July 7, 1931. F. FAST 1,813,841

DEVICE FOR SORTING COINS

Filed Nov. 20, 1928

Fig. 3.

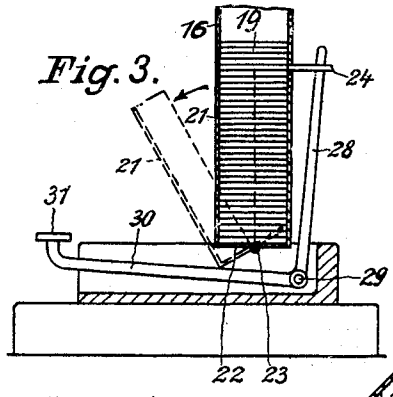


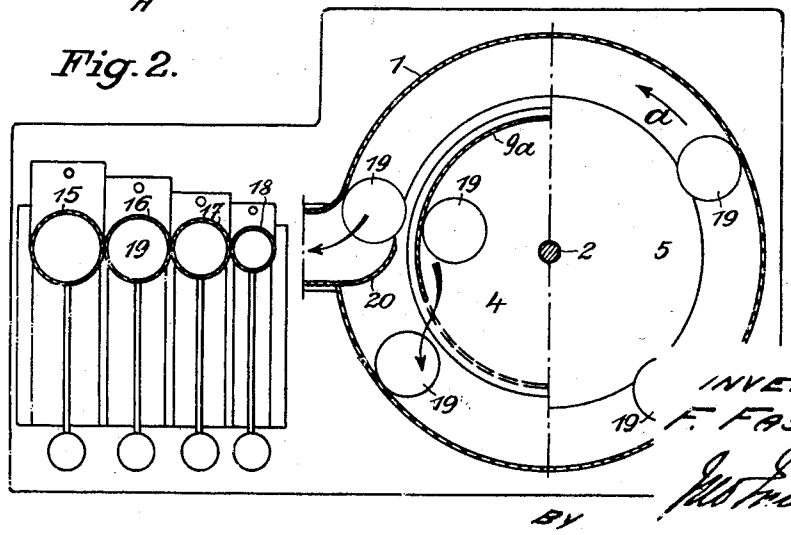

Fig. 1.




Fig. 4.




Fig. 2.




INVENTOR
F. FAST
BY
ATTY.

Patented July 7, 1931

1,813,841

# UNITED STATES PATENT OFFICE

FRIEDRICH FAST, OF BERLIN, GERMANY

## DEVICE FOR SORTING COINS

Application filed November 20, 1928, Serial No. 320,685, and in Germany December 5, 1927.

The present invention relates to a device for sorting coins wherein the coins to be sorted fall on rotary tables. Such sorting devices are already well known per se. Such devices however are as a rule complicated in construction and unreliable in operation. The object of the present invention is to provide an improved sorting machine which is simple in construction, and entirely reliable in operation.

According to the present invention a number of rotary discs are arranged one underneath the other and enclosed in a casing. Between the outer edge of the rotary discs and a wall which surrounds them are formed annular spaces of which the width is reduced from disc to disc. The annular spaces are so dimensioned that through the uppermost space can fall all the coins with the exception of those of the largest type to be sorted. The next space is narrower than the uppermost to such an extent that in the second space all except the second largest size of coin can fall through. The third size of coin cannot fall through the third space and so on. Those coins which by reason of their size cannot fall from a particular rotary surface are rotated with this and conveyed into a passage at the end of which is provided a container for the reception of coins of a particular size.

The separate rotary surfaces are preferably inclined downwardly towards their outer edges so that the coins, on the rotation of the surfaces, are rapidly conveyed from the middle of the surfaces to the edges thereof. Above the separate rotary surfaces annular partitions are provided which at the sides on which are located the openings of the passages for receiving the sorted coins, extend to close against the rotating surfaces so that the coins cannot pass directly from the rotary surfaces into the said passages. Along the remaining edge portions of the rotary disc there is provided between the lower edge of the partitions and the surface of the discs a space of which the width corresponds with the thickness of coins which are to be sorted on the disc in question. The result of this is that through the slot located between the lower edge of the partition and the upper surface of the disc a coin of the kind to be sorted can just pass but if another coin should be lying on this coin the second coin is removed from the coin to be sorted by the lower edge of the partition.

The above mentioned containers into which the sorted coins are received have a diameter corresponding with the separate sorted coins and are provided with a hinged portion forming a half-cylinder of which the height corresponds with the number of piled coins to be removed at any time from the container. This construction of the container is for the purpose of enabling the coins piled one on the other to be removed from the collecting device and at the same time to form automatic means to determine that the separate piles of coins removed from the collecting device always contain a predetermined number of coins.

The said hinged half-cylinder forms a portion of the wall of the collecting tube and is preferably connected to the bottom of this tube, which is rotatably mounted on a horizontal shaft, which shaft simultaneously forms the pivotal axis for the half-cylinder. In order to open the container the half-cylinder which in the closed position forms a portion of the container is tilted forwardly whilst the bottom simultaneously turns about its horizontal axis. Simultaneously with the tilting of the half cylinder a partition is inserted at the level of the upper edge of the half-cylinder into the inside of the coin collecting sleeve in order to prevent those coins, which are in the collecting tube above the tilted portion from falling down when the hinged portion has been opened. Together with the hinged portion there is also swung outwardly from the interior of the collecting tube the pile of coins which extends along the hinged half-cylinder. The pile of coins which now lies in the form of a roll in the outwardly tilted portion of the coin container can be removed from the tilted portion in any desired manner. The number of coins forming the pile is accurately determined by the height of the pile.

The subject of the invention is illustrated

in the accompanying drawings by way of example, wherein:—

Fig. 1 shows a longitudinal section of the sorting machine on the line 1—1 of Fig. 2 according to the invention.

Fig. 2 is a section on the broken line 2—2 of Fig. 1.

Fig. 3 illustrates the collecting device separately in longitudinal section on the line G—H of Fig. 1, whilst

Fig. 4 illustrates a detail of the collecting device.

In the various figures 1 indicates the casing of the sorting machine in the interior of which is provided a shaft 2 which is rotated for example by a motor 3 or in any other suitable manner. On the shaft are mounted, one above the other, a number of downwardly inclined sorting discs 4, 5, 6, 7. The diameter of the sorting discs is gradually increased from the top downwards so that the width of the annular space between the outer periphery of the sorting discs and the casing wall 1 is gradually reduced from the top downwards. At the upper end of the casing 1 is provided the charging opening 8. Above the uppermost sorting disc 4 is located an annular wall. A portion of this wall, indicated at 9*a*, is extended downwardly for about a quarter of a circle to such an extent that the lower edge of this portion of the wall is directly above the conical sorting surface. The space between the lower edge of this portion of the wall and the sorting surface 4 is so small that a coin cannot slide off the sorting surface at the point at which this wall portion is provided. The lower edge of the remainder of the circular wall 9*b* is spaced from the sorting surface 4 such a distance that the largest coins can just pass through the slot formed between the wall 9*b* and the surface 4, but where two coins rest one on the other the upper coin is removed from the lower one.

Above the remaining sorting surface walls 10*a*, 10*b* are provided in a similar manner to the wall 9*a*, 9*b* above the uppermost sorting surface 4. The lower edge of the wall portion 10*a* is so close to the corresponding sorting surface that at those points, at which the wall portions 10*a* are provided, coins cannot slide off the rotating sorting discs. The wall portions 10*a* are substantially a quarter of a circle like the wall portions 9*a*.

Between the lower edge of the wall portions 10*b* and the rotary discs spaces are provided of which the width corresponds with the thickness of the coins which are to be separated by the corresponding sorting surface in such a manner that even the smallest coin which may be lying on the the coin to be sorted is removed from the latter. As the thickness of the coins is reduced from the top downwards, the width of the slot between the walls 10*b* and the sorting surfaces is correspondingly reduced the lower the sorting surfaces to which the walls 10*b* appertain. The walls 10*a*, 10*b* are so constructed that their upper edges, by means of which they are secured to the casing 1, serve as supports for the coins which have already been separated, according to their size, after these have slid under the wall 9*b* or 10*b* from the sorting surfaces and only rest on the latter by means of a small rim surface.

On the side on which the wall portions 9*a* and 10*a* are provided, terminate passages 11, 12, 13 and 14 which receive the sorted coins and conduct them to coin collecting containers 15, 16, 17, 18. At the entrance to the passages 11, 12, 13, 14 are provided guide walls 20 which facilitate the sliding of the coins into the passages adapted to receive them. The containers 15, 16, 17, 18 are each provided at their lower end with a hinged half-cylinder 21 forming a portion of the container wall. The half-cylinder 21 is connected to the bottom of its container (see Fig. 3). Both the half-cylinder 21 and the bottom 22 can be tilted on the horizontal shaft 23.

The height of the hinged wall 21 corresponds with the height of a predetermined number of coins 19 forming a pile. The height of this wall varies for different kinds of coins and preferably always corresponds to an equal number of coins. On a level with the upper edge of hinged wall 21 a slot is located in the fixed wall of the container through which a plate 24, which is of the same thickness as a coin, is passed into the interior of the container. The plate is provided on one side with a semicircular recess 25. The radius of this recess 25 corresponds with the radius of the coins in the container. At its front end the plate 24 is provided with two projections 26 which project beyond the semicircular recess. The purpose of these projections 26 will be described hereinafter. At the rear end of the plate 24 is provided a recess 27 with which engages a substantially vertical arm 28 of a bell crank lever pivoted on the shaft 29. The substantially horizontal arm 30 of the bell crank lever carries a key 31. In order to prevent a number of superposed coins from falling into the containers 15, 16, 17, 18 and in this manner interfering with the regular piling of the coins in the collecting containers partitions 32 are provided in the passages leading to the container, said partitions having their lower edge extending downwardly to such an extent that between the lower edge of the partitions 32 and the bottom of the passage there remains a slot of which the height is just sufficient in order to permit a single coin to pass.

The method of operation of the subject of the invention is as follows:—

The coins to be sorted are poured into the funnel 8 and fall from here to the uppermost

rotary sorting disc 4. By reason of the centrifugal force produced by the rotation of the sorting disc and the inclination of the sorting disc the coins move rapidly towards the edge of the sorting disc 4. At the point at which the wall 9*a* is provided the coins cannot fall from the sorting disc 4 so that they cannot pass directly into the passage 11. At the remaining points, however, at which the wall 9*b* is provided, the coins can slide from the disc 4 through the slot formed between the lower edge of the wall 9*b* and the upper surface of the sorting surface 4. The distance between the outer circumference of the disc 4 and the casing wall 1 is somewhat smaller than the diameter of the largest type of coin but somewhat larger than the diameter of all the remaining types of coins. With the exception of the largest type of coin all the remaining coins fall through the space between the periphery of the disc 4 and the casing wall 1 onto the disc 5. Only coins of the largest type remain with one of their edges resting on the rotating surface 4 and with their other edge on the upper edge of the annular wall 10*a*, 10*b* appertaining to the next sorting surface 5. On the rotation of the disc 4, which rotates in the direction of the arrow *a* in Fig. 2, the largest coins are moved therewith and conveyed to the passage 11 through which they slide into the collecting container 15. The guide wall 20 serves to conduct the sorted coins directly into the passage 11 and prevents the sorted coins from being moved unnecessarily a number of times in a circular path along the casing wall 1 before passing into the passage which conveys them to the container.

The remaining coins, however, as already described, have fallen onto the sorting surface 5. The space between the edge of the sorting surface 5 and the casing wall is such that the coins of the second size cannot fall through the space between the sorting surface 5 and the casing wall onto the surface 6 but as indicated in Fig. 1 in connection with the coins 19 remain resting on the edge of the disc 5 and the upper edge of the second wall 10*b*. As further shown in Figs. 1 and 2 the coins 19 have fallen through the first space between the disc 4 and the wall 1. The width of the slot between the wall 10*b* and the surface 5 is again so selected that the coins 19 can just pass through this slot. If however other smaller coins lie on the coins 19 they are removed by the lower edge of the wall 10*b* when the coins 19 pass through the said slot. It is therefore never possible for a small coin which is resting on a larger coin to pass into the sorting passage adapted to receive a larger coin. The coin 19 is conveyed in the same manner as described in connection with the coins of the first size, by the rotating disc 5 into the opening of the passage 12, adapted to receive it, and from here into the collecting container 16.

In the same manner, as above described in connection with the coins of the first and second size, the other coins are sorted by the succeeding sorting discs.

The sorted coins are piled to a suitable height in the separate collecting containers. If now a pile of coins, containing a predetermined number of coins, for example 50, is to be removed from the containers the key 31 is depressed. The plate 24 of which the circular shaped front portion has hitherto not projected into the interior of the collecting sleeve, is moved forwardly. The projections 26 of the plate 24 press against the upper edge of the hinged half-cylinder 21 so that this together with the bottom 22 is caused to swing outwardly. The hinged front portion 21 and the bottom 22 then reach the position shown in dotted lines in Fig. 3. At the same time the pile of coins, which is piled in the interior of the container along the length of the hinged portion 21, is swung outwardly from inside the collecting container. Further coins above this pile are prevented from falling down by the plate 24, which has now entered the interior of the collecting container. The pile of coins resting on the outwardly tilted half-cylinder 21 can now be removed and, for example, placed in a paper bag. The number of coins forming a pile is determined by the height of the portion 21. After the outwardly tilted pile of coins has been removed the wall 21 is again returned to its closed position. At the same time the plate 24 is again returned to its original position so that the coins which were hitherto above the plate 24 can fall on the bottom of the collecting container. As soon as a sufficient number of coins have again collected in the collecting container a pile containing a predetermined number of coins can again be removed from the interior of the collecting container.

The new device is distinguished from prior art by its extreme simplicity of construction, and also by the novel method of operation involved, whereby the coin to be separated is caused by centrifugal action to lie across the gap or clearance between the disks and the surrounding wall, and to travel over said clearance along a wall ledge to the point of discharge, the smaller coin being allowed to drop freely through said annular clearance so that the coins may be rapidly separated and danger of congestion is eliminated.

Another feature lies in the easy way of assembling and dismantling the machine, which is tantamount to saving of time and labor. In this respect it is noted that the coin sorter is subdivided into two assembly units, that is the set of rotary discs assembled upon a shaft, this unit to be called the rotor, and on the other hand the housing surround-

ing said disks and which might be called the stator. With the disks increasing in size in downward sequence, the rotor may be withdrawn from the stator without interfering with the partitions or plates $9^a$, $10^a$, $10^b$. To assemble the device one only needs to insert the rotor unit into the stator unit when the shaft finds its bearing in the top plate of the stator, and the disks come into operative relation with the associated stationary partitions thus forming the passages for the coins.

Another feature lies in the general arrangement that is the compactness of the device, which makes it handy, portable and well adapted for office use. The device is mounted upon a base plate 33 by which it can be placed upon a desk or working table. The base plate also carries mounted thereon the coin collecting compartments 15, 16, 17, 18 which are supplied by the chutes through which the coins may gravitate into their denominational compartments. The height of the housing 1 is controlled by the height required for the coins to drop into their denominational compartment. The space thus gained in the foot-portion of the housing 1 may be utilized by mounting therein the motor 3 which is also fastened upon the base-plate and shown to be coaxial with the sorting disks. As it is impracticable for the coins as stacked in their compartments, to be removed through the bottom or base-plate upon which the whole device is mounted, it is useful and makes for convenience to provide movable wall portions in said denominational compartments, by the operation of which stacks of coins may be laterally removed from the compartments. To expedite the operation of laterally discharging a stack of coin from its compartment the device as per Fig. 3 is applied.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

1. A device for sorting coins including in combination a plurality of rotary sorting disks one beneath the other, a wall surrounding said sorting disks and having annular clearances with said disks, the width of said clearances to be decreased from disk to disk in downward sequence according to the size of coin to be separated by each disk, circular ledges provided at the inside of said wall, each ledge being associated to a disk and surrounding the same, each disk directing the coin of its denomination to lie across the clearance between the disk and the associated wall-ledge, while simultaneously rolling the coin upon said ledge to a point of discharge in said wall, however allowing smaller coin to drop upon the following disk, and means for rotating said disks.

2. A device for sorting coins including in combination a plurality of rotary sorting disks one beneath the other, said disks having conical shape, a wall surrounding said sorting disks and having annular clearances with said disks, the width of said clearances to be decreased from disk to disk in downward sequence according to the size of coin to be separated by each disk, circular ledges provided at the inside of said wall, each ledge being associated to a disk and surrounding the same, each disk directing the coin of its denomination to lie across the clearance between the disk and the associated wall-ledge, while simultaneously rolling the coin upon said ledge to a point of discharge in said wall, however allowing smaller coin to drop upon the following disk, and means for rotating said disks.

3. A device for sorting coins including in combination a plurality of rotary sorting disks one beneath the other, a wall surrounding said sorting disks and having annular clearances with said disks, the width of said clearances to be decreased from disk to disk in downward sequence according to the size of coin to be separated by each disk, circular ledges provided at the inside of said wall, each ledge being associated to a disk and surrounding the same, each disk directing the coin of its denomination to lie across the clearance between the disk and the associated wall-ledge, while simultaneously rolling the coin upon said ledge to a point of discharge in said wall, however allowing smaller coin to drop upon the following disk, and means for rotating said disks.

4. A device for sorting coins including in combination a plurality of rotary sorting disks one beneath the other, a wall surrounding said sorting disks and having annular clearances with said disks, the width of said clearances to be decreased from disk to disk in downward sequence according to the size of coin to be separated by each disk, circular ledges provided at the inside of said wall, each ledge being associated to a disk and surrounding the same, each disk directing the coin of its denomination to lie across the clearance between the disk and the associated wall-ledge, while simultaneously rolling the coin upon said ledge to a point of discharge in said wall, however allowing smaller coin to drop upon the following disk, and means for rotating said disks, said ledges providing means for intercepting the coin on its passage from disk to disk and serving to cover said clearances and having inwardly and downwardly inclined faces, and extending to proximity with the associated disks to form passages therewith of a width allowing each coin to be individually separated.

5. A device for sorting coins including in combination a plurality of rotary sorting disks one beneath the other, a wall surrounding said sorting disks and having annular

clearances with said disks, the width of said clearances to be decreased from disk to disk in downward sequence according to the size of coin to be separated by each disk, circular ledges provided at the inside of said wall, each ledge being associated to a disk and surrounding the same, each disk directing the coin of its denomination to lie across the clearance between the disk and the associated wall-ledge, while simultaneously rolling the coin upon said ledge to a point of discharge in said wall, however allowing smaller coin to drop upon the following disk, and means for rotating said disks, said ledges providing curved stationary shield plates to cover the vicinity of the discharge openings in the wall and closing down upon circumference of the associated sorting disks so that coins dropped in the vicinity of said discharge openings may not unduly enter said openings.

6. A device for sorting coins including a rotating disk, means spaced beyond the periphery of the disk to define with the disk a sorting area, the minimum distance of this area radially of the disk being greater than the diameter of the coins to be rejected and less than the diameter of the coins to be selected, means cooperating with the disk whereby coins may be delivered to the sorting area singly, and means for rotating the disk to compel delivery of coins to the sorting area and to further induce travel of the selected coins from their point of selection to a point of delivery free of the disk.

7. A device for sorting coins including a rotating disk, means arranged beyond the disk and defining with the edge of the disk a coin sorting area, the minimum distance of such area radially of the disk being greater than that of the coins to be rejected and less than that of the coins to be selected, an element cooperating with the disk to permit passage of coins in single order from the disk to the supporting area, means for rotating the disk to compel delivery of coins to the sorting area and to further compel movement of the selected coins to a point of discharge, and means arranged transverse the sorting area at the point of discharge to compel the selected coins to leave the disk.

In testimony whereof I affix my signature.

FRIEDRICH FAST.