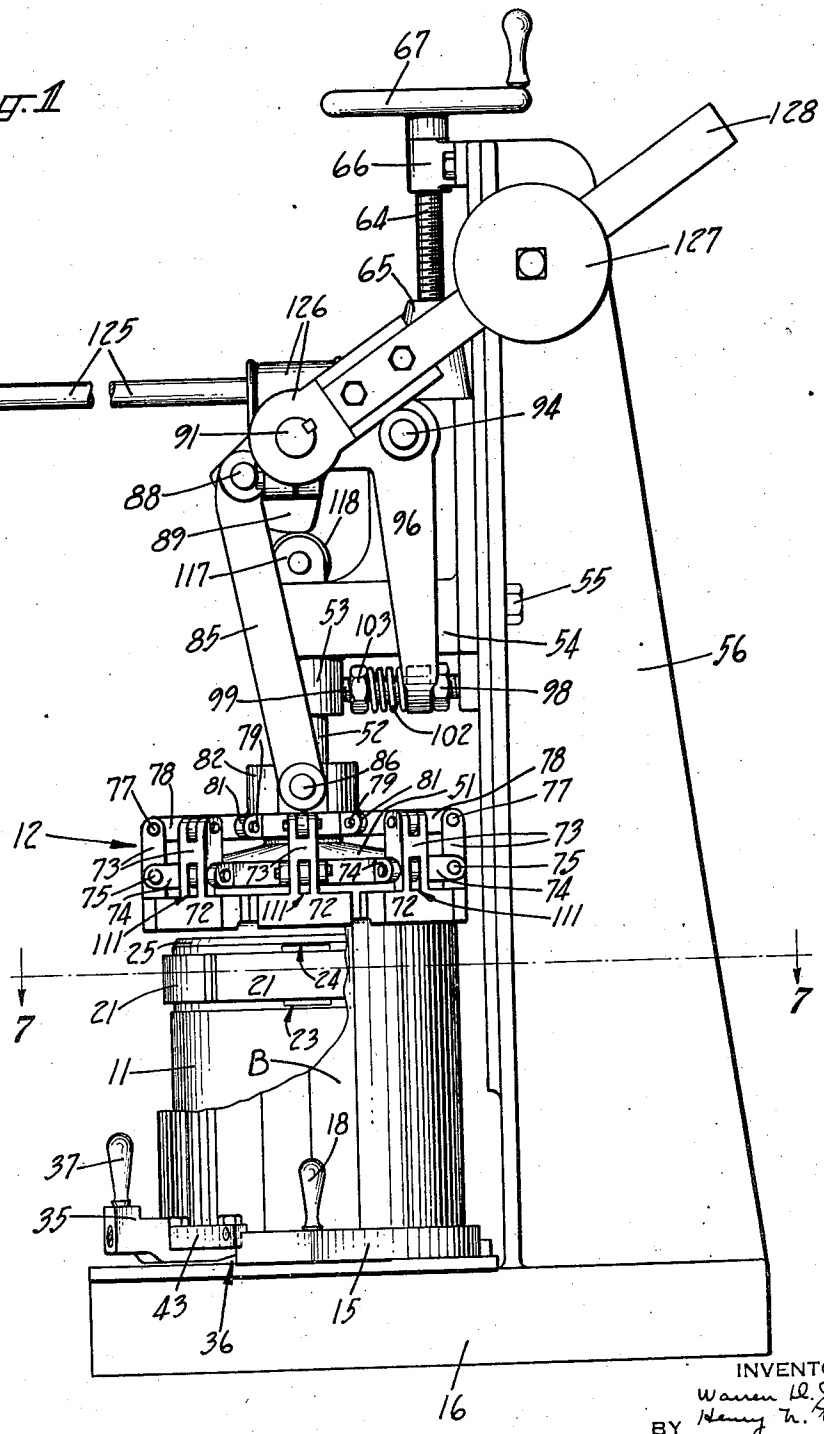
July 13, 1943. W. D. JORDAN ET AL 2,323,914

CAN CLOSING MACHINE

Filed June 27, 1940 4 Sheets-Sheet 1

Fig. 1



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CAN CLOSING MACHINE

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Fig. 3

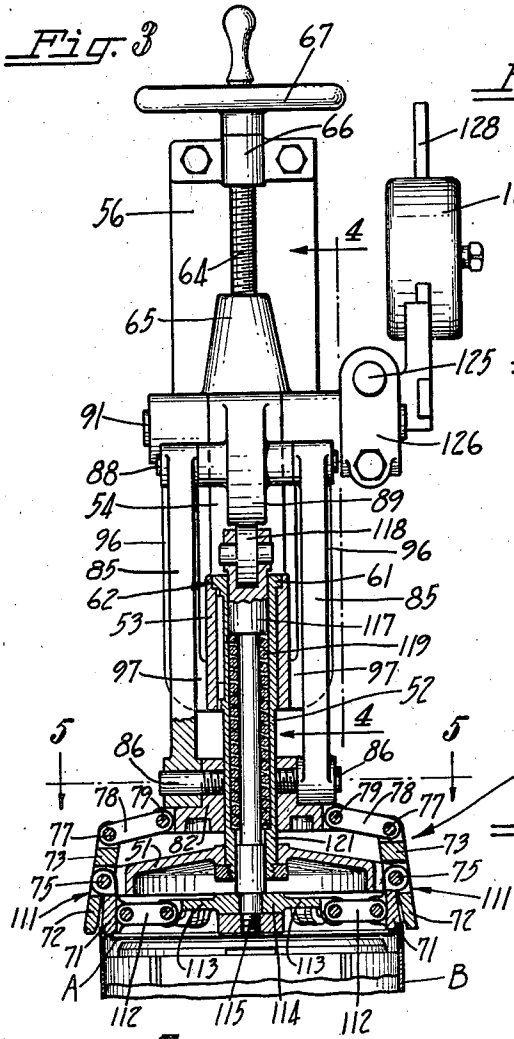


Fig. 2

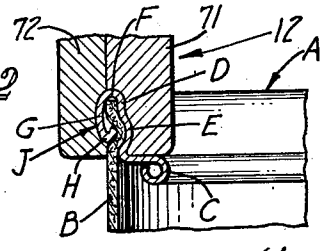


Fig. 4

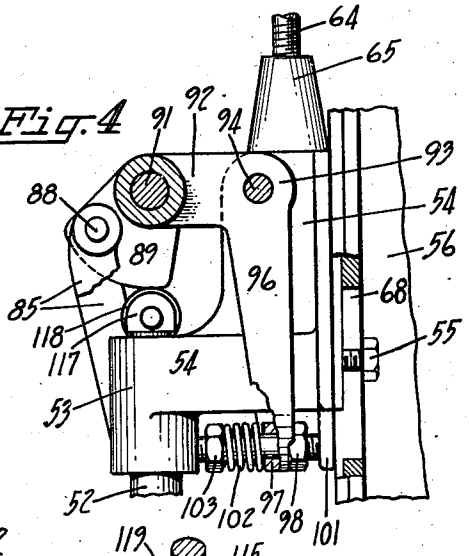


Fig. 6

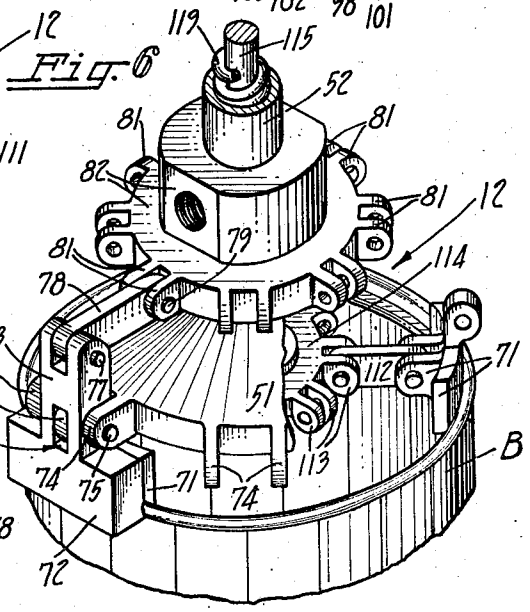
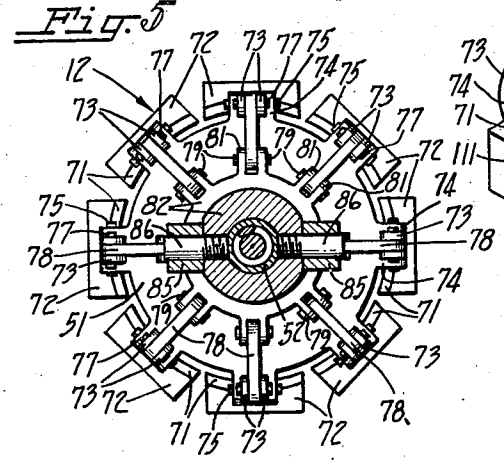


Fig. 5



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CAN CLOSING MACHINE

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Fig. 7

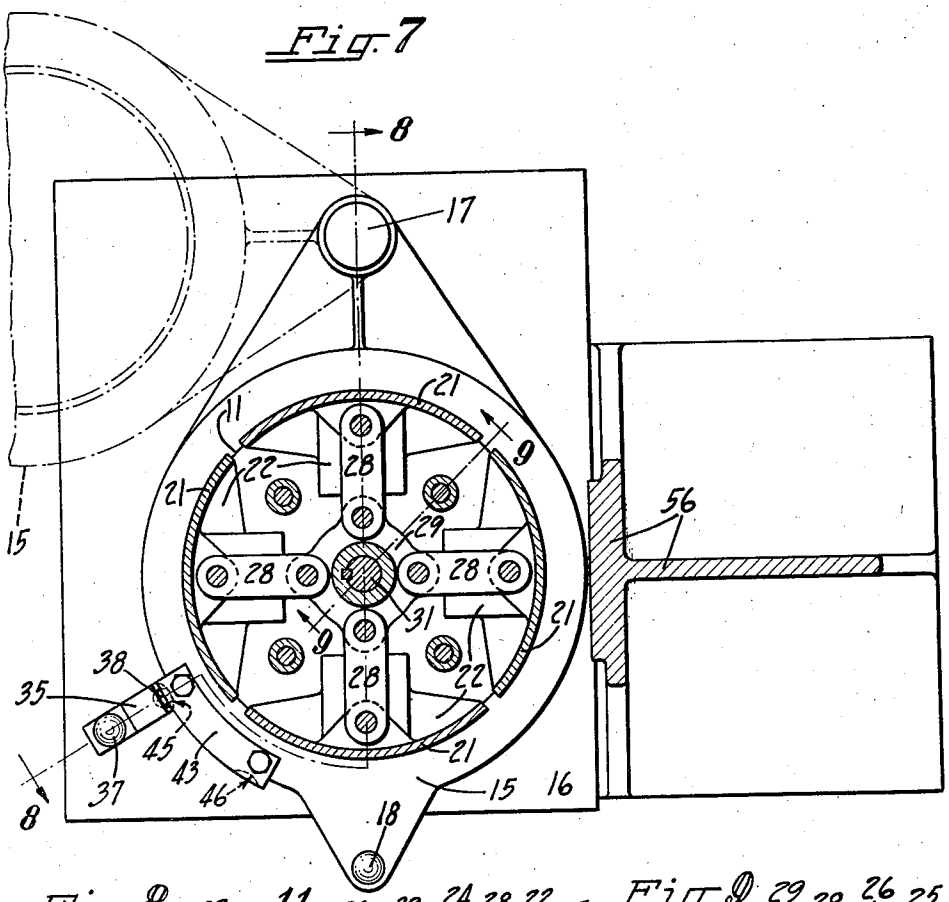


Fig. 8

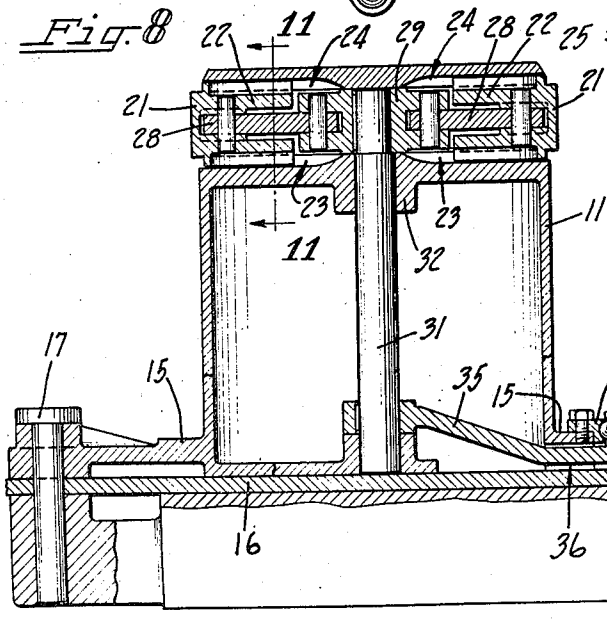
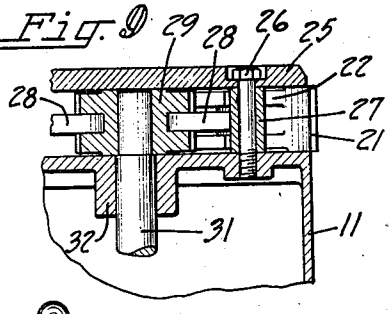


Fig. 9



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CAN CLOSING MACHINE

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Fig. 10

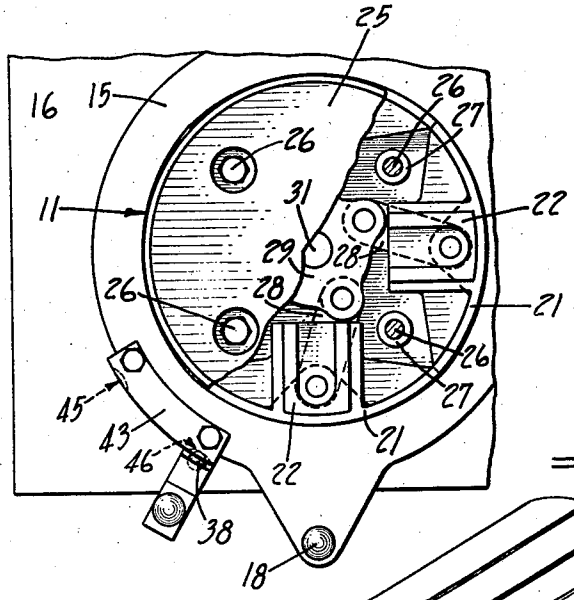


Fig. 11

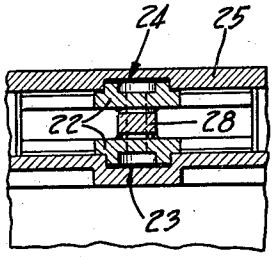


Fig. 12

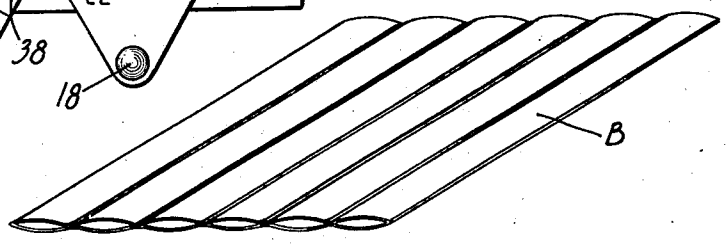


Fig. 14

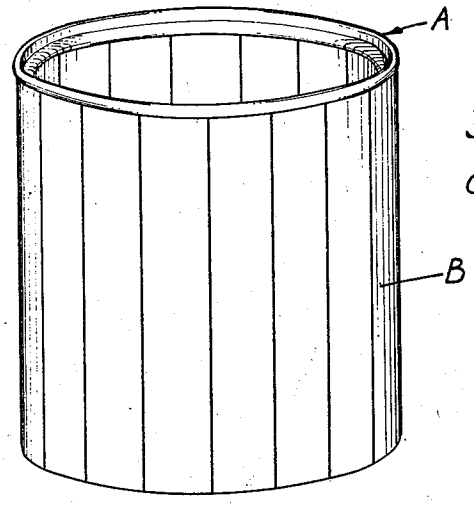
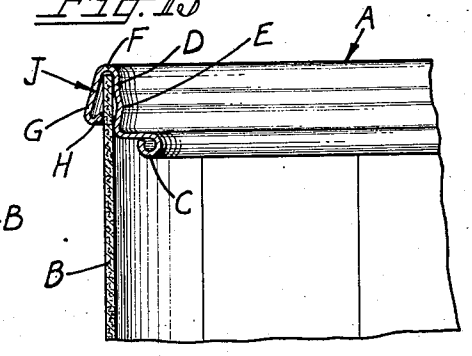


Fig. 13



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UNITED STATES PATENT OFFICE

2,323,914

CAN CLOSING MACHINE

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Application June 27, 1940, Serial No. 342,784

4 Claims. (Cl. 153—1)

The present invention relates to a container or can closing machine and has particular reference to an improved machine for clinching metal end closures or closure parts onto light weight fibre cans or can bodies.

Within recent years a light weight fibre can having metal rings attached to its ends for the reception of a friction plug cover and a suitable bottom has been developed for use in packaging products such as potato chips and pretzels and in some cases ice cream. Such rings therefore constitute parts of the end closures for the can. In such a can the fibre body before receiving its metal end rings is so flexible that it will not stand very much end pressure during attachment of the rings. Being flexible the body is incapable of holding a true cylindrical shape to receive such metal rings unless supported in some suitable manner.

The present invention contemplates overcoming these difficulties in the manufacture of such a can by providing a manually operated machine of simple construction which will easily secure the metal rings in place while properly supporting and without in any way distorting or otherwise injuring the fibre body.

An object therefore of the invention is the provision of a manually operated fibre can closing machine of simple construction wherein a metal ring or end closure may be readily clinched in place on the end of a light weight fibre can body without in any way distorting or otherwise injuring the body during such an operation.

Another object is the provision of such a machine wherein end pressure usually exerted on a can body during a closing operation is eliminated so that a light weight fibre can body may be operated upon without collapsing or otherwise straining the body due to end pressure.

Another object is the provision in a machine of this character of devices which operate to round up the fibre body into a true cylindrical shape prior to clinching its end rings in place and which maintain the body in proper shape during the ring clinching operation.

Another object is the provision of such a machine wherein the can body conditioned to receive its metal rings may be readily delivered into position on its support and swung into and out of clinching position relative to the clinching parts of the machine.

Numerous other objects and advantages 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.

Referring to the drawings:

Figure 1 is a side elevation of a machine embodying the instant invention, with parts broken away;

Fig. 2 is an enlarged sectional view of one corner of a fibre can body showing a metal end ring in clinched position and showing portions of the clinching tools for performing the operation;

Fig. 3 is a front elevation of the upper portion of the machine of Fig. 1 with parts broken back and shown in section, the view also showing the upper portion of a can in clinching position in the machine;

Fig. 4 is a part elevation part sectional view taken along a vertical plane indicated by the line 4—4 in Fig. 3, with parts broken away;

Fig. 5 is a horizontal section taken substantially along the line 5—5 in Fig. 3;

Fig. 6 is an enlarged perspective view of a clinching head used in the machine, with parts broken away and other parts omitted;

Fig. 7 is an enlarged horizontal section taken substantially along the line 7—7 in Fig. 1, with parts indicated as in an alternate position being shown by dotted lines;

Fig. 8 is a vertical section taken substantially along the broken line 8—8 in Fig. 7;

Fig. 9 is a fragmentary sectional view taken substantially along the line 9—9 in Fig. 7;

Fig. 10 is a top plan view of the parts shown in Fig. 8, with parts broken away;

Fig. 11 is a sectional detail taken substantially along the line 11—11 in Fig. 8;

Fig. 12 is an enlarged perspective view of a fibre can body to be operated upon, the body being shown collapsed for convenience in shipping;

Fig. 13 is an enlarged sectional view of one corner of the can body in rounded shape and having a metal end ring in place ready for clinching to the body; and

Fig. 14 is an enlarged perspective view of the can body with an end ring clinched thereto.

As a preferred embodiment of the invention the drawings disclose a machine in which metal friction plug rings A (Figs. 2, 13 and 14) are clinched in position over the upper end edge of light weight fibre can bodies B of the collapsible character disclosed in United States Patent 2,033,888, issued March 10, 1936, to L. E. La Bombard on Method of fabricating containers.

The ring A is preferably of the countersunk panel type having its inner edge terminating in a downwardly and outwardly smooth edge curl C which provides an annular seat for a friction plug cover. Preferably the ring is formed with an inner vertical wall D in which an inwardly bent annular bead E is formed. The upper edge of the wall D merges into a sharply curved wall section F which is the upper integral part of an outer depending vertical wall G. Wall G terminates at its bottom in a smooth partial edge curl H. These wall sections set off an inverted U-shaped channel J in which the upper edge of the fibre body B is adapted to fit when the ring is assembled in place on the body.

In the machine the fibre body B is first opened out and placed in a vertical position over a holding mandrel 11 (Figs. 1, 7, 8 and 10) and is rounded up at that time into a true cylindrical shape. The ring A is then positioned on the upper end edge of the body with its channel wall sections surrounding the body edge. After such assembly the ring is secured in place by a clinching head 12 (Figs 1, 3, 5 and 6).

The result obtained by operation of the clinching head is shown in Fig. 2. Operating parts of the clinching head press the outer terminal edge H of the ring wall G inwardly against the side wall of the fibre can body and this forces the adjoining part of the body wall into the annular bead E of the ring. This action fully clinches the can body wall between the ring wall sections D, G in a permanent joint or seam and thereby completes the clinching operation.

The mandrel 11 (Figs. 1, 7, 8 and 10) which receives the reformed can body B preparatory to the clinching of its ring A, is preferably slightly smaller in diameter than the body and is mounted vertically on a horizontal swing plate 15. The plate is supported on a machine base 16 and may be swung on a pivot stud 17 secured in the base. A handle 18 secured in the swing plate is provided for readily shifting the plate on its pivot stud 17 from a position directly under the head 12, shown in full lines in Fig. 7, into a position to one side of the head, shown in dotted lines in Fig. 7, so that a can body B may be placed on the mandrel.

A can body B to be operated upon is slipped over the mandrel 11 when the latter is in its outward position and the upper part of the body is immediately rounded up into a true cylindrical shape. This rounding up operation is effected by a plurality of segmental jaws 21 which are located on top of the mandrel proper and are disposed around its periphery.

The jaws 21 are formed preferably on the outer ends of radial slides 22 which are disposed in lower slideways 23 (Fig. 11) formed in the top of the mandrel and in upper slideways 24 formed in a top plate 25. Plate 25 is secured by bolts 26 (see also Fig. 9) to the top of the mandrel and is held in spaced relation thereto. Spacer sleeves 27 surround the bolts and retain the top plate in this spaced position and confine the slides 22 against lateral displacement.

The slides 22 (Figs. 7, 8 and 10) are connected by links 28 to a rotatable disc 29 located within the mandrel unit and secured to the upper end of a vertical shaft 31. The shaft is carried in bearings 32, 33 formed in the mandrel. The lower end of the shaft carries an operating arm 35 which extends out through a clearance opening 36 formed in the swing plate 15. The arm where it extends beyond the plate carries a handle 37 which may be readily gripped by the operator.

Hence by shifting the arm 35 in the proper direction the vertical shaft 31 and the disc 29 carried thereon are rocked and the slides 22 are thereby moved outwardly a predetermined distance to bring the jaws 21 into engagement with the inside surface of the can body B on the mandrel 11. This rounds up the body into true cylindrical shape without stretching or otherwise distorting it.

Provision is made for limiting the outward movement of the jaws 21 at the desired predetermined position to prevent distortion of the can body. For this purpose the jaw operating arm 35 carries a spring pressed ball 38 which is disposed in a bore 39 formed in the arm. This is backed up by a compression spring 41. The ball engages against a grooved segmental track 43 which is bolted to the outer edge of the swing plate 15. The track is formed with a pair of indentations 45, 46 (Fig. 7) located near the two ends of the track.

When the arm is shifted to expand the jaws 21 the spring ball 38 slides along the track 43 and snaps into the depression 45. This locks the arm against movement with the jaws in their expanded position. In a similar manner when the arm is shifted in the other direction it retracts the jaws so that the can body may be removed from the mandrel. In the exact contracted position the spring ball riding on the track snaps into the depression 46. This locks the arm and retains the jaws in their proper contracted positions.

With the body thus rounded up the ring A is placed in position, as hereinbefore explained. The mandrel is then shifted back to bring it and the can body into position under the clinching head 12 as an incident or preparatory to clinching the ring A to the can body.

The clinching head 12 includes a cylindrical head body 51 (Figs. 1, 3, 5 and 6) which is secured to the lower end of a vertical sleeve 52 keyed for vertical sliding movement in a bearing 53 (see also Fig. 4) of a bracket 54. This bracket is adjustably secured by a bolt 55 to a finished face of an upright frame member 56 formed integrally with the machine base 16. The upper end of the sleeve 52 is formed with a flange 61 which seats in a shoulder 62 formed in the top of the bearing 53. This retains the sleeve in the bearing.

In order to properly set the clinching head 12 relative to the can body B for the clinching operation, a manually operable adjusting screw 64 is provided for shifting the bracket on the face of the frame. The lower end of the screw is threaded into a boss 65 formed on the bracket 54, while the upper end of the screw is retained against vertical movement in a bearing 66 secured to the frame member 56. The screw may be readily rotated by a hand wheel 67 which is mounted on the upper end thereof.

In adjusting the head 12 the bracket 54 is first freed for movement by loosening the bolt 55. The hand wheel 67 is then turned and the head is raised or lowered as desired. The bolt 55 during such adjustment moves along a slot 68 (Fig. 4) cut through the frame 56. After such an adjustment the bolt is again tightened to lock the bracket and hence the head in place.

The clinching of the ring A to the can body B is brought about by a plurality of inner and outer jaws or clinching elements 71, 72 which are arranged around the outer edge of the head body

51. Each outer jaw 72 is formed with a lever arm 73 which extends up between a pair of lugs 74 formed on the outer edge of the head body. Each jaw is mounted on a pivot pin 75 which extends through its associated lever arm and is secured in the head body lugs of that pair of clinching elements.

The upper ends of the outer jaw lever arms 73 are bifurcated and are secured by pivot pins 77 to the outer ends of toggle links 78. The inner ends of the toggle links are connected by pivot pins 79 to lugs 81 projecting out from a vertically movable hub 82 which slides on the sleeve 52. The hub is supported on a pair of vertical operating links 85 (Figs. 1 and 3) the lower ends of which are carried on pivot studs 86 threaded into the hub.

The upper ends of the two operating links 85 are connected by a short shaft 88 to the sides of an edge cam 89 which is secured to a cross or transverse rock shaft 91. Shaft 91 is carried in the outer ends of horizontal arms 92 of a pair of bell crank levers 93 disposed one on each side of the head bracket 54. These bell cranks are carried on a short shaft 94 which extends through the head bracket and is secured therein.

Depending arms 96 of the bell cranks 93 extend down adjacent the bracket 54. At their lower ends the arms are formed with inwardly projecting lugs 97 which engage against a stop nut 98 threaded on a bolt 99. This bolt is interposed between the bearing 53 and a leg portion 101 of the bracket 54 and is threaded into both of these parts. A compression spring 102 surrounds the bolt between the lugs 97 of the bell cranks and an adjusting nut 103 which is carried on the bolt adjacent the bearing 53. This spring forms a cushion for the clinching action of the head as will be more fully explained hereinafter.

The inner clinching jaws 71 of the head 12 are mounted on and extend inside of the outer jaws 72, as shown in the drawings, and their upper ends extend into slots 111 (Figs. 3 and 6) cut through the middle part of the outer jaw lever arms 73. Each inner jaw is formed at the top in a boss which hangs on the associated outer jaw pivot pin 75. Below this point of support in the outer jaw and in the head body 51, each inner jaw is connected by a toggle link 112 to a pair of lugs 113 formed on a disc 114.

The disc 114 is secured to the lower end of a vertical rod 115 which extends up through the head sleeve 52. At its upper end the rod is formed with a bifurcated cam roller block 117 which carries a cam roller 118. A compression spring 119 surrounds the rod and is interposed between the roller block 117 and a shoulder 121 formed in the head sleeve 52. This spring tends to keep the rod 115 in a raised position within the head sleeve.

When a can body B and its interposed ring A is properly assembled under the clinching head 12 for the clinching operation, the head is in a slightly raised position above and clear of the top of the can body. In this raised position the inner jaw disc 114 is up against the head body 51 and hence the inner jaws 71 are inclined inwardly. The cam 89 (Fig. 4) at this time is forward of and out of engagement with the cam roller 118 and the hub 82 is in a raised position so that the outer jaws 72 also are held in an outwardly inclined position.

In commencing the clinching operation the clinching head 12 is moved down into position over the top of the can body but not touching it, the spread-apart jaws extending down adjacent the ring A on both sides thereof. This movement of the head is brought about by manually pulling down on a handle bar 125 (Figs. 1 and 3) the inner end of which is secured in a bracket 126 keyed to the cross-shaft 91. A counter-balance weight 127 is adjustably secured to a flat or other bar element 128 which in turn is bolted to the handle bracket. This facilitates operation of the handle.

Pulling down of the handle 125, rotates or rocks the cross shaft 91 and swings the cam 89 into position over the cam roller 118 as shown in Figs. 1 and 4. This action first moves the head sleeve 52 down in its bearing 53 until its flange 61 seats home against its shoulder seat 62 in the bearing, as shown in Fig. 3. It is this seating action that arrests further downward movement of the head body and holds it in a predetermined position above the can body B. This prevents any downward pressure on the can body during clinching, and collapse of the can body vertically is thereby prevented.

Further downward movement of the cam roller 118 forces the rod 115 down against the resistance of the compression spring 119 and this lowers the inner jaw disc 114. Lowering of the disc rocks the inner toggle links 112 and thereby forces the inner jaws 71 outwardly against the inside wall section D of the ring A. The positioned inner jaws thereupon serve as anvils for the outer jaws 72 as shown in Fig. 3.

As the handle 125 is pulled further down and the cross shaft 91 is further rotated the cam 89 rides along the cam roller 118 without further depressing it and thereby maintains the inner jaws 71 in their anvil functioning position. However, the operating links 85 being connected to the cam are moved downwardly during this period and this depresses the hub 82 and rocks the outer toggle links 78. The clinching lower sections of the outer jaws 72 move inwardly against the flange wall section G of the ring A and clinch this wall section against the can body B which is backed up by the inner jaws 71 at the time. It is this action that forces the curled edge H of the wall G and the wall of the body B into the bead E. This produces the permanent joint or seam between ring and body, as hereinbefore explained. The clinching operation is thus completed.

Although no downward pressure is exerted on the can body B to distort or injure it in any way during this clinching operation, there is nevertheless a tremendous pressure exerted on the ring C in a lateral direction to produce the clinched joint. Provision is made for relieving this pressure in case it is multiplied too greatly. Such relief is made possible by the spring 102 which exerts its pressure against the lugs 97 of the bell cranks 93.

During the rotation of the cross shaft 91 with its consequent downward movement of the head parts, the bell cranks are estopped from rotating on their pivot shaft 94 by the nut 98 on the spring bolt 99. However, when the lateral pressure on the can body ring exceeds a desired amount, the heavy pressure reacts upwardly through the operating links 85 and the rod 115 and thereupon rocks the bell cranks against the resistance of the spring 102. This action relieves the clinching pressure and prevents injury to the can body seam. It further prevents breaking of the head parts of the machine.

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.

We claim:

1. A can closing machine for securing cover parts to can bodies, comprising in combination, a support for the can body, a stationary bearing adjacent said support, a sleeve in said bearing and movable toward and away from said support in the direction of the longitudinal axis of the can body, a clinching head on said sleeve and carrying pivotally mounted clinching elements operable upon movement of the sleeve toward the support for clinching a cover part to an end of the can body, means for bodily moving said sleeve and said clinching head towards said support, and a stop element on said sleeve and engageable with said bearing for limiting the travel of the head toward the support and for retaining the head in spaced relation to the can body during the clinching operation, whereby to protect the can body against endwise pressure exerted in the direction of the longitudinal axis of said can body.

2. In a can closing machine for securing a metal friction plug ring to a collapsible tubular fibre can body, the combination of a movable clinching head carrying clinching elements operable for clinching a friction plug ring to an end of the can body, means for moving said head, a mandrel for supporting the can body in tubular form for engagement by said clinching head, and rounding means carried by said mandrel and having means for expanding the same relative thereto for forming a supported can body preparatory to a clinching operation thereon.

3. A can closing machine for securing cover parts to can bodies, comprising in combination, a support for the can body, a clinching head, means on the can support to support the head for movement toward and away from said support in the direction of the longitudinal axis of the can body, said head having pivotally mounted clinching elements operable for clinching a cover part to an end of the can body, operating means connected to the head and clinching elements for moving said clinching head toward said can body support to actuate said clinching elements to effect a clinching operation, and supporting means on the support for the clinching head engaging a part of said head as the head moves toward the can body for stopping movement of the engaged part to hold said head for operation of the clinching elements and to absorb longitudinal pressure on the can body to prevent edgewise distortion thereof.

4. A can closing machine for securing cover parts to can bodies, comprising in combination, a support for the can body, a clinching head, means on the can support to support the head for movement toward and away from said support in the direction of the longitudinal axis of the can body, said head including pivotally mounted inner and outer clinching elements operable for clinching a cover part to an end of the can body, means for moving said clinching head toward said can body support first to actuate said inner clinching elements to move them into clinching position and thence to actuate said outer clinching elements to effect a clinching operation, and means engaging a part of said head as the head moves toward the can body for stopping movement of the engaged part to hold said head for operation of the clinching elements and to absorb longitudinal pressure on the can body to prevent edgewise distortion thereof, while said outer clinching elements are performing the clinching operation.

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