

July 10, 1951

N. H. SWANSON

2,559,904

APPARATUS FOR CRIMPING CONDENSER CANS HAVING LEADS

Filed Dec. 8, 1948

4 Sheets-Sheet 1

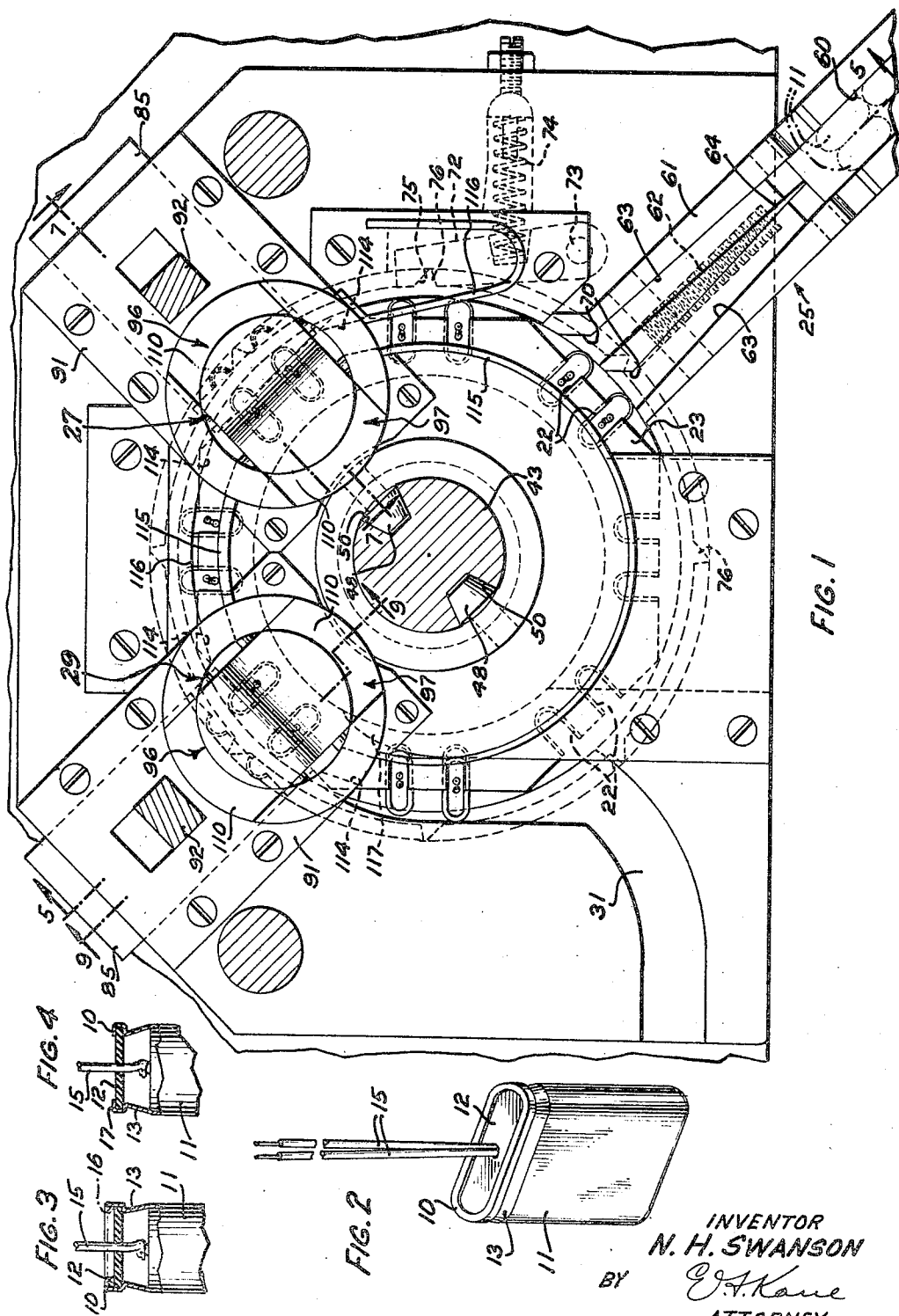


FIG. 3

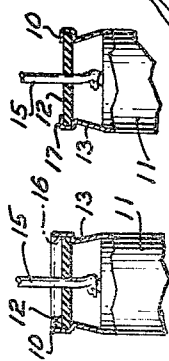
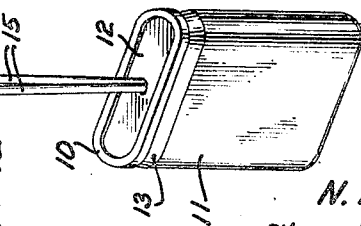


FIG. 2



INVENTOR
N. H. SWANSON
BY
V. F. Kaul
ATTORNEY

July 10, 1951

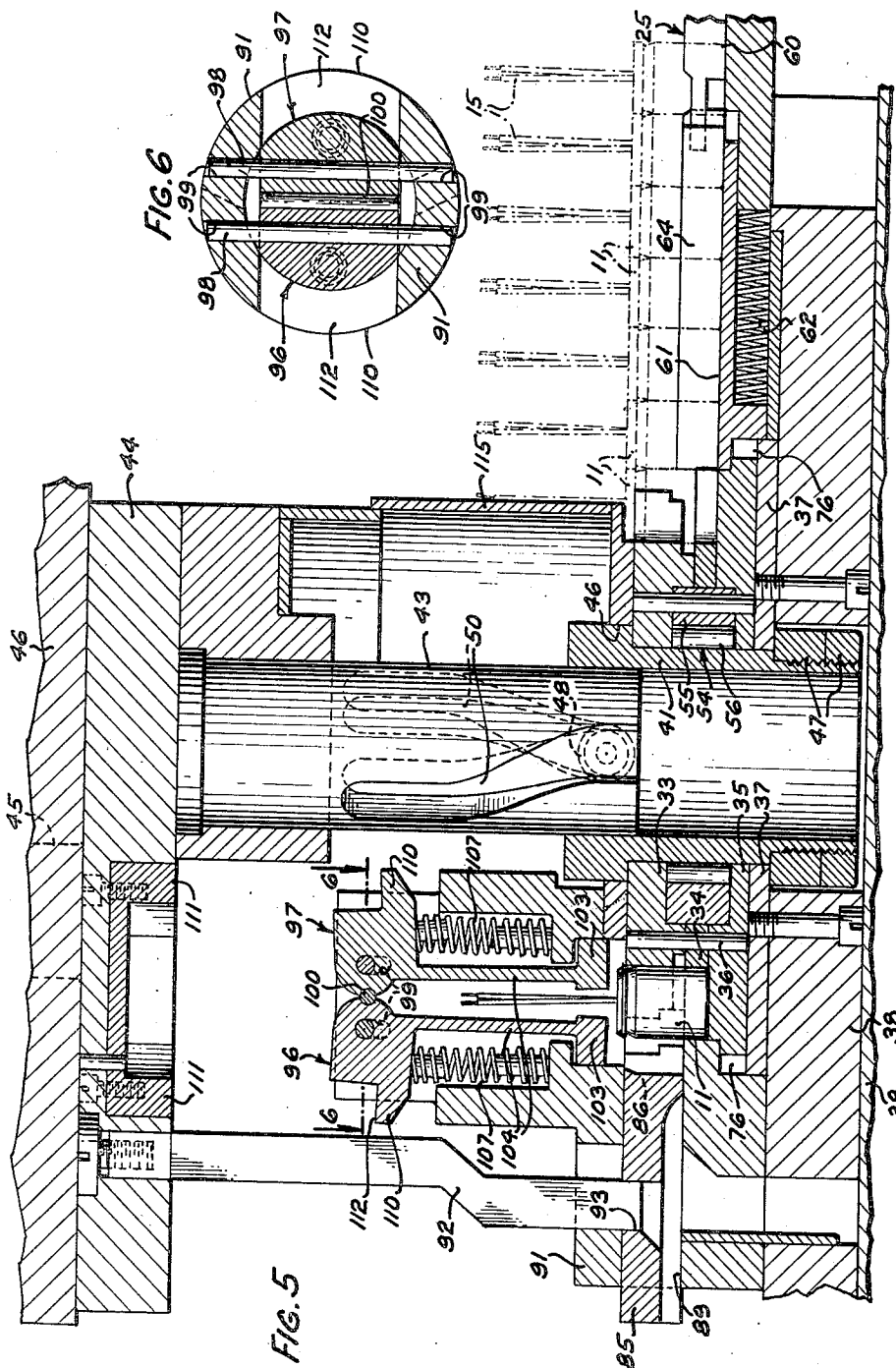
N. H. SWANSON

2,559,904

APPARATUS FOR CRIMPING CONDENSER CANS HAVING LEADS

Filed Dec. 8, 1948

4 Sheets-Sheet 2



July 10, 1951

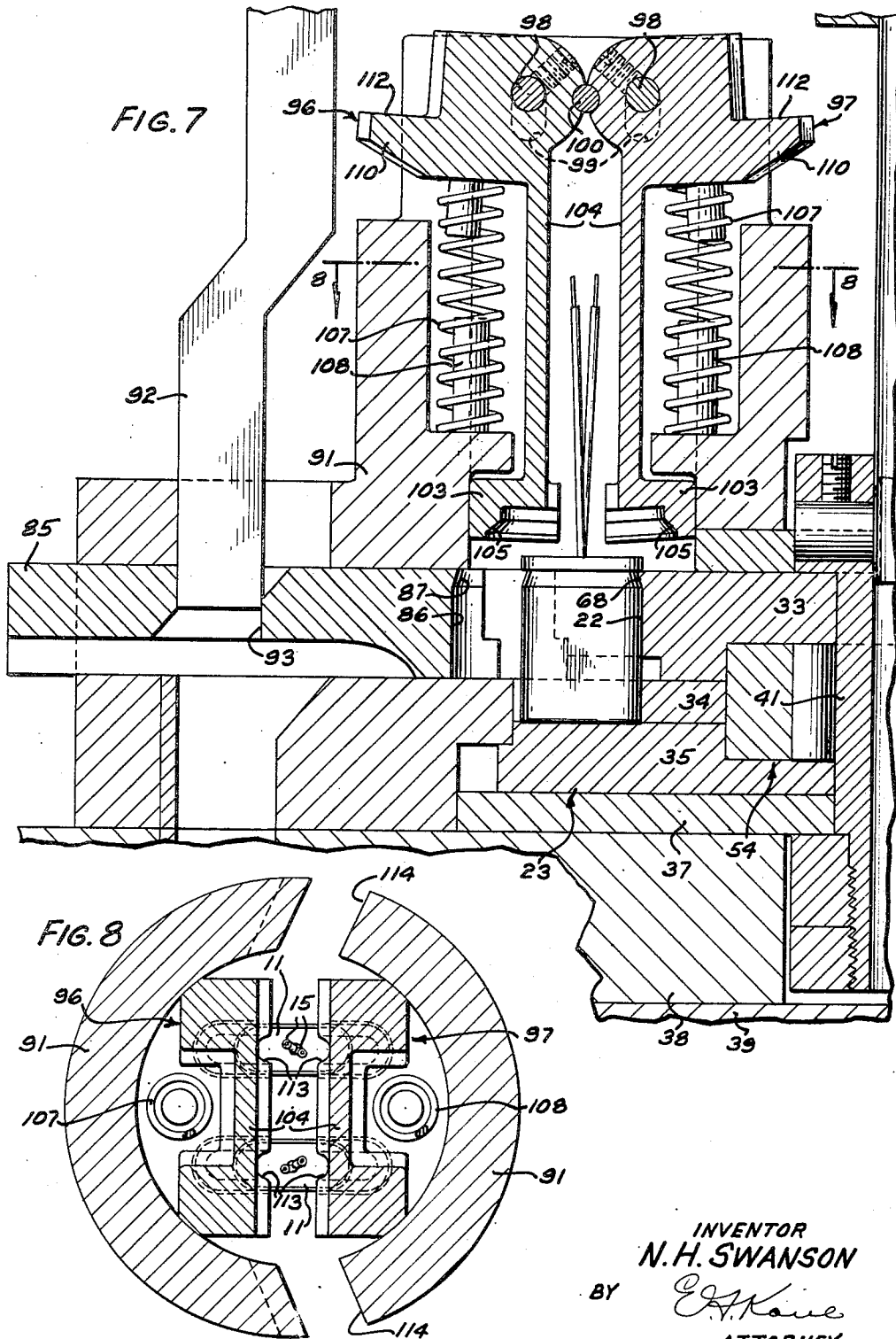
N. H. SWANSON

2,559,904

APPARATUS FOR CRIMPING CONDENSER CANS HAVING LEADS

Filed Dec. 8, 1948

4 Sheets-Sheet 3



July 10, 1951

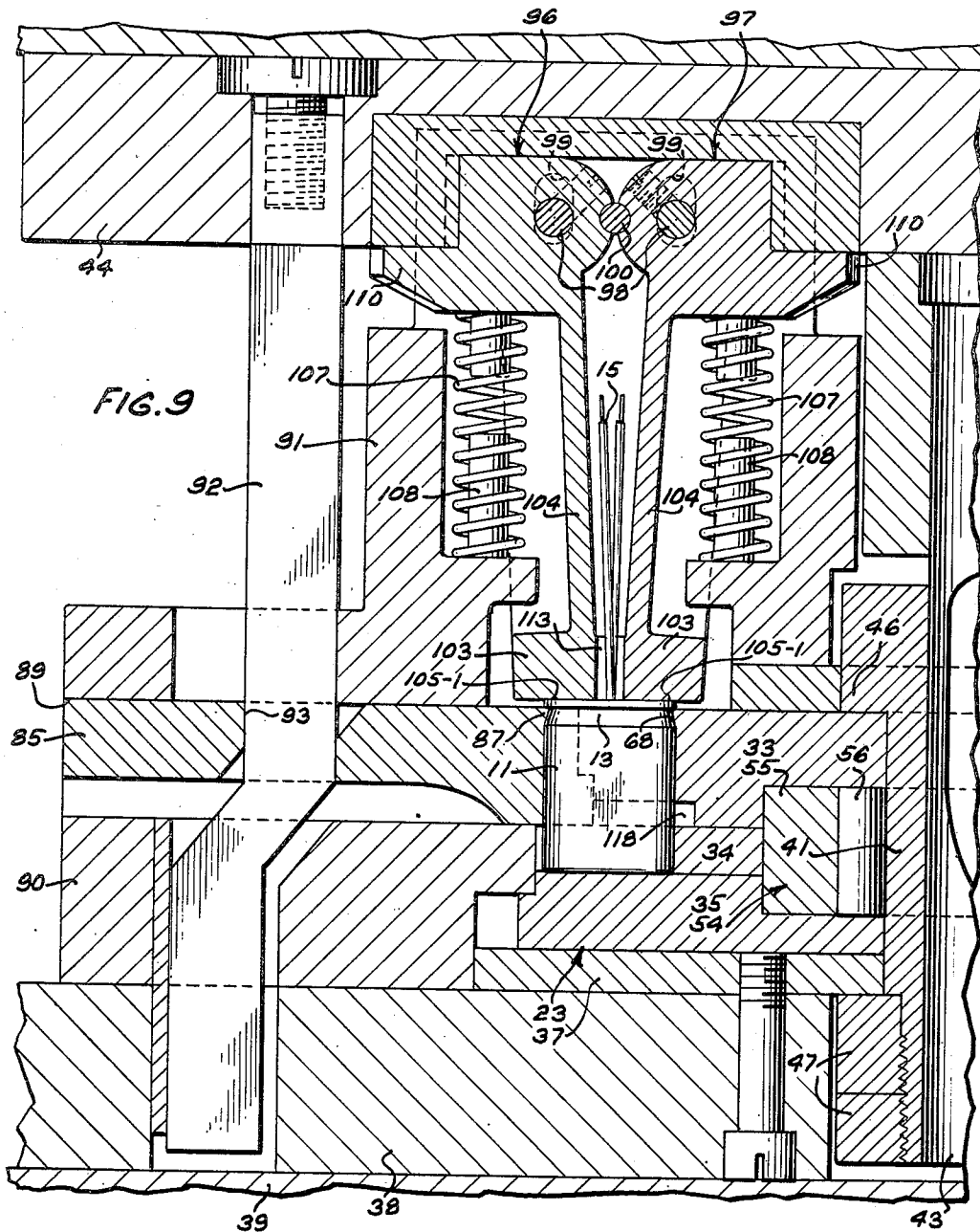
N. H. SWANSON

2,559,904

APPARATUS FOR CRIMPING CONDENSER CANS HAVING LEADS

Filed Dec. 8, 1948

4 Sheets-Sheet 4



INVENTOR
N. H. SWANSON
BY *E. F. Kane*
ATTORNEY

UNITED STATES PATENT OFFICE

2,559,904

APPARATUS FOR CRIMPING CONDENSER
CANS HAVING LEADS

Nils H. Swanson, La Grange, Ill., assignor to
Western Electric Company, Incorporated, New
York, N. Y., a corporation of New York

Application December 8, 1948, Serial No. 64,078

5 Claims. (Cl. 113—18)

1

This invention relates to apparatus for crimping articles and more particularly to a press-operated punch and die for crimping the edges of condenser cans having electrical leads extending outwardly from one end thereof.

It is an object of the present invention to provide an improved reciprocatory apparatus for crimping the ends of articles having parts extending from an end thereof.

In one embodiment of the invention, the apparatus is mounted on a punch press and actuated by the ram thereof and condenser cans having electrical leads extending from one end thereof are positioned in supporting recesses in a dial or feed table, which is indexed step by step in response to the reciprocation of the ram to carry the cans through two crimping stations, where the edges of the cans are crimped in two operations—the first station acting to crimp the edge of the can approximately 45°, and the second crimping station acting to complete the crimping operation. At each crimping station there is a pair of pivoted crimping die members mounted for limited vertical and pivotal movement and yieldingly held in their upper and separated positions above and on opposite sides of the path of movement of the can to permit the cans and the leads to be moved into alignment therewith, after which the ram actuates the die members to first rock them about their pivots to their closed position above the can and then move them downwardly into engagement with the can to crimp the edges thereof. The crimped cans, upon further rotation of the feed table, are then ejected from the apparatus.

Other objects and advantages of the apparatus will be apparent by reference to the following description thereof and the accompanying drawings illustrating a preferred embodiment thereof, wherein

Fig. 1 is a plan sectional view of the crimping apparatus;

Fig. 2 is a view in perspective of a condenser can of the type processed in the crimping apparatus illustrated herein and having a pair of relatively long leads extending from one end thereof;

Figs. 3 and 4 are detail views showing a portion of the can and the upper edges thereof before and after being crimped;

2

Fig. 5 is a vertical sectional view of the apparatus taken on the line 5—5 of Fig. 1 showing the ram of the press and the movable parts of the apparatus in their raised or inoperative position;

Fig. 6 is a fragmentary plan sectional view of a portion of one of the crimping dies taken on the line 6—6 of Fig. 5;

Fig. 7 is an enlarged vertical fragmentary sectional view through the punch and die at the first crimping station taken on the line 7—7 of Fig. 1 and showing the parts in their upper or inoperative position;

Fig. 8 is a fragmentary plan sectional view of a portion of the crimping dies taken on the line 8—8 of Fig. 7; and

Fig. 9 is an enlarged fragmentary vertical sectional view of the apparatus at the second crimping station and showing the dies and other movable parts in their lower or operative position.

The apparatus disclosed herein is designed to crimp the edges 10 of a condenser can 11 (Figs. 1, 2 and 3) against the closure member 12, which seats on a shoulder formed by an inwardly extending groove 13 adjacent the open end of the can and serves to close the can and seal the contents therein. Extending outwardly from the end of the can through apertures in the closure member 12 is a pair of relatively long leads 15, which are connected to the condenser in the can 11. The crimping of the ends 10 of the can is accomplished in two operations—the first operation bending the edges inwardly approximately 45°, as indicated in dotted lines, at 16 in Fig. 3, and the second operation further crimping the edges into engagement with the face of the closure member 12, as indicated at 17 in Figs. 2 and 4.

The crimping apparatus, which is adapted to be mounted on the punch press and actuated by the ram thereof, is designed simultaneously to crimp the cans in pairs, although obviously it may be designed to crimp one or more cans at a time. The cans 11 are fed a pair at a time into recesses 22—22 in the periphery of a dial or feed table 23 (Figs. 1 and 5) through a feed chute 25, and the dial 23, indexed in response to the reciprocation of the ram of the press, advances the cans carried thereby to a crimping station 27 (Fig. 1), where the top edge 10 of the cans is bent inwardly 45°, after which the cans

are advanced by the dial to the crimping station 29, where the edges 10 are crimped to their final position in engagement with the cover plate 12, after which the cans, with their ends completely crimped, are ejected from the apparatus through a discharge chute or groove 31 upon further rotation of the dial. The dial 23 (Figs. 5, 7 and 9), which is a composite structure comprising the annular discs 33, 34 and 35 suitably secured together, as with dowel pins 36, is rotatably supported on a plate 37, which is secured to a bolster plate 38 of the apparatus. A bed 39 of the press, on which the bolster plate 38 is suitably secured, supports a portion of the crimping apparatus.

Telescopically mounted in the central aperture of the dial 23 is a sleeve 41, which, in turn, telescopically receives within its bore a cylindrical cam member 43 depending from and secured to a punch holder 44 of the crimping apparatus. The punch holder 44 has an upwardly extending shank 45, by means of which it is secured to the ram 46 of the punch press, so that as the ram reciprocates, the punch holder and the parts carried thereby are reciprocated therewith. The sleeve 41 has a shoulder 46 engaging the disc 33 and a shoulder formed by the threaded collars 47 engaging the plate 37 and is supported for rotation and against axial movement by the dial 23 and the plate 37. A pair of diametrically opposed cam rollers 48—49 extend inwardly from the sleeve 41 into engagement with a pair of cam grooves 50—51 formed in the cam member 43 and cooperates with the cam grooves to impart an oscillating movement to the sleeve in response to the reciprocation of the cam member 43 by the ram 46. The sleeve 41 forms a driving element of a one-way clutch 54, which serves to impart step by step rotation in one direction to the dial 23 to index the dial and advance the cans 11 through a predetermined path of travel in the crimping apparatus. The one-way clutch, which may be of a common or well-known variety, includes a cam ring 55 pinned to the dial 23 and having a plurality of inwardly directed cam surfaces thereon and a plurality of rollers 56 yieldingly held against the outer peripheral surface of the sleeve 41 and the inner cam surfaces of the ring 55.

The feed chute 25 (Figs. 1 and 5), which has a central guide slot 60 therein adapted to receive two rows of cans positioned side by side, is provided adjacent the dial 23 with a movable section 61 slidably mounted on the chute 25 and yieldingly urged toward the dial by a compression spring 62. A pair of diverging slots or grooves 63—64, separated by a V-shaped partition 64, are provided in the movable section 61 of the feed chute and serve to separate the cans in the two rows and guide them into the spaced recesses 22—22 in the dial 23.

V-shaped shoulders 68—69 (Figs. 5, 7 and 9), conforming in cross-section to the shape of the groove 13 in the can 11, are formed on the upper edges of the recesses 22 of the dial 23 and are adapted to fit into the groove 13 of the cans and support the cans positioned on the dial. The cans 11, when applied to the dial, have a portion extending radially outwardly beyond the edge of the dial. The projecting ends of the cans 11 engage inclined surfaces 70—70 (Fig. 1) on the movable section 61 of the feed chute 25 and cam the section 61 outwardly from the dial as the cans are carried from the loading station to the next station. A locking pawl 72 (Fig. 1), pivoted at 73 and stressed toward the dial 23 by a spring 74, has a notch 75 for receiving successive ones of

a plurality of teeth 75 formed on the periphery of the disc 34 of the dial to lock the dial 23 against reverse rotary movement during the downstroke of the ram.

The construction and operation of the crimping mechanism at stations 27 and 29 are identical, except for the angular position of the crimping forming surface thereon and only one station will be described in detail, the same reference numerals applying to the same parts of both structures. To support the portion of the can 11 projecting beyond the periphery of the dial 23, a slide member 85 (Figs. 1, 5, 7 and 9) is mounted for radial movement into abutting relation with the edge of the dial 23 and is provided with a pair of recesses 86 for receiving the projecting portions of the cans 11. The recesses 86, at their upper surface, are provided with V-shaped shoulders 87 engageable in the grooves 13 of the can to support against vertical movement the portions of the cans projecting beyond the dial 23. Reciprocably mounted in a slideway 89 formed in a supporting block 90 and a housing member 91, the slide 85 is reciprocated by a cam member 92 engaging in a cam aperture 93 in the slide 85 and secured to and movable with the punch holder 44. The housing member 91 is formed with an upwardly extending hollow portion, circular in cross section, for receiving and supporting a pair of crimping dies 96—97.

The crimping dies 96 and 97 are mounted for limited vertical and pivotal movements and have supporting pins 98—99 passing through apertures in the die members and with the ends thereof forming trunnions engaging in vertical slots 99—99 in the walls of the housing 91. A pin 100, positioned parallel to the supporting pins 98—99 in grooves formed in the die members 96 and 97, serves to pivotally connect the two die members for simultaneous oscillation in opposite directions about the axes of their respective supporting pins 98. The dies 96 and 97 are provided with heads 103 formed on the lower ends of elongated shank or wall portions 104 extending downwardly from the pivot pins 98 and have crimping surfaces 105 on the lower surface of the heads engageable with the cans 11 for crimping the edges 10 thereof. Compression springs 107—107, mounted on the pins 108—108 in the housing 91, engage laterally extending portions or arms 110—110 of the dies 96—97 and serve to move the dies upwardly to their upper position (Figs. 5 and 7) and to rock them about the axes of their supporting pins 98—98, thereby moving the heads of the dies vertically above the cans 11 and laterally away from each other.

Abutment surfaces 111 on the punch holder 44 (Fig. 5) are adapted to engage shoulders 112 (Fig. 7) on the laterally extending portions 110 of the dies 96 and 97 on the downward movement of the ram and cause the dies 96—97 first to rock about the axes of the pins 98 to move the heads 103 together in abutting relation and aligned vertically with respect to the cans 11 therebeneath and then to impart vertical downward movement to the dies 96 and 97 and move the crimping surfaces 105 into engagement with the edges 10 of the can 11 and bend them inwardly. The heads 103 of the dies are provided at their meeting surfaces with vertical grooves 113 (Fig. 8), which cooperate to form apertures providing clearance for the leads 15 extending upwardly from the cans 11. The shank or wall portions 104 of the dies 96 and 97 are also spaced apart to provide clearance for the leads 15, and

5

the heads 103, when the dies are in their upper or inoperative position, are spaced apart to provide clearance between them for arcuate feeding movement of the leads 15. Clearance slots 114 in the opposite walls of the housing 91 and a guideway formed by the radially spaced inner and outer vertical guide members 115 and 116, respectively, positioned in advance of the station 27 and between the stations 27 and 29, provide a passageway for the upstanding leads 15 of the cans 11 as they are advanced in a circular path through the crimping apparatus.

After being partially crimped in the crimping station 27, the cans are advanced in two increments of movement to the crimping station 29 where the crimping or forming surfaces 105—1 on the heads 103 of the dies 96 and 97 (Fig. 9) bend or crimp the edges 10 of the can into horizontal position in engagement with the upper surface of the closure 12 to complete the crimping operation. As the cans 11 are advanced from the crimping station 29, a curved cam member 117, suitably mounted on the supporting member 99 and extending into the space 118 between the discs 33 and 34 of the dial 23, serves to cam the crimped cans 11 radially outwardly from the recesses or holders 22 of the dial 23. The cans thus ejected from the recesses of the dial 23 are guided for movement in a discharge groove 31 formed in the supporting member 90.

In the operation of the crimping apparatus, a pair of cans 11 positioned side by side are placed in the groove 66 of the feed chute 25 and moved manually toward the dial 23 into engagement with the endmost of the two rows of cans positioned therein and thereby cause the foremost pair of cans of the two rows to be moved into the holders or recesses 22—22 of the dial 23. Assuming that the crimping apparatus has been operated sufficiently to feed cans under the crimping stations 27 and 29, the operator may then actuate the press to cause the ram 46 and the parts carried thereby to move downwardly and upwardly through one reciprocation. On the first portion of the downstroke of the ram, the cam 43, through the sloping portions of the cam grooves 50, rollers 48, sleeve 41 and the one-way clutch 54, acts to rotate or index the dial 23 one increment or step, following which the cam members 92 serve to move the slides 85 radially inwardly into supporting engagement with the cans 11, and the abutment surfaces 111 of the punch holder are moved into engagement with the shoulders 112 of the dies 96 and 97 to rock the dies and move the heads 103 thereof into engagement with each other in vertical and spaced relation above the top edges 10 of the can 11, after which continued downward movement of the ram imparts a downward vertical movement of the dies 96 and 97 and the engagement of the crimping surfaces 105 and 105—1 with the ends 10 of the cans 11 to effect the crimping of the ends of the cans at station 27 to 45° and at station 29 into horizontal engagement with the closure plate 12. On the upstroke of the ram, the springs 107 serve to return the dies to their upper position and then, when the pins 98 have reached the upper ends of the slots 99, the springs act to rock the dies about their pivots 98 to separate the heads 103, the cams 92 move the slides 85 outwardly, and the cam 43 oscillates the sleeve 41 through an idle return movement to its normal starting position.

It is to be understood that the above-described arrangements are simply illustrative of the appli-

6

cation of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. An apparatus for crimping cans having leads extending therefrom comprising a holder for supporting one of said cans, means for supporting and guiding said holder for moving said can and leads thereon through a predetermined path to and from a crimping station, a pair of elongated upright die members disposed above said holder at said crimping station and on opposite sides of the path of movement of said leads, each of said die members having a head at its lower end provided with forming surfaces engageable with the can to crimp the end thereof, trunnions on said die members disposed above and in spaced relation to said heads, a support having vertical slots for receiving said trunnions and supporting said dies for movement vertically toward and away from said holder and for pivotal movement about the axis of said trunnions, said dies being oscillatable about the axis of said trunnions to move said heads laterally to and from a closed position in engagement with each other and in alignment with said can and an open position in spaced relation to each other to provide clearance for the movement therebetween of said leads and said dies being vertically movable to and from a lower position in engagement with said can and an upper position in spaced relation thereto, said dies also having portions adjacent each other provided with cylindrical recesses disposed parallel and intermediate the axis of said trunnions, a cylindrical member disposed in said recesses to interconnect said dies for equal and opposite rocking movement respectively about the axes of said trunnions, said dies also having portions disposed laterally outwardly relative to said trunnions, springs engaging the lateral portions of said dies for moving the dies upwardly from said holder and for rocking the dies about the axis of the trunnions in a direction to move the heads on said dies away from each other to open position, stop surfaces on said support for limiting the upward and outward movements of said dies, and a reciprocable actuating member engageable with the laterally disposed portions of said dies to impart rocking and vertical downward movements to said dies whereby the heads of said dies are first moved into closed position in engagement with each other and then moved downwardly in engagement with the can to crimp the end thereof.

2. An apparatus for crimping condenser cans having leads extending from one end thereof comprising a holder for supporting one of said cans with the leads extending upwardly therefrom, means for supporting and guiding said holder for moving said can and leads thereon through a predetermined path to and from a crimping station, a pair of die members at said crimping station disposed above said holder and on opposite sides of the path of movement of said leads and having heads with forming surfaces thereon for forming said can, pivot members on each of said dies disposed at a level above the path of movement of said leads, a stationary support at said crimping station having slots therein for receiving said pivot members and for guiding said die members for limited vertical movement toward and away from said holder and for

pivotal movement about the axis of said pivot members, said die members being vertically movable to and from an upper position spaced from a can in said crimping station and a lower position in engagement with said can and being oscillatable about the axis of said pivot members to move said heads thereon to and from a closed position in engagement with each other and in vertical alignment with said can and an open position in spaced relation to each other to provide clearance for the movement of said leads therebetween, said die heads being recessed to receive said leads when in closed position, resilient means engageable with said die members to move said die members upwardly and to rock said die members about said pivot members to open position, laterally outwardly extending arms on said die members, a vertically reciprocable actuating member engageable with said laterally extending arms for moving said die members in response to downward movement of said actuating member to cause said die members to be rocked about the pivots into closed position and moved downwardly into engagement with said can.

3. An apparatus for crimping condenser cans having leads extending from one end thereof, comprising movable feeding means for supporting a can, means guiding said feeding means for moving a can and the leads thereon in a predetermined path to and from a crimping station, a pair of dies at said crimping station having portions disposed on opposite sides of said path of movement of said leads and provided with heads having forming surfaces engageable with a can for crimping the end thereof, means including pivot means mounting said dies for limited rectilinear movement toward and away from a can at said crimping station and for oscillatable movement of said dies whereby the heads of said dies may be oscillated laterally to and from a closed position in engagement with each other and in alignment with said can and an open position separated from each other to provide clearance therebetween for the movement of said leads to and from the crimping station and whereby said dies may be moved rectilinearly to and from an operative position in engagement with said can in said crimping station and an inoperative position in spaced relation to said can, resilient means operable to move said dies away from said operative position to said inoperative position and to oscillate said dies about said pivot means to move the heads thereof away from each other into open position, a reciprocable actuator movable toward and away from said dies, and arms on said dies engageable with said actuator for imparting movement to said dies in response to movement in one direction of said actuator to cause an oscillating movement of said dies into closed position and a rectilinear movement thereof into engagement with said can.

4. An apparatus for crimping condenser cans having leads extending from one end thereof comprising a rotatable feed table having a plurality of recesses extending inwardly from the periphery thereof for receiving and supporting a can in each recess, means mounting said table for rotation to guide a can and the leads thereon through a predetermined path to and from a crimping station, an auxiliary can supporting member movable radially toward and away from said feed table at said crimping station and having a recess for receiving a portion of said can operable in cooperation with said feed table for

surrounding and supporting said can, a vertically reciprocable actuator having a cam engageable with said auxiliary can supporting member for moving said member toward and away from said feed table, a pair of die members at said crimping station disposed above said feed table and having heads on opposite sides of the path of movement of said leads provided with forming surfaces for crimping said can, a support at said crimping station, means including pivot means disposed above said heads interconnecting said support and said die members for guiding said die members for limited vertical movement and for pivotal movement whereby said heads may be oscillated to and from a closed position in engagement with each other and in vertical alignment with said can and an open position in spaced relation to each other to provide clearance for the movement therebetween of said leads and whereby the dies may be moved to and from a lower position in engagement with a can at said crimping station and an upper position in spaced relation to said can, said die heads having recesses for receiving said leads when said heads are in closed position, spring means operable to move said die members upwardly to said upper position and to oscillate said dies to open position, arms on said die members engageable with said actuator for actuation thereby in response to the downward movement thereof to rock said dies from open position to closed position and to move said dies from the upper position to the lower position in engagement with said can, and indexing means interconnecting said actuator and said feed table for indexing said feed table.

5. An apparatus for crimping cans having leads extending from one end thereof comprising a holder for supporting said can, means for supporting and guiding said holder for moving a can and the leads thereon through a predetermined path to and from a crimping station, a pair of cooperating die members at said crimping station disposed on opposite sides of the path of movement of said leads and provided with heads having forming surfaces for engaging and crimping said can, means pivotally mounting said die members for oscillating movement to permit the movement of said heads laterally relative to the path of movement of said leads to and from a closed position disposed in alignment with a can at said crimping station and an open position in which said heads are spaced from each other to provide clearance for the movement therebetween of said leads, means mounting said dies for rectilinear movement toward and away from an operative position in engagement with a can at said crimping station and a normal inoperative position spaced from said can, resilient means engageable with said die members to stress said die members for rectilinear movement to their normal inoperative position and for oscillating movement to their open position, means for stopping said die members in their open and normal inoperative position, said dies in their closed position being in engagement with each other and having a recess for receiving said leads, a reciprocable actuator movable toward and away from said die members, and arms on said die members having portions thereof engageable with said reciprocable actuator for imparting movement to said dies in response to movement of said actuator toward said die members to cause said dies to be rocked to a closed position and moved from their normal

9

inoperative position to their operative position
in engagement with said can.

NILS H. SWANSON.

REFERENCES CITED

The following references are of record in the
file of this patent:

UNITED STATES PATENTS

Number	Name	Date
563,552	Brass	July 7, 1896
1,010,617	Gray	Dec. 5, 1911
1,021,825	Craggs	Apr. 2, 1912

Number
1,160,369
1,276,523
1,394,623
5 1,666,767
1,846,319
1,867,288
2,068,107
2,116,068
10 2,258,611

Number
780,788

10

Name	Date
Bradley	Nov. 16, 1915
Gwinn	Aug. 20, 1918
Holthaus	Oct. 25, 1921
Annen	Apr. 17, 1928
Dister	Feb. 23, 1932
Thomas	July 12, 1932
Nygard	Jan. 19, 1937
Gantzer	May 3, 1938
Hothersall	Oct. 14, 1941

FOREIGN PATENTS

Country	Date
France	May 3, 1935