# United States Patent

**Harlow**

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## [54] SELECTOR FOR EDGE NOTCH CODED CARD-TYPE ITEMS


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[73] Assignee: **Image Systems, Inc.**, Culver City, Calif.



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[52] **U.S. Cl.** ..... **209/80.5**, 209/111.8

[51] **Int. Cl.** ..... **B07g 5/3444**

[58] **Field of Search** ..... 209/72, 111.8, 80.5



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,429,436 | 2/1969 | Irasek | 209/72 |
| 3,554,373 | 1/1971 | Rothfus | 209/111.8 |



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[57] **ABSTRACT**

A selector for edge notch coded card-type items comprising a plurality of parallel, spaced pairs of plates movable oppositely into projected and retracted positions and, in projected position, cooperating to address a desired card-type item in a store presenting edge notches to the address plates. Magnet means, which may be rotatably mounted, cooperates with magnetic means on the coded edges of the items tending to draw the items forwardly from the store, with all but the addressed item prevented from moving forwardly by the engagement of their edges with the edges of projected address plates. Solenoid operators and spring means cooperate in the opposite movements of the paired address plates of the selector which are interconnected for simultaneous opposite movement by a lever for each pair engaged adjacent each end with one plate of the pair and having a relatively fixed pivotal axis intermediate its ends about which it rotates to effect the opposite movements of the plates in the pair. The end engagements of the lever may be through pin and slot connections to provide for rectilinear movement of the address plates while the lever rotates about its axis.


**8 Claims, 4 Drawing Figures**

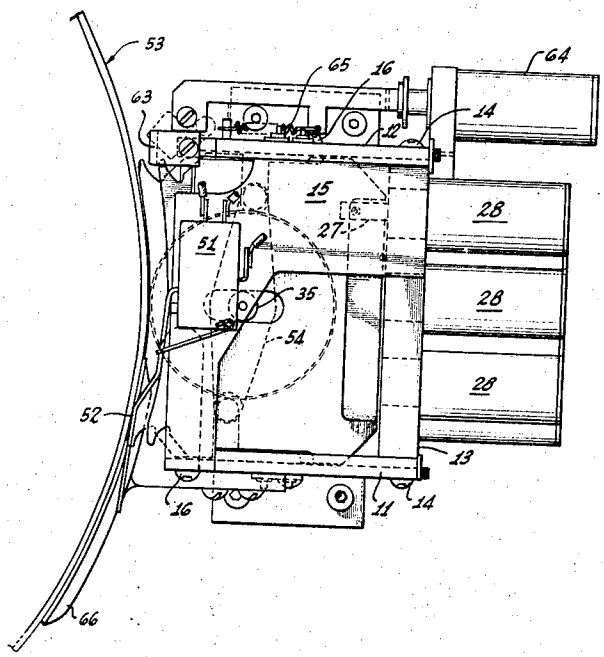

Fig. 1

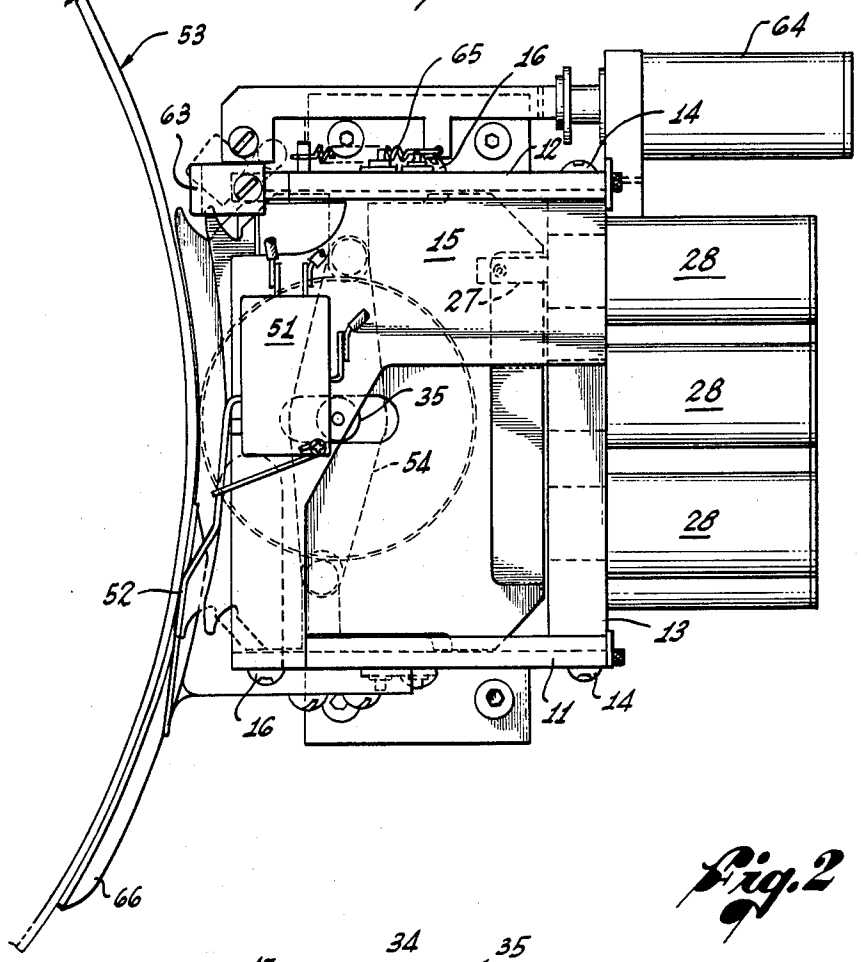


Fig. 2

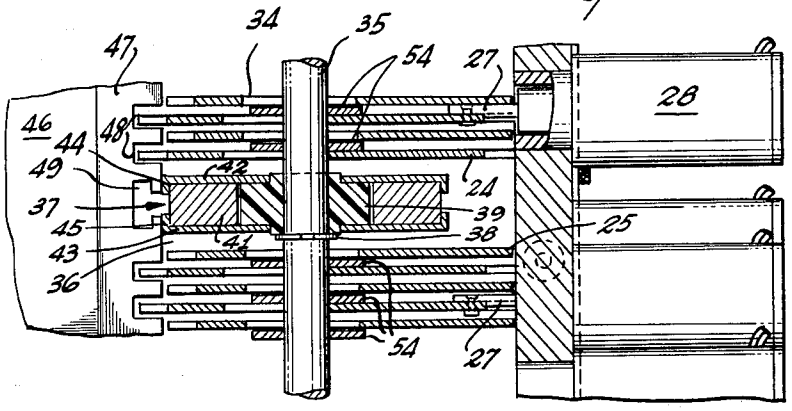


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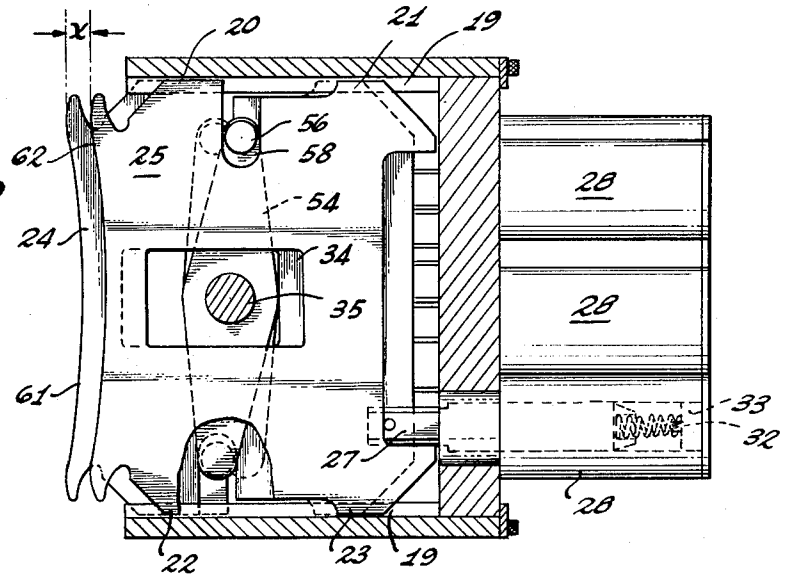
Fig. 3



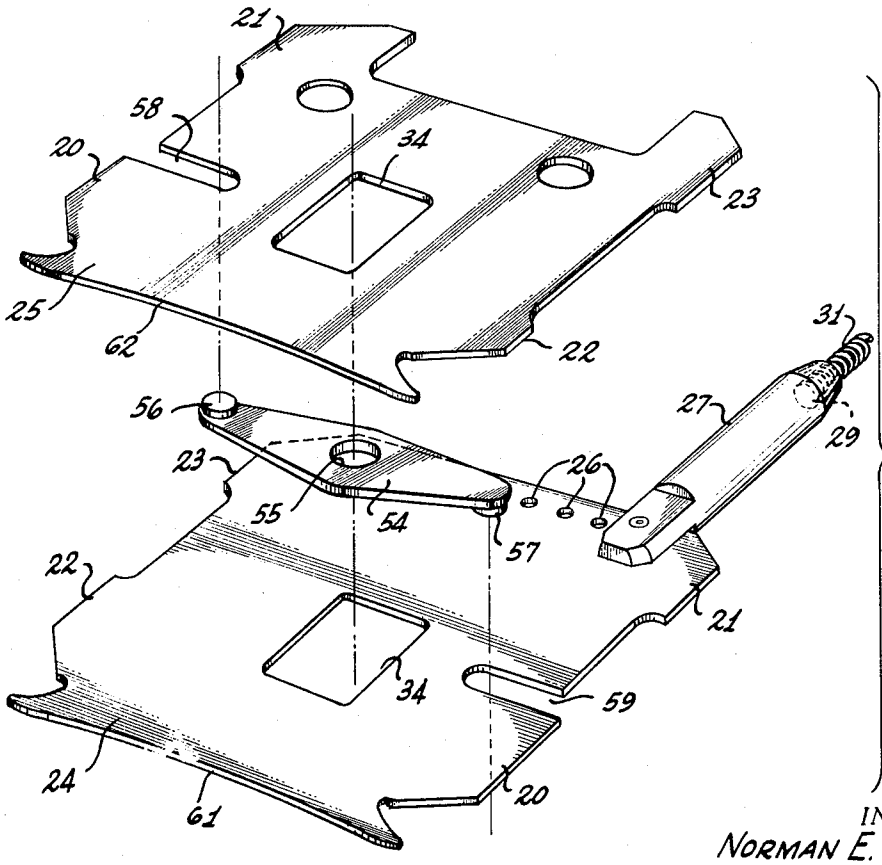




Fig. 4

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# SELECTOR FOR EDGE NOTCH CODED CARD-TYPE ITEMS

## BACKGROUND OF THE INVENTION

1. This invention is in the field of random access storage and retrieval devices for card-type items, such as microfiche.

2. A random access storage and retrieval device to which the present invention is applicable is described and claimed in the patent granted to E. H. Irasek, U.S. Pat. No. 3,429,436 on Feb. 25, 1969 for Random Access Storage and Retrieval Device. The selector of the present invention may be used as a substitute for that shown and claimed in the application of James P. Hagan, Ser. No. 882,503 filed Dec. 5, 1969 for Selector for Edge Notch Coded Card-Type Items. The aforesaid Irasek patent shows a rotary store in which card-type items having magnetic means at their edges are edge-coded by means of notches and which utilizes a selector employing address plates which are pivotally mounted and rotatable bodily into one of two alternate positions and, by their positions, addressing a unique card for withdrawal from the rotatable store by means of magnets eccentrically mounted relative thereto.

The selector mechanism of the aforesaid Hagan application comprises opposite rectilinear movable pairs of plates having opposed racks thereon engaged by pinions rotating on stationary axes to effect simultaneous movement of the address plates in opposite directions. The application also shows a rotating magnet substituted for the eccentric magnets of the patent.

The selector mechanism of the present invention is substituted for that of the Hagan application as being simpler, more economic and more reliable and being less subject to jamming and the like from dirt and other foreign material.

## SUMMARY OF THE INVENTION

The selector mechanism of the present invention is associated with the edges of edge notch coded card-type items which are mounted in side-by-side relation in a store for relative movement with respect to the selector. The selector comprises a plurality of pairs of parallel address plates which are moved rectilinearly to project one and retract the other plate in each pair simultaneously. The forward edges of the address plate extend across the coded edges of the card-type items in substantially right-angle relation, acting to maintain nonaddressed items within the store while permitting only addressed items to move partly forwardly by the depths of the notches in the item edges embracing the appropriate projected address plates. A U-shaped clip of magnetic material at the edge of the item cooperates with a rotating magnet which pulls an addressed item a limited distance from the store where a slot in the edge of the withdrawn items receives an extractor, all as disclosed in the aforesaid Hagan application.

One of the address plates of each pair is connected to a solenoid actuator moving in a retracting direction and having a spring co-axial with its armature and carried at the back face thereof for moving the armature forwardly when the solenoid is de-energized.

Between the address plates of each pair is mounted a lever pivoted for rotation intermediate its ends on a fixed axis, specifically the shaft supporting the rotary magnet. Each end of the lever is connected to one address plate of each pair by means of a pin and slot connection, so that as one address plate is moved to retracted and projected positions by the solenoid-spring combination, the lever will be turned about its axis and will effect movement of the other address plate of the pair in the opposite direction to project and retract it as the other is retracted and projected.

Latching means is provided for latching the address plates in position. To change an address, the appropriate solenoids may be energized, without effect, and then the latching means released to effect simultaneous movements of the appropriate address plates by the springs and solenoids. The address plates are guided for rectilinear movement in projected and retracted directions by means of a plurality of slots in mounting plates at the opposite sides of the address plates, with the slots receiving the opposite side edges of the address plates. The levers operating the address plates are disposed therebetween for free rotation on the shaft of the rotating magnet and have central hubs entering elongated slots generally central of the address plates spaced from the address plate surfaces by central washer-like projections on opposite sides of the lever. Pins are provided on the opposite ends of the levers, facing oppositely and received within transverse slots in opposite edges of the pair of address plates.



## DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view of the selector according to the present invention;

FIG. 2 is a partial vertical sectional view through the selector;

FIG. 3 is a horizontal sectional view through the selector; and

FIG. 4 is an exploded perspective view of paired address plates, the lever connecting therebetween and the solenoid armature-spring operator therefor.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The physical embodiment of the selector of the present invention illustrated in the drawings comprises a pair of side plates **11** and **12**, a back plate **13** to which they are connected by studs **14** and an irregularly-shaped top plate **15** connected to the side plates by studs **16**. The side plates **11** and **12** are provided with opposed, horizontal-extending, vertically-spaced notches **19** in which are guided opposite side edge projections **20, 21** and **22, 23** on the address plates whereby they are supported in vertically spaced, stacked relation and guided in the notches for movement forwardly and rearwardly of the selector. The address plates are interconnected in pairs and, as more particularly shown in FIG. **4**, one address plate of each pair is designated **24** and the other **25**.

The address plates **24** of each pair are provided with a plurality of spaced openings **26** adjacent their rear edge giving alternate locations for connection to solenoid armatures **27**, the actuating coils for which are shown at **28**. The back faces of the armatures **27** are provided with pockets at **29** receiving one end of operating springs **31**, the other ends of which surround projections **32** on the forward faces of back magnetic elements **33** within the solenoid coils. When the solenoid coils **28** are energized, the armatures **27** are drawn thereinto to retract the address plates **24** and when the solenoid coils are de-energized, the springs **31** project the armatures **27** forwardly to project the address plates **24** forwardly.

The address plates are provided with generally centrally located, elongated openings **34** therethrough which are aligned vertically and through which projects a shaft **35**, rigidly mounted in any desired manner, for example, between the top plate **15** and a lower plate supported from the back plate **13**, in the manner described in the aforesaid Hagan application. The stack of address plates is divided substantially midway between the top and bottom thereof to provide a clearance space **36** within which is rotatably mounted on the shaft **35** a magnet assembly **37** supported on a snap ring **38**. The magnet assembly **37** comprises a wheel-like structure having a central bearing **39**, molded of Teflon or the like, about which is disposed an annular permanent magnet **41** of Alnico, ceramic magnetic material or other permanent magnet, and having pressed thereon discs **42** and **43** of magnetic material having integral peripheral pole faces **44** and **45** between which the magnetic flux passes through the magnetic material on the edge of the card-type items.

An item of the type with which the selector of this invention cooperates is shown at **46** in FIG. **2**, having a U-shaped clip **47** about its forward edge which is formed of magnetic material and has coding notches **48** cut therein. Adjacent the central portion of the clip **47** is disposed a T-shaped notch **49** adapted to receive an extractor **66** in partially withdrawn position to prevent involuntary return of the item into the store.

Upon the top plate **15** is mounted an electrical switch **51** having an elongated operating arm **52** which acts as a sensor on the downstream side of the selector, to be engaged by the edge of a partially withdrawn item to operate the switch **51** to indicate such withdrawal of an addressed item. This may de-energize the rotating store shown at **53**, as in the aforesaid Irasek patent, or may slow the rotation of the store for a subsequent stopping of the item at a delivery station.

Between each address plate **24** and **25** of a pair is disposed a lever **54** having a central opening **55** therethrough by which it is slidably and rotatably mounted on the shaft **35**, with the lower faces of the levers supported on the upper faces of the address plates **24**. The opposite ends of the lever **54** are provided with pins **56** and **57** which face in opposite directions. The address plates **24** and **25** are provided with slots **58** and **59** in their opposite side edges which receive the pins **56** and **57**, respectively, and thereby interconnect the address plates **24** and **25** of each pair for rectilinear movement in opposite directions as one of them is moved and the interconnecting lever **54** is rotated.

The store **53** is of drum-shape, as disclosed in the aforesaid Irasek patent, and the forward edges of the address plates **24** and **25** are likewise made arcuate at **61** and **62** to closely follow the path of rotation of the forward edges of the card-type items in the store. The lock bar **63** has operating means including a solenoid **64** and a spring **65** as disclosed in the aforesaid Hagan application for locking the address plates in adjusted positions.

The selector is shown in the drawings with all of the address plates **24** projected into their forward positions by the springs **31** and with all of the address plates **25** moved thereby, through the lever **54**, into retracted positions. According to the coding system selected, the forward position of the address plates **24** may conform to either of the binary numbers zero or one, the reverse number being set into each pair of address plates by projecting the address plate **25** of that pair forwardly. The forward projection of each address plate **25** is accomplished by energizing the solenoid coil **28** whose armature **27** is connected to the address plate **24** paired with the address plate **25**, whereupon the address plate **24** will be retracted, will rotate the lever **54** by engagement of the pin **57** in the slot **59**, and rotation of the lever **54** will, in turn, move the address plate **25** rectilinearly forwardly in its opposite slots **19** through engagement of the pin **56** in transverse slot **58** of the address plate **25**.

Normally, all of the solenoid coils which are to be energized for a particular card address are energized without the movement of their associated address plates **24** since they are locked in position by lock bar **49**. After all the desired solenoid coils are energized, the solenoid **64** is momentarily energized, thereby unlatching the lock bar **49** to release the address plates **24** and **25**, whereupon the address plates **24** whose solenoids were energized are retracted and, through the levers **54**, project the address plates **25** with which they are paired forwardly. Should an address plate **24** be locked in retracted position and a solenoid actuator not be energized, it will, when unlocked, be moved forwardly by its spring **31**, thereby retracting the paired address plate **25**.

After movement of the address plates, the solenoid **64** is de-energized, the lock bar **49** is returned to locking position by spring **65** and thereafter the solenoid coils **28** may be de-energized without affecting the settings of the address plates which are locked in position.

Movement transversely of the items in the store **53** relative to the selector may be effected by moving either part, for example by rotating the store **53** as shown in the aforesaid Irasek patent. As an item **46** approaches the magnet assembly **37**, its magnetic edge **47** will be attracted thereto and the magnet **37** will rotate therewith. Unaddressed items will be prevented from leaving the store because of the engagement of the edge of the item with the forwardly projected edges **61** or **62** on the address plate **24** or **25** which do not conform with the edge notch coding at **48**. For the addressed item, notches **48** will be disposed opposite the projected edges of the address plate and, as the item moves to the run-off side of the magnet **37**, the item will move outwardly from the store by the limited distance provided therefor by the cooperating notches and address plates. An addressed item so moved engages its T-shaped notch **49** about the retainer **66** and, as it continues to move downstream, engages the arm **52** of the switch **51** to effect whatever further action is programmed into the apparatus as, for example, disclosed in the aforesaid Irasek patent.

It will be understood that the eccentric magnets of the aforesaid Irasek patent may be used instead of the rotary magnet assembly **37**, although shaft **35** or some other pivoting means for the levers **54** will be retained.

While certain preferred embodiments of the invention have been specifically illustrated and described, it will be understood that the invention is not limited thereto as many variations will be apparent to those skilled in the art, and the invention is to be given its broadest interpretation within the terms of the following claims.

I claim:

**1.** A selector for edge notch coded card-type items mounts in a store comprising:
- a plurality of address plates mounted in parallel spaced relation and presenting edges transverse to the edges of the items;
- means mounting said address plates for rectilinear movement toward and away from the edges of the items so that the address plates positioned toward the item edges encode an address for an item in the store;
- magnetic means on said items;
- magnet means associated with the selector and cooperating with the magnetic means on said items for partially withdrawing an addressed item from the store; and
- means interconnecting said address plates in pairs for simultaneous movement in opposite directions, including:
- a lever;
- means mounting said lever for rotary movement about an axis intermediate its ends; and
- means connecting the opposite ends of said lever to the separate address plates in the pair, whereby rectilinear movement of one plate of each pair is, through the interconnecting rotating lever, transmitted to the other address plate in the pair in the opposite direction.

**2.** The selector defined in claim **1** in which the opposite ends of the lever are connected to the address plates of the pair at opposite edges thereof.

**3.** The selector defined in claim **2** in which the connections between said lever and the opposite edges of the address plates of each pair are effected through pin-and-slot connections to accommodate rectilinear movement of the address plates with rotary movement of the lever about a fixed axis.

**4.** The selector defined in claim **3** in which the pin-and-slot connections include:
- pins at the opposite ends of said lever projecting oppositely therefrom; and
- slots on opposite sides of the centers of said address plates receiving said pins to interconnect the address plates through the lever.

**5.** The selector defined in claim **1** including:
- a solenoid armature connected to the rear edge of one address plate of each pair and moving it in a retracted direction; and
- spring means within the solenoid co-axial with the armature and bearing against the rear end thereof for projecting the armature and the address plate to which it is connected in a forward direction.

**6.** The selector defined in claim **1** including:
- a shaft passing through said address plates transversely thereof;
- said levers being mounted on said shaft between the plates of each pair and rotating about said shaft in effecting the oppositely directed movements of the address plates in the pair.

**7.** The selector defined in claim **6** in which said magnet means comprises:

a rotating, substantially circular magnet having peripheral pole faces for attracting the magnetic means on the items in the store;

said circular magnet being mounted on said shaft to be freely rotatable thereon and positioned within said stack of address plates intermediate the ends thereof.

8. The selector defined in claim 7 in which:



said store rotates about a vertical axis with the items mounted substantially vertically and radially thereof;

said address plates being stacked vertically in parallel horizontal planes; and

said shaft having a vertical axis.

* * * * *