

Nov. 28, 1944.

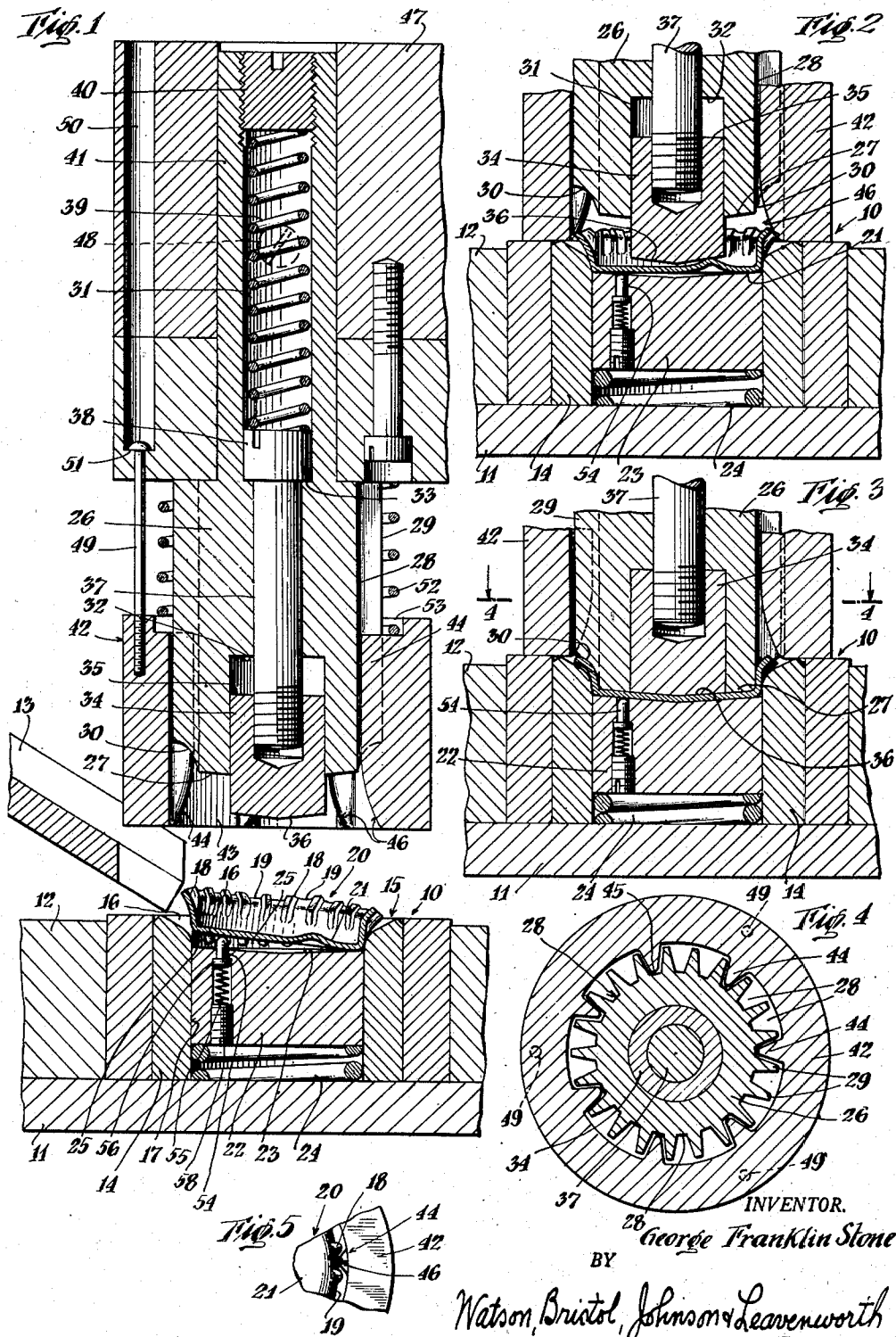
G. F. STONE

2,363,815

APPARATUS FOR RECLAIMING CROWN CAPS

Filed Dec. 11, 1942

2 Sheets-Sheet 1



INVENTOR.
George Franklin Stone
BY
Watson, Bristol, Johnson & Leavenworth
ATTORNEYS

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2 Sheets-Sheet 2

Fig. 6

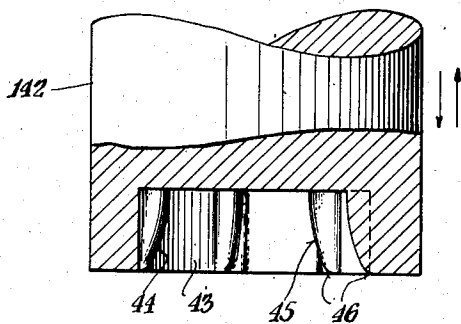


Fig. 7

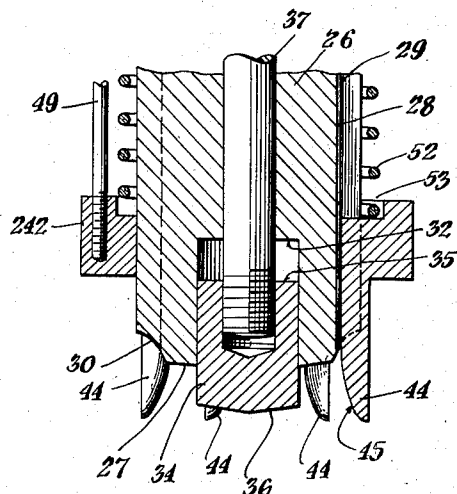
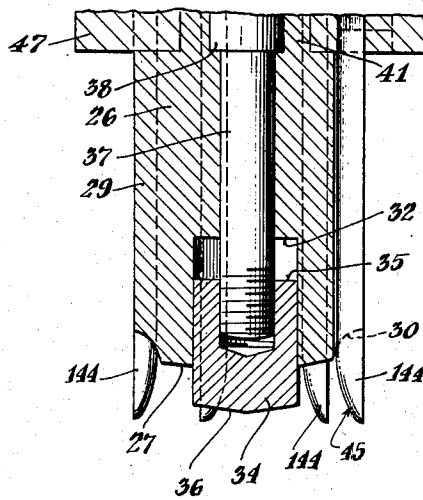


Fig. 8



INVENTOR.

George Franklin Stone

BY

Watson, Bristol, Johnson & Leavenworth
ATTORNEYS

UNITED STATES PATENT OFFICE

2,363,815

APPARATUS FOR RECLAIMING CROWN CAPS

George Franklin Stone, Nutley, N. J., assignor to
Royal Crown Bottling Company of Newark, Inc.,
Newark, N. J., a corporation of New Jersey

Application December 11, 1942, Serial No. 468,872

16 Claims. (Cl. 113—38)

The present invention relates to apparatus for reclaiming used crown caps for bottles and the like, and constitutes an improvement on the invention described and claimed in my copending application Serial No. 462,803, filed October 21, 1942.

A general object of the present invention is the provision of such apparatus which in an efficient and commercially practicable manner readily and effectively reshapes distorted used crown caps, making them suitable for reuse, and to provide in such apparatus cap-aligning mechanism of simple construction which in a positive and efficient manner assures proper alignment of distorted used caps between reshaping dies making more practical a rapid commercial operation of maximum efficiency.

A more specific object of the invention is the provision in such apparatus of cap-aligning structure which is featured by means adapted to engage the skirt of a distorted used cap when in a variety of inverted positions as fed to the vicinity of reshaping dies, which may be so formed as effectively to engage a flute in a cap skirt, and then to orient the cap or move it to a predetermined aligned position in an efficient manner, and which upon accomplishing that desired end may, in addition to substantially aligning the center of the cap top with the axis of a reshaping die, also orient the cap to a position where flutes and ribs in the cap skirt are so aligned with reshaping structure of dies as to assure a minimum deformation of cap stock in the skirt upon reshaping and consequently avoid tendency to rupture cap stock in the skirt.

Another object of the invention is to provide in crown cap reclaiming apparatus a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and shaping ribs intervening between such slots, and a cap-aligning structure having means adapted to engage the skirt of a distorted used cap when in a variety of positions as fed to such female die and upon axial movement toward the latter to orient or assure orientation of such cap with respect to shaping ribs of the female die so as to bring flutes in the cap skirt into substantial alignment therewith or assure such disposition thereof.

A further object of the invention is the provision in such apparatus of means which when a fed used cap comes to rest in the vicinity of

reshaping apparatus, it is initially supported in a tilted position to present a flute of the cap skirt to cap-aligning structure in such position as to provide a well defined notch in which cap-aligning means may readily and securely engage for subsequent efficient aligning orientation of the cap.

A still further object of the invention is the provision in such apparatus of cap-aligning structure so associated with male die structure as to perform its function in an automatic and effective manner as the male and female reshaping dies are moved toward each other to cap reshaping positions.

A still further object of the present invention is the provision of structural embodiments of the device of the present invention which are readily constructed and allow efficient use and operation thereof.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction set forth in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a vertical sectional view with parts broken away of a structural embodiment of the present invention showing the initial positions of the parts thereof after a distorted used cap has been fed thereto for reshaping;

Fig. 2 is a view similar to Fig. 1 of part of the structure shown therein and depicting apparatus parts in their relative positions just prior to cooperative movement of the male and female dies during cap reshaping operation;

Fig. 3 is a view similar to Fig. 2 showing the relative positions of apparatus parts upon completion of cap reshaping operation;

Fig. 4 is a sectional view of cap-aligning mechanism and male die structure taken on line 4—4 of Fig. 3;

Fig. 5 is a bottom plan view with parts broken away of a used crown cap and cap-aligning structure of Fig. 1 showing aligning engagement therebetween;

Fig. 6 is an elevational view, with parts broken away and in section, showing a modified form of

the cap-aligning mechanism of the present invention;

Fig. 7 is a vertical sectional view, with parts broken away, of another embodiment of cap-aligning mechanism of the present invention shown associated with male die structure and with the shown parts in the initial positions prior to operation for aligning a distorted used cap and thereafter reshaping the same; and

Fig. 8 is a view similar to Fig. 7 of still another embodiment of the present invention.

Prior to the present invention the apparatus of the above identified application was developed to reshape distorted crown caps in whatever form they may be as a result of prying them off the necks of beaded containers, such as by a bottle opener, to a form permitting their efficient reuse in the closure of such containers. Such mechanism provided for feed of such caps to the vicinity of reshaping dies and contemplated alignment of each cap relative thereto by any suitable means such as by hand. The present invention proposes mechanism for attaining such cap-alignment in a particular and positive manner which efficiently eliminates hand alignment of caps or any necessity therefor. The details of the invention will be readily understood by reference to the accompanying drawings in which like numerals refer to like parts throughout of an embodiment therein shown by way of example.

As shown in Figs. 1, 2 and 3, a female die 10 comprising an annular sleeve-like member is supported in any suitable manner such as, by way of example, upon a supporting or base plate 11 and held in desired position by any suitable surrounding structure 12. The base plate 11 and surrounding structure 12 may be held in a fixed manner or constitute part of a turret head suitably provided with a plurality of succeeding series of female dies 10 adapted to be carried successively to a distorted crown cap receiving station, a cap-aligning station, a reshaping station and a reshaped cap removing station, or to stations whereat two or more of the indicated operations are combined.

The distorted crown caps may be successively fed to the female die by any suitable means, such as by a chute 13. As shown in Fig. 1 the female die 10 may comprise a pair of interfitted sleeves with the inner sleeve 14 having a lip 15 and a plurality of circumferentially spaced apart slots 16—16 in the side walls 17 thereof extending a predetermined distance axially of the female die 10 so as to receive ribs 18—18 intervening between flutes 19—19 in the skirt of a distorted cap 20. As shown in Fig. 1 the top 21 of such cap 20 is usually distorted by the formation of an indentation or transversely extending bend therein.

Within the sleeve-like female die 10 is reciprocatively disposed a cylindrical plug or anvil block 22 having the outward surface 23 thereof shaped complementary to the desired shape of the top of a cap. The anvil block 22 is suitably supported by spring biasing means 24 such as a helical spring and may be limited in its retractive movement either by suitable abutment means cooperatively located on the sleeve 14 and the block 22 or by the spring 24 when under full compression as indicated in Fig. 3. The outward surface 23 of the block 22 constitutes the bottom of a socket, the side walls of which are formed by walls 17 of the female die 10. This socket is provided with a plurality of circumferentially spaced apart ribs 25—25 by the formation of the slots 16—16 there-

in. As shown in Fig. 2 this socket is adapted to receive a distorted cap 20.

The male die 26 of the present invention has a substantially circular end 27 to force the top 21 of the cap 20 into the socket of the female die 10 for reshaping the same and this circular end is contoured complementary to the outward surface 23 of the anvil block 22. A plurality of axially extending flutes 28—28 are formed on the circumferential surface of the male die 26 in any suitable manner, such as by cutting and/or grinding wheels. This fluting provides a plurality of axially extending circumferentially spaced apart ribs 29—29.

The ribs 29—29 terminate in inwardly curved ends 30—30 extending no farther than the circular end 27 and are shaped complementary to the ribs 18—18 in the cap skirt. The ribs 29—29 are arranged for cooperation with ribs 25—25 of the female die member 10 for reshaping the cap skirt. The male die 26 is provided with a longitudinally extending bore 31 enlarged at the outer end to provide an abutment shoulder 32 and another enlarged portion thereof provides another abutment shoulder 33. A kicker device or cylindrical plunger 34 is reciprocatively mounted in the enlarged outer end of the bore 31 with the inward end thereof 35 adapted to abut against the shoulder 32 for limiting retractive movement of the plunger 34. The plunger 34 is of such longitudinal dimension with respect to the location of shoulder 32 as to provide for alignment of the outward surface 36 thereof with the surface of the circular end 27 cooperatively to provide a cap top reshaping surface as is indicated in Fig. 3.

Preferably the plunger 34 is provided with any suitable means adapted to cooperate with shoulder 33 to limit outward travel thereof. Such means may comprise a bolt 37 having a threaded end thereof engaged in a threaded hole in the plunger 34. Head 38 of the bolt 37 may provide abutment means cooperating with the shoulder 33. The bolt 37 is preferably biased by a helical or coil spring 39 held in the bore 31 under compression by a plug 40 threaded into the end of reduced shank portion 41 of the male die 26 so as normally to cause the kicker plunger 34 to project from the end 27 as shown in Figs. 1 and 2. It will be noted from Fig. 2 that the plunger 34 is of such diameter as readily to be receivable in distorted caps.

With the apparatus described above distorted crown caps may be readily reshaped by seating a distorted cap 20 in the shaping socket of the female die 10 as shown in Fig. 2. The male and female dies are then moved relatively toward each other. For example, the male die 26 may be moved toward the female die 10 with the kicker projection 34 engaging within the distorted cap and then upon further movement of the male die 26 toward the female die 10 the projecting kicker plunger 34 will be retracted against the biasing force of spring 39 until the abutment shoulder 32 stops further retractive travel of the plunger 34. Thereafter the cooperative surfaces 27 and 36 will reshape the cap top 21 as shown in Fig. 3. At the same time the cap stock in the skirt thereof will be snugly engaged between the faces of the ribs 25—25 and the root surfaces of the flutes 28—28. During this action the curved ends 30—30 of the ribs 29—29 engage in the ribs 18—18 of the cap skirt to place strain upon the stock of the cap skirt to reshape the ribs thereof.

With the shaping ribs 25—25 of the female die

engaged in the cap skirt flutes 19—19 this action will stretch the cap stock of the skirt across, around and over the ribs 25—25 to the proper shape resulting in a reshaped cap shown in Fig. 3. It has been found that with the use of such dies there is not a pronounced tendency for them to reshape the ribs and flutes in the cap skirt at points other than their original formation therein due to the fact that the sloping surfaces of the ribs and slots of the female die and those of the ribs and flutes of the male die tend to cause the distorted cap automatically to assume a position where the ribs of the skirt thereof are substantially aligned with the slots of the female die. Any such tendency is eliminated to a practical degree if alignment of each cap in the female die is performed, preliminary to reshaping operation, by cap-aligning mechanism of the present invention.

Suitable cap-aligning structure of the present invention may be provided separate from the male die and brought into cooperative position with respect to the female die and then moved away prior to operation of the male die and, as such, may be located at a separate cap-aligning station, such as in a turret structure. Preferably, however, in accordance with the embodiment shown in the drawings it is associated with the male die to align a distorted cap in a female die prior to cap reshaping operation of the male die and to assure that the cap remains in aligned position until the male and female dies clamp it therebetween during reshaping operation. Thus it is to be understood that the cap-aligning structure may comprise a cap-aligning member, such as a collar or sleeve 42, having a socket 43 therein to receive a distorted cap 20. The socket 43 may be formed by a through bore, as shown, in which the male die 26 is slidably received and is of such lateral dimension at the mouth thereof as readily to receive, when the axes of the socket 43 and the female die are substantially aligned, the portion of any average distorted cap which is of greatest lateral dimension, such as the edge of the skirt, when the cap is in a variety of inverted positions in the female die socket which are possible with the omission therefrom of cap tilting means or different angular positions of such cap tilting means.

Means are provided in the aligning socket 43 to engage in a flute 19 in the cap skirt for alignment of the engaged flute with one of the shaping ribs 25 of the female die. Such means may comprise a rib 44 on the aligning socket wall but preferably are a plurality thereof extending longitudinally of the collar 42 and located in circumferentially spaced apart relation in the bore. As shown in Fig. 4 preferably seven aligning ribs 44—44 are provided in collar 42 for a male die having twenty-one ribs 29—29, which is equal in number to the number of ribs 18—18 formed as a common practice on crown caps. The ribs 44—44 are so shaped as readily to be slidably received in certain of flutes 28—28 of the male die and with the bore 43 of greater diameter than the outside diameter of the male die 26 inclusive of its ribs 29—29, as shown in Fig. 4, to permit the male die to slide easily in the collar or sleeve 42.

As shown in Figs. 1, 4 and 5 the ribs 44—44 are of narrowest dimension and preferably rounded at their edges 45—45 to provide for ready engagement of each in a cap skirt flute 19 and at the mouth of the collar 42 the ends of the ribs 44—44 which are nearest the female die 10 are

gradually flared outwardly away from the axis of the collar finally merging with the collar at or near the outer end thereof, such as is indicated at 46—46. For most efficient engaging and aligning action, the flared ends of the ribs 44—44 at 46—46 are also rounded and tapered, as shown, and the so-formed curved edges of the rib ends act as cams in the cap skirt flutes 19—19 to align or orient the cap to its desired position with those flutes substantially aligned with the shaping ribs 25—25 of the female die as the cap-aligning member 42 is moved toward the female die.

As shown in Fig. 1 the shank 41 of the male die 26 may be mounted in a bore in a suitable support 47, part of which is shown broken away, and may be guided for reciprocative movement relative to the female die such as by interfitting means (not shown) on the support 12 and the support 47. The shank 41 of the male die may be held in fixed position in the support 47 by suitable means such as by a set screw threaded into the support to the bore receiving the shank 41 as indicated in dotted lines at 48. The cap-aligning collar 42 is permitted limited sliding action on the male die relative to the support 47 by any suitable means such as a plurality of supporting bolts 49—49, say three in number, with their threaded ends engaged in internally threaded bores in the back or trailing end of collar or sleeve 42 and with the headed end of each received in a bore 50 in the support 47 countersunk to provide a shoulder 51 functioning as a limiting stop for the head of the bolt. These bolts 49—49 thus mount the cap-aligning collar 42 to the support 47 with the mouth or outer end thereof initially positioned beyond the end 27 of the male die 26 as shown. Such positioning is important since in moving the male die toward the female die the cap-aligning mechanism should perform its functions before any portion of the distorted cap is clamped between portions of the male and female dies as between an anvil block 22 and the kicker device 34, otherwise proper alignment or orientation of a cap might be interfered with or prevented.

The cap-aligning collar or sleeve 42 is held in its initial position shown in Fig. 1 by a biasing spring 52, which may be a helical spring capable of a relatively small biasing force to permit the male die 26 readily to be slid through or telescoped with the cap-aligning collar 42 after the outer end of the latter has been moved to engagement with the end or lip 15 of the female die as shown in Fig. 2. The back or trailing end of the cap-aligning sleeve 42 is preferably counterbored at 53 to provide a seat for the end of the helical spring 52.

In order to assure the presentation of a well defined notch in the skirt of the distorted cap 20 to at least one of the aligning ribs 44 it has been found to be advisable to position the distorted cap in the female die in a tilted position as shown in Fig. 1. Such positioning will present a flute 19 to the outwardly flared end 46 of a rib 44 in such position as to provide a well defined notch for engagement therein of the flared and rounded camming face of the rib 44. Any suitable means for accomplishing such tilting of the cap is contemplated by the present invention and, by way of example, such means may be a projecting member or pin 54 reciprocatively mounted in a bore offset from the axis of the anvil block 22 of the female die and biased by a small relatively weak helical spring 55 to

projecting position as shown in Fig. 1. As there-in shown the cap tilting means or pin 54 is off-set from the axis of the female die toward the supply chute 13 but obviously may be located in any other angular position as desired. As shown a hole may be drilled through the anvil block 22 and counterbored to receive an enlarged head 56 on pin 54 for limiting outward movement thereof. The spring 55 may be confined in the counterbored portion of the hole between the head 56 and a threaded plug 58.

The cap-aligning structure depicted in the drawings and the male and female dies associated therewith operate in the following manner: A distorted used cap 20 is fed from the chute 13 to the socket in the female die and is therein supported by the pin 54 in the tilted position shown in Fig. 1. The male die support 47 then may, by way of example, be moved toward the female die support 12 with the axes of the male and female dies substantially aligned, carrying the cap-aligning collar or sleeve 42 down over the distorted cap and engaging the flared tapered face 46 of an aligning rib 44 nearest the chute 13 into contact with the edge of the skirt of the cap. Since the cap is supported in the tilted position shown a well defined notch between adjacent ribs in the cap skirt is presented to the approaching or leading end of that aligning rib. That end of the aligning rib will always seat in that notch by virtue of the shape and relative dimensions of the ribs and intervening flutes in the cap skirt which are indicated in Fig. 5. Upon further movement of the support 47 toward the female die support 12 the cap 20 will be oriented in the female die socket by cooperative camming action of the aligning ribs 44—44 in cap skirt flutes 19—19 bringing the center of the cap top 21 into substantial alignment with the axis of the female die structure. The outer or leading end of the aligning collar or sleeve 42 will be moved to abutment with the lip 15 or end of the female die 10 to limit further movement thereof. Approaching travel of the support 47 is continued to cause the male die 26 to slide through the stopped aligning collar 42 causing the kicker 34 to move into the cap and finally engage the top 21 thereof. This will cause the cap to be seated in an oriented position in the female die socket depressing the pin 54, permitting the cap top to be pushed into seating engagement with the top of the anvil block 22 as shown in Fig. 2. Upon further movement of the male die 26 toward the female die 10 the kicker 34 is caused to retract in the bore 31 against biasing force of the spring 39 and the anvil block 22 is caused to be depressed against the biasing force of the spring 24, both to stopped positions. Thereafter, and perhaps during some of those operations, the cap is reshaped between the male and female dies to the form shown in Fig. 3. The male and female dies are then separated permitting the biasing spring 24 to lift the anvil block 22 to kick the reformed cap out of the socket of the female die and the kicker 34 to project from the end of the male die to free the reformed cap from the end thereof. The pin 54 will project to raise the reshaped cap to tilted position thus facilitating removal operations which may be performed, by way of example, by an air jet, trip finger, etc.

It is to be understood that since the cap-aligning mechanism need not be associated with the male die, such as in the form of a sleeve slidably

disposed thereover as in the embodiment shown in Figs. 1 to 4, inclusive, of the drawings, the cap-aligning mechanism may comprise other than a collar or sleeve having a through bore. It may comprise a member having a recess therein suitably shaped to receive and orient a distorted cap, as illustrated in Fig. 6; and it is to be understood that the term "socket" as used herein with respect to cap-aligning structure identifies either such a recess or the mouth portion of the bore in a self-aligning collar or sleeve. Further it will be understood that in the association of the cap-aligning mechanism with the male die, the collar or sleeve need not completely encompass therein the aligning ribs. Obviously the latter may project from the end of suitable supporting structure such as a narrow ring, as illustrated in Fig. 7; or may be reciprocally mounted in the support for the male die, such as 47, with suitable means being provided for causing the aligning members or ribs to slide in the flutes of the male die, as illustrated in Fig. 8.

In Fig. 6 is shown a cap-aligning structure which comprises a solid member in the form of a cylindrical element 142 provided with a socket 43 in the form of a recess or cup. Aligning ribs 44—44 are provided on the side walls of the socket 43 similar to the provision of similar ribs on the walls of the bore in the collar or sleeve 42 of the structure shown in Figs. 1 to 4, inclusive. Such a cap-aligning structure, as previously explained, is adapted for use previous to the employment of the male die structure for reshaping a distorted cap aligned in the female die by such cap-aligning structure.

In the structure shown in Fig. 7 the sleeve or collar 242 to which the aligning ribs 44—44 are mounted or with which they are made integral is foreshortened so that at least the outward ends of those ribs project beyond the end of the surrounding sleeve. The ribs, however, operate in a manner similar to their operation in the structures shown in Figs. 1 to 6, inclusive.

In the structure shown in Fig. 8 the cap-aligning ribs 144—144 are shown as separate structures, each separately reciprocable in the mount thereof which may be the support 47 for the male die. These ribs 144—144 also function in a manner similar to the functioning of ribs 44—44 of the structures shown in Figs. 1 to 7, inclusive, as to the alignment of flutes in the outside surface of the skirt of a distorted cap with respect to the ribs in a female die.

It is believed to be obvious that cap tilting means such as pin 54 and kicker means such as block 22 and plunger 34 of the dies may be operated by means other than biasing springs 55, 24 and 39. For example, they may be operated progressively by suitable mechanism timed in relation to the movements of the dies and cap-aligning means, such as that shown in Glenn U. S. Patent No. 882,060 of March 17, 1908.

It will thus be seen that the objects set forth above and indicated herein, among others, are attained in an efficient manner and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein de-

scribed, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning member in addition to said female die which member has a socket therein to receive such a cap and adapted to cooperate with said female die when their axes are substantially aligned, and means in the member socket to engage in a flute in the skirt of such a cap on the outside thereof for alignment of the engaged flute with one of the shaping ribs of said female die; and means to move said cap-aligning member toward said female die with their sockets in opposed relation.

2. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning member in addition to said female die which member has a socket therein to receive such a cap with the axis of the socket substantially aligned with the axis of said female die, and at least one longitudinally extending rib on the side walls of the member socket substantially aligned with one of the shaping ribs of said female die to engage in a flute in the skirt of such a cap on the outside thereof for alignment of the cap; and means to move said cap-aligning member toward said female die with their sockets in opposed relation.

3. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning member in addition to said female die which member has a socket therein to receive such a cap with the axis of the socket substantially aligned with the axis of said female die, and at least one longitudinally extending rib on the side walls of the member socket substantially aligned with one of the shaping ribs of said female die, the end of the rib of said cap-aligning member nearest said female die being flared outwardly away from the axis of said socket readily to engage in a flute in the skirt of such a cap on the outside thereof for alignment of the cap; and means to move said cap-aligning member toward said female die with their sockets in opposed relation.

4. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a

predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning member in addition to said female die which member has a socket therein to receive such a cap with the axis of the socket substantially aligned with the axis of said female die, and a plurality of spaced apart longitudinally extending ribs on the side walls of the member socket arranged circumambiently thereof with each substantially aligned with one of the shaping ribs of said female die, the end of each of the ribs of said cap-aligning member nearest said female die being flared outwardly away from the axis of said socket readily to engage in a flute in the skirt of such a cap on the outside thereof for alignment of the cap; and means to move said cap-aligning member toward said female die with their sockets in opposed relation.

5. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; and a cap-aligning collar having a bore extending longitudinally therethrough with the diameter of the latter being of greater dimension than the greatest lateral dimension of such a cap, said collar having its axis substantially aligned with the axis of said female die and being reciprocable toward and away from the latter, and a plurality of circumferentially spaced apart longitudinally extending ribs on the side wall of the bore with each substantially aligned with one of the shaping ribs of said female die, the end of each of the ribs of said collar nearest said female die being flared outwardly away from the axis of said collar readily to engage in a flute in the skirt of such a cap for alignment of the latter.

6. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning collar having a bore extending longitudinally therethrough with the diameter of the latter being of greater dimension than the greatest lateral dimension of such a cap, said collar having its axis substantially aligned with the axis of said female die and being reciprocable toward and away from the latter, and a plurality of circumferentially spaced apart longitudinally extending ribs on the side wall of the bore with each substantially aligned with one of the shaping ribs of said female die, the end of each of the ribs of said collar nearest said female die being flared outwardly away from the axis of said collar readily to engage in a flute in the skirt of such a cap for alignment of the latter and spring means biasing said collar toward said female die.

7. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of

circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning member having a socket therein to receive such a cap and adapted to cooperate with said female die when their axes are substantially aligned, and means in the member socket to engage in a flute in the skirt of such a cap for alignment of the engaged flute with one of the shaping ribs of said female die; and retractable projecting means in the die socket initially to support such a cap in a tilted position to present one of the flutes in the cap skirt to said aligning means in the member socket in such position as to provide a well defined notch in which said aligning means may readily engage.

8. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a cap-aligning structure comprising a plurality of spaced apart longitudinally extending ribs each substantially aligned with one of the shaping ribs of said female die and substantially located on the arc of a circle the center of which is substantially aligned with the axis of said female die and of sufficient diameter as to permit upon axial movement toward said female die at least one of said ribs to engage in a flute in the skirt of such a cap fed in inverted position to the vicinity of said female die and so shaped as to bring the cap skirt flutes into substantial alignment with said shaping ribs of the female die upon such movement; and a retractable projecting member in the bottom of the die socket offset from the axis thereof initially to support such a cap in a tilted position to present one of the flutes in the cap skirt to one of said aligning ribs in such position as to provide a well defined notch in which said aligning rib may readily engage.

9. In crown cap reclaiming apparatus, the combination comprising, a sleeve-like female die having a bore therethrough terminating in an outward lip and a plurality of circumferentially spaced apart slots in the bore wall extending a predetermined distance from the outward lip axially of said die to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; and a substantially cylindrical anvil block reciprocally mounted in the bore with the outward surface thereof cooperating with the bore wall to provide a cup-shaped socket for reshaping such a cap; a cap-aligning collar having a bore extending longitudinally therethrough with the diameter of the latter being of greater dimension than the greatest lateral dimension of such a cap, said collar having its axis substantially aligned with the axis of said female die and being reciprocable toward and away from the latter; and a plurality of circumferentially spaced apart longitudinally extending ribs on the side wall of the bore with each substantially aligned with one of the shaping ribs of said female die, the end of each of the ribs of said collar nearest said female die being flared outwardly away from the axis of said collar readily to engage in a flute in

the skirt of such a cap for alignment of the latter; and a spring-biased pin mounted in and initially projecting from a longitudinally extending bore in said anvil block offset from the axis thereof initially to support such a cap in a tilted position to present one of the flutes in the cap skirt to one of said aligning ribs in such position as to provide a well defined notch in which said aligning rib may readily engage.

10. In crown cap reclaiming apparatus, cap-aligning means comprising, a member having a socket therein of a lateral dimension greater than the greatest lateral dimension of used crown caps, a plurality of spaced apart longitudinally extending ribs on the side walls of the socket arranged circumambiently thereof with each adapted to engage in a flute of a skirt of such a cap for aligning the latter in a predetermined manner, each of said ribs having an end thereof flared outwardly away from the socket axis, reciprocative means to carry said member, and spring biasing means between said carrying means and said member to permit the latter to be stopped during forward motion of said carrying means.

11. In crown cap reclaiming apparatus, cap-aligning structure comprising, a plurality of spaced apart circumambiently arranged members each having a face to engage in a flute in the outer surface of a cap skirt, said members being so radially spaced when in operative position facing the open faces of such caps as to provide for reception therebetween of the outer flute surfaces of the cap skirts and means to move said members simultaneously toward a cap-aligning position, each of said flute-engaging faces being flared outwardly at its cap-engaging portion for engagement in a flute in the outer surface of a cap skirt as said members are moved toward the open face of such cap.

12. In crown cap reclaiming apparatus, cap-aligning means comprising, a collar having a bore extending longitudinally therethrough with the diameter of the latter being of greater dimension than the greatest lateral dimension of used crown caps, a plurality of circumferentially spaced apart longitudinally extending ribs on the side wall of the bore with each adapted to engage in a flute of a skirt of such a cap for aligning the latter in a predetermined manner and having the end thereof near the mouth of the collar flared outwardly away from the collar axis to merge with the bore wall, a reciprocative elongated member slidably carrying said collar, and a helical spring located about said member behind said collar biasing the latter to a certain position on said member and to permit said collar to be stopped and said member to slide therethrough during forward motion of the latter.

13. In crown cap reclaiming apparatus, the combination comprising, a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a male die having a substantially circular end to force the top of such a cap into the socket for reshaping the same and axially extending flutes and intervening ribs with the latter terminating in ends shaped complementary to the ribs in the cap skirt and arranged for cooperation with the ribs

and intervening flutes in the cap skirt; and a cap-aligning structure comprising a plurality of circumferentially arranged members each slidably mounted in one of the flutes of said male die, each of said members having a cap skirt flute-engaging face initially terminating beyond the outer end of said male die and flared outwardly away from the axis of said male die.

14. In crown cap reclaiming apparatus, the combination comprising; a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a male die having a substantially circular end to force the top of such a cap into the socket for reshaping the same and axially extending flutes and intervening ribs with the latter terminating in ends shaped complementary to the ribs in the cap skirt and arranged for cooperation with the ribs and intervening flutes in the cap skirt; and a cap-aligning collar slidably mounted on said male die with the mouth of the former initially positioned beyond the outer end of the latter and having inside thereof a plurality of circumferentially arranged longitudinally extending aligning ribs each slidably received in one of the flutes of said male die, the end of each said aligning ribs nearest said female die being flared outwardly away from the axis of said collar readily to engage in a flute in the skirt of such a cap for alignment of cap flutes with the shaping ribs of said female die.

15. In crown cap reclaiming apparatus, the combination comprising; a female die having a substantially cylindrical socket therein with the side walls of the socket having a plurality of circumferentially spaced apart slots extending a predetermined distance axially of the socket to receive the ribs intervening between the flutes in the skirt of such a cap and to provide shaping ribs intervening therebetween; a male die having a substantially circular end to force the top of such a cap into the socket for reshaping the same and axially extending flutes and intervening ribs

with the latter terminating in ends shaped complementary to the ribs in the cap skirt and arranged for cooperation with the ribs of the female die for reshaping the ribs and intervening flutes in the cap skirt; said socket, circular end and flutes of said dies being so dimensioned with respect to each other as to receive snugly therebetween the cap stock; a retractable kicker projection extending from the circular end of said male die and of a lateral dimension as readily to be receivable in distorted caps; a cap-aligning collar slidably mounted on said male die with the mouth of the former initially positioned beyond the outer end of said male die and having inside thereof a plurality of circumferentially arranged longitudinally extending aligning ribs each slidably received in one of the flutes of said male die, the end of each of said aligning ribs nearest said female die being flared outwardly away from the axis of said collar readily to engage in a flute in the skirt of such a cap for alignment of cap flutes with shaping ribs of said female die; and spring biasing means mounted with said male die biasing said collar to its initial position and to permit it to stop in travel toward said female die on engagement therewith with said male die sliding through the stopped collar to cooperate with said female die in reshaping a distorted cap.

16. In crown cap reclaiming apparatus, means for supporting a crown cap with its open face positioned outwardly, a cap-aligning and orienting member opposed to said means and provided with a camming face to engage in a flute in the outer surface of a cap skirt flared away on the leading side for ready flute engagement, and movable means supporting said member with its flared surface opposed to said cap support means, said means being adapted to move said member toward said cap support means in a direction substantially parallel to the axis of the latter for engagement in a flute in the outer surface of a cap skirt and for subsequent camming action to align and orient the cap.

GEORGE FRANKLIN STONE.