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US-A- 2 906 276
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Description

The present invention relates generally to coin sorting devices and, more particularly, to coin sorters of the type which use a resilient disc rotating beneath a stationary sorting head for sorting coins of mixed denominations.

The applicants are aware of U.S. Patent No. 4564036 (Ristvedt) which provides a coin sorter apparatus which includes a disc which guides coins to selected peripheral areas thereof. Sensors located at these selected areas count the number of coins exiting at each area. A recycling recess and bridge guide combination are responsive to a predetermined count of any of the sensors to redirect the outwardly radial movement of the coins to an inwardly radial movement which recycles coins to the center of the stationary disk in order to immediately terminate the sorting function in response to the detected predetermined number of sorted coins exiting from any of the selected areas.

It is a primary object of the present invention to provide an improved coin sorter of the foregoing type which presses the coins into the resilient disc for positive control throughout the referencing, sorting and ejection movements, but does not require any depressors, ploughs or other auxiliary devices to extract the coins from the pressure exerted thereon by the resilient disc at the locations designated for ejection of coins of different denominations. In this connection, a related object of the invention is to provide such an improved coin sorter which is simple and inexpensive to manufacture and which can be accommodated in a small space.

Another related object of the invention is to provide such an improved coin sorter which can be quickly stopped by braking each time a preselected number of coins of the same denomination have been ejected from the sorter.

It is another important object of this invention to provide an improved coin sorter which quickly moves the coins to their outermost radial positions in the sorting mechanism by centrifugal force, and then presses the coins into the resilient disc and maintains that pressure throughout the referencing, sorting and ejecting movements.

A further object of this invention is to provide an improved coin sorter which can be made small enough for countertop use and yet have the capability of sorting six or more denominations of coins.

In accordance with the present invention, the foregoing objects are realised by providing a coin sorter for sorting coins by their diameter, including a rotatably mounted coin-carrying disc having a resilient top surface onto which coins may be fed ; means for rotating said disc ; a guide plate having a surface positioned over and closely adjacent said disc, wherein said surface includes an inner recess within which coins are able to move radially in response to rotation of said disc and means for arranging coins in said inner recess in a single file of a single-layer of coins ; means for allowing coins to enter between said disc and said guide plate ; wherein said allowing means includes a central opening in said guide plate, a referencing means configured in said surface for engaging the radially outer edges of coins of all denominations as the coins are moved circumferentially between said disc and said plate to position the radially outer edges of the coins of all denominations at a common radial location, whereby the radially inner edges of coins of different denominations are positioned at different radial locations determined by the diameters of the respective coins ; sorting means including a series of circumferentially spaced ejection recesses formed in said guide plate and extending outwardly from the outer periphery to form inner ends spaced inwardly from said outer periphery, characterised by the width of each ejection recess being smaller than the diameter of the coin to be received by that recess and the surface of the guide plate adjacent the coin-receiving edge of each ejection recess pressing the portions of the coins of all denominations extending beyond the width of the ejection recess into said resilient top surface of said disc so that the inner edges of the coins received by each respective ejection recess are tilted upwardly into that recess, said ejection recesses extending outwardly to the periphery of said guide plate so that the recesses guide the tilted coins outwardly and eject those coins from between said disc and said guide plate.

Other objects and advantages of the invention will be apparent from the following detailed description and the accompanying drawings.

There will be described an example of a coin sorting mechanism according to the invention. It will be understood that the description is given by way of example only and not by way of limitation.

In the drawings :

Fig. 1 is perspective view of a coin sorter embodying the present invention, with portions thereof broken away to show the internal structure ;

Fig. 2 is an enlarged horizontal section taken generally along the line 2-2 in Fig. 1 to show the configuration of the underside of the sorting head or guide plate, with hatching added to the lowermost surface of the guide plate to more clearly identify the recessed areas, and with various coins superimposed thereon to illustrate the functions of the guide plate ;

Fig. 3 is an enlarged section taken generally along line 3-3 in Fig. 2, showing the coins in full elevation ;

Fig. 4 is an enlarged section taken generally along line 4-4 in Fig. 2, showing the coins in full elevation ;

Fig. 5 is an enlarged section taken generally

along line 5-5 in Fig. 2, showing two pennies in full elevation at different positions along the section ;

Fig. 6 is an enlarged section taken generally along line 6-6 in Fig. 2, showing two half dollars in full elevation at different positions along the section ;

FIG. 7 is an enlarged section taken generally along line 7-7 in FIG. 2. showing two half dollars and a dime in full elevation at different positions along the section ;

FIG. 8 is an enlarged section taken generally along line 8-8 in FIG. 2, showing a nickel registered with the ejection recess ;

FIG. 9 is a portion of the same section shown in FIG. 8 but with a quarter rather than a nickel registered with the ejection recess ;

FIG. 10 is the righthand half of FIG 2. with certain coins superimposed thereon to illustrate the recycling of stacked coins ;

FIG. 11 is an enlarged section taken generally along line 11-11 in FIG.10.

FIG. 12 is the righthand portion of FIG 2 with certain coins superimposed thereon to illustrate the destacking of stacked coins and their subsequent travel paths around that portion of the guide plate; and

FIG. 13 is an enlarged section taken generally along line 13-13 in FIG. 12.

Turning now to the drawings and referring first to FIG. 1, a hopper 10 receives coins of mixed denominations and feeds them through central openings in a housing 11 and an annular sorting head or guide plate 12 inside the housing. As the coins pass through these openings, they are deposited on the top surface of a rotatable disc 13. This disc 13 is mounted for rotation on a stub shaft (not shown) and driven by an electric motor 14 via drive belt 15. The disc 13 comprises a resilient pad 16 bonded to the top surface of a solid metal disc 17. The top surface of the resilient pad 16 is preferably covered with a durable fabric bonded to the pad itself, which is preferably made of a resilient rubber or polymeric material.

As the disc 13 is rotated, the coins deposited on the top surface thereof tend to slide outwardly over the surface of the pad due to centrifugal force. As the coins move outwardly, those coins which are lying flat on the pad enter the gap between the pad surface and the guide plate 12 because the underside of the inner periphery of this plate is spaced above the pad 16 by a distance which is slightly greater than the thickness of the thickest coin.

As can be seen most clearly in FIG. 2, the outwardly moving coins initially enter an annular recess 20 formed in the underside of the guide plate 12 and extending around a major portion of the inner periphery of the annular guide plate. Coins C1, C2 and C3 superimposed on the bottom plan view of the guide plate in FIG.2 are examples of coins which have entered the peripheral recess 20. The outer wall 21 of the recess 20 extends downwardly to the lowermost surface 22 of the guide plate, which is spaced from the top surface of the pad 16 by a distance which is slightly less, e.g., 0.010 inch, than the thickness of the thinnest coins. Consequently, free radial movement of the coins is terminated when they engage the wall 21 of the recess 20, though the coins continue to move circumferentially along the wall 21 by the rotational movement of the pad 16, as indicated by the arrows in FIG. 2.

The only portion of the central opening of the guide plate 12 which does not open directly into the recess 20 is that sector of the periphery which is occupied by a raised land 23, the purpose of which will be described in more detail below. As coins within the recess 20 approach the leading edge 24 of the land 23, those coins move outwardly around the land 23 through a recess 25 which is merely an outward extension of the inner peripheral recess 20. In FIG. 2, coins C4, C5, C6 and C7 are examples of coins moving in succession through the recess 25, which is wide enough to accommodate coins of all denominations.

The recess 25 extends entirely around the outer wall of the land 23 and rejoins the peripheral recess 20 at the downstream end 26 of the land 23. Just as the recess 25 is an extension of the peripheral recess 20, the outer wall 27 of the recess 25 is an extension of the outer wall 21 of the recess 20. Thus, coins which approach the recess 25 with their outer edges riding on the wall 21 move into the recess 25 with their outer edges riding on the outer wall 27, as illustrated by coins C4-C7 in FIG. 2. As can be seen in the sectional view in FIG.4, the wall 27 is preferably tapered to minimise abrasion by minimising the area of contact between the coins and the recess wall.

Rotation of the pad 16 continues to move the coins along the wall 27 until the outer portions of those coins engage a capturing ramp 28 sloping downwardly from the top surface of the recess 25 to a region 22a of the lowermost surface 22 of the guide plate 12. (For clarity, hatching has been added to the entire surface 22 in FIG. 2). Coin C7 in FIG. 2 is an example of a coin which has just engaged the ramp 28. Because the surface 22 is spaced from the pad 16 by a distance that is less than the thickness of the thinnest coin, the effect of the ramp 28 is to depress the outer edge of any coin that engages the ramp downwardly into the resilient pad 16 as the coins are advanced along the ramp by the rotating disc. As can be clearly seen from the sectional view in FIG. 6, this causes the coins to be firmly gripped between the guide plate surface region 22a and the resilient pad 16, thereby holding the coins in a fixed radial position as they continue to be rotated along the underside of the guide plate by the rotating disc.

Even though only a small portion of the surface area of any given coin is gripped between the guide

plate surface region 22a and the resilient pad 16, the compressive gripping force is sufficient to hold the coins in a fixed radial position. In fact, gripping the coins along a segment which is only one millimeter wide is sufficient to hold the coins against radial movement, even while they are being rotated along the underside of the guide plate by the rotating disc.

As the coins continue to be rotated along region 22a of the guide plate surface, they enter a referencing recess 30 whose top surface is spaced away from the top of the pad 16 by a distance that is (1) less than the thickness of the thinnest coin but (2) slightly greater than the distance between the surface 22 and the top of the pad 16. For example, when the surface 22 is spaced 0.010 inch from the pad surface, the surface of the recess 30 is spaced 0.050 inch from the pad surface (the thickness of a dime is 0.053 inch). Consequently, the coins continue to be gripped between the guide plate 12 and the resilient pad 16 as they are rotated through the referencing recess 30. The purpose of the referencing recess 30 is to form an outer wall 31 for engaging and positioning the outer edges of the coins as they pass through the recess 30.

At the upstream of the recess 30, where the coins first enter the recess, the outer wall 31 is located at the same radial distance from the centre of the guide plate as the outer edge of the ramp 28 (which is also the outer-most portion of the outer wall 27 of the recess 25). Thus, the radial position of the coins is not changed when they first enter the referencing recess 30. As the coins move circumferentially through the referencing recess 30, however, the wall 31 cams the outer edges of the coins progressively inwardly, thereby re-referencing the outer edges of the coins to a different radial position that is slightly closer to the centre of the guide disc. This camming action is illustrated by the progressive changes in the radical locations of the outer edges of the coins C8, C9, C10 and C11 in FIG. 2.

The reason for the re-referencing recess 30 is that certain coins may be captured by the ramp 28 even though they are not actually engaging the outer wall 27 of the recess 25. That is, the outer edge of a coin may be slightly spaced from the outer wall 27 as the coin engages the ramp 28, and yet that coin might still overlap a sufficient portion of the ramp 28 to become gripped between the guide plate surface 22 and the resilient pad 16. Inward movement of all the coins by the wall 31 ensures that the outer edges of all the coins are located at a common radial position, regardless of where the outer edges of those coins were located when they were initially captured by the ramp 28.

At the downstream end of the referencing recess 30, a gentle ramp 32 slopes downwardly from the top surface of the referencing recess 30 to region 22b of the lowermost surface 22 of the guide plate. Thus, the coins are gripped between the guide plate 12 and the resilient pad 16 with the maximum compressive force, as clearly illustrated in the sectional view in FIG.7. This ensures that the coins are held securely in the new radial position determined by the wall 31 of the referencing recess 30.

In accordance with an important feature of the present invention, the guide plate 12 forms sorting means comprising a series of ejection recesses spaced circumferentially around the outer periphery of the plate, with the innermost edges of successive slots located progressively farther away from the common radial location of the outer edges of all the coins for receiving and ejecting coins in order of icreasing diameter ; the width of each ejection recess is smaller than the diameter of the coin to be received and ejected by that particular recess, and the surface of the guide plate adjacent the radially outer edge of each ejection recess presses the outer portions of the coins received by that recess into the resilient pad so that the inner edges of those coins are tilted upwardly into the recess. The ejection recesses extend outwardly to the periphery of the guide plate so that the inner edges of these recesses guide the tilted coins outwardly and eventually eject those coins from between the guide plate 12 and the resilient pad 16.

This feature of the invention stems in part from the discovery that coins can be reliably sorted and ejected at high throughput rates, while being pressed into the resilient pad, without the use of auxiliary coin-tilting devices such as depressors or ploughs. It has been found that with proper location and dimensioning of ejection recesses which are more narrow than the diameters of the respective coins to be ejected, the inner edges of the coins can be urged into the ejection recesses by the guide plate itself. Coins of different denominations are thus reliably ejected at designated circumferential locations around the periphery of the guide plate without the need for any auxiliary devices for ejecting the coins. It has been demonstrated that this arrangement permits sorting at rates in excess of 2500 coins per minute with less than 0.005% mis-sorted coins, without the use of any auxiliary devices for ejecting the coins.

In the illustrative embodiment of this invention, a series of six arcuate ejection recesses 40, 41, 42, 43, 44 and 45 are spaced circumferentially around the outer periphery of the guide plate 12. These six recesses 40-45 are positioned and dimensioned to eject dimes, pennies, nickels, quarters, dollars and half dollars, respectively. More specifically, the innermost edges of the ejection recesses are positioned so that the inner edge of a coin of only one particular denomination can enter each recess ; the coins of all other remaining denominations extend inwardly beyond the innermost edge of that particular recess so that the inner edges of those coins cannot enter the recess. Thus, all the coins except the dimes bypass the recess 40.

For example, the first ejection recess 40 is inten-

ded to discharge only dimes, and thus the innermost edge 40a of this recess is located at a radius that is spaced inwardly from the radius of the referencing wall 31 by a distance that is only slightly greater than the diameter of a dime. Consequently, only dimes can enter the recess 40. Because the outer edges of all denominations of coins are located at the same radial position when they leave the referencing recess 30, the inner edges of the pennies, nickels, quarters, dollars and half dollars all extend inwardly beyond the innermost edge of the recess 40, thereby preventing these coins from entering that particular recess. This is illustrated in FIG 2 which shows dimes C12 and C13 captured in the recess 40, while a penny. C14 and half dollar C15 are bypassing the recess 40 because their inner edges extend inwardly beyond the innermost edge 40a of the recess.

At recess 41, the inner edges of only the pennies are located close enough to the periphery of the guide plate 12 to enter the recess. The inner edges of all the larger coins extend inwardly beyond the innermost edge of the recess 41 so that they remain gripped between the guide plate and the resilient pad. Consequently, all the coins except the pennies continue to be rotated past the recess 41. This is illustrated in FIG. 2 which shows pennies C16, C17 and C18 captured in the recess 41, while a nickel C19 is bypassing the recess 41 because the inner edge of the nickel overlaps the innermost edge 41a of the recess.

Similarly, only the nickels (e.g., C20, C21 and C22) enter the ejection recess 42, only the quarters (e.g., C23, C24 and C25) enter the recess 43, only the dollars (e.g., C26, C27 and C28) enter the recess 44, and and only the half dollars (e.g., C29, C30 and C31) enter the recess 45. FIG. 2 also shows a quarter C32 bypassing the nickel recess 42, a dollar C33 bypassing the quarter recess 43, and a half dollar C34 bypassing the dollar recess 44.

The cross-sectional profile of the ejection recesses 40-45 is shown most clearly in FIG. 8, which is a section through the nickel recess 42. Of course, the cross-sectional configurations of all the recesses are similar ; they vary only in their widths and their circumferential and radial positions. As can be clearly seen in FIG. 8, the recess slot 42 has a width which is greater than the radius, but less than the diameter, of the nickel C20. Consequently, the outer portion of the nickel is pressed downwardly into the resilient pad 16 by region 22c of the guide plate surface 22 at the outer edge of the recess 42, thereby causing the inner edge of the nickel to be tilted upwardly into the recess 42 with the inner edge of the nickel riding along the inner wall 42a of the recess. Then, as the nickel is moved circumferentially along the surface of the guide plate, the wall 42a of the recess 42 cams the nickel outwardly until it reaches the periphery of the guide plate 12 and is eventually released entirely from the gripping pressure of the guide plate and the resilient pad. At this point centrifugal force causes the coin to move radially away from the sorting mechanism into a suitable receptacle, such as a coin bag or box.

Because each coin is gripped between the guide plate 12 and the resilient pad 16 throughout its movement through the ejection recess, the coins are under control at all times. Thus, any coin can be stopped at any point along the length of its ejection recess, even when the coin is already partially projecting beyond the outer periphery of the guide plate. Consequently, no matter when the rotating disc is stopped (e.g., in response to the counting of a preselected number of coins of a particular denomination), those coins which are already within the various ejection recesses can be retained within the sorting head until the disc is restarted for the next counting operation.

FIG. 9 is a portion of the same section shown in FIG. 8 with a quarter C32 rather than the nickel C20 positioned over the ejection recess 42. It can be seen that the inner edge of the quarter extends inwardly beyond the inner edge 42a of the recess 42, which prevents the quarter from entering the recess. Consequently, the quarter C32 continues to be advanced in the circumferential direction by the rotating disc until the quarter comes into register with the next ejection recess 43.

Returning now to the function of the land 23, the primary function of this portion of the guide plate 12 is to prevent two or more coins stacked on top of each other from reaching the ramp 28. When two or more coins are stacked on top of each other, they may be pressed into the resilient pad 16, even within the deep peripheral recess 20. Consequently, stacked coins can be located at different radial positions within the recess 20 as they approach the land 23. Coins C35 and C36 represent one example of such a pair of stacked coins.

FIG. 10 illustrates a pair of stacked coins which have only partially entered the recess 20 and, therefore, engage the inner wall 23a of the land 23. As can be seen most clearly in the cross-sectional view in FIG. 11, the inner wall 23a is bevelled so that stacked coins which have only partially entered the recess 20, such as the exemplary pair of coins C35 and C36, are allowed to bypass the land 23 by passing beneath the bevelled wall 23a. It can be seen that the bevelled wall 23a tilts the stacked coins C35 and C36 as they pass thereunder, thereby retaining the stacked coins in their original radial positions partially within the recess 20. Consequently, when the stacked coins emerge from the downstream end of the island 23, they are in position to engage a notch 50 formed in the inner periphery of the guide plate (see FIG. 2). When the stacked coins engage the notch 50, the upper coin C35 engages the wall 51 of the notch, which retards the upper coin C35 while the lower coin C36 continues to be advanced by the rotating disc. Thus, the stacked coins are stripped apart so that they can once again

enter the recess 20, this time in a single layer. The stripping action of the notch 50 is clearly illustrated in the sectional view of FIG. 3.

FIG. 12 illustrates a stacked pair of coins C37 and C38 which have moved farther out, in the radial direction, within the recess 20 before reaching the land 23. This pair of stacked coins engages the outer wall 23b of the land 23 ; as clearly illustrated in FIG. 13, the lower portion of this wall 23b forms a short bevel while the upper portion is vertical. Thus, the upper coin C37 engages the vertical upper portion of the wall 23b and is thereby cammed outwardly into the recess 25. The lower coin C38 engages the bevelled lower portion of the 23b wall which presses the coin C38 into the resilient pad 16 so that it can pass beneath the land 23. Pressure between the land 23 and the resilient pad 16 maintains the lower coin C38 in a fixed radial position as it passes beneath the land 23 so that this coin is recycled into the recess 20 as the pad continues to rotate, as shown most clearly in the sectional view of FIG. 5. With the upper coin C37 being cammed outwardly into the recess 25, while the lower coin C38 is maintained in a fixed radial position, the two C37 and C38 coins are stripped apart. The upper coin C37 is then free to move outwardly by centrifugal force to the guide wall 27 and onto the ramp 28 while the lower coin is recycled.

Claims

1. A coin sorter for sorting coins by their diameter, including a rotatably mounted coin-carrying disc (13) having a resilient top surface onto which coins may be fed ; means (14) for rotating said disc (13) ; a guide plate (12) having a surface positioned over and closely adjacent said disc (13), wherein said surface includes an inner recess (20) within which coins are able to move radially in response to rotation of said disc and means (23, 51) for arranging coins in said inner recess in a single file of a single-layer of coins ; means for allowing coins to enter between said disc (13) and said guide plate (12) ; wherein said allowing means includes a central opening in said guide plate (12), a referencing means (30, 31) configured in said surface for engaging the radially outer edges of coins of all denominations as the coins are moved circumferentially between said disc (13) and said plate (12) to position the radially outer edges of the coins of all denominations at a common radial location, whereby the radially inner edges of coins of different denominations are positioned at different radial locations determined by the diameters of the respective coins ; sorting means including a series of circumferentially spaced ejection recesses (40-45) formed in said guide plate (12) and extending outwardly from the outer periphery to form inner ends spaced inwardly from said outer periphery, characterised by the width of each ejection recess being smaller than the diameter of the coin to be received by that recess and the surface of the guide plate (12) adjacent the coin-receiving edge of each ejection recess (40-45) pressing the portions of the coins of all denominations extending beyond the width of the ejection recess into said resilient top surface of said disc (13) so that the inner edges of the coins received by each respective ejection recess are tilted upwardly into that recess, said ejection recesses extending outwardly to the periphery of said guide plate (12) so that the recesses guide the tilted coins outwardly and eject those coins from between said disc and said guide plate.

2. The coin sorter as set forth in claim 1, wherein the radially outer edge of said ejection recess sloping upwardly to gradually release the coins of said first denomination from the pressure of said resilient top surface of said disc.

3. The coin sorter as set forth in claim 1, wherein said sorting means further includes a series of circumferentially spaced ejection recesses (40-45) formed in said guide plate (12) with the radially inner edges of successive ejection recesses located at different radial positions for receiving the inner portion of coins of progressively increasing diameter.

4. A coin sorter as set forth in claim 3, wherein at least one of said ejection recesses (40-45) is curved outwardly toward the periphery of said guide plate and away from the circumferential path of movement of coins approaching the ejection recess.

5. A coin sorter as set forth in claim 1, wherein said referencing means (30, 31) including a recess (30) in said lowermost surface having a radially outer edge being positioned and shaped to engage the radially outer edges of the coins of all denominations and moving said coins radially inwardly as the coins are advanced circumferentially through said recess (30).

6. A coin sorter as set forth in claim 4, wherein the space between said resilient top surface (13) and said guide plate (12) surface adjacent the radially outer edge of each ejection recess (40-45) is less than the thickness of the thinnest coins to be sorted.

Patentansprüche

1. Münzsortierer zum Sortieren von Münzen nach ihrem Durchmesser mit einer drehbar gelagerten, Münzen tragenden Scheibe (13), die eine elastische Oberfläche hat, auf die Münzen zugeführt werden ; einer Einrichtung (14) zum Drehen der Scheibe (13) ; einer Führungsplatte (12), die eine oberhalb der und dicht benachbart zur Scheibe (13) angeordnete Fläche hat, wobei die Fläche einen inneren Ausschnitt (20), in dem Münzen sich bei der Drehung der Scheibe radial bewegen können, und Einrichtungen (23, 51) zum Ausrichten von Münzen in dem inneren

Ausschnitt in einer einschichtigen Einzelschicht von Münzen hat ; einer Einrichtung, die ein Eintreten von Münzen zwischen die Scheibe (13) und die Führungsplatte (12) erlaubt, wobei diese Einrichtung eine zentrische Öffnung in der Führungsplatte (12) und eine Bezugseinrichtung (30, 31) umfaßt, die in der Fläche zum Beaufschlagen der radial äußeren Kanten der Münzen aller Wertigkeiten ausgebildet ist, wem die Münzen zwischen der Scheibe (13) und der Platte (12) in Umfangsrichtung bewegt werden, um die radial äußeren Kanten der Münzen aller Wertigkeiten an einem gemeinsamen radialen Ort zu positionieren, wodurch die radial inneren Kanten der Münzen unterschiedlicher Wertigkeiten an unterschiedlichen radialen Orten positioniert werden, die durch die Durchmesser der jeweiligen Münzen bestimmt sind, und einer Sortiereinrichtung, die eine Reihe von in Umfangsrichtung beabstandeten Ausstoßausschnitten (40-45) umfaßt, die in der Führungsplatte (12) ausgebildet sind und sich vom Außenumfang nach außen erstrecken, um innere Enden zu bilden, die vom Außenumfang aus nach innen beabstandet sind, **dadurch gekennzeichnet**, daß die Breite eines jeden Ausstoßausschnitts kleiner als der Durchmesser der von dem Ausschnitt aufzunehmenden Münze ist, und die Fläche der Führungsplatte (12) neben der die Münze aufnehmenden Kante eines jeden Ausstoßausschnittes (40-45) die Teile der Münzen aller Wertigkeiten, die sich über die Breite des Ausstoßausschnittes hinaus erstrecken, in die elastische Oberfläche der Scheibe (13) hineinpreßt, so daß die inneren Kanten der Münzen, die von jedem jeweiligen Ausstoßausschnitt aufgenommen werden, nach oben in den Ausschnitt hineingekippt werden, wobei die Ausstoßusschnitte sich nach außen zum Umfang der Führungsplatte (12) erstrekken, so daß die Ausschnitte die gekippten Münzen nach außen führen und die sich zwischen Scheibe und Führungsplatte befindenden Münzen ausstoßen.

2. Münzsortierer nach Anspruch 1, wobei die radial äußere Kante des Ausstoßabschnittes nach oben ansteigt, um die Münzen einer ersten Wertigkeit vom Druck der elastischen Oberfläche der Scheibe allmählich freizugeben.

3. Münzsortierer nach Anspruch 1, wobei die Sortiereinrichtung außerdem eine Reihe von in Umfangsrichtung beabstandeten Ausstobausschnitten (40-45) umfaßt, die in der Führungsplatte (12) mit radial inneren Kanten von aufeinanderfolgenden Ausstoßausschnitten, die an unterschiedlichen radialen Orten angeordnet sind, zur Aufnahme des Innenteils der Münzen von progressiv ansteigendem Durchmesser ausgebildet sind.

4. Münzsortierer nach Anspruch 3, wobei mindestens einer der Ausstobausschnitte (40-45) nach außen zum Umfang der Führungsplatte und fort von dem Umfangsbewgungsweg der Münzen, der an dem Ausstoßausschnitt ankommt, gebogen ist.

5. Münzsortierer nach Anspruch 1, wobei die Bezugseinrichtung (30, 31) einen Ausschnitt (30) in einer untersten Fläche umfaßt, der eine radial äußere Kante hat, die so angeordnet und geformt ist, daß sie die radial äußeren Kanten der Münzen aller Wertigkeiten beaufschlagt und die Münzen radial einwärts bewegt, wenn die Münzen in Umfangsrichtung durch den Ausschnitt (30) vorgeschoben werden.

6. Münzsortierer nach Anspruch 4, wobei der Abstand zwischen der elastischen Oberfläche (13) und der Fläche der Führungsplatte (12) neben der radial äußeren Kante eines jeden Ausstoßausschnittes (40-45) geringer als die Dicke der dünnsten zu sortierenden Münze ist.

Revendications

1. Dispositif de triage de pièces de monnaie (désignées ci-après par pièces) pour trier des pièces en fonction de leur diamètre, comportant un disque porte-pièces (13) monté rotatif et ayant une surface supérieure élastique sur laquelle peuvent être déposées des pièces ; un moyen (14) pour entraîner ledit disque (13) en rotation ; une plaque de guidage (12) ayant une surface positionnée au-dessus et étroitement adjacente audit disque (13), ladite surface comportant une cavité intérieure (20) à l'intérieur de laquelle des pièces peuvent se déplacer radialement en réponse à la rotation dudit disque et des moyens (23, 51) pour disposer des pièces dans ladite cavité intérieure suivant une file unique d'une couche unique de pièces ; un moyen pour permettre aux pièces de pénétrer entre ledit disque (13) et ladite plaque de guidage (12) ; dans lequel ledit moyen permettant l'introduction des pièces comporte un orifice central ménagé dans ladite plaque de guidage (12), des moyens de repérage (30, 31) configurés dans ladite surface pour engager les arêtes extérieures radiales des pièces de toutes valeurs à mesure que les pièces sont déplacées circonférentiellement entre ledit disque (13) et ladite plaque (12) pour positionner radialement les arêtes extérieures des pièces de toutes valeurs suivant une position radiale commune, grâce à quoi les arêtes intérieures radiales des pièces de différentes valeurs sont positionnées suivant des emplacements radiaux différents déterminés par les diamètres des pièces respectives ; un moyen de triage comportant une série de cavités d'éjection (40-45) espacées circonférentiellement ménagées dans ladite plaque de guidage (12) et s'étendant vers l'extérieur depuis la périphérie extérieure pour constituer des extrémités intérieures espacées vers l'intérieur à partir de la périphérie extérieure, caractérisé par le fait que chaque cavité d'éjection est inférieure au diamètre de la pièce devant y être reçue, la surface de la plaque de guidage (12) adjacente au bord récepteur de pièces de chaque cavité d'éjection (40-45)

exerçant une pression sur les portions de pièces de toutes valeurs s'étendant au delà de la largeur de la cavité d'éjection contre ladite surface supérieure élastique dudit disque (13), de telle sorte que les arêtes intérieures des pièces reçues par chaque cavité d'éjection respective sont basculées vers le haut dans ladite cavité, lesdites cavités d'éjection s'étendant extérieurement vers la périphérie de ladite plaque de guidage (12) de telle sorte que les cavités guident les pièces redressées vers l'extérieur et éjectent ces pièces depuis l'espace situé entre ledit disque et ladite plaque de guidage.

2. Dispositif de triage de pièces selon la revendication 1, dans lequel le bord extérieur radial de ladite cavité d'éjection est incliné vers le haut pour libérer graduellement les pièces de ladite première valeur de la pression exercée par ladite surface supérieure élastique dudit disque.

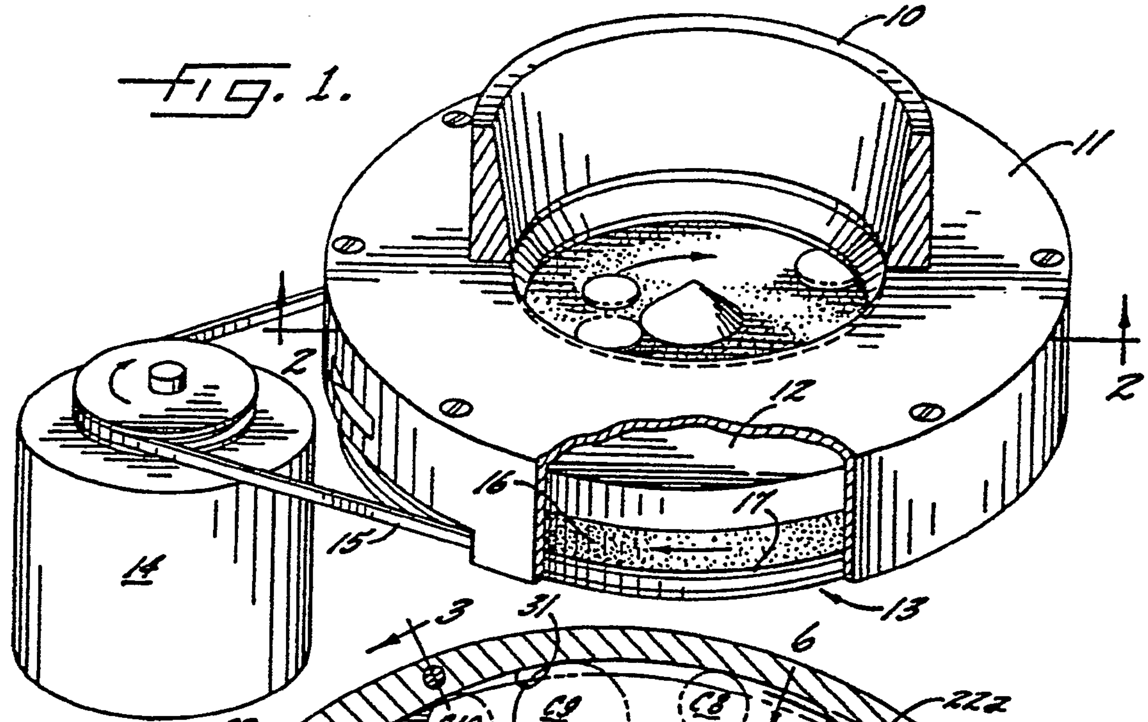
3. Dispositif de triage de pièces selon la revendication 1, dans lequel ledit moyen de triage comporte en outre une série de cavités d'éjection espacées circonférentiellement (40-45) ménagées dans ladite plaque de guidage (12), les bords intérieurs radiaux des cavités d'éjection successives étant situés suivant des positions radiales différentes pour recevoir la partie intérieure des pièces de diamètres progressivement croissants.

4. Dispositif de triage de pièces selon la revendication 3, dans lequel au moins une des cavités d'éjection (40-45) est incurvée extérieurement vers la périphérie de ladite plaque de guidage et éloignée de la trajectoire circonférentielle du déplacement des pièces s'approchant de la cavité d'éjection.

5. Dispositif de triage de pièces selon la revendication 1, dans lequel lesdits moyens de repérage (30, 31) comportent une cavité (30) ménagée dans ladite surface la plus basse et dont le bord extérieur radial est positionné et formé pour engager les arêtes extérieures radiales des pièces de toutes valeurs et déplacer lesdites pièces dans une direcction radiale vers l'intérieur à mesure que les pièces sont avancées circonférentiellement à travers ladite cavité (30).

6. Dispositif de triage de pièces selon la revendication 4, dans lequel l'espace situé entre ladite surface supérieure élastique (13) et ladite surface de plaque de guidage (12) adjacente au bord extérieur radial de chaque cavité d'éjection (40-45) est inférieur à l'épaisseur des pièces les plus minces devant être triées.

Fig. 1.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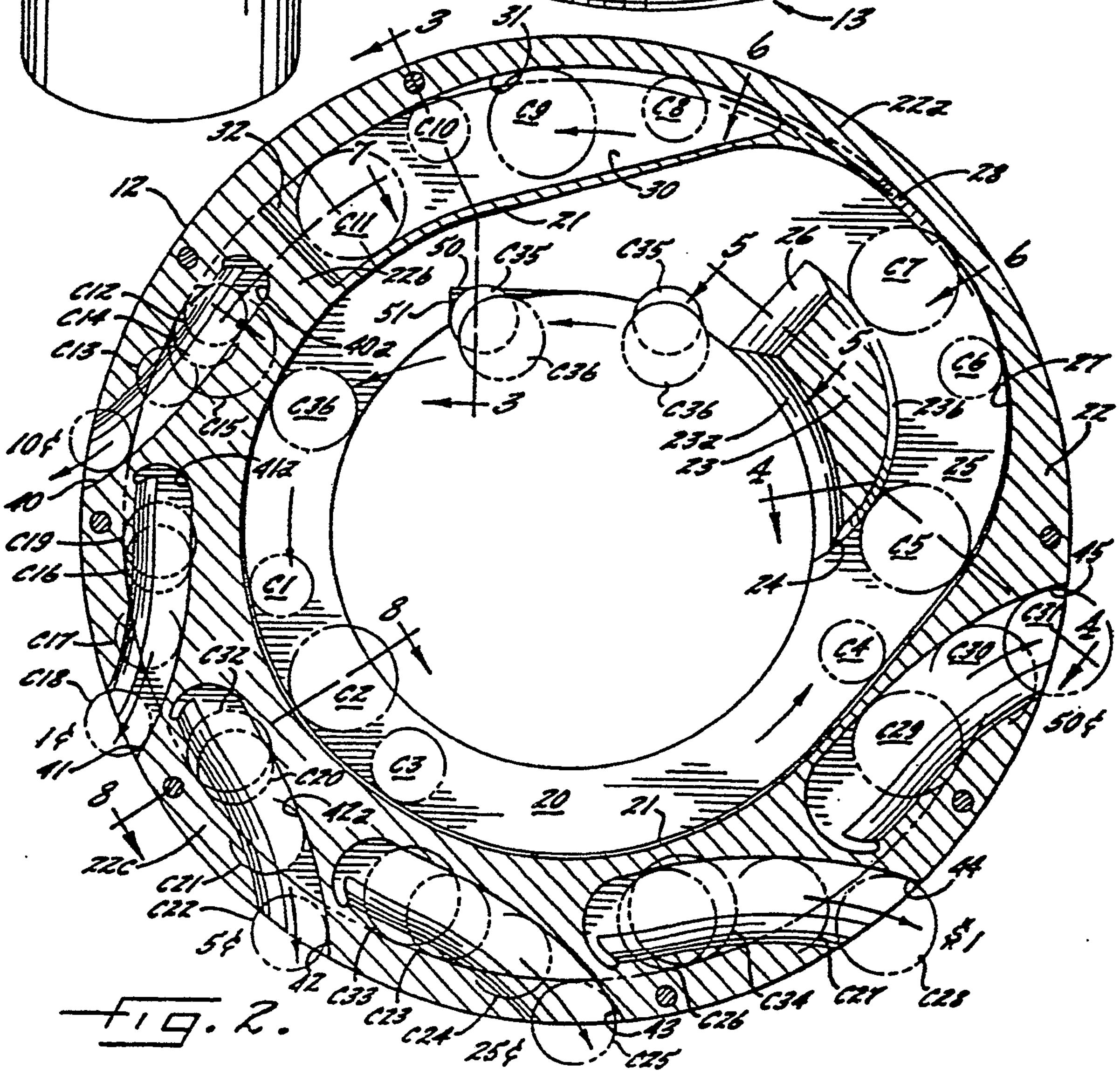
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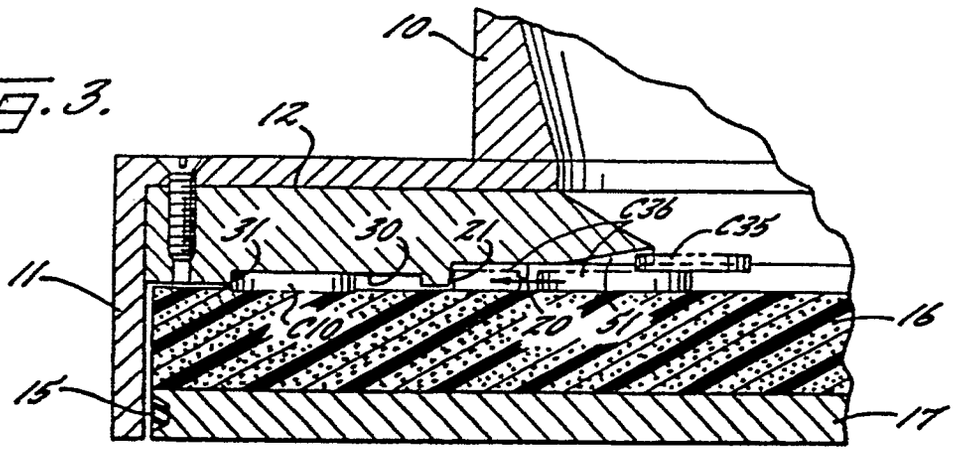
Fig. 2.

Fig. 3.



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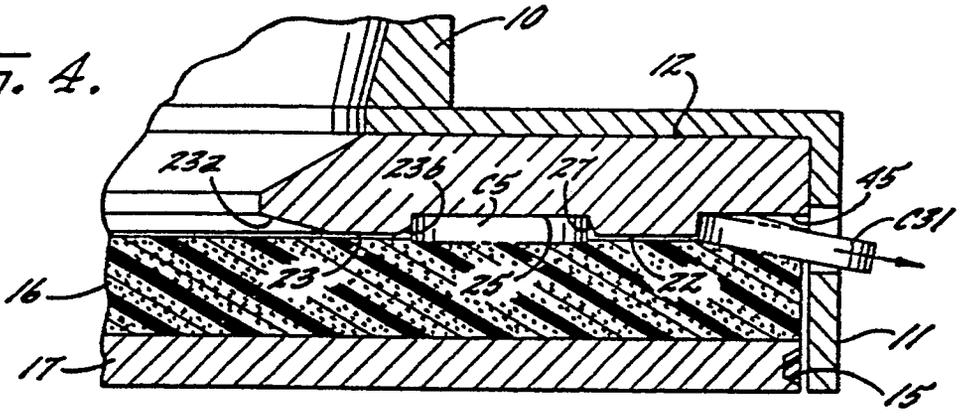

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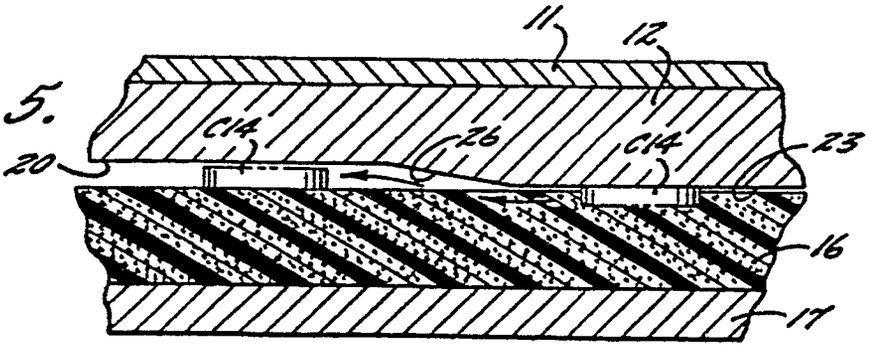

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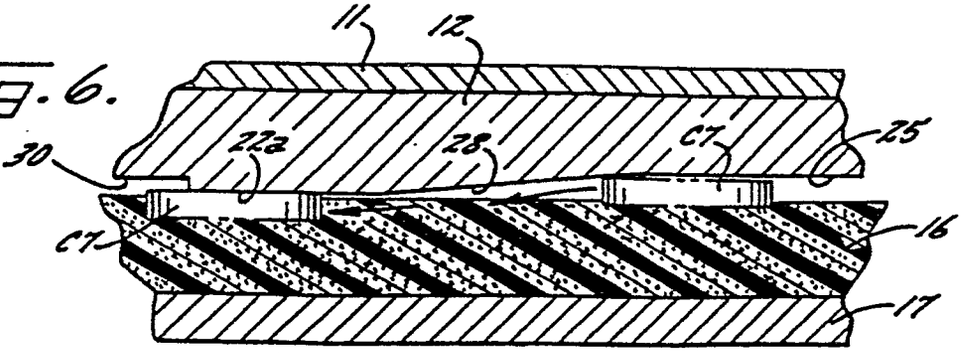

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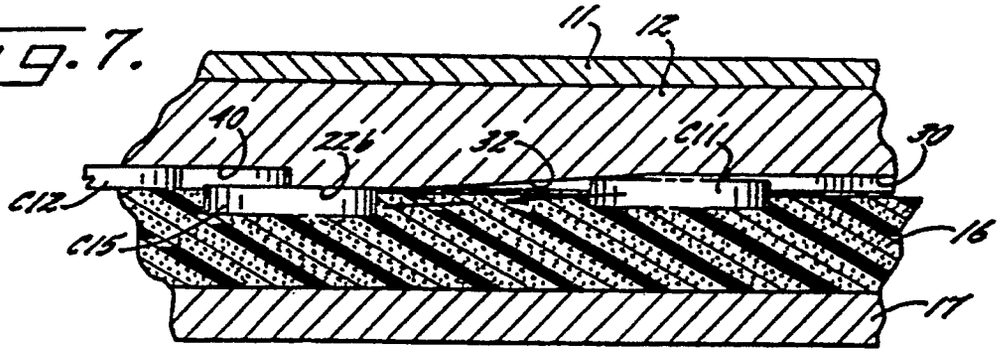

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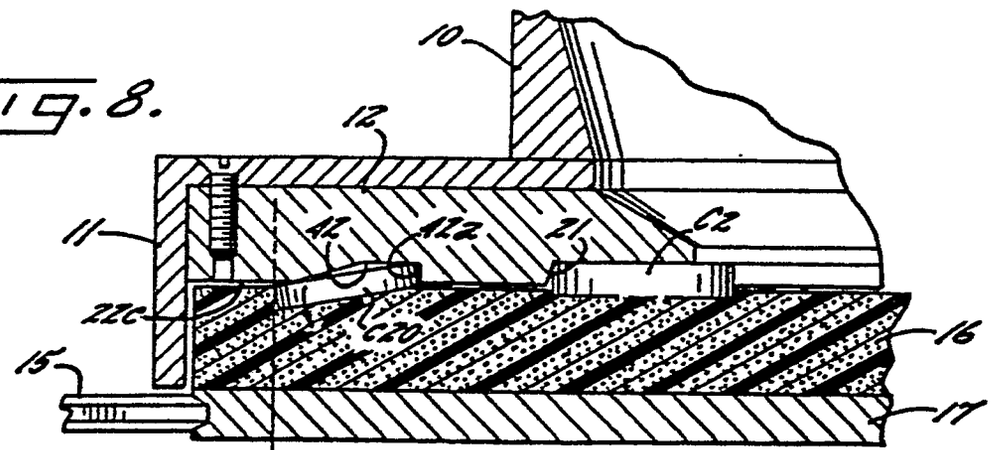

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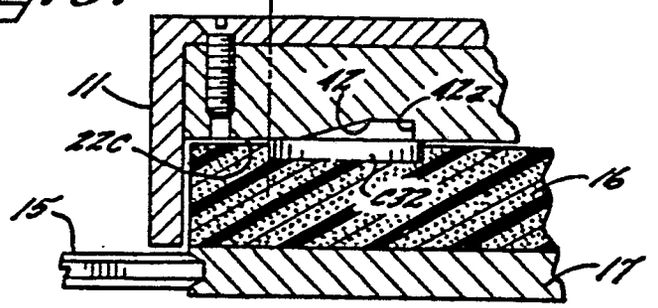

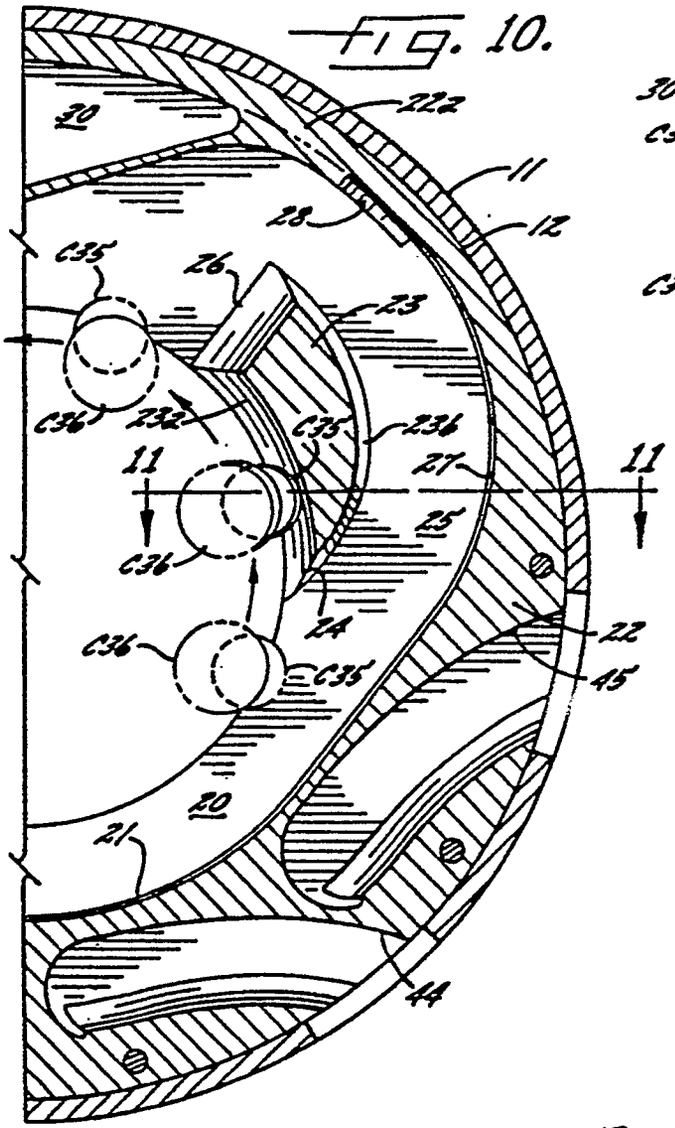

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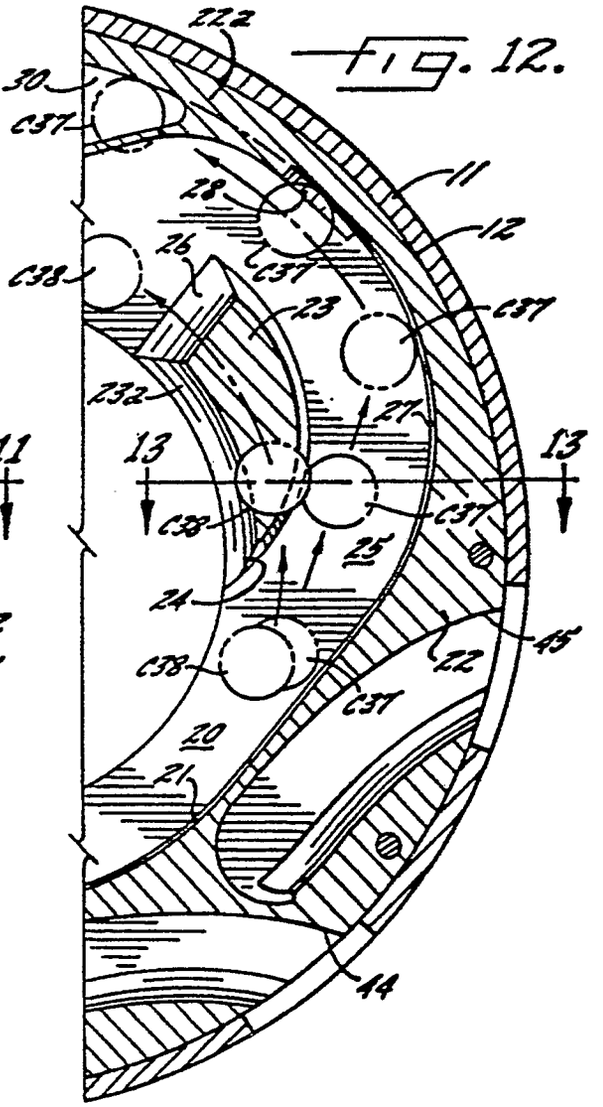

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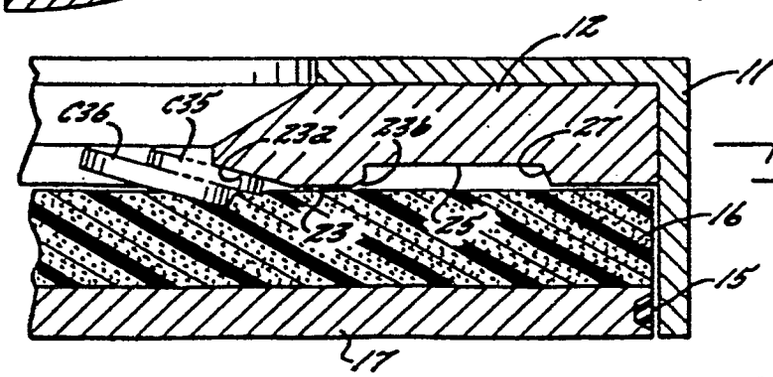

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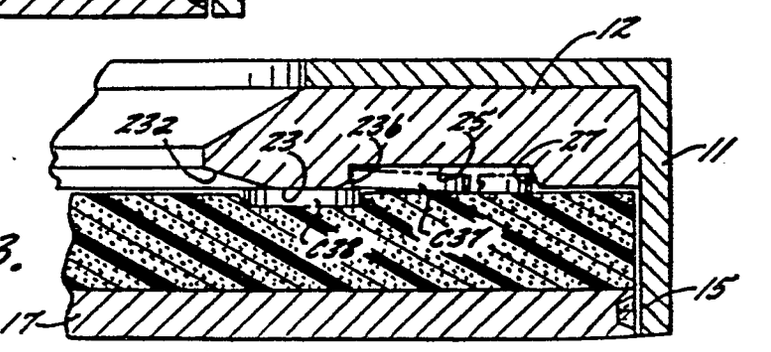

Fig. 13.