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(54) A device for separation of cups from stack of cups, e.g. in a vending machine, designed to serve beverages

(57) The invention relates to a device (1) provided to separate cups (5) from a stack of cups. The device comprises a shell (3), which is stationarily mounted in the vending machine and which is provided to receive a stack of cups, a separator (4) for individual cups as well as a driving device (6) and a feed device (25) for separated cups, the shell (3) being telescopicly and concentrically respectively mounted in a sleeve-like holder (2), which is provided to be driven by said driving device (6) and be displaced during the separation phase in relation to the shell (3), with activation of said feed device (25). According to the invention, said feed device (25) is provided to be actuated by spring power during said relative movements between said stationary shell (3) and said moveable holder (2) and separator (4) to pivot into and out of, respectively, a recess (17) in said holder (2) and at the same time penetrate with a projection (45) into the region between flanges of the two lowermost cups, whereby bearing surfaces (43) on the feed devices being designed to be tilted downwards and release the flange of the lowermost cup.

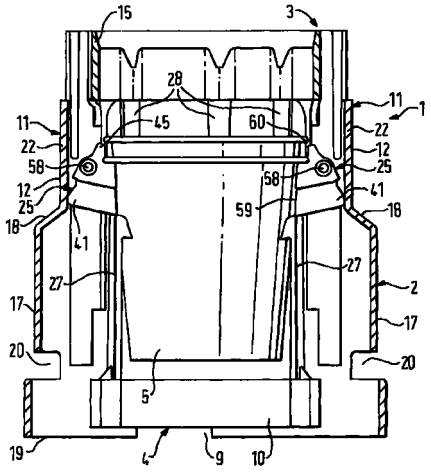

FIG. 6

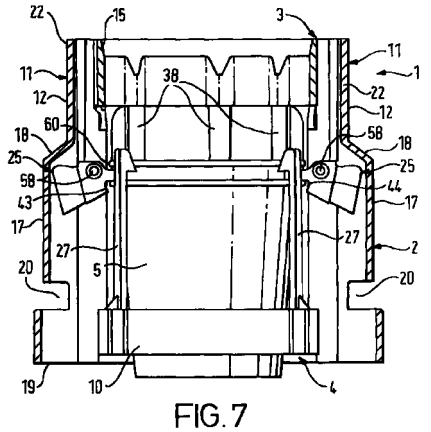

FIG. 7

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Description

[0001] The present invention relates to a device designed to separate cups from a stack of cups, e.g. in a vending machine, designed to serve beverages, and the device is described more in detail in the preamble of claim 1.

[0002] The field of application of the invention is primarily vending machines, cups, which are provided with a powdered or granulated substance, designed to be solved in warm or cold water, being separated from a stack of cups. The invention can also be applied to stacks of cups, in which the individual cups are to be provided with said substance and subsequently in stacks be mounted in said vending machines.

[0003] Many different separation devices of this type are already known, which are based on the principle, that a fork-like element with oblique surfaces along its fork legs is inserted above the lowermost cup in a stack between the flange of this cup and the flange of the cup positioned above the lowermost cup and then presses the lowermost cup downwards and keeps this cup in place respectively and presses the stack upwards, simultaneously a bearing surface for the lowermost cup and the stack of cups respectively temporarily being moved apart.

[0004] These conventional separation devices are expensive and still often do not function properly, i.a. due to the fact, that the forks require a long displacement distance transversely to the stack of cups in order to, with a reasonable safety, carry out a separation of a cup. A large space is necessary for this and consequently the resulting machines are bulky, which is a substantial drrawback and would be noticed very much, if a plurality of cups for different beverages were to be arranged adjacent each other. Also, to mount a driving device for each stack of cups would be expensive and complicated and take up a great deal of space.

[0005] Examples of already known separation devices for cups are described in the following publications :

[0006] GB-A-2 145 071 comprises a stationary inner ring having two different types of separate holding and separation elements, mounted alternately in vertical recesses. On the outside of the inner ring an outer ring is movably mounted with a third form of separate holding elements, which are mounted alternately with the above-mentioned holding elements.

[0007] GB-A-2 221 672 , which belongs to the same applicant, relates to a stationary outer ring and an inner ring, movably mounted in the outer ring, with three different , separately disposed types of holding and separation elements, which are mounted alternately in the circumferential direction.

[0008] EP-A-0 339 946 relates to two different types of separate separation elements in a separation device. A plurality of such devices are mounted on a rotating plate and each such device is provided with its own actuation mechanism.

[0009] The object of the present invention is to counteract and eliminate as far-reachingly as possible the above-mentioned drawbacks and to create a new device, which far-reachingly guarantees safety of operation and durability and which safes space and is easy to manufacture. Also, the object of the invention is to promote the state of the art in this field in various respects.

[0010] These objects are achieved according to the present invention by means of a device of the type described in the introduction, which device is designed in the way set forth in the characterizing clause of claim 1. The feeding device according to the invention carries out multiple functions and thus the device according to the invention replaces several conventional features or devices and is thus more simple and reliable.

[0011] Additional characterizing features and advantages of the invention are mentioned in the following description, reference being made to the enclosed drawings, which show a few preferred but not limiting embodiments. The drawings show in :

Fig. 1 a perspective view from above of a device according to the invention;
Fig. 2 a perspective view from above of a holder, also shown in Fig. 1;
Fig. 3 a similar view of a shell, also shown in Fig. 1 but without a feed device;
Fig. 4 a similar view of a separation device, also shown in Fig. 1;
Fig. 5 a similar view of a feed device, also shown in Fig. 1;
Fig. 6 a diametrical axial sectional view of the device according to Fig. 1 in its starting position;
Fig. 7 a view similar to the view in Fig. 6, during the separation phase;
Fig. 8 a view similar to the views in Figs. 6 and 7, subsequent to a completed separation; and
Fig. 9 a perspective view from above of a driving device in a separation device according to Figs. 1-8.

[0012] The separation device according to the invention is in its entirety designated with 1. It comprises three main parts, i.e. a holder 2 (Fig. 2), a shell 3, inserted from above into the holder (Fig. 3) and a separator 4, inserted from below into the holder, for cups or mugs 5 (Fig. 4).

[0013] I a typical so called coffee vending machine (not shown) according to the invention, in which a powdery or granulated starting material for coffee, tea or the like is to be mixed with hot or cold water and possibly sugar and cream powder respectively in e.g. a cup 5 in order to obtain a finished beverage, there are a plurality of, e.g. six or eight or eleven, of the devices shown in Fig. 1 mounted below a not shown horizontal rotatable plate with the same mutual angular distance along a circular movement path. The plate is rotated by means of

a not shown motor with a certain predetermined separation device, in which each cup in a pile preferably already contains a certain starting material, up to a separation position in connection with a not shown dispensing opening with e.g. a placement plane for a cup, which is to be filled with water and be provided with e.g. cream powder and sugar.

[0014] Said dispensing opening is also associated with a stationary driving device 6, which however is pivotable in a limited way upwards and downwards about a base end, for the separation device, which at the moment is positioned within the area of said dispensing opening. Thus, there is only one driving device for all the separation devices, which is shown in Fig. 9.

[0015] Parts 2-4 have circular cylindrical sections, designed to guide the rotation symmetrical cups in a vertical direction. Thus, holder 2 has such a section 7 in the middle in an axial direction, which in its circumferential direction is interrupted by plane areas 8, which downwards are limited by recesses 9, which with their web are used as insertion limits for base ring 10 of separator 4. Said plane areas allow a placement, with a star-shaped orientation in a space-saving way, of a plurality of separation devices along a circular path and suitably are positioned at a mutual distance from each other with an angle of about 150° and end upwards at the same level as said sections 7, adjacent in the circumferential direction, in order to form an upper holder end 16 with the exception of two guide areas 11, which are positioned at mutually diametrically opposite sides and project above said ends in an axial direction in the shape of U-profiles 12, which with their one legs 13, positioned at the same side, change into guide sections 14 for base ring 15 of shell 3, which guide sections mainly are axial and circumferential extensions or parts of said sections 7. Plane sections 8 we positioned in a mirror symmetrical way as regards guide sections 11. Ends 16 and adjacent legs 13 and guide sections 14 respectively form upper recesses 36 and 37 respectively, which due to guide sections 14 are shorter and longer respectively in the circumferential direction.

[0016] Said U-profiles 12 extend downwards along the entire length of the holder, but there is a recess 17 with a twice as large depth immediately below said end areas 16. The change to the recesses take place by means of an oblique surface 18 with an angle of roughly 45° in web 22 of the U-profiles, whereas legs 13 extend outwards in the same plane. This extension of the U-profiles outwards then continues rectilinearly along all the central part of the holder, seen in an axial direction, up to an area above lowermost portion 19, where the web and/or the legs of the U-profiles are expanded outwards one more time but forming an opening 20, which extends in a tangential direction through the web and a part of the legs and is designed to receive control pins 21 and pass them to said driving device 6 respectively.

[0017] Also, U-profiles 12 have guide surfaces 23, which, starting from said oblique surface 18 and all the way to lowermost end 19, are plane-parallel to the web and which are positioned within the same plane as the uppermost part of the web. The guide surfaces leave, starting from said oblique surface 18, a central guide opening 24 designed to guide a feed device 25. The guide effect can be strengthened by bringing inwards the edges along the long sides of the guide opening a short distance, e.g. 1-3 mm, and the edges can extend all the way to the upper end of the U-profile in the shape of guide ribs 28 inside the web.

[0018] Also, U-profiles 12 are lined on each side by guide grooves 26, which are open downwards and, where they end at a distance from upper end 16, are open inwards and are provided with a step-like somewhat expanded lower end. These guide grooves project radially outwards from said circular cylindrical section 7 and are designed to house gripping arms 27 and the radial thick parts respectively of separator 4 at their lower ends within the area of base ring 10, which suitably is assigned its own insertion limitation in the shape of said recesses, which in the circumferential direction extend all over the width of said plane areas. The depth of the grooves is smaller than the radial extension of gripping arms 27 and the groove bottoms are removed from the outer side of the gripping arms respectively, the gripping arms being allowed to elasticly penetrate deeper into the grooves, particularly with their upper, free ends, which are limited by inwardly directed hooks 29 having an upper bearing surface 30 and oblique surfaces 31, turned towards the center of the device, as well as terminating lower limitation surfaces 32, which suitably are undercut.

[0019] Shell 3 has guide arms 33, which project downwards from base ring 15 and are mounted in pairs for each U-profile 12. These guide arms have the same length as the U-profiles and have an expedient profiling, which is shown in the drawings. Between the guide arm pairs there are short guide arms 38, which are roughly uniformly distributed along the circumference of the base ring, e.g. six of them, which with their outwardly turned long sides are designed to abut the inner side of the holder or to be positioned at a small distance from said side. The purpose of these guide arms is primarly to guide the cups in a radial direction and counteract a deformation of the cups during the feed process. Also, e.g. triangular bases 34 project from base ring 15 outwards in a radial direction and have threaded holes 35 designed to recieve binding screws (not shown), designed to fasten the shell and consequently the entire separation device below a rotatable plate, as has been described above. As an alternative self-tapping screws and smooth holes can be used. E.g. three such bases 34 can be used with the same angular distance along the circumference of base ring 15 and two of these bases are designed to penetrate into longer recess 37, whereas one is designed to penetrate into shorter recess 36, all three being designed to be supported by upper end 16 of the holder (Fig. 7), when the latter is

pushed upwards all the way. Each guide arm pair supports between its arms a feed device 25, which in Fig. 1 is shown in a blocking or non-separation position (also shown in Figs. 6 and 8), whereas Fig. 7 shows the separation phase.

[0020] Each feed device 25 comprises an e.g. plate-like base 39 with two roughly triangular holding walls 40, wich project from the base in one direction, as well as a guide nib 41, which project in the opposite direction. The holding walls are provided with opposite through holes 42, designed to receive a shaft 58, which with ends, which project above the outer side of the holding walls, are fastened in each guide arm pair at roughly half its height. Also, each holding wall has, within the area of its free, somewhat sharpened end, a bearing surface 43 and a groove 44, which limit this surface in one direction, above which groove there is a nose-like projection 45. The upper surfaces of the projections are inclined somewhat downwards and against each other or are rounded in a similar way along a circular path, allowing these surfaces in the best way to follow the contour of the cup wall. A helical spring (not shown) is fastened around the shaft and is with a projecting end supported by the upper side of base 39, whereas the other spring end is supported by the inner side of base ring 15. The spring is biased in such a way, that the feed device tends to rotate around the shaft, the guide nib striving to penetrate into U-profile 12. In Figs. 1, 6 and 8 such a rotational movement of the U-profile web is stopped, while in Fig. 7 the holder has been pushed upwards, the deeper U-profile part ending up at the same height as the nib, which then is able to penetrate into this deeper part.

[0021] Driving device 6 (Fig. 9) has a base 46, which is fixed in a vending machine, at which base a roughly U-shaped control arm 47 is pivotably fastened around a horizontal shaft (not shown). Control arm 47 has a web, 48, which is positioned roughly in a radial direction in relation to said circular path, and a leg 49, which projects from the inner end of the web in a roughly horizontal direction, which leg at its end, which is turned away from the web, has an oblong hole 50, which is parallel to the leg, and is changed into a vertical arm 51, which supports at its free upper end a control pin 21, which extends towards second leg 53 of the control arm and its free horizontal end. The last-mentioned free end also has a control pin 21, which is positioned in front of the first-mentioned pin. However, leg 53 extends at base 46 from a vertical arm 54 and is arcuately pivoted, the separation devices being able to pass above leg 49 and inside leg 53. In oblong hole 50 free end 55 of a crankshaft 56 is mounted, which crankshaft extends from an electric motor 52, mounted in a central position in the vending machine.

[0022] The device according to the invention functions in the following manner:

In the position shown in Fig. 6 the holder is in its lower starting position, in whcih feed devices 25 are pressed, each with its nib 41, against the upper more flattened portion of U-profile web 22 due to the power of said spring. A stack of cups is supported with a radially outwardly turned flange 60 with its lowermost cup 5 by the four bearing surfaces 43, which are horizontally disposed in this position, and consequently is securely fastened, the inwardly turned common vertical surfaces 59 of the holding walls and the nibs also abutting against the upper portion of the cup wall and consequently contributing to a prevention of any deformation of the lowermost cup. These surfaces are inclined in relation to each other and roughly follow a cylinder or a frustrum of a cone in order to be adjusted to the contour of the cup wall in the best way.

[0023] In the position shown in Fig. 7 the holder has, by means of driving device 6, been pushed upwards in relation to the shell, motor 52, by means of crankshaft 56, having pivoted arms 49, 51 and 54, 53 with their respective pins 21 the corresponding distance upwards. For the rest and before that the rotatable plate has been turned in such a way, that the desired separation device with e.g. the desired ingredient ends up in a meshed position in relation to driving device 6, pins 21 of which penetrating into openings 20. Those separation devices, which are not active, just pass pins 21 with their openings 20.

[0024] During the displacement of the holder upwards feed devices 25 are allowed to pivot due to said spring power into deeper groove portions 17 and at the same time to penetrate with their projections into the area between the flanges of the two lowermost cups, bearing surfaces 43 being tilted downwards and releasing the flange of the lowermost cup. Subsequently the projections exert a pressure on the flange of the lowermost cup downwards and consequently press the cup to a level below the level of hooks 29 of gripping arms 27, which hooks after they have passed the flange initially elasticly move outwards and then back again in order to render impossible a movement of the cup upwards again. The cup then falls down on a placement surface (not shown), where water and possibly sugar and cream substitute can be dispensed into the cup.

[0025] After the separation of the lowermost cup according to Fig. 7 the holder is pushed downwards again by means of driving device 6 according to Fig. 8, oblique surface 18 and finally the more flattened U-profile web exerting a pressure on and pivoting back the feed devices in order to in a corresponding way support a cup, which is now the lowermost in a stack of cups. In Fig. 8 it is also shown, how the cup, which has now been separated, possibly could accompany the next lowermost cup upwards, e.g. due to a squeezing, but hooks 29 prevent in an efficient way a continued joint movement upwards to a level above the level of their lowermost limitation surfaces 32.

[0026] The present invention is not limited to the embodiments described above and/or shown in the drawings, which solely are to be regarded as non-limit-

ing examples, which can be modified and supplemented in an arbitrary way within the scope of protection of the inventive idea and according to the enclosed claims. The devices according to the invention can e.g. of course be mounted in another arrangement than a circular one, e.g. a parabola-like or a rectilinear arrangement.

Claims

1. A device (1) provided to separate cups (5) from a stack of cups, e.g. in a vending machine, provided to serve beverages, which device comprises a shell (3), which is stationarily mounted in the vending machine or the like, and which is provided to receive a stack of cups, a separator (4) for individual cups as well as a driving device (6) and a feed device (25) for separated cups, the shell (3) being telescopicly and concentrically respectively mounted in a sleeve-like holder (2), which is provided to be driven by said driving device (6) and be displaced during the separation phase in relation to the shell (3), with activation of said feed device (25), **characterized in that** said feed device (25) is provided to be actuated by spring power during said relative movements between said stationary shell (3) and said moveable holder (2) and separator (4) to pivot into and out of, respectively, a recess (17) in said holder (2) and at the same time penetrate with a projection (45) into the region between flanges of the two lowermost cups, whereby bearing surfaces (43) on the feed devices being designed to be tilted downwards and release the flange of the lowermost cup.

2. A device according to claim 1, **characterized in that** the holder (2) has two guide areas (11), which we disposed on mutually diametrical opposite sides and consists of U-profiles (12), which extend along the holder and form said recess (17), an oblique surface (18) being used as a transition to this recess and having roughly a 45° angle in relation to the web (22) of the U-profiles (12), and in that the U-profiles, starting with said oblique surface (18) and all the way to the lowermost end (19) of the holder, have guide surfaces (23), which are plane-parallel in relation to the web and have , starting with said oblique surface (18), a central guide opening (24) , each designed to guide its feed device (25), which is designed to, during the displacement of the holder upwards, with spring power actuation pivot into said recess (17), and/or that in the holder (2) the shell (3) is inserted from above and the separator (4) is inserted from below, the separator preferably being telescopicly and concentrically mounted in said holder (2).

3. A device according to claim 1 or 2, **characterized in that** a plurality of devices, e.g. six or eight or eleven of them, being mounted below a horizontally rotatable plate with the same mutual angular distance along a circular diplacement path and said plete being designed to be rotated by a motor with a certain predetermined separation device, each cup in a stack preferably already containing a certain basic substance, up to a separation position adjacent a dispensing opening with e.g. a placement area for a cup, which is to be filled with water and be provided with e.g. cream powder and sugar, **characterized in that** said driving device (6) is associated with said dispensing opening and is stationary and upwardly and downwardly pivotable to a limited extent about a base end for the separation device, which at this moment is present within the area of said dispensing opening, and in that there is only one driving device for all of the separation devices.

4. A device according to any of claims 1-3, **characterized in that** the holder (2), the shell (3) and the separator (4) have circular cylindrical sections designed to guide the rotation symmetrical cups in a vertical direction, in that the holder (2) has such a section (7) in the middle in an axial direction, which in the circumferential direction is interrupted by plane areas (8), which downwards are limited by recesses (9), which with their web function as insertion limitations for the base ring (10) of the separator (4), in that said plane areas are designed to allow, with a star-shaped orientation in a space-saving way, mounting of a plurality of separation devices along a circular path and suitably are mutually distanced from each other with an angle of about 150° and end at the top at the same level as said section (7), which is adjacent in the circumferential direction, in order to form an upper holder end (16) with the exception of said guide areas (11), which project above said ends in an axial direction in the form av U-profiles (12), which with their one legs (13), positioned on the same side, are changed to guide sections (14) for the base ring (15) of the shell (3), which guide sections actually are axial and circumferential continuations or portions of said sections (7), in that the plane areas (8) are disposed in a mirror symmetrical way in relation to the guide areas (11), and in that the ends (16) and adjacent legs (13) and the guide sections (14) respectively form upper recesses (36 and 37 respectively), which due to the guide sections (14) are shorter and longer respectively in the circumferential direction.

5. A device according to claim 4, **characterized in that** the legs (13) of said U-profiles (12) are extended outwards in the same plane, which extention of the U-profiles outwards then continues in a

rectilinear way along the entire central portion of the holder, seen in an axial direction, up to a distance above the lowermost end (19), where the webs and/or the legs of the U-profiles are widened outwards once more but with the formation of an opening (20), which tangentially extends through the web and a portion of the legs and is designed to recieve control pins (21) and respectively let them pass to said driving device (6) and/or the guide effect can be strengthened due to the fact, that the edges along the long sides of the guide opening (24) are displaced inwards a small distance, e.g. 1-3 mm and the edges can extend all the way up to the upper end of the U-profiles in the form of guide ribs (28) on the inner side of the web.

6. A device according to claim 5, **characterized in that** the U-profiles (12) are lined on each side by guide grooves (26), which are open downwards and open inwards, ending a small distance from the upper end (16), with a step-like, somewhat widened lower end, which guide grooves project radially outwards from said circular cylindrical section (7) and are designed to house the gripping arms (27) of the separator (4) and the radial widenings respectively at their lowermost ends within the area of the base ring (10), which suitably is provided with its own insertion limitation, in the form of said recesses, which in the circumferential direction extend across the width of said plane areas, and in that the depth of the grooves is smaller than the radial extension of the gripping arms (27) and the groove bottoms are positioned respectively at a distance from the outer side of the gripping arms, in such a way, that the gripping arms can by means of spring power penetrate deeper into the grooves, particularly with their upper, free ends, which are limited by inwardly directed hooks (29) having an upper bearing surface (30) and oblique surfaces (31), turned towards the center of the device, and terminating lower limitation surfaces (32), which suitably are undercut.

7. A device according to any of claims 4-6, **characterized in that** the shell (3) has guide arms (33), which project downwards from the base ring (15) and which are mounted in pairs for each U-profile (12) and which have the same length as the U-profiles and are profiled in an expedient way, in that between the guide arm pairs shorter guide arms (38) are distributed roughly uniformly along the circumference of the base ring, e.g. six of them, which with their outwardy turned long sides can abut the inner side of the holder or be somewhat distanced from the latter, which guide arms primarily are designed to guide the cups in a radial direction and to counteract a deformation of the cups during the feed process, in that e.g. triangular bases (34) from the base ring (15) project outwards in a radial direction and have threaded holes (35) designed to recieve binding screws, designed to fasten the shell and consequently also the entire separation device below said rotatable plate, or have self-tapping screws and smooth holes, in that said bases (34) are e.g. three in number and are evenly distributed along the circumference of the base ring (15), and in that two of these bases are designed to penetrate into the longer recess (37), whereas one base is designed to penetrate into the shorter recess (36), all three of them being designed, when the holder is completely displaced upwards, to be supported by the upper end (16) of the holder, and in that each guide arm pair support between its arms a feed device (25).

8. A device according to any of claims 1-7, **characterized in that** each feed device (25) comprises an e.g. plate-like base (39) with two roughly triangular holding walls (40), which project outwards from the base in one direction and guide nibs (41), which project outwards in the opposite direction, in that the holding walls are provided with opposite matching through holes (42), designed to receive a shaft (58), which with ends, which project along the outer side of the holding walls, is supported by each guide arm pair at roughly half its height, so that each holding wall within the area of its free, somewhat sharpened end is provided with said bearing surface (43) and a groove (44), which limits this surface in one direction, above which groove said projection (45) is provided, which is shaped like a nose, in that the upper surfaces of the projections lean somewhat downwards and against each other or are rounded in a similar way along a circular path in order to, in the best possible way, follow the contour of the cup wall, in that a helical spring is mounted around the shaft, which spring with a projecting end is supported by the upper side of the base (39), whereas the opposite spring end is supported by the inner side of the base ring (15), and in that the spring is biased in such a way, that the feed device tends to pivot about the shaft, the guide nib striving to penetrate into the U-profile (12).

9. A device according to any of claims 1-8, **characterized in that** the driving device (6) has a base (46), which is fixed in a vending machine, on which base a roughly U-shaped control arm (47) is pivotingly mounted around a horizontal shaft, in that the control arm (47) has a web (48), which is directed in a roughly radial direction in relation to said circular path, and a roughly horizontal leg (49), which projects from the inner end of the web and which at its end, which is turned away from the web, has an oblong hole (50), parallel to the leg, and changes into a vertical arm (51), which supports at its free upper end a control pin (21), which is directed

against the second leg (53) of the control arm and its free horizontal end, in that also the last-mentioned free end is provided with a control pin (21), which is positioned in front of the first-mentioned pin, in that the leg (53) at the base (46) projects from a vertical arm (54) and is arcuately curved in such a way, that separation devices can pass above the leg (49) and inside the leg (53), ,and in that in the oblong hole (50) the free end (55) of a crankshaft (56) is mounted, which crankshaft projects from an electric motor (52) in the center of the vending machine.

10. A method of separating cups (5) from a stack of cups in e.g. a vending machine designed to serve beverages, which vending machine comprises a shell (3) designed to recieve a stack of cups, separators (4) designed for individual cups as well as a driving device (6) and a feed device (25) designed for separated cups, according to any of claims 1-9, **characterized in that,** when the holder is in its lowermost starting position, the feed devices (25) are pressed, each with its nib (41), against the upper more flattened portion of the U-profile web (22), due to the power of said spring, a stack of cups being supported, with a radially outwardly directed flange (60), with its lowermost cup (5), on the four in this position horizontal bearing surfaces (43) and thereby being securely fastened, also the inwardly turned common vertical surfaces (59) of the holding walls and the knibs abutting the upper portion of the cup wall and thereby contributing to a prevention of any deformation of the lowermost cup, which surfaces lean against each other and roughly follow a cylinder or a truncated cone to achieve the best possible adjustment to the contour of the cup wall respectively, in that the holder in a following position by means of the driving device (6) is displaced upwards in relation to the shell, the motor (52) by means of the crankshaft (56) pivoting the arms (49,51) and (54,53) with the respective pins (21) the corresponding distance upwards, in that before then the rotatable plate is rotated in such a way, that the desired separation device with e.g. a desired ingredient will mesh with the driving device (6), the pins (21) of which penetrate into the openings (20), the non-active separation devices just passing with their openings (20) the pins (21), in that during the displacement of the holder upwards the feed devices (25) are allowed to pivot, due to said spring power, into the deeper groove portions (17) and simultaneously penetrate with their projections into the area between the flanges of the two lowermost cups, the bearing surfaces (43) being tilted downwards and releasing the flange of the lowermost cup, in that subsequently the projections press the flange of the lowermost cup from above and thereby press the cup to a level below the level of the hooks (29) of the gripping arms (27), which hooks, when they pass the flange, immediately are elastically displaced outwards and then back again, in order to make it impossible for the cup to be displaced upwards again, in that the cup then falls down on a placement surface, on which water and possibly sugar and cream substitute respectively are added and the cup can be removed, in that subsequently to the separation of the lowermost cup the holder is displaced downwards again by means of the driving device (6), the oblique surface (18) and finally the more flattened U-profile web pressing and pivoting back the feed device in order to in a corresponding way support the now lowermost cup in a stack of cups, and in that the hooks (29) are designed to efficiently prevent a continued joint displacement upwards above the level of their lowermost limitation surfaces (32).

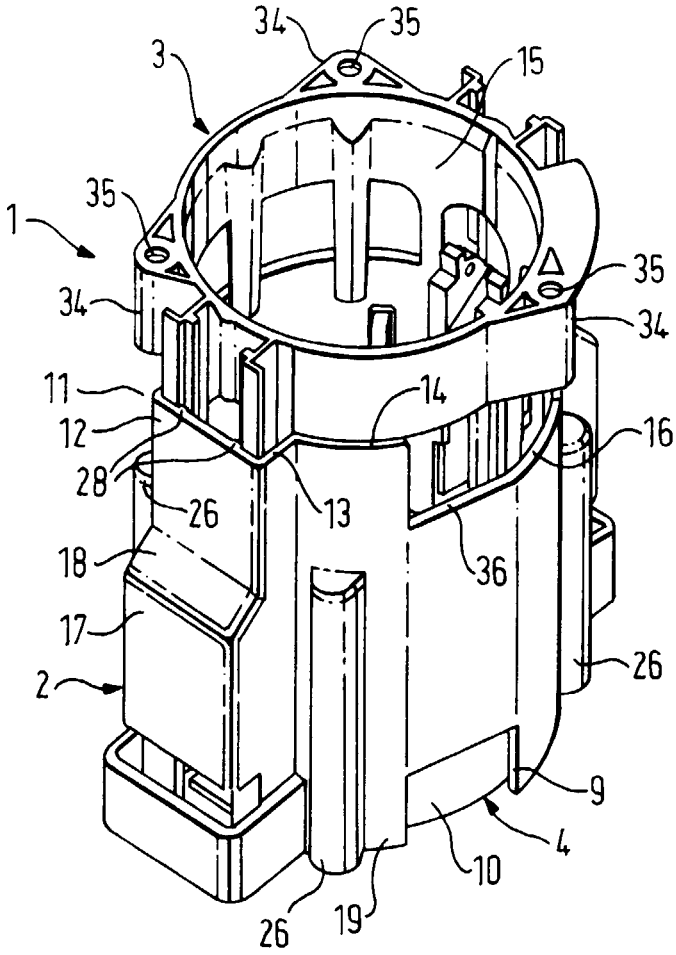
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FIG. 1

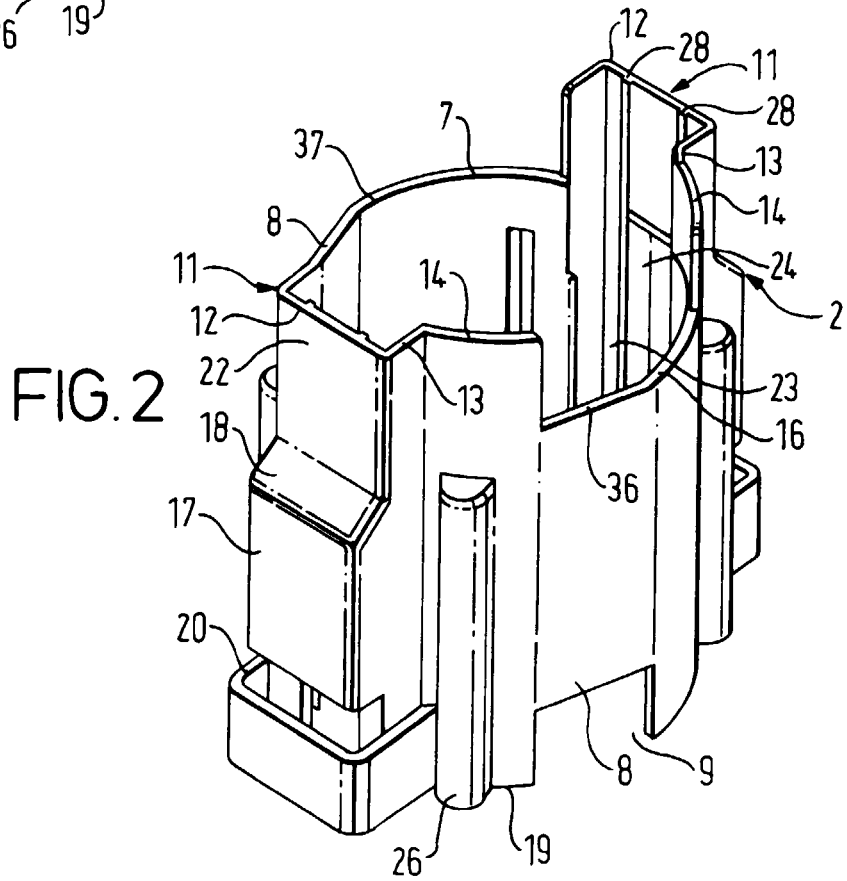
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FIG. 2

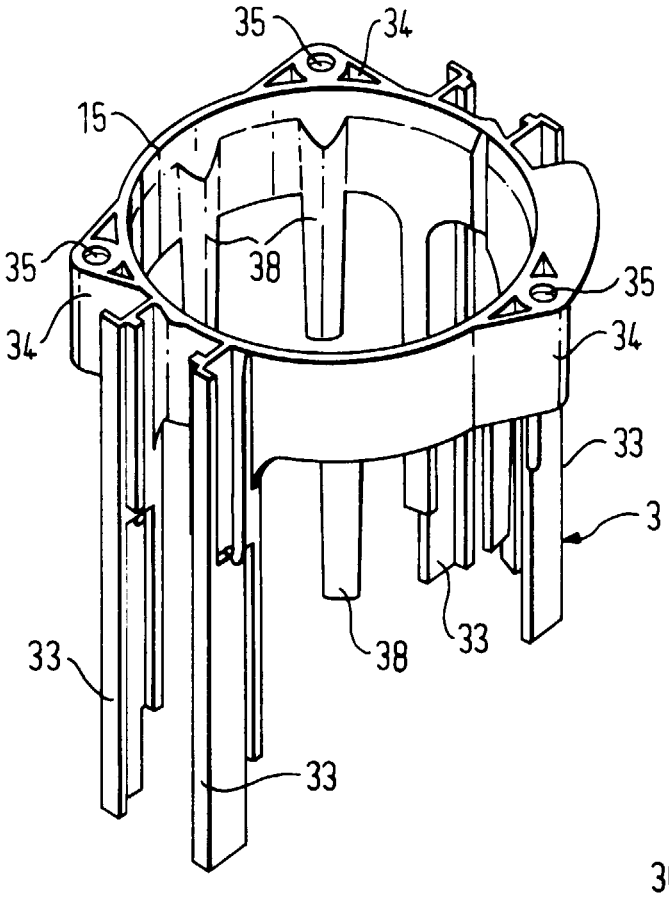
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FIG.3

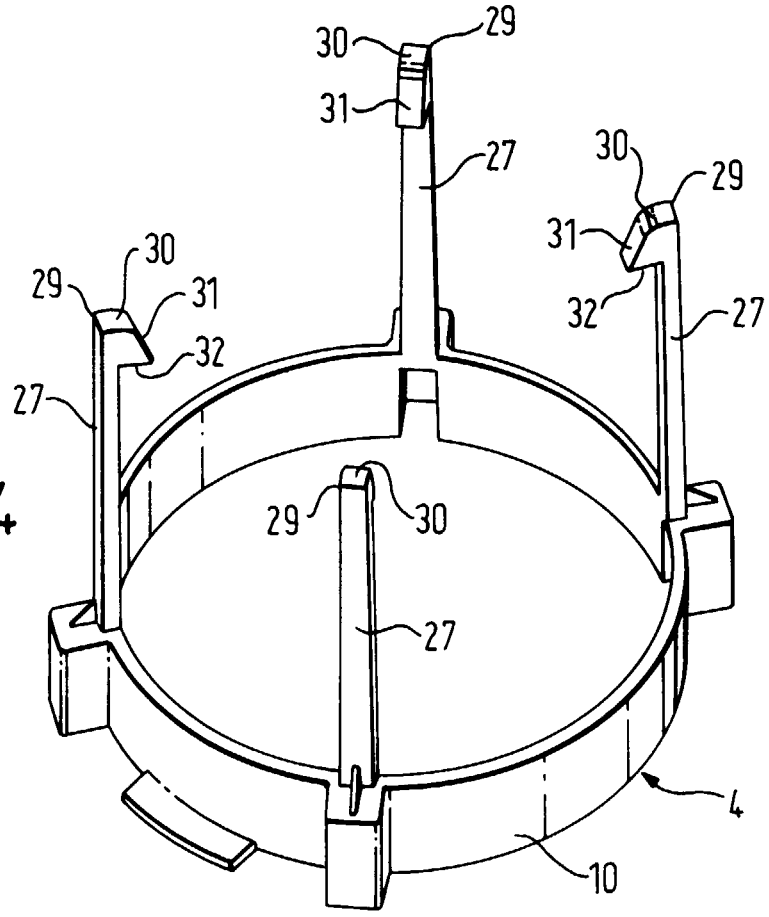
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FIG.4

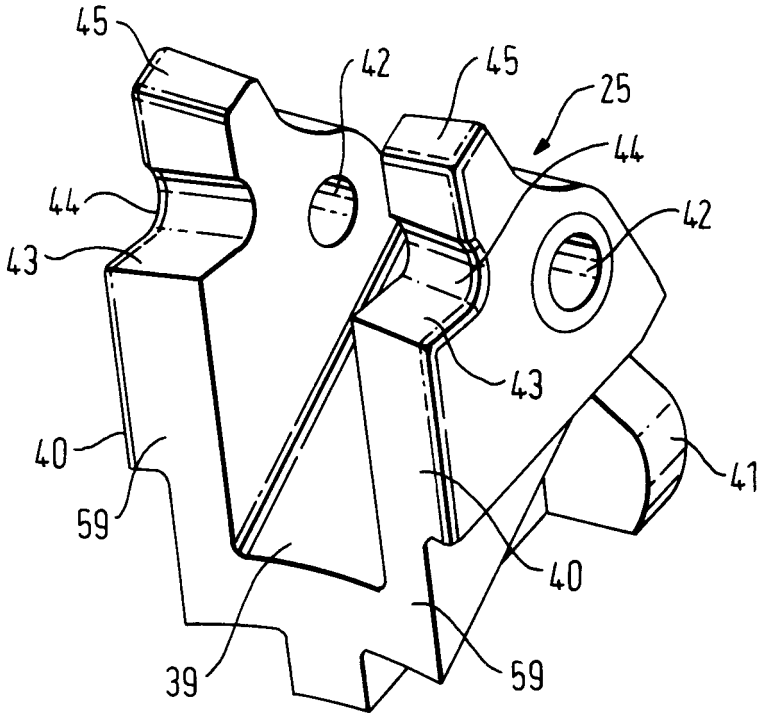

FIG.5

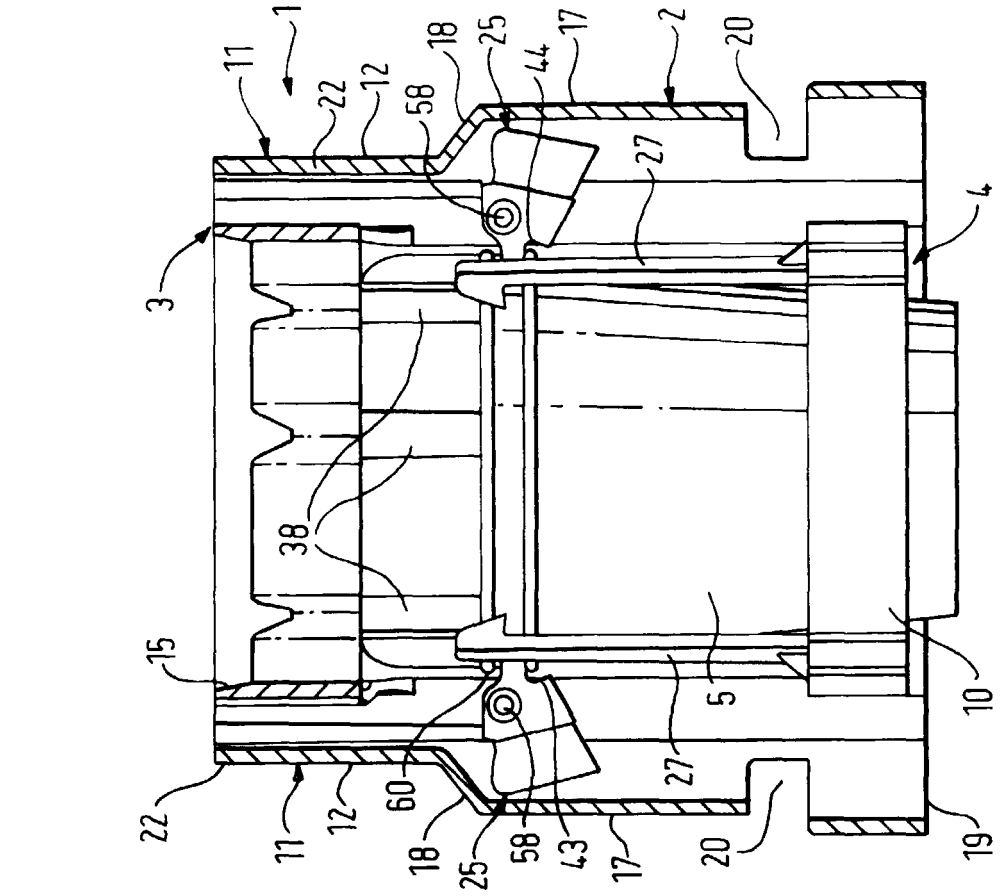
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FIG. 7

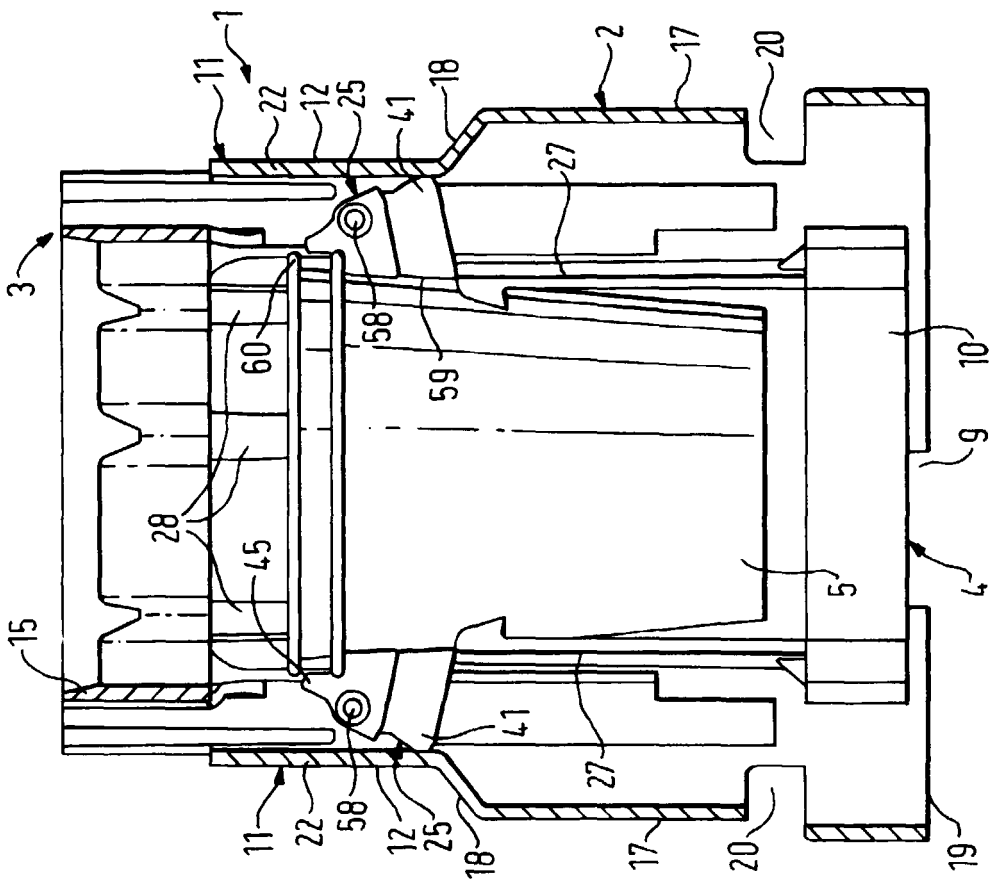
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FIG. 6

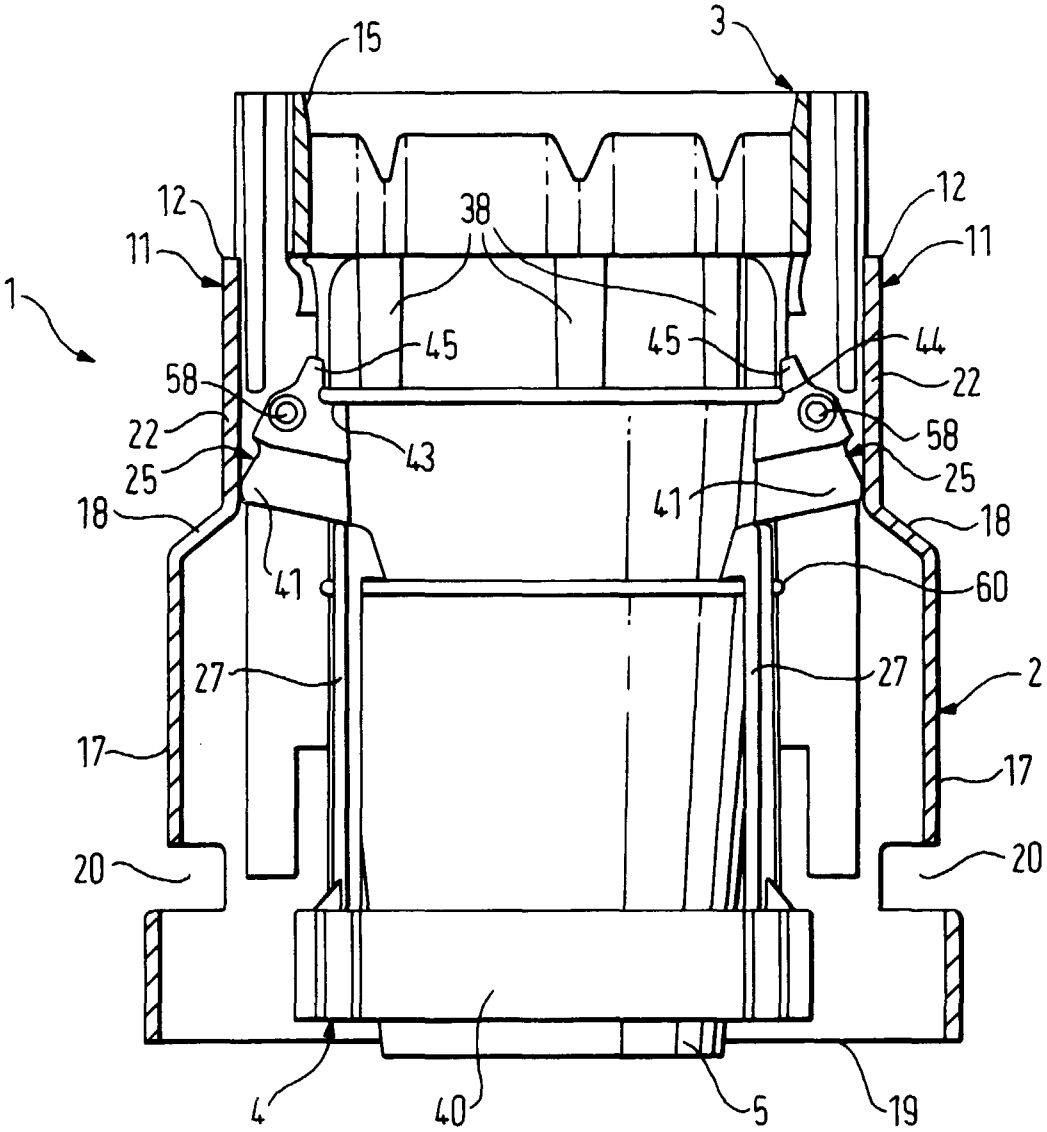
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FIG.8

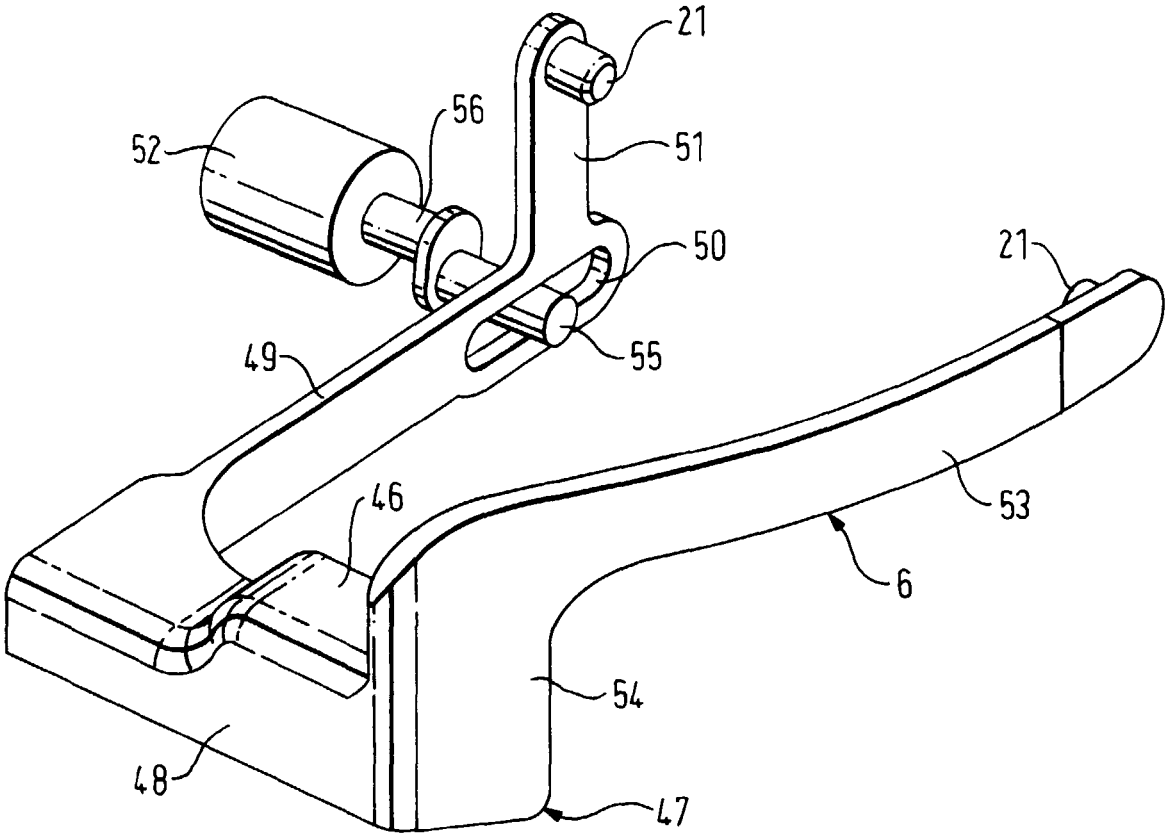

FIG.9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 11 4325

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	20 October 1999	Wauters, J

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