(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 028 400 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
16.08.2000 Bulletin 2000/33

(51) Int Cl.[7]: **G07F 11/24**

(21) Application number: **00500019.5**

(22) Date of filing: **11.02.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **12.02.1999 ES 9900290**
07.02.2000 ES 200000259

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(54) Extraction mechanism for automatic vending machines

(57) Extraction mechanism for automatic vending machines, particularly for machines which sell products contained in cylindrical or prismatic containers (3) stacked in a horizontal position arranged in quincunxes and forming two columns which are contained by two parallel walls (1, 2), with the extraction mechanism consisting of a retainer (4) element on which rests the lowermost container (3). Retainer (4) consists of at least one approximately semicircular element which may revolve about its axis (5) and placed such that its curved segment (6) together with the lower edge (7) of the opposing wall defines a gap narrower than the diameter of containers (3'), while the straight segment (8) defines an outlet gap slightly larger than said diameter so that container (3') may be let out.

FIG. 1

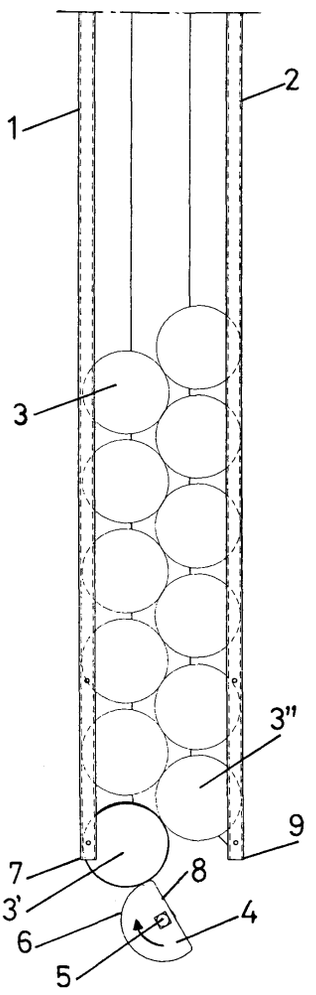

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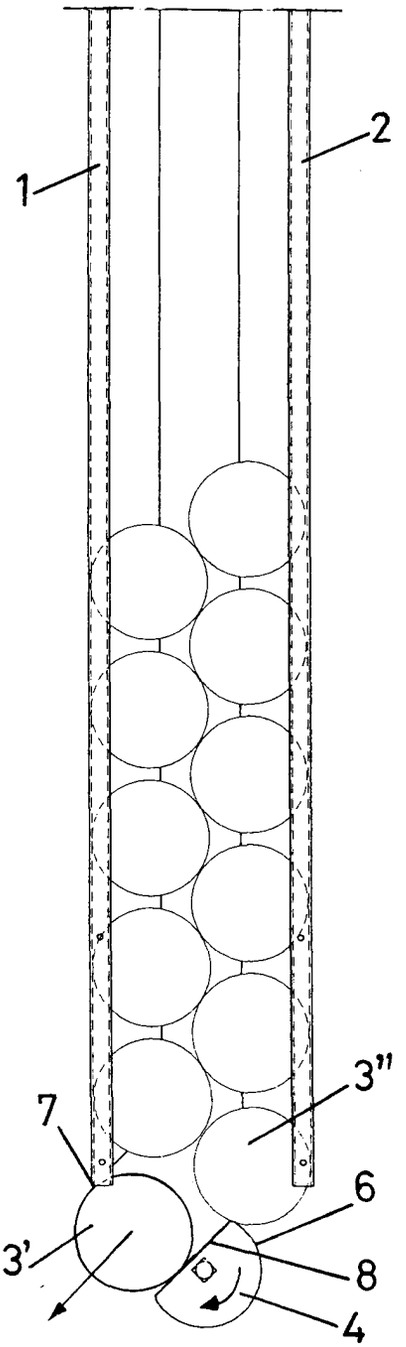
FIG. 2



Description

[0001] The present invention relates an extraction mechanism for automatic vending machines, and more specifically for machines selling products packaged in cylindrical, spherical or prismatic containers.

[0002] The mechanism of the invention is particularly designed for drink container vending machines, such as cans or bottles.

[0003] Already known are vending machines for drink cans and bottles where the containers are stacked vertically contained between two vertical walls separated by a distance between the diameter of said containers and double such diameter, so that the containers are arranged in quincunxes, forming two vertical columns in which the containers are placed at different heights.

[0004] With this arrangement the containers in both columns alternately occupy the lower outlet section where the extraction mechanism is placed.

[0005] For this purpose, extraction mechanisms are known which consist of a retainer placed under the container columns so that it serves as a support for the container of the columns which is at the lowermost position, acting as a retainer preventing its outlet and thereby that of the remaining containers stacked above it.

[0006] Said retainer can revolve about an axis parallel to the containers and is configured so that by rotating about a certain angle it allows the lowermost container to exit, bearing the weight of the container immediately above in the quincunxes arrangement, which will be allowed out by a further rotation by the same angle.

[0007] In this sense US Patent no. 4036400 can be mentioned, in which the retainer consists of a structure which swivels between two extreme positions, in each of which it supports consecutive containers arriving from different columns and furthermore bears in a lower position a container from either column, which is ready to be supplied in the next swivel motion of the structure. This container which is ready to be supplied is retained between the swivelling structure and one of the walls which limit the container columns, for which it is necessary that the walls which limit the container columns extend beneath the position of the swivelling structure. Furthermore, the structure includes moving parts which complicate its construction and add to its cost, as well as being possible sources of malfunctions and inadequate functioning.

[0008] US Patent 4509658 discloses a further extraction mechanism in the form of a revolving scoop placed under the container columns. When it has its concave side facing upwards it receives the container in the lowermost position. As the scoop turns and is placed upside down, the container falls freely under the action of gravity. This system requires that when the containers reach the lowermost position they be placed on the scoop. In order to achieve this the containers must almost form a single column, with small lateral deviations but not adopting a quincunxes arrangement, resulting for a given height in a reduced number of containers per extraction mechanism.

[0009] The object of the present invention is to eliminate the problems described above by means of an extraction mechanism of a simple construction, reduced cost and reliable functioning, and which further allows a wide arrangement in quincunxes of the containers in order to obtain maximum capacity.

[0010] Furthermore, the extraction mechanism of the invention is applicable to containers of different diameters, for which it is enough, when required, to adjust the separation of the walls which house the container columns.

[0011] The mechanism of the invention can also be applied to extraction of containers from different containers stacks placed after each other with the containers arranged in quincunxes in each stack, occupying two columns.

[0012] As described above, the extraction mechanism of the invention is particularly designed for vending of products contained in cylindrical containers or packages, which are stacked horizontally in quincunxes forming two vertical columns which are contained by two vertical parallel walls separated by a distance greater than the diameter of the containers and smaller than twice this diameter.

[0013] The mechanism of the invention is of the type which consists of a revolving retainer on which rests the lowermost container of the two columns, which retainer revolves around a shaft parallel to the containers and which is preferably contained within the plane of intersection of the two container columns.

[0014] The mechanism of the invention is characterised in that the aforementioned retainer consists of a part with an approximately semicircular shape which revolves about a shaft which passes through the centre of said semicircle. Said part is placed at such a distance from the lowermost edge of the walls which contain the two container columns so that the curved edge of the semicircular outline of said retainer defines together with the lower edge of the opposite wall an outlet narrower than the container diameter, while when the retainer revolves the straight segment of its perimeter defines, together with the lower edge of the wall opposite said straight segment, a maximum size outlet slightly larger than the container diameter.

[0015] With such an arrangement, as the retainer revolves the curved segment will prevent outlet of the container which rests on this segment, while the straight segment will, in the correct position, allow a container to exit.

[0016] The retainer may be an approximately semicircular outline plate or a semicylindrical body.

[0017] The rotation of the retainer may take place in a single direction or alternatively in either direction.

[0018] The above and further characteristics of the present invention, as described in the claims, will become apparent in view of the accompanying drawings

which show an example of a preferred embodiment of the invention for purposes of illustration only and in no way meant to define the limits of the invention.

[0019] In the drawings:

[0020] Figure 1 shows a schematic representation of a front elevation of the extraction mechanism according to the invention, with the retainer blocking the container outlet.

[0021] Figures 2 to 4 are similar views to figure 1, showing successive situations of extraction and retention, due to the rotation of the retainer in a single direction.

[0022] Figures 5 to 8 are similar views to figure 1 showing successive situations of extraction and retention when the retainer rotates alternately in both directions.

[0023] Figure 9 is a perspective view of the extraction mechanism shown in figures 1 to 8 with the retainer blocking the container outlet.

[0024] Figures 10 and 11 are similar perspective views to figure 5, showing possible variations of execution.

[0025] The extraction mechanism of figure 1 includes two parallel walls labelled (1) and (2), between which are placed cylindrical containers (3) in a horizontal position. The separation between walls (1) and (2) is greater than the diameter of containers (3) but smaller than twice said diameter, so that the containers are stacked in a quincunxes distribution.

[0026] Beneath walls (1) and (2) is placed the extraction mechanism which consists of a retainer (4) with an approximately semicircular outline and which may revolve about a shaft (5) which coincides with the centre of outline (4).

[0027] As mentioned above, retainer (4) is placed beneath the lowermost edge of walls (1) and (2) with the rotation axis (5) exactly coinciding with the plane of intersection of containers (3) of the two columns.

[0028] The outline and position of retainer (4) are such that the distance from the curved segment (6) of the outline to the lower edge (7) of the opposite wall is less than the diameter of containers (3), while the distance between the straight segment (8) and the lower edge (9) opposite it is greater than said diameter.

[0029] In the position shown in figure 1, container (3') rests on the curved segment (6) of retainer (4), thus blocking its exit. Container (3') in turn retains the following container (3") so that no containers can exit.

[0030] As retainer (4) revolves in the direction of the arrow and arrives at the position shown in figure 2, the straight segment (8) of retainer (4) is left opposite lower edge (7) of wall (1). The distance between said straight segment (8) and lower edge (7) is greater than the diameter of the containers, and so container (3') is free to fall under gravity. Simultaneously, container (3") rests on the curved segment (6) of retainer (4), so that it is thus blocked and the overall situation is that shown in figure 3.

[0031] As retainer (4) continues to revolve in the direction of the arrow, it reaches the position shown in figure 3, where the distance between the straight segment (8) of retainer (4) and lower edge (9) of the wall (2) is greater than the diameter of container (3"), thus allowing it to exit freely. In this position the following container (3"') rests on the curved segment (6) of retainer (4) with the overall situation as shown in figure 1, the cycle continuing with each operation of retainer (4).

[0032] Between each position shown in figures 1, 2 and 4 retainer (4) has turned 180°, so that with each 180° rotation of retainer (4) a container is let out from a different column.

[0033] The extraction mechanism shown in figures 5 to 8 is identical to that shown in figures 1 to 4 with the difference that retainer (4), instead of revolving in a single direction as in figure 1 to 4, here revolves in either direction alternately.

[0034] From the resting situation of retainer (4) shown in figure 5, when the extraction mechanism is activated retainer (4) revolves in the direction of arrow A until it reaches the position shown in figure 6, where it allows container 3' to be let out, to then revolve in the opposite direction until returning to its resting position as in figure 7.

[0035] When the extraction mechanism is again activated, retainer (4) revolves in the direction of arrow B (figure 7) until it allows container (3") to be let out, as shown in figure 8, after which it shall revolve in the opposite direction to return to its resting position.

[0036] Naturally, the resting position could also be either extreme position of the retainer element shown in figures 6 to 8.

[0037] The above described mechanisms allow using the same retainer (4) for containers (3) of different diameters, for which it is enough to be able to adjust the separation between walls (1) and (2).

[0038] As is traditional, the vertical extremes of walls (1) and (2) may end in tabs which prevent any accidental longitudinal displacement of containers (3).

[0039] Retainer (4) may consist of one or more approximately semicircular plates mounted on a single revolving shaft congruent with the centre of said plates.

[0040] Retainer (4) may also consist of a semicylindrical body as shown in figure 9, mounted on a shaft (10) congruent with the shaft of retainer (4) which will determine its axis of revolution (5).

[0041] As shown in figures 10 and 11, two or more retainers may be mounted on shaft (10), each of which placed beneath a stack (11) of containers (3) arranged in quincunxes. The various retainers will be angularly out of phase with each other so that the consecutive rotation of shaft (10) by the corresponding angle causes the outlet of containers (3) belonging to different stacks (11). With this arrangement, two or more stacks of containers (3) may be placed between walls (1) and (2).

[0042] In either case the shaft (10) on which retainer or retainers (4) are mounted will be driven by a micro-

engine, commanded by the control devices which may be activated by introducing coins as is traditional for this type of machines.

Claims

1. Extraction mechanism for automatic vending machines, particularly for machines which sell products packaged or contained in cylindrical or prismatic containers (3) stacked in a horizontal position arranged in quincunxes and forming two vertical columns which are contained by two parallel walls (1, 2) which are separated by a distance greater than that of the diameter of containers (3) but smaller than twice said diameter, the extraction mechanism of which consists of a retainer (4) element on which rests the lowermost container of either column, said element mounted so that it may revolve about a shaft (5) parallel to containers (3) and contained in the plane of intersection of the two columns of containers (3), characterised in that retainer (4) consists of at least one plate of an approximately semicircular outline which may revolve about its axis (5) and which is placed at a distance from the lower edge (7, 9) of the walls (1, 2) which contain the two container (3) columns such that the curved segment (6) of the semicircular outline of retainer (4), together with the lower edge (7, 9) of the wall opposite, it provides a gap which is narrower than the diameter of containers (3), while straight segment (8) together with the lower edge (7, 9) of the wall opposite it provides an outlet gap slightly larger than the diameter of said containers (3).

2. Mechanism as in claim 1, characterised in that the retainer (4) consists of at least one or more plates of an approximately semicircular outline mounted on a single revolving shaft congruent with the centre of said plates.

3. Mechanism as in claim 1, characterised in that retainer (4) consists of one or more aligned bodies of an approximately semicylindrical shape mounted on a single revolving shaft congruent with the axis of said bodies.

4. Mechanism as in claim 1, characterised in that retainer (4) revolves in a single direction.

5. Mechanism as in claim 1, characterised in that retainer (4) revolves alternately in both directions.

FIG. 1

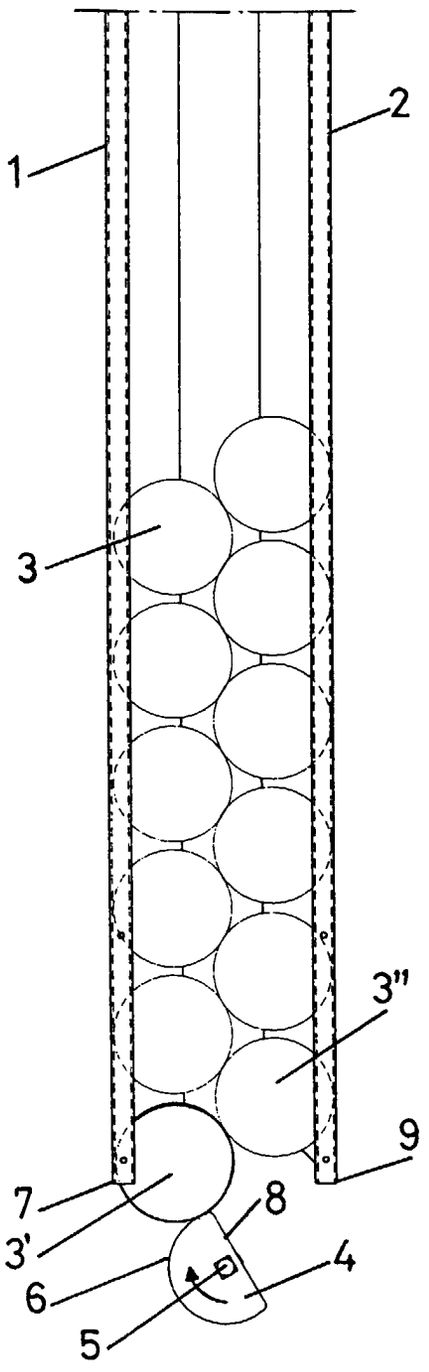


FIG. 2

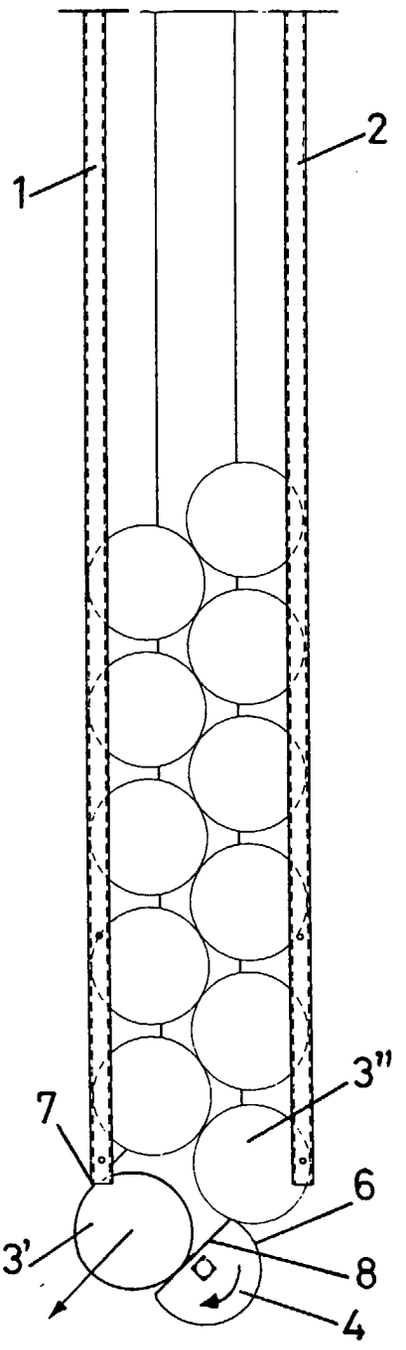


FIG. 3

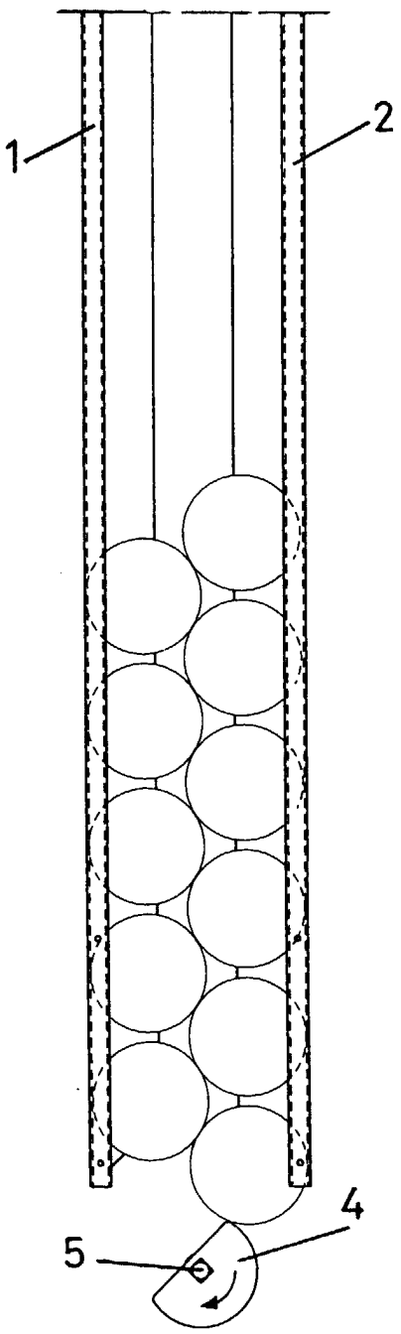


FIG. 4

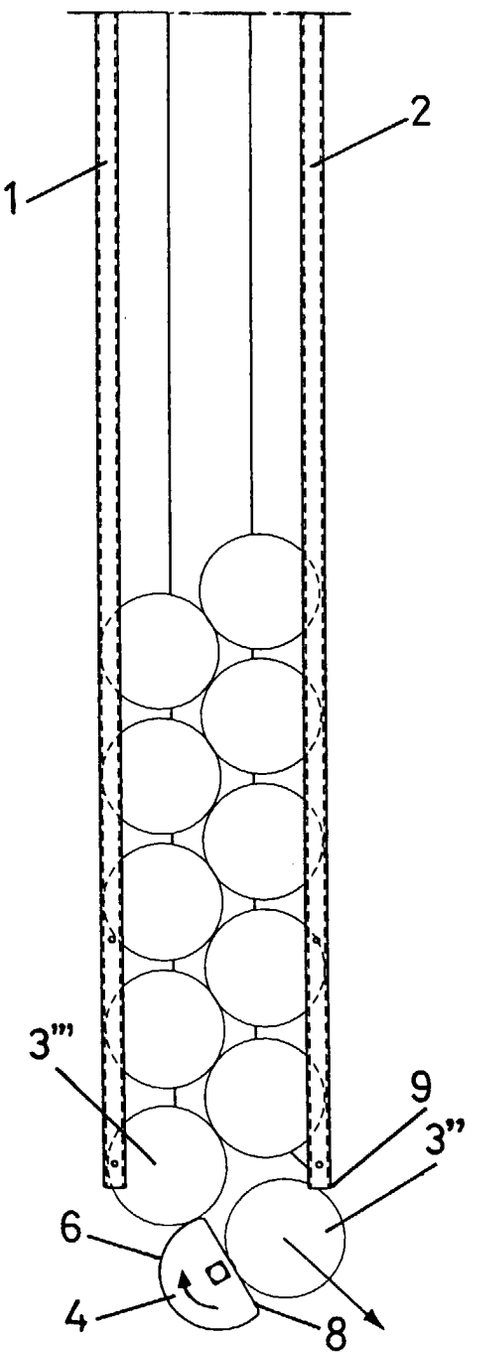


FIG. 5

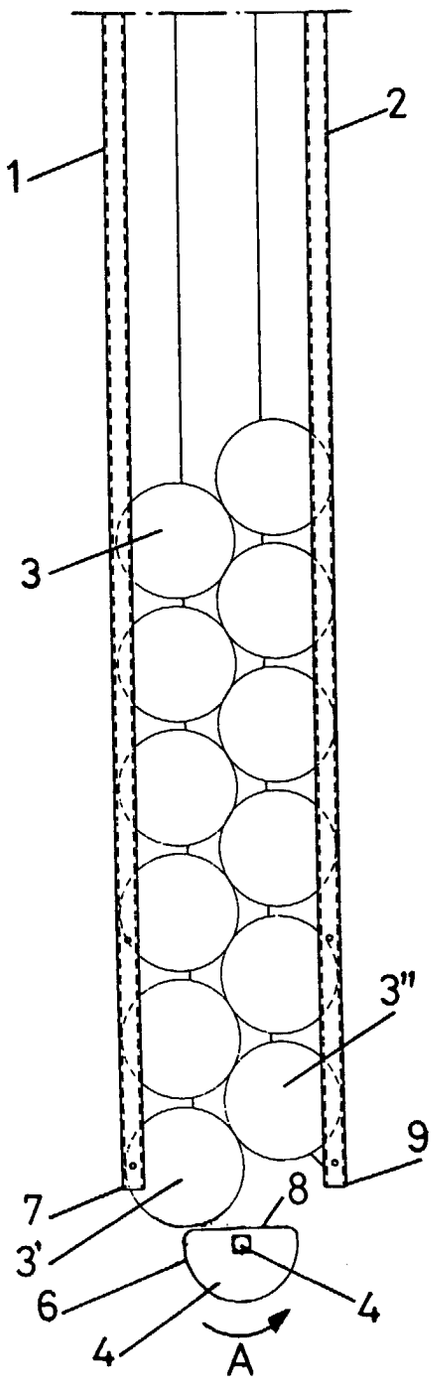


FIG. 6

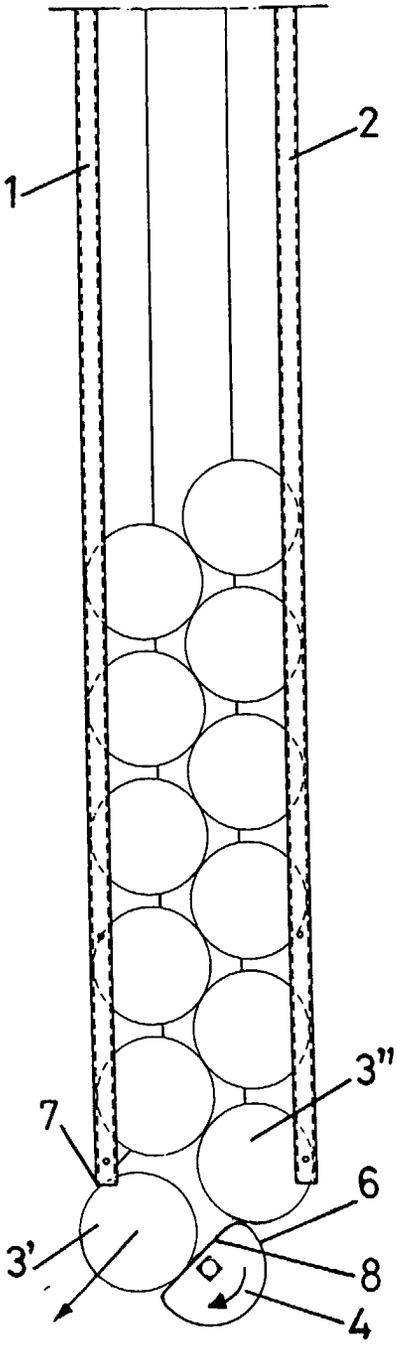


FIG. 7

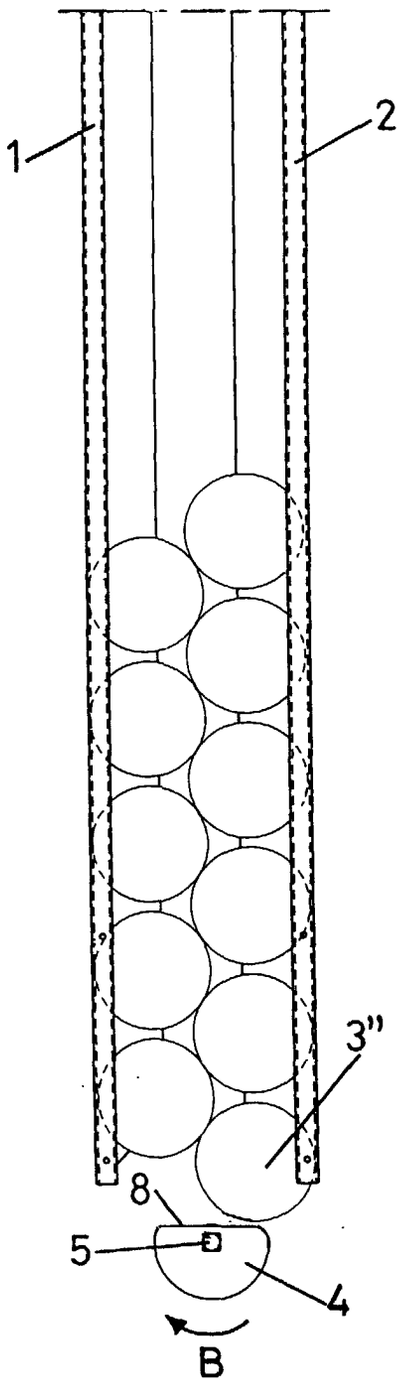
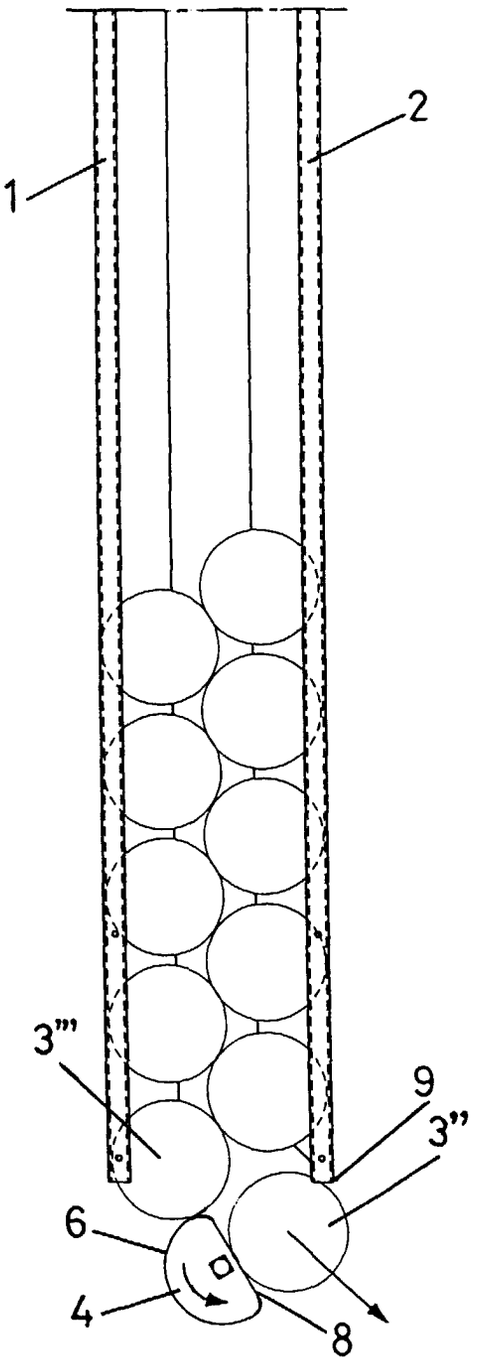


FIG. 8



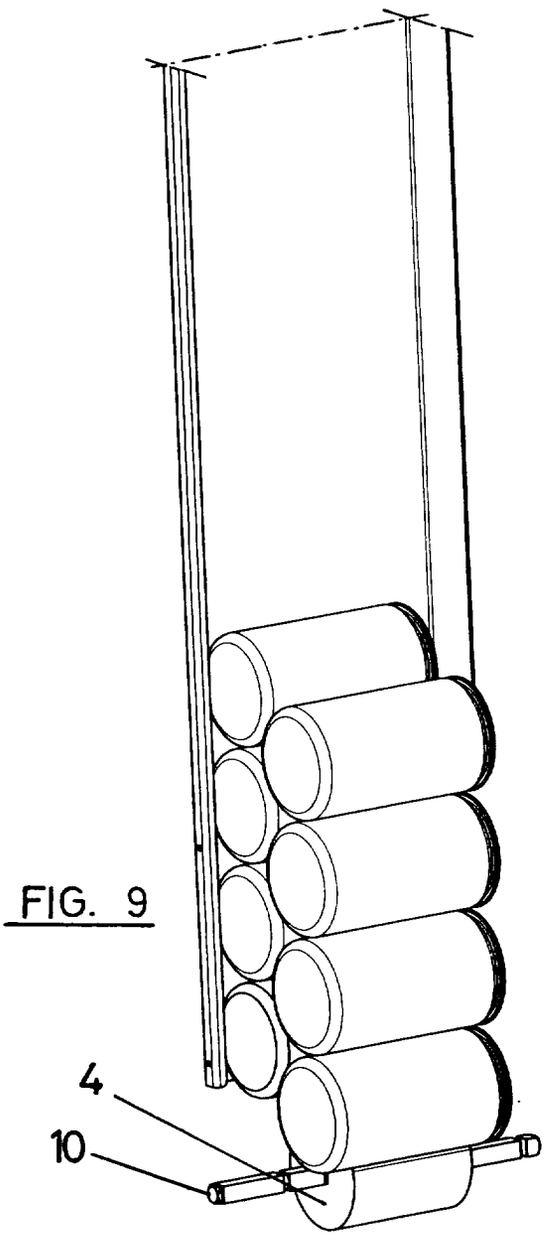


FIG. 9

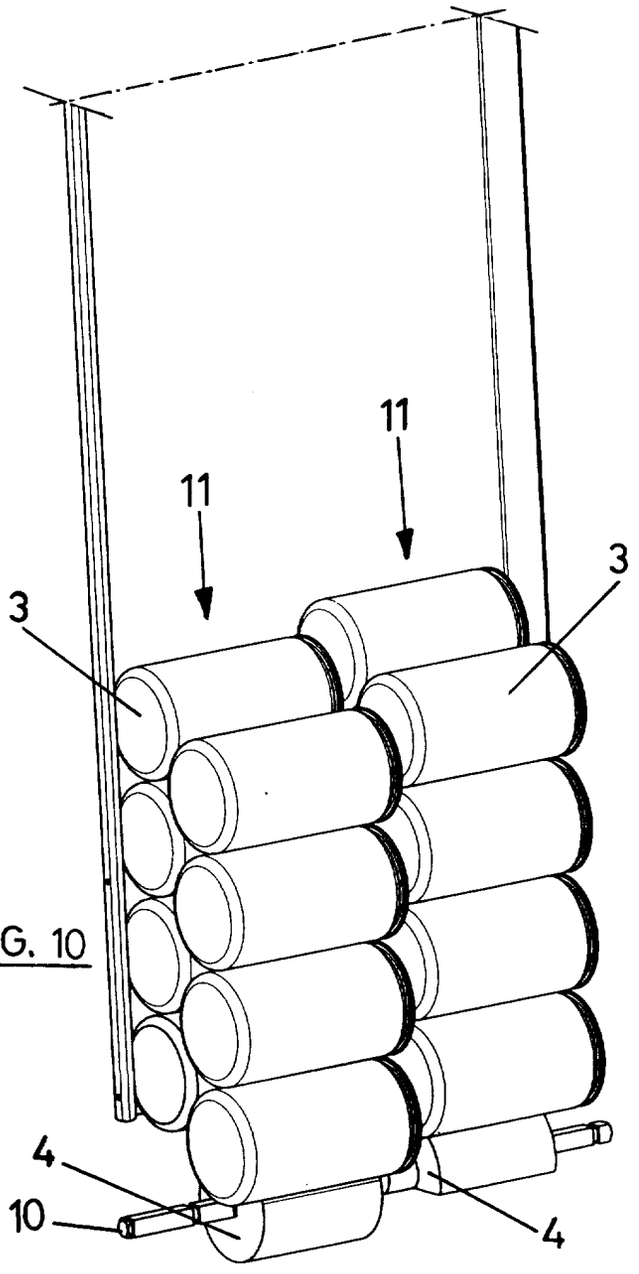


FIG. 10

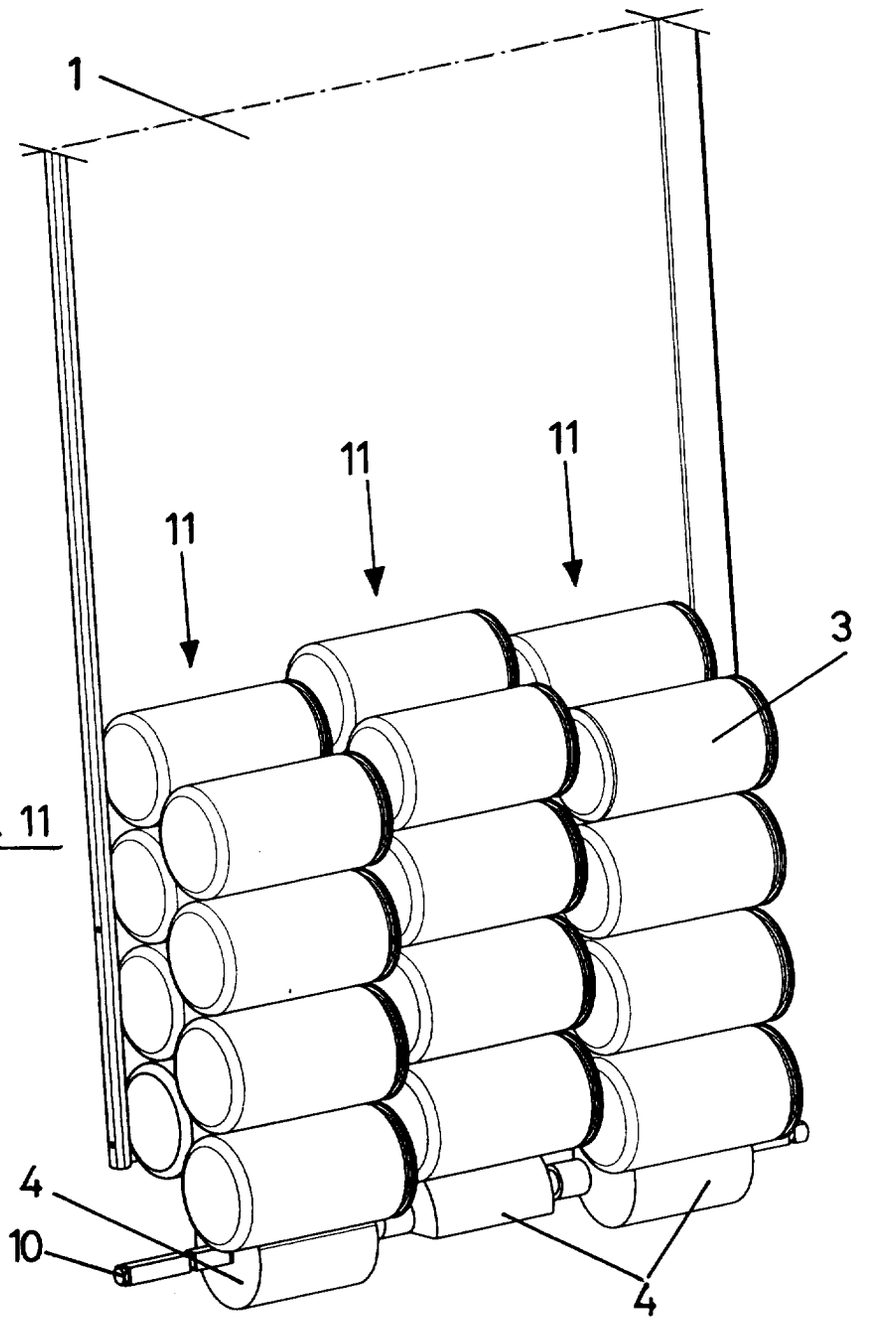


FIG. 11