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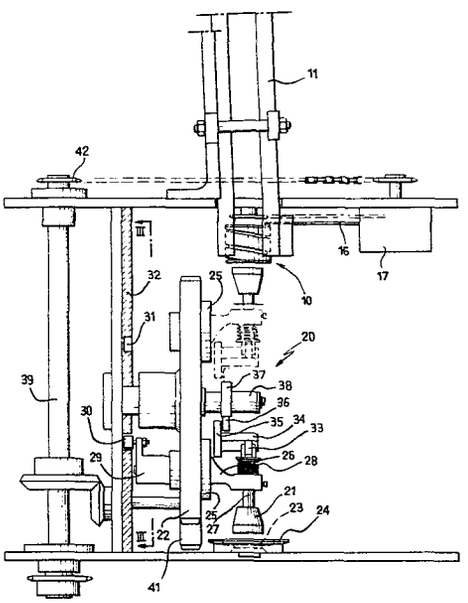
(54) Improvements to automatic machines feeding small wire cages for sealing stoppers applied to sparkling wine bottles and the like.

(57) The machine comprises a unit (10) for extracting cages from a stacked supply including two volute rollers (12, 13) which engage the bottom ring of each cage to cause an axial displacement of the latter and means of transferring the extracted cages to sockets (23) in a conveyor chain (24), comprising a plurality of buckets (21) subjected to controlled motion components which halt each bucket (21) temporarily at the extraction unit (10) to receive the cage and displace the bucket (21) in perpendicular alignment with each socket (23) in the chain (24), the buckets (21) being then subjected to the action of means (27, 33, 34, 35, 36, 37) which produce axial displacement serving for picking up and respectively depositing the cages.



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COMPLETE DOCUMENT

This invention relates to improvements to automatic machines of the type employed to feed small wire cages, particularly of a type known as four-wire cage, for sealing stoppers which have been applied to bottles of sparkling wine in general.

More specifically, the invention concerns such an automatic cage-feeding machine, which comprises an extraction unit formed by an auger-like or volute member cooperating with a lever, which separates each cage individually by withdrawing it from a stacked supply and bucket delivery means which receive said cages and transfer them to the stoppers of continuously advanced bottles. Current machines of this same general type, while affording trouble-free operation capabilities, have the disadvantage of a low output rate. To obviate this problem, and increase the overall efficiency of the machine, the number of the extraction units and delivery means has been increased; however, while on one hand this only improves the efficiency by a small amount, on the other hand appreciably complicates the machine construction, with attendant higher manufacturing and operating costs and inferior reliability in operation.

This invention essentially sets out to improve the cage feeding machines of the type specified above, such as to appreciably increase their efficiency and at the same time simplify their construction, and this both in order to improve

the reliability and reduce the overall size, weight and cost of such machines.

Within the above general aim, the invention is also directed to provide a machine capable of separating and feeding up to 15,000 cages/hour; which is the equivalent of an output rate five times as great as that of conventional machines of the type employing a plurality of separating units.

It is further possible to arrange that the improved cage-feeding machine according to this invention has no reciprocating parts, thereby it is substantially free of operational dead times and can achieve high output rates with structures which can be light in weight because only moderately stressed.

According to one aspect of the present invention, there is provided an improved automatic cage-feeding machine comprising an extraction unit including first and second drums in side-by-side relationship, each drum having a single-start volute formed thereon, said drums cooperating with each other to push each cage into corresponding delivery buckets carried, with a cyclic motion coordinated with that of said side-by-side drums, below said extraction unit, rotary means including tiltable holders or supports for said buckets and kinematic members associated with said holders to produce a controlled oscillation of said buckets, said oscillation, during the cage loading step, temporarily halting said buckets in

alignment with said extraction unit and compensating for the forward movement of the rotary holder and, during the cage transferring step, holds said buckets over a preset travel distance perpendicular to and in line with corresponding sockets in a conveyor chain, and means for producing a quick radial displacement of said buckets for picking up and transferring said cages upon said buckets becoming aligned with said extraction unit and respectively with a corresponding socket in said conveyor chain.

Further features and advantages will be more apparent from the detailed description which follows, with reference to the accompanying drawings, given herein by way of example and not of limitation, where:

Figure 1 is a partly sectional side elevation view of a machine according to this invention;

Figure 2 is a reduced scale front view thereof, as taken in the direction of the arrows II-II of Figure 1; and

Figure 3 is a reduced scale, schematical sectional view taken along the line III-III of Figure 1.

In the drawings, the reference numeral 10 generally designates the cage extraction unit, the wire cages being stacked in a supply (not shown) contained within a specially provided loader 11 overlying said extraction unit. The latter comprises a pair of side-by-side drums 12,13, each drum being

formed with a screw-like volute 12a, 13a, respectively, effective to engage the wire in the bottom ring of each cage. The drums or rollers are driven rotatively in the same direction by a drive chain (not shown) which meshes with corresponding sprocket wheels 14,15, respectively rigid with said rollers, the volutes being oppositely handed. Furthermore, the volute 12a of the roller 12 extends over a longer axial distance in the direction of stacking of the cages, thereby said roller is operative to engage first, with its volute, the bottom ring of each cage to start the cage to move correspondingly away from its supply stack. After said initial away movement or separation has been completed, a rocker lever 16, arranged frontally to the rollers and driven -- in synchronization with the rotation of the rollers -- by a mechanism 17, known per se, e.g. operated through a crank lever handle, will push the cage sideways to thus engage it with the volute 13a of the roller 13. At this stage, the cooperating volutes 12a,13a separate the cage from the stack and, by moving it axially away, push the cage into the pick up members of an underlying delivery unit, generally indicated at 20.

The delivery unit comprises a plurality of closed-bottom buckets 21 having a magnetized insert at their bottoms. The buckets 21 are cyclically brought, through a rotating disk 22, under said extraction unit to receive the cages, and then

into alignment with the sockets 23 of an underlying chain 24 for depositing in said sockets the cages, which are thus fed to the stopper cage applying machine (not shown). The cyclic motion of the buckets is thus coordinated with that of the rollers 12,13 and of the chain 23. Moreover, the buckets are subjected to controlled oscillations, which momentarily halt each bucket under the extraction unit 10, thus compensating for the continuing forward movement of the disk 22, and respectively holding the buckets perpendicular to and aligned with the sockets 23 of the chain 24 over a short travel distance.

For this purpose, each bucket 21 is secured to a corresponding tiltable holder or support 25 on the disk 22. Each holder is provided with an outer arm 26 having a radial seat which retains in sliding relationship a stem 27 of a related bucket; said stem being centripetally biased by a spring 28. The holder further carries an inner arm 29 which is terminated with a small roller 30 adapted for engaging the profile groove 31 of a stationary frontal cam formed on a plate 32 rigid with the machine frame. The profile of the cam, shown in detail in Figure 3, features a negative slope segment 31a which, at the extraction unit 10, causes the bucket 21 to oscillate between limit positions 21a,21b, shown in dashed lines in the Figure, with attendant temporary compensation for the advancing movement of the bucket caused by the

rotation of the disk 22. Thus, the bucket is held momentarily stationary below the unit 10, to receive a cage being urged into the bucket by the combined action of the drums 12,13.

A further cam profile segment 31b, having a slight negative slope, is formed on the diametrically opposite cam portion, and is effective to compensate for the inclination resulting from the rotational movement of the disk 22 and allow the bucket to cover a distance adjacent the chain 24 by moving parallel to itself in a perpendicular direction to the plane of lay of said chain and in line with a corresponding socket of the latter.

Additionally to the aforedescribed controlled oscillations, the buckets 21 also undergo a rapid axial displacement movement, against the bias of the springs 28, which is imparted thereto at the diametrically opposite cage pick up stations by the unit 10 of cage extraction and deposition into the sockets 23 on the conveyor chain. To this aim, the stem 27 of each bucket is provided with a cam following roller 33 which is engaged by the profiled web 34 of a pusher lever 35; each pusher lever being articulated to the next adjacent bucket holder. The levers 35 are in turn provided with a cam following roller 36 each, whereon is active a stationary cam 37 with diametrically opposed lobes, said stationary cam being rigid with the pin 38 supporting the disk 22.

The inventive machine further comprises drive

means including a driveshaft 39 which, through a bevel gear pair 40 and pinion gear 41, rotatively drives the disk 22, the latter being to this end formed with peripheral gear teeth. Moreover, the driveshaft 35 drives, through an end pinion gear 42, the mechanism 17, which in turn transmits the motion to the sprocket wheels 14,15 of the drums 12, 13.

Of course, based upon the same principle of this invention, the constructional details and contingent shapes may be varied largely with respect to the description and illustrations provided herein by way of example and not of limitation, without departing from the scope of the present invention.

Thus, for example, while the delivery unit has been shown provided with four buckets at 90° from each other, such an arrangement is not a requisite of the invention, the number of the buckets being variable from two to twenty. Quite similarly, the extraction unit 10 may be positioned otherwise with respect to the disk 22, in particular on one side thereof; in this case, the cages would be fed, rather than by gravity, under the biasing of elastic or pneumatic means.

C L A I M S

1. An automatic wire cage feeding machine for feeding small wire cages for sealing stoppers applied to bottles of sparking wine and the like, characterized in that it comprises an extraction unit (10) including first and second drums (12, 13) in side-by-side relationship, each drum having a single-start volute (12a, 13a) formed thereon, said drums (12, 13) cooperating with each other to push each cage into corresponding delivery buckets (21) carried, with a cyclic motion coordinated with that of said side-by-side drums (12, 13), below said extraction unit (10), rotary means (22) including tiltable holders or supports (25) for said buckets (21) and kinematic members associated with said holders (25) to produce a controlled oscillation of said buckets (21), said oscillation, during the cage loading step, temporarily halting said buckets (21) in alignment with said extraction unit (10) and compensating for the forward movement of the rotary holder and, during the cage transferring step, holds said buckets (21) over a preset travel distance perpendicular to and in line with corresponding sockets (23) in a conveyor chain (24), and means for producing a quick radial displacement of said buckets (21) for picking up and transferring said cages upon said buckets (21) becoming aligned with said extraction unit (10) and respectively with a corresponding socket (23) in said conveyor chain (24).

2. A machine according to Claim 1, character-

ized in that said extraction unit (10) and said conveyor chain (24) are located diametrically oppositely relative to the rotary means (22) carrying said delivery buckets (21), said rotary means comprising a disk (22) formed with peripheral gear teeth.

3. A machine according to Claims 1 and 2, wherein said first and second side-by-side drums (12, 13) have oppositely handed volutes (12a, 13a) formed thereon of different axial extensions, the axial extension of the volute (12a) on the first drum (12) being longer, thereby the second drum (13) will engage a cage, to cooperate to the withdrawal of said cage from its related supply stack, after the first drum (12) has started said cage to move away from said supply stack.

4. A machine according to the preceding claims, characterized in that said extraction unit (10) further comprises a rocker lever (16) driven by a mechanism of a motion coordinated with that of said drums (12, 13) and adapted for causing each cage, as partly withdrawn by the first drum (12), to engage with said second drum (13).

5. A machine according to the preceding claims, characterized in that it comprises, at a location overlying said drums (12, 13) of the extraction unit (10), a single magazine or loader for containing a corresponding stack of cages.

6. A machine according to the preceding claims, wherein said delivery buckets (21) are provided with

at least one magnetic insert and have a radial stem (27) slidably supported, against the bias of elastic means (28), by a seat in a corresponding outer arm (26) of the related tiltable holders (25), said holders (25) including an additional inner arm (29) carrying an end roller (30) adapted for engaging a groove (31) in a stationary frontal cam (32) effective to produce said controlled oscillations of said delivery buckets (21) in accordance with the rotary motion of the disk (22) carrying said buckets (21).

7. A machine according to Claims 1 and 6, wherein said stationary frontal cam (32) has first and second active profile segments (31a, 31b) with negative slopes to compensate for the forward movement of said disk (22) by temporarily halting said buckets (21) at the extraction unit (10), and to respectively enable said buckets (21) to cover said distance perpendicularly to and in alignment with said sockets (23) on said conveyor chain (24).

8. A machine according to the preceding claims, wherein the end of the stem (27) of each said buckets (21) carries, on the side extending toward the center of said supporting disk (22), a cam following roller (33) being engaged by the profiled web (34) of a pusher lever (35), and wherein each pusher lever (35) carries in turn a cam following roller (33) whereon is active a stationary cam (37) attached to the shaft or pin (38) of the rotary disk (22) and provided with a pair of oppositely located lobes effective to produce said rapid radial displacement movements of said

buckets (21) for picking up and transferring said cages.

9. A machine according to Claim 8, wherein the pusher lever (35) of each bucket (21) is articulated to the tiltable holder (25) of an adjacent bucket (21).

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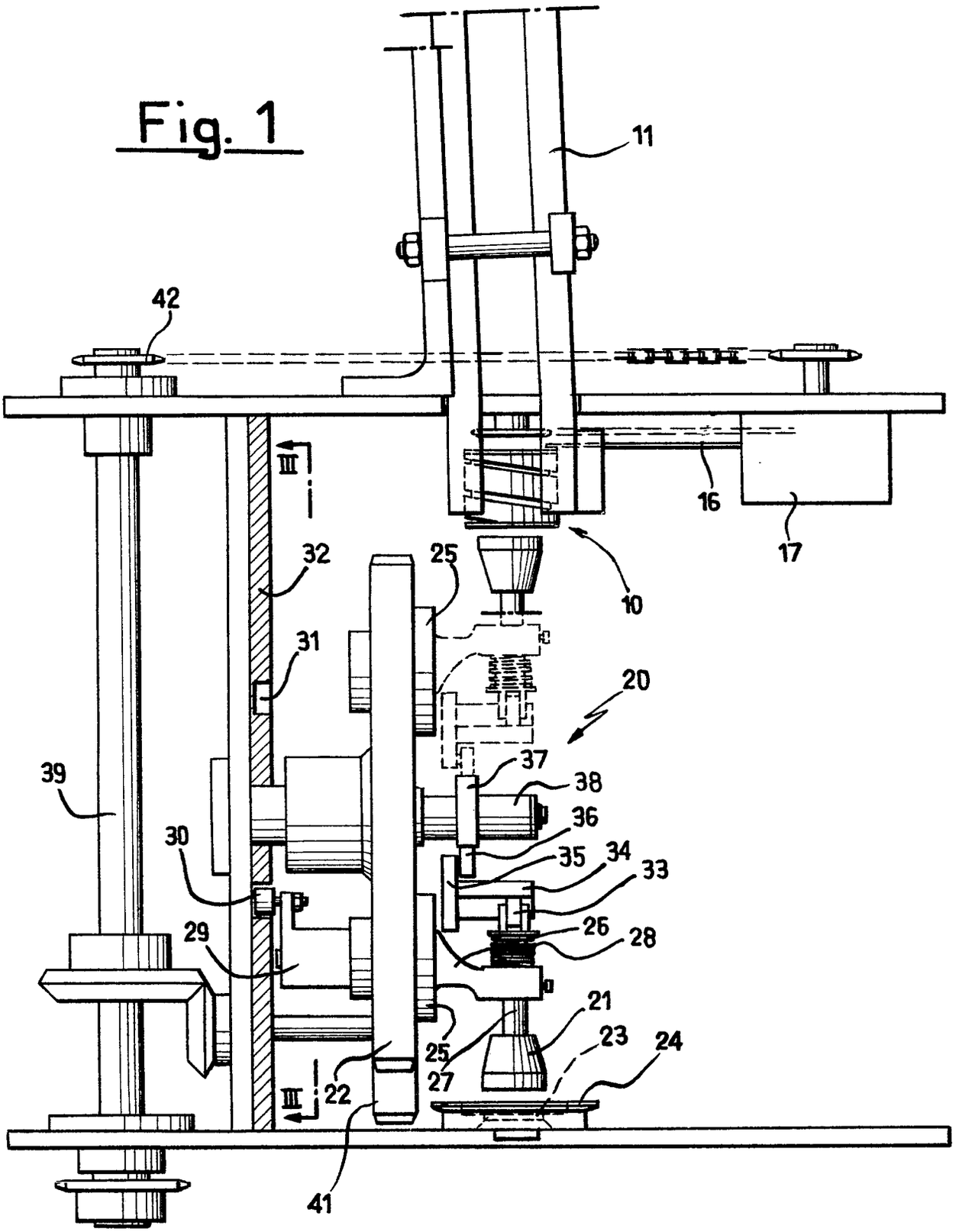
Fig. 1



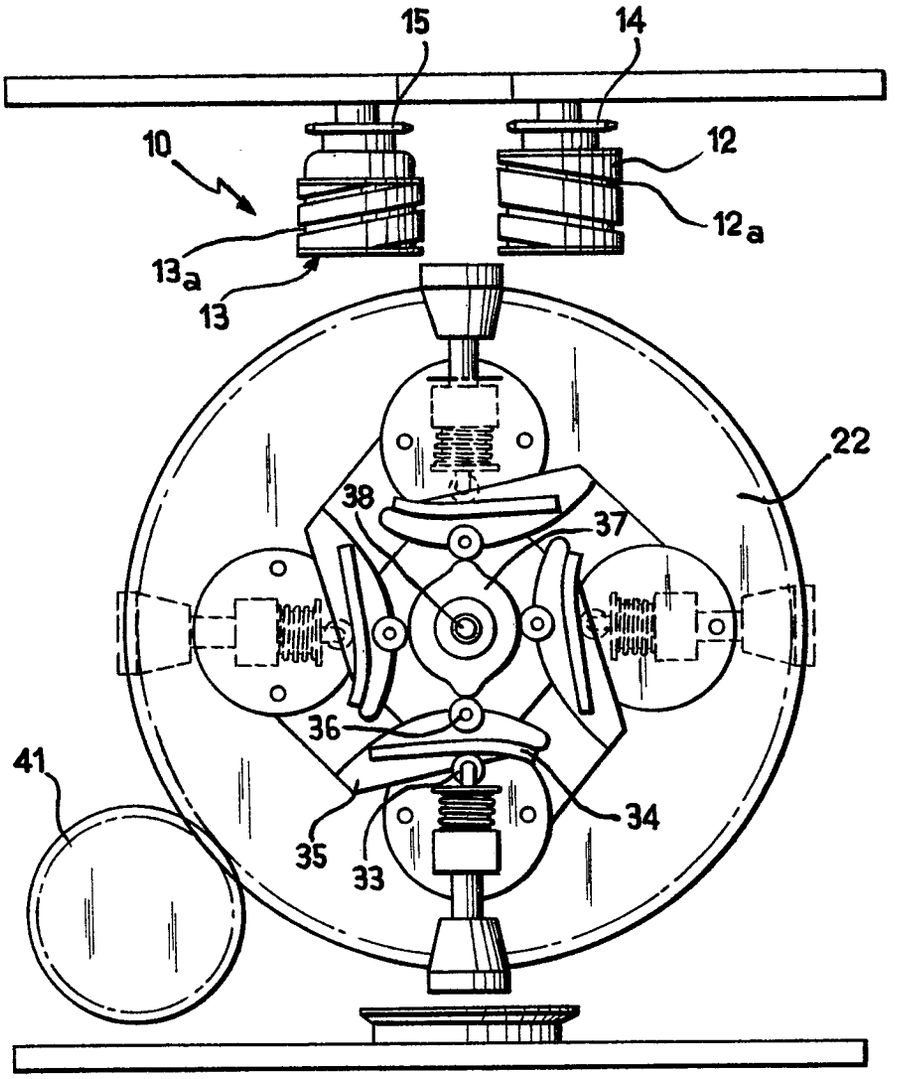


Fig. 2

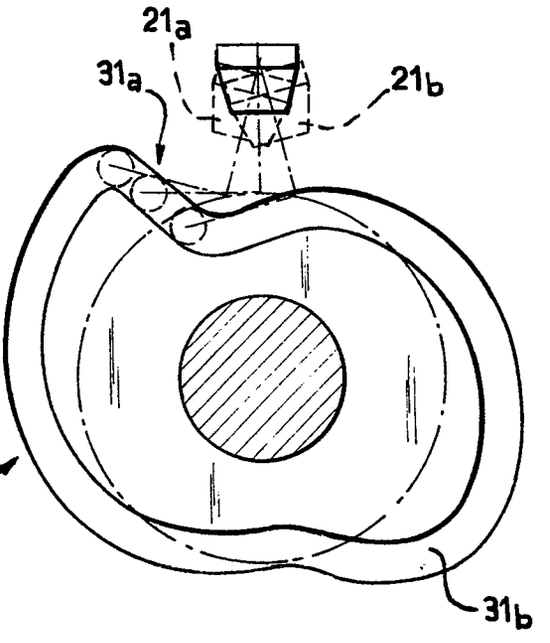


Fig. 3