

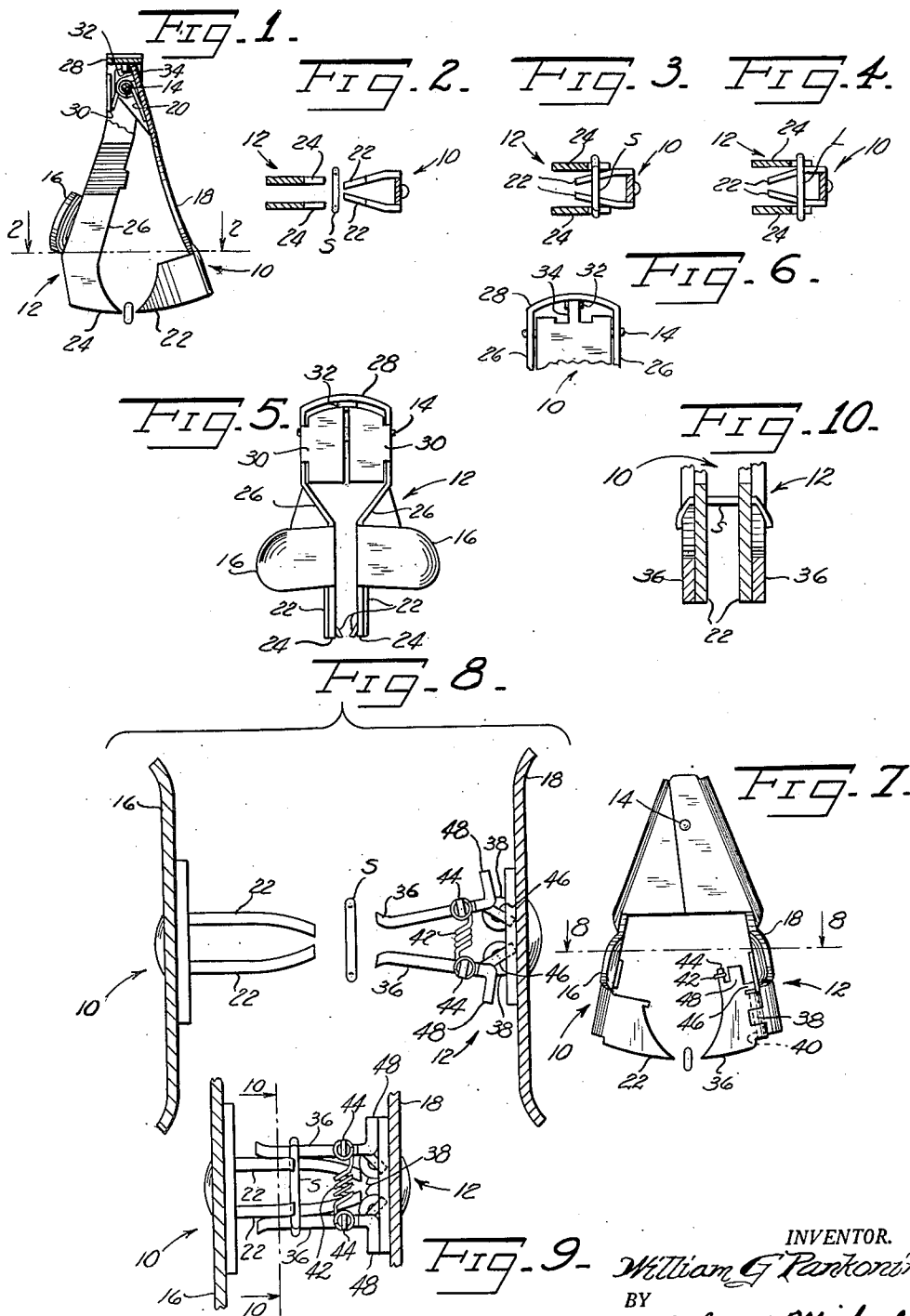
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STAPLE REMOVER

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STAPLE REMOVER

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This invention relates to improvements in tools for removing sheet-binding staples from sheets of paper or other material which have previously been secured together by the staples. A tool of this type is described and claimed in Patent No. 2,033,050, issued to William G. Pankonin on March 3, 1936. While the staple remover therein described operates satisfactorily, it will efficiently remove only staples of the one size of crown for which it was designed and will not efficiently remove staples the crowns of which are smaller than that for which the remover was originally designed.

It is an object of this invention, therefore, to provide a device which will readily remove staples having a variety of widths at the crown.

Another object of this invention is to provide a device of this character which is simple in construction, low in cost of manufacture, and quick and reliable in operation.

In the removal of staples from material where the legs have been clinched or bent over under the material, it is necessary to provide a solid surface which during withdrawal of the staple bears against the inner side of each leg and straightens each leg enough to prevent substantial damage to such material. The surface for each leg must be closely adjacent such leg to be effective in a practical manner. The foregoing objects are obtained by making the relative positions of each surface selectable so that such surface will be close to its respective leg even though the distance between legs varies with different size staples. Such surfaces are spread apart during the removing action and hence are self-adjusting to staples the legs of which are of varied distances apart.

The novel features, which are considered characteristic of the invention, are set forth with particularity in the appended claims. The invention itself, however, both as to its organization and its method of operation, together with additional objects and advantages thereof, will best be understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a view in side elevation with parts broken away and shown in section of a device embodying the present invention and showing the relative position at the beginning of a staple-removing operation;

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1 showing the staple-engaging teeth about to enter under a staple with a relatively small or narrower than standard crown;

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Fig. 3 is a sectional view taken on line 2—2 of Fig. 1 showing the relative position of the staple-engaging teeth after they have entered under such staple and substantially completed the removing thereof;

Fig. 4 is a sectional view taken on line 2—2 of Fig. 1 showing the relative position of the teeth after substantially removing a staple with a relatively large or standard crown;

Fig. 5 is a view in left end elevation of the staple-removing tool viewed in Fig. 1;

Fig. 6 is a fragmentary right-end view in elevation of the upper part of the staple remover viewed in Fig. 1;

Fig. 7 is a view in side elevation of a modified form of a staple remover embodying the present invention;

Fig. 8 is an enlarged sectional view taken on line 8—8 of Fig. 7 showing the staple-engaging teeth as they are about to enter under a staple with a relatively small or narrower than standard crown;

Fig. 9 is an enlarged fragmentary sectional view taken on line 3—3 of Fig. 7 showing the staple-engaging teeth after they have substantially removed such staple; and

Fig. 10 is a fragmentary sectional view taken on line 10—10 of Fig. 9.

Referring to the drawings by reference numerals, all modifications of the staple remover have opposed cooperable jaws 10 and 12 which are pivoted at 14 so that they may be swung toward each other under the influence of manual force applied to handles 16 and 18 and swung apart by the spring 20. Each jaw has teeth with upper and lower camming surfaces enlarging outwardly from their intersection or point of the tooth. In all modifications herein described, as the jaws are brought together, such camming surfaces operate in the manner described in the aforesaid patent and reference is made thereto for a full and complete description of such action.

In both modifications shown in Figs. 1 to 10, inclusive, the jaw 10 has two teeth 22 which are laterally fixedly spaced. The teeth have their points close together and their sides slope gradually apart to the widest place. The distance apart at the points is small enough so that when the teeth on jaw 12 commence to overlap the teeth 22, both sets of teeth may enter under the crown and between the legs of a staple with a small or narrower than standard crown. The distance apart at the widest place is sufficient so that both sets of teeth when fully overlapped will

fit between the legs of a staple with a relatively large or standard crown.

In the modification shown in Figs. 1 to 6 the jaw 12 has two teeth 24 which are normally spaced so that their points will lie to the outer sides of teeth 22 at the points of the latter. The teeth 24 are carried on arms 26 joined by a bridge 28 at the upper ends. The arms 26 are sufficiently inherently resilient to permit the teeth 24 to spread apart as their points ride along the sloping sides of teeth 22 as jaws 10 and 12 are moved together and to bring back the teeth 24 to normal position as such jaws are moved apart. The arms 26 may be provided with flat, wing-like portions 30 which constitute a wall for the upper part of jaw 12 and also form an abutment for one leg of the spring 20. In order to prevent the jaws 10 and 12 from spreading too far apart under the influence of spring 20, a tab 32 may be struck downwardly from the material of bridge 28 to form an abutment which engages with a projection 34 on the upper end of jaw 10.

In the modification shown in Figs. 7 to 10, inclusive, the jaw 12 has two teeth 36 which are hinged by pintle 40 to spaced barrels 38 carried on the jaw 12. The points of teeth 36 are normally urged toward each other by a tension spring 42 acting between pins 44 on the upper end of said teeth. The inner or normal position of the teeth 36 is determined by the engagement between lugs 46 on such teeth and a portion of jaw 12. In the normal position, the points of the teeth 36 are spaced so that they will lie slightly outside the points of teeth 22. The outer or fully spread position of the points of teeth 36 is determined by the abutment between lugs 48 on such teeth and an adjacent portion of the jaw 12. This outer position is sufficient to permit the teeth 36 to spread apart to permit their points to ride along the sloping sides of teeth 22 as jaws 10 and 12 are moved together. The spring 42 has sufficient strength to bring back the teeth 36 to normal position as the jaws are moved apart.

To remove a staple S with a relatively small or narrower than standard crown, either of the devices of both modifications shown in Figs. 1 to 10 is first placed with the jaws 10 and 12 on opposite sides of the bridge of such staple as shown in Figs. 1 and 2 and 7 and 8. In this position, as the jaws are moved toward each other the points of both the teeth 22 and 24 or 22 and 36 will enter under the bridge of the staple and the outer sides and edge of the lower camming surfaces on the teeth 24 or the teeth 36 will provide surfaces which bear against the inside of the legs of such staple as the jaws are moved farther into overlapping relationship to remove such staple in the manner described in the aforesaid patent. Because the jaws 24 or the jaws 36 are spread apart during this action, such surfaces will continually bear against and even slightly spread the legs of such small staple S in the manner indicated in Figs. 3 and 10. Such spreading is not detrimental to the withdrawing action. When the teeth have reached the relative overlapping position shown in Figs. 3 and 9, the staple S will have been completely removed from the material. When removing a staple with a relatively large or standard crown, such as is indicated at L in Fig. 4, such surfaces will bear against the inside of the legs in the same way as heretofore described. However, such spreading of the staple will not occur and such

staple will be withdrawn in the same manner as described in such patent. Hence, the device described in the modifications of Figs. 1 to 10, inclusive, can efficiently and readily remove staples without regard to whether they have relatively small or narrower than standard crowns or relatively large or standard crowns.

Although only several embodiments of the invention are shown and described herein, it will be understood that this application is intended to cover such other changes or modifications as come within the spirit of the invention or scope of the following claims.

I claim:

1. A staple remover having cooperable jaws for removing staples upon relative movement of said jaws toward each other, one of said jaws having spaced teeth provided with upwardly sloping camming surfaces and mounted on resilient arms connected by a bridge and the other of said jaws having a narrow inner end insertible between said spaced teeth and sides sloping outwardly from said narrow inner end.

2. A staple remover having cooperable jaws for removing staples upon relative movement of said jaws toward each other, one of said jaws having pointed spaced teeth provided with upwardly sloping camming surfaces and hinged so that the points thereof may swing apart during the removing of staples.

3. A staple remover having cooperable jaws for removing staples upon relative movement of said jaws toward each other, one of said jaws having pointed spaced teeth provided with upwardly sloping camming surfaces and hinged so that the points thereof may swing apart during the removing of staples, and spring means for normally urging said teeth toward each other.

4. A staple remover having cooperable jaws for removing staples upon relative movement of said jaws toward each other, one of said jaws having pointed spaced teeth provided with upwardly sloping camming surfaces and hinged so that the points thereof may swing apart during the removing of staples, spring means for normally urging said teeth toward each other, and abutments for limiting the inward relative movement of said teeth.

5. A staple remover having cooperable jaws for removing staples upon relative movement of said jaws toward each other, one of said jaws having pointed spaced teeth provided with upwardly sloping camming surfaces and hinged so that the points thereof may swing apart during the removing of staples, spring means for normally urging said teeth toward each other, and abutments for limiting the inward relative movement of said teeth, the other of said jaws having a narrow inner end insertible between said spaced teeth and sides sloping outwardly from said narrow inner end.

6. A device for removing sheet-binding staples comprising a pair of cooperable members for engaging the crown of the staple, said members upon relative movement therebetween cooperating to lift upwardly on said staple and remove it from the material holding the same, one of said members having spaced crown-engaging portions resiliently maintained in normal staple-engaging position, and means operable on relative movement between said members to spread said portions beyond said normal position.

7. A device for removing sheet-binding staples comprising a pair of cooperable members for engaging the crown of the staple, said members

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upon relative movement therebetween cooperating to lift upwardly on said staple and remove it from the material holding the same, one of said members having spaced crown-engaging portions resiliently maintained in normal staple-engaging position, the other of said members having a tapered portion engageable with said portions to spread said portions on relative movement between said members.

8. A device for removing staples of varied width of crown comprising oppositely movable members for engaging the crown of the staple to lift said staple, each of said members having spaced crown-engaging portions, the crown-engaging portions of one member being slidable between the crown-engaging portions of the other member to laterally spread said latter portions.

9. In a staple remover having cooperable jaws provided with spaced teeth adapted to be inserted between the crown and bent legs of a sheet-binding staple, said teeth having points for facilitating such insertion, the teeth of one jaw sloping inwardly toward the points thereof whereby said points may be inserted beneath the bridge of a relatively small staple, and means movably mounting the teeth of the other jaw member and normally relatively positioning such

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teeth to engage said sloping teeth near the points thereof and be spread thereby as said jaws cooperate in removing a staple.

10. In a staple-removing tool, spaced means for engaging the crown of a staple immediately adjacent the legs thereof to act upon said crown in the removing of said staple, means resiliently mounting said spaced means for varying the spacing of said first means to accommodate staples of varying size crowns, and means for automatically spreading said spaced means during operation of said tool.

WILLIAM G. PANKONIN.

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