

[54] **METHOD AND APPARATUS FOR SEPARATING END PORTIONS FROM METAL CANS**

2,209,209 7/1940 Rheem113/120 BB
 2,441,353 5/1948 Gosmann et al.....29/426
 2,636,408 4/1953 Mitchell29/426

[75] Inventors: **Harry B. Osborn, Jr.; John H. Maxim**, both of Cleveland, Ohio

Primary Examiner—Richard J. Herbst
Attorney—James H. Tilberry, Alfred C. Body and Robert V. Vickers

[73] Assignee: **Park-Ohio Industries, Inc.**, Cleveland, Ohio

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[57] **ABSTRACT**

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[58] Field of Search113/1 K, 120 BB; 225/93.5; 29/426; 30/140; 221/32

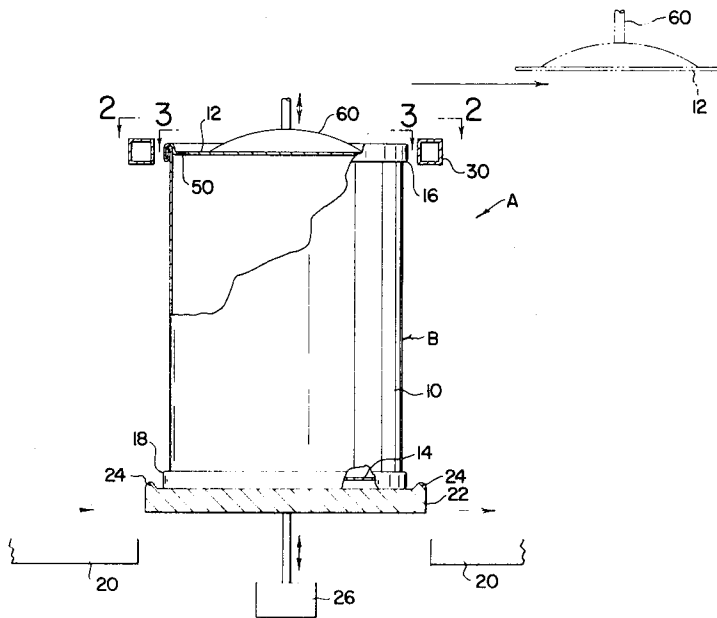
A method and apparatus for separating the end portions, or lids from a metal can including a cylindrical steel body portion and aluminum end portions wherein the aluminum end portions are melted adjacent the periphery of the body portion to allow separation from the can.

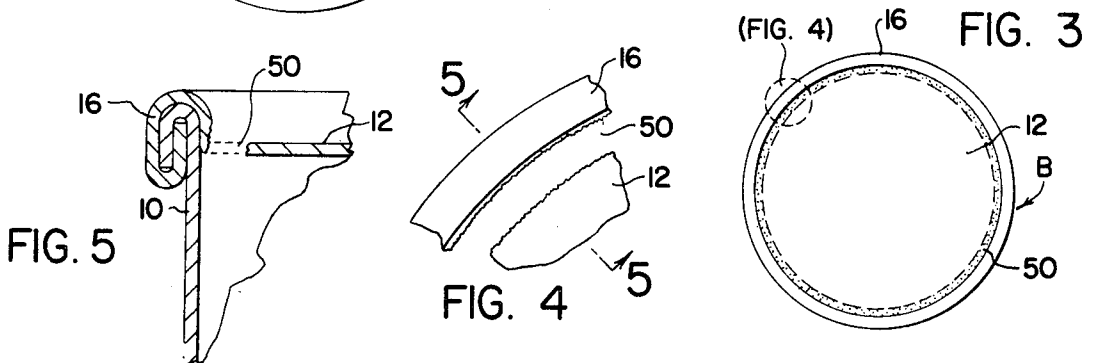
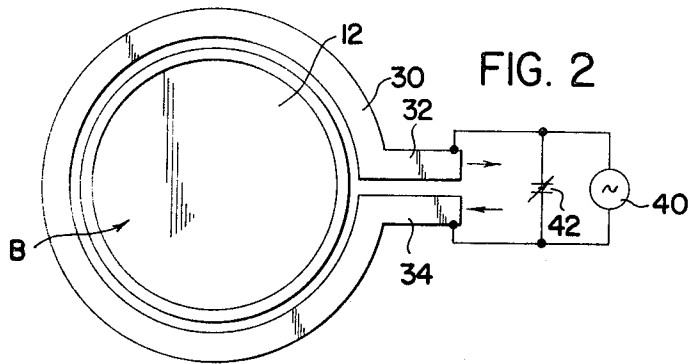
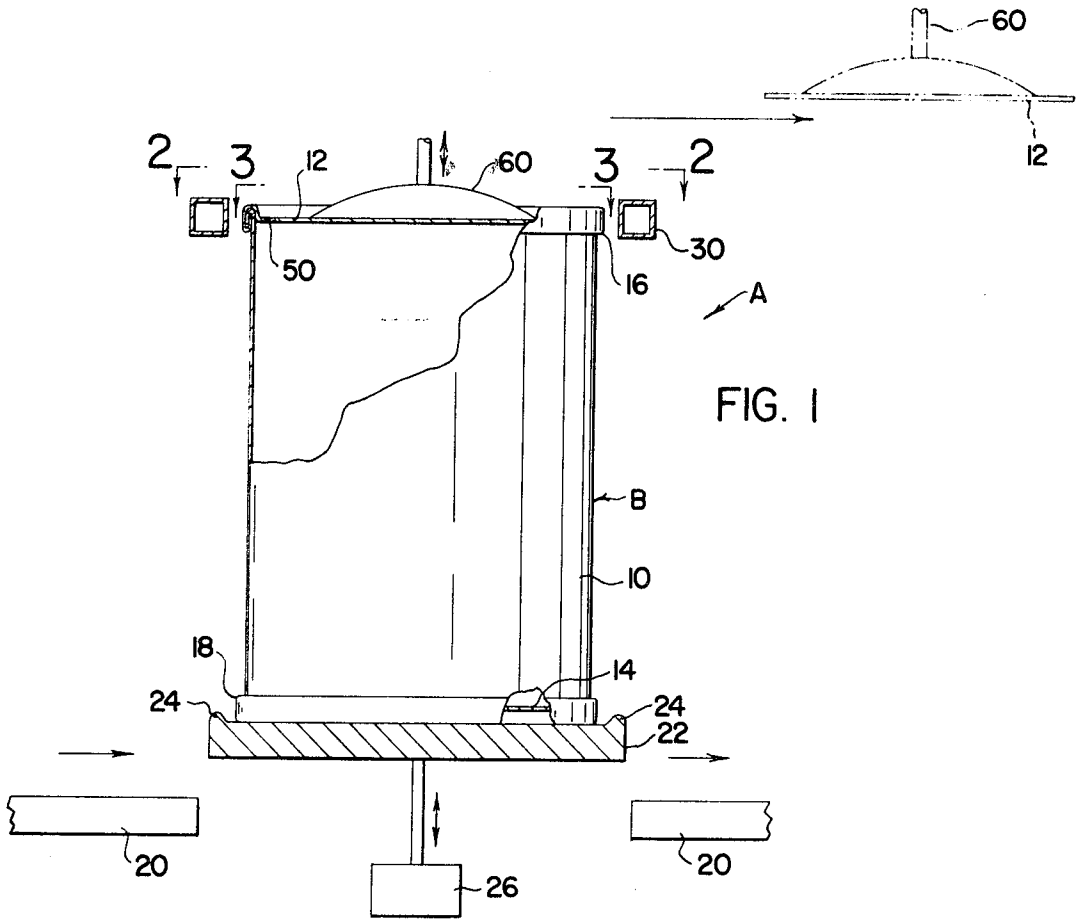
[56] **References Cited**

UNITED STATES PATENTS

10 Claims, 5 Drawing Figures

2,175,411 10/1939 Rheen113/120 BB





METHOD AND APPARATUS FOR SEPARATING END PORTIONS FROM METAL CANS

The present invention is directed toward the art of reclaiming metal cans and more particularly to a method and apparatus for removing the end portion from a can body. The invention is particularly applicable for removing an aluminum end portion from a steel can body, and it will be described with particular reference thereto; however, it must be appreciated that the invention has broader applications and may be used for removing metal end portions from various metal cans, irrespective of the metal forming the end portion and can body.

A large number of the metal cans now produced are formed from a cylindrical body portion made from steel and aluminum end portions secured onto the body portion at peripherally extending wrapped beads. After these cans have been used, it has been difficult to reclaim the metal from the cans because of the dissimilarity between the steel and aluminum. Consequently, these cans are often discarded and not reclaimed. The present invention relates to a method and apparatus which allows reclaiming of cans having dissimilar body portions and end portions.

In accordance with the invention, there is provided a method of separating the end portion from a metal can including a cylindrical body portion formed from a first metal having a first melting temperature and an end portion formed from a second metal having a second melting temperature. This method includes the steps of heating the can completely around the periphery of the can body and adjacent the joint between the end portion and the can body to a temperature substantially greater than one of the metal melting temperatures, and then separating the end portion from the cylindrical portion. By utilizing this method, at least the metal having the lowest melting point is melted in a circular area or band adjacent the joint between the end portion and the can body. When this melting takes place, the end portion is separated from the body portion so that these two separate portions can be separated and independently reclaimed.

In accordance with another aspect of the present invention, there is provided an apparatus for performing the method defined above which apparatus includes means for supporting the can, an inductor adjacent the joint or bead and coextensive with the periphery of the can body, a high frequency power supply means connected to the inductor for energizing the inductor with a current sufficient to heat the can to a temperature greater than the melting temperature of one of the metals forming the body portion or end portion and means for separating the end portion from the cylindrical body portion.

The primary object of the present invention is the provision of a method and apparatus for reclaiming metal cans having end portions formed from a metal different than the body portion, which method and apparatus provides an inexpensive arrangement for separating the ends.

Another object of the present invention is the provision of a method and apparatus as defined above which method and apparatus includes the use of an inductor surrounding the body portion adjacent one end for melting a narrow band of the can to disconnect the end portion from the body portion.

These and other objects and advantages will become apparent from the following description used in connection with the accompanying drawing in which:

FIG. 1 is a side elevational view showing, somewhat schematically, an embodiment of the present invention;

FIG. 2 is a reduced, partial schematic view taken generally along line 2—2 of FIG. 1;

FIG. 3 is a view taken generally along line 3—3 of FIG. 1;

FIG. 4 is an enlarged view taken generally in the area designated by the circle in FIG. 3;

FIG. 5 is a cross-sectional view taken generally along line 5—5 of FIG. 4.

Referring now to the drawings wherein the showings are for the purpose of illustrating one embodiment of the invention only and not for the purpose of limiting same, FIG. 1 shows an apparatus A for operation upon a metal can B having a cylindrical body portion 10 and spaced end portions 12, 14 secured onto the body portion at opposite ends thereof by normal rolled beads 16, 18, respectively. As illustrated, apparatus A removes only end 12 from the cylindrical portion 10. It is appreciated that the apparatus can be modified to remove simultaneously or successively both ends 12, 14 from the cylindrical portion.

The can B includes dissimilar metals in the cylindrical body portion and the two ends. Normally, the body portion is formed from steel and the ends are formed from aluminum. With this arrangement, aluminum melts at approximately 960°–1,100° F and steel melts at over 2,000° F. In accordance with the invention, the end or ends 12, 14 are separated from the body portion by melting a small band of the aluminum around the periphery of the can body to provide a separating area allowing separation of the aluminum end from the steel cylindrical body. In accordance with a more limited aspect of the present invention, the aluminum is melted from the steel body by induction heating the steel at the joint or bead 16 in a manner to be described later in connection with apparatus A; however, it is appreciated that processes could be used for accomplishing the basic result of separating the can end or ends from the cylindrical body by providing a melted area around the can and adjacent the joint.

Referring now more particularly to apparatus A, a supporting and conveying platform 20 is provided for allowing movement of the can B from left to right in FIG. 1. A nest 22 having a rim 24 and reciprocated by a lifting mechanism 26 receives the can B and moves the can upwardly from the platform 20 into the position shown in FIG. 1. An encircling inductor 30 surrounds the bead 16 and is connected by input leads 32, 34 with a high frequency power supply means 40. To correct the power factor in the heating installation, there is provided a normal adjustable capacitor 42 or other appropriate circuitry. When the inductor is energized by the power supply means 40, there is magnetic coupling between the inductor 30 and the steel with the bead 16. This heats the bead 16 to a sufficient temperature to form a melted band 50 extending around the periphery of the can body 10 and providing a separation area for the end 12. Of course, the steel within the bead 16 must be heated to a temperature exceeding the melting temperature of the metal forming end 12. If aluminum is used for the end, the bead is heated to a temperature of approximately 1,000°–1,200° F. The steel must be heated to a temperature higher than the

melting temperature of the particular aluminum alloy used for the end. It is preferred that the portion of the steel in the bead be in contact with the aluminum end and be heated to approximately 50° above the melting temperature of the metal forming the end 12. This assures rapid and positive melting around band 50 for subsequent separation.

Referring now to FIGS. 3-5, during the heating operation, the aluminum within the bead may be melted. This could allow separation of the end 12; however, it is preferred that a melting operation take place in a small band 50 immediately adjacent to the bead. This is shown best in FIG. 5. A variety of structures could be used for separating the end 12 which is divided from the remainder of the can by the melted band 50. A separating means, such as a suction cup 60, engages end 12 prior to the melting operation and removes the end 12 upwardly and to the right after the end has been separated from the can by the heating operation. This is illustrated in FIG. 1.

It is appreciated that the melting temperature of the can body may be less than the melting temperature of the end. When this happens, the band 50 is around the upper portion of body 10; however, the same results are obtained. If the melting temperature for the metal forming the end 12 is quite close to the melting temperature of the metal forming the body portion 10, it is conceivable that a band 50 would be in both the end and the body portion. Since the invention is particularly directed toward the can having a steel body and an aluminum end, the band 50 is formed in the aluminum end. This is normal construction for cans now being used in the soft drink trade.

It is also possible to place the inductor 30 above the bead 16 or adjacent the inner portion of the bead, instead of surrounding the bead 16 as shown in FIG. 1. The same results will be obtained; however, there is a possibility that the magnetic coupling will not be as efficient as the arrangement shown in the illustrated embodiment. In the preferred embodiment, the steel provides an extremely good magnetic coupling for induction heating which greatly enhances the heating operation when the can body is formed of steel or other ferrous material. For this reason, the invention is particularly applicable to the situation where the body 10 is ferrous and the ends are aluminum.

Having thus defined out invention, we claim:

1. A method of separating the end portion from a metal can including a cylindrical body portion formed from a first metal having a first melting temperature, said cylindrical body having axially spaced ends, and an end portion formed from a second metal having a second melting temperature different from said first melting temperature, said end portion being secured to one of said ends by a joint extending around the periphery of said cylindrical portion, said method comprising the steps of:

- a. heating said can completely around said periphery and adjacent said joint to a temperature substan-

tially greater than one of said melting temperatures; and,

- b. then separating said end portion from said cylindrical portion.

2. The method as defined in claim 1 wherein said heating step includes inductively heating said can completely around said periphery and adjacent said joint.

3. The method as defined in claim 1 wherein said second melting temperature is less than said first melting temperature.

4. The method as defined in claim 1 wherein said heating temperature is at least 50°F greater than one of said melting temperatures.

5. The method as defined in claim 4 wherein said one melting temperature is said second melting temperature.

6. The method as defined in claim 5 wherein said first melting temperature exceeds said second melting temperature by more than 50°F.

7. The method as defined in claim 6 wherein said first metal is steel and said second metal is aluminum.

8. The method as defined in claim 7 wherein said heating step includes inductively heating said can completely around said periphery and adjacent said joint.

9. An apparatus for separating the end portion from a metal can including a cylindrical body portion formed from a first metal having a first melting temperature, said cylindrical body having axially spaced ends, and an end portion formed from a second metal having a second melting temperature different from said first melting temperature, said end portion being secured to one of said ends by a joint extending around the periphery of said cylindrical portion, said apparatus comprising:

- a. means for supporting said can;
- b. an inductor adjacent said joint and coextensive with said periphery;
- c. a high frequency power supply means connected to said inductor for energizing said inductor with a current sufficient to heat said can to a temperature substantially greater than one of said melting temperatures; and,
- d. means for separating said end portion from said cylindrical portion.

10. A method of separating the end portion from a metal can including a cylindrical body portion formed from a first metal having a first melting temperature, said cylindrical body having axially spaced ends, and an end portion formed from a second metal having a second melting temperature different from said first melting temperature, said end portion being secured to one of said ends by a joint extending around the periphery of said cylindrical portion, said method includes the steps of:

- a. melting at least one of said metals in a narrow band forming a closed shape coextensive with said periphery and adjacent said joint; and,
- b. then separating said end portion from said cylindrical portion at said narrow band.

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