

Feb. 12, 1952

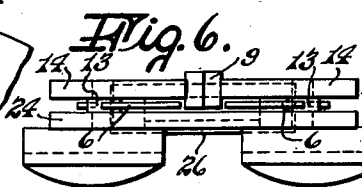
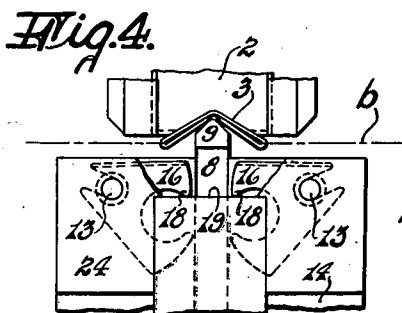
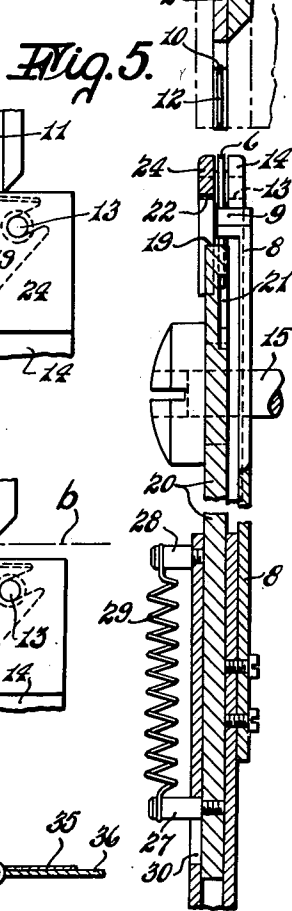
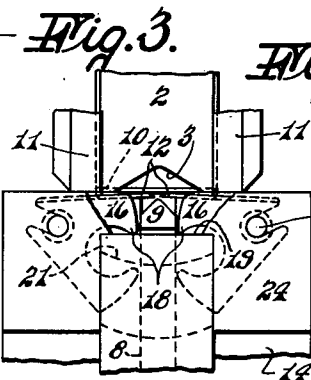
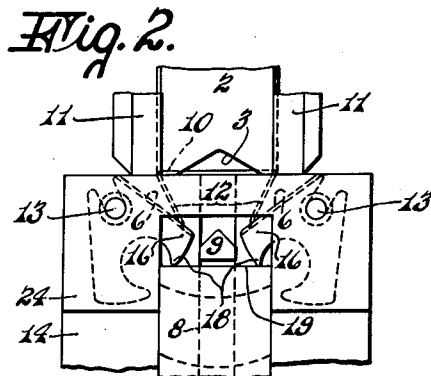
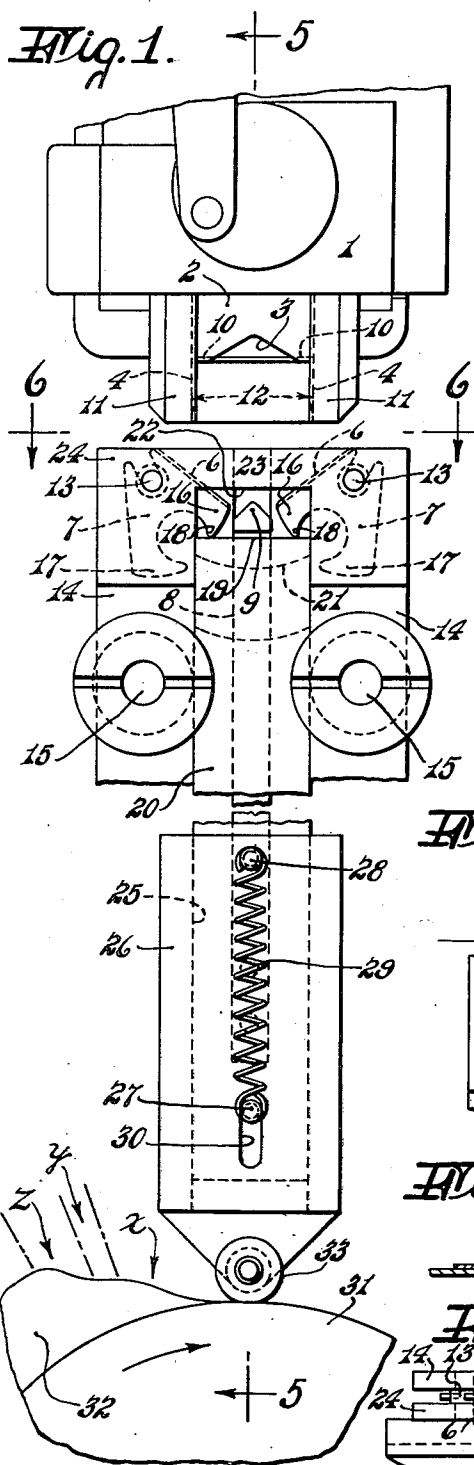
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2,585,807

WIRE STITCHING APPARATUS

Filed April 12, 1950

2 SHEETS—SHEET 1



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2 SHEETS—SHEET 2

Fig. 8.

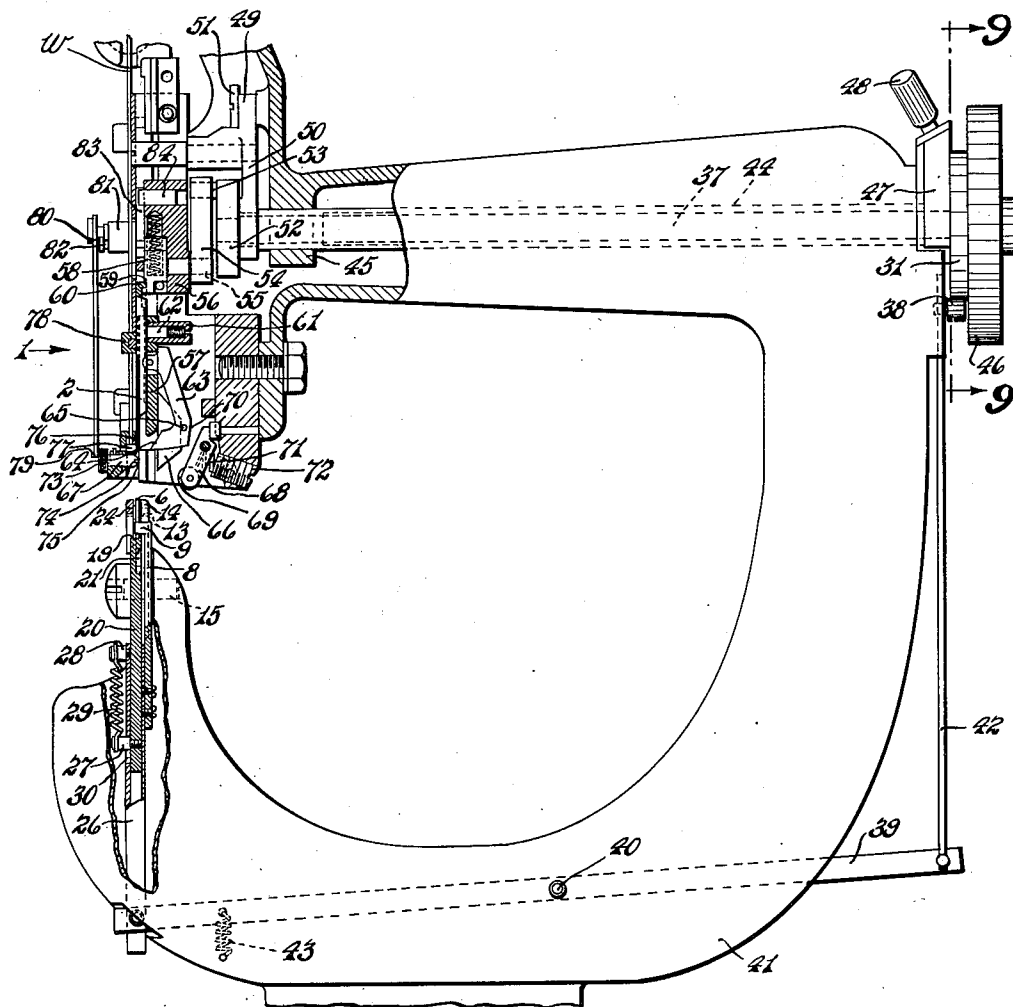
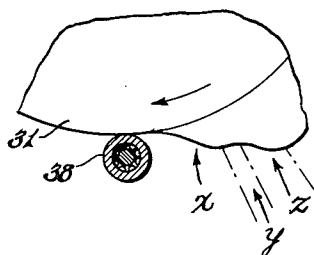


Fig. 9.



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WIRE STITCHING APPARATUS

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Application April 12, 1950, Serial No. 155,448

5 Claims. (Cl. 1—2)

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This invention relates to a method and apparatus for setting a wire staple to fasten together two pieces of relatively limp flexible material which have been placed together in superimposed relation and a staple driven through them as by a wire stitching machine.

An object of the invention is to provide by the method and apparatus disclosed a new set for a wire staple which will hold the portions of the superimposed materials between the ends of the set staple in flexed relation so as to shelter the tip ends of the rebent portions of the wire. Thus, the staple is protected against accidental separation from the materials by one of the wire ends being worked loose on contact with an adjacent surface.

A more particular object is to provide for the efficient stapling of a removable paper ticket to an article of laundry so as to identify each individual item of a bundle of laundry before placing the bundle in laundry washing and processing machines and to set the staple so as to prevent loss of the ticket.

Another object of the invention is to provide apparatus for forming and setting a light-gauge readily deformable wire staple so as to firmly fasten the paper ticket to the cloth of an article of laundry and yet permit the same to be easily removed without damage to the item after the ticket has served its purpose.

The invention as herein disclosed is described with reference to the operative parts of a wire stitching machine such as is manufactured by the Boston Wire Stitcher Company and known as its "No. 2 Wire Stitcher." A machine of this type and the relationship of its parts to the present disclosure may be seen in patent to McClure, No. 1,983,384, dated December 4, 1934. It will be apparent, however, that the invention may be practiced in connection with other stitching and staple forming machines.

In the drawings:

Fig. 1 is a fragmentary front elevation of a staple forming and setting apparatus embodying the invention;

Fig. 2 is a similar fragmentary view showing the driver of the apparatus advanced to an initial position in the staple setting operation;

Fig. 3 is a similar view showing the parts moved to set the wire to staple form;

Fig. 4 is a similar view to show the parts in a final stage of operation;

Fig. 5 is a longitudinal section on line 5—5 of Fig. 1 showing the relationship of parts in the assembly;

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Fig. 6 is an end view of a portion of the assembly on line 6—6 of Fig. 1;

Fig. 7 is an enlarged view of a staple to show its special utility;

Fig. 8 is a side elevation of a wire stitching or stapler machine showing the relationship of operating parts and embodying the invention with parts broken away to show the stitcher head and staple setting mechanism in vertical section; and

Fig. 9 is a fragmentary section on line 9—9 of Fig. 8.

As shown by the drawings (Figs. 1—6), the operative parts of the staple setting apparatus consist generally of two oppositely positioned shaping members having elements adapted to be moved toward one another to set a light-gauge wire staple, as will be described. It will be understood that the parts shown and described here in detail are adapted to be mounted upon a frame and to be actuated by the usual driving means of an automatic wire stitching machine such as the Boston Wire Stitcher above noted and shown by Fig. 8. The operation thereof is well understood by those skilled in the art. A driver head mechanism, indicated generally at 1, provides a means by which a length of wire for a staple may be cut from an indefinite spool supply and delivered as a U-shaped piece into wire seats of a driver 2.

For purposes of practicing the invention, it will be obvious that the parts represented by the drawings may be moved by other means than that described for their operation in the aforesaid McClure patent and illustrated by Fig. 8.

In operation the driver 2, which is a flat bar having a centrally recessed lower edge face at 3 and vertically reciprocable in the head 1, shifts downwardly in the head past its position as shown by Fig. 1 so as to drive the legs 4 of the U-shaped length of wire through two pieces of material held horizontally underneath the driver. The legs are carried against grooved wire-engaging anvil edges 6 of a pair of spaced, pivotally mounted, anvil members or clincher dogs 7. When the driver 2 reaches the lowest point of its downstroke as shown by Fig. 2, the clincher dogs 7 are rocked upwardly to fold the legs into generally horizontal alignment adjacent to and substantially parallel with the intermediate portion of the wire (see Fig. 3).

As the driver 2 is reciprocated and commences its upstroke, a plunger rod 8 is driven upwardly from between the spaced inner end edges of the clincher dogs 7 to follow the driver and to hold

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the staple now partially set against the seats of the driver. It will be noted that the plunger rod has a head 9 at its upper end, offset from the shank (Fig. 5) and pointed to conform to the shape of the recess face 3. When the driver is spaced a short distance from the anvil edges of the clincher dogs 7, the plunger rod 8 then is carried upwardly of the edges 6 to overtake the driver and bend the intermediate portion of the partially set staple into the recessed driver face 3 and make it conform to the V shape thereof.

Referring now in detail to the structure and operation of the apparatus, it is seen that a U-shaped piece of wire for a staple is seated in grooved wire seats 10 at each end of the driver face. Two lateral guides 11 of the stitching machine head are slotted as at 12 to slidably hold the reciprocating driver bar 2 in its path and form as well guideways for the legs 4 of the wire piece or formed staple.

The downward motion of the driver causes the wire legs 4 to pierce the material which is to be stapled, and to engage the upper anvil edges 6 of the spaced clincher dogs 7. The clincher dogs 7 in lower position as shown by Figs. 1 and 2 are supported with their anvil edges 6 inclined downwardly and toward each other in relatively acute angular relation. Thus an angle between wire leg 4 and anvil edge 6 when the former initially engages the latter is relatively small. This makes possible the use of a very light-gauge ductile wire for the staple. As will be explained more fully it is one purpose of the invention to employ an extremely light wire. A more nearly horizontal disposition of the anvil edges 6 would tend to crumple the legs when driven against said edges to commence setting of the staple.

The dogs 7 are pivoted on pins 13 held between spaced clincher support plates 14 and an overlying cover plate 24. Plates 14 are fixed as by studs 15 to a portion of the lower frame structure (Fig. 8) of the machine.

Each dog 7 has an upper leg portion 16 and a lower leg portion 17. The upper legs 16 provide bearing points 18 by which the dogs are supported and moved upwardly by sliding engagement on the uppermost edge 19 of a clincher bar 20. The bar 20 is reciprocated, as will be later described, and as the driver 2 reaches the lowest point of its downstroke (Fig. 2), the bar 20 rises to rock dogs 7 to the position of Fig. 3. A flat staple is thus set or clinched by the linear wire engaging surfaces of the dogs. It will be noted the inner edges of the legs 16 of the dogs are in spaced relation, with the lower legs 17 rotated into a recess 21 near the top of the clincher bar 20. The arcuate upper edge of recess 21 is for reversely pivoting the dogs on the reciprocating downstroke of bar 20 by engagement against the tips of legs 17.

The overlying cover plate 24 of the assembly has a cross-piece 23 with a lower edge at 22 to provide a limit stop for the upward stroke of the bar 20 by abutment of its edge 19 against the edge at 22. The cover plate 24 overlies the clincher dogs 7 and is fixed in spaced relation to plates 14 as by the pivot pins 13.

The bar 20 is mounted in a guideway 25 of a carriage member 26 and is resiliently attached to said member by a spring-supported lost motion connection. This connection is effected by a pin 27 fixed transversely to the bar at its lower end and an anchor pin 28 on the carriage member. A spring 29 is tensioned between the two pins. The bar pin 27 is guided vertically in a

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slot 30 of the member 26 and the spring is constantly urging bar 20 to its upward position in its guideway. It will be noted that bar 20 is held in its path of movement against the dogs 7 by the inner vertical edges of plate 24 and by slidable relation between the offset heads on the frame studs at 15.

The member 26 is adapted to be vertically reciprocated in timed relation with the driver 2 as herein described by any of the usual driving connections of a machine of this type. On the stitcher machine here shown by Fig. 8 a crank arm is operated by suitable connections from a motor driven cam wheel to impart the desired motion thereto. For purposes of simplification the drawing of Fig. 1 herein diagrammatically indicates a cam disc 31 directly acting on the lower portion of the member 26 to illustrate the means for actuating that member.

In Figs. 8 and 9 the member 26 of the stitcher is vertically reciprocated in timed relation with the driver as in the above McClure patent by a crank and a cammed linkage system. A cam disc 31 fixed to a horizontal drive-shaft 37 on the machine actuates member 26 through a cam follower roller 38 and linkage between roller 38 and member 26. A lever 39 centrally pivoted on pin 40 of a lower arm of frame 41 is linked at one end to member 26 and at the other end to follower rod 42 on which roller 38 is rotatably mounted. A spring 43 pinned to the frame and lever 39 normally holds lever 39 urged to press roller 38 against cam disc 31.

Shaft 37 is journaled in a bushing 44 supported by a bearing 45 at the forward end of an upper arm of the frame casing 41 of the machine.

A motor driven flywheel or drive pulley 46 at the rear end of shaft 37 revolves freely on said shaft until a clutch 47 connects it with the shaft. Clutch 47 couples the drive pulley 46 with shaft 37 when clutch lever 48 is pressed down. As long as clutch lever 48 is held down, the clutch remains in engagement and shaft 37 and cam disc 31 continue to turn. If the clutch lever is released, the clutch is disengaged when the driver 2 is approximately at the top of its stroke.

The forward end of shaft 37 extends into the head 1 of the machine. At the rear of head 1 is a bracket 49 having a downwardly extending portion 50 which surrounds the bushing 44. Bracket 49 is fastened by screw 51 to the frame of the machine.

At the forward end of shaft 37 is a crank-disc 52 carrying an eccentrically disposed crank-pin 53. Connected to crank-pin 53 is a link 54 the lower end of which is pivotally joined to a stud 55 projecting rearwardly from a slide 56. Slide 56 constitutes the reciprocating member for actuating driver 2 to which it imparts vertical movement within head 1.

Driver 2 and a staple-former or bender bar 57 are both actuated from the slide 56. Driver 2 is connected to the slide 56 by a slidable plunger 58. In the forward side of plunger 58 is a slot 59 engaged by a key 60 at the upper end of the driver 2. The driver 2 is thus connected to the plunger 58 and the driver is normally reciprocated with the full extent of stroke of the slide 56.

The staple-former or bender bar 57 comprises an H-shaped member reciprocated by and with driver 2. A cylindrical bushing 61 having a spring pressed plunger-pin 62 slidably mounted therein is attached to the upper end of bender

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bar 57. Bender bar 57 is moved with the driver 2 by the frictional engagement of the pin 62.

Pivoted to bender bar 57 is a staple-supporter 63 having an inclined face 64 for supporting a staple as it is forced downwardly by driver 2. Staple-supporter 63 is rocked rearwardly by engagement of a pin 65 thereon with cam-shaped projections 66 on the sides of head 1. As the bender-bar descends, the staple-supporter rocks forwardly to support a staple with its legs in straddled relationship after the staple is released from a staple forming anvil 67.

Staple supporter 63 may be rocked forwardly by pivoted arms 68 carrying a roller 69 which engages a beveled face 70 on the supporter during descent of the latter. Arm 68 is urged forwardly by a spring 71 in stud 72 screwed in head 1.

Forming anvil 67 has a knurled head 73 at one end and a deep transverse groove 74 in the other end, which groove is bisected by a shallower groove 75 extending at right angles thereto. This construction is more fully shown and described in said McClure Patent No. 1,983,384.

Wire *w* is fed downwardly from a source of supply (not shown) and its lower end is caused to pass through groove 74 in the anvil 67. Anvil 67 is rotated back and forth about its axis throughout an angle of 90 degrees. At the first rotation, the wire slips from groove 74 to groove 75 where it is severed above the anvil by cutters 76 and 77. The anvil is then turned back in the opposite direction to position the severed length of wire in groove 75 to a horizontal position.

Normally the oppositely beveled end of the anvil 67 projects beneath the lower edge of the staple driver 2 with groove 74 in alignment with wire *w* which is fed down by a wire clamp or gripper 78 connected with driver 2. Anvil 67 is rotated by a crank pin 79 linked to a connecting rod 80. An eccentric hub 81 is also connected with connecting rod 80 and is pivoted on a stud 82 projecting from head 1. Rotary motion is transmitted to anvil 67 through the oscillating action of eccentric hub 81. The hub 81 is connected with a lever 83 which in turn is connected with a pin 84 in slide 56 to convert the reciprocatory motion of the slide into oscillating motion for the eccentric hub 81, all as described in detail in the aforesaid patent.

Thus, as the drive shaft 37 is rotated by engagement of the clutch 47, slide 56 is reciprocated, the driver 2 on its down stroke moving downward and feeding wire *w* into the anvil groove 74, then turning the anvil and cutting of a length of wire for a staple. Further movement of the drive shaft causes the bender-bar to descend to bend the wire to staple form and rocks the staple supporter forward to receive the staple after it is released from the anvil and to support the staple until driver 2 drives it. Timed with the staple forming and staple driving operations is the staple setting operation, the cam disc 31 and the driver 2 being given cooperating motion by the common drive shaft 37 as has been described.

Referring for simplification of the timed drive to Fig. 1 wherein the disc 31 has been numbered similarly to the disc of Figs. 8 and 9 the cam disc 31 has an eccentric portion 32 providing, through a roller engagement at 33, the controlled drive for reciprocating the member 26. As the disc 31 rotates in the direction indicated by the arrow a portion X of the cam eccentric 32 drives the member 26 and bar 20 upwardly toward the driver to pivot dogs 7 to the position of Fig. 3.

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At this point the driver 2 commences its upward stroke. The plunger rod 8, fixed centrally at the top of member 26 as by screws 34 (Fig. 5) and therefore movable with the carriage member, is driven upwardly by portion Y of the cam eccentric to follow the driver. The bar 20 is meanwhile held against upward movement by the cross piece 23 and its pin 27 rides in the slot 30 while portion Y of the cam eccentric moves the member 26 and plunger rod upwardly at the same speed as the speed of withdrawal of driver 2. Thus, the head 9 of the rod 8 holds the flat now partially set staple firmly in the seats 10 in the driver. This obviates any danger of a staple, left free by the withdrawal of the driver 2, having a tendency to pull out of the line of movement of the plunger rod and driver before the head 9 can drive and bend the clinched staple into the recess at 3.

After the driver has retreated a relatively short distance from the anvil edges 6, as to the dotted line *b* of Fig. 4, portion Z of the eccentric 32 drives the plunger rod 8 upwardly at a greater speed than the speed of withdrawal of the driver 2. The head 9 then bends the central portion of the clinched staple into the recess 3 of the driver (Fig. 4).

The staple setting operation is thus completed. Driver 2 continues upwardly, and the succeeding portion of the cam eccentric permits the lowering of member 26 to ride downwardly, thus freeing the stapled material for removal from the machine.

A consideration of the relative position of the parts, as shown by Fig. 4, will clarify the preferred operation in delaying the upthrust of the plunger rod 8 so as to delay a bending of the staple into the recess 3 until the driver 2 has been withdrawn slightly from the anvil edges 6. It will be clear that the bending operation causes the rebent ends of the staple to rotate downwardly relative to the driver 2. If sufficient clearance is not provided between the lower edge of the driver seats and the edges 6, the rebent ends of the staple will be caught between them. If the central portion is bent under these conditions and the ends are drawn horizontally, they are tightly squeezed at the reverse bend of the wire. A tightening squeeze at this point tends to clench the stapled material and may weaken and perhaps fracture the wire at said bend.

It will be noted the apparatus of the invention has a particular utility in fixing a removable identification tag on an item of laundry so that the tag will not become separated and lost in the washing and handling processes of a modern commercial laundry. Distinguishing marks have generally heretofore been provided for laundry items of permanently inked symbols on the individual items. Removable tags have the advantage of leaving a customer's laundry unmarked and of affording the laundry an opportunity to identify articles with consecutive numbers for more convenient handling.

However, wire staples as previously formed are subject to objection from the standpoint of serviceability for this use in some respect or another. If a light-gauge wire staple is clamped firmly enough to resist separation of tag and laundry piece, the latter is generally pierced in several places as by rebent staple prongs, resulting in a probability of tearing the stapled material especially on removal. A flatly shaped staple has been found to permit slippage of fabric off the wire ends. Further, the relatively

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open relation of the spaced wire ends of the usual flat staples makes it possible for the wire ends to catch and tear an adjacent cloth piece and to cause the bending open of the clinched staple prongs or legs. Furthermore, if a heavy-gauge wire staple is used to insure firm attachment of the tag on the laundry item, removal of the staple usually entails a tearing of the fabric of the laundered piece or a painstaking and time-consuming staple removing operation by a worker.

A very light gauge wire has been found satisfactory in actual commercial laundry work with the form of staple as herein described. This form of staple is easily removable from the items without tearing the cloth. At the same time it is not subject to casual separation due to catching when as shown the wire tip ends lie inside the apex of the V. With the wire ends so protected, foreign material is not caught thereby. Any adjacent object inadvertently thrust into the V will not tend to catch on the tip ends because of the mutual protection afforded in the close adjacent relationship of the tips.

It will be noted that in the staple of this invention the legs 4 are bent approximately to parallel relation without substantial stress. As shown most clearly by Fig. 7 which shows a staple as attached to hold a ticket 35 on a piece of cloth 36 this permits a slight looseness of the fabric at the area of the bend at the staple ends. Such relatively loose staple formation prevents damage to the goods by freeing the same from strain at the points where the staple prongs pass through the material, while the upward bend of the staple to V shape gives complete security to the material held in the staple.

Thus, it is seen that the new staple shape makes possible a substantial contribution to the efficiency and economy with special reference to modern commercial laundry work.

What is claimed is:

1. A wire stitching machine comprising a reciprocable driver having a recess in the face thereof, a reciprocable plunger mounted in opposite relation to the recessed portion of said driver face, clincher dogs pivoted laterally of said plunger, a clincher bar adjacent said plunger and movable against said dogs, a stop for said bar limiting movement thereof toward said driver, a resilient lost-motion connection between said bar and said plunger, and means to drive said plunger toward and away from said driver face at varying speeds and beyond the limit of movement of said clincher bar.

2. A wire stitching machine comprising a vertically reciprocable driver having a centrally recessed face, spaced anvil means pivotally mounted opposite said face, a plunger rod reciprocably movable towards and away from the central portion of said face, a slide bar to actuate said anvil means, a resilient lost-motion connection between said plunger and said slide bar, a stop to limit the approach of said slide bar toward said driver face, means to move said plunger and slide bar from a position remote from said stop to a position with said bar against said stop when said driver is at the low point of

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its stroke, means to move said plunger from said last-named position toward said driver at the driver speed in commencing its upward stroke, means to move said plunger toward said driver at a speed greater than said driver after the latter has commenced its upward stroke and means to permit return of said plunger away from said driver after said plunger has engaged the central recess of said driver face.

3. A wire stitching machine comprising relatively movable driver and anvil members, said anvil members having linear wire-engaging faces for bending the legs of a U-shaped wire toward each other and into substantial parallelism with the intermediate portion of the wire, anvil driving means engageable with said anvil members to move the latter towards said movable driver, a stop limiting movement of said anvil driving means, and reciprocable bending means movable towards the driver and the intermediate portion of a staple set by said driver and anvil members, said bending means extending beyond the limit of movement of the anvil members towards the center of said driver and bending said staple into V-shape with the ends of the wire lying within the angle of the V.

4. A wire stitching machine comprising a reciprocable driver having a recess in the face thereof, a reciprocable plunger movable toward and away from said recessed face, clinchers pivotally mounted for movement toward and away from said driver and laterally of the path of said plunger, a clincher bar movable against said clinchers, stop means for said bar limiting movement thereof and movement of said clinchers towards said driver, and means to drive said plunger towards said driver, said plunger in extended position lying beyond the limit of movement of said clinchers and against the recess of said driver face.

5. A wire stitching machine comprising a reciprocable driver having a recess in the face thereof, a reciprocable plunger mounted in opposite relation to the recessed portion of said driver face, clincher dogs pivoted laterally of the path of said plunger, a clincher bar engageable with said dogs to move the same toward the driver, said bar being mounted in slidable engagement with said plunger, means to limit movement of said bar, and means to drive said plunger beyond the limit of movement of said clincher dogs and against the recess of said driver.

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