in accordance with an incidental feature of this invention makes it possible to reduce the clearances between punches and dies to a minimum and hence to remarkably enhance the perforating capability of the punch assembly.

In operation, for stapling together sheets of paper, for example, with the stapler-punch combination of the foregoing construction, the sheets are placed as usual between the base 14 and staple magazine 18 of the stapler assembly 10 in the state of Figures 1 and 2. Upon depression of the handle 20 as well as the staple magazine 18 against the forces of the cantilever springs 28 and 44, the ejector 22 forces the foremost one of the staples S out of the magazine. The ejected staple penetrates the sheets of paper and, clinched by the anvil 16, fastens them together.

For the use of the stapler-punch combination as a hand punch, the platen 50 of the punch assembly 12 is opened or turned away from the bed 54 to a position approximately 90 degrees away therefrom as in Figure 3. Then, with the paper or the like to be punched placed over the bed 54, or over the pair of dies 56 mounted therein, the platen 50 is pressed down to the position of Figures 1 and 2. The descending pair of punches 52 thereupon penetrate the paper as they enter the die bores 58. The platen 50 is again pivoted away from the bed 54 for withdrawal of the perforated paper. Although the paper will then tend to move with the punches 52 away from the bed 54, the pair of stripper springs 70 will act to release the paper from the punches, leaving the paper on the bed as the platen is turned away therefrom.

In Figures 6 to 9 a modified punch assembly 12a is combined with the stapler assembly 10 of the same construction as in the preceding embodiment of the invention to provide another preferred form of the stapler punch combination in accordance with this invention. The modified punch assembly 12a features a metal-made head or platen 50a formed integrally with a pair of perforating punches 52a. The platen 50a is riveted at 62 to the base 14 of the stapler assembly 10 and hinged at 60a to a planar die 56a defining the bores 58. This die is riveted at 80 to a bed 54a, so that the platen is pivotable about the hinge 60a relative to the bed as in the foregoing embodiment. One or more, two in this embodiment, permanent magnets 68a are embedded in the die 56a to attract the platen 50a of magnetic material, for normally holding the platen closed against the die as in Figures 6, 7 and 9. The permanent magnet or magnets 68a could of course be attached to the platen 50a, provided that the die 56a is of a magnetic material.

Boxlike in shape, the bed 54a is partly open and has a removable bottom 82. This removable bottom is formed to include two transverse partitions 72a dividing the interior of the bed into two outer spaces 74a for containing punchings created by the punch assembly, and an intermediate space 76a for accommodating a spare bar or bars of staples Sa.

The other details of construction, as well as the manners of use of the stapler and punch assemblies, of this second embodiment of the invention are substantially as set forth above in connection with Figures 1 to 5. An advantage of the second embodiment of the invention resides in the ease with which the perforating punches 52a are manufactured and mounted in place.

Figures 10 to 12 illustrate still another preferred embodiment of this invention, including another modified punch assembly 12b combined with the stapler assembly 10 of the first embodiment. In this punch assembly 12b a pair of perforating punches 52b are mounted on a flat bed 54b, instead of on the platen as in the two previous embodiments. The bed 54b is hinged at 60b to a platen 50b which in this embodiment of the invention takes the form of an open-bottom box. A die 56b defining the bores 58 for receiving the punches 52b is mounted in the platen 50b so as to close its bottom. The platen 50b is formed to include two transverse partitions 72b to define, in combination with the die 56b, two closed outer spaces 74b for accommodating punchings and a closed intermediate space 76b for receiving a spare bar or bars of staples Sa. The die 56b has an L-shaped lateral protuberance 90 at the midpoint of its longitudinal dimension. Exposed through a recess 92 in the platen 50b, this protuberance serves as a thumbpiece for parting the platen and the die from each other for withdrawing the punchings from the spaces 74b or for taking the spare staple bar S' from the space 76b.

At 68b in Figures 11 and 12 are seen a pair of small projections 68b on the bed 54b. Instead of the permanent magnets used in the first two embodiments the projections 68b function to normally hold the platen 50b and the bed 54b closed against each other by internally and resiliently engaging the opposite end walls of the platen as in Figure 11.

An additional feature of this third embodiment of the invention is that the stapler assembly 10 and the punch assembly 12b are made readily separable from each other to allow use of each as an independent unit. As shown in Figure 11, the front end of the base 14 of the

stapler assembly 10 is fitted in an undercut groove 94 in the platen 50b of the punch assembly 12b so as to be free to slide backward on the platen. A permanent magnet 96 is embedded in the platen 50b adjacent its rear end for attracting the stapler base 14 of magnetizable material. Normally, therefore, the stapler assembly is retained in position on the punch assembly 12b both by the attractive force of the magnet 96 and by the engagement of the front end of the stapler base in the undercut groove 94 in the punch platen 50b. By pulling the stapler base upwardly and backwardly of the punch platen, the device is readily separated into the stapler assembly and the punch assembly.

In the use of the stapler-punch combination of Figures 10 to 12, sheets of paper or the like are stapled by the stapler assembly 10 as combined with the punch assembly 12b, as has been explained with reference to Figures 1 and 2. Additionally, removed from the punch assembly, the stapler assembly may be grasped in one hand for stapling, as is usual with ordinary small-sized hand staplers.

For punching, paper or the like is placed over the perforating punches 52b of the punch assembly 12b, with its platen 50b hinged away from the bed 54b as in Figure 12. The paper is perforated as the platen is subsequently turned down onto the bed to receive the punches in the die bores 58. Thereafter, as the platen is again turned up, the perforated paper remains on the bed, ready for withdrawal from over the punches. The punch assembly 12b can likewise be removed from the stapler assembly 10 for punching. The separation of the punch assembly from the stapler assembly offers the advantage of permitting the use of both hands in

depressing the platen onto the bed, as for punching thick paper or other not-easily-penetrable material.

Although the invention has been shown and described in terms of some preferred embodiments thereof, these are by way of example only. A variety of modifications or changes are possible without departing from the scope of the appended claims. For example, the stapler-punch combination in accordance with this invention may incorporate a stapler assembly of various types other than the one represented here. Further, the platen could be omitted from the illustrated embodiments of the invention without in any way impeding the functions of the stapler-punch combination either as stapler or punch. In the absence of the platen, then, the perforating punches would be mounted directly to the stapler in the first two embodiments disclosed, and the bores for receiving the punches might be formed in the stapler base in the last embodiment. Thus, according to the broadest aspect of this invention, the set of perforating punches are to be formed on either of the base and the bed, and the bores for receiving the punches in the other of the base and the bed. The perforating punches may be formed integrally with either of the platen and the bed.

A further possible departure from the illustrated embodiments is the omission of the means (i.e., permanent magnets 68 or 68a or projections 68b) for normally holding the platen (or stapler base) and the bed closed against each other. The same purpose could be accomplished by closely fitting the perforating punches in the die bores.

It will also be seen that the three illustrated embodiments of the invention incorporate some interchangeable features. For instance, the stapler and punch

assemblies could be made separable not only in the third but also in the first two embodiments. Another instance of interchangeable features is the hinge joint of different types between platen and bed adopted in the three
5 embodiments.

CLAIMS

1. A hand-operated stapler-punch combination comprising:

(a) a base having an anvil adjacent one end;

5 (b) a staple magazine for receiving a bar of staples, the staple magazine being coupled to the base for pivotal motion about a first axis adjacent the other end of the base;

10 (c) a handle having a staple ejector movable with respect to the staple magazine transversely of the bar of staples for forcing the successive staples out of the staple magazine against the anvil on the base,

15 (d) a bed hingedly coupled to the base for relative hinging movement thereof away from and towards the base about a second axis at right angles to the first axis; and

20 (e) a set of spaced-apart perforating punches on and movable with either of the base and the bed and being received by respective bores in the other of the base and the bed for cooperative punching operation upon the relative hinging movement between the bed and base.

25 2. The stapler-punch combination as claimed in claim 1, further comprising a platen secured to the base and hinged to the bed for relative hinging movement thereof away from and towards the bed about the second axis, the perforating punches being on either of the platen and the bed, and the bores in the other of the platen and the bed.



3. The stapler-punch combination as claimed in claim 2, wherein the perforating punches are on the platen, wherein the bed is in the form of an open-top box, and wherein the bores are formed in dies mounted in the bed.
- 5 4. The stapler-punch combination as claimed in any one of the preceding claims, wherein the handle is coupled to the base and to the magazine for independent pivotal motion about the first axis.
- 10 5. The stapler-punch combination as claimed in claim 4, wherein the magazine comprises a cover pivotable independently about the first axis.
- 15 6. The stapler-punch combination as claimed in any one of claims 3 to 5, wherein the dies are of magnetic material, and wherein the combination further comprises permanent magnets attached to the platen for attracting the dies in order to normally hold the platen and the bed closed against each other.
- 20 7. The stapler-punch combination as claimed in any one of the preceding claims, further comprising stripper means for separating perforated paper or the like from the perforating punches.
- 25 8. The stapler-punch combination as claimed in claim 7, wherein the stripper means comprises a cantilever spring attached to the platen in the vicinity of each perforating punch.
9. The stapler-punch combination as claimed in any one of claims 2 to 8, wherein the platen is integral with the bed and made pivotable relative to the same by forming a V-shaped groove along the second axis.



10. The stapler-punch combination as claimed in any one of claims 2 to 9, wherein the perforating punches are formed integrally with either of the platen and the bed.

5 11. The stapler-punch combination as claimed in claim 10, wherein the perforating punches are formed on the platen, and wherein the bores are formed in a die attached to the bed.

10 12. The stapler-punch combination as claimed in any one of the preceding claims, wherein the bed is partitioned to provide spaces for accommodating punchings.

13. The stapler-punch combination as claimed in any one of the preceding claims, wherein the bed further provides a space for housing a spare bar of staples.

15 14. The stapler-punch combination as claimed in claim 12 or claim 13, wherein the bed has a removable bottom.

20 15. The stapler-punch combination as claimed in any of claims 11 to 14, wherein at least either of the platen and the die is of magnetic material, and wherein the combination further comprises at least one permanent magnet attached to either of the platen and the die for attracting the other, in order to normally hold the platen and the die closed against each other.

25 16. The stapler-punch combination as claimed in claim 2, wherein the perforating punches are formed on the bed, wherein the platen is in the form of an open-bottom box, and wherein the bores are formed in a die mounted in the platen.

17. The stapler-punch combination as claimed in claim 16, wherein the platen is partitioned to provide,



in combination with the die, closed spaces for accommodating punchings.

18. The stapler-punch combination as claimed in claim 17, wherein the platen further provides, in combination with the die, a closed space for receiving a spare bar of staples.

19. The stapler-punch combination as claimed in claim 2, wherein the platen is removable from the base in order to separate the stapler-punch combination into a stapler assembly and a punch assembly.

20. The stapler-punch combination as claimed in any one of the preceding claims, wherein each perforating punch has at least three cutting teeth each with a pointed crest.

21. The stapler-punch combination as claimed in claim 20, wherein the second axis lies between a plane (A) containing the entrance ends of the bores and a plane (B) containing the pointed crests of the perforating punches fully received in the bores.

22. The stapler-punch combination substantially as hereinbefore described with reference to Figures 1 to 5 of the accompanying drawings.

23. The stapler-punch combination substantially as hereinbefore described with reference to Figures 6 to 9 of the accompanying drawings.

24. The stapler-punch combination substantially as hereinbefore described with reference to Figures 10 to 12 of the accompanying drawings.

