

[54] BOTTLE CAPPING MACHINE

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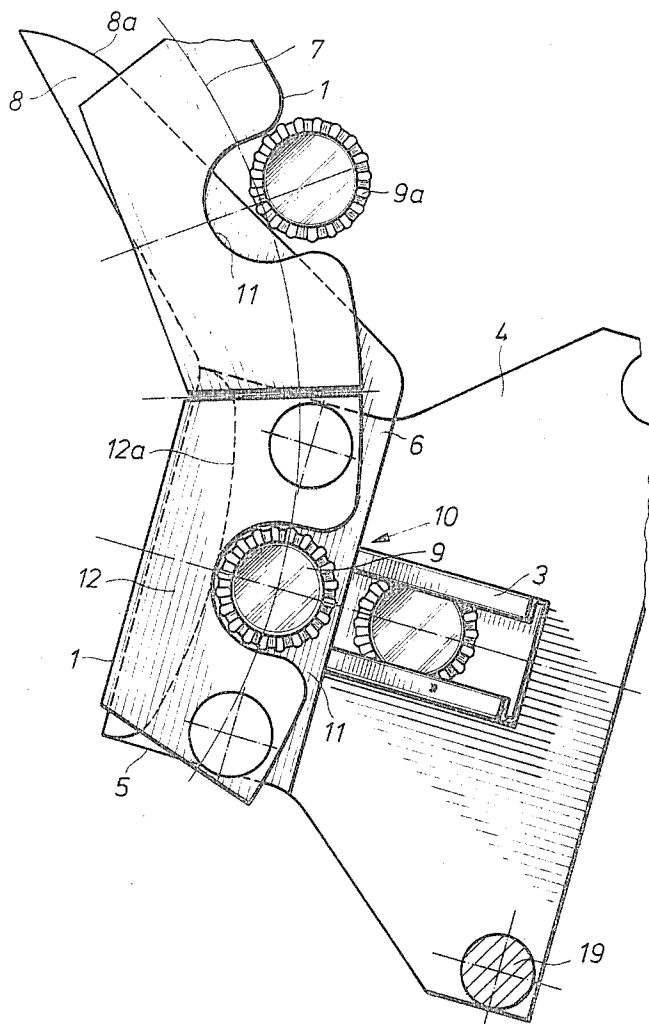
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[57]

ABSTRACT

A bottle capping machine wherein the capping units orbit about a vertical axis and have sockets which travel past a transfer station where each socket receives a cap which is thereupon engaged by a permanent magnet and is lifted toward a sealing ram of the respective unit while the latter moves toward registry with a filled bottle. The transfer station accommodates a vertically adjustable platform which supports a chute for delivery of caps to successive sockets and a stop which centers the caps in the sockets to place them into an optimum position for engagement with the respective magnets. A deflector is mounted on the platform to expel, if necessary, from successive sockets caps and/or fragments of bottles before such sockets reach the transfer station.

10 Claims, 2 Drawing Figures



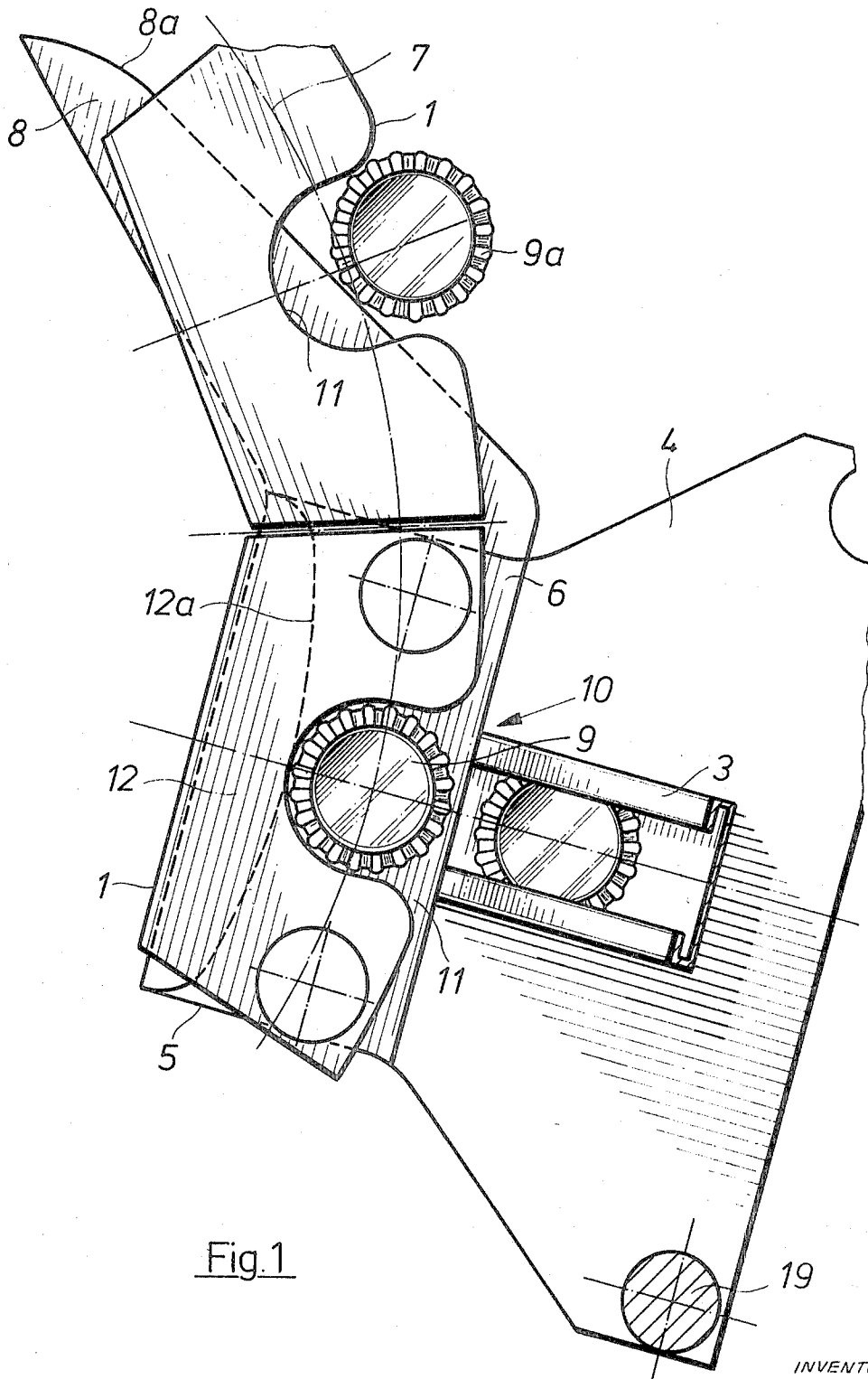


Fig. 1

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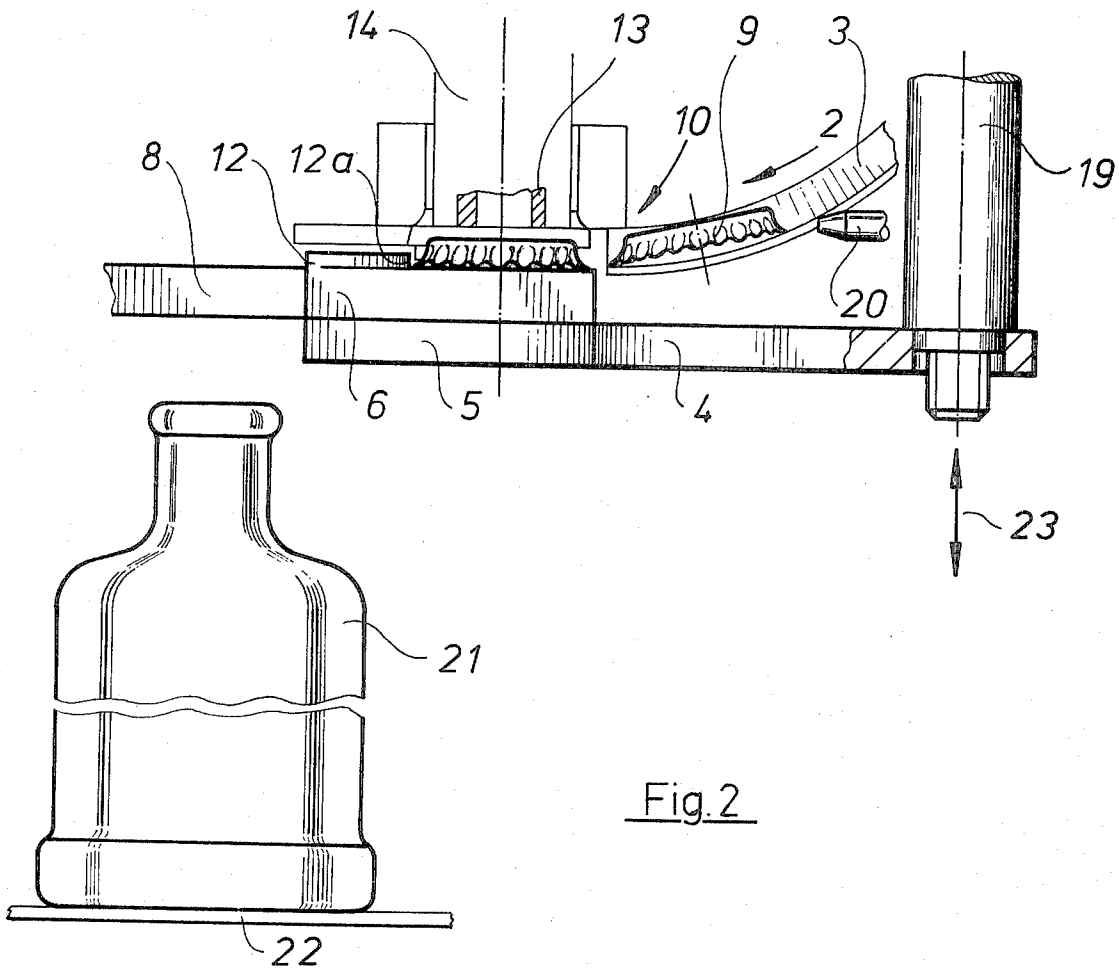


Fig. 2

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BOTTLE CAPPING MACHINE

BACKGROUND OF THE INVENTION

The present invention relates to improvements in machines for the application of caps to bottles or other types of containers. More particularly, the invention relates to improvements in machines of the type wherein two or more capping units orbit about a vertical axis to apply caps to bottles or like containers which are conveyed at a level below the capping units. Still more particularly, the invention relates to improvements in the construction and mounting of capping units and of parts which are installed at the cap feeding station of a machine for the application of caps to bottles or like containers.

Machines which embody a set of orbiting capping units or heads have found widespread acceptance for the capping of filled beer bottles, milk bottles, bottles containing fruit juice and/or similar containers having an elongated slender neck and a steeply sloping shoulder between the lower part of the neck and the main body portion of the container. However, such machines must be provided with bulky, costly and complicated attachments and other auxiliary equipment if their capping units are to apply caps to containers of the type having a very short neck and a slightly inclined shoulder between the neck and the main portion of the container. Such auxiliary equipment is necessary mainly to insure accurate centering of containers below the respective capping units. As a rule, the centering bell and/or the cap-receiving platform of a capping unit is mounted at a considerable distance from the sealing device which applies the cap over the mouth of a container. This is desirable to insure convenient introduction of caps into successive capping units. On the other hand such construction of conventional capping units prevents the mouth of a container with a short neck from being moved sufficiently close to the sealing device.

It was already proposed to provide each capping unit with a centering member which surrounds the sealing device and is moved axially to raise or lower a holder for caps. The holder receives a cap in the lowered position of the centering member and the latter is thereupon raised to move the cap close to the sealing device. It was also proposed to reduce the distance between the sealing device and the holder for caps in a capping unit by the provision of a centering bell which is mounted for pivotal movement about a horizontal axis. The cap is placed onto the mouth of a container and the container is thereupon moved toward the sealing device. Such proposal is not entirely satisfactory because the dimensions of successively capped containers may vary within a rather wide range so that the caps cannot always be placed on the mouths of successive containers in an optimum position for deformation in a way to establish a leakproof seal.

SUMMARY OF THE INVENTION

An object of the invention is to provide a capping machine for bottles or analogous containers wherein the capping units are constructed and assembled in such a way that they can apply caps to containers having short or long necks and that their sealing action is not affected by the configuration of containers.

Another object of the invention is to provide a capping machine for bottles or like containers with novel means for feeding caps into successive capping units.

A further object of the invention is to provide a capping machine which embodies the improved feeding means and which comprises novel and improved capping units.

The invention is embodied in a machine for the application of caps to bottles or analogous containers, for example, to containers having relatively long or short necks with strongly or slightly sloping shoulders between the lower ends of the necks and the main body portions of such containers. The machine comprises a plurality of capping units which are driven to orbit about a substantially vertical axis along an endless path. Each such capping unit includes a cap-receiving

socket having an open side facing away from the axis, and cap retaining means which preferably includes a permanent magnet movable up and down to raise caps from the socket to a sealing ram or an analogous cap applying device of the respective unit. The machine further comprises a platform which is adjacent to a portion of the endless path and is preferably movable up and down so as to enable the machine to cap shorter or taller containers, a support provided on the platform and registering with successive sockets when the capping units are set in motion, centering means preferably comprising a stop provided on the platform so that its stop surface is inwardly adjacent to the open side of a socket which reaches the aforementioned portion of the endless path, feeding means preferably comprising a suitable inclined chute or an analogous device for delivering caps in a predetermined orientation onto the support so that a thus delivered cap engages the centering means and is thereby located in the range of the respective retaining means to be lifted by the latter toward the associated sealing ram while the capping unit moves toward registry with a filled container, and deflector means provided on the platform and extending across the endless path upstream of the feeding means, as considered in the direction of travel of the capping units, to expel from successive sockets such caps which were not applied to containers and/or fragments of broken containers which happen to be transported toward the feeding means. The deflector means insures that each socket is invariably empty before it moves into registry with the support for reception of a fresh cap.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved bottle capping machine itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary plan view of a bottle capping machine which embodies the invention; and

FIG. 2 is a side elevational view of the structure shown in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The drawing illustrates a portion of a capping machine which comprises a frame or housing including one or more vertically adjustable carriers 19 for a horizontal platform 4 supporting a feeding device 2 for caps 9. The feeding device 2 includes an inclined chute 3 whose outlet is adjacent to the endless circular path 7 for an annulus of capping units 1 which orbit about a vertical axis. The chute 3 receives properly oriented caps 9 from a suitable hopper, not shown. The platform 4 has an extension 5 whose width decreases in a direction toward the axis about which the capping units 1 orbit, i.e., toward the center of the path 7. The extension 5 carries at its upper side a support or holder 6 for successive caps 9. The support 6 is rigidly connected to or integral with an ejector or deflector 8 having an inclined deflecting surface 8a which extends across the path 7. The capping units 1 rotate in a clockwise direction, as viewed in FIG. 1.

The chute 3 delivers properly oriented caps 9 to a transfer station 10 and each cap which reaches such station is thereupon propelled into a cutout or socket 11 of the adjacent capping unit. The open sides of the sockets 11 face away from the axis about which the capping units orbit, i.e., away from the center of the path 7. The means for propelling the caps 9 from the transfer station 10 into successive sockets 11 can include a suitable pneumatic system having one or more nozzles 20 which discharge streams of compressed air in synchronism with the speed of the capping units 1. Each of the thus propelled caps 9 slides along the support 6 and comes into abutment with a raised centering member or stop 12 which is

positioned in such a way that a cap which abuts against its stop surface or shoulder 12a is properly centered in the respective socket 11, i.e., that such a cap is located at an optimum distance from the center of the path 7. The thus centered cap 9 enters the field of a retaining device here shown as a permanent magnet 13 which forms part of the respective capping unit 1 and serves to retain the cap in the centered position. The magnet 13 moves the centered cap 9 upwardly against a sealing or cap-applying ram 14 of the respective capping unit 1. The latter advances the cap 9 into registry with the mouth of a container 21 which is supported by the customary turntable plates of a transporting conveyor 22, and the cap is applied over and sealingly secured to the mouth in a manner not forming part of the present invention.

The purpose of the deflector 8 is to eject from successive sockets 11 those caps 9a which were not applied to containers and/or to expel from such sockets the necks of broken or deformed containers. The deflector 8 insures that the sockets 11 which reach the transfer station 10 are invariably empty so that each thereof can receive a properly oriented and properly centered cap 9. The parts which are expelled by the inclined surface 8a of the deflector 8 can drop into a suitable collecting receptacle or onto a takeoff conveyor, not shown. The upper side of the deflector 8 can be flush with the upper side of the support 6.

The carrier 19 is adjustable up and down, as indicated by the arrow 23, so that it can move the support 6 and the deflector 8 to several levels. This enables the machine to apply caps to different types of containers. The parts 6 and 8 are preferably separable from the extension 5 of the platform 4.

An important advantage of our capping machine is that the caps need not be placed onto the containers 21 prior to the application of deforming forces. Thus, each capping unit 1 receives a properly oriented cap 9 directly from the feeding device 2 and moves the cap into registry with the respective container 21. Each container is centered with reference to the respective capping unit 1 and is thereupon lifted off or with the conveyor 22 so as to move its mouth into engagement with the corresponding cap 9 which is held by the permanent magnet 13. The upward movements of containers 21 are entirely unobstructed because the containers begin to move upwardly after the respective capping units 1 have advanced beyond the transfer station 10 and upon completion of lifting of the corresponding caps by the magnets 13. Such mode of operation prevents tilting of caps prior to or during the application of deforming stresses because each cap is properly centered and held in the respective capping unit 1 before it comes into contact with the mouth of the associated container.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our con-

tribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended.

We claim:

1. In a machine for the application of caps to bottles or analogous containers, a combination comprising a plurality of capping units arranged to orbit along an endless path about a substantially vertical axis, each of said units including a cap-receiving socket having an open side facing away from said axis and cap retaining means; a platform adjacent to a portion of said path; a support provided on said platform at a level below said path and registering with successive sockets when said units orbit about said axis; centering means provided on said platform; feeding means comprising a device for delivering caps in a predetermined orientation onto said support and into successive sockets so that a thus delivered cap engages said centering means and is thereby located in the range of the respective retaining means; and deflector means supported by said platform and extending across said path upstream of said feeding means, as considered in the direction of travel of said units, to expel from successive sockets any parts which might be contained therein during travel of such sockets toward said portion of said path.

2. A combination as defined in claim 1, wherein said centering means comprises a stop provided on said platform and having a stop surface inwardly adjacent to the open side of that socket which registers with said feeding means.

3. A combination as defined in claim 1, further comprising conveyor means for transporting containers below said path so that successive containers register with successive capping units.

4. A combination as defined in claim 1, wherein said platform is movable up and down to locate said deflector means and said centering means at one of a plurality of levels.

5. A combination as defined in claim 4, further comprising vertically movable carrier means for said platform.

6. A combination as defined in claim 1, wherein said device for delivering caps comprises a chute.

7. A combination as defined in claim 1, wherein each of said retaining means comprises a permanent magnet which is movable up and down.

8. A combination as defined in claim 1, wherein each of said units further comprises a cap applying device located at a level above the respective socket and wherein said retaining means are movable up and down to raise caps from said sockets into close proximity of the respective cap applying devices.

9. A combination as defined in claim 1, wherein said feeding device is mounted on said platform.

10. A combination as defined in claim 1, wherein said support and said deflector means have upper sides located in a common horizontal plane.

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