United States Patent [19]

Hunt et al.

[11] **3,854,784**

[45] **Dec. 17, 1974**

[54] **INFORMATION MEDIA HANDLING SYSTEM**

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[73] Assignee: **International Business Machines Corporation,** Armonk, N.Y.

[22] Filed: **Nov. 29, 1972**

[21] Appl. No.: **310,314**

[52] **U.S. Cl.** **312/319,** 312/10, 312/333, 292/DIG. 4, 360/133, 360/137

[51] **Int. Cl.** **E05c 19/06,** A47b 81/06

[58] **Field of Search** ..... 312/333, 319, 10; 292/80, 292/99, DIG. 4; 360/133, 137; 274/4 B

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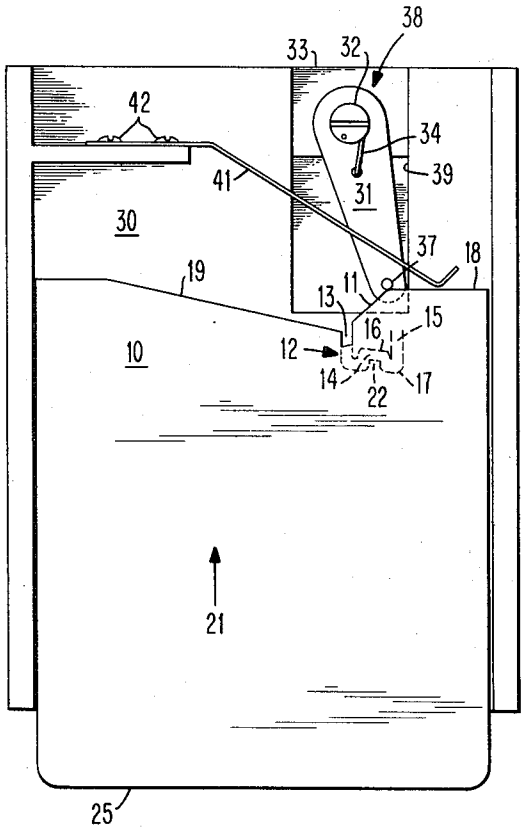
Primary Examiner—Harry N. Haroian
Attorney, Agent, or Firm—D. H. Lefeve; John L. Jackson; J. Jancin, Jr.

[57] **ABSTRACT**

An information media handling system comprises an information media container and a hopper which is adapted to receive the container. The hopper includes a spring biased automatic locking arm having an integral pin which during insertion of the container into the hopper enters and follows a groove in the container to a first position in the groove to lock the container into positive engagement with the hopper. Momentary application of another force in the direction of insertion disengages the container by allowing the pin to continue along and exit from the groove. Another spring then causes the container to be partially ejected from the hopper.

11 Claims, 8 Drawing Figures



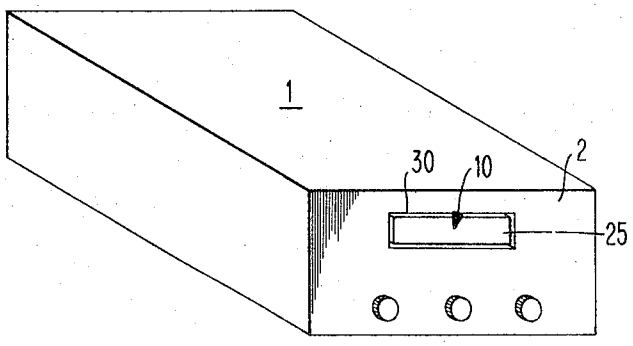


FIG. 1

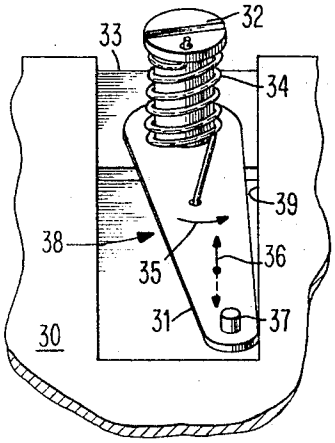


FIG. 3

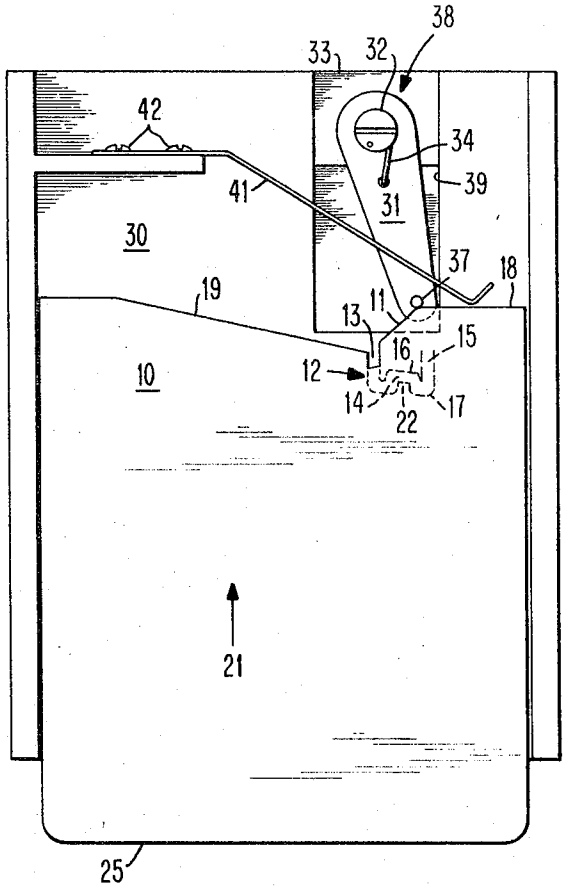


FIG. 4

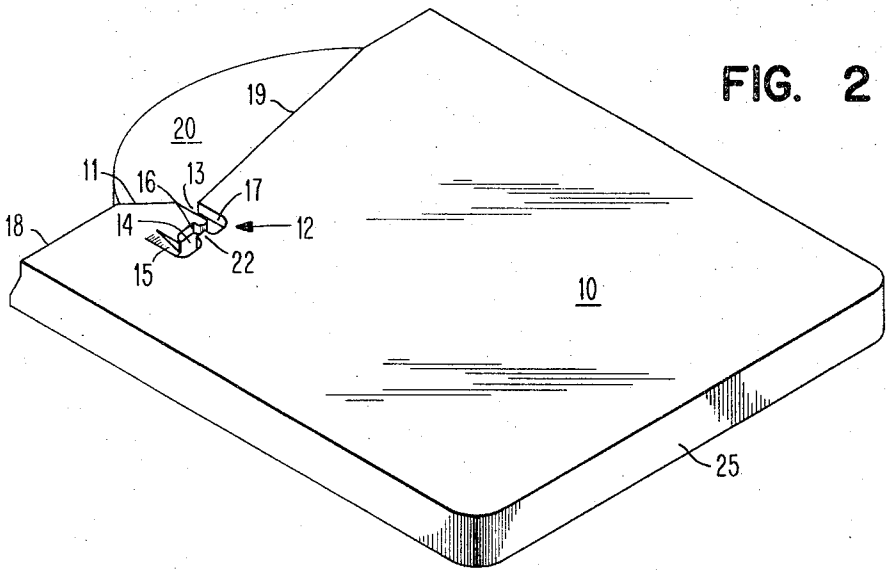

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FIG. 2

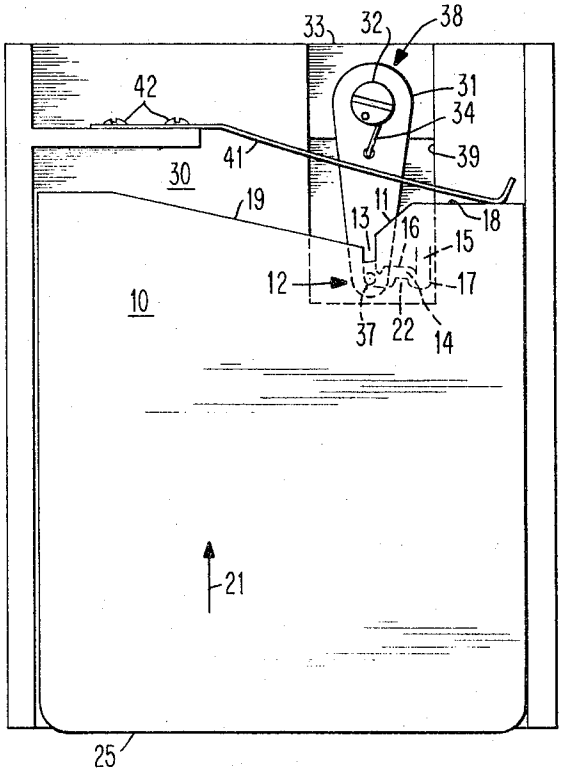
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FIG. 5

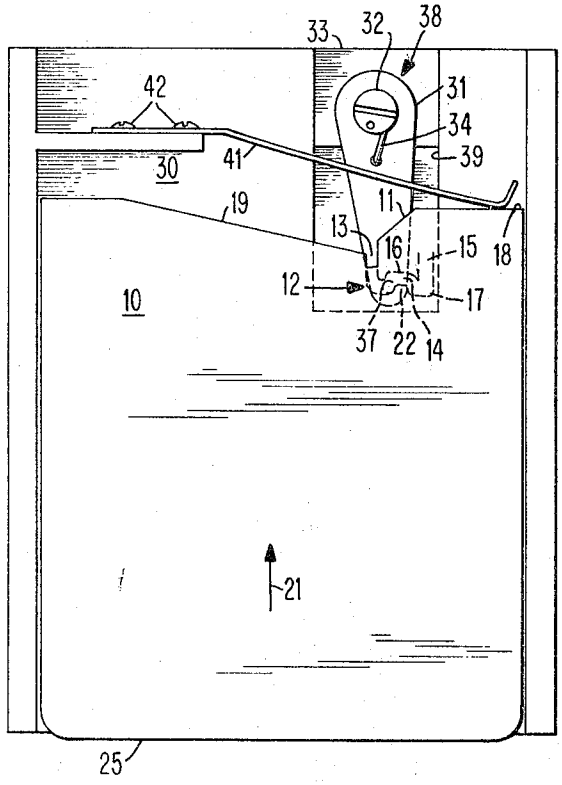
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FIG. 6

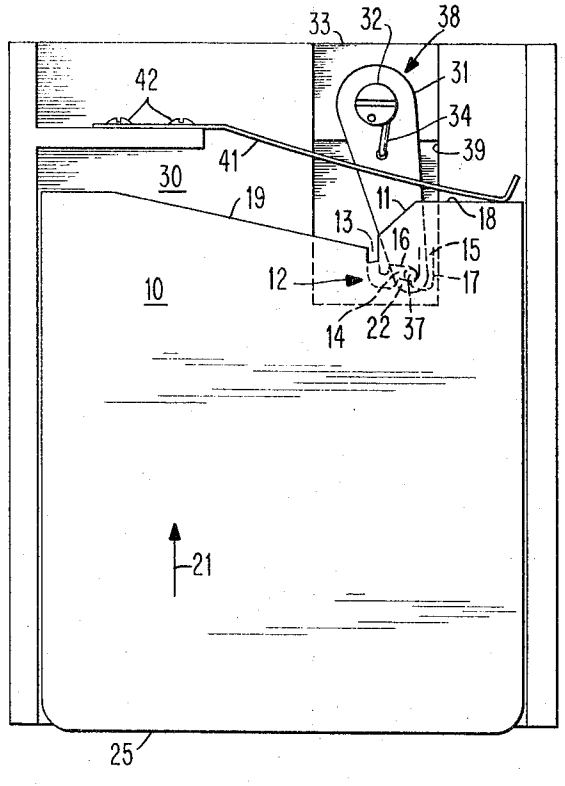
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FIG. 7

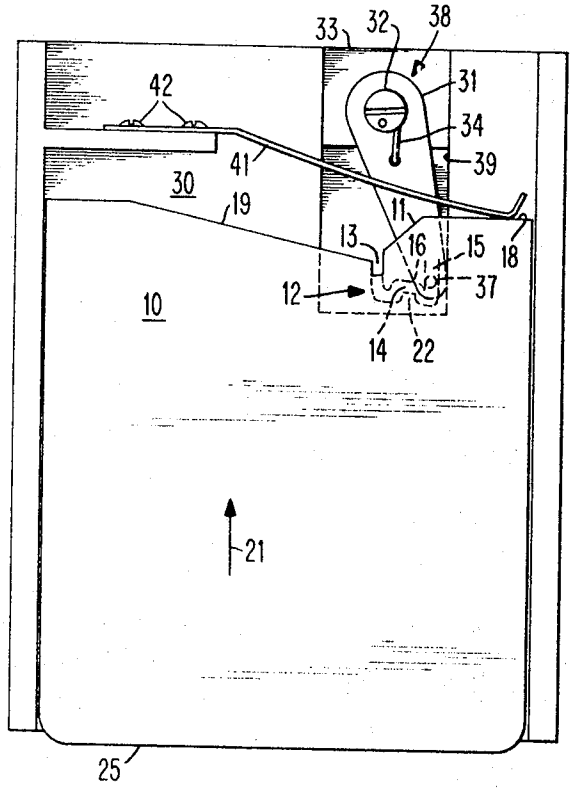

FIG. 8

INFORMATION MEDIA HANDLING SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to information media handling systems, and more particularly to information media handling systems having hoppers adapted to engage storage media containers.

2. Description of the Prior Art

Examples of prior art information media handling systems include a number of systems in which a container of magnetic storage media is engaged in a hopper for performing various operations to the media. In an apparatus utilizing a tape cartridge or tape cassette for the information media container, reading and recording operations are performed while at least a portion of the media remains within the container.

Alternatively, information media handling systems are known in which the information media is completely removed from the media container after the container is engaged in the hopper. An example of this latter system is found in magnetic disc recording systems wherein one or more substantially thin and flexible magnetic discs are protected from mutilation and abuse by storage in a cartridge while outside of the reading and recording apparatus. The cartridge is loaded into a hopper of the reading and recording apparatus and the discs are completely ejected from the cartridge for performing read and record operations on the discs. During reading and recording the empty cartridge may be removed from the reading and recording apparatus. For retrieving the discs, the cartridge is inserted into a hopper and the discs are reloaded from the reading and recording apparatus back into the cartridge. The reloaded cartridge may then be removed from the reading and recording apparatus with assurance that the delicate discs contained therein will be protected while outside the apparatus.

In any of these systems utilizing a cartridge, cassette, or similar container for the storage media a problem exists in positively engaging the container into the hopper. In the familiar cartridge tape system for stereo entertainment purposes, this problem is solved by frictionally engaging the tape cartridge near the end of its travel into the hopper of the recording or playing machine. This solution has the disadvantage of requiring that a portion of the cartridge protrude from the playing or recording apparatus so that the cartridge may be grasped by hand to retrieve it from the apparatus. This protrusion of the cartridge is unsightly from an appearance standpoint and may also hamper access to the various controls on the front of the recording and playing apparatus.

Another solution to this problem of engaging the information media container into the hopper is found in a locking mechanism which requires the operator to perform such an operation as pushing a button or twisting or turning a lever to disengage the container from the hopper. A disadvantage of this solution is the additional control whose operation must be learned by the operator.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to engage an information media container into a hopper in an improved manner.

It is also an object of this invention to engage an information media container substantially totally within a hopper without the requirement of a protrusion of the container from the hopper.

It is a further object of this invention to engage an information media continer into a hopper with the application of a substantially low force on the container.

It is yet another object of this invention to disengage an information media container from a hopper by application of a substantially low force on the container.

These and other objects are accomplished by providing an information media container which engages a spring biased rotatable locking arm mounted in a hopper. The container has a guiding entry ramp at an acute angle from the direction of entry of the container into the hopper. During insertion this entry ramp is first engaged by a pin mounted at an end of the locking arm. The ramp guides the arm and pin until the pin engages a groove in the container. Continued inward movement of the container causes the spring biased pin to enter the groove. The container is further inserted into the hopper until the pin engages a stopping edge in the groove. Inward force on the container is then released and a return spring mounted in the hopper biases the container into positive engagement with the pin on the locking arm, establishing an interim locking position to positively lock the container into the hopper. To remove the container an inward force is applied to the container which causes the pin on the spring biased locking arm to continue movement within the groove to an exit port/ramp. When the pin reaches the exit port/ramp of the groove the release of inward force on the container causes the return spring to push the container out of the hopper as the pin on the locking arm rides out of an exit port/ramp.

The foregoing and other objects, features and advantages of the invention will be apparent from the following more particular description of a preferred embodiment of the invention, as illustrated in the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a perspective view of an information reading and recording apparatus including the information media container and hopper of this invention;

FIG. **2** is a perspective view of the information media container of this invention;

FIG. **3** is a perspective view of the automatic locking means of the hopper of this invention;

FIGS. **4 – 8** are plan views showing the positions of the moving parts of the hopper and the information media container as the container is inserted into the hopper, engaged by the automatic locking means, and ejected from the hopper.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1,** information media reading and recording apparatus **1** is shown including a hopper **30** having engaged therein an information media container **10.** It can be observed in FIG. **1** that surface **25** of container **10** is substantially flush with front panel **2** of reading and recording apparatus **1.**

FIG. **2** shows information media container **10** as a cartridge for holding information media disc **20.** Container **10** includes an entry ramp **11** having a substan-

tially acute angle with respect to the direction of entry of container **10** into hopper **30**, which direction of entry is parallel to the sides of container **10**. At one end of entry ramp **11** is a lock engaging means which includes groove **12**. Groove **12** includes an entrance port **13**, holding section **14**, and exit port/ramp **15**. On one side of groove **12** is wall **16** while on its opposite side is wall **17**.

At the other end of entry ramp **11** is edge **18** of container **10**. At the end of entrance port **13** opposite entry ramp **11** is shown edge **19** of container **10**. The angle that edge **19** makes with any portion of container **10** is immaterial for the purposes of description of this invention. Edge **19**, therefore, may be parallel to edge **25** or may form a greater or lesser angle than that shown in FIG. **2**.

FIG. **3** shows automatic locking means **38** of hopper **30**. Locking means **38** includes locking arm **31** mounted for pivotal movement about pivot stud **32** on riser **33** of hopper **30**. Compression and torsion spring **34** serves as a spring biasing means for biasing locking arm **31** in two directions. The compression function of spring **34** biases arm **31** against riser **33** but allows movement in the direction of arrow **36**. The torsion function of spring **34** biases locking arm **31** in a counter-clockwise direction against wall **39** of hopper **30** as indicated by arrow **35**. Locking pin **37** is mounted on locking arm **31** and follows groove **12** on container **10** during insertion into and removal of container **10** into and out of hopper **30**.

Referring now to FIg. **4**, return spring **41** is shown mounted on hopper **30** by screws **42**. Container **10** is shown inverted from the orientation shown in FIG. **2** and partially inserted into hopper **30** with locking pin **37** of automatic locking means **38** in contact with entry ramp **11** of container **10**. Return spring **41** of hopper **30** is also shown in contact with edge **18** of container **10**. Application of a force on container **10** in the direction of arrow **21** against the biasing forces of springs **34** and **41** moves container **10** toward the rear of hopper **30**. It should be recognized that edge **18** may be a straight extension of entry ramp **11** or it may make other angles with ramp **11** than that shown.

As container **10** moves toward the rear of hopper **30**, entry ramp **11** moves locking pin **37** toward entrance port **13**. With continued application of force on container **10** in the direction of arrow **21**, locking pin **37** enters entrance port **13** as shown in FIG. **5**.

In FIG. **5**, locking arm **31** and locking pin **37** are restricted from counter-clockwise movement from the biasing force of spring **34** because locking pin **37** is in contact with wall **16** of entrance port **13**. Continued movement in the direction of arrow **21**, however, moves wall **16** of entrance port **13** out of contact with locking pin **37** so that locking arm **31** and locking pin **37** move in a counterclockwise direction into the holding section **14** of groove **12**. Before the force on container **10** in the direction of arrow **21** is released, however, locking pin **37** is restricted from further counter-clockwise movement in holding section **14** by protrusion **22** in groove **12**. Container **10** is also restricted from any further rearward movement because of the engagement of locking pin **37** and wall **17** of groove **12**. If all external force on container **10** is removed at this time, return spring **41** moves container **10** slightly outward from the rear of hopper **30** into the position shown in FIG. **7**. Container **10** can move no further than slightly outward by the force of return spring **41** because of the engagement of locking pin **37** with the portion of wall **16** in holding section **14** adjacent to exit port/ramp **15**.

In FIG. **7**, container **10** is positively engaged into hopper **30** by the cooperation of automatic locking means **38** on hopper **30** and groove **12** in container **10**. Application of a momentary force on container **10** in the direction of arrow **21**, however, causes wall **16** of holding section **14** to move rearward, out of engagement with locking pin **37**, allowing locking pin **37** and locking arm **31** to rotate counter-clockwise. This counter-clockwise movement of locking pin **37** allows pin **37** to enter exit port/ramp **15** of groove **12**. By releasing external force on container **10**, return spring **41** produces a force on container **10** tending to move it away from automatic locking means **38** of hopper **30**. As container **10** moves away from automatic locking means **38**, locking pin **37** is guided out of engagement with groove **12** by exit port/ramp **15**, as shown in FIG. **8**. In moving out of engagement with exit port/ramp **15**, locking pin **37** and locking arm **31** are pushed away from container **10** by exit port/ramp **15**, against the compression bias of spring **34**.

Return spring **41** may be selected to provide enough force to push container **10** only partially out of hopper **30** or it may desirable for return spring **41** to provide enough force to completely eject container **10** from hopper **30** when locking pin **37** rides out of exit port/ramp **15**.

Operation

Container **10**, FIG. **2**, is automatically locked into engagement with hopper **30** by initial insertion into hopper **30** as shown in FIG. **4**. A force is then applied to container **10** in the direction of arrow **21** until rearward movement of container **10** ceases as locking pin **37** contacts wall **17** and protrusion **22** of groove **12** as shown in FIG. **6**. The force applied to container **10** is then released and container **10** moves into positive engagement with automatic locking means **38** as shown in FIG. **7**.

To release container **10** from positive engagement with hopper **30**, a momentary force is applied to container **10** in the direction of arrow **21** as shown in FIG. **7**. Container **10** will move slightly rearward in hopper **30** and then come to rest as locking pin **31** contacts wall **17** of groove **12**. The external force on container **10** is released and return spring **41** moves container **10** out of engagement with automatic locking means **38**, as shown in FIG. **8**.

It is recognized that the invention described herein is applicable to many types of information media apparatus. It is immaterial whether container **10** is used with a single information media disc, a plurality of information media discs, an information media elongated tape, or any other information media utilizing a container therefor. Further, it is immaterial whether reading or recording of the information media takes place inside the container or partially or totally external to the container. For example, the invention described herein may be used to engage a tape cartridge into a magnetic tape playing machine wherein the tape is contained within the cartridge throughout playing. Alternatively, the container of the invention may be used as a storage container for information media discs upon which recording and reading are performed only after the con-

tainer of discs has been loaded into the apparatus and the discs have been ejected therefrom.

While the invention has been particularly shown with reference to a preferred embodiment thereof, it will be understood by those skilled in the art that the foregoing and other changes in form and detail may be made therein without departing from the spirit and scope of the invention.

What is claimed is:

1. An information media handling system comprising in combination:

a hopper for insertion of an information media container therein;

said container including a side having a recessed lock engaging means for engaging an automatic locking means of said hopper, said automatic locking means including a substantially rigid locking arm rotatable in two axes of rotation, so that said container is locked into said hopper by application of a first force in a first direction to said container and released from said hopper by application of a second force to said container in said first direction.

2. The information media handling system of claim **1** wherein said lock engaging means of said information media container further includes a groove engageable with said pin at said locking arm, said groove including an entrance port, a holding section, and an exit port/ramp.

3. The information media handling system of claim **2** wherein said automatic locking means further includes spring biasing means connected to said locking arm of said automatic locking means for biasing said locking arm toward said exit port/ramp of said groove of said lock engaging means of said information media container.

4. The information media handling system of claim **3** wherein said information media container further includes an entry ramp for guiding said pin of said locking arm into said entrance port of said lock engaging means of said information media container.

5. The information media handling system of claim **4** wherein said automatic locking means further includes a return spring engageable with said information media container, said return spring biasing said information media container against travel in said first direction for positive engagement of said pin with said holding section.

6. The information media handling system of claim **5** wherein said information media container further includes a cavity for storage of one or more magnetic recording discs.

7. An information media handling system comprising in combination:

a hopper for insertion of an information media container therein;

said container including a side having a recessed lock engaging means for engaging an automatic locking means of said hopper;

said automatic locking means including a substantially rigid locking arm rotatable in two axes of rotation, said locking arm having mounted thereon a pin having a substantially circular cross section, said pin engaging said lock engaging means of said container, and said automatic locking means including a return spring engageable with said container, said container being locked into said hopper by application of a first force in a first direction to said container against the bias of said return spring and released from said hopper by application of a second force to said container in said first direction.

8. The information media handling system of claim **7** wherein said lock engaging means of said information media container further includes a groove engageable with said pin of said locking arm, said groove including an entrance port, a holding section, and an exit port/ramp.

9. The information media handling system of claim **8** wherein said automatic locking means further includes spring biasing means connected to said locking arm of said automatic locking means for biasing said locking arm toward said exit port/ramp of said groove of said lock engaging means of said information media container.

10. The information media handling system of claim **9** wherein said information media container further includes an entry ramp for guiding said pin of said locking arm into said entrance port of said lock engaging means of said information media container.

11. The information media handling system of claim **10** wherein said information media container further includes a cavity for storage of one or more magnetic recording discs.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 3,854,784

DATED : December 17, 1974

INVENTOR(S) : Ronald Eugene Hunt and William Melchior Jenkins

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 5, line 27, the word "said" (first occurrence) should read --a--.
Column 5, line 27, the word "at" should read --of--.

Signed and Sealed this

sixteenth Day of *December 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks