United States Patent

Bozek

[15] **3,646,840**

[45] **Mar. 7, 1972**

[54] TRIMMING HEAD FOR METAL CANS

[72] Inventor: **John S. Bozek**, Chicago, Ill.

[73] Assignee: **Continental Can Company, Inc.**, New York, N.Y.

[22] Filed: **Oct. 27, 1969**

[21] Appl. No.: **869,694**

[52] **U.S. Cl.** **82/82**, 82/47, 82/101

[51] **Int. Cl.** **B23b 3/04**, B23b 5/14, B23b 1/00

[58] **Field of Search** 82/46, 82, 101

[56] **References Cited**

UNITED STATES PATENTS

1,622,253	3/1927	Putt et al.	82/82
1,807,671	6/1931	Phelps	82/82
2,342,246	2/1944	Bruekner	82/82
2,443,963	6/1948	Ricciardi	82/82

FOREIGN PATENTS OR APPLICATIONS

818,366	8/1959	Great Britain	82/82

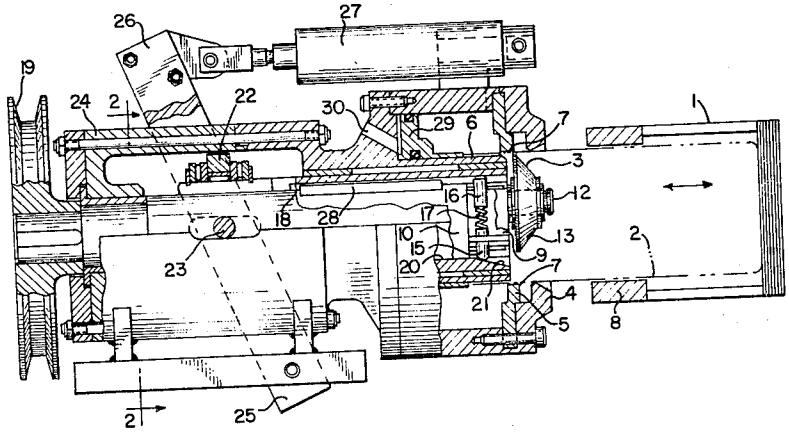
Primary Examiner—Harrison L. Hinson

Attorney—Americus Mitchell, Joseph E. Kerwin and William A. Dittmann

[57] **ABSTRACT**

A trimming head for metal cans having a cutter rotating against a stationary cutter ring. The can end to be trimmed is fitted inside the stationary exterior cutting ring. As the interior cutter rotates, it cuts the can end off to leave the can at a uniform length. A knockout ring ejects the scrap, and the trimming head is ready for the insertion of another untrimmed can end.

8 Claims, 4 Drawing Figures



PATENTED MAR 7 1972

3,646,840

SHEET 1 OF 2

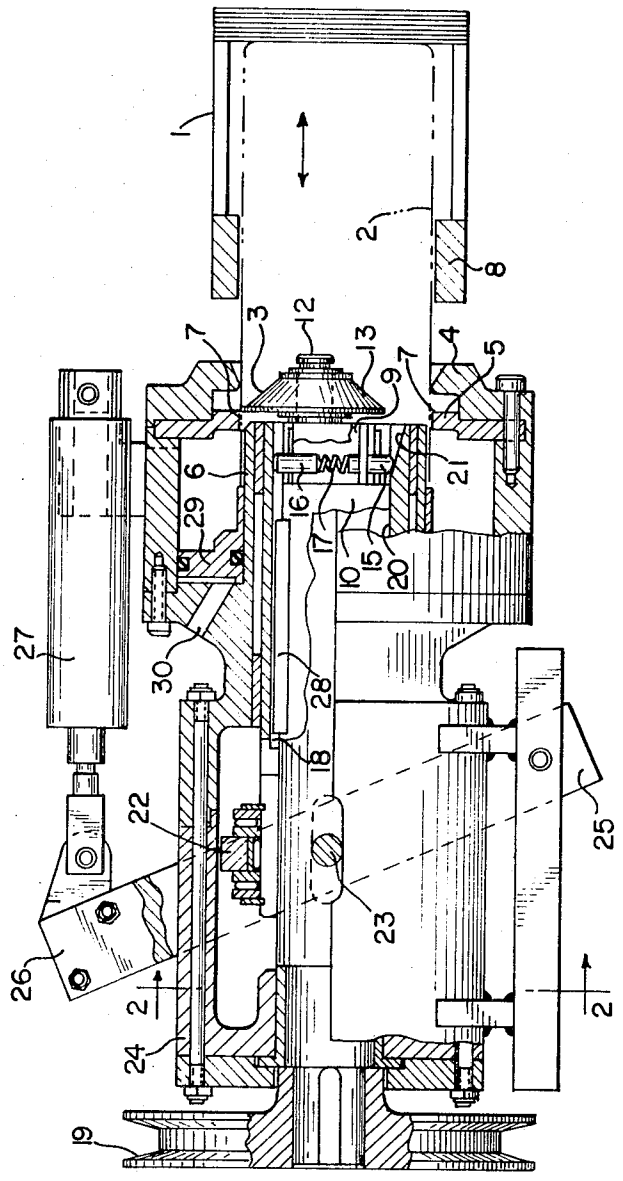


FIG. 1

INVENTOR
JOHN S. BOZEK

BY

ATT'Y.

FIG. 3

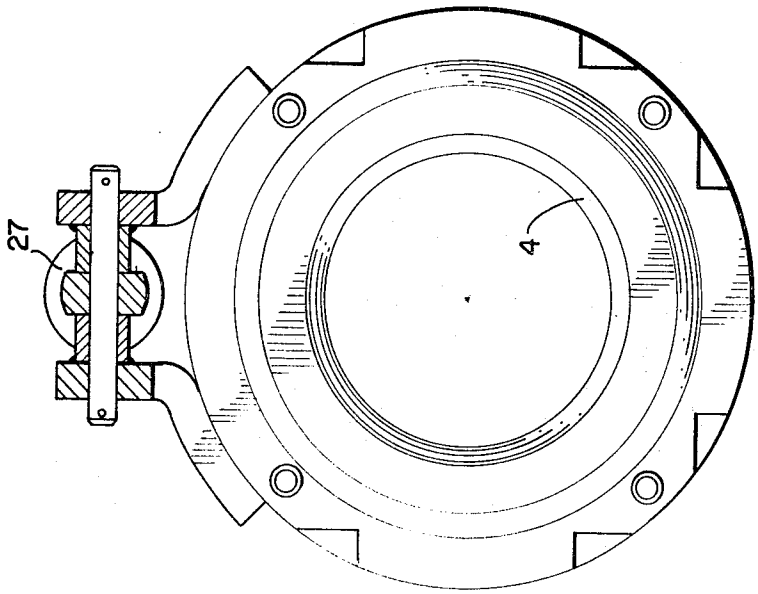


FIG. 4

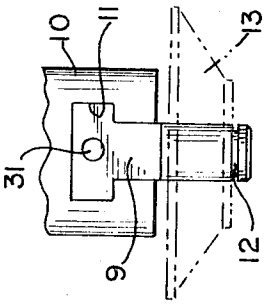
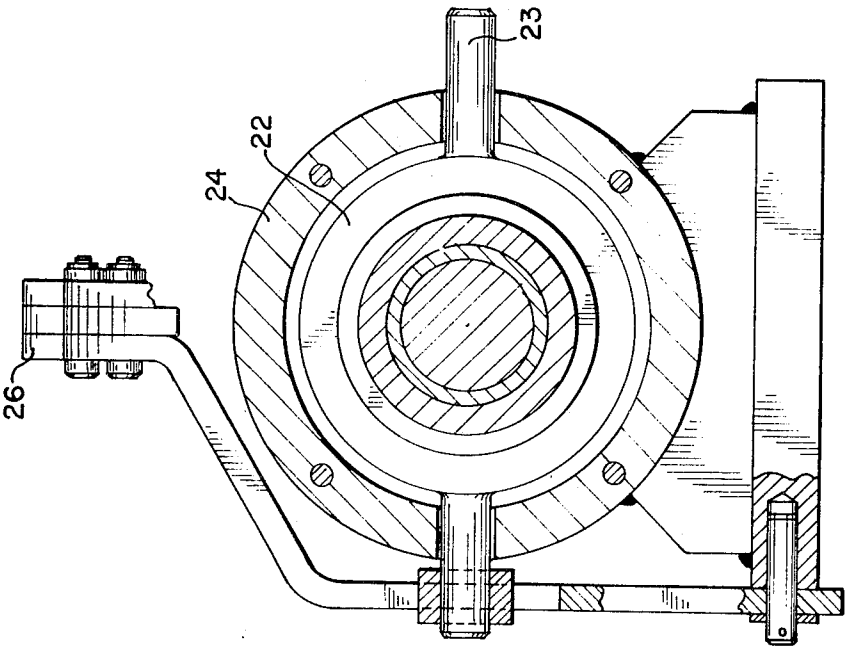


FIG. 2



INVENTOR
JOHN S. BOZEK

BY

ATT'Y.

TRIMMING HEAD FOR METAL CANS

My invention relates to a trimming device for cylindrical objects, and especially to a high-speed trimming device for cans.

In the prior art, there are several types of trimming devices, such as a milling-type device, and a shear-type cutter. These devices have various problems in operation, such as that of preventing the can from turning in the can holder and dispensing long, springlike chips. The problems of disposing of the scrap ring cutoff from the can and the elimination of the slivers which may be created during trimming are also found in devices of the prior art.

It is an object of my invention to trim cylindrical elements to a uniform length.

It is another object of my invention to trim cylindrical elements with a single rotary motion of the cutter without developing cracks, burrs, or slivers.

It is a final object of my invention to trim cylindrical elements by trimming with a high-speed operation and, at the same time, turning the burr outward.

In brief, my apparatus is operated by sliding a movable inside cutter across a stationary outside cutter ring. The cylindrical object or can is disposed with its open end inside the stationary cutting ring. The can is placed squarely down and inside the cutting ring. The active cutting element is an inside cutter. This cutter rotates rapidly and is gradually moved offcenter by a built-in cam mechanism. The inside cutter shears off the surplus portion of the can against the exterior cutting ring. A knockout ring moves the scrap ring out of the die into a scrap catcher. The machine is now ready for another cycle.

Other objects of the invention will become apparent from the following specification and the drawings relating thereto and from the claims set forth.

FIG. 1 shows a view of my device with sections cut away.

FIG. 2 shows an end view of my device, taken from the right-hand side.

FIG. 3 shows a section taken along the line 3—3 of FIG. 1.

FIG. 4 shows a top view of the stud shaft and main shaft.

My invention is illustrated to best advantage in FIG. 1. In this FIGURE as shown, a can holding fixture 1 is used to move a can or can body 2 from the extreme right-hand position up to the trimming head 3. The can is then guided by a stationary ring 4 into the exterior cutting ring 5 and over the cylindrical body of the knockout slide 6. The height of the can is predetermined by the distance between the cutting edge 7 and the inside bottom of the collet 8. During the actual trimming, the can is supported at three points, one in the collet, second in the guiding ring near the trim line, and third at the trim line.

In essentials, my apparatus has a stud shaft 9 mounted slideably into a rotatable main shaft 10. The peculiar mounting of the stud shaft onto the shaft is one of the reasons for the success of my operation. The sliding section of the stud shaft 9 has a T-shape and fits into a slot 11 in the end of the shaft 10. (FIGS. 1 and 4). The T is secured in the slot, with the capability to slide along the length of the slot. It's vertical protrusion 12 projects from it and serves as a shaft for the inside cutter 13. The stud shaft 9 is drilled along the length of the T as shown in FIGS. 1 and 4, and two pins 15, 16 are inserted in this opening. One pin 15 is fastened immovably to the T stud while the other pin 16 has a slip fit. A compression spring 17 is inserted in the opening between the two pins to keep the movable pin 16 always engaged in the groove 18 of the cam sleeve, while the position of the fixed pin in relation to the cam sleeve determines the eccentricity of the cutter 13 in relation to the main shaft 10. The main shaft 10 is rotated by a pulley 19 attached to its other end. Mounted about the length of the shaft 10 is a sleeve 20 which is in its principal function a cam sleeve. At the cutter end of the sleeve is a cam 21 which coacts with the fixed pin 15 to cause the T-stud to move offcenter when the sleeve is moved forward to move the stud shaft in an upward direction as shown in FIG. 1. Actually, the cam causes the pin 15 to move toward the axis of rotation of the shaft and the cutter 13 to move away from the axis. A bearing ring 22 is mounted about the sleeve and attached to the bearing ring are trunnions 23 which project outwardly through the housing 24

and are actuated by a bifurcated element 25. One end 26 of the bifurcated element is attached to an air cylinder 17 or the like for shifting the element 25 and the trunnions 23 back and forth. The main shaft 10 and sleeve 20 are keyed together by key 28 and rotate together.

Mounted adjacent the outer cutting ring 4 is a knockout ring 29. On the left side of the knockout ring is a connection 30 to compressed air and on the other side of the knockout ring may be vacuum or air at ambient temperature and pressure. After the surplus material has been cut from the can, compressed air is conducted through the conduit in the housing and into the area behind the knockout ring, thereby forcing the knockout ring forward and ejecting the scrap material from the apparatus. The scrap material may be collected in a wastebasket or the like.

The operation of my device is as follows: the can holding means takes a can and pushes it through the guiding ring into the area inside the stationary cutting ring. At this stage, the inside cutter is located dead center on the axis of the rotating main shaft. The shaft is rotated by its pulley at all times. Now, the air piston shifts the bifurcated element forward causing the trunnions to move forward and carry with the trunnions the ring actuator and the ring mounted on the sleeve. The sleeve moves forward, the stationary pin of the stud rides upward on the cam in the forward end of the sleeve. This causes the stud shaft to more away from the centerline of the main shaft 10. The stud shaft moves progressively away from the centerline of the pin until the cutter, which is mounted on the stud shaft, begins to cut the can. The can is cut by the inside cutter and the stationary outside cutter. After the can has been cut, the stud shaft returns to center position. While the stud shaft is returning to its center position, the can holding means moves away from the cutting apparatus or the outside cutter. Compressed air is connected to the conduit leading to the power chamber to one side of the knockout ring apparatus. The knockout ring is moved from left to right, pushing the scrap can end before it. The scrap can end is caught in some waste container mounted below my apparatus. Now the apparatus is ready to begin a new cycle.

Shown in FIG. 2 is a cross section along the line 2—2 of FIG. 1, showing the trunnion 23, trunnion ring 22, and housing apparatus 24. The sleeve 20 is mounted inside the trunnion ring and moves with the trunnion ring. The shaft 10 is located centrally of the apparatus and the bifurcated shifting elements 25 are shown in part section.

FIG. 3 shows my device taken along the line 3—3 of FIG. 1. The guide 4 obscures the cutting edge, the stationary outside cutting ring, as it extends completely around the entrance to this area. The air cylinder is shown mounted above the apparatus and in the view of FIG. 4, shown below, is the stud and stud shaft 9 mounted in the rotating shaft 10. The hole 31 for the pins 15, 16 is likewise shown.

The part of the can which extends into the slot becomes scrap after the cutting operation takes place, and it is severed from the rest of the can.

During the whole operation, the inside cutter is turning at a high speed. The inside cutter is mounted on the stud shaft. The stud shaft is mounted on the arbor shaft. The arbor shaft is turned by a pulley and the arbor shaft and stud shaft are constantly rotating. After the can has been moved the appropriate distance in through the outside ring cutter, the high-speed inside cutter is gradually moved offcenter by means of a built-in cam.

As the can moves forward, the inside cutter is moved into a more and more eccentric position, and as it whirls around, it separates the surplus can material from the rest of the can. The inside cutter cuts against the outside ring and leaves few, if any, slivers. As the scrap material is sheared off the end of the can, and after this operation is completed, a cutter moves back into its center position along the centerline and then, together with the trim head, and sheared off scrap, the cutter retracts.

While the trim head is retracting, air is admitted to the knockout ring through an opening in the housing. When air is admitted, the knockout ring moves the scrap ring forward. The scrap ring falls from the machine into a scrap container.

Some of the advantages of this machine are: ready disposition of the scrap ring cutoff of the can, the elimination of slivers created during trimming, a burr, if any, only on the outside of the can, thus facilitating cleaning, and easy elimination of the scrap ring.

The foregoing is a description of an illustrative embodiment of the invention, and it is applicant's intention in the appended claims to cover all forms which fall within the scope of the invention.

What is claimed is:

1. In an apparatus for trimming the end of a can and having a cutting ring, a main shaft, a sleeve around the main shaft, a stud shaft having a first end slidably attached to the main shaft, a cutter attached to a second end of the stud shaft, the improvement comprising:

a first groove of varying depth extending along the length of the inside of said sleeve,

a T-shaped slot in the end of the main shaft,

a T-shaped fitting on the first end of said stud shaft for sliding in the slot of said main shaft whereby said stud shaft is slidably joined to said main shaft,

a passageway through said stud shaft in a plane perpendicular to the axis of rotation of said main shaft,

a fixed pin mounted in said passageway and projecting from said passageway into said first groove,

a movable pin mounted in said passageway,

compression spring means mounted in said passageway between said movable pin and said fixed pin for urging said movable pin out of said passageway whereby said movable pin presses against the side of said sleeve and urges said stud shaft and cutter toward the cutting ring to shear off the excess material from the end of the can.

2. An apparatus for cutting a tubular workpiece as set forth in claim 1 further comprising:

a trunnion ring mounted about said sleeve and attached to said sleeve for moving said sleeve toward and away from said cutting ring.

3. An apparatus for cutting a tubular workpiece as set forth in claim 2 in which said first groove comprises:

cam means located on the inside of said sleeve adjacent said movable pin whereby as said sleeve is moved away from said cutting ring said fixed pin rides down the cam surface toward the outside of said sleeve carrying said stud shaft and said cutter with it toward cutting cooperation with said cutting ring and as said sleeve is moved toward said ring said fixed pin rides up said cam surface toward the longitudinal axis of said sleeve carrying said stud shaft and cutter with it.

4. An apparatus for cutting a tubular workpiece as set forth in claim 3 further comprising:

a bifurcated means for moving said trunnion ring toward and away from said cutting ring,

trunnion bearing means mounted on opposing sides of said trunnion ring for cooperation with said bifurcated means whereby motion of said bifurcated means is imparted to said trunnion ring and thus to said sleeve.

5. An apparatus for cutting a tubular workpiece as set forth in claim 1 further comprising:

ejection means for ejecting the cutoff portion of a tubular workpiece from adjacent said cutting ring after said rotary cutter has cut the tubular workpiece and separated said cutoff portion from said tubular workpiece and said cutter has returned from its cutting position to a central position as said sleeve has retracted from the neighborhood of said cutting ring and said fixed pin has slid down said cam surface on said sleeve.

6. An apparatus for cutting a tubular workpiece as set forth in claim 5 in which said ejection means comprises:

a knockout ring means for pressing the cutoff portion of said tubular workpiece out of said apparatus.

7. An apparatus for cutting a tubular workpiece as set forth in claim 6 comprising further:

an air chamber located behind and adjacent to said knockout ring means for pressing said knockout ring against said cutoff portion of said workpiece and expelling said cutoff portion from said apparatus.

8. A can end trimming device comprising:

an outer cutting ring forming an orifice and attached to the casing of the can end trimming device,

can holding means for moving an untrimmed can into the outer cutting ring and for moving the trimmed can away from the outer cutting ring after the surplus material has been removed from said can,

a main shaft mounted for rotation about its axis and having a T-shaped slot in one end,

a stud shaft having a first end and a second end and having a T-shaped fitting at said first end for sliding in said slot whereby said stud shaft is slidably joined to said main shaft,

a rotatable cutter mounted on the second end of said stud shaft,

a passageway through said stud shaft and extending normal to the axis of said main shaft,

a movable pin mounted in said passageway,

a fixed pin mounted in said passageway and extending out of said stud shaft a short distance,

a compression spring mounted in said passageway between said movable pin and said fixed pin for urging said movable pin outwardly from said stud shaft,

a sleeve mounted about said main shaft,

a first groove of varying depth extending longitudinally of said sleeve along the interior of said sleeve whereby said fixed pin rides in said groove to move said stud shaft and said rotatable cutter to and from cutting position against the side of said can end, and

a second groove of uniform depth extends longitudinally of said sleeve on the opposite side of said sleeve from said first groove whereby said movable pin rides in said second groove while the main shaft and sleeve turns and when said fixed pin rides down the varying depth of said first groove then said compression spring urges said stud shaft outwardly to cause said cutter to engage and sever said can side against said outer cutting ring.

* * * * *