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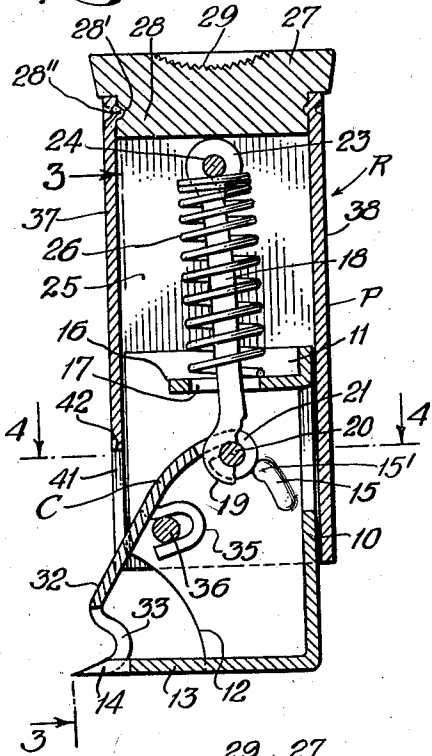
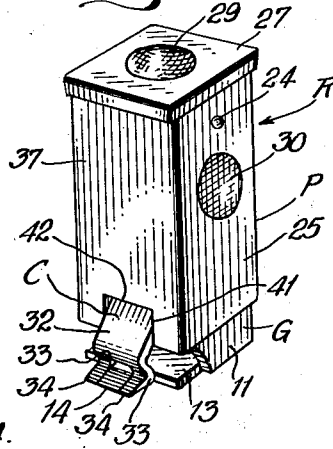
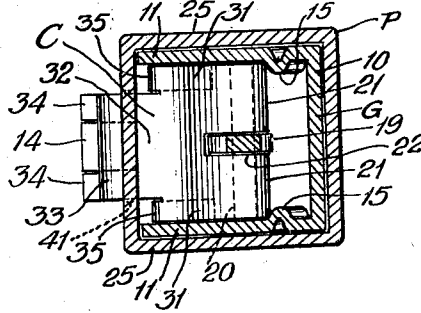
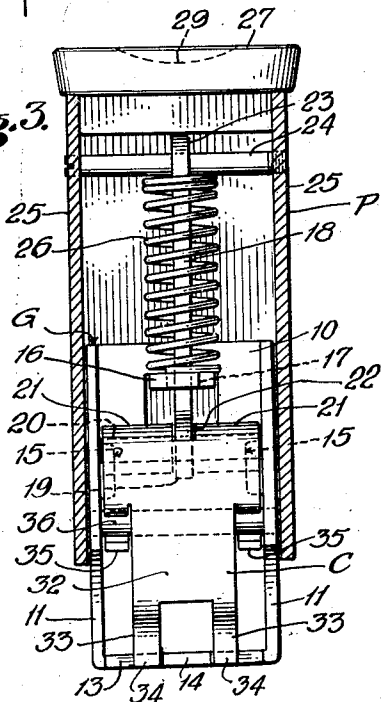
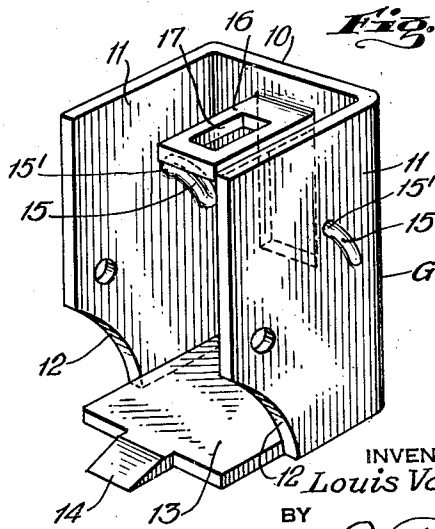
L. VON CSEH

STAPLE REMOVER

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2 Sheets-Sheet 1



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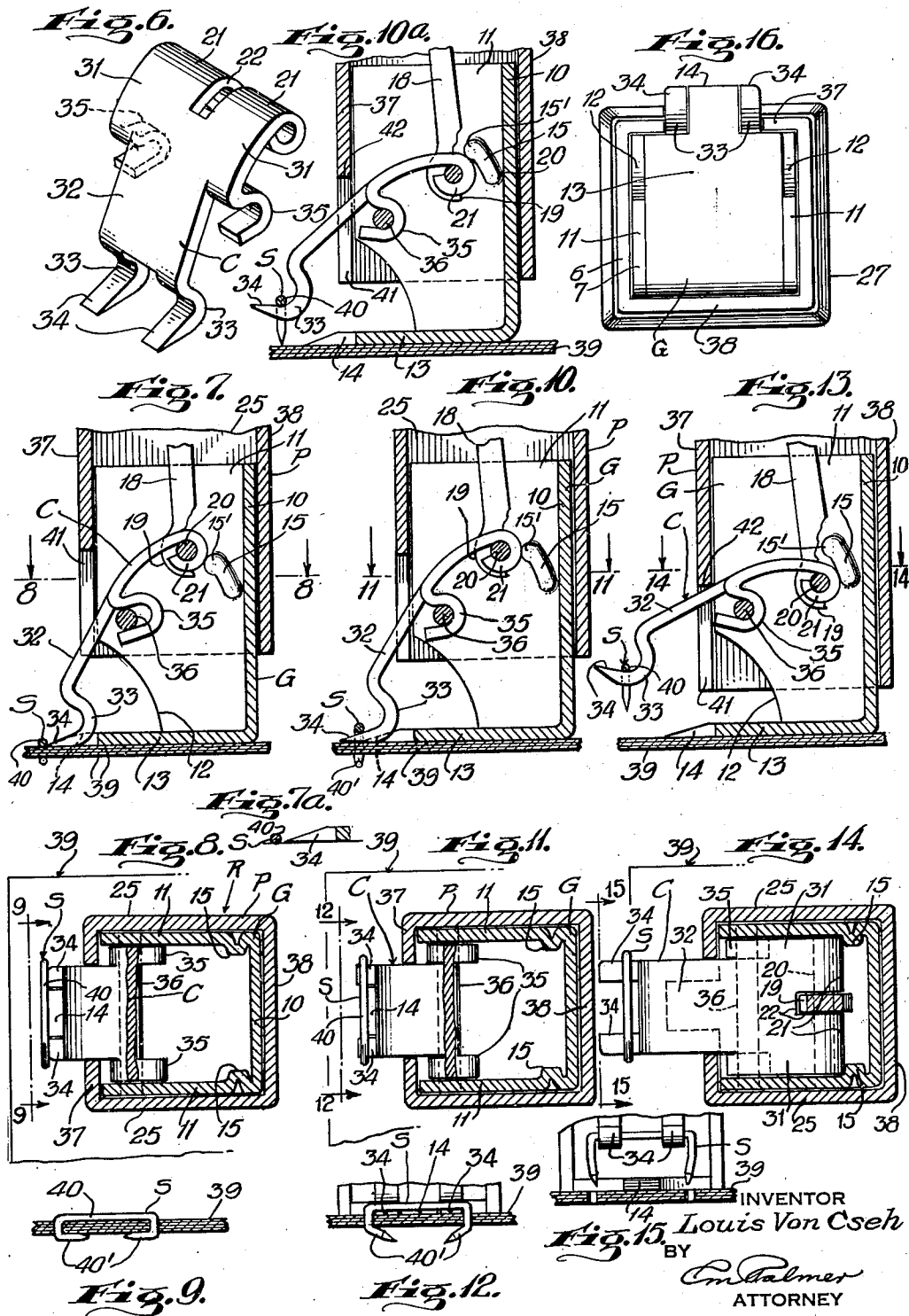
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UNITED STATES PATENT OFFICE

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STAPLE REMOVER

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18 Claims. (Cl. 254—28)

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This invention has to do with means for extracting or removing a clinched staple. Staple extracting means of the types alluded to generally require a portion of the staple lifting means to be manually urged or coaxed under the bridge of the clinched staple prior to its extraction. The principal object of the invention resides in the provision of a novel and improved staple remover wherein the lifting means thereof is merely positioned alongside of and adjacent the bridge of a clinched staple and thereafter automatically projected under the bridge on the initial downward stroke of a slidably guided plunger controlling means for actuating the staple lifting means. The invention has as another important object the provision of a serviceable staple remover wherein a loosely and swingably guided staple lifter includes spaced staple lifting elements adapted on the extracting stroke of the plunger to be shifted automatically linearly and forwardly and thereafter pivotally and upwardly. The invention has as another object to provide a staple remover wherein the staple lifting elements on the retractive stroke of the plunger are adapted to be initially tilted or pivoted downwardly and thereafter automatically shifted linearly and rearwardly. The invention has as a further object the provision of a guard having spaced cam means coacting with a loose connection for the swingable staple lifting means to provide for a compound motion to the latter on the downward or upward stroke of the slidably guided plunger. The invention has as a further object the provision of a pendulum for operatively interconnecting the slidably guided plunger and staple lifting means. Other important and functional and structural features of the invention will appear from the following detailed specification taken with the accompanying drawings wherein:

Fig. 1 is a perspective view of the staple remover or extractor according to my invention.

Fig. 2 is a vertical sectional view of Fig. 1.

Fig. 3 is a vertical sectional view on the line 3—3 of Fig. 2.

Fig. 4 is a horizontal sectional view on the line 4—4 of Fig. 2.

Fig. 5 is a perspective view of the guide or guard.

Fig. 6 is a perspective view of the staple lifter or claw.

Fig. 7 is a fragmentary view of Fig. 2 however illustrating the remover positioned adjacent a staple to be extracted in which instance the staple lifter is along one side of the staple but not projecting under the bridge thereof.

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Fig. 7A is a fragmentary and enlarged view of Fig. 7.

Fig. 8 is a horizontal sectional view on the line 8—8 of Fig. 7.

Fig. 9 is a fragmentary sectional view on the line 9—9 of Fig. 8 illustrating the clinched staple to be extracted.

Fig. 10 is a view similar to Fig. 7 however showing the automatic projection of the pivoted staple lifter or claw under the staple upon initial depression of the slidably guided plunger relative to the guard.

Fig. 10A is a view similar to Fig. 10 illustrating coaction of the pivoted staple lifter against the extruded cam means of the guard on continuation of the downward stroke of the plunger.

Fig. 11 is a sectional view on the line 11—11 of Fig. 10.

Fig. 12 is a sectional view on the line 12—12 of Fig. 11.

Fig. 13 is a view similar to Fig. 10 however showing the plunger completely depressed and the claw further swung upwardly and completely extracting the formerly clinched staple.

Fig. 14 is a sectional view on the line 14—14 of Fig. 13.

Fig. 15 is a sectional view on the line 15—15 of Fig. 14, and

Fig. 16 is a bottom view of Fig. 1.

The staple remover or extractor is generally denoted R and comprises the U-shaped guard or guide G and the hollow rectangularly shaped plunger P.

The guard G is a one piece channeled member having the back wall 10, the forwardly projecting side wall 11 having the reentrant notched portions 12. Integral with the back wall 10 and closely straddled by the spaced sides or side walls 11 is the forwardly projecting base 13 embodying the forwardly extending tapered tongue 14. The guard may be of suitable sheet metal and the sides thereof are extruded inwardly to provide the arcuate and inclined ribs or cams 15 including at their upper portions an overhanging bead or lip 15'.

Struck out of the back wall 10 of the guard and extending between the spaced sides 11 is the forwardly extending lug 16 having the opening 17 for the reception of the connecting rod, link or pendulum 18 which has its lower eye or annular bearing 19 swiveled to the staple lifting means or claw C rotatably mounted on the fulcrum pin 20 frictionally and firmly retained by the spaced arcuate ears 21 defining slot 22 (Figs. 3, 4 and 14) the walls of which straddle the lower bear-

ing or eye 19 of link or pendulum 18 to retain and position the latter along the fulcrum pin 20.

The upper eye or annular bearing 23 of link 18 rotatably or pivotally surrounds a fixed fulcrum pin 24 carried by the spaced side walls 25 of the hollow and square shaped plunger or casing P which is slidably guided on and by the sides 11 and back wall 10 of the guard G.

Seated on the forwardly extending lug 16 and surrounding the shank of the connecting rod or link 18 is the normally expanded helicoidal spring 26 having its upper end abutting the fixed fulcrum pin 24 and its lower end abutting the lug 16. When the plunger P is slidably displaced downwardly relative to the guard G the spring 26 is compressed. Upon removal of manual pressure from the plunger, spring 26 automatically elevates the plunger P to its normally raised position (Fig. 1). The cap 27 has a depending square shaped boss 28 provided with a peripheral groove 28' for frictionally receiving and interlocking with rib or detent means 28'' of the plunger. The cap serves as a closure having the depressed knurled portion 29 which with the knurled portions 30 on the sides 25 of the plunger facilitates gripping and actuating the latter.

The connection defined by lower eye 19 of the connecting rod or link 18 and the fulcrum pin 20 fixedly carried by the spaced ears or bearings 21 of the claw or staple lifting means C, may be said to be pivoted or tiltable, that is, when the slidable plunger is depressed the upper portion of the claw is pivoted downwardly and when it retracts the upper portion of the claw is carried upwardly. On pivotal displacement of the claw it is guided between the spaced sides 11 of the guard. Or in other words, the retaining ears 21 of the swingable claw C are closely straddled by the spaced walls 11 of the guard G. These ears 21 are integral with the lateral extending shoulders or wings 31 of the claw C. The shoulders 31 are movably guided and closely straddled by the spaced sides 11 of the guard.

The staple lifter or claw C is a one piece sheet metal member preferably made in progressive dies and its upper part which embodies the shoulders or wings 31 and the spaced ears 21 is slightly arcuate as illustrated and depending therefrom is the substantially rectilinear reduced portion or shank 32 terminating in the spaced hooks or staple lifting elements 33 having the tapered and substantially flat feet 34.

Integral with and depending from the shoulders or wings 31 and disposed rearwardly of the shank 32 are the spaced arcuate shoes or bearings 35 loosely, rotatably and in part surrounding the fulcrum pin 36 fixedly carried by the spaced sides 11 of the guard G which also slidably guides the front and rear walls 37 and 38 of the plunger.

Normally the rear portions of the U-shaped and in part arcuate shoes or bearings 35 of the claw C are appreciably spaced from the fixed fulcrum pin 36 (Fig. 7) to provide adequate slack or clearance. At this time the slidably guided plunger P is in its normally elevated position (Figs. 1 and 2).

It is important to observe that at such time the free ends of the spaced feet 34 of the swingable staple lifter or claw C are in alinement with the terminal of the forwardly projecting tapered tongue 14 of the guard (Figs. 1 and 8) and at such time the feet or extracting means 34 of the claw C closely but movably straddle tongue 14.

For extracting a staple S fastened to sheet material such as paper, cardboard or the like 39,

the staple remover R is first placed adjacent to the bridge 40 of the clinched staple S (Figs. 7 and 8). Specifically the feet 34 which are alined with the tongue 14 are placed along and near the bridge 40 of the staple to be extracted. But not coaxed under the bridge! Thereafter the plunger is grasped and shifted downwardly relative to the guard G.

Of importance is the observation that at the beginning of the downward stroke of the plunger, the feet 34 or staple lifting elements 33 of the staple lifter C are automatically projected under the bridge 40 of the staple S (Figs. 10, 11 and 12), thus also initially spreading legs 40' of the staple. This forward projection of the staple lifter C relative to the tongue 14 is due to the camming action caused by the enlargements or terminal lips 15' of arcuate cams 15 of the guard G initially actuating the ears or sockets 21. More particularly on the downward stroke of the plunger, the connecting rod or pendulum 18 drives pin 20 downwardly, thus displacing the annular ears or sockets 21 to meet and contact the terminal and overhanging beads or enlargements 15' of the spaced cams 15, causing the staple lifter or claw C to be bodily shifted forwardly. Hence on the initial portion of the downward stroke of the plunger the U-shaped spaced shoes or yokes 35 of the claw move towards and against the fixed fulcrum pin 36 about which staple lifter C is thereafter rotated or pivoted. By such action the staple lifting feet 34 of the staple lifter C are first automatically and rectilinearly projected under bridge 40 of the clinched staple (Figs. 10 and 11).

With the feet 34 automatically projected under the bridge of the staple, the plunger P continues in its downward stroke and shoes or bearings 35 contact and rotate against the fulcrum pin 36, hence feet 34 of the spaced elements 33 are pivotally elevated, causing the complete extraction of the staple (Figs. 13, 14 and 15). Shank 32 of the staple lifter C projects through slot 41 in the front wall 37 of the plunger and upward tiltable displacement of shank 32 is limited by the portion 42 of wall 37 which serves as a stop.

By the present arrangement the swingable or tiltable staple lifter or claw C has a compound movement during the down and up strokes of the plunger due to the action of the loose connection between the spaced shoes 35 and the fixed fulcrum pin 36. On the downward stroke the claw is bodily displaced forwardly and linearly prior to its tilting about the fulcrum pin 36, taking up the slack between the latter and shoes or bearings 35 due to the camming action of the enlargement or beads 15' on the retaining ears 21. Thereafter bearings 21 coast with the cams or ribs 15, thus rotatably retaining shoes 35 against the fulcrum pin 36. On the retractive or up stroke of the plunger pursuant to the extraction of a formerly clinched staple, the claw C first rotatably tilts downwardly about fulcrum pin 36, then bodily and linearly retracts from the latter to provide the desired slack between shoes 35 and the fixed fulcrum pin 36 thus restoring the staple lifting members or feet 34 to again straddle tongue 14 of the guard G. The return stroke of the plunger is automatic due to the expansion of the spring 26. Thus for completing each cycle of the pendulum in the matter of extracting a staple, the claw C first is urged rectilinearly, and thereafter is rotatably retained to complete the downward plunger stroke and on the return or retractive plunger stroke the claw is rotatably

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retained by the cams or ribs 15 until it strikes the protuberances or beads 15', thereafter retracting rectilinearly to its normal position, thereby completing the cycle of operation.

By the present invention it is not necessary to initially coax the staple lifting means 33 under the bridge of the staple! This operation is automatic and prompt after the staple remover is placed alongside but not under the bridge of the staple prior to its extraction and prior to the down stroke of the plunger.

On each complete cycle of the plunger link 18 pivots about the fulcrum pin 24 acting as a pendulum oscillating in slot 17 making one cycle on each complete cycle of the plunger.

The link or pendulum 18 in fact may be said to drive the staple lifting means or claw C which by reason of the spaced shoes 35 which straddle the fulcrum means 36 constitute with the latter loose connections normally open as illustrated in Fig. 2. When the sockets 21 strike the overhanging lips or enlargements 15', the loose connections close and concomitantly the staple lifting means is rectilinearly projected forwardly. Once the loose connections are closed, the lifting means may be rotated or pivoted as desired to extract the staple, but the maintenance of the pivotal or rotatable relation is retained by the arcuate ribs or cams 15 after the sockets 21 move past the overhanging lips 15'.

Various changes may be made in details of construction and arrangement of parts without departing from the spirit of the invention or sacrificing any of the advantages therein.

I claim:

1. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means to permit linear and pivotal displacement of the latter, means cooperating with said lifting means on the downward displacement of said plunger relative to said guard for bodily and automatically shifting said lifting means initially rectilinearly under said staple prior to pivotal displacement thereof by said connection on the continuation of said displacement of said plunger for extracting said staple, and means for retaining said pivotal displacement pursuant to shifting of said lifting means under said staple.

2. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means to permit linear and pivotal displacement of the latter, and cam means cooperating with said lifting means on the downward displacement of said plunger relative to said guard for bodily and automatically shifting said lifting means initially rectilinearly under said staple prior to pivotal displacement thereof by said connection to extract said staple.

3. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means and disposed intermediately thereof, cam means projecting from said guard and cooperating with said lifting means on the downward displacement

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of said plunger relative to said guard for bodily and automatically shifting said lifting means initially rectilinearly under said staple, and means for sustaining said connection pursuant to the shifting of said lifting means under said staple to provide for pivotal displacement of said lifting means for extracting said staple.

4. In a remover for extracting a staple, a guard having fulcrum means, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means including bearing means having rearwardly disposed means spaced from said fulcrum means, means carried by said plunger for driving said lifting means, and means projecting from said guard and cooperating with said lifting means on the downward displacement of said plunger relative to said guard for shifting said rearwardly disposed means towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and for shifting and retaining said rearwardly disposed means against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

5. In a remover for extracting a staple, a guard having fulcrum means, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means in part disposed within and movably guided by said guard and including spaced bearings having rearwardly disposed means normally spaced from said fulcrum means, means carried by said plunger for driving said lifting means, and cam means projecting from said guard and cooperating with said lifting means on the downward stroke of said plunger relative to said guard for shifting said rearwardly disposed means towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and concomitantly shifting and rotatably retaining said rearwardly disposed means against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

6. In a remover for extracting a staple, a guard having fulcrum means, a plunger, means movably guiding the stroke of said plunger relative to said guard, staple lifting means including a shank and spaced bearings having portions normally spaced from said fulcrum means, driven means interconnecting said plunger and lifting means, and cam means projecting from said guard and cooperating with said lifting means on the downward displacement of said plunger relative to said guard for shifting said portions towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and concomitantly shifting said portions against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

7. In a remover for extracting a staple, a guard having fulcrum means, a plunger, means movably guiding the stroke of said plunger relative to said guard, staple lifting means including bearing means having portions normally spaced from said fulcrum means and including socket means, pin means carried by said socket means, link means connected to said plunger and rotatably mounted on said pin means, and cam means projecting from said guard and cooperating with

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said socket means on the downward displacement of said plunger relative to said guard for shifting said portions towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and for subsequently shifting said portions against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

8. In a remover for extracting a staple, a guard having fulcrum means, a plunger, means movably guiding the stroke of said plunger relative to said guard, staple lifting means including bearing means having shoes in part spaced from said fulcrum means, means carried by said plunger for driving said lifting means, spring means to resist displacement of said plunger, and arcuate means projecting from said guard and cooperating with said lifting means on the downward displacement of said plunger relative to said guard for shifting said shoes towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and concomitantly shifting said shoes against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

9. In a remover for extracting a staple, a guard having fulcrum means, a plunger, a link, means carried by said plunger for pivotally sustaining said link, means movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end socket means and including intermediately disposed laterally and rearwardly arranged bearing means having arcuate means including rearwardly disposed means normally spaced from said fulcrum means, pin means carried by said socket means and rotatably carrying said link, and cam means projecting from said guard and cooperating with said socket means on the downward stroke of said plunger relative to said guard for shifting said rearwardly disposed means towards said fulcrum means for automatically shifting said lifting means initially rectilinearly under said staple and concomitantly shifting said rearwardly disposed means against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

10. In a remover for extracting a staple, a guard having a tongue, fulcrum means sustained by said guard, a plunger, a link, means carried by said plunger for pivotally sustaining said link, means movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end spaced socket means defining a slot and having intermediately disposed laterally and rearwardly arranged spaced bearing means having rearwardly disposed means normally spaced from said fulcrum means, said link projecting through said slot, said lifting means having at its lower end spaced lifting elements normally in alignment with and straddling said tongue, pin means carried by said socket means and rotatably carrying said link, and means projecting from said guard and cooperating with said socket means on the downward stroke of said plunger relative to said guard for shifting said rearwardly disposed means toward said fulcrum means for automatically shifting said elements initially forwardly of said tongue

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and rectilinearly under said staple and concomitantly shifting said rearwardly disposed means against said fulcrum means to provide for upward arcuate displacement of said lifting means whereby said elements on the continuation of said downward stroke extract said staple.

11. In a remover for extracting a staple, a guard having fulcrum means, a plunger, a link, means carried by said plunger for pivotally sustaining said link, means movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end socket means and including intermediately disposed laterally and rearwardly arranged bearing means having rearwardly disposed means normally spaced from said fulcrum means, pin means carried by said socket means and rotatably carrying said link, cam means projecting from said guard and having terminal lips cooperating with said socket means on the downward stroke of said plunger relative to said guard for shifting said rearwardly disposed means towards and against said fulcrum means and for automatically shifting said lifting means initially rectilinearly under said staple, and said cam means cooperating with said socket means on travel of the latter passed said lips to retain said bearing means against said fulcrum means to provide for pivotal displacement of said staple lifting means.

12. In a remover for extracting a staple, a guard having fulcrum means, a plunger, a link, means carried by said plunger for pivotally sustaining said links, means movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end socket means and including intermediately disposed shoes loosely straddling said fulcrum means, means on the displacement of said plunger relative to said guard for projecting said lifting means linearly under said staple and said shoes to rotatably bear against said fulcrum means, and means pursuant to said displacement to rotatably sustain said shoes against said fulcrum means.

13. In a remover for extracting a staple, a guard having fulcrum means, a plunger, a link, means carried by said plunger for pivotally sustaining said link, means for movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end socket means and including intermediately disposed shoes loosely straddling said fulcrum means, projecting means on said guard and cooperating with said socket means to shift the latter linearly and said shoes against said fulcrum means, and retaining means cooperating with said socket means to rotatably maintain said shoes against said fulcrum means.

14. In a remover for extracting a staple, a guard having fulcrum means, a plunger, a link, means carried by said plunger for pivotally sustaining said link, means for movably guiding the displacement of said plunger relative to said guard, staple lifting means having at its upper end socket means and including intermediately disposed laterally and rearwardly arranged bearing means having rearwardly disposed means normally spaced from said fulcrum means, pin means independent of said plunger and carried by said socket means and rotatably carrying said link, spring means surrounding said link, and cam means projecting from said guard and having lip means cooperating with said socket means on the downward stroke of said plunger relative to said guard for shifting said lifting means initially

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rectilinearly under said staple and concomitantly shifting said rearwardly disposed means against said fulcrum means to provide for pivotal displacement of said lifting means whereby the latter on the continuation of said downward stroke extracts said staple.

15. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means and disposed intermediately thereof, and means cooperating with said lifting means on the displacement of said plunger relative to said guard to close said connection for bodily and automatically shifting said lifting means initially rectilinearly under said staple and subsequently providing a rotatable connection for extracting said staple.

16. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means and disposed intermediately thereof, and arcuate means projecting from said guard and having overhanging means cooperating with said lifting means on the displacement of said plunger relative to said guard for bodily and automatically shifting said lifting means initially rectilinearly under said staple.

17. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, means carried by said plunger for driving said lifting means, a loose and pivoted connection for said lifting means and disposed intermediately thereof, and arcuate

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means projecting from said guard and having terminal overhanging means cooperating with said lifting means on the displacement of said plunger relative to said guard for bodily and automatically shifting said lifting means initially rectilinearly under said staple and subsequently concomitantly closing said loose connection whereby on further displacement of said plunger said lifting means is rotatably displaced for extracting said staple.

18. In a remover for extracting a staple, a guard, a plunger, means movably guiding the displacement of said plunger relative to said guard, staple lifting means, pivoted means carried by said plunger for driving said lifting means, spring means surrounding said pivoted means, normally loose and pivoted connections for said lifting means and disposed intermediately thereof, and means projecting from said guard and having terminal and enlarged means cooperating with said lifting means on the displacement of said plunger relative to said guard and against the resistance of said spring means for bodily and automatically shifting said lifting means initially forwardly and rectilinearly under said staple concomitantly closing said loose connections whereby on further displacement of said plunger said lifting means is rotatably retained and displaced for extracting said staple.

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