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(54) **CONTAINER PROCESSING APPARATUS.**

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Description

The present invention relates generally to the manufacture of containers and, more particularly, to an apparatus for conditioning two-piece metal cans to improve the appearance thereof, as well as increase certain strength characteristics of the cans.

Background Prior Art

The use of a two-piece can has become very common in the beer and beverage industry. The two-piece can consists of a unitary body that forms the sidewall of the can and has an end wall integral therewith at one end which is usually formed to a dome-shaped configuration to increase the overall strength of the can. The opposite open end of the can has an end seamed thereto after the product has been inserted into the can.

In the manufacture of cans of this type, a sheet of stock material of predetermined thickness is fed to a cupping press wherein discs are cut from the stock material and are transformed into cups that have a diameter which is considerably larger than the ultimate diameter of the finished can.

The preformed cups are then transferred to a can-forming apparatus, commonly referred to as a bodymaker, wherein the cup is aligned with a punch carried by a reciprocable ram and cooperates with a plurality of spaced ironing dies and a doming mechanism located at the end of the path for the punch. During the formation process, the punch initially cooperates with a redraw assembly in which the shallow cup is redrawn to a smaller diameter cup that has an internal diameter which is equal to the internal diameter of the ultimately-finished can and a height that is greater than the height of the original cup. Each cup then passes through a series of ironing dies having progressively reduced diameters so that the sidewall of the can is progressively reduced in thickness, while the height of the can increases. At the end of the stroke for the punch or ram, the end of the can is forced into a predetermined configuration of a dome and the integral end wall is reformed to increase the strength thereof.

After the container has been reformed in the bodymaker, which is commonly referred to as the drawing and ironing process, the uneven or ragged free edge of the open end of the container is trimmed to provide a finished product of predetermined height and the upper open end then has a reduced neck and an outwardly-directed flange formed thereon, which is used to ultimately seam an end thereto.

In the more recent types of cans that are being produced, the necking process consists of forming the reduced neck in two or more stages of reduction so that smaller diameter ends can be utilized thereby reducing the overall cost of the metal required for the formation of the cans. The progressively-reduced neck not only reduces the necessary diameter of the end but also provides additional strength adjacent the open end of the can and enhances the package when it is presented to the consumer with the product therein.

Of course, with the increased costs of the raw material, such as aluminum or steel, manufacturers are constantly striving to reduce the amount of stock material necessary to produce a can that can be sold at a competitive price.

With the increased efficiency in the can-making process, manufacturers are now capable of manufacturing cans at the rate of 200 cans per minute or more from a single bodymaker with the majority of the can sidewall having a thickness on the order of about 0.004 inches (0.1016 mm) or less.

In the GB-A-889 981 the apparatus for ribbing a thin metal cylinder consists of at least one peripherally ribbed mandrel movable in a predetermined path by a support therefor. Opposed pressure applying devices cooperating with the mandrel during rotation thereof to apply radial pressure to a thin metal cylinder surrounding the mandrel and to cause the cylinder to assume a constantly changing oval-cross section. According to one embodiment said opposed pressure-applying devices consist of a rotatable roller and a rail having a curved surface facing and spaced from the rotatable roller which is provided with a pattern of ribbing to mate with a similar pattern formed on the peripheries of mandrels. The curved surfaces of the roller and rail form a path through which the mandrels are moved while a cylinder surrounding the mandrel is ribbed by radial pressure exerted thereon by the roller and rail. The rail is supported by yieldable members for movement towards and away from the roller and is resiliently urged towards the roller by springs. The mandrels are each mounted on a pivoted arm supported by a conveyor by which the mandrel is moved bodily between the pressure-applying devices and to and from positions at which a cylinder is positioned there-around for ribbing respectively. The conveyor is rotatable about a shaft to which the roller is fixed and is rotated by a gear which meshes with a fixed internal gear and a gear rotatable with said shaft. The ribbing pattern may consist of ribs, which extend lengthwise of the cylinder, or of a multiple diamond pattern etc. An alternative embodiment of the known apparatus comprises a plurality of rotatable and spring-loaded rollers, one for each mandrel, being carried on pivoted supports which together with arms are supported by a conveyor, and are arranged to replace the curved rail above described. In this case the

roller is stationary. In a further embodiment of said reference, the rotatable mandrels are movable by a carrier in a fixed path and the pressure-applying devices each consist of rotatable and spring-loaded profile rollers mounted on pivoted arms which are supported by a conveyor. The spring-loaded rollers can be adjusted to accommodate the size of the cylinder. This known apparatus is intended to achieve ribbing of long, thin metal cylinders, particularly cylinders the length of which is greater than that of an individual can body, which permits the application to mandrel of the high pressure required to effect ribbing of the cylinders while avoiding excessive deflection of the mandrel.

In US-A-4 059 000 is disclosed a rotary embosser for embossing strip sheet metal. This reference refers to rotary embossing of continuous strip material having usually being carried on in the past by passing the strip material through a pair of steel rollers which had complementary mating male and female formations for making indentations in the strip material. This was not entirely satisfactory for the embossing of continuous strip sheet metal. Therefore, it has been proposed to subject the steel strip to the action of complementary male and female embossing rolls while maintaining the strip under tension between sets of tensioning rolls located upstream and downstream of the embossing rolls. It has also been proposed to form such transverse indentations without subjecting the steel to tension. None of these two different systems worked satisfactory. Thus, the object of this reference is to improve said rotary embossing of continuous strip material by the provision of a rotary embosser for embossing strip sheet metal and a male embossing roll having a series of upstanding die formations thereon around which the sheet metal runs. Indentation rolls having a resilient roll surface are arranged to run in pressurized contact with said embossing roll. Tension roll means are arranged upstream of said die receiving rolls around which said sheet metal runs, whereby said sheet metal strip is maintained in tension as it passes around both said die receiving rolls and said embossing roll. Preferably, an indentation roll will be operated so that it has a peripheral rotational speed slightly in excess of the rotational speed of said embossing roll whereby to increase the tension applied thereto. The use of a downstream tensioning roll having a resilient tread makes it possible to maintain tension in the strip without the necessity of having tensioning rolls having die formations corresponding to the embossing die formations, and precisely synchronized so as to interfit with the impressions already made in the strip metal by the embossing dies. In a case, where an uneven or stressed configuration is acceptable and may conceivably be desirable, depending upon the end use of the panels, it is possible to run the strip around a nip roll and around a briddle roll. The strip then passes between the nip of the upper indentation roll and the embossing roll, without contacting the lower indentation roll. In this mode of operation, the end product will show stress marks, or be uneven or warped, due to the lack of tension. However, such a quality of an embossed strip sheet material is unacceptable for two-piece containers being common in the beer and beverage industry.

Difficulties have been encountered in processing of the cans in the can manufacturing line in that the thin walls and the merging section between the sidewall and the domed end have a tendency to become dented during the transfer of cans during transportation along guide rails between the various processing stations.

Another area that has received a remarkable degree of attention in the manufacture of metal cans is the overall appearance of the final product. Because of the fierce competition in the packaging industry, not only among metal can manufacturers, particularly the beer and beverage industry, but also between metal cans, glass bottles and plastic cans, manufacturers are constantly striving to gain a competitive edge by producing a product that not only meets the rigid structural requirements at a low cost, but is also aesthetically pleasing to the ultimate consumer to entice the consumer into selecting the packaged product.

Summary of the Invention

According to the present invention, an apparatus for providing embossments in the side wall of a two-piece can in accordance with claim 1 has been developed. These embossments enhance the appearance of the can, as well increase the structural characteristics thereof. More specifically, the embossments can be added into any existing manufacturing line for two-piece cans without any significant modification thereof.

The apparatus consists of a mandrel that is rotatable about a fixed axis and has a can-loading mechanism axially aligned therewith. The mandrel has a plurality of circumferentially-spaced, axially-extending rigid projections on the periphery thereof and a resilient member is rotatable adjacent the mandrel in a position to be engageable with the periphery of the mandrel to produce crease lines along the axial dimension of the metal can that are interconnected by generally planar or chordal portions resulting in the embossed can.

Each projection has a length that is less than the overall length of the can so that the crease lines terminate inwardly of opposite ends of the can to provide a rather pleasing transition between

the embossments and the remaining circular main body of the container at opposite ends of the crease lines.

The two mandrels are rotatably driven at synchronized speeds to prevent relative rotation between the mandrels during the embossing operation.

In one embodiment of the invention, the resilient member or forming mandrel is pivoted on the frame adjacent the can supporting mandrel or embossing mandrel and is moved into and out of engagement with embossing mandrel by cams so that the forming mandrel is only in driving engagement with the can supporting mandrel during the actual embossing operation.

In a modified form of the invention, the resilient member is an arcuate segment formed on a cam member that is continuously rotated about a fixed axis parallel to and spaced from the fixed axis of rotation for the embossing mandrel. In this embodiment of the invention, the resilient arcuate segment, equivalent to the forming mandrel, has a circumferential dimension approximately equal to the circumferential dimension of the embossing mandrel.

According to a further aspect of the invention, both embodiments described above could readily be embodied into existing types of commercial container trimming machines, such as the type illustrated in U.S. Patent No. 3,838,653, incorporated herein by reference with certain modifications.

Brief Description of Several Views of Drawings

FIG. 1 shows a fragmentary side elevation view of a can processing apparatus having the present invention incorporated therein; FIG. 2 is an enlarged fragmentary end view as viewed along line 2-2 of FIG. 1 showing details of the apparatus;

FIG. 2A is a fragmentary end view of the drive mechanism of Fig. 1;

FIG. 3 is an enlarged side elevational view of the embossing mandrel forming part of the apparatus shown in FIG. 1;

FIG. 4 is an enlarged end view as viewed along line 4-4 of the mandrel shown in FIG. 3; and,

FIG. 5 is an enlarged fragmentary end view of a modified form of the invention.

Detailed Description

FIG. 1 of the drawings generally discloses an apparatus for processing two-piece containers commonly referred to as cans which is generally designated by reference numeral 10. The can processing apparatus 10 is preferably an apparatus such as disclosed in the above-mentioned U.S. patent No. 3.838.653 which discloses a trimming apparatus for trimming the uneven edge of a drawn and ironed can. According to the present invention, the container trimming apparatus is modified to produce an apparatus that is capable of embossing a container, as will be described below.

The container processing apparatus 10 generally includes a base or support structure 12, only a portion of which is shown in FIG. 1. A main drive shaft 14 is rotatably supported about a fixed axis on base 12 and is driven by a suitable motor 16. Main drive shaft 14 has a large gear 18 fixed thereto for rotation therewith which is in mesh with a second gear 20 that is mounted on a further driven shaft 22 extending parallel to the shaft 14. Driven shaft 22 is supported on bearings in housing 26 which is clamped by brackets 24, so that the shaft 22 is rotated about a fixed stationary axis. One end of the shaft 22 has a mandrel 30 (FIG. 2) supported thereon for rotation therewith.

A container-loading mechanism, generally designated by reference numeral 34, is supported on base 12 and is adapted to receive and move a container onto the mandrel 30 for processing thereon. The container-loading station includes a reciprocable plunger 36 which is reciprocated through suitable drive means (not shown), such as a fluid ram, for movement along an axis that is coincident with the axis for main shaft 22. Containers are constantly supplied through a starwheel 38 which is rotatable about a fixed axis and has a plurality of circumferentially-spaced pockets which are sequentially indexed into alignment with the plunger 36. The plunger 36 is movable from the solid line position illustrated in FIG. 1 to the dotted line position for moving a container from a receiving station or starwheel 38 onto the mandrel 30.

The apparatus so far described is generally of the type disclosed in the above-mentioned patent and patents cited therein, which is specifically designed for trimming of uneven edges of containers after the containers have been processed in the drawing and ironing machine. This type of apparatus has been commercially available from the Assignee of the present invention, as well as other manufacturers, with only minimum modification thereof. The prior trimming apparatus is designed such that the drive shaft 14 is continuously rotated and, in turn, rotates driven shaft 22 and mandrel 30. The starwheel 38 is periodically indexed to align a pocket with the mandrel 30 and plunger 36 with a container thereon. The mandrel is then actuated through a fluid cylinder (not shown) and the container is moved from the starwheel 38 through a locating collar 39 onto the continously-rotating mandrel 30.

In the prior art trimming apparatus, a trimming knife, located on a cam member (not shown), fixed to and rotatable with drive shaft 14, cooperates with a cutting element adjacent one end of the mandrel 30 to trim the edge of the container. After the uneven edge of the container has been removed, the container is then removed from the mandrel, such as by forcing air through the shaft 22 and blowing the container off the mandrel back to the pocket on the starwheel. The starwheel is then indexed and the process is repeated.

According to the present invention, the container trimming apparatus of the prior art type that is commercially available has been slightly modified so that the apparatus can be utilized for producing an embossed container. The apparatus for producing embossed containers includes the mechanism described above, with only minor modifications, so that a container supported on the mandrel can readily be reformed from a circular configuration to a generally non-circular configuration having a very aesthetic appearance.

More specifically, the mandrel 30 is modified in a manner that will be described later and the general apparatus is further modified to provide a member that cooperates with the mandrel to form the embossed container, as will be described later.

The mandrel utilized in the present invention is generally shown in FIGS. 3 and 4 and consists of a generally cylindrical solid member 40, formed from a hard metal, which is tapered at one end 42 to conform generally to the configuration of the integral end wall of the container supported thereon. The rigid circular member 40 has a plurality of circumferential, equally-spaced projections 44 thereon extending from the periphery thereof. The projections are generally rectangular or square in cross-section, as seen in FIG. 4, and the projections terminate inwardly of opposite ends of the circular member, for a purpose that will be described later.

A resilient member 50 (FIG. 2) is mounted adjacent the mandrel 30 to cooperate therewith and to perform the embossing function.

The resilient member or mandrel 50 is keyed to a shaft 52 that is rotatably supported on a pair of bracket arms 54 and has a gear 56 fixed to one end thereof. The bracket arms 54 are secured to a hollow sleeve 58 that is rotatable on a drive shaft 60. Shaft 60 is rotatably supported in bearings in a U-shaped bracken 62 supported on base 12 and is driven through a gear 64 thereon in mesh with main drive gear 18 and drives resilient mandrel 50 through gear 66 in mesh with gear 56 on shaft 52.

Hollow sleeve 58 also has a further pair of arms 68 secured thereto and the outer ends of arms 68 support a pin 70 which rotatably supports a cam follower 72.

Cam follower 72 is biased toward a cam member 74 through a spring 76 and cam member 74 has a raised portion 78 which pivots the arms 54, 68 and sleeve 58 on shaft 60 and, in turn,the resilient member 50, as will be described later. Raised portion 78 of the cam will be long enough to force engagement between mandrel 30 and resilient member 50 for approximately one complete revolution at synchronized speed provided by proper selection of the size and gear ratios of the respective gears 56, 64 and 66. The resilient member may be in the form of various materials, but preferably is a rubber or deformable plastic member that cooperates with the projections, as will be described later.

In the operation of the embodiment described, the container processing apparatus is operated in the same general fashion as previously in connection with the trimming of container bodies. Initially, containers are supplied to the various pockets on the starwheel 38 and the starwheel is consecutively indexed to align a pocket with the plunger 36, which is then extended and carries the container from the starwheel onto the rotating mandrel 30. After the container has been positioned on the embossing mandrel, the continuous rotation of the cam member 74 will cause the cam surface 78 of cam 74 to move cam follower 72, which in turn will pivot and force the resilient member or forming mandrel 50 into engagement with the periphery of the container-supporting mandrel. The arms 54, hollow sleeve 58 and arms 68 may be considered a single pivoted link providing movement for the member 50.

As indicated above, the peripheral speeds of the forming mandrel 50 and mandrel 30 are sychronized so that the speeds are approximately equal to prevent any relative movement during the actual embossing process. The cam surface 78 is configured to provide movement of forming mandrel 50 to take up clearance between resilient member 50 and mandrel 30 and to further compress the two, thereby providing forming loads necessary to provide the embossed form.

In the actual operation, it has been determined that the metal essentially will be pinched along the leading edge of each of the projections and the adjacent forming member to produce a crease line and the metal will be somewhat stretched over the remainder of the projection so that a generally chordal portion will be formed between adjacent projections during the embossing operation. Also, by having the projections terminate inwardly of the opposite ends of the rigid circular member 40, the projections will likewise terminate inwardly of the opposite ends of the containers, and it has been determined that the particular configuration of the projections is such that there will be a smooth

transition between the crease line and the remaining circular portion of the container at opposite ends thereof. This will also produce a more transitional change between the flattened chordal portions and the remainder of the circular container at opposite ends to produce what appears to be a generally scalloped configuration between the respective crease lines which is more apparent in different positions of tilt with the container axis relative to the eye of the potential purchasers.

The number and spacing of crease lines and chordal portions will to some extent depend upon the size of the container and the desired final appearance of the product.

From the above, it will be appreciated that an extremely simplified modification to an existing machine can readily be designed and implemented to produce the embossed container that has considerably greater aesthetic appeal than the circular containers that are presently on the market. Furthermore, the pleasingly-aesthetic container also has a certain inherent strength characteristic incorporated therein because of the configuration resulting from the embossment. Since the crease line or ridges are interconnected by chordal portions, it has been determined that the column strength of the thin-walled container is increased substantially, which has significant advantages during the filling operation where large axial loads are applied to the upper open end of the container by the filling machinery, as well as during the seaming process of the end onto the container.

A slightly modified form of the invention is illustrated in FIG. 5 wherein the container-supporting or embossing mandrel 30 and the structure associated therewith is identical to that described in connection with the embodiment shown in FIG. 1 and in existing trimming mechanisms. In the embodiment shown in FIG. 5, the resilient member or forming member is in the form of an arcuate segment 80 which is formed on and extends beyond the periphery of a circular driven member 82 carried by the main drive shaft 14. The circular or arcuate member 80 has a circumferential peripheral dimension which is at least equal to the circumferential dimension of the container-supporting mandrel 30 and the mandrel and support member 82 are driven at a speed such that the peripheral speed of the arcuate, resilient member 80 is approximately equal to the peripheral speed of the container-supporting mandrel 30. In this embodiment, of course, the resilient member would have an elongated dimension at least equal to the axial dimension of the mandrel and would cooperate with the projections 44 in the same manner described above.

While specific embodiments have been illustrated and described, numerous modifications come to mind without significantly departing from the spirit of the invention.

For example, the embossing apparatus need not be embodied into an existing machine of the type described above, and could readily be formed as part of existing can-processing machinery. For example, the mandrel 30 could be incorporated into respective stations of multiple-stations on the periphery of a rotating turret. The respective mandrels could be simultaneously rotated by a common drive with a single resilient, rotatable or stationary member supported adjacent the periphery of the turret to be engageable and rotate with each of the separate container-supporting mandrels. For such an arrangement, the apparatus could readily be placed in a proper position in a can-manufacturing line to reduce the amount of container handling necessary for performing the embossing operation.

Claims

1. Apparatus (10) for providing embossments in the side wall of a two-piece metal can having a bottom and a cylindrical side wall integral therewith, said apparatus comprising

- a base (12) having a mandrel (30) rotatable about a fixed axis (22) thereon, said mandrel (30) being a generally cylindrical elongated member (40) formed from hard metal and being tapered at one end (42) to conform generally to the configuration of the integral end wall of the can supported thereon;
- embossing means for forming crease lines in said can, said embossing means including circumferentially-spaced, axially-extending projections (44) on said outer peripheral surface of said member (40), each projection (44) having a length less than the overall length of the can;
- means (34) for moving a can onto said mandrel (30),
- a resilient forming member (50; 80) rotatable about an axis (14; 52) generally parallel to said fixed axis (22) of the mandrel (30) supported adjacent said mandrel (30),
- means for moving said resilient member (50; 80) into and out of embossing pressure engagement with a can on the mandrel (30);
- drive means for rotating said mandrel (30) to produce relative rotation in opposite direction between said mandrel (30) and said resilient member (50) to emboss said can,
- said resilient forming member (50; 80) engaging said mandrel (30) and gripping

said can between said resilient member (50; 80) and said projections (44) to produce said crease lines axially of said can interconnected by segments of generally scalloped configuration; and

- the peripheral speeds of said resilient forming members (50; 80) and said embossing mandrel (30) being synchronized so that the speeds are approximately equal to prevent any relative movement during the actual embossing process.

2. The apparatus as defined in Claim 1 in which said projections (44) terminate inwardly of opposite ends of the elongated member (40).

3. Apparatus as defined in Claim 1 or 2, characterized by a link (54, 58, 68) pivoted intermediate opposite ends about a fixed axis (60) on the base (12) and in which said axis (52) of the resilient member (50) is generally parallel to said fixed axis (60), and cam means (74, 78) cooperating with an opposite end (70, 72) of said link (54, 58, 68) for pivoting said resilient member (50) into and out of engagement with said mandrel (30).

4. Apparatus as defined in claim 3 including common drive means for driving said mandrel (30), said cam (78) and said resilient member (30) at substantially synchronized speeds.

5. Apparatus as defined in Claim 1 or 2, characterized by a generally circular disc (82) rotatable about a second fixed axis (14) parallel to and spaced from a fixed axis (22) of the mandrel (30), said circular disc (82) having a resilient segment (80) extending from a periphery thereof which defines said resilient member (30), said resilient segment (80) having a circumferential dimension at least equal to the circumferential dimension of said mandrel (30) and being engageable with said mandrel (30) during each revolution of said circular disc (82).

6. Apparatus as defined in any of Claims 1 to 5 in which said means for removing said container from said mandrel comprising means for forcing a fluid through a shaft (22) in said mandrel (30) against the end wall of a container.

Patentansprüche

1. Vorrichtung (10) zum Anbringen von Prägungen in der Seitenwand einer zweiteiligen Metalldose mit einem Boden und einer mit diesem einheitlichen zylindrischen Seitenwand, wobei die Vorrichtung umfaßt

- eine Basis (12) mit einem Dorn (30), der um eine feststehende Achse (22) auf derselben drehbar ist, wobei der Dorn (30) ein im allgemeinen zylindrisches, sich längs erstreckendes Element (40) ist, das aus Hartmetall geformt und an einem Ende (42) verjüngt ist, um sich allgemein der Form der integralen Endwand der darauf abgestützten Dose anzupassen;
- Prägemittel zum Formen von Sickenlinien in der genannten Dose, wobei die Prägemittel in Umfangsrichtung beabstandete, sich axial erstreckende Vorsprünge (44) auf der genannten äußeren Umfangsfläche des genannten Elementes (40) umfassen, und jeder Vorsprung (44) eine Länge hat, die geringer als die Gesamtlänge der Dose ist;
- Mittel (34) zum Bewegen einer Dose auf den genannten Dorn (30),
- ein elastisches Formelement (50; 80), das um eine Achse (14; 52) drehbar ist, die im allgemeinen parallel zu der genannten feststehenden Achse (22) des Dornes (30) angeordnet und in der Nähe des Dornes (30) abgestützt ist,
- Mittel zum Verstellen des elastischen Elementes (50; 80) in die und aus der Prägedruckberührung mit einer Dose auf dem Dorn (30);
- Antriebsmittel zum Drehen des genannten Dornes (30) zum Hervorrufen einer relativen Drehung in entgegengesetzter Richtung zwischen dem genannten Dorn (30) und dem genannten elastischen Element (50) zum Prägen der genannten Dose; wobei das genannte, elastische Formelement (50; 80) mit dem genannten Dorn (30) in Berührung kommt und die genannte Dose zwischen dem genannten, elastischen Element (50; 80) und den genannten Vorsprüngen (44) erfaßt wird, um die genannten Sickenlinien der genannten Dose axial zu erzeugen, die durch Segmente von im allgemeinen ausgebogter Form verbunden sind; und
- die Umfangsgeschwindigkeiten des genannten, elastischen Formelementes (50; 80) und des genannten prägenden Dorns (30) synchronisiert sind, so daß die Drehzahlen annähernd gleich sind, um irgendeine Relativbewegung während der wirksamen Prägephase zu verhindern.

2. Vorrichtung nach Anspruch 1, bei der die genannten Vorsprünge (44) innerhalb sich gegenüberliegender Enden des sich längs erstrek-

kenden Elementes (40) enden.

3. Vorrichtung nach Anspruch 1 oder 2, gekennzeichnet durch einen Hebel (54, 58, 68), der zwischen sich gegenüberliegenden Enden um eine feststehende Achse (60) auf der Basis (12) schwenkbar ist und bei der die genannte Achse (52) des elastischen Elementes (50) im allgemeinen parallel zu der genannten feststehenden Achse (60) gerichtet ist, und eine Steuernockenvorrichtung (74, 78) mit einem gegenüberliegenden Ende (70, 72) des genannten Hebels (54, 58, 68) zum Verschwenken des genannten elastischen Elementes (50) in die und aus der Berührung mit dem genannten Dorn (30) zusammenwirkt.

4. Vorrichtung nach Anspruch 3, umfassend eine gemeinsame Antriebsvorrichtung zum Antrieb des genannten Dornes (30) des genannten Steuernockens (78) und des genannten, elastischen Elementes (30) mit im wesentlichen synchronisierten Drehzahlen.

5. Vorrichtung nach Anspruch 1 oder 2, gekennzeichnet durch eine im allgemeinen kreisförmige Scheibe (82), die um eine zweite, feststehende Achse (14) drehbar ist, welche parallel zu und im Abstand von einer feststehenden Achse (22) des Dornes (30) angeordnet ist, wobei die genannte, kreisförmige Scheibe (82) ein sich von einem Umfang derselben erstreckendes, elastisches Segment (80) aufweist, das das genannte elastische Element (30) bildet, wobei das genannte, elastische Segment (80) eine Umfangsabmessung hat, die mindestens der Umfangsabmessung des genannten Dornes (30) gleich ist und die mit dem genannten Dorn (30) während jeder Umdrehung der genannten kreisförmigen Scheibe (82) in Berührung bringbar ist.

6. Vorrichtung nach einem der Ansprüche 1 bis 5, bei der die genannten Mittel zum Entfernen der genannten Dose von dem genannten Dorn Mittel zum Hineindrücken einer Flüssigkeit durch eine Welle (22) in dem genannten Dorn (30) gegen die Endwand einer Dose umfaßt.

Revendications

1. Appareil (10) pour réaliser des bossages dans la paroi latérale d'une boîte métallique en deux parties ayant un fond et une paroi latérale cylindrique faisant parties intégrantes de celle-ci, ledit appareil comprenant :
   - un bâti (12) comportant un mandrin (30) mobile en rotation autour d'un axe fixe (22) de celui-ci, ledit mandrin (30) étant un élément allongé, globalement cylindrique, (40) réalisé à partir de métal dur et étant aminci à une extrémité (42) pour s'adapter globalement à la configuration de la paroi d'extrémité faisant partie intégrante de la boîte supportée par celui-ci ;
   - des moyens d'emboutissage pour former des lignes de plis dans ladite boîte, lesdits moyens d'emboutissage comprenant des saillies (44) espacées de façon circonférentielle et se prolongeant axialement sur ladite surface périphérique extérieure dudit élément (40), chaque saillie (44) ayant une longueur inférieure à la longueur hors tout de la boîte ;
   - des moyens (34) pour déplacer une boîte sur ledit mandrin (30) ;
   - Un élément de formage élastique (50, 80) mobile en rotation autour d'un axe (14, 52), globalement parallèle audit axe fixe (22) du mandrin (30), supporté adjacent audit mandrin (30) ;
   - des moyens pour déplacer ledit élément élastique (50, 80) en et hors contact de pression d'emboutissage avec une boîte, sur le mandrin (30) ;
   - des moyens d'entraînement pour mettre en rotation ledit mandrin (30) afin de produire une rotation relative en sens opposé entre ledit mandrin (30) et ledit élément élastique (50) pour emboutir ladite boîte.
   - ledit élément élastique de formage (50, 80) venant en contact avec ledit mandrin (30) et saisissant ladite boîte entre ledit élément élastique (50, 80) et lesdites saillies (44) pour réaliser axialement lesdites lignes de plis de ladite boîte, reliées par des segments, de configuration globalement dentelée ; et
   - les vitesses périphériques dudit élément élastique de formage (50, 80) et dudit mandrin d'emboutissage (30) étant synchronisées de sorte que les vitesses sont approximativement égales pour empêcher un quelconque mouvement relatif pendant la phase d'emboutissage effective.

2. Appareil selon la revendication 1 dans lequel lesdites saillies (44) s'arrêtent en-deça des extrémités opposées de l'élément allongé (40).

3. Appareil selon la revendication 1 ou la revendication 2 caractérisé par un élément de liaison (54, 58, 68) pivotant entre des extrémités opposées autour d'un axe fixe (60) sur le bâti

(12) et dans lequel ledit axe (52) de l'élément élastique (50) est globalement parallèle audit axe fixe (60) et un moyen came (74, 78) coopérant avec une extrémité opposée (70, 72) dudit élément de liaison (54, 58, 68) pour faire pivoter ledit élément élastique (50) en contact et hors contact avec ledit mandrin (30).

4. Appareil selon la revendication 3 comprenant des moyens d'entraînement communs pour entraîner ledit mandrin (30), ladite came (78) et ledit élément élastique (30) à des vitesses sensiblement synchronisées.

5. Appareil selon la revendication 1 ou la revendication 2 caractérisé par un disque globalement circulaire (82) mobile en rotation autour d'un second axe fixe (14) parallèle à un axe fixe (22) du mandrin (30) et distant de celui-ci, ledit disque circulaire (82) comportant un segment élastique (80) se prolongeant depuis une périphérie de celui-ci qui définit ledit élément élastique (80), ledit segment élastique (80) ayant une dimension circonférentielle au moins égale à la dimension circonférentielle dudit mandrin (30) et pouvant être mis en contact avec ledit mandrin (30) pendant chaque tour dudit disque circulaire (82).

6. Appareil selon l'une quelconque des revendications 1 à 5 dans lequel lesdits moyens pour retirer ladite boîte dudit mandrin comprennent des moyens pour pousser un fluide, à travers un axe (22) dans ledit mandrin (30), contre le paroi d'extrémité d'une boîte.

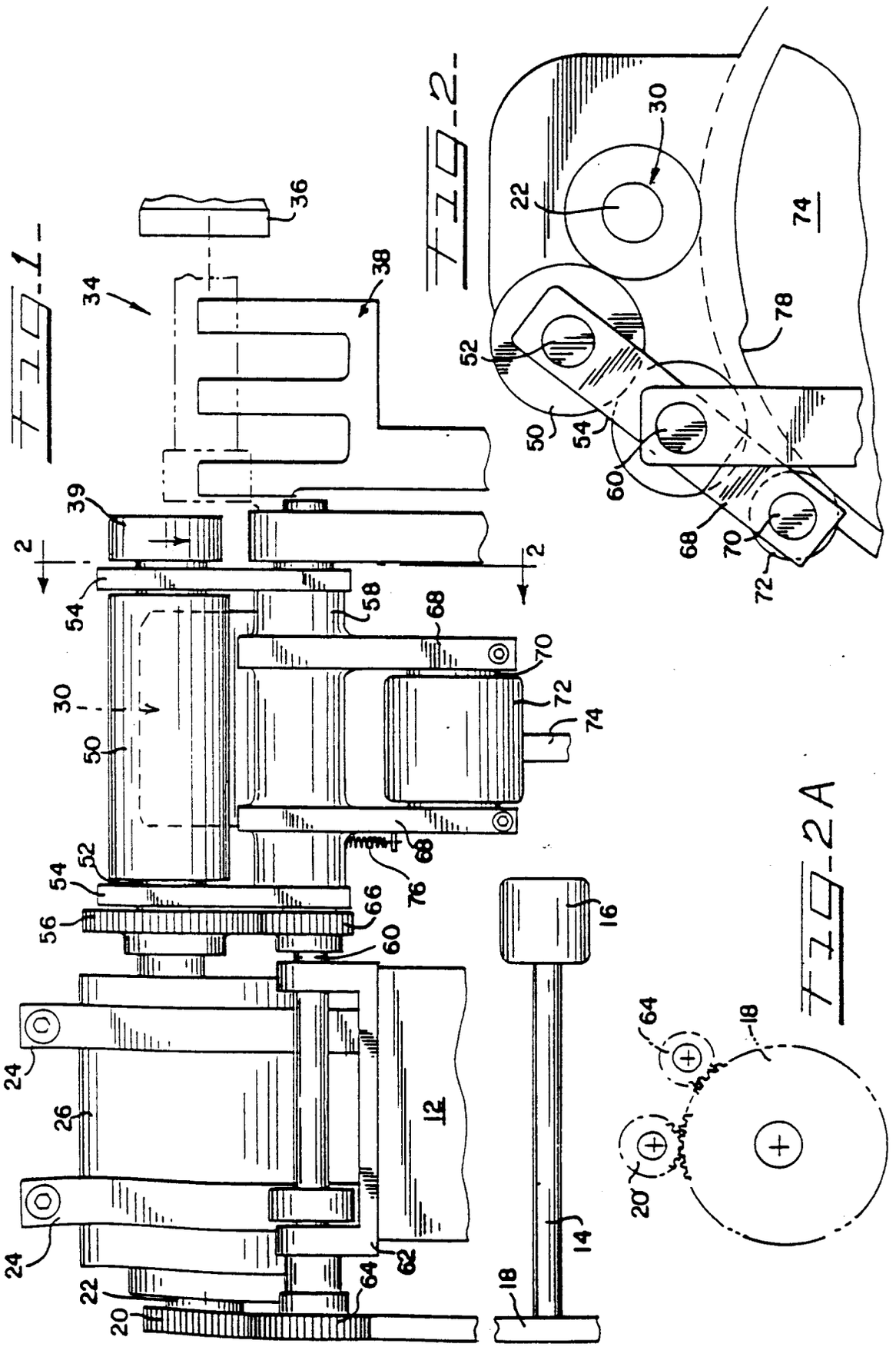
FIG-1
FIG-2
FIG-2A
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FIG. 3

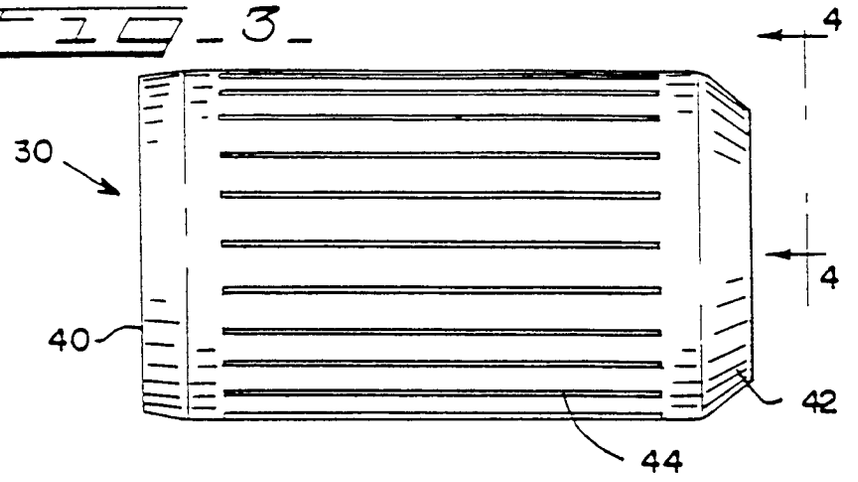

FIG. 4

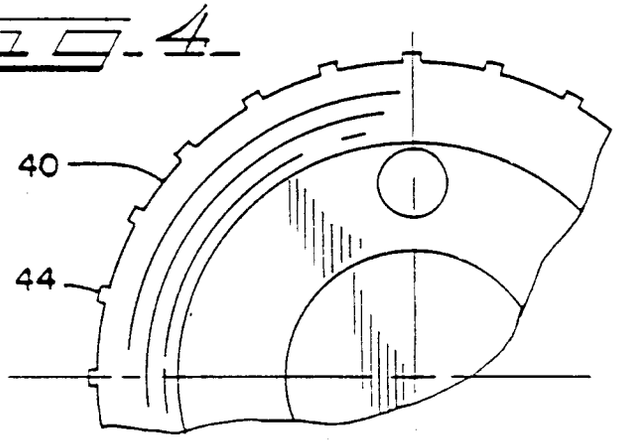

FIG. 5