Jan. 20, 1970 D. W. BARNES 3,490,588

CARD SORTING APPARATUS

Filed July 11, 1967 3 Sheets-Sheet 1

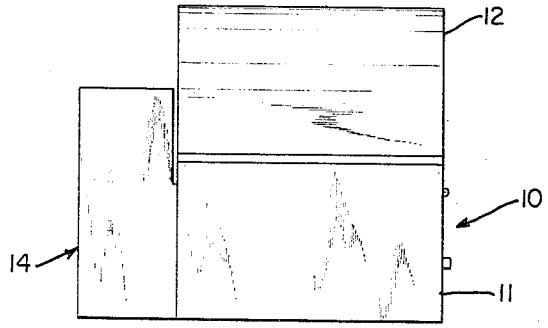


FIG. 1

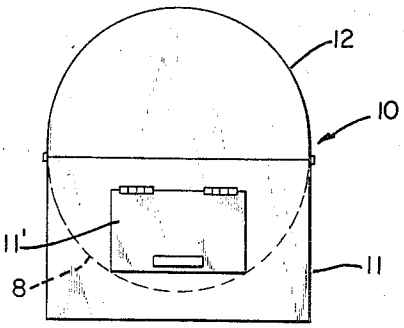


FIG. 2

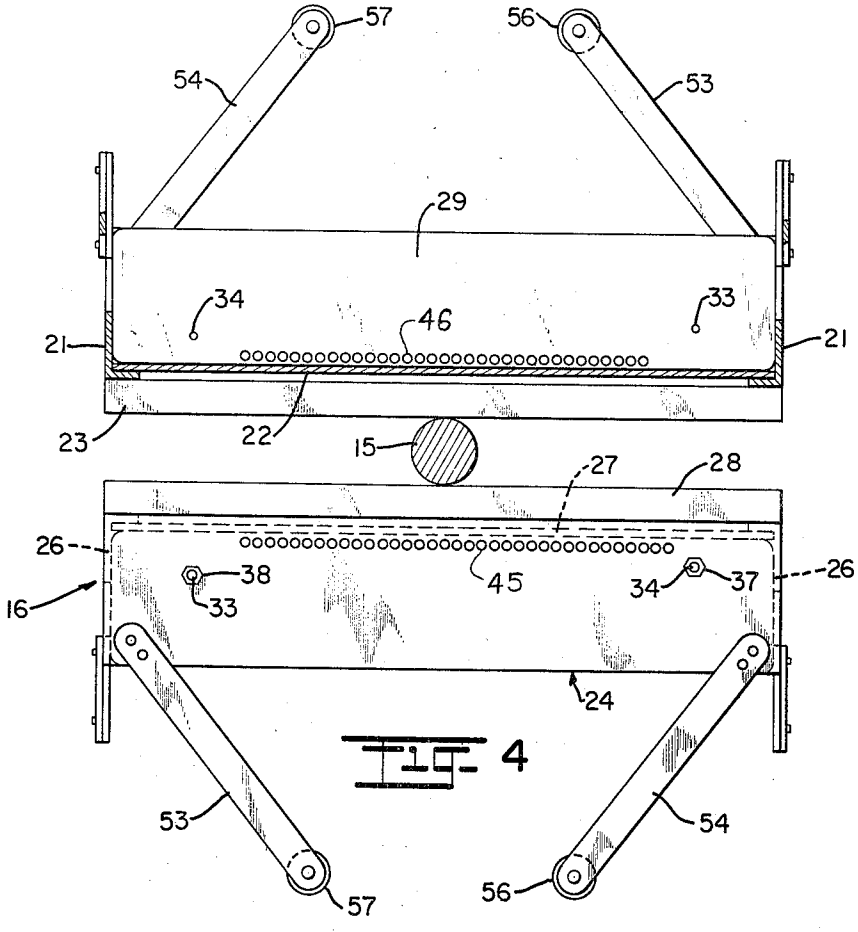


FIG. 4

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CARD SORTING APPARATUS

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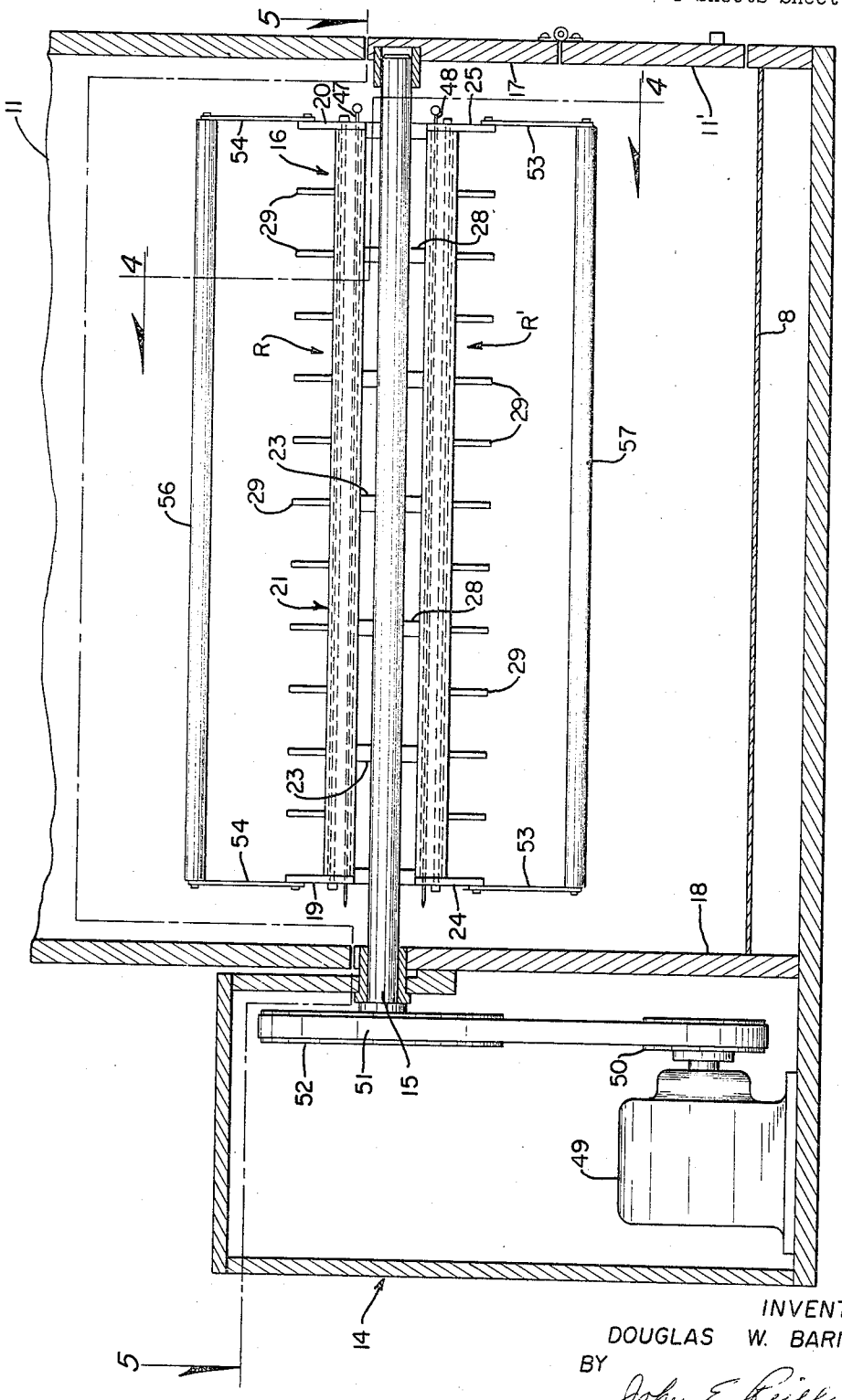


FIG. 3

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CARD SORTING APPARATUS

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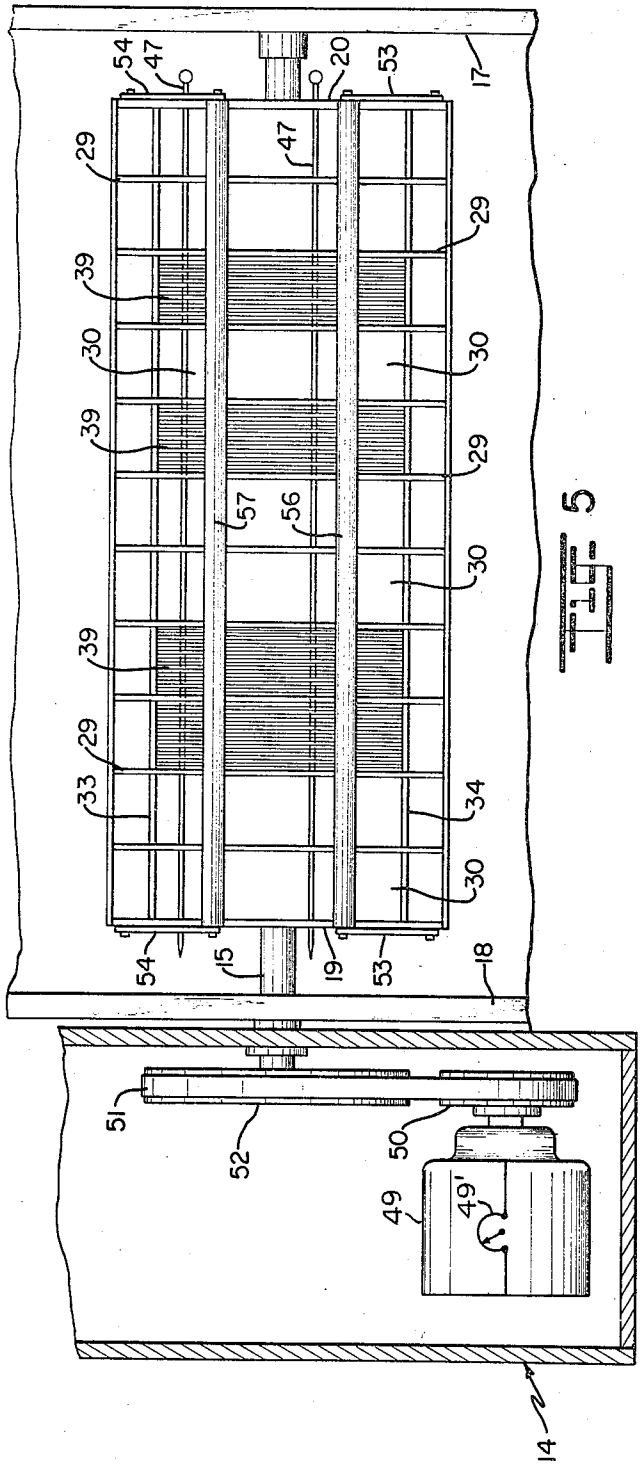


FIG. 5

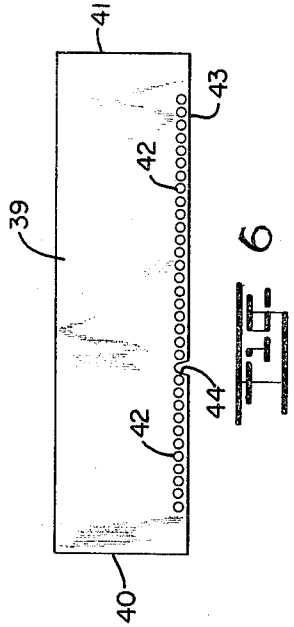


FIG. 6

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3,490,588

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3,490,588

# CARD SORTING APPARATUS

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Int. Cl. B07c 5/34
U.S. Cl. 209—110 8 Claims

## ABSTRACT OF THE DISCLOSURE

A card sorting apparatus has a pair of card-receiving receptacles oppositely disposed for rotation about a common axis. Each of the receptacles has a plurality of divider plates mounted on guide rods extending through the receptacles and which rods also function as guides for the ends of cards stacked within each of the receptacles. The cards are of a conventional type being formed with openings along one edge, the openings being aligned when stacked together to permit insertion of sorting needles; and selected openings are notched so that when the receptacles are rotated, only those cards having notches aligned with the sorting needles may be removed or separated from the remainder of the cards by centrifugal force.

This invention relates to a novel and improved card sorting apparatus wherein selected cards are to be sorted from a large group of cards; and more particularly relates to an improved card sorting apparatus in which a large number of cards may be economically handled with selected cards being positively removed from the group or stack of cards.

The selection or sorting of cards with certain information from a group of cards is known. In conventional sorting apparatus, each of the cards is formed with one or more marginal notches together with a plurality of openings along one edge thereof. The cards are coded so that each of the notches and openings represents a different category of information and a notch is formed alongside each information category pertaining to the card. In order to remove the cards possessing desired information, a sorting needle or rod is passed through the aligned openings or notches in a stack of cards in such a way that only those cards having notches aligned with the sorting rod may be separated and removed from the stack. Of course, more than one category of information may be desired on the card to be selected in which event more than one rod or needle is employed. Thus, if it is desired to select cards having two particular categories or information, then two needles are inserted.

Various means for removing selected cards from a stack of cards have been devised. These have included shaking or vibrating the stack to effect release of those cards in which the sorting needles pass only through the notches. Another type of card sorting apparatus employs sorting needles with rotation through 180° to permit selected cards to fall by gravity from their frictional support on the rod.

When handling a relatively small number of cards, such as, numbers less than 400 cards, the steps of penetrating the cards with rods or needles and separating selected cards from the remainder of the cards may be accomplished by presently known card sorting devices. However, when a relatively large number of cards is to be handled, presently available card sorting devices are not capable of economically selecting the pertinent cards, without resorting to relatively expensive and complex sorting mechanisms. With a large number of cards it is particularly difficult to manually insert the needles through all of the cards and insure that each rod or needle has passed through the aligned openings or notches. For example, if only one of the cards is not properly aligned with the other cards, the card may not be selected if the rod penetrates another portion of the card away from the notch.



The present invention satisfactorily solves the foregoing and other difficulties and drawbacks by utilizing guide members in cooperation with divider members to assure proper alignment between the openings and notches in the cards, and between a stack of cards and the sorting rods, and accomplishes the same in a simplified, highly accurate manner. Furthermore, in handling a large number of cards, selected cards are separated under high-speed continuous rotation, the speed being closely regulated to insure sufficient force to remove the selected cards without damage to the cards. Thus, the present invention positively removes all of the selected cards by exerting the necessary force on the cards without damaging or bending the cards, and greatly minimizes wear on the cards under constant use.

It is therefore an object of the present invention to provide an improved card sorting apparatus that permits economical handling of a large number of cards.

It is another object of the present invention to provide a card sorting apparatus in which high-speed rotation is effected to separate selected cards from a stack or group of cards.

It is a further object of the present invention to provide a card sorting apparatus in which large numbers of cards are properly aligned with each other to receive the separating rod or needle in the correct notch or opening in each card.

In accordance with the present invention, the card sorting apparatus has a pair of counter-balancing receptacles mounted for rotation on a motor-driven horizontal shaft, each of the receptacles being formed by end walls and side walls along with a bottom wall extending between the end and side walls. A plurality of dividers is supported within each of the receptacles to separate each receptacle into a plurality of compartments, and guide rods extend between the end walls of each of the receptacles to slidably mount the plates thereon. The guide rods are spaced from each other a sufficient distance to abut opposite ends of cards disposed within each receptacle. In turn, each of the dividers has the same number of openings as the total of the openings and notches in each of the cards. Accordingly, when a sorting needle is inserted through an opening in one of the end walls, it passes through the aligned opening or notch in each of the cards, which are properly aligned by the guide rods, as well as the appropriate opening in each of the dividers. The receptacles are revolved by a motor to centrifugally urge the cards provided with notches aligned with the sorting needles to be separated from the remainder of the cards, whereupon those cards separated from each of the receptacles are directed by overhead guide frames into a bin or other collecting area.

The above and other objects, advantages and features of the present invention will become more readily appreciated and understood from a consideration of the following detailed description of a preferred form of the card sorting apparatus of the present invention when taken together with the accompanying drawings, in which:

FIGURE 1 is a side elevational view of the card sorting apparatus of the present invention.

FIGURE 2 is an end elevational view of the card sorting apparatus of FIGURE 1.

FIGURE 3 is a side sectional view, partly in elevation, of the card sorting apparatus of FIGURE 1.

FIGURE 4 is a sectional view, partly in elevation, of a portion of the card sorting apparatus of FIGURE 3 and taken along line 4—4 of FIGURE 3.

FIGURE 5 is a top sectional view, partly in plan, of the card sorting apparatus showing a group of cards disposed between two of the dividing plates and taken along line 5—5 of FIGURE 3; and

FIGURE 6 is a top plan view of a card of the type used with the card sorting apparatus of the present invention.

Referring to the drawings and particularly to FIGURES 1 and 2, the card sorting apparatus of the present invention is broadly comprised of a housing **10** having a lower fixed casing portion **11** with an access door **11'** and an upper casing portion **12** which is movable between an open and closed position with respect to the lower portion **11** by being hinged or otherwise removably connected thereto. A motor casing **14** is connected to one end of the lower portion **11**. As shown in FIGURE 3, a shaft **15** for a platform **16** is rotatably mounted in end walls **17** and **18** of the lower portion **11** of the housing **10**; and in the preferred form, the platform is defined by a pair of corresponding receptacles R and R' carried in opposed, outwardly facing relation on the shaft **15**. The receptacle R is formed of a first set of end walls **19** and **20** connected to opposite ends of a pair of L-shaped members **21**; and in turn the L-shaped members **21** are secured to opposite sides of a base member **22**. The L-shaped members **21** form side walls for the receptacle while member **22** forms the bottom wall of the receptacle, and the members **21** and **22** being supported in spaced relation to the shaft **15** by a plurality of spaced, laterally extending beams **23**, the latter being fixedly secured to the shaft **15** and directly to the L-shaped members **21**.

A corresponding receptacle R' has a second set of end walls **24** and **25** being disposed in the same planes as the end walls **19** and **20**, respectively, as shown in FIGURE 3. The end walls **24** and **25** are also connected to L-shaped members **26** secured to opposite sides of base member **27**. The members **26** and **27** are supported in spaced relation to the drive shaft **15** by a plurality of transversely extending beams **28** secured to the shaft **15** and to the L-shaped members **26**. The second receptacle R' is oppositely disposed to the first receptacle **23** so that the receptacles R and R' are equi-angularly spaced from each other about the axis of the shaft **15** in counter-balancing relation.

Each of the receptacles R and R' has a plurality of rectangular shaped divider plates **29** disposed therein to divide the receptacles R into a plurality of compartments **30**. Here the rectangular plates **29** extend between the respective L-shaped members **21** and **26** and are supported on the base members **22** and **27**, as shown in FIGURE 4. In each receptacle, the plates **29** are slidably mounted on a pair of substantially parallel guide rods **33** and **34** extending between the end walls **19** and **20** of receptacle R and between the end walls **24** and **25** of receptacle R'. One end of each of the rods **33** and **34** has a head thereon to limit movement through an opening in one of the end walls **19** and **24** while the other ends pass through openings in the other of the end walls **20** and **25** and are threaded to receive nuts **37** and **38** whereby to retain the rods **33** and **34** in the desired position.

The distance between each pair of rods **33** and **34** in each receptacle corresponds to the length of punched cards **39** whereby the rods function as guides for the cards **39** when the latter are disposed within the receptacles. A typical punched card **39** is shown in FIGURE 6, and it will be noted that the edges **40** and **41** of each card **39** abut against the rods **33** and **34** to insure proper positioning of the cards **39** in aligned relation within each receptacle. As shown in FIGURE 6, each card **39** has plurality of openings **42** formed therein adjacent to one longitudinal edge **43**. For the purpose of illustration, the card **39** may have one or more notches or grooves **44** formed in the edge **43**, in place of one or more openings **42** to designate selected categories of information on the card, according to the information to be denoted by each card.

From the foregoing it will be evident that the receptacles are identical in construction; and accordingly all further reference to the intended function and use of one receptacle will apply equally as well to the other receptacle, unless otherwise indicated.

As shown in FIGURES 4 and 5 the end walls **19** and **20** in receptacle R have aligned openings **45** being equal in number and spacing to the total of the openings **42** and notches **44** in each of the cards **39**. Similarly, each of the divider plates **29** has a set of openings **46** being equal in number and spacing to the openings **42** and notches **44** in each of the cards **39**. In this way, plates **29** and the end walls **19** and **20** have the same number of openings equal to the total of the openings **42** and the notches **44** in each of the cards **39**. Furthermore, with the edges **40** and **41** of each of the cards **39** aligned by the guide rods **33** and **34** in the receptacles, the openings **42** or notches **44** are aligned with one of the openings in each of the end walls and the plates that form the compartments in each receptacle. In order to separate selected cards from the stack, sorting rods or needles **47** are inserted through openings in the end wall **19**, the plates **29** and the aligned openings or notches in the cards **39** disposed within one or more of the compartments **30**. The placement of the rods **47** is of course dictated by the information categories selected and, for this purpose, the front end wall **20** will have its openings **45** identified by suitable labels or markings, not shown, to conform to the identity of the openings on the cards **39**. The platform **16** of the present invention is mounted for rotation by a motor **49** supported within the motor housing **14**. The motor **49** has a drive pulley **50** with a drive belt **51** trained for advancement over the pulley **50** and a pulley **52** on the shaft **15** whereby rotation of the motor **49** will cause rotation of the shaft **15** to revolve the platform **16**. The speed of rotation of the motor **49** may be controlled by well-known means, such as a rheostat, not shown, to vary the speed of rotation of the platform **16** and thus vary the centrifugal force as required for separation of the cards.

As shown in FIGURE 4, an overhead guide frame for each receptacle takes the form of pairs of arms **53** and **54** extending from opposite sides of the end walls in upwardly convergent relation toward one another. Rods **56** and **57** serve to guide and direct the cards **39**, as they are separated from the stack of cards, downwardly into a bin or the like, provided within the lower portion **11** of the housing **10**. This minimizes damage to the cards thrown outwardly from the receptacles, and the cards are prevented from interfering with rotation of the platform **16**.

Considering the operation of the present invention, each of the cards **39** is coded with specified information thereon, in accordance with conventional practice. If the cards **39** are concerned with real estate, for example, each of the cards **39** may contain pertinent information concerning a piece of property, such as, the price range, type of property, whether the buildings are new or old, location of the property, trade or sale, and each opening would represent a different category or unit of information. Marginal notches **44** are formed in each card **39** opposite each category of information that applies to the property in question whereby to designate price, location, trade or sale, etc. Thus, the card **39** may have one or more notches **44** formed therein.

The cards **39** having information recorded thereon concerning various parcels of real estate are appropriately coded for the information recorded by forming notches **44** in place of the openings **42**, and thereafter the cards **39** are stacked within the receptacles R and R'. Each of the compartments **30** between the plates is relatively small so as to contain about 100 cards thereby to permit easy insertion of the cards **39**. It should be understood that each of the receptacles R and R' most desirably has approximately the same number of cards disposed therein in order to balance the platform when under rotation. If

the cards are to be selected from a small group of the cards **39**, then it may be necessary to use a dummy set of cards in the other of the receptacles to establish proper balance.

After the cards **39** are disposed within the receptacle R, the sorting rods **47** are inserted through the appropriate openings in the end wall **20**, each opening **46** being appropriately labeled as described. For instance, if it is desired to ascertain the available houses in a particular price range, one rod **47** would be inserted in the opening for that particular price range and another of the rods **47** would be inserted in the opening for residential real estate.

Likewise, the receptacle R' is filled with the cards **39** depending upon the number to be sorted. As previously stated, the same number of cards **39** will be disposed in each of the receptacles to assure proper balance and the sorting rods would then be inserted through the openings in the end wall **20** representing the same information as the openings in the end wall of receptacle R.

The motor **49** is energized to rotate at a constant speed at which sufficient centrifugal force is developed to remove all selected cards **39** from the receptacles having the notches **44** formed therein for houses in the particular price range. By selecting the proper speed of rotation of the motor **49**, through a rheostat **49'** or other suitable speed control means sufficient centrifugal force is exerted to select the desired cards and remove them from the remainder of the group or stack of cards in the receptacle **23** without any damage to the cards; furthermore, the rods **56** and **57** cooperate to insure that the selected cards **39** are directed into the bin or other structure at the bottom of the portion **11** of the housing **10**, and the cards may then be removed through the access door **11'**.

While the cards **39** have been shown as being disposed within only one of the compartments **30** in the first receptacle R, it should be understood that all of the compartments **30** could be filled, depending upon the total number of cards to be stacked. As previously mentioned, the same amount of cards or dummy cards must be disposed within one or more of the compartments **32** in the second receptacle R to provide proper balance between the two receptacles R and R' during rotation of the platform **16**.

While the cards **39** have been described as having openings **42** and notches **44** to represent specified information, a part or all of the units of information could be combined in a binary code, or "condensed coding" in order to permit reduction in the number of openings **42** and notches **44** required. Moreover, the openings **42** and the notches **44** have been described with respect to utilization for a real estate operation to enable a realtor to quickly locate all properties meeting certain requirements of a client, and it should be understood that the cards **39** may contain any desired information. Thus, depending upon the type of information upon the cards **39**, the coding of each of the openings **42** and the notches **44** will be appropriately selected.

While the present invention has been described with the platform **16** having two receptacles R and R' therein, it should be understood that more than two of the receptacles could be employed if desired. However, the receptacles must be equally spaced about the axis of rotation of the shaft **15** in order to be balanced during rotation thereof. The plates **29** have been described as being slidable on the rods **33** and **34** with the plates being merely held in position due to friction between the rods and the plates. If desired, suitable means may be employed to adjustably lock each of the plates **29** in different positions along the guide rods so as to prevent any shifting of the cards during rotation of the platform **16**. However, it has been found that the frictional fit between the plates and the rods is sufficient to prevent such shifting under normal operation.

An important feature of this invention resides in the large number of cards that may be easily and economically handled without risk of damage to the cards during separation under high-speed continuous rotation. Nevertheless, all cards to be selected are separated in a very short period of time, usually a matter of a few seconds, notwithstanding the size of the stack of the cards; and when separated the overhead guide frames will facilitate removal of the cards for collection in the bin area.

While the preferred form of the card sorting apparatus of the present invention has unique application as described, it is nevertheless to be understood that various modifications and changes may be made in the detailed construction and arrangement of elements comprising the preferred form of the invention as well as its intended use without departing from the spirit of the present invention.

What is claimed is:

**1.** A card sorting apparatus comprising an outer enclosure, a shaft supported at opposite ends for rotation about a horizontal axis of rotation, a receptacle mounted on said shaft within said enclosure for stacking a series of cards tranversely of said shaft in aligned relation to one another within said receptacle in which each card is formed with at least one marginal notch in an edge thereof and a plurality of openings near the edge, each card having the same aggregate number of notche sand openings with equal spacing between the notches and openings, at least one sorting rod, said receptacle having guide means provided with openings aligned with the openings and notches in the stacked cards to support said sorting rods for insertion through the aligned notches or opening in the stacked cards, a plurality of divider plates adjustably mounted at spaced intervals along said receptacle transversely of said shaft to divide said receptacle into a plurality of cards receiving compartments, each of said divider plates having openings therein aligned with the openings in said guide means and each of said opening in each of said divider plates being aligned with one of the notches or openings in each of the cards when the cards are disposed in said receptacle whereby said sorting rods extending through a notch or opening in each of the cards extends through aligned openings in said divider plates, and motor drive means mounted in a driving relation to one end of said shaft to revolve said receptacle about the shaft axis of rotation to separate by centrifugal force the cards having said sorting rods passing only through notches therein from the remainder of the cards in said receptacle for gravity movement away from said receptacle and collection at the bottom of said enclosure, and said enclosure having an access door in communication with the bottom of the enclosure for removal of cards therefrom.

**2.** The apparatus according to claim **1**, said receptacle further including longitudinally extending guide members disposed on opposite sides of said receptacle to contact opposite ends of each of the cards adjacent the edge having the notches and openings whereby to align the notches and openings in each of the cards for receiving each of said sorting rods through aligned notches and openings in the cards, and a guide frame on said receptacle arranged in the path of movement of the cards away from said receptacle when said cards are separated from said receptacle by centrifugal force whereby to guide and direct the separated cards away from said receptacle for gravity movement to the bottom of the enclosure.

**3.** The apparatus according to claim **2** in which each of said sorting rods extends substantially parallel to the axis of rotation of said receptacle.

**4.** The apparatus according to claim **2** including means to vary the speed of said motor drive in accordance with the total number of cards in said receiving means.

**5.** The apparatus according to claim **2** there being at least two corresponding receptacles equi-angularly spaced from each other, the axis of rotation of said shaft being common to and located centrally between said receptacles.

6. The apparatus according to claim 5 in which each receptacle has longitudinal guide rods extending in spaced relation to one another along opposite sides of said divider plates to slidably mount said divider plates in close-fitting engagement on said guide rods and to retain said divider plates in said receptacles.

7. The apparatus according to claim 6, said motor drive means being mounted at one end of said enclosure and said drive shaft extending the length of said enclosure to define the common horizontal axis of rotation for said receptacles, said receptacles being of elongated rectangular configuration and being mounted in back-to-back relation to one another on said drive shaft.

8. A card sorting apparatus comprising an outer enclosure, a horizontal drive shaft within said enclosure, a pair of receptacles mounted in counter-balancing relation about the horizontal axis of rotation of said shaft within said enclosure, each receptacle being adapted to receive cards in which each card is formed with at least one marginal notch in an edge thereof and a plurality of openings near the edge with each card having the same aggregate number of notches and openings, at least one sorting rod for each receptacle, means to support each sorting rod in a receptacle for insertion through the aligned notches or openings in a stack of cards, guide means disposed within the receptacle to engage the ends of each of the cards adjacent the edge having the notches and openings whereby to maintain the notches and openings aligned for insertion of each of said sorting rods, a pluarility of divider plates disposed in each receptacle to divide each receptacle into a plurality of card-receiving compartments, each of the divider plates having openings therein corresponding in number and spacing to the



number of spacing between the notches and openings in each of the cards, and the openings in each of said divider plates being aligned with the notches and openings in the cards when the cards are disposed in each receptacle, an overhead guide frame on each of said receptacles in spaced, outwardly disposed relation to said cards and in the path of movement of said cards whereby to guide cards released from said receptacles for gravity movement away from said receptacles, and motor drive means for rotating said receptacles through said drive shaft to separate by centrifugal force the cards having said rods passing only through notches therein from the remainder of the cards in each receptacle.

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