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Deprez et al.

[11] **3,732,977**

[45] **May 15, 1973**

[54] **DEVICE FOR THE STORAGE, SELECTION AND LOCATING IN A READING POSITION OF INFORMATIONS RECORDED ON MICRO-CARDS**

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[21] Appl. No.: **166,410**

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Dec. 23, 1970	Germany	G 70 47 541.1
Dec. 10, 1970	Netherlands	7017998

[52] **U.S. Cl.** **209/110.5**

[51] **Int. Cl.** **B07c**

[58] **Field of Search** 209/80.5, 110.5

[56] **References Cited**

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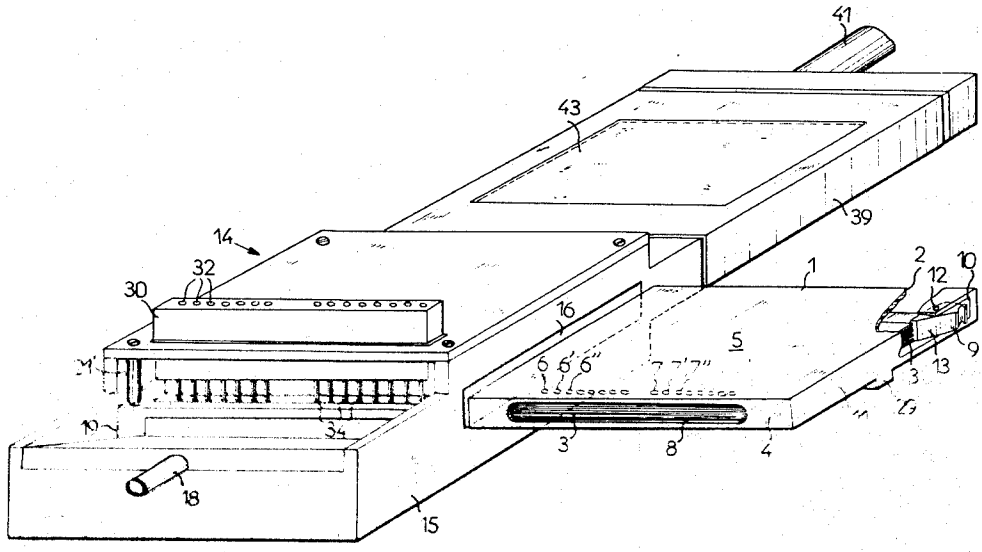
Primary Examiner—Allen N. Knowles

Attorney—Robert E. Burns, et al.

[57] **ABSTRACT**

In a device for the storage, selection and locating in a reading position of recorded information on micro-cards it is known to reduce the format of the cards by photographic means. It is also known to mount the standard card on a rigid frame or bar to permit the selective calling up and automatic positioning of the cards in reading means. In the present invention the device comprises cassettes in each of which are stacked micro-cards, each card being provided at one of their edges with coding perforations in the form of open slots or holes forming as many combinations as there are cards in the cassette, the cassette having a row of holes opposite the holes and slots in the micro-cards for the passage of retaining means permitting the locking of the pile of micro-cards and the selective unlocking of each one of them by disengagement of the retaining means passing through the holes of the corresponding card. The cassettes are conveniently constituted by flat rectangular boxes open at a narrow side and having an opposite elongated opening for the introduction of compressed air to expel the selected card from the cassette opening.

9 Claims, 10 Drawing Figures



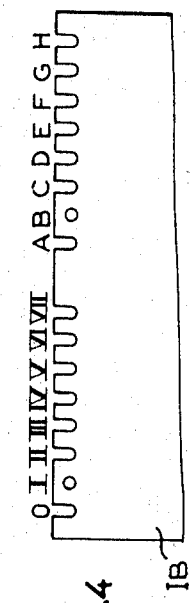


FIG.4

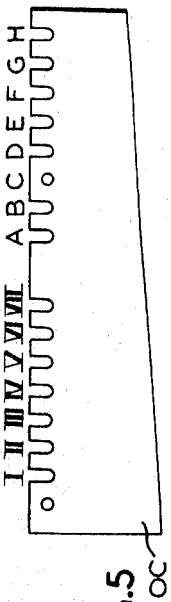


FIG.5

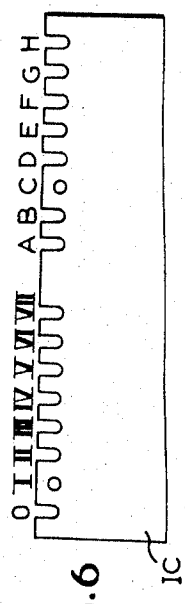


FIG.6

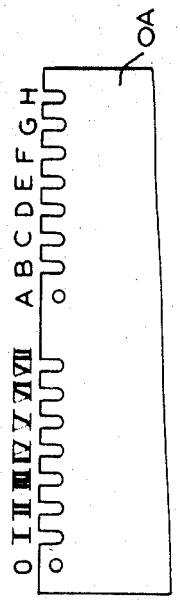


FIG.1

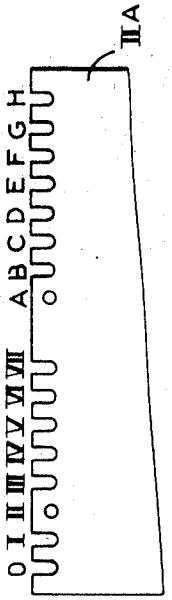


FIG.2

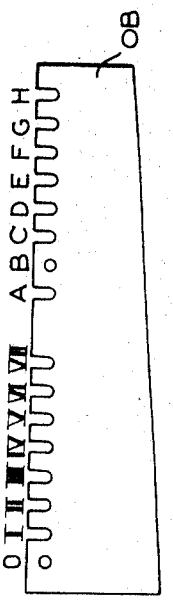


FIG.3

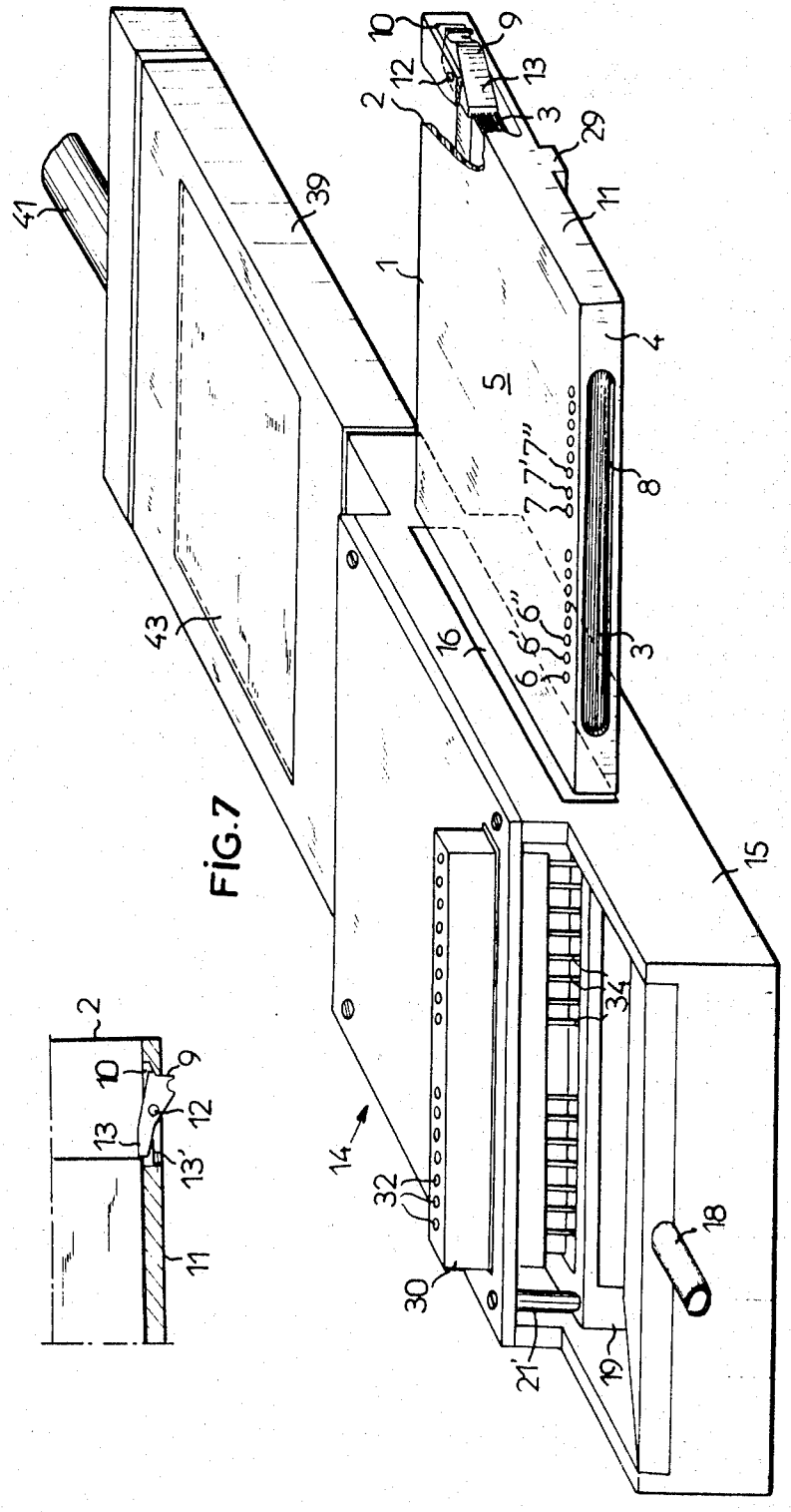

10
9
12
13
2
3
29
11
41
39
1
4
5
8
7 7' 7"
6 6' 6"
43
16
3
15
34
14
32
30
18
21
19

FIG.7

2
10
9
12
13
13'
11

FIG.8

FIG.9

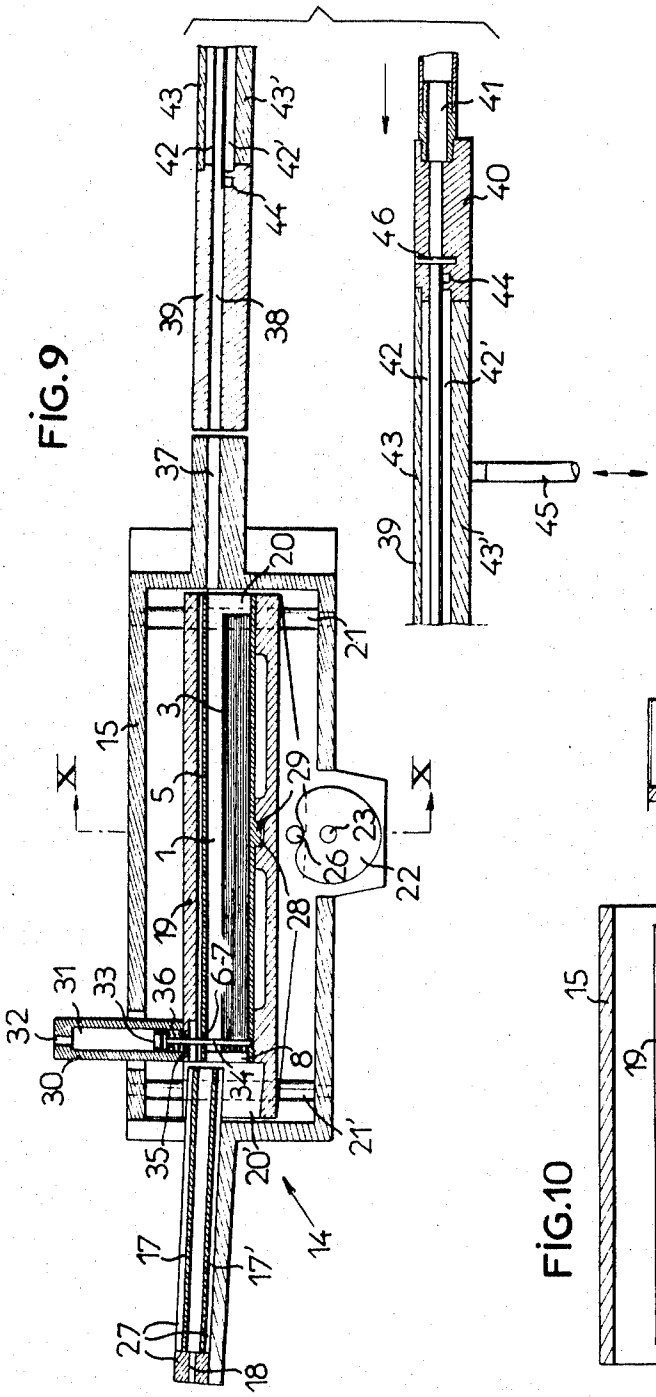
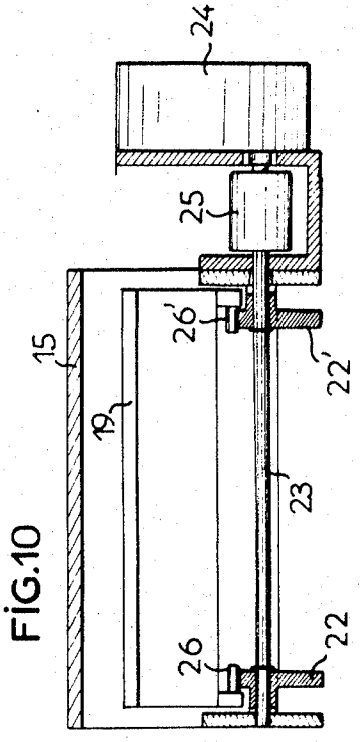

43
43'
42
42'
44
39
38
37
41
40
46
44
42
42'
43
39
43'
45
20
21
15
3
5
1
19
29
23
26
22
28
31
33
36
32
30
34
8
35
20'
21'
17
17'
14
27
18
X
X

FIG.10


24
25
26'
22'
15
19
23
26
22

DEVICE FOR THE STORAGE, SELECTION AND LOCATING IN A READING POSITION OF INFORMATIONS RECORDED ON MICRO-CARDS

The present invention relates to a device for the storage, selective calling up and placing in a reading position of information recorded on micro-cards.

BACKGROUND OF THE INVENTION

It is known that the storage of a large amount of information is increasingly carried out by producing by photographic means reduced format cards, in order to reduce the space required for the storage and to ensure rapid access to the information for the purpose of its utilization. By reason of their reduced format (for example at present up to 128 images per micro-card of dimensions 105 × 148 mm) the information stored on micro-cards in this way cannot be utilized directly and requires for its reading or reproduction reading apparatuses or reader-reproducers. Moreover, the search for a micro-card in a rack which may contain several thousands of such cards is a long and tedious operation, even if the classification of the cards in the rack and their marking enables them to be recovered without difficulty. To this must be added the time required for the individual placing of each micro-card in the reader and for its re-classification in the rack.

Systems have already been proposed permitting selective calling up and automatic placing in the reader of micro-cards, but these systems all require the production of special micro-cards or the addition to a standard micro-card of a rigid frame, a bar or some other suitable means carrying references which act in conjunction with exploring members. This is so, for example, in the case of cards supported by a carousel and each furnished with a bar carrying slots, in which selection brushes may engage. In other systems the sorting is carried out by the delivery of the cards which are at the bottom of a pile.

SUMMARY OF THE INVENTION

According to the present invention there is provided a device for the storing, selective calling up and placing in a reading position of information recorded on micro-cards, comprising cassettes in each of which are stacked micro-cards each card being provided at one of their edges with a number of coding perforations in the form of open slots and of holes forming as many combinations as there are cards in the cassette, the cassette having a row of holes opposite said holes and slots of the micro-cards for the passage of retaining means permitting the locking of the pile of micro-cards and the selective unlocking of each one of them by disengagement of the retaining means passing through the holes of the corresponding card.

The device according to the present invention enables original micro-cards to be used, without the addition of any special element such as a frame or bar, and the cards to be stored in a compact manner, while at the same time permitting easy selective call up of each one of them.

BRIEF DESCRIPTION OF THE DRAWINGS

An embodiment of a storage and reading device utilizing cassettes of 64 micro-cards will now be described, by way of example only, with reference to the accompanying drawing, in which:

FIGS. 1 to 6 represent several cards possessing different combinations of slots and holes.

FIG. 7 shows in perspective the general arrangement of the apparatus for the selection of a card and placing in a reading position, with a cassette shown outside the apparatus.

FIG. 8 is a partial view in horizontal section of a cassette showing the device for blocking the cards.

FIGS. 9 and 10 are views in longitudinal and transverse section respectively of the general arrangement of the selection and reading apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

As shown on cards 1 to 6, each card is furnished at its front edge with two series of eight perforations designated respectively the numbers 0, 1, II, ... VII and by the letters A, B, C, D, E, F, G. H, each of these two series of perforations comprising seven open slots and one hole, the position of which varies from one card to another. There are thus obtained eight series of eight cards, each series being characterized by the position of the hole in the second series of perforations A – H and each card in each series of eight cards being characterized by the position of the hole in the series of perforations O – 1. These eight series are as follows:

Series No.	1:	0A to VLL A
Series No.	2:	0B to VLL B
Series No.	3:	0C to VLL C
	—	
	—	
	—	
Series No.	8:	0H to VLL H

amounting in total to 64 cards. FIG. 1 shows the card OA FIG. 2 the card IIA, FIG. 3 the card 0B, FIG. 4 the card 1B, FIG. 5 the card 0C, FIG. 6 the card IC.

Each set of 64 cards is stored in a stacked condition in a cassette 1, shown in FIG. 7, and constituted by a flat box, of rectangular or square shape, the narrow front side 2 of which is open to permit the introduction into it of the cards 3, the perforated edge of which will be placed against the narrow rear side 4 of the cassette 1 which is opposite to the opening 2. On the upper face side of the cassette 1, above the row of holes and slots of the cards 3, are formed two series of eight perforations 6, 6′ 6″ . . . . and 7, 7′, 7″ . . . . corresponding to the series, 0, I . . . . VII *abd* A, B . . . H of perforations of the cards and permitting the introduction into the cassette of the pins which will hold the pile of cards in place in the cassette, and permitting also the selective freeing of the cards by disengagement of two of these pins corresponding to the holes of the card selected. On the short rear side 4 of the cassette there is formed on elongated opening 8 which serves, as will be described hereinafter, for the introduction of compressed air ensuring, firstly the propulsion by its edge of the selected card and secondly by turbulant flow between the cards the separation of these and consequently the removal of the friction of the card propelled against the adjacent cards remaining in the cassette.

During the course of storage and in the absence of the pins introduced into the holes 6 and 7, the cards are immobilized in the cassette and prevented from sliding outwards by a blocking member 9 (FIGS. 7 and 8) pivoted in a window 10 of the lateral wall 11 of the cassette about a vertical axis 12 and with its tip 13 applied to the front edge of the pile of cards 3 by the action of a restoring spring 13′. During the introduction of the

cassette into the selection and reading apparatus which will now be described, the blocking member **9** is lightly tilted in an anti-clockwise direction against the spring **13'** by a spur provided for this purpose in this apparatus, so that its tip **13** frees the pile of cards.

The cassettes are preferably of transparent plastics material.

The apparatus for handling the cards and for selecting and placing the selected cards in a reading position is constituted by an elongated box designated as a whole in FIG. **7** by **14** and comprising two parts: a part **15** open at its rear upper portion and possessing a lateral opening **16** for the introduction of the cassette **1.** In the uncovered rear portion of the compartment **15** there is disposed a compressed air supply duct constituted by two parallel plates **17, 17'** (see FIG. **9**) for example of 3 mm dimension, and extending across the whole width of the box **14,** the frame **27** comprising a compressed air inlet pipe **18** and being preferably inclined at a slight angle of about 5° relative to the horizontal planes in which the micro-cards lie and terminating a very short distance from the opening **8** disposed at the rear of the cassette **1.** This cassette **1** is placed in a cassette support **19** (see FIGS. **9** and **10**) arranged inside the compartment **15** and formed by a flat box open at the front and at the rear at **20, 20'.** This support is guided in such a way that it may be provided with an alternating vertical movement by four pillars, two of which have been shown at **21, 21'** fixed in the compartment **15,** this movement being produced by two cams **22, 22'** keyed to a shaft **23** rotatable in the bottom of the compartment **15** and rotatably driven by a motor **24** through the intermediary of a reduction gear **25.** The two cams **22, 22'** act on the cassette support **19** through the intermediary of the rollers **26, 26'** rotatably mounted on this support. The internal face of the lower wall of the support **19** possesses a guide groove **28,** into which engages a rib **29** formed on the external face of the bottom of the cassette **1** which is thus positioned with accuracy in its support **19.** On the rear part of the support **19,** above the orifices **6, 6', 6'' . . . . 7, 7', 7'' . . . .** of the cassette **1,** there is mounted a block **30** in which are drilled **16** small cylindrical holes **31** opening upwards through compressed air inlets **32.** In the cylindrical holes **31** are arranged pistons **33,** forming cylinder-piston assemblies constituting the same number of pneumatic jacks; piston rods of the pistons **33** form the locking pins **34** of the cards **3** by engaging in the perforations of the latter through the orifice **35** formed in the upper wall of the support **19** and through the orifices **6, 6', 6'' . . . . 7, 7', 7'' . . . .** of the cassette **1.** The pistons **33** are fitted with restoring spring **36** which maintain them at rest in the upward position in which the locking pins **34** are disengaged from the orifices **6** to **7** of the cassette and therefore from the perforations of the cards **3.**

The air inlets **32** of cylinder-piston assemblies **31 – 33** are connected to a compressed air distribution circuit through the intermediary of minivalves controlled by electrical miniswitches actuated by push buttons operated manually or automatically. The placing of the cassette **1** can in one preferred form of embodiment, actuate a switch operating the supply to all the piston-cylinder assemblies **31 – 33** and bring all the locating pins **34** into the downward position, in which all the cards are locked.

At the front of the apparatus the compartment **15** containing the cassette **1** terminates in a flat duct **37** communicating with a duct **38** of a compartment **39** used for placing the micro-cards in the reading position. This compartment **39,** constructed of plastics material or of polished metal, is closed at the front by a side **40,** into which there opens a compressed air inlet nozzle **41.** This compartment possesses on its broad faces two windows **42, 42'** constructed opposite to one another and fitted with plates of optical glass **43, 43'.** The lower window **42'** is surrounded by a groove **44** communicating with an air suction and admission pipe **45** for the immobilization by suction and the release of the micro-card positioned between the window **42, 42'** by means of a stop **46.**

The functioning of the apparatus is as follows :

The cassette **1** having being introduced into the support **19** which is in the lower position (see FIG. **9**) in compartment **14,** the pins **34** are, as indicated above, automatically lowered by the introduction of compressed air into the piston-cylinder assemblies **31 – 33** so that all the cards **3** are locked.

The compressed air supply is then cut off from the two pistons and cylinders corresponding to the two holes of the card selected, the locating pins **34** of these pistons ascend, releasing the corresponding card and, at the same time, compressed air is supplied at a pressure of 7 kg/cm into the air supply duct formed by the plates **17, 17''** and the motor **24** providing the reciprocating vertical movement of the support **19** for the cassette **1** is set in motion. While the edges of the cards pass opposite the outlet of the air supply duct the air blown through this duct separates the cards from one another and, when the selected card freed by the two piston-cylinder assemblies **31 – 33** arrives opposite the air supply duct, it is propelled by the compressed air through the ducts **37, 38** into the reading compartment **39** and is positioned opposite the windows **42, 42'** by the stop **46** and by the air suction in the groove **44** through the pipe **45,** which is at the same time connected to the suction source. During this period, the support **19** completes its upward course, carries out its downward course and stops, while the compressed air supply is cut off.

After reading or reproduction of the micro-card which has been selected and brought into the reading position in compartment **39,** the pipe **45** is connected to a compressed air inlet, so that the micro-card becomes released from the groove **44.** At the same time, compressed air is blown into the reading compartment **39** through the nozzle **41** and the micro-card is returned backwards through the ducts **38** and **37** into the cassette **1.** Since this cassette has been stopped in the lower position by the mechanism for producing the reciprocating vertical movement of the support **19,** the micro-card becomes automatically placed on the top of the pile of the cards **3** contained in the cassette **1,** without being damaged by these cards. Another card can now be selected from the same cassette, or all piston and cylinder assemblies **31 – 33** may be released in order to withdraw the cassette and replace it by another.

The duration of the operation, starting from the introduction of the cassette into the apparatus and the selection of the card by operation of the pistons, that is the extraction of the selected card, its bringing into

the reading position and its return into the cassette, is of the order of 5 seconds.

We claim:

1. A device for handling a set of micro-cards each having information recorded thereon and each having coding perforations along at least one of its edges, said device comprising: a cassette dimensioned to receive and store in a stacked condition said set of micro-cards and having therein means defining holes aligned with said coding perforations when said micro-cards are stacked within said cassette; a rectangular compartment having a front side, rear side, and two opposed sides and dimensioned to receive therein said cassette and having means in one of said two opposed sides defining an opening through which said cassette may be introduced during use of the device; an air nozzle disposed at said rear side of said rectangular compartment and oPening therein for introducing compressed air into said rectangular compartment, said air nozzle comprising a pair of parallel plates positioned close together to define an air passage therebetween and inclined at a slight angle relative to the planes in which said micro-cards lie when in a stacked condition; a cassette support mounted for vertical movement within said rectangular compartment and having a boxlike configuration which is open at the front, rear and one side whereby said cassette may be introduced through the open side and supported by said cassette support; retaining means coacting with the coding perforations for releasably locking said micro-cards within said cassette and operative to selectively unlock said micro-cards so that theY may be removed from said cassette; and means for imparting reciprocating vertical movement to said cassette support to effect corresponding movement of said cassette and micro-cards past said air nozzle; whereby compressed air delivered from said air nozzle effects removal of the unlocked micro-card from said cassette during vertical movement of said cassette support.

2. A device according to claim 1; in which said cassette comprises a flat rectangular box open at a narrow side and carrying on one face, close to the edge opposite to the open narrow side, a series of holes intended for the passage of said retaining means, while on a lateral narrow side, in the vicinity of the open side, there is formed a window, a movable blocking member movable to one position wherein same urges against the front edge of the micro-cards to keep them in said cassette and movable to another position wherein same is released from the micro-cards during the placing of said cassette into said rectangular compartment, and means normally biasing said blocking member into said one position.

3. A device according to claim 1; in which said cassette support includes therein means defining holes corresponding to those in said cassette and serving for the guidance of said retaining means.

4. A device according to claim 1; wherein said means for imparting the reciprocating vertical movement to said cassette support comprises a motor, and a set of cams driven by said motor through a cycle corresponding to one ascent and one descent of said cassette support so that said cassette is in a low position during the return of the micro-card which thus arrives onto the top of the pile of micro-cards contained in said cassette.

5. A device according to claim 1; including a reading compartment for receiving therein a micro-card and having two opposite transparent windows through which the information recorded on said micro-card may be viewed; a passageway communicating said reading compartment with said rectangular compartment and wherein said front face of said rectangular compartment is open so that compressed air delivers from said air nozzle may effect movement of an unlocked micro-card from said cassette through said passageway into said reading compartment; and another air nozzle for delivering compressed air into said reading compartment to effect return of said micro-card into said cassette.

6. A device according to claim 5; including means for releasably positioning a micro-card by suction in said reading compartment and for effecting its release so that same may be returned into said cassette.

7. A device according to claim 1; wherein said retaining means comprises a block mounted on said rectangular compartment and containing therein a number of small pneumatic piston and cylInder assemblies corresponding to the coding perforations along each micro-card, each piston having a rod extendable through one of said card perforations and being held in an upward rest position disengaged from said cassette by restoring springs.

8. A device according to claim 7; further comprising means actuated by said cassette when same is introduced into said cassette support for controlling the supply of compressed air into the piston and cylinder assemblies so as to lock the micro-cards by lowering the pistons and their rods.

9. A device according to claim 7; including mini-valves for controlling the supply of compressed air to the pneumatic piston and cylinder assemblies, and mini-switches operated by push buttons for controlling the actuation of said mini-valves.

* * * * *