This invention relates in general to the attachment of tearing strip keys to can ends, and has more particular reference to the direct feeding of flattened keys to can ends, eliminating stacking and extra handling of the formed keys.

Instead of flattening the keys and stacking them for separate or subsequent application to can ends, as has been the practice, it saves time and handling to feed the keys directly from the flattening device to can ends to which they are attached.

An important object of the invention is, therefore, the provision of mechanism for magazine feeding of key blanks and can ends, and for flattening the blanks and delivering them directly to can ends to which they are spot welded.

A further important object of the invention is the provision of improved feeding mechanism whereby the keys are firmly held, positively fed, and loosely deposited upon can ends in succession, and discharged automatically with the can ends to which they are spot welded by the positioning of the next can end to receive its key.

Numerous other objects of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

In the drawings:

Figure 1 is a sectional view of a key feeding and welding apparatus constructed in accordance with the principles of this invention;

Figure 2 is a sectional detail of the can end feeding apparatus;

Figure 3 is a sectional plan view illustrating the apparatus; and

Figure 4 is an extension of the can end feeding mechanism, Figures 3 and 4 taken together illustrating the operation of a can end cutout blade.

This invention relates particularly to the attachment of a slotted key to a tearing strip can or container, the problem being to prevent the unintentional displacement of the key from the container but permitting the removal of the key from the container without tearing the can prior to its intended operation with the tearing strip. The most satisfactory key is one provided with weakened parts welded or otherwise attached to a can cover which permits removal of the main portion of the key by tearing it away from the welded portion and without disrupting the can cover surface in doing this.

This apparatus is an improvement upon that disclosed in my prior application, Serial No. 89,534, in which tearing strip keys of this kind are automatically stacked from a promiscuous mass, fed to a flattening die and automatically restacked, the present improvement consisting particularly in the substitution of can end feeding mechanism and spot welding mechanism for attaching the keys to the can covers.

Referring more particularly to the drawings: the numeral 11 designates generally the bed plate of a press-like frame supported upon legs 12 having vertical guide ways 13 in which a crosshead 14 is movable for die or punching operations.

At one side of the bed plate is a stacker for key blanks 15 comprising a pair of casings 16 and 17 which provide a recess 18 for receiving the heads of the keys 15 loosely therein, the heads being previously collected and threaded upon a rod 19 which fits loosely within the head of the key blanks. This rod has a lower bevelled end 20 and the lower ends of the casings 16 and 17 are cut away at 21 to permit the key blanks 15 to be withdrawn from the bottom of the stack one at a time, the rod 19 rising to permit the keys to slip past the bevelled end 20.

After passing from the stacking station, a key blank is brought to rest at a flattening station under the crosshead 14 of the press. A punch block 22 is carried by a plate 23 movable with the crosshead 14 and in the block 22 are die members to engage a key blank brought to rest upon a die plate 24 inserted in the bed plate 11 below the crosshead 14.

In the block 22 are chambers 25 and 26 and die pins 27 and 28 project through the block with enlarged heads extending into the chambers 25 and 26 and springs 29 are disposed in the chambers bearing against the plate 23 and the inner end of the pins tending to project the pins from the underside of the block 22. A side plate 30 also normally projects from the face of the
block 22 under the pressure of a spring 31 and the lower end of the plate engages the lower end of a key blank 15 positioned upon the die plate 24. The lower end of the pin 27 is formed with a reduced extremity 32 for coiling over the head of the key blank 15, in order positively to center the key in proper position on the die plate 24. Immediately following the centering of the key, a pivoted foot 33 carried by the other spring-pressed die pin 28 engages the central shank of the key 15 and holds it in fixed position.

With the key thus positively centered and firmly held in position upon the die plate 24, further downward movement of the crosshead 14 carries a flattening punch 34 into contact with the extremity of the key 15 in position thereunder and flattens this extremity against the upper face of a hardened steel die member 35 fixed in the die plate 24, the punching movement forming one or more projections or tite 36 in the flattened portion of the key and producing a weakened break-off place.

After this punching operation is complete, the punch block 22 is raised by the crosshead, thus releasing the key which is then free to be moved to the next station where it is spot welded to a can end 36. The means for moving the keys 15 from one station to another comprises a slide 37 movable transversely in the bed plate 11 and having inclined sides 38 for retaining the slide in the guideway 39. A pair of spring-pressed feed dogs 40 and 41 are carried by the slide, the first being pivoted directly on the slide and having a spring 42 tending to press it in key engaging position and a fixed stop 43 on the slide to limit its movement in this direction. The other feed dog 41 is pivotally mounted in a bracket 44 secured to and projecting from the end of the slide 37 and having a spring 45 tending to press the dog into key engaging position with a shoulder 46 on the bracket to limit the movement of the feed dog in this direction.

A spring-pressed plate 47 extends transversely of the bed plate 11 and parallel with the slide 37 and has a shoulder 48 substantially in alignment with the side of the key holding recess 18 away from the slide 37, so that a key engaged by the dog 40 at the bottom of the feeding stack is moved against the shoulder 48 of the plate 47 into a die engaging position and is engaged by the dog 41 to move the formed key from the die position to the spot welding position. This plate 47 may be held in place by fastening 49, one or more of which is encircled by the coil spring 60, thus yieldingly engaging and retaining the keys 15 in position and the dog 41 moving the keys along under the plate in engagement with the shoulder 48.

At the end of the plate 47, in the spot welding position, is a shoulder 51 which limits the movement of a key 15 in this direction, the key falling, when moved by the dog 41 against the shoulder, upon a can end 36 previously positioned for receiving the key as hereinafter described.

In order to move the slide 37 there is a reciprocating lever or arm 52 pivotally connected at its lower end to a rod 53, the other end of which is pivoted in lugs 54 projecting from the slide 37. The timed movement of the arm 52 causes a corresponding feeding movement of the slide 37 to advance the key blanks step by step by the action of feed dogs 40 and 41.

At right angles to the movement of the keys 15 is a shallow passage or channel 55 in the bed plate 11 for receiving can ends 56, the keys being movable directly over the upper edges of the can ends into spot welding position upon the ends. The bed plate 11 is also recessed to receive an operating slide 56 with its upper face at or below the level of the guideway or channel 55, and this slide carries a spring-pressed feeding dog 57 mounted in a recess therein and engaged by a spring 58 for feeding the lowermost can end 36 from a stack of such blanks, the blanks being held in a magazine of proper size and shape to contain them, comprising an upright rods 59 inserted in a ring or plate 60 at the top of the bed plate 11.

The feeding slide 56 is reciprocated in any suitable manner as by means of an operating lever or arm 61 having a pivotally connecting link 62 between one end thereof and attached to a lug 63 projecting from the under side of the slide 56 as shown more clearly in Fig. 2.

In its reverse movement the feeding dog 57 slides under the lowermost can end 36 and as the can covers are fed from the stacked position the lowermost one is separated from the stack and the upper portion of the stack is partially supported by a single cutout blade 64 operated from one side of the stack by means of a lever 65 positively connected to the blade 64 and having a fixed pivot pin 66 adjacent the slide 56 with a contact roller 67 adapted to engage a cam surface 68 on the side of the slide 56 to move the blade 64 inwardly when the slide 56 feeds the lowermost can end forwardly into the spot welding position.

The spot welder comprises an electrode 69 located in a recess 70 in the bed plate 11 below and substantially level with the lower surface of the can end channel 55, so that a can end disposed in the spot welding position will directly engage the upper surface of this electrode. The upper electrode 71 is adjustably mounted at the end of a lever arm 72 with one or more conductors 73 extending from the electrode.
the other end of the lever being bifurcated and the extremities 74 thereof spaced apart and pivoted upon a cross-shaft 75. A lever 76 is also pivoted on the shaft 75 between the ends 74 of the lever 72 and one end has pivoted thereto a bolt 77 which extends through an opening 78 in the lever 72 intermediate its ends with a spring 79 surrounding the bolt above the lever 72 and having a bearing collar 80 engaged by one end of the spring and pressed against the upper side of the lever 72 and a nut 81 engaging the other end of the spring and adjustable upon the bolt to vary the tension of the spring.

Also carried by the lever 72 is a limiting device comprising a bolt 82 threaded through the lever and projecting from the under side in position to engage a fixed stop 83 secured to the bed plate 11 and projecting into the path of the lower end of the bolt 82 so as to limit the movement of the upper electrode 71 carried by the arm 72, the flexible connection between the levers 72 and 76 causing the upper electrode to press the key to the can end during the welding operation.

The operating lever 76 is positively driven in timed relation to the other parts by means of a circular cam 84 mounted on a shaft 85 upon which is also a driving sprocket 86 for operating the cam. The adjacent end of lever 76 carries a roller 87 for engaging an internal cam groove 88 in the cam 84 so that when the lever 76 is operated thereby the lever 72 is pressed downwardly through the intermediary of the resilient connection between the levers to bring the positive electrode 71 in welding engagement with a key 15 disposed thereunder.

A step by step action is thus performed in which the keys are fed from the bottom of a stack to the die flattening station; the keys are first firmly engaged and then are flattened to form an easily severable portion with reduced contact tils; the formed keys engaged by the spring-pressed plate and feeding dog 41 are then moved in succession to the spot welding position where the keys drop by gravity upon can ends fed intermittently from the bottom of a stack of can ends at right angles to the direction of movement of the keys. A single key falls on each can end and a movable contact of a spot welder is applied to the key, pressing it against the can end and welding it by means of the reduced contact tils to the can end. The welding operation is continued for a short time depending upon the dwell of the cam 88; the upper electrode is then lifted and the movement of the next can end 36 into position causes the discharging movement of the spot welded can end from the opposite end of the channel 55.

The operation is entirely automatic and mechanical and although the actions are performed intermittently, they are progressive, positively completing the desired operation.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In an apparatus of the character described, means for feeding can strip tearing keys in succession, apparatus for feeding can ends at an angle to and below the key feeding means, and spot welding means movable to engage and weld a key on a can end.

2. In an apparatus of the character described, the combination with means for intermittently feeding can strip tearing keys one at a time, means including a channel at an angle to and below the feeding path of the keys for feeding can ends in a position to engage the keys, and spot welding means having a contact movable to engage a key deposited on a can end to weld it thereto.

3. In an apparatus for welding strip tearing keys to can ends, the combination with a spot welder having a contact movable intermittently in a vertical direction, means for feeding can ends in succession below the movable contact, and key feeding means for moving keys one at a time at an angle to the movement of the can ends and for depositing such keys upon the can ends and below the spot welder.

4. In an apparatus for automatically spot welding strip tearing keys to can ends, the combination with means for holding a stack of keys and means for holding a stack of can ends, of feeding apparatus for the can ends and keys adapted to feed them one at a time in paths at an angle to each other and to deposit a key upon each can end, and spot welding means for engaging a key upon each can end and welding it thereto.

5. In an apparatus for automatically welding strip tearing keys to can ends, the combination with means for feeding can ends and keys one at a time and depositing a key upon each can end, and spot welding mechanism below which a key and can are positioned having a movable electrode to engage the key and to weld it to the can end.

6. In an apparatus for automatically attaching tearing keys to can ends, the combination of means for supporting a stack of can ends and a stack of keys, of separate feeding means for intermittently feeding the lowermost can end and key in paths at an
angle to each other and for depositing a key upon each can end, and spot welding means movable to receive a can end and key in position thereunder and to engage the key upon the can end for welding it thereto.

7. In an apparatus of the class described, a can end feeding mechanism, a tearing key feeding mechanism including spring-pressed means for engaging the key during its feeding operation, each key dropping freely upon a can end at the end of its feeding movement, and spot welding means for engaging a key upon a can end for welding it thereto.

8. In an apparatus for welding keys to can ends, the combination with a spot welder, having a vertically movable spring-pressed electrode, of means for feeding can ends in succession below the electrode, means for feeding keys in succession upon can ends below the electrode, said feeding means including a spring-pressed plate which engages the key through a portion of its feeding operation but allows the key to drop by gravity upon the can end below the electrode.

9. In a key welding apparatus, the combination with a vertically movable spring-pressed contact member, of means for feeding can ends in succession thereunder, and means for feeding keys at an angle to and above the path of the can ends, said feeding means including a spring-pressed plate with a shoulder to limit the movement of each key and to cause it to drop upon a can end below the electrode which yieldingly engages it and welds it to a can end.

10. In an apparatus for welding keys to can ends, the combination with means for feeding can ends one at a time, means for feeding keys and depositing them upon the can ends, of means for stamping the keys to provide welding projections during its feeding movement, and a spot welder for engaging a key deposited upon a can end and attaching it thereto by the welding projections formed on the key.

11. In a key welding apparatus, a movable welding electrode, means for feeding can ends one at a time below the electrode, means for feeding keys one at a time and depositing them upon the can ends below the electrode, and stamping means for engaging the keys in their feeding movement to provide welding protuberances thereon, the keys being deposited so that the protuberances are disposed beneath the electrode for attachment directly to the can end.

12. The combination with can end and key feeding means operable at an angle to each other for depositing a formed key upon each can end, and a welding mechanism including a movable electrode to yieldingly engage a key upon a can end and positive means for applying the electrode, there being a yielding connection between said positive means and the electrode to permit a yielding movement of the latter.

13. In an apparatus for welding keys to can ends, means for positioning can ends in succession, a stack holder and a flattening die for tearing strip keys, and means for feeding a key directly from the stack to the flattening die and thence to a positioned can end.

14. In an apparatus for welding keys to can ends, a magazine feeder for can ends, a magazine holder and a flattening die for tearing strip keys, means for feeding a key from the holder to the die and then directly depositing it upon a can end, and spot welding means for attaching a key to a can end upon which it is deposited.

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