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3,105,593

CODED CARD SELECTOR APPARATUS

Filed Sept. 19, 1960

3 Sheets-Sheet 1

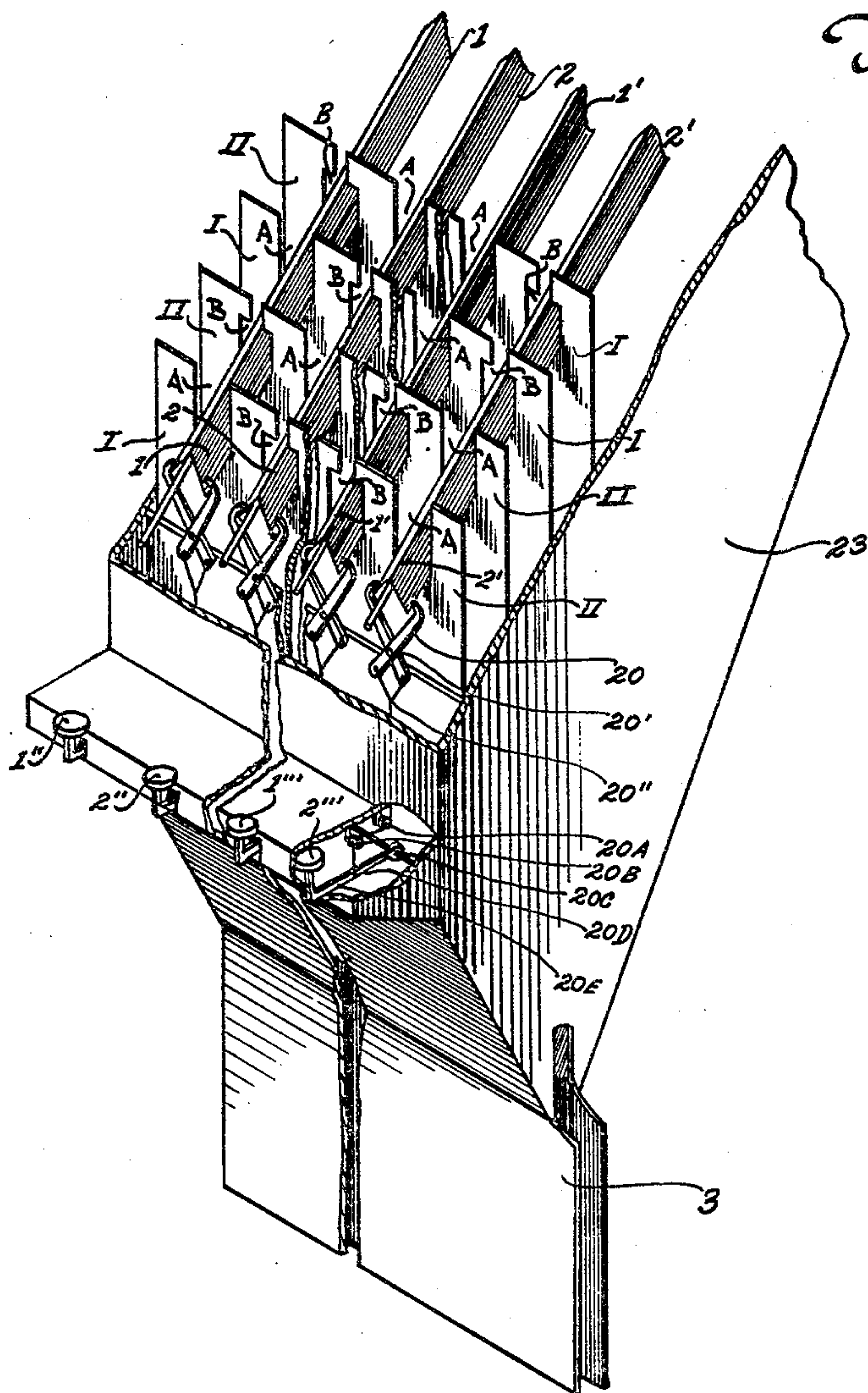


Fig. 1

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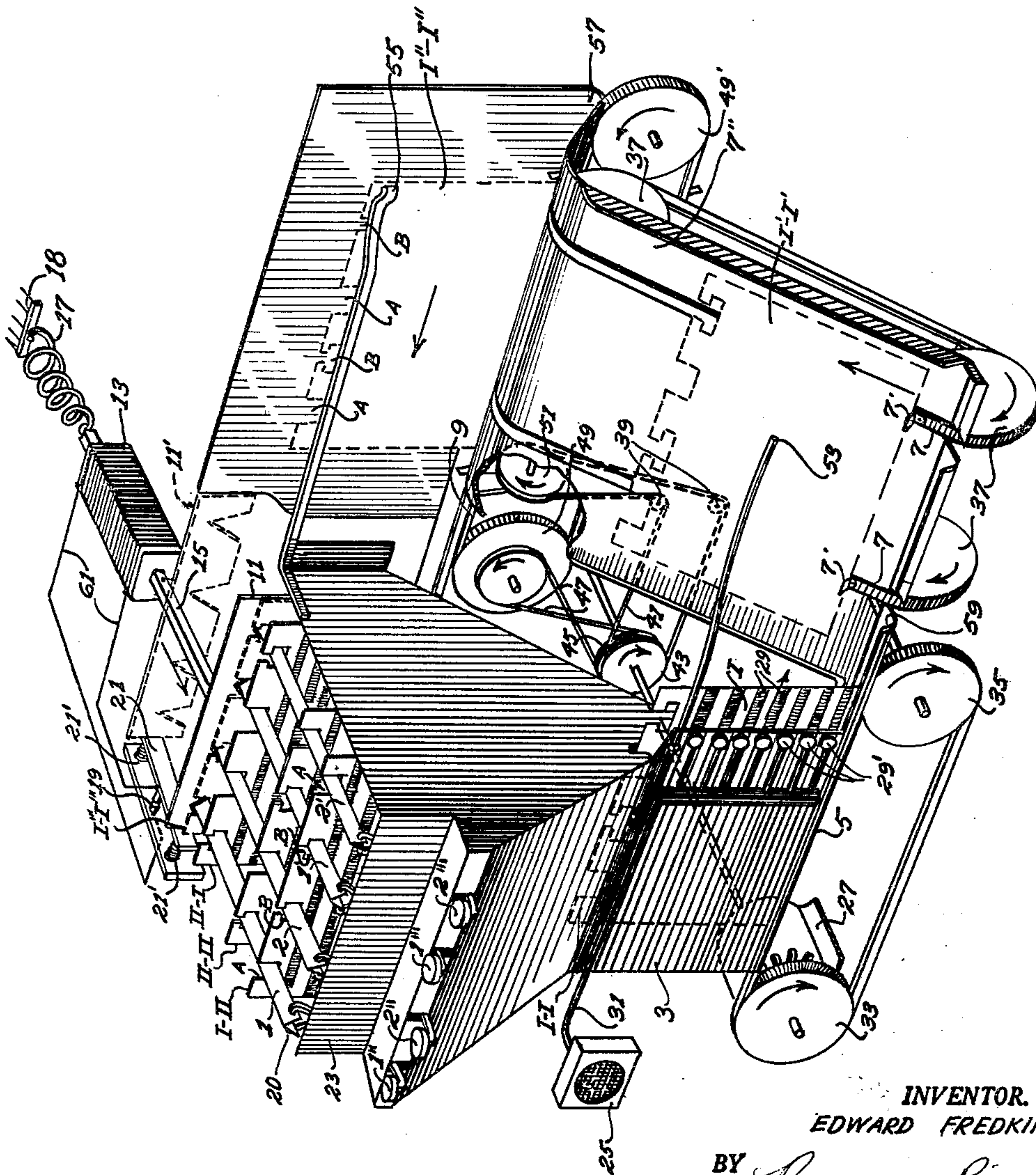
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3 Sheets-Sheet 2

Fig. 2



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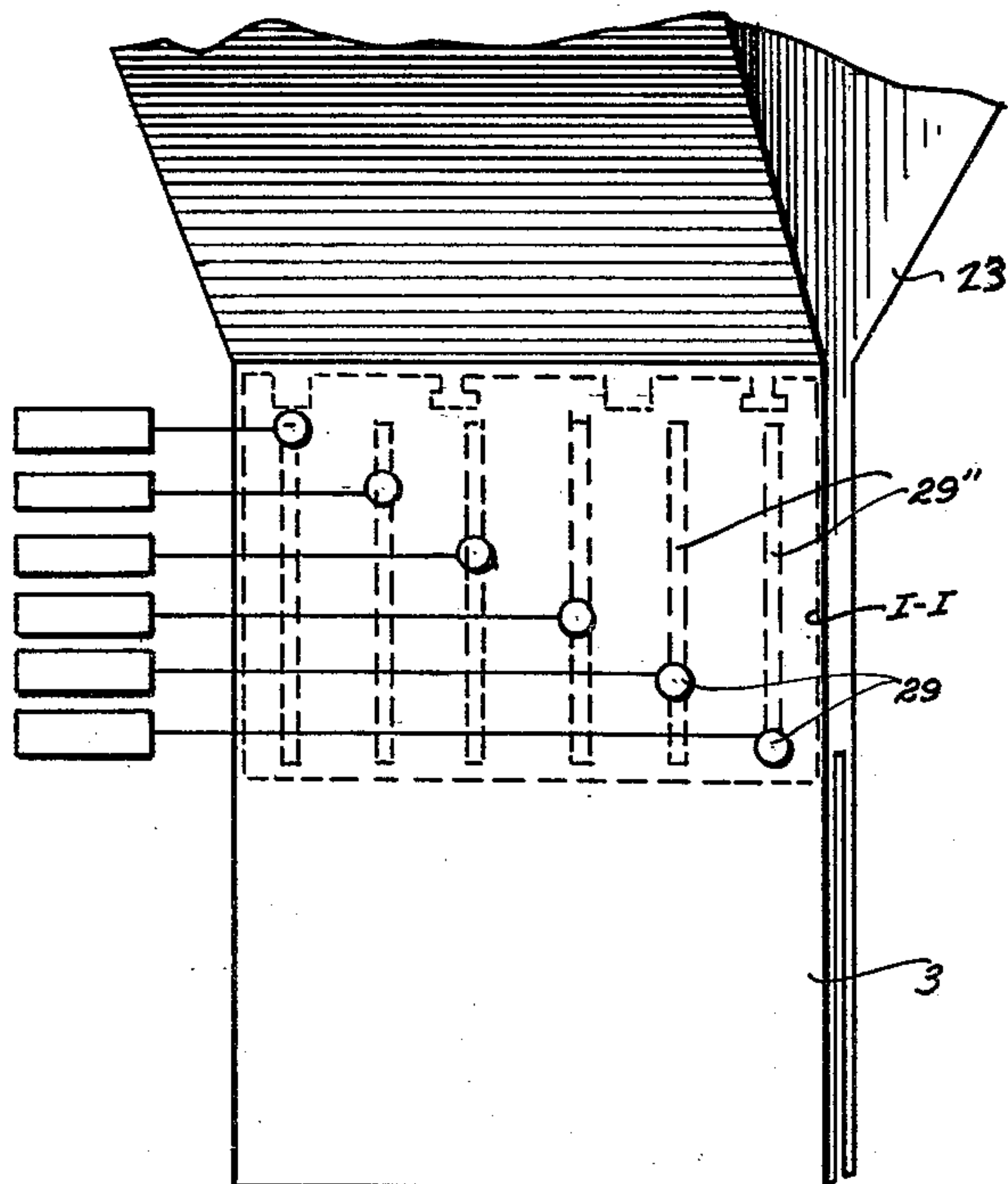
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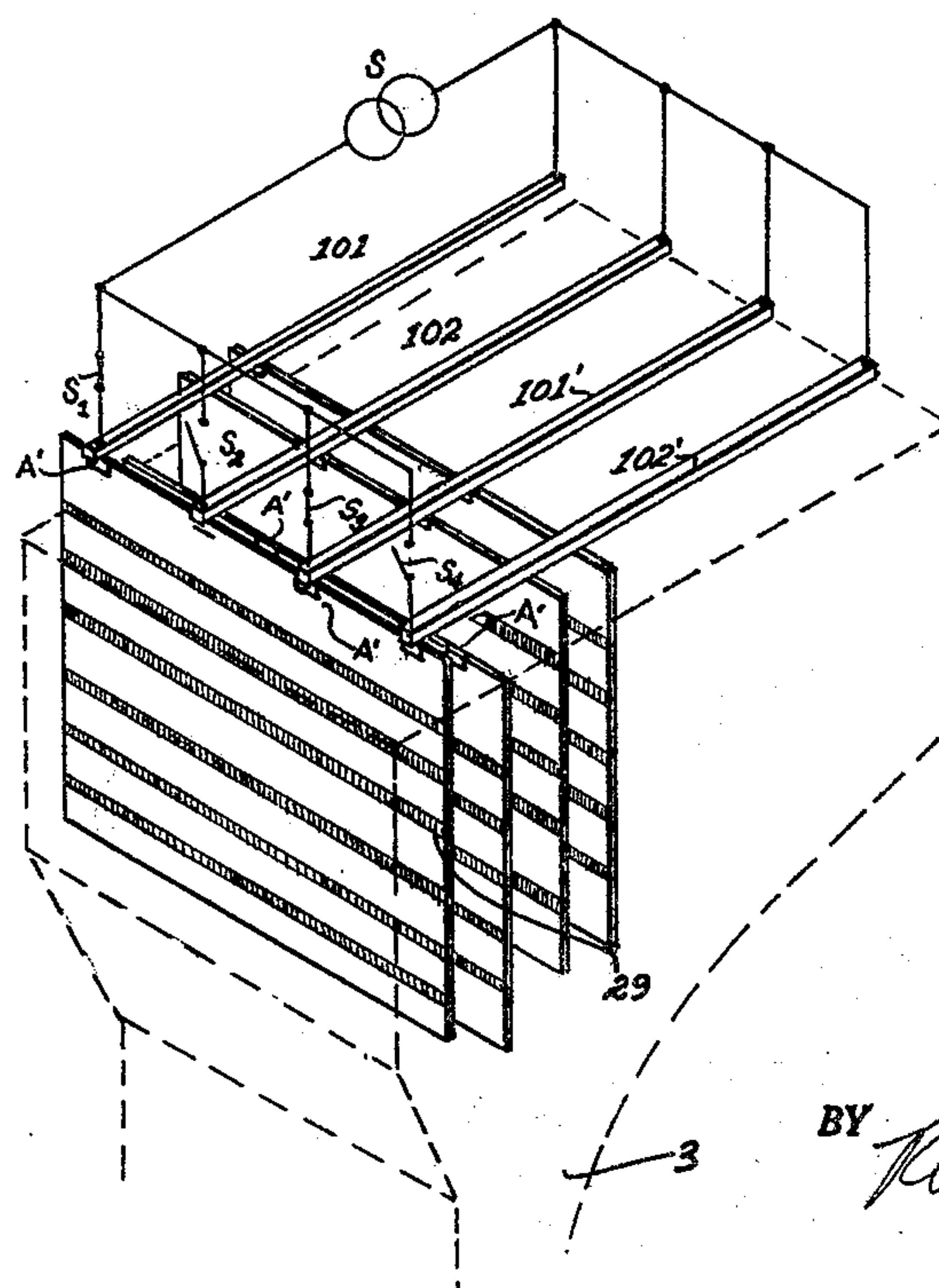
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3 Sheets-Sheet 3



*Fig. 3*



*Fig. 4*

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## CODED CARD SELECTOR APPARATUS

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6 Claims. (Cl. 209-110)

The present invention relates to selector apparatus and methods, and more particularly, to apparatus adapted to select predetermined cards and the like from a plurality or stack of cards and the like; where the term "card" generically connotes an individual sheet or component of a filing system or similar information-storage apparatus.

Various types of card-sorting devices have been evolved throughout the years for enabling the separation of cards containing predetermined data from a stack of such cards. Generally, an individual card is identified by some code, and an operation is performed that procures the specified card. In one widely used current system, stacks of coded cards are run through a sorter which examines each card, in turn, and shunts out the card, or cards, fitting a predetermined description. Such a serial sorting system, however, obviously involves the expenditure of large amounts of time in selecting the desired card.

Other prior card-sorting devices have employed rods or similar devices passed through openings at the bottom of the card whereby the operation of the rods separates all the undesired cards from the desired cards, leaving the desired cards attached to the rod system. In other apparatus, correlative rods or pins are withdrawn from the cards, leaving behind only the desired cards with all of the other cards falling away. Such systems are subject, however, to the disadvantage that it is the correlative cards that must be moved and not just the desired or predetermined card or cards, and that the desired card is quite inextricably enmeshed in the selection mechanism. The removal of the card from such mechanism and its subsequent handling have not thus lent themselves to mechanization. Other prior proposals, however, that overcome this particular disadvantage still require the insertion and withdrawal of rods from an array of cards and the like in order to provide a free-falling or otherwise freely accessible preselected card.

An object of the present invention, accordingly, is to provide a new and improved card-sorting apparatus and method that shall not be subject to any of the above-stated disadvantages; but that, to the contrary, shall enable the ready removable of preselected cards from a stack without any of the steps of inspection of all of the cards, or movement of all of the cards, or inserting or withdrawing rods or pins from the array of cards.

An additional object is to provide such an improved selector with automatic mechanism for obtaining information from the selected card and returning the same to the stack or array.

A further object is to provide a novel card-selector apparatus of more general utility, as well.

Other and further objects will be explained hereinafter and will be more particularly pointed out in connection with the appended claims.

In summary, the preferred selector apparatus of the present invention embodies, in combination, a plurality of cards and the like, each provided with a plurality of indicia along preferably the upper edge thereof, the indicia being coded to provide holding characteristics, at different preselected indicia of each card and the like, that are distinct from those of the other indicia thereof. There is provided a plurality of releasable members extending along the corresponding indicia in each card and the like to support the same at other than the preselected in-

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dicia in a stack, suspended from the members. Means is also provided for releasing all of the members except those corresponding to the preselected indicia of a predetermined card and the like, thereby to permit the said predetermined card and the like only to fall from the stack. Preferred details and constructional refinements are hereinafter explained.

The invention will now be described in connection with the accompanying drawing,

FIG. 1 of which is a perspective view, partly broken away, illustrating the selector apparatus in preferred form;

FIG. 2 is a similar view of the selector apparatus of the type disclosed in FIG. 1, adapted for the recovery of information contained or stored upon the card and the like, the system of FIG. 2 providing completely automatic selecting, reproducing, and card-returning functions;

FIG. 3 is a fragmentary view of a mechanism for enabling vertically-stored magnetic or other recorded information upon the card to be reproduced during the falling of the card from the stack; and

FIG. 4 is a view similar to FIG. 1 of a modification involving magnetic supporting and releasing mechanisms.

Referring to FIG. 1, a plurality of cards, bearing legends at their left and right-hand edges reading I—II, II—II, I—I, II—I, are suspended preferably from their upper edges, by width-collapsible longitudinally extending hinge-like supporting members 1, 2, 1', 2', the hinged members being supported at their hinges between the front and rear walls of the housing. While but four cards are shown, this is for purposes of simplicity of illustration and explanation; it being understood that the invention is particularly adapted for use with a large number of cards, if desired. The supporting members 1, 2, 1', 2' pass through coded indicia, in the form of notches or openings, near the upper edge of each of the cards. In the embodiment of FIG. 1, the first card I—II is provided at the left with a free U-shaped opening A the mouth of which is large enough freely to receive the member 1. Adjacent the opening A, is a further notched opening B the mouth of which is smaller and that prevents the withdrawal of the supporting member 2 passing therethrough. The left-hand section I of the first card thus has a wide opening A and a narrow opening B. The right-hand section II of the first card is provided with a similar free or wide opening A, receiving but not holding the longitudinal supporting member 2', and an opening B having a partially closed mouth for receiving and supporting longitudinal member 1' passing therethrough. It will thus be observed that the card I—II is held suspended by the engagement of the longitudinal hinged members 2 and 1' with the small mouths or necks of openings B contained on the left and right-hand portions I and II of the first card.

The second card II—II is provided with a different code or series of opening indicia along its upper edge. The left-hand section II is provided with a left-hand partially closed opening B and a right-hand completely open opening A; receiving, respectively, the longitudinal supporting members 1 and 2, but with the member 1 only supporting the card as a result of the small mouth at B. In the right-hand section II of the second card, there is provided a left-hand partially closed opening B and a right-hand free opening A, receiving, respectively, the supporting members 1' and 2', with the member 1' only holding the card. The second card II—II is thus held supported by the members 1 and 1' engaging the partially closed or small-mouth openings B of the left and right-hand sections thereof.

The indicia on the third card I—I are of still a different code sequence, the third card having the same A-B code along its left-hand section I that is provided in the



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left-hand section of the first card; but the right-hand section having a left-hand free opening A and then a small-mouth opening B supporting the longitudinally extending member 2'.

By similar token the fourth card II—I has the same type of coded indicia on its left-hand section that is provided at the left-hand section of the second card, but openings A and B on its right-hand section of the type provided in the right-hand section of the third card.

Each of the cards I—II, II—II, I—I, and II—I, therefore, is provided with a plurality of opening-indicia along its upper edge, with the indicia coded to provide different holding characteristics at different preselected indicia of each card; i.e., the indicia A will not exert any holding action in connection with the longitudinal members received therethrough, whereas the partially closed or small-mouth openings B will have a holding characteristic, engaging the longitudinal members passing therethrough. All of the cards, of the array, however, are supported by the array of members 1, 2, 1', 2'.

If this four-card sequence be represented in binary terminology, letting the A-type of non-holding opening indicia be represented by unity, and the B-type of supporting opening indicia, by zero, the following sequence is provided:

Card	Sequence	Effective Holding Member
First (I—II).....	1 0 0 1	2, 1'
Second (II—II).....	0 1 0 1	1, 1'
Third (I—I).....	1 0 1 0	2, 2'
Fourth (II—I).....	0 1 1 0	1, 2'

It is to be understood, of course, as before stated, that this simple example is but by way of illustration, and that, in actual practice, a large number of cards with a large number of unambiguous indicia codings and a large number of longitudinally extending supporting members may be employed. Trinary and other higher order systems than binary coding may obviously also be employed.

Continuing with the illustration of FIG. 1, let it be assumed that it is desired to pre-select a predetermined card from the stack of cards I—II, II—II, I—I, and II—I. This end may be effected by means of a plurality of selector buttons 1'', 2'', 1''', 2''', etc., one corresponding to each of the longitudinal supporting members 1, 2, 1', 2', etc. The buttons enable the appropriate supporting members to become collapsed in width so as to permit the appropriate predetermined card, thus selected, to fall, with the small mouths in the openings B slipping over the collapsed supporting members. The supporting members may then, by resiliency, return to the open or uncollapsed state.

As an illustration, let it be assumed that it is desired to obtain from the array of cards the third card, I—I. Since the B opening indicia of the card I—I are the second openings on each of the right-hand and left-hand sections of the card, by pressing the second button 2'' of the left-hand set 1'', 2'', etc., and the second button 2''' of the right-hand set 1''', 2''', etc., the longitudinal supporting members 2 and 2' will become released or collapsed, as later explained, so that they are of width less than the small-mouth openings B of the card I—I. Since the other openings A of the left-hand and right-hand sections I of the third card do not in any way restrain the longitudinal extending members 1 and 1' passing therethrough, the pre-selected third card I—I only will thus fall from the stack. It will be observed, however, that no other card of the array can fall, and that therefore the desired pre-selected card has been selected as a freely falling member, separated from the array or stack of cards, without removing rod mechanisms, without moving the other cards and without the necessity for card sorting.

In the particular embodiment of FIG. 1, the releasing or collapsing action of the supporting members is effected

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with the aid of X-shaped pinchers 20 associated with the code-selecting buttons. In connection with button 2''', for example, the pinchers 20 are pivoted at 20', with their upper diverging ends engaging the hinged members 2', and their opposite diverging ends connected to a cord 20''. The cord 20'', in turn, passes over rollers 20A and 20B and is secured at 20D to a lever arm 20E. When the button 2''' is depressed, the arm 20E pivots downward about the shaft 20C, thereby pulling the cord 20'' downward over the rollers 20A and 20B, and collapsing the X-shaped pinchers 20 to compress the releasable hinged member 2'. The resulting reduced width of the member 2', releases the support by the member 2' at the opening B.

Referring, now, to FIG. 2, the pre-selected card I—I has thus freely separated from the stack of cards and is guided in a downward path along a chute 3, depending below the converging walls 23 of the card-stack housing. The card I—I comes to rest upon a belt 5 disposed at the bottom of the chute 3. It is in this position that, in the system of FIG. 2, any information stored on the card I—I may be extracted or otherwise indicated; the term "indicate" being employed herein generically to embrace all kinds of reproduction, recording, indicating or evidencing of the stored information. This may be done visually or automatically with the aid of photo-cells, flash-photography, or other types of transducing mechanism, as is well known; but, for illustrative purposes, it is illustrated as effected with the aid of magnetic reproducing means responsive to magnetic information stored upon the card I—I, as upon a plurality of coextensive strips of magnetic tape shown horizontally disposed at 29. In the case of optical systems, of course, holes or other type of information, such as graded-density film material and the like, may also be used.

The belt 5 is driven by pulleys 33 and 35, rotated by a motor 27, to cause the selected card I—I to move to the right in the direction of the guide 59. In so moving, the data stored on the card I—I, such as that contained in the magnetic recorded strips 29, is scanned by correspondingly aligned magnetic reproducing members 29'. If the data is audibly intelligible, the members 29 may be connected at 31 to amplifying and loudspeaker equipment 25, or any other desired indicating apparatus. The movement of the card I—I past the reproducing members 29', thus extracts the stored information.

Further movement of the card to the right is guided between the guide 59 and the inwardly bent resilient guide rod 53, until the card I—I reaches a limiting position upon a pair of separated belts 7, 7, driven by pulleys 37 over an upwardly inclined form 7''. Upon the belts 7 are located a pair of lugs 7' that will ultimately engage the lower edge of the card I—I and start to carry the same upward as shown in dotted lines at I'—I', upon the belts, 7, 7, over the form 7''. Near the upper end of the form 7'', the upper edge of the card will engage a vertically extending stop 57 and slide upward between the same and the guide member 55, ultimately to assume the vertical position shown at I'—I'. The card I'—I' is then carried by belt 9, driven from pulleys 49—49' to the left, as shown by the arrow thereupon. In the extreme left-most position of the card I'—I' it rests against a support 11' and the left-hand edge of the card will engage a bar 21 in order to compress a spring 21' and cause a pair of electrical contacts 19 to close. The closing of the electrical contacts 19 effects momentary energization, through conductors 61, of a solenoid winding 13. The armature 15 of the solenoid 13 is normally held in a retracted position by spring 17 engaging a fixed surface 18, holding the surface 11' in its dotted position. Upon momentary energization of the solenoid winding 13, however, the armature 15 moves forward, as shown by the arrow there-adjacent, and pushes the surface 11' upon which the card I'—I' is resting, forward to the solid-line position 11, and on to the supporting members 1, 2, 1', 2', etc., there-upon promptly returning under action of the spring 17.



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While numerous drive systems may be used, in FIG. 2, the shaft of the motor 27 is shown also driving a pulley 43 that, through a reversely strung pulley 47, drives the pulley 49, carrying the belt 9. A second pulley groove on the pulley 43 carries the belt 41 over idlers 39 to drive the pulley 51, which provides the motive power for the belts 7 about the pulley wheels 37.

In the system of FIG. 2, therefore, the operator has selected a predetermined code indicative of the particular card from which it is desired to extract information; that card is caused readily to separate from the rest of the cards, leaving the rest of the cards undisturbed; in separating, the pre-selected card has automatically come into position for the extraction of data stored thereupon; that data has thereupon automatically been reproduced or otherwise indicated; and the card has been automatically returned to the rear of the stack of cards. It will be observed that it is absolutely of no significance in what order the cards are arranged upon the array of holding or supporting members 1, 2, 1', 2', since the coded indicia at the upper edges of the cards unambiguously determine which card will drop upon the pressing of the proper combination of code buttons 1'', 2'', 1''', 2''', etc.

It will also be evident that proper timing of the delivery and reproducing mechanisms will enable a number of cards to be dropped, one after the other, as for the purpose of playing, successively, through one or more different recording heads, thereby to reproduce a desired message. Thus, for example, only an upper horizontal strip of magnetic material might be reproduced by an upper reproducing member 29' on a first card; and then a card next selected in order might then have a lower horizontal strip scanned and reproduced by a lower head 29'; and so on, thus to provide a sequence of messages or other information stored on the successive cards.

It will be evident that one of the principal advantages of the present invention, as previously discussed, resides in the fact that the desired card will drop freely away from the stack without disturbing the same and irrespective of its position in the array. It is also possible to store a great deal of information in a small and inexpensive medium through this technique, and most rapidly to obtain access to pre-selected information. In actual practice, one might employ a thousand cards with as much as, say, 12,000 feet of strips of horizontal or vertical magnetically stored material positioned upon the cards. The great rapidity with which the card is selected is of course another great advantage of the invention.

The storage capability of a stack of one thousand 8½ x 11 inch cards with 4-inch wide magnetic tape on both faces is equal to that of 7,200 feet of standard 1-inch data tape, or roughly the equivalent of the contents of three present-day computer tape units. In addition, the access time to any bit of information in the stack is well under a second; while on a standard reader, there may be as much as 3-5 minutes transit time from the beginning of a reel to some data near the end of the reel that is sought by the operator.

Instead of storing the information upon the horizontal strips 29, moreover, the information may be stored on vertical strips 29'', as shown in FIG. 3, or in any other desired manner, so that, in the falling process within the chute 3, one effects the desired read-out or other indication of the stored information. The responding members 29' may also be staggered or in-line; and, indeed, information on one of the strips might even be used, in well-known manner, to control the subsequent movement or disposition of the card.

Other kinds of indicia and supporting members besides the particular types of openings A and B and collapsible supports 1, 2, 1', 2', may also be employed. Thus, in the embodiment of FIG. 4, there is provided a plurality of magnetizable bars 101, 102, 101', 102', corresponding to the mechanically hinged longitudinal members 1, 2, 1', 2', of FIGS. 1 and 2. Operation of switches S1, 75

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S2, S3 and S4, corresponding to the mechanical buttons 1'', 2'', 1''', 2''', etc., of FIGS. 1 and 2, will cause energization of the corresponding bars from a source of energy S. At the top of the cards, indicia in the form of little permanent magnets may be provided in the same unambiguous code sequence as the openings A and B discussed in connection with the embodiments of FIGS. 1 and 2. Thus, in FIG. 4, the first card is shown provided with a permanent magnet indicia A' at the left-most side of the card and at the third holding region of the card, but with no such magnetic indicia at the location of the members 102 and 102'. If the switches S1 and S3 are closed, as shown, the magnetic field developed in the holding members 101 and 101' will cause the front card to be attracted and supported at the permanent magnet indicia A'. The second card, however, is shown provided with the permanent magnet indicia A' at the second positions of the left and right-hand sections of the card. Opening of the switches S2 and S4, thus has enabled the free-falling of the second card from the de-energized supporting members 102', 102, while the other cards of the array are held supported.

Still other types of indicia and holding mechanisms may also be employed, as may other types of card-return mechanism and the like. If desired, moreover, the present invention may be employed simply for the purpose of separating cards without the added functions of extracting stored information from the cards, as before discussed.

Further modifications will also occur to those skilled in the art and all such are considered to follow within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. Selector apparatus having, in combination, a stack of cards containing information at a predetermined position thereon, said cards having at predetermined regions thereof card-coding elements, said elements defining different patterns for the respective cards, a plurality of card-holding members adjacent corresponding coding elements and having means for releasably coupling the holding members to coding elements of said cards, code-selective operating means for preventing the coupling of coding elements of a selected card with corresponding holding members, whereby the selected card may be separated from said stack, means for automatically guiding the selected card apart from said stack along a predetermined path and thereafter returning the selected card to said stack, and information-sensing means disposed along said path in alignment with said predetermined card position for scanning the information contained on the selected card as the selected card follows said predetermined path.

2. The apparatus of claim 1, said stack being arranged with said cards upright, said card-coding elements comprising notches defined in the upper edge of said cards, said coupling means comprising means for releasably suspending said cards by notches thereof, whereby the selected card may be dropped from said stack, said card-returning means comprising means for positioning the selected card at one end of said stack with the card-coding elements thereof adjacent corresponding card-holding members.

3. The apparatus of claim 1, said information being arranged in a plurality of parallel tracks on said cards, said sensing means having plural scanning elements aligned with corresponding tracks as the selected card is moved along said path past said scanning elements.

4. The apparatus of claim 1, said coupling means being magnetic.

5. The apparatus of claim 1, said information being stored magnetically and said sensing means comprising a magnetically sensitive pick-up.

6. The apparatus of claim 1, said card-coding elements comprising notches defined in the upper edge of said



cards, some of said notches having larger mouths than  
others, said card-holding members comprising width-col-  
lapsible members extending through corresponding  
notches, said members having a quiescent configuration  
of width less than the larger mouths but greater than the  
narrow mouths and having an active configuration of  
width less than said narrow mouths, whereby activation  
of the members through all the narrow mouth notches  
of a card releases that card, said operating means com-  
prising means for selectively activating only those hold-

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ing members through the narrow mouth notches of the  
selected card.

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