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STAPLE PULLER

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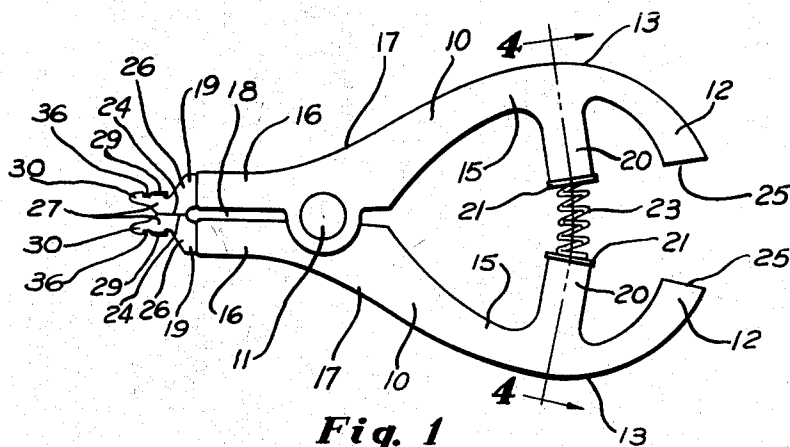


Fig. 1

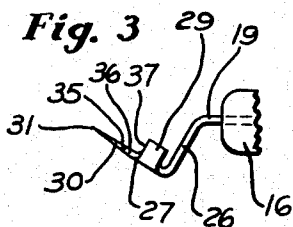


Fig. 3

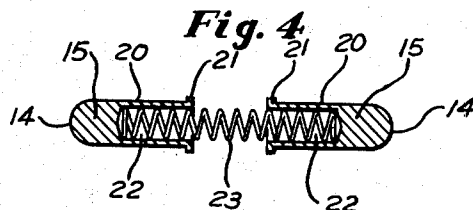


Fig. 4

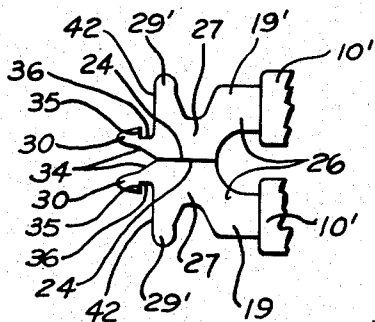


Fig. 5

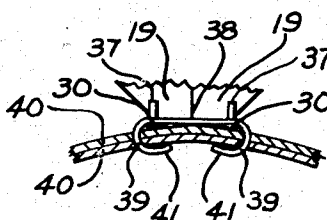


Fig. 7

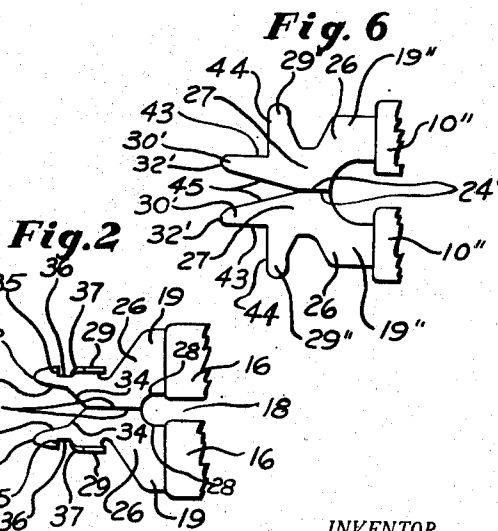


Fig. 2

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9 Claims. (Cl. 254—28)

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My invention relates to staple removing tools, and more particularly to a staple removing tool that is adapted to be readily engaged under the transverse portion of the staple and held in operative position relative thereto without any necessity of placing the body portion of the tool in engagement with the surface of the material through which the staple extends.

More particularly it is a purpose of my invention to provide a staple removing tool having a pair of forwardly projecting jaws thereon that have forwardly projecting prongs constituting end portions on said jaws that are beveled or tapered so as to provide a thin leading edge that is readily inserted between the transverse portion of the staple and the paper or similar material that the staple is in engagement with, and which forwardly projecting prongs are convexly curved on the forward end thereof to facilitate such insertion in operative position relative to the staple.

It is a particularly important purpose of my invention to provide a staple removing tool of the above mentioned character that is so constructed that the jaws thereof can be engaged with a staple without any exercise of skill on the part of the operator, the tool being provided with stop shoulders on the jaws limiting movement of the forwardly projecting prongs so that when the staple engages said stop shoulders no further movement of the prong portions of the tool under the staple can be accomplished, thus making it impossible to in any way damage the paper or other material that is stapled, by excessive movement of the removing tool into staple engaging position.

It is a further purpose of my invention to provide means on the jaws whereby the staple will be held in position adjacent the stop shoulders throughout the movement of the jaws in a direction away from each other, during which movement the staple removal is accomplished, said means comprising recesses between the forwardly projecting end portion or prong on each jaw and the stop shoulder, defining a stop shoulder that faces the previously mentioned stop shoulder so that the downwardly extending leg portions of the staple that pass through the material that is stapled together thereby will be confined between the two shoulders during the opening movement of the jaws.

It is another purpose of my invention to provide jaws that are offset from the main body portion of the tool and extend in a plane at an oblique angle to the body portion of the tool so that the body portion of the tool can be held in a raised position relative to the surface of the material through which the staple to be removed extends.

It is another important purpose of my invention to provide a simple and improved mounting for resilient means for holding the jaws in closed

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position, said simple mounting comprising tubular portions on the pivotally connected body portions of the tool, which extend toward each other, and have mounted in the bores thereof the opposite ends of a coil spring that bridges the gap between these tubular portions that urges the jaws toward each other until the same are in engagement with each other, with the forwardly projecting end portions or prongs on said jaws in proper position to pass under the transverse or cross portion of the staple at points between the portions thereof that extend through the material that is stapled and the clinched end portions thereof, which are the portions of the staple that are most readily entered by the prongs on the jaws.

Other objects and advantages of my invention will appear as the description of the drawings proceeds. I desire to have it understood, however, that I do not intend to limit myself to the particular details shown or described, except as defined in the claims.

In the drawings:

Fig. 1 is a plan view of my improved staple removing tool.

Fig. 2 is a fragmentary enlarged plan view of the jaw portion thereof.

Fig. 3 is a fragmentary side elevation of the jaw portion of the tool shown in Fig. 1.

Fig. 4 is a section thereof taken on the line 4—4 of Fig. 1.

Fig. 5 is a view similar to Fig. 2 of a modification.

Fig. 6 is a view similar to Fig. 2 of a further modification, and

Fig. 7 is a fragmentary sectional view showing the prong portions of the jaws in engagement with a staple ready to start the removal operation.

Referring in detail to the drawings, my improved staple removing tool comprises a pair of body portions 10 of molded plastic material, which are pivotally connected together in any suitable manner, as by means of a pivot pin 11 extending through suitable openings in the members 10. The plastic body portions 10 each have an inwardly turned rear end portion 12, said end portions 12 extending toward each other, and the outer surfaces of the handle portions of the body portions 10 are preferably concavely curved lengthwise, as indicated at 13, being shown as being curved substantially on the arc of a circle and being also transversely curved, as shown at 14 in Fig. 4, this transverse and longitudinal curvature being provided so that the handle portions will readily fit in the palm of the hand for operation of the device by pushing the handle portions toward each other. The handle portions are indicated generally by the numeral 15 in Figs. 1 and 4.

Said body portions 10 also have forwardly extending substantially parallel portions 16 that

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join with the handle portions by means of portions that have concavely curved outer edge portions 17 merging with the convexly curved outer surfaces 13. The forwardly extending portions 16 are spaced apart as shown at 18 in Fig. 1, and have metal jaws 19 mounted therein, said jaws 19 having portions that are embedded in the forwardly extending portions 16 so as to be firmly anchored therein, as by molding in the plastic material or by inserting the heated metallic members 19 in the thermo-plastic material of the forwardly extending portions 16 of the body portions 10.

Said body portions 10 also have inwardly extending tubular portions 20, which have end flanges 21 thereon that are adapted to engage to limit inward movement of the tubular portions 20 toward each other. Mounted within the bores 22 of the tubular portions 20 is an expansion coil spring 23, which tends to hold the body portions 10 in such a position that the straight inner edge portions 24 of the jaws 19 are in engagement with each other. Upon movement of the handle portions 15 toward each other the flanges 21 will engage before the inner ends 25 of the inwardly turned end portions 12 of the handles reach a position where these would otherwise engage with each other, thus leaving these sufficiently spaced that it will be impossible to pinch the fingers or the hand between said ends 25. In other words, the flanged ends 21 of the tubular members 20 are more closely spaced than the end faces 25 of the inturned end portions 12 of the handles 15.

In the form of the invention shown in Figs. 1, 2 and 3 the jaws 19 have obliquely extending portions 26 that extend downwardly toward the paper or similar material that is engaged by the staple to be removed, and forwardly extending portions 27 that extend substantially perpendicularly to the portions 26. The straight engaging edges 24 lie partly in the portions 26 and partly in the portions 27, as will be obvious from Figs. 1, 2 and 3. The jaws are also provided with concavely curved edge portions 28 that extend from the embedded portions of said jaws to the straight edges 24.

Said jaws are provided with upstanding stop ears or flanges 29 thereon, these being on the portions 27 of said jaws, and the forward ends thereof are provided with prongs 30 that are tapered to a sharp edge 31 at the leading edges thereof, as will be obvious from Fig. 3. Said prongs 30 have convexly curved outer ends 32 that merge with inwardly extending edge portions 33 that converge toward each other and which join with the edges 34 of said jaws that extend at an oblique angle to the straight edges 24 and extend to said straight edges 24. The outer or remote sides of the jaws 32 have a convexly curved edge portion that extends to a transversely extending edge or shoulder 35 on each of said jaws, which is the forward margin or boundary of a recess 36 at the outer sides of each of said jaws. The recess 36 has an inner edge portion that extends substantially parallel to the edge 24 and lies slightly inwardly toward the edge 24 from the upstanding ear 29. The forward edges 37 of the upstanding ears 29 serve as stop shoulders and the edges 35 serve as cooperating shoulders to hold the staple confined between said shoulders 35 and 37 in a manner to be described below.

A staple having a transverse portion 38 and downwardly bent portions 39 that extend through

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the plies of paper 40, or similar material, held together by the staples, such as that shown in Fig. 7 of the drawings, has the clinched ends 41 thereof spaced from said portions 39, as is customary. It will be noted that the prongs 30 are spaced from each other when the parts are in the position shown in Figs. 1 and 2, this spacing being such that the prongs will enter under the transverse portion 38 of the staple between the clinched ends 41 thereof and the legs 39 thereof. To insert the staple removing tool into staple engaging position, it is only necessary to place the portions 27 of the jaws flatwise against the upper surface of the upper paper ply 40, at which time the handle portions 15 will be extending obliquely upwardly from the paper, and push the prongs 30 under the transverse portion of the staple 38 until the stop shoulders 37, provided by the ears 29, are engaged by the transversely extending portion 38 of the staple. Thus the staple removing tool is located in exact position relative to the staple that is to be removed, and upon movement of the jaw portions 19 away from each other by pressing the handles 15 toward each other, the legs 39 of the staple will be confined in the recess 36 between the shoulder 35 and the shoulder 37 of each of the forwardly extending portions of the jaws, and as the handles 15 are pressed toward each other the sidewise movement of the jaws causes the straight inner walls of the recess portions 36 of the jaws to engage the legs 39 of the staple, pulling these out of the stapled material to remove the same. The wedge shaped cross section of the prongs 30 aid in the entry of the prongs under the transverse portion 38 of the staple and tend to force this transverse portion upwardly away from the adjacent ply 40 through which the staple extends so as to facilitate the moving of the tool into position such that it will remove the staple in the manner above described.

Instead of providing jaws such as shown in Figs. 1 to 3, inclusive, the jaws 19' shown in Fig. 5, may be provided, which are mounted in the body portion 10' in the same manner as the jaws 19 are mounted in the body portion 10, the body portions 10 and 10' being the same in construction, shape and arrangement. The jaws 19' are the same as the jaws 19, except that instead of providing the ears 29 extending upwardly perpendicularly to the portion 27 of each jaw, the ears 29' extend perpendicularly laterally outwardly. Said jaws 27 have the straight inner edge portions 24 that are in engagement with each other when the jaws are in closed position and the forwardly extending prongs 30 are the same shape as previously described and the shoulders 35 define the forward marginal ends of the recesses 36 that lie between the straight forward edges 42 of the ears 29' and the rear edges 35 of the prongs 30. Thus a stop shoulder is provided at 42 that is of such width laterally that the leg portions 39 of any staple within the size limits of the tool will be engaged thereby. The tool is operated in the same manner as in the form of the invention shown in Figs. 1 to 3, inclusive, the prongs 30 being pushed under the transverse portion 38 of the staple until the shoulders 42 formed by the forward straight edges of the ears 29' engage the legs 39 of the staple. When the jaws of the staple removing tool are opened in the same manner as previously described until the inner straight walls of the recesses 36 are engaged by the legs 39 of the staple, said legs will be confined between the

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shoulder 35 on each prong 30 and the shoulder 42 on each ear 29', thus preventing any accidental disengagement of the staple from the tool.

While it is preferred that the recess 36 be provided adjacent the stop shoulder provided on each of the jaws of the staple removing tool, a tool of still simpler construction can be provided, as shown in Fig. 6, although it would require more careful operation thereof to assure that the staple will remain in engagement with the stop shoulders thereon throughout the staple removing, opening movement of the jaws. The jaws 19'', shown as being applied to the body portions 10'' of the staple removing tool, said body portions 10'' being the same in construction as the body portions 10 and pivotally secured together in the same manner, are quite similar in shape to the jaws 19 and 19' in that said jaws have portions 26 that extend obliquely downwardly from the body portions 10'' and portions 27 that extend perpendicularly thereto, said jaws having straight contacting edges 24', similar to the edges 24 of the jaws 19 and 19' and having forwardly extending prongs 30' that are similar to the prongs 30 previously described, but instead of said jaws being cut away to form shoulders, as at 35 in Figs. 1, 2 and 5, the outer edges of the prongs 30' extend straight back, as shown at 43, to the shoulders 44, which correspond to the shoulders 42 shown in Fig. 5, on the ears 29'', which are similar to the ears 29', the forward ends of the jaws being convexly curved at 32' in a similar manner to the jaws 30, said convexly curved edges 32' merging with the inwardly inclined edges 45 that lie between said convexly curved portions 32' and the straight engaging edges 24' of the jaws 19''. In both the form of the invention shown in Fig. 5 and that shown in Fig. 6 the prongs taper in a similar manner to that shown in Fig. 3 toward the forward end edge thereof.

The tool having the jaws shown in Fig. 6 is used in a similar manner to the tool shown in Figs. 1 to 3, inclusive, the prongs 30' being pushed under the transverse portion 38 of the staple until the shoulders 44 engage the legs 39, whereupon the handles are pressed together to cause the straight edge portions 43 to engage the legs 39 and remove the staple, care being taken that the legs 39 remain substantially in engagement with the shoulders 44 throughout the movement thereof, this being easily accomplished by exerting a forward pressure on the tool as the handle is manipulated to open the jaws.

What I claim is:

1. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a convexly curved forward end portion, said jaws diverging toward said curved ends to space said ends from each other in closed position, and a stop shoulder spaced from said convexly curved end.

2. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a forward end portion tapering in thickness toward the extremity thereof to provide a thin forward end edge on each thereof, said forward end edge being convexly curved and a stop shoulder spaced from said tapering end.

3. A staple removing tool comprising a pair of pivotally connected members, each of said members having a body portion having a jaw at one end thereof extending at an oblique angle to said body portion, each of said jaws having a con-

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convexly curved forward end portion and a stop shoulder spaced from said convexly curved end.

4. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a forwardly extending portion having a convexly curved forward extremity and divergent edges extending rearwardly from said curved extremity, and an ear thereon adjacent the rear end of said forwardly extending jaw portion providing a stop shoulder spaced from said convexly curved extremity.

5. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a forwardly extending portion having a transversely convexly curved forward extremity, a stop shoulder spaced rearwardly from said forwardly extending portion and a reduced portion between said forwardly extending portion and said stop shoulder providing a transverse shoulder at the rear end of said forwardly extending body portion spaced forwardly from and facing said stop shoulder.

6. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a transversely convexly curved forward end edge and an upstanding ear on the side edge thereof remote from the other jaw providing a stop spaced from said convexly curved end edge.

7. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a transversely convexly curved forward end edge and a laterally projecting ear on the side edge thereof remote from the other jaw providing a stop spaced from said convexly curved end edge.

8. A staple removing tool comprising a pair of pivotally connected members, each of said members having a convexly curved forward extremity, a stop shoulder spaced from said convexly curved extremity and a reduced portion between said forward extremity and said stop shoulder providing a laterally opening recess in said jaw and a transverse shoulder defining the forward end of said recess in forwardly spaced relation to said stop shoulder.

9. A staple removing tool comprising a pair of pivotally connected members, each of said members having a jaw at one end thereof, each of said jaws having a forwardly tapering forward end portion having a convexly curved forward extremity, an upstanding ear thereon providing a stop shoulder spaced from said extremity and a reduced portion between said forward extremity and said stop shoulder providing a laterally opening recess in said jaw and a transverse shoulder defining the forward end of said recess in forwardly spaced relation to said stop shoulder.

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