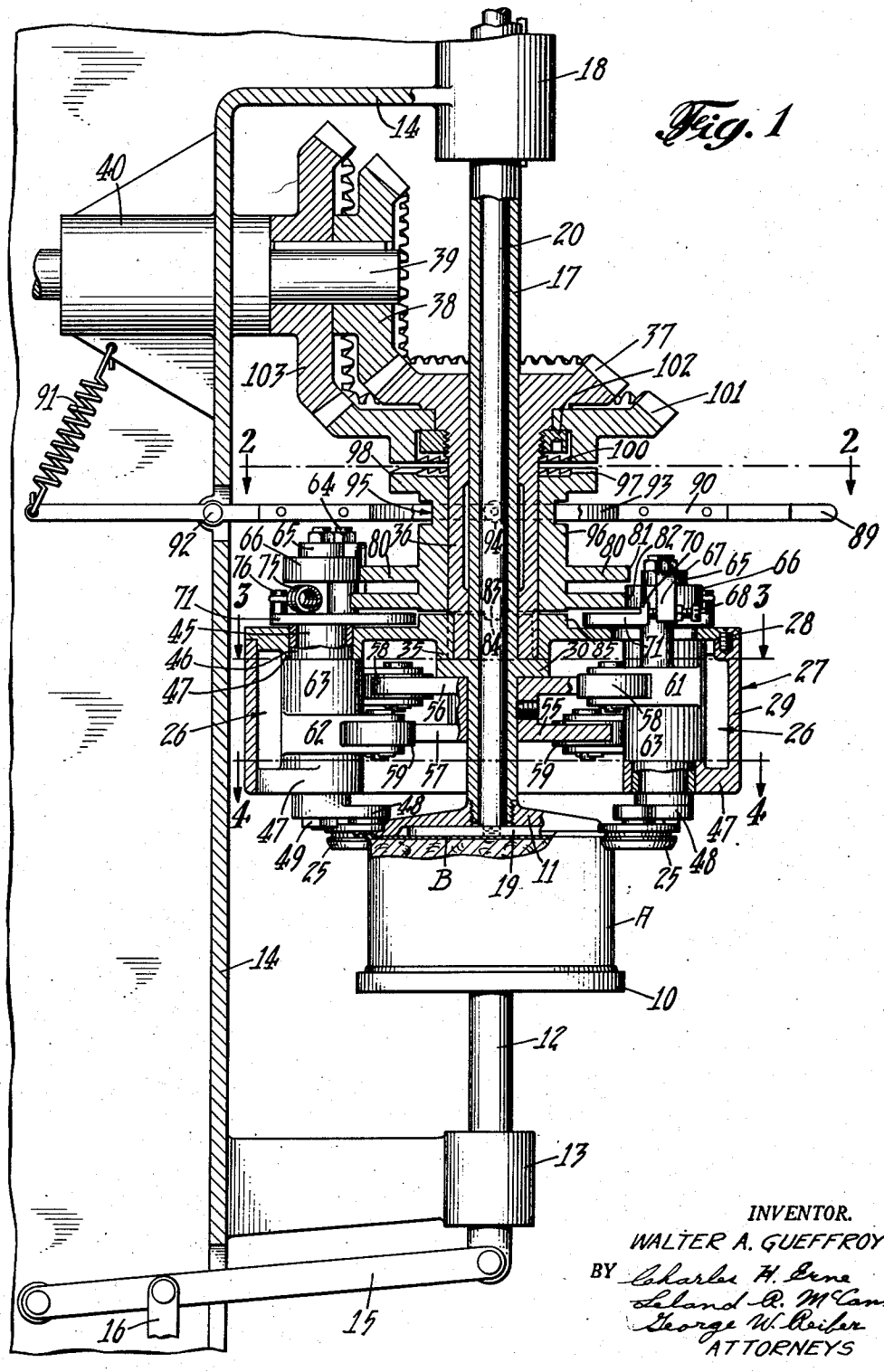
June 28, 1955 W. A. GUEFFROY 2,711,706

CONTINUOUSLY ROTATING SEMI-AUTOMATIC SEAMING HEAD

Filed Dec. 18, 1951 3 Sheets-Sheet 1

Fig. 1



INVENTOR.
WALTER A. GUEFFROY
BY Charles H. Grene
Leland R. McCann
George W. Reiber
ATTORNEYS

June 28, 1955 W. A. GUEFFROY 2,711,706

CONTINUOUSLY ROTATING SEMI-AUTOMATIC SEAMING HEAD

Filed Dec. 18, 1951 3 Sheets-Sheet 2

Fig. 2

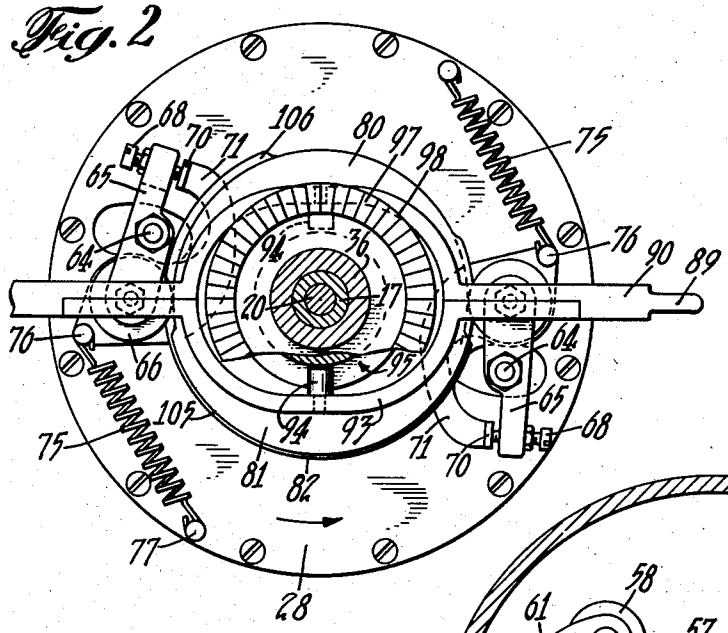


Fig. 3

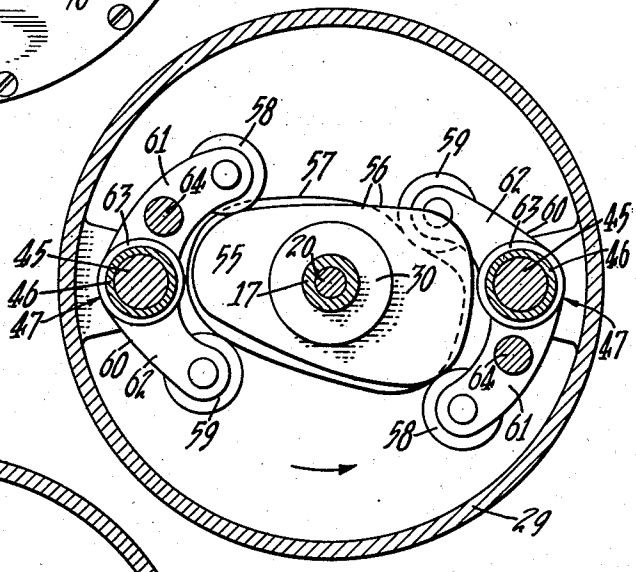
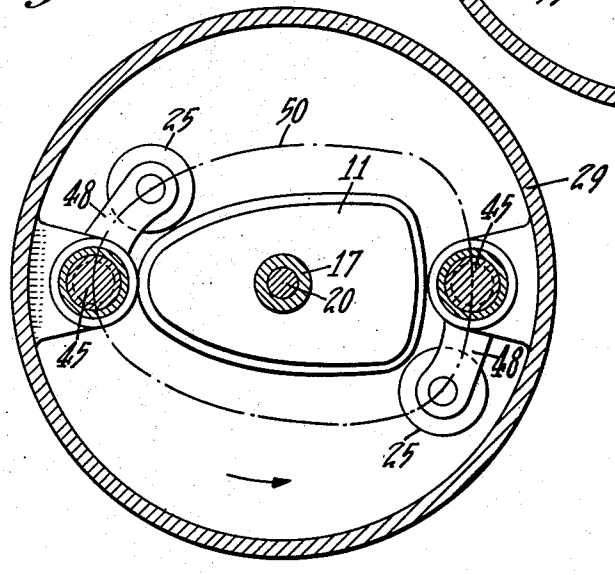


Fig. 4



INVENTOR.
WALTER A. GUEFFROY
BY Charles H. Sturm
Leland R. McCann
George W. Reiber
ATTORNEYS

June 28, 1955 W. A. GUEFFROY 2,711,706

CONTINUOUSLY ROTATING SEMI-AUTOMATIC SEAMING HEAD

Filed Dec. 18, 1951 3 Sheets-Sheet 3

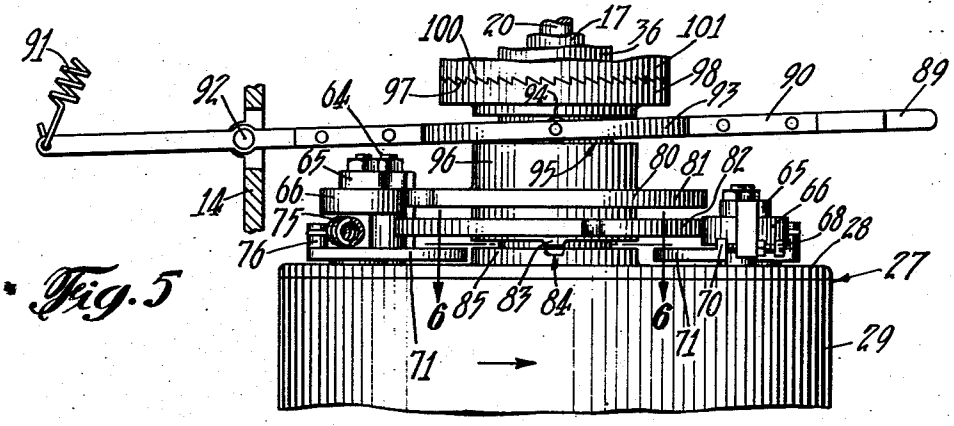


Fig. 5

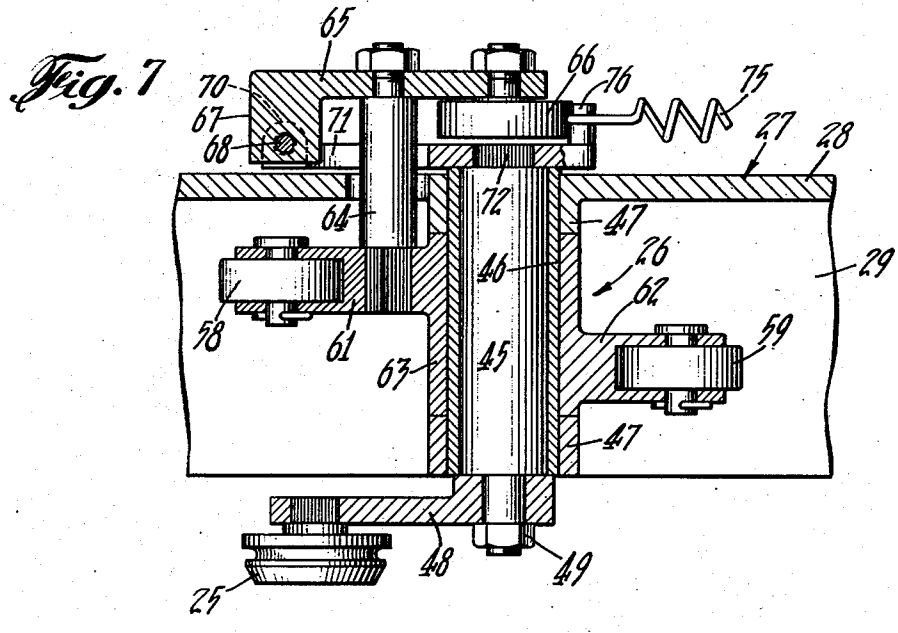


Fig. 7

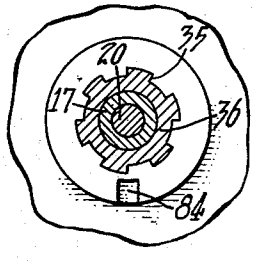


Fig. 6

INVENTOR.
WALTER A. GUEFFROY
BY Charles H. Sine
Leland R. McCann
George W. Raiber
ATTORNEYS

United States Patent Office 2,711,706 Patented June 28, 1955

2,711,706

CONTINUOUSLY ROTATING SEMI-AUTOMATIC SEAMING HEAD

Walter A. Gueffroy, Roslyn Heights, N. Y., assignor to American Can Company, New York, N. Y., a corporation of New Jersey

Application December 18, 1951, Serial No. 262,293

6 Claims. (Cl. 113—24)

The present invention relates to semi-automatic can closing machines and has particular reference to a continuously rotating seaming head which is provided with an axially reciprocable seaming cam to inactivate the seaming rolls after each seaming operation in order to adapt the machine to the productive capabilities of the operator and thus increase its output.

In the double seaming of non-circular or irregular shaped cans, it is the general practice to provide two independently operating cam systems in the seaming head. One of these systems operates to guide the seaming rolls along a path of travel which is parallel to the shape or contour of the can being seamed, and thus is usually referred to as the "contour cam" system. The other cam system superimposes a secondary movement onto the seaming rolls to move them into and out of seaming contact with the can, and is thus known as the "seaming cam" system. It is only when the seaming rolls are in nonseaming or "out"-position that the can and end may be introduced into or removed from the seaming head. Since it is desirable that the seaming rolls be in this out position for only a small part of each seaming cycle in order that the maximum time may be devoted to the actual seaming operation, there remains only a comparatively short time interval between successive cycles of a continuously rotating seaming head during which the seamed can may be removed and an unseamed can raised to sealing position in the head.

In automatic closing machines having an automatic can feeding mechanism synchronized with the seaming cycle, this situation is not a problem but is actually advantageous. However, in semi-automatic machines wherein the cans are fed and removed by hand, any delay on the part of the operator may result in the loss of an entire seaming cycle between successive cans and a consequent loss of production.

One method of overcoming this objectionable waste of time is to stop and start the seaming head for each can. This is not a desirable solution, however, for the seaming head is a very heavy mechanism and the shock imparted by its intermittent operation imposes a severe strain on the whole machine.

The present invention, on the other hand, furnishes a simple solution by providing a seaming head in which the seaming cam is movable vertically with respect to the remainder of the head. Thus, during the seaming portion of each cycle, the seaming cam is held in raised position where it is in engagement with its driving gear which rotates it at a speed which differs from that of the head proper in order to impart the suitable in and out movements to the seaming rolls. After the seaming operation has been completed, the seaming cam is automatically moved downwardly to disengage it from its driving gear and to simultaneously key it to the head so that it rotates at the same speed as the head, thereby locking the seaming rolls in their out-position until the next seaming cycle is initiated by the operator.

An object of the invention, therefore, is the provision

of a continuously rotating seaming head in which the seaming cycle is completely under the control of the operator and can be initiated by merely shifting the seaming cam bodily into direct engagement with its driving gear.

Another object is the provision in such a head of a movable seaming cam which automatically operates to lock the seaming rolls in nonseaming position at the completion of each seaming cycle in order to obviate the necessity of stopping the head each time a can is sealed.

Still another object is to provide a continuously rotating seaming head of simple construction which is designed to operate at the optimum production speed of the operator and which is especially desirable for use with non-circular cans, although the principles of the instant invention may also be adapted to the seaming of circular cans.

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 vertical section of a seaming head embodying the instant invention, with parts broken away;

Figs. 2, 3 and 4 are horizontal sections taken substantially along the lines **2—2**, **3—3** and **4—4**, respectively, of Fig. 1;

Fig. 5 is a side elevation of a portion of the seaming head of the instant invention showing the seaming cam in engagement with its driving gear;

Fig. 6 is a horizontal section taken substatnially along the line **6—6** in Fig. 5, with parts broken away; and

Fig. 7 is an enlarged vertical section taken through one of the seaming units embodied in the head, with parts broken away.

As a preferred or exemplary embodiment of the instant invention, Fig. 1 illustrates a can seaming head adapted to interfold the outwardly extending flanges of a non-circular can A and a superimposed end or cover B into a conventional type of double seam. During the double seaming operation, the can A and end B are immovably clamped between a nonrotating lifter pad or support **10** and chuck **11**. The can support **10** is mounted on the upper end of a vertically reciprocable stem **12** which is disposed in a suitable bearing **13** which forms a part of the main frame **14** of a can closing machine. The stem **12** is suitably actuated through a lever **15** and a connecting link **16** to raise the unseamed can and cover into seaming position against the chuck **11** which has a contour similar to and engages within the countersink of the can end B.

The chuck **11** is threadedly secured to the lower end of a stationary chuck sleeve **17** which at its upper end is secured in a bearing **18** formed on the main frame **14**. The bottom face of the chuck **11** is recessed to receive a knockout pad **19** carried on a stem **20** which is disposed within the chuck sleeve **17**. The stem **20** is cam-actuated in the usual manner to move the knockout pad **19** downwardly in order to eject the can from the seaming head after the seaming operation has been completed.

The actual shaping of the double seam is performed by first and second operation seaming rolls **25** which form a part of seaming units whch are generally designated by the numeral **26** in the drawings. There are two of these seaming units **26** illustrated in the present drawings, the first operation unit being the one on the left (as viewed in Fig. 1), and as they are substantially similar in construction and operation, a description of one will suffice for a complete understanding of both.

The seaming units **26** are oppositely disposed in a ro-

tatable head housing 27 which is composed of a head plate 28 and a cylindrical shell 29 secured together to form a unitary structure. The head plate 28 is supported by a flange 30 formed integral with the stationary chuck sleeve 17 and is multiply keyed as at 35 (see Figs. 1 and 6) to the lower end of a rotatable splined head sleeve 36 which is disposed around the chuck sleeve 17.

A seaming head bevel gear 37, formed at the upper end of the head sleeve 36, meshes with a constantly rotating driving gear 38 to rotate the head housing 27 and carry the seaming units around the stationary chuck 11 in a counterclockwise direction as indicated by the arrows in Figs. 2, 3, 4, 5. The driving gear 38 is keyed to and is driven by a drive shaft 39 which is rotated in any suitable manner in a bearing 40 formed in the main frame 14.

Each seaming unit 26 includes a vertical rocker shaft 45 (Fig. 7) which is rotatably disposed in a bearing sleeve 46 secured in bearings 47 formed in the head housing 27. The lower end of the rocker shaft 45 below the head housing is reduced in diameter and has keyed thereto a seaming roller lever arm 48 which is held in place by a nut 49. The arm 48 carries the freely rotatable seaming roll 25 at its free end.

As each seaming roll 25 is carried around the stationary irregularly shaped can body A and end B by the rotation of the head housing 27, it moves in a primary orbit which is substantially identical in contour to the outline of the can A, end B and chuck 11. The center line of this orbit is indicated by the broken line 50 in Fig. 4. The particular shape of the orbit 50 is imparted to the seaming roll 25 by a stationary contour cam 55 (Figs. 1 and 3) in a manner whch will hereinafter be described.

The contour cam 55 is disposed within the head housing 27 and is mounted on and secured to the chuck sleeve 17. The cam 55 is a double cam and is composed of a pair of vertically spaced, conjugate cam tracks or faces 56 and 57 (see Figs. 1 and 3).

A pair of vertically spaced contour cam follower rollers 58, 59 (see also Figs. 3 and 7) which operate against and are in constant engagement with the cam faces 56, 57 respectively (Figs. 3 and 7) as the head housing 27 rotates them around the cam 55, are carried by each seaming unit 26 on a bell crank 60 having a pair of opposed, vertically offset arms 61, 62 which extend horizontally from a sleeve 63 rotatably mounted on the rocker arm bearing sleeve 46 between the bearings 47. The trailing arm 61 of each seaming unit 26 carries a vertical pin 64 which extends up through an opening in the head plate 28. This pin is reduced at its upper end to form a pivot bearing for a seaming lever 65 (see Figs. 2 and 7) one end of which carries a seaming cam roller 66 while the other end is formed with a depending lug 67. The lug 67 is provided with an adjusting screw 68 which bears against an opposing lug 70 formed at the trailing end of a curved rocker shaft arm 71 (see Figs. 2 and 7) which is securely press fitted to a reduced portion 72 formed at the upper end of the rocker shaft 45.

A coiled tension spring 75 is stretched between a pin 76, secured to the leading end of the rocker shaft arm 71, and a second pin 77, secured in the head plate 28, in order to press the lug 70 against the adjusting screw 68 and thus urge the seaming lever 65 in a counterclockwise direction. The seaming cam roller 66 is thereby constantly maintained in contact with a seaming cam 80 (see Figs. 1, 2, 5) which slideably surrounds the head sleeve 36 and is disposed just above the head housing 27.

The seaming cam 80 is a double cam and is formed with two vertically spaced cam tracks or faces, these being an upper, first operation cam face 81 which cooperates with the first operation seaming cam roller 66, and a lower, second operation cam face 82 which co-operates with the second operation seaming cam roller 66, the latter roller 66 being disposed at a lower level than the first operation roller 66.

As previously stated, the primary, or contour orbit 50 is imparted to the seaming rollers 25 by the contour cam 55. As the seaming units 26 are rotated around this cam 55, the bell cranks 60 are oscillated around the rocker shafts 45 as the contour cam rollers 58, 59 travel along the suitably shaped, mated cam faces 56 and 57. These movements are conveyed to the seaming levers 65 by the pins 64, which reciprocate laterally in a short arcuate path of travel, and cause the seaming levers 65 to oscillate around the seaming cam rollers 66 which are held against the seaming cam 80 and thus act as pivot points for the levers 65. The movements of the seaming levers 65 are transferred to the rocker shaft arms 71 through the contact between the scews 68 and the lugs 70, causing the arms 71 to oscillate around and rock the rocker shafts 45. The rocking motion of the shafts 45 in turn oscillates the seaming roll arms 48 and causes the seaming rolls 25 to follow a path of travel parallel with but slightly spaced from the periphery of the can body A and end B.

The slight secondary movement necessary to bring the seaming rolls 25 inwardly into seaming contact with the can body and end is effected by the seaming cam 80. This seaming cam 80 is slideable vertically along the head sleeve 36 and is provided with a depending, radial key 83 which fits into a radial keyway 84 (see Figs. 1, 5 and 6), formed in a raised annular hub 85 of the head plate 28, when the seaming cam is in its lowermost, nonseaming position. When the parts are so positioned, the seaming cam 80 travels around with the seaming head and does not rotate relative to it. The seaming cam rollers 66 traveling with the head, during this time are on the low portions of the seaming cam faces 81, 82 and, as a result, the seaming rolls 25 are locked in out-position to permit the raising of an unseamed can A and end B into seaming position against the seaming chuck body 11 at the convenience of the operator.

When the can body and end have been thus positioned, the operator initiates the seaming operation by lifting the handle end 89 of a pivoted lifting lever 90 against the pull of a spring 91 secured to the other end of the lever beyond its pivot 92. The central part of the lever 90 is made in the shape of a slightly elongated ring 93 (Fig. 2) which surrounds the seaming cam 80 and is provided with oppositely disposed rollers 94 which operate in an annular groove 95 located in a collar 96 formed integral with the seaming cam 80 (see Figs. 1, 2). The seaming cam collar 96 is also provided with a plurality of upwardly extending ratchet teeth 97 radially disposed in a flange 98 formed at its upper end (Figs. 1, 2 and 5).

The lifting of the lever 90 slides the seaming cam 80 upwardly a short distance along the head sleeve 36 and brings the ratchet teeth 97 into engagement with a plurality of matching ratchet teeth 100 which are formed at the bottom of a seaming cam bevel gear 101 which surrounds and is rotatably mounted on the seaming head sleeve 36 and is held in place by a threaded ring 102. The seaming cam rollers 66 of course remain in contact with the seaming cam faces 81 and 82 during this upward movement of the seaming cam 80, since the distance the cam 80 travels is considerably less than the thickness of the rollers 66.

The cam bevel gear 101 is constantly rotated at a speed which is slightly slower than that of the head bevel gear 37 by a driving gear 103 which is keyed to the drive shaft 39. When the seaming cam 80 is raised into engagement with the bevel gear 101, the key 83 is simultaneously lifted out of the keyway 84, thus disengaging the cam 80 from the head 27 and engaging the ratchet teeth 97 with the ratchet teeth 100, thus permitting the cam 80 to rotate at the slower speed of the gear 101. The slower rotation of the seaming cam 80 permits the seaming cam rollers 66 to catch up to and travel along the high portions 105, 106 of the first and second operation cam faces

81 and 82 respectively. This action moves the seaming cam rollers 66 outwardly, and the seaming lever arms rotate in a clockwise direction around the pins 64, thereby moving the curved rocker shaft arms 71 and thus the rocker shafts 45 and seaming roll levers 48 in a clockwise direction to move the seaming rolls 25 into seaming engagement with the can body A and cover B to perform the double seaming operation.

During the double seaming operation the key 83 slides around the upper surface of the head plate hub 85 and gradually falls behind the keyway 84. The double seaming cycle is completed when the seaming head proper makes one complete revolution more than the seaming cam 80 thus bringing the keyway 84 once more into position beneath the key 83 and permitting the key to drop into the keyway. This permits the seaming cam 80 to drop, under the influence of gravity and the pull of the spring 91, to its lowermost, nonseaming position where it rests upon and rotates in unison with the seaming head housing 27.

Before the key 83 drops into the keyway 84, however, the seaming cam rollers 66 ride off the high portions 105, 106 and onto the lower portions of the seaming cam faces 81 and 82. As a result, the seaming rollers 25 are in out-position when the relative motion between the cam rollers 66 and the cam faces 81, 82 ceases, and they remain in this nonseaming, out-position until such time as the operator again lifts the lever 90, thus eliminating any possibility that the next seaming cycle will commence before the operator can remove the seamed can from the seaming head and replace it with an unseamed can body and cover.

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.

I claim:

1. In a seaming head for uniting can ends to cans in a seaming operation, the combination of a rotatable seaming head housing, means for rotating said housing continuously at a substantially constant speed, a stationary chuck adjacent said housing for holding a can and an end to be seamed and around which said housing revolves, a seaming roll carried by said housing and being movable into seaming position adjacent said chuck and to an inoperative position away from said chuck, driving means spaced from said housing and rotating continuously at a different substantially constant speed than said housing, and a seaming cam mounted for rotation and axial reciprocation between said driving means and said housing for moving said seaming roll to said seaming and inoperative positions, means on said cam for alternately interengaging with said housing and said driving means, said seaming cam being normally disengaged from said driving means and engaged with and therefore rotating at the same speed as said housing to maintain said seaming roll in said inoperative position, and said axial movement of the seaming cam from said engagement with the housing into engagement with said driving means produces relative rotation between said cam and said housing to shift said seaming roll into said seaming position.

2. In a seaming head for uniting can ends to cans in a seaming operation, the combination of a rotatable seaming head housing, means for rotating said housing continuously at a substantially constant speed, a stationary chuck adjacent said housing for holding a can and an end to be seamed and around which said housing revolves, a seaming roll carried by said housing and being movable into seaming position adjacent said chuck and to an inoperative position away from said chuck, driving means spaced from said housing and rotating continuously at a different substantially constant speed than said housing, a seaming cam coaxially mounted for rotation and axial

reciprocation between and relative to said driving means and said housing for moving said seaming roll alternately to said seaming and inoperative positions, means on said cam for alternately interengaging with said housing and said driving means, said seaming cam being normally disengaged from said driving means and engaged with and therefore rotating at the same speed as said housing to maintain said seaming roll in said inoperative position, and movement of said seaming cam axially from said housing into engagement with said driving means produces relative rotation between said cam and said housing to shift said seaming roll into said seaming position, and means for maintaining said seaming cam in engagement with said driving means until the completion of said seaming operation.

3. In a seaming head for uniting can ends to cans, the combination of a rotatable seaming head housing, means for rotating said housing continuously at a substantially constant speed, a stationary chuck around which said housing revolves, a seaming roll carried by said housing, a seaming can operatively connected with said seaming roll for moving said roll, said seaming cam being mounted contiguous to said housing for rotation coaxially therewith and for axial reciprocation relative to the housing, means for keying said seaming cam to said housing to maintain said seaming roll normally in nonseaming position, said keying means being engageable and disengageable by said axial reciprocation of the cam, a driving gear adjacent to said seaming cam and rotating continuously at a different substantially constant speed than said housing, and normally disengaged driving connections on said seaming cam and driving gear, whereby said reciprocation of the seaming cam axially away from said housing effects disengagement of said keying means and interengagement of said driving connections on said seaming cam and driving gear to produce relative rotation between said seaming cam and said housing to thereby shift said seaming roll into seaming position.

4. In a seaming head for uniting can ends to cans in a seaming operation, the combination of a rotatable head housing, means for rotating said housing continuously at a substantially constant speed, a stationary chuck having a shape corresponding to a can and end to be seamed and around which said housing revolves, a rocker shaft mounted in said housing and carrying a seaming roll, means for rocking said shaft to guide said seaming roll in an orbit parallel to the contour of said chuck, a seaming cam operatively connected with said rocker shaft and mounted contiguous to and coaxially with said housing for rotation and for axial reciprocation relative to said housing and normally in engagement with and therefore rotating at the same speed as said housing to maintain said seaming roll in nonseaming position, driving means adjacent to said seaming cam and continuously rotating at a different substantially constant speed than said housing, and normally disengaged driving connections on said seaming cam and driving means, whereby movement of said seaming cam axially from said housing effects interengagement of said driving connections to produce relative movement between said seaming cam and said housing to rock said rocker shaft to shift said seaming roll into seaming position.

5. In a seaming head for uniting can ends to cans in a seaming operation, the combination of a head housing rotatable about an axis, means for rotating said head continuously at a substantially constant speed, a stationary chuck adjacent said housing for holding a can and an end to be seamed, a seaming roll carried by said housing adjacent said chuck, a seaming cam mounted for rotation and for axial movement relative to said housing, said cam having a seaming portion and a nonseaming portion, a seaming cam roller carried by said housing, said cam roller being operatively connected with said seaming roll and maintained constantly in contact with said seaming cam, keying means on said seaming cam and said housing to prevent relative rotation be-

tween said cam and said housing when said cam roller is on the nonseaming portion of said cam, said keying means being engageable and disengageable by said axial movement of the cam, and driving means adjacent to said cam and rotating continuously at a different substantially constant speed than said housing, normally disengaged driving connections on said seaming cam and driving means, whereby movement of said cam axially away from keyed relation with said housing also interengages said driving connections between said cam and said driving means to produce relative rotation between said seaming cam and said housing and thereby move said cam roller along the seaming portion of said cam.

6. In a seaming cam for uniting can ends to cans in a seaming operation, the combination of a rotatable seaming head housing, means for rotating said housing continuously at a substantially constant speed, a stationary chuck for holding a can and end to be seamed, a seaming roll carried around said chuck by said housing, a seaming cam operatively connected with said seaming roll, said cam being mounted for rotation and for reciprocation between a lowermost and an uppermost position above and coaxially with said housing, a key and keyway in opposing faces of said cam and said housing for locking said cam to said housing when said cam is in its lowermost position so that said cam and said housing rotate at the same speed to maintain said seaming roll in nonseaming position, driving means rotating continuously at a different substantially constant speed than said

housing and disposed above and coaxially with said seaming cam, cooperating teeth on said cam and said driving means, said driving means being normally spaced and disengaged from said cam when the latter is in its lowermost position and said teeth being in interlocking engagement when said cam is in its uppermost position so that said cam and said driving means rotate together thereby effecting a differential rotation between said cam and said housing to move said seaming roll into seaming position, a said opposing face engaging against said disengaged key for holding said seaming cam locked in its said uppermost position until the completion of the seaming operation.

References Cited in the file of this patent

UNITED STATES PATENTS

871,856	Beyer	Nov. 26, 1907
923,687	Nelson	June 1, 1909
1,040,952	Johnson	Oct. 8, 1912
1,079,558	Jenssen	Nov. 25, 1913
1,167,351	Brenzinger	Jan. 4, 1916
1,469,334	Ross	Oct. 2, 1923
1,941,972	Cameron	Jan. 2, 1934

FOREIGN PATENTS

267,668	Italy	Sept. 14, 1929
544,777	Great Britain	Apr. 27, 1942