United States Patent

Cronquist

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[45] **Dec. 5, 1972**

[54] VIDEO STRIP FILE AND SYSTEM

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[22] Filed: **Dec. 28, 1970**

[21] Appl. No.: **101,707**

[52] **U.S. Cl.**.....**179/100.2 PM,** 178/6.6 A, 209/110, 221/278, 235/61.11 D, 243/1, 271/74, 340/174.1 C

[51] **Int. Cl.**.....**G11b 15/38,** G11b 25/04

[58] **Field of Search**.....178/6.6 A; 179/100.2 PM; 209/80.5, 110.5; 221/87, 88, 278; 235/61.11 D; 243/1, 29; 271/74; 340/174.1 C, 174.1 E

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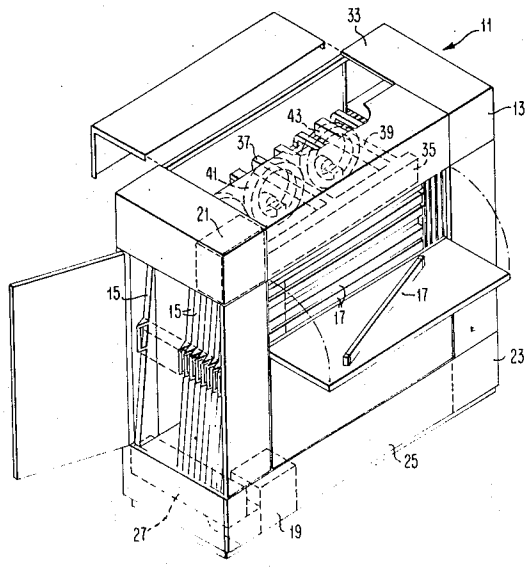
[57] **ABSTRACT**

A data processing system for storing a large number of tape strips and selectively processing them. The mechanism includes a storage file which has a plurality of elongated slits formed in it. Each of the slits has first and second ends which open outwardly from the file. A data bearing tape strip is cooperatively received by each of the slits for purposes of storage. The first and second ends of each of the slits are coupled together externally of the file by means of a conduit means. A transducer element is disposed in communication with a passageway provided by this conduit means. An air drive mechanism is applicable to each of the slits for exerting a force upon a tape strip located therein to operate the strip from one end to the other of the slit, through the conduit means and past the transducer.

4 Claims, 17 Drawing Figures



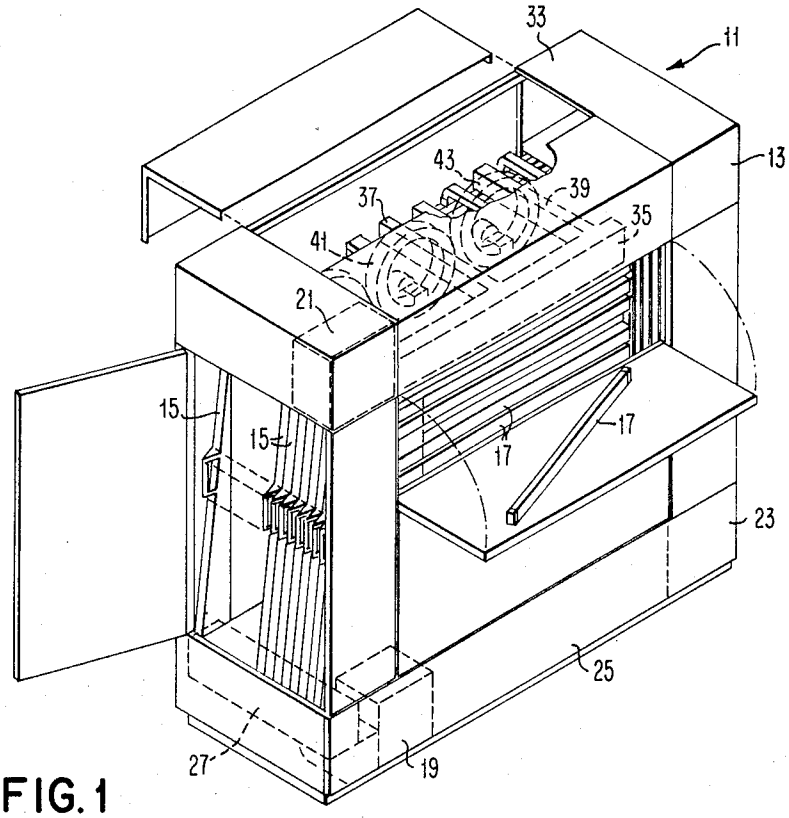


FIG. 1

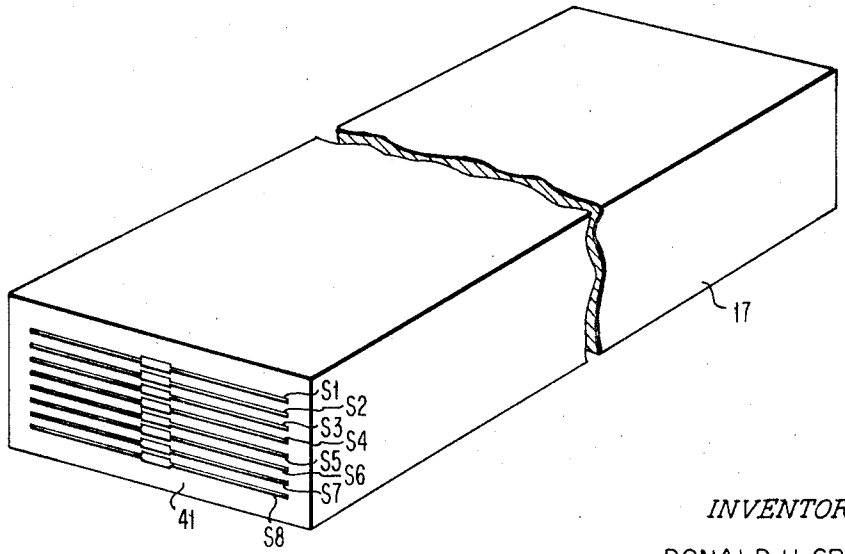


FIG. 3

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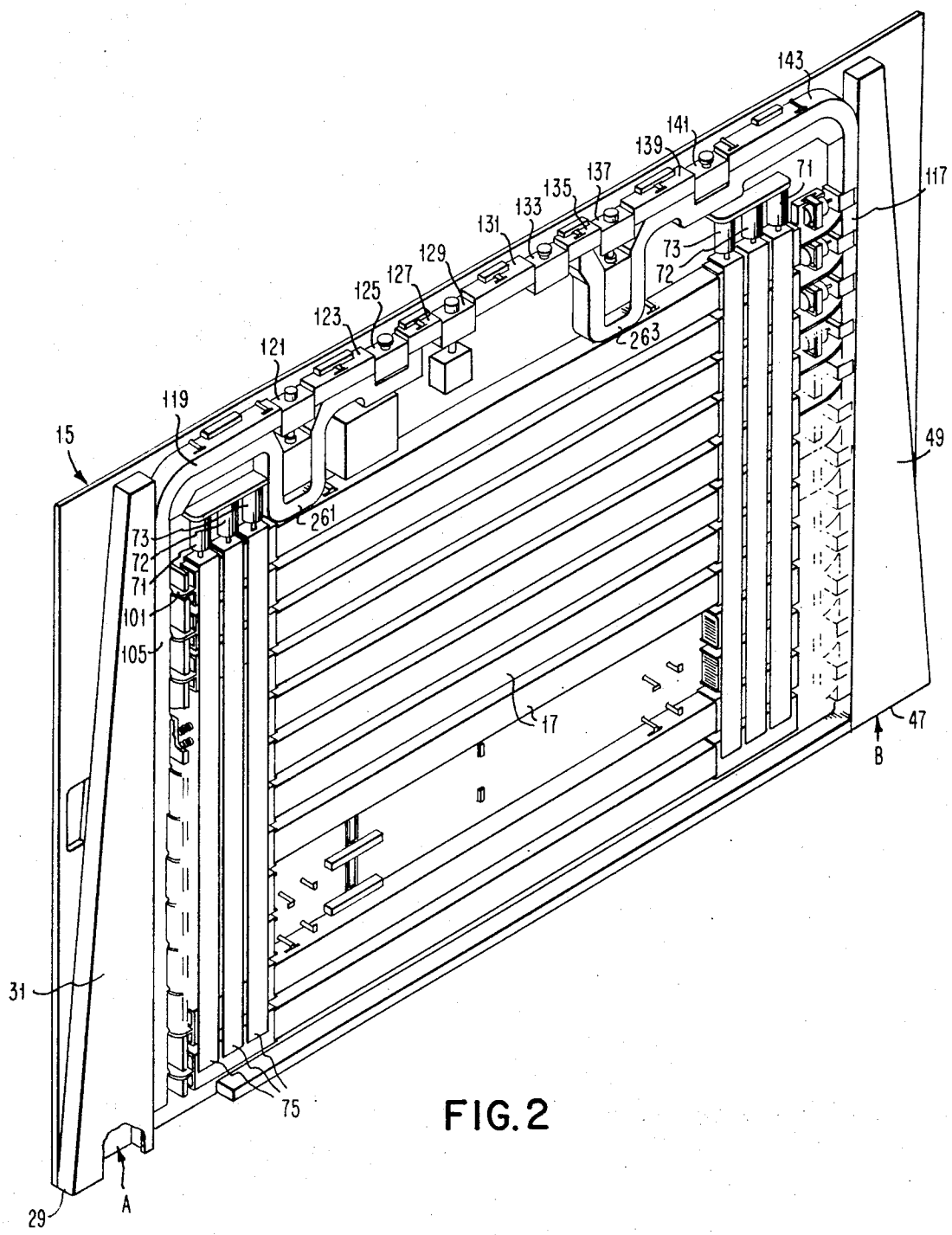
143
141
139
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125
123
121
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117
15
49
73
72
71
101
105
261
263
17
47
B
31
75
29
A

FIG. 2

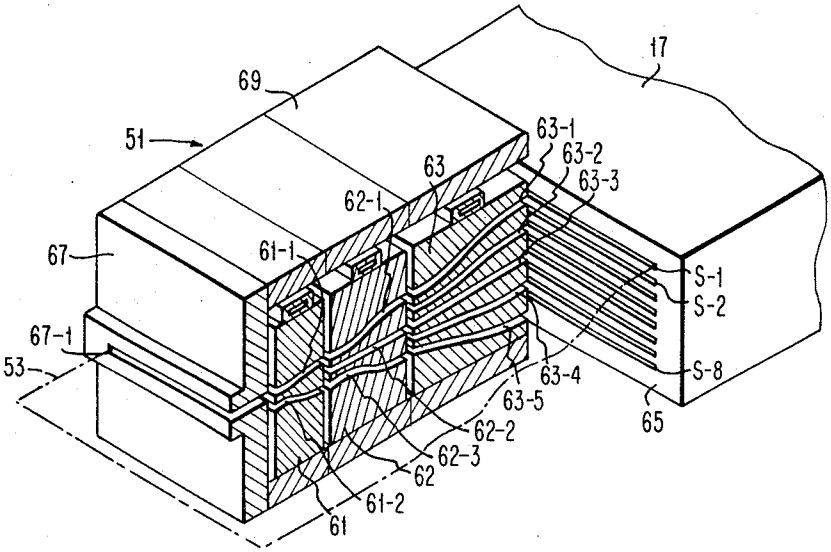


FIG. 4

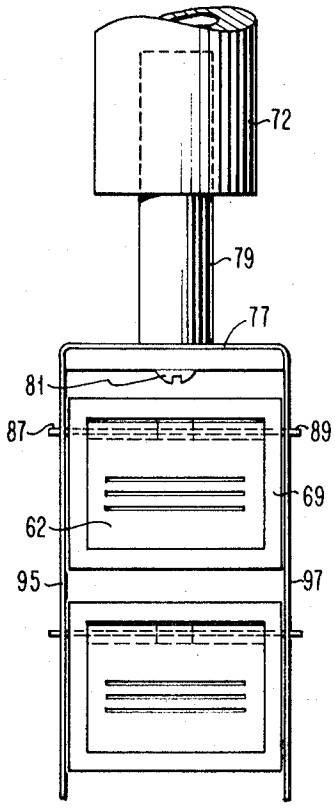


FIG. 4a

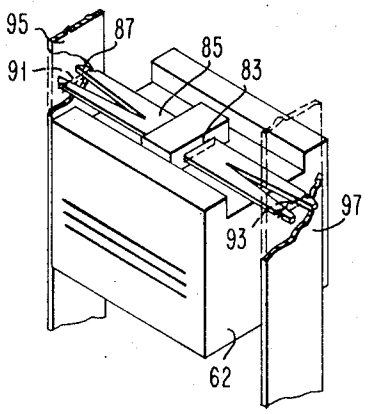


FIG. 4b

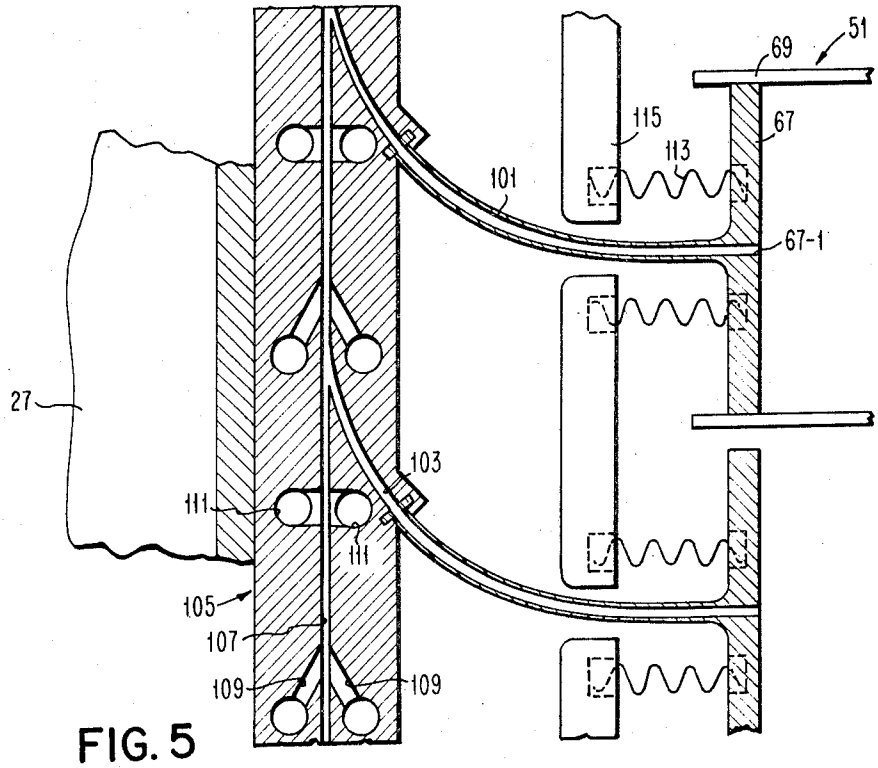
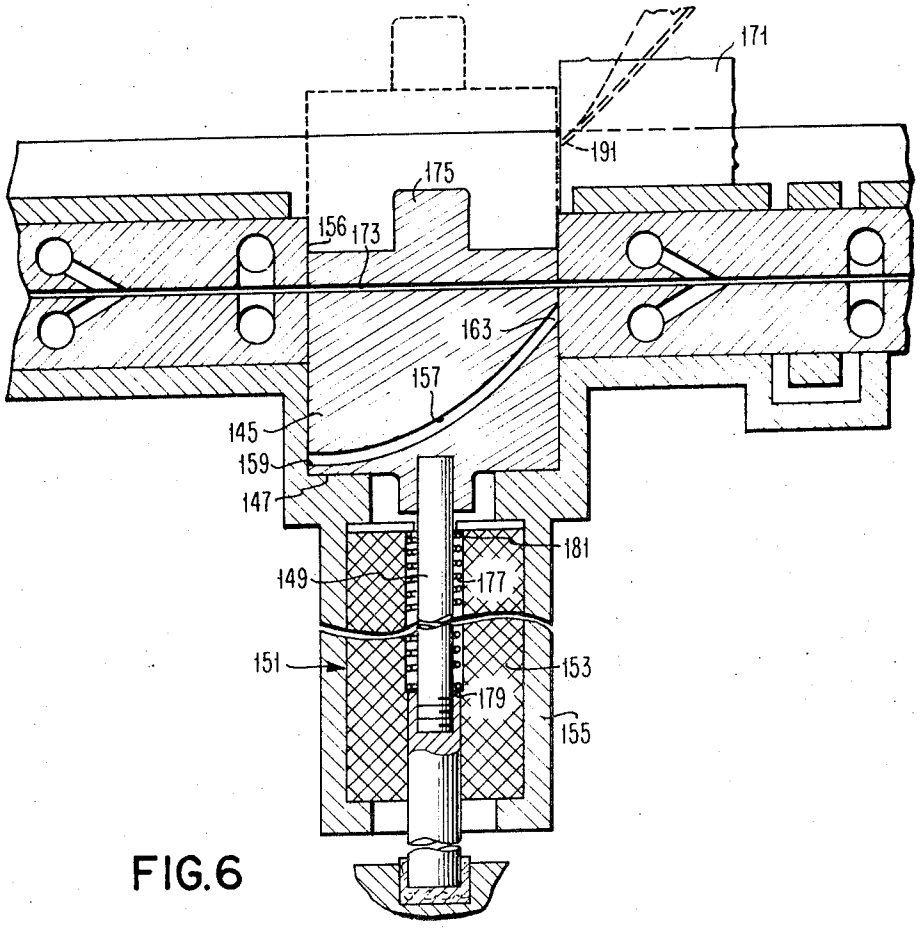

51
69
67
115
113
101
67-1
27
103
111
111
105
107
109
109

FIG. 5


171
191
175
156
173
163
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145
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147
181
149
177
151
153
179
155

FIG. 6

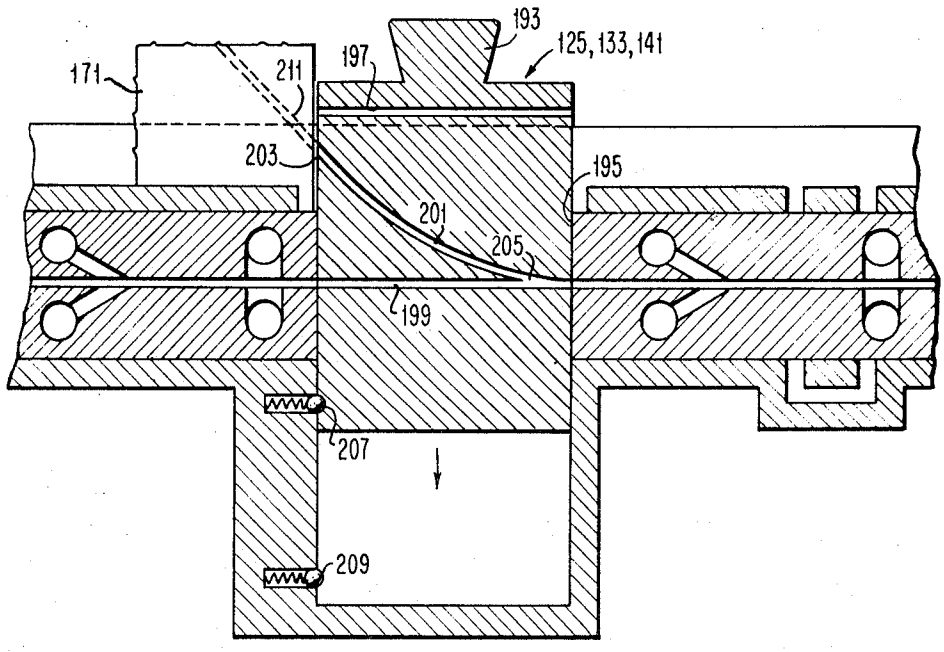
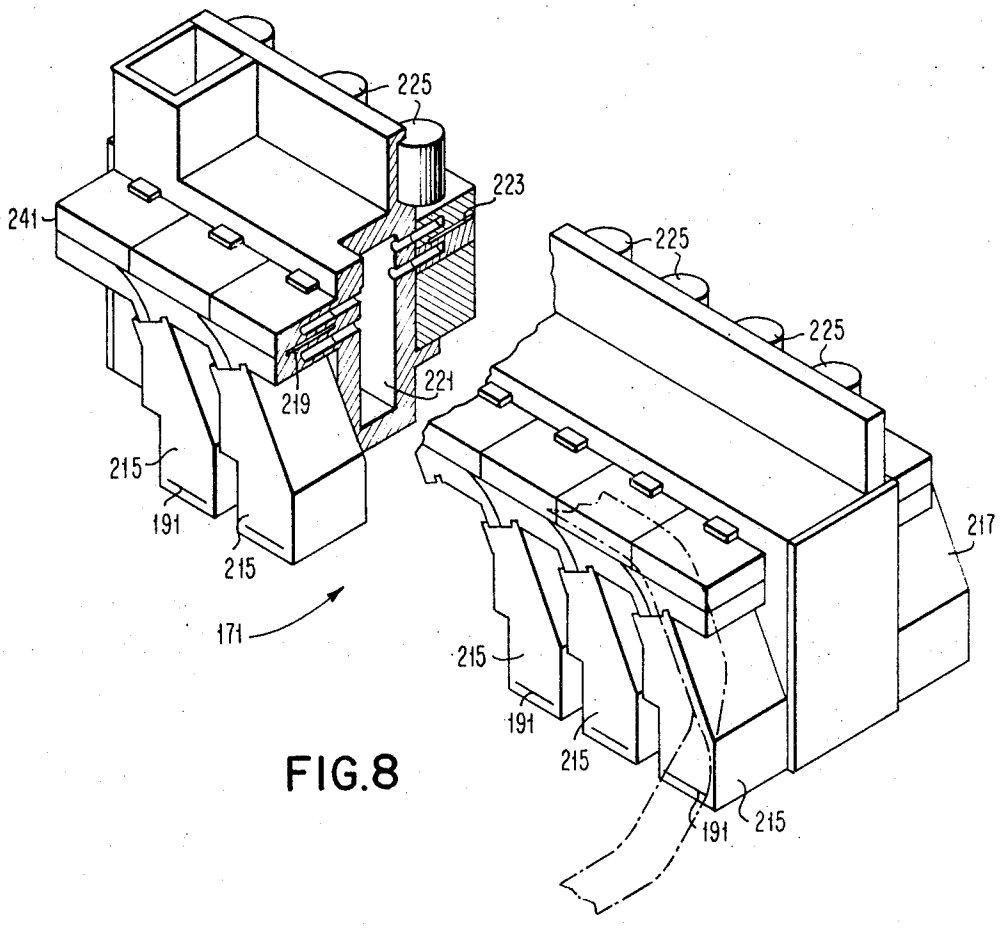

193
125, 133, 141
171
211
197
203
195
201
205
199
207
209

FIG.7


225
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241
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191
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171
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191
215

FIG.8

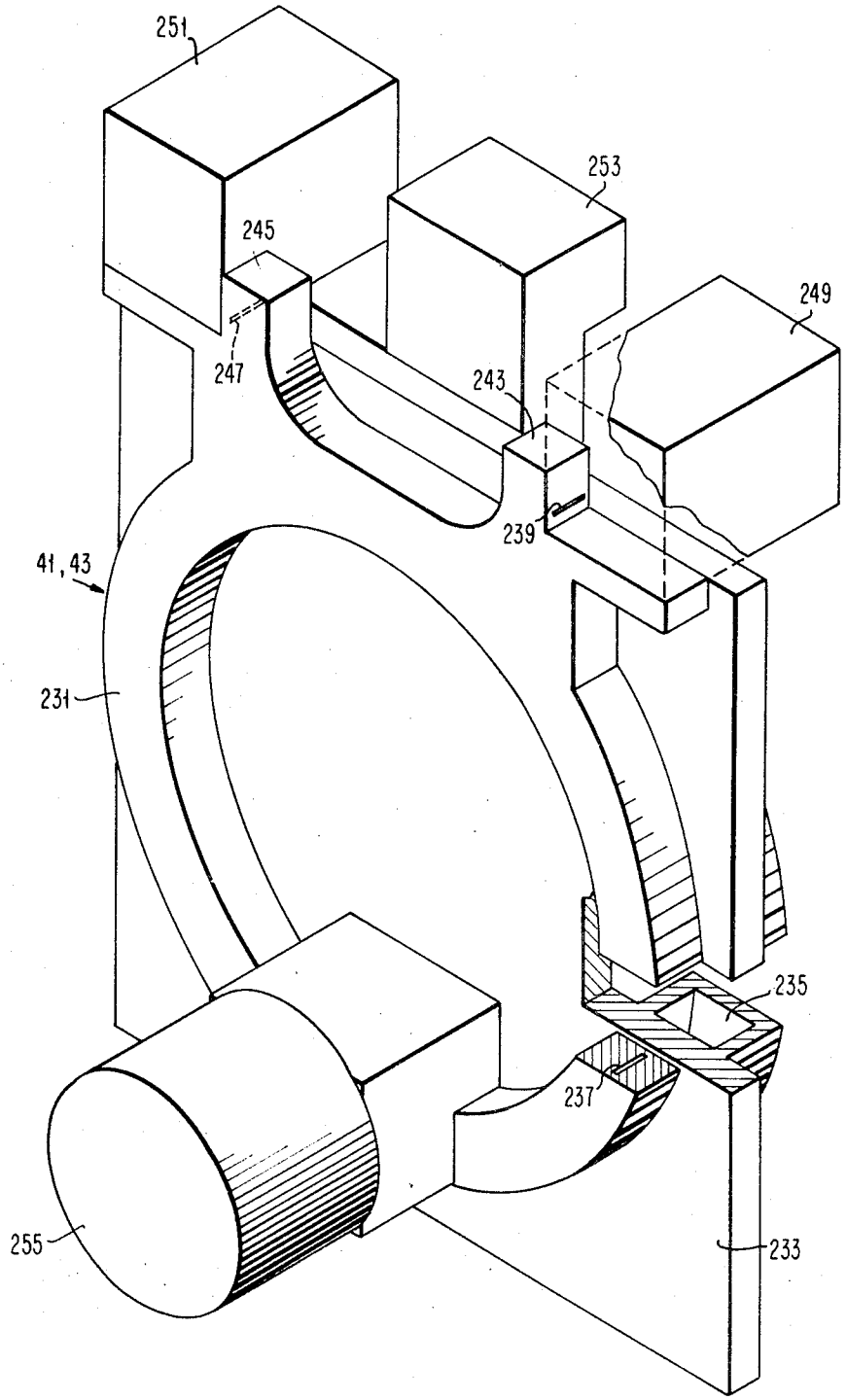

FIG.9

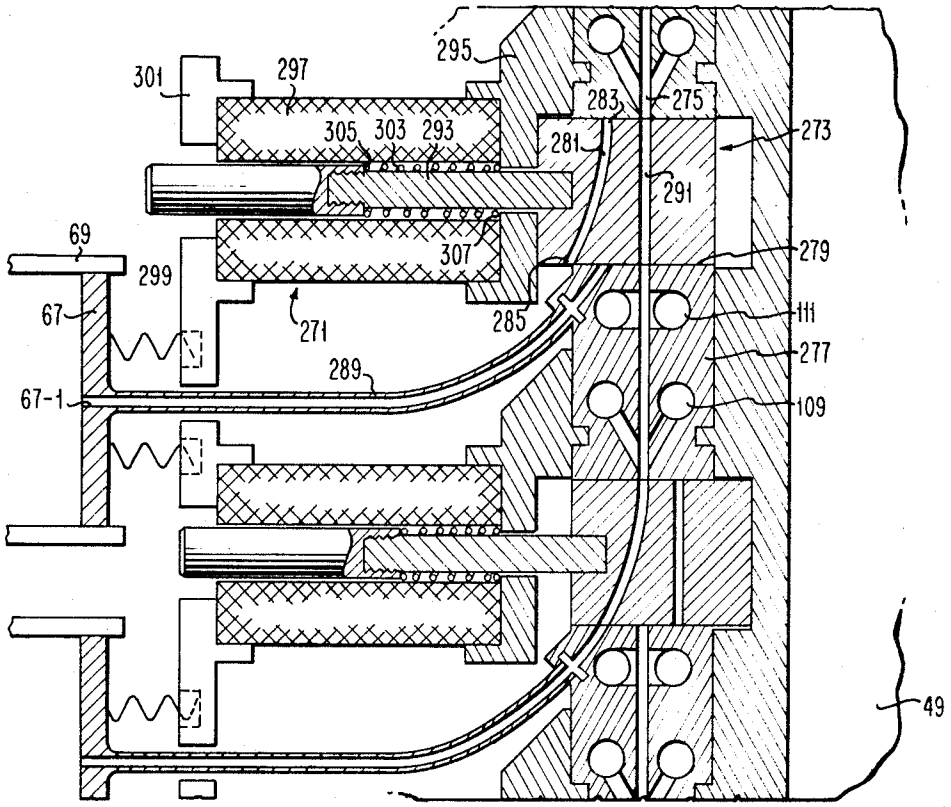

FIG. 10

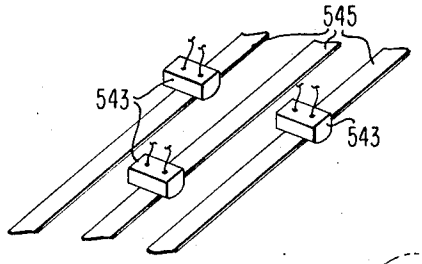

FIG. 11(c)

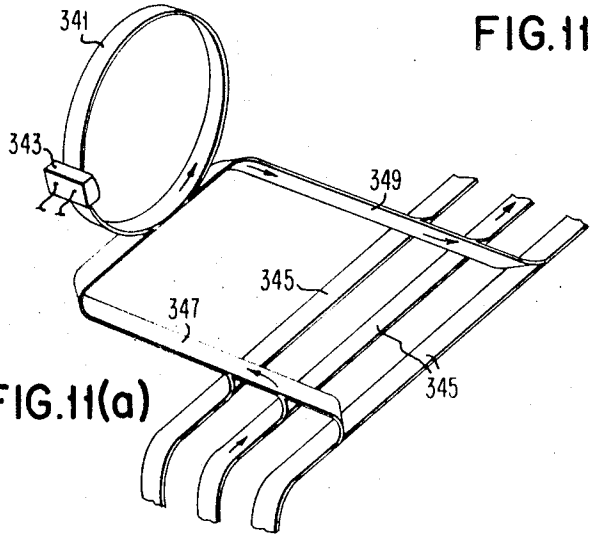

FIG. 11(a)

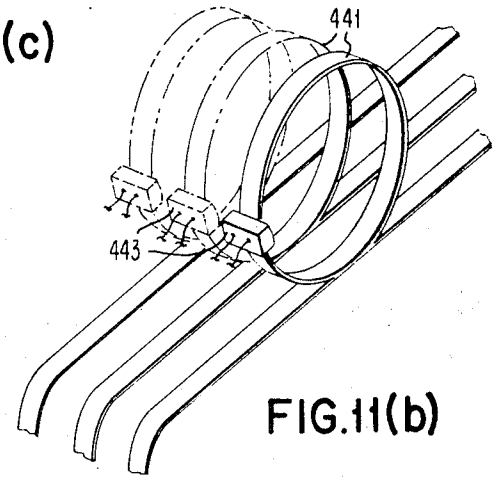

FIG. 11(b)

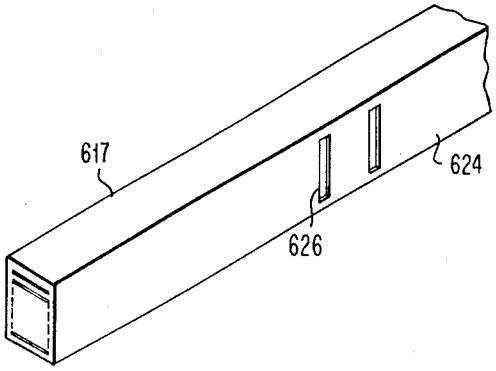

FIG. 12(a)

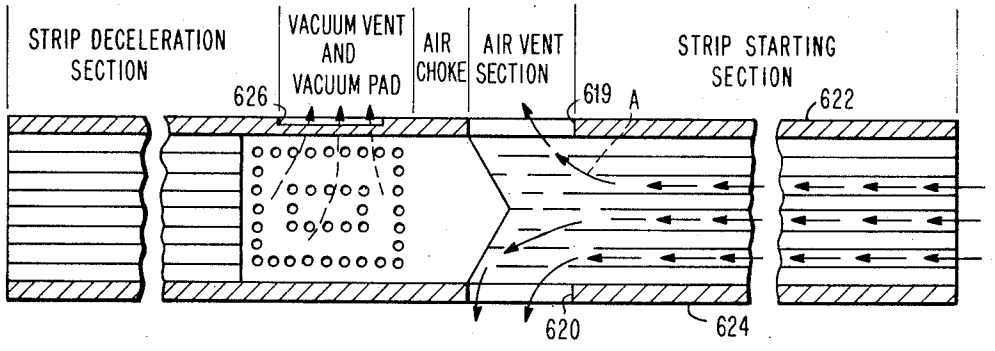

FIG. 12(b)

VIDEO STRIP FILE AND SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a novel and improved strip file and system especially advantageous for use with video strips.

2. Description of the Prior Art

Strip files have been known in the prior art; various techniques have also been known in the prior art for moving tape loops and tape strips within a transport mechanism by a means which includes the application of either an increase or decrease in air pressure.

It has also been known in the prior art to manufacture data processing storage devices which store strip tape material; however, such devices have been found to include undesirable mechanical manipulation of the tape preparatory to its removal from the file for processing. Thus, although the prior art has illustrated techniques for utilizing air flow to move tape strips from a storage file into a processing area, no technique has heretofore been known for effectively moving tape strips from a storage file into a processing area and then back into their original location in the storage file, solely by means of air propulsion, or the like.

SUMMARY OF THE INVENTION

An object of this invention is to provide a novel and improved storage file for video strips, which uses pressurized air to propel the strips out of the file and back into it after processing.

Another object of this invention is to obtain an improved video strip file system which uses an air drive for floating each storage strip out of the file into a processing circuit and then back into the file.

A further object of my invention is to provide an improved tape strip storage file, which is capable of compactly storing a large number of tape strips in a relatively small area.

Still another object of my invention is to provide an improved video strip storage file which includes a novel method of selecting a stored strip for movement into a processing area.

An additional object of my invention is to provide an improved random access, rapid retrieval file for video strips, which is simplified and economical in cost.

In carrying out my invention, in one form thereof, I have provided a data processing system for processing selected tape strips from a storage file. The storage file includes a plurality of file boxes, each having a plurality of elongated slits disposed in it. Each of these slits has a pair of opposed ends which open outwardly from the box to facilitate the storing of data bearing tape strips therein. A conduit means is positioned in association with the storage file for coupling one end of each slit to the other end thereof, and thereby providing a closed passageway between the ends of each slit. A transducer is disposed in the file in communication with the closed passageway. An air drive mechanism is applicable to each of the slits for exertion of a force upon each tape strip located therein, to operate the strip from one end to the other of the slit, through the conduit means and past the transducer means.

Another aspect of the present invention which has been found particularly advantageous in my improved data processing system, is a binary strip diverter mechanism located between each end of the storage file and the conduit means. The binary diverter means is selectively actuated to steer any tape strip disposed in a slit, out of the slit and past the transducer means. In addition, another binary diverter means is also applicable for returning the strip after its passage through the conduit means, to its associated storage slit.

BRIEF DESCRIPTION OF DRAWINGS

The foregoing and other objects, features and advantages of this invention, will be apparent from the following description of the drawings, in which:

FIG. **1** is a perspective, and partially exploded view of a strip file, embodying my invention, in one form thereof;

FIG. **2** is an enlarged, perspective view of a drawer used for storing discrete video strip files in conjunction with the strip file of FIG. **1**;

FIG. **3** is a perspective view of an exemplary video strip storage box, representing one form of the present invention;

FIG. **4** is a sectional perspective view showing a binary diverter mechanism of the type which may be used in conjunction with the strip file;

FIG. **4***a* is a fragmentary end view, taken between two binary diverter blocks, to show the solenoid actuating mechanism for a bank of binary diverter blocks, and the technique for supporting the blocks;

FIG. **4***b* is a fragmentary perspective view showing the retainer means for supporting the diverter blocks;

FIG. **5** represents a fragmentary sectional view of the air drive technique used for propelling the strips out of their storage slits;

FIG. **6** illustrates a sectional view of the structure used for transferring video strips to a read/write station at the top of the strip file;

FIG. **7** illustrates a sectional view of a drawer disconnecting mechanism used to implement removal of a file drawer from the master file unit;

FIG. **8** illustrates an interchange or transfer unit which connects to the structures of FIG. **6** for feeding strips from the file drawers to the cyclic buffers;

FIG. **9** illustrates a read/write or cyclic buffer station representing those included in the strip file;

FIG. **10** illustrates the air drive technique and selector mechanism used for returning strips to their file slits;

FIGS. **11***a*, **11***b* and **11***c* illustrate, in perspective view, alternative arrangements for feeding strips to and from read/write stations; FIG. **12***a* is a fragmentary perspective view of a file box, showing its vacuum vent for braking the video strip; and

FIG. **12***b* is a fragmentary section of the file box of FIG. **12***a*, taken in a plane parallel to the slits.

DESCRIPTION OF PREFERRED EMBODIMENT OF THE INVENTION

As shown in FIGS. **1** and **2**, for carrying out the present invention, I have provided a video strip file **11** which includes a box-shaped housing **13** having a series of 16 vertical drawers is removably mounted therein. Each of the drawers **15** supports a tier of 16 elongated file boxes **17** (FIG. **2**), which are arranged in mutually parallel relationship therein for the storage of video strips. As shown in FIG. **3**, for this purpose, the file

boxes 17 have a spaced apart series of eight parallel slits St1 to S-8 formed therein, for accommodating a like number of video strips, or tapes upon which video information is storable.

Since the 16 file boxes 17 of drawer 15 are each capable of containing or storing eight video strips, the total storage capacity per drawer is 128 video strips, thus providing a total capacity for the overall video file 11, of 2,048 strips.

It is further contemplated within the framework of the present invention, that a similar, but larger file box than box 17 could be provided, which would include 64 parallel slits for accommodating a like number of video strips. Although not shown, a video strip file including 16 drawers, each carrying 16 file boxes with the 64 slits/box, would thus achieve storage capability for 16,384 strips.

For selective movement of the video strips out of and back into each of the file boxes 17, an air flow driving mechanism may be provided. In the illustrated embodiment, this driving mechanism involves three distinct fans 19, 21 and 23. Fan 19, is located in the bottom compartment 25 of housing 13, and feeds into an upside air duct header 27. Header 27 extends transverse to the drawers 15 and underneath their output end 29, so that a positive air flow is established in the direction of arrow A, shown in FIG. 2, upwardly through the vertically extensive drawer air duct 31, located on the left side or tape exiting side of drawer 15 (viewing FIG. 2). The air flow from fan 19 serves to provide a selective force for removing video strips from their associated file slits S-1 to S-8, as shall be further described hereinafter.

Fan 21 is located, as shown in FIG. 1, in the top compartment 33 of housing 13, and feeds into a topside air duct header 35. Header 35 extends in a direction generally parallel to the file boxes 17, and is located near the front of housing 13 within compartment 33, so that it may feed pressurized air into a series of three tubular arms, such as the arms 37, 39, for transporting video strips into the buffer loops 41, 43.

Fan 23 is disposed in the bottom compartment 25 of housing 13, as shown in FIG. 1, at the right side thereof, for feeding pressurized air into a downside air duct header (not shown) similar to the upside air duct header 27. This downside duct header, like header 27, extends transverse to the drawers 15 and below their input end 47, so that a positive air flow is established in the direction of arrow B, shown in FIG. 2, upwardly through the vertically extensive panel air duct 49, located on the right side or strip entrance side of drawer 15 (viewing FIG. 2). The air flow from fan 23 serves to provide a selective force for impelling video strips back into their storage slits after they have been processed by the buffers and/or the transducers, as shall be further described hereinafter.

For controlling the egress of video strips from the file slits S-1 to S-8 for the various file boxes 17, there is provided a binary strip diverter mechanism 51. One form of this mechanism 51 is shown in FIG. 4, for selectively feeding video strips 53 out of a slit S-1 of a file box 17. The mechanism 51 is essentially a series of binary actuated blocks 61, 62, 63 which have predetermined channels therein for steering the desired video strip from its storage slit in a file box 17, into the processing conduit of the master file box 11.

More particularly, as shown in FIG. 4, at the output end of each file box 17, the three slidable diverter blocks 61, 62, 63 are located so that block 63 has five strip diverting channels 63-1, 63-2, 63-3, 63-4 and 63-5; block 62 has three strip diverting channels 62-1, 62-2, and 62-3; and block 61 has two strip diverting channels 61-1 and 61-2. Each block 61, 62 and 63 has one or more channels which are selectively movable into precise alignment with the channels of an adjacent block 61, 62, 63, the output end 65 of file box 17, or the output end 67 of diverter block housing 69. Thus, more specifically, each of the blocks 61, 62, 63 is slidably actuated in a vertical direction by means of an associated solenoid 71, 72, 73 (FIG. 2). As shown in FIG. 2, each of the solenoids 71, 72, 73 is connected by means of an elongated U-shaped yoke 75 to an entire vertically arranged bank or tier of identical diverter blocks, to concurrently actuate all diverter blocks (e.g. block 62) in a vertical direction. From viewing FIG. 4a, it will be seen that the yoke 75 includes a bight 77 that is suitable fastened to the binary actuated plunger 79 of solenoid 72 by means of screw 81. Each of the diverter blocks has a horizontal key hole 83 formed in the top thereof, for receipt of a retaining key 85. The key 85 thus extends horizontally through the roof of each diverter block, and outwardly from each side of the diverter block housing 69, with the bifurcated outer ends 87, 89 of key 85 extending through cooperating slots 91, 93, formed in the vertically extending outer strips 95, 97 of the yoke 75. Each of the yokes 75 thus serves to carry a vertical bank of 16 diverter blocks, by means of the attachment of the retaining keys 85 of the blocks to the strips 95, 97.

The same binary diverter mechanism 51 which is used for selectively operating video strips 53 out of end 29 of the drawer 15, is also used for returning the strips to their appropriate storage slits. For a determination of the number of strip storage slits or compartments into and from which such a mechanism 51 can feed strips, the equation

$$C = 2^B$$

is applicable, where C is the number of storage slits for a given file box 17, and B is the number of slidably movable diverter blocks required at each of the entrance and exiting ends thereof. The number of strip diverting channels required for any of the requisite diverter blocks in a given strip file application, is determined by the equation

$$D = 1 + 2^{(B-1)\ 1)}$$

where D equals the number of channels and B is the identifying number of the particular diverter block (e.g. blocks 61, 62 and 63 would be numbers 1, 2, 3, respectively).

When a video strip is withdrawn from its associated slit in file box 17 by the binary diverter mechanism 51, it passes outwardly through a thin flexible channel 101 (FIG. 5), coupled to slit 67-1 at the output side 67 of mechanism 51. Channel 101 is coupled at its output to an inlet channel 103 of a vertical upside strip carrying tube 105. Inlet channel 103 of tube 105 curves upwardly to the left, viewing FIG. 5, to feed the strip into the upside vertical channel 107. Thus, as shown in FIG. 5, the output slit 67-1 of each of the binary diverter mechanisms 51 (i.e. sixteen for each drawer 15) feeds into a flexible channel 101 for entry into the upside ver-

tical channel **107**. The aforementioned fan **19** (FIG. **1**) propels air through the upside duct header **27**. Such pressurized air is fed uniformly into channel **107** by means of vertically spaced pairs of inlet passageways **109**, with alternate vertically spaced pairs of air exhausting ports **111** located therebetween. Each pair of inlet passageways **109** exerts an upward propelling force upon a video strip so that a substantially uniform upward force is exerted upon a video strip located in upside vertical channel **107**, to move the strip toward the top of drawer **15**.

As further shown in FIG. **5**, to help compensate for manufacturing tolerances and temperature changes, a coiled compression spring **113** is connected between the output side **67** of each diverter mechanism **51** and a suitable mounting boss (not shown) of vertical base plate **115**.

If selected for egress by binary diverter mechanism **51**, after each video strip leaves its storage slit in a channel drawer, it is effectively blown or floated upwardly through vertical tube **105** until it reaches the top of drawer **15**.

At the top of drawer **15**, as shown in FIG. **2**, vertical upside tube **105** is selectively coupled to a vertical downside strip carrying tube **117**, by means of left corner horizontal tube section **119**, first read/write station elector **121**, intermediate horizontal tube section **123**, first drawer disconnect block **125**, intermediate horizontal tube section section **127**, second read/write station selector **129**, intermediate horizontal tube section **131**, second drawer disconnect block **133**, intermediate horizontal tube section **135**, third read/write station selector **137**, intermediate horizontal tube section **139**, third drawer disconnect block **141**, and right corner horizontal tube section **143**.

The structure of each of the read/write station selectors **121**, **129**, **137** at the topside of drawer **15**, is shown in detail by FIG. **6**. Each selector comprises a slidably movable selector block **145** secured at its bottom **147** to the vertically movable magnetic plunger **149** of a solenoid **151**. The main portion of plunger **149** extends through coil **153** of the solenoid **151**, which may be supported in a well **155**. Well **155** is secured to drawer **15** and located underneath the tube interruption **156**, wherein block **145** is slidably located. The block **145** includes a curved and angular channel **157**, which may be coupled at its input end **159** to horizontal channel **161** of an adjacent tube section **119**, **127** or **135**. Channel **157** extends upwardly and to the right (viewing FIG. **6**) from its input end, to provide an output **163** for communication with a drawer interchange unit (FIG. **8**) **171**.

In addition to the curved angular channel **157**, each slidably movable selector block **145** also includes a horizontal channel **173** which provides a continuous path for strip movement through the station selector, and an upper projection **175**, for engagement with a suitable file surface to cushion upward movement of the block **145**.

For normally maintaining the selector block **145** in the position shown in FIG. **6**, whereby a video strip is passed through the horizontal channel **173** (thus not entering interchange unit **171**, therefrom), a coiled compression spring **177**, surrounds a portion of solenoid plunger **149**. Spring **177** runs in compression between shoulder **179** of the plunger and a fixed shoulder **181** located at the top of the solenoid **151**, so that a continuous compressive force of spring **177** urges the block **145** into its depressed position. When solenoid **155** is energized by suitable control circuitry, the block **145** is actuated upwardly from its depressed position (shown in full in FIG. **6**) to its upper position (shown by dash lines in FIG. **6**). Passageway **157** thereupon communicates with an associated input channel **191** of the interchange unit **171**, to feed the strip into the interchange unit.

After a selected video strip passes through horizontal channel **173** of one of the read/write station selectors **121**, **129**, **137**, it enters into one of the intermediate horizontal tube sections **123**, **131**, **139**. Each of these sections, in like manner to the corner tube sections **119** and **143**, has a channel therein for passing a video strip in response to fan blown air. Upon egress from each of the horizontal sections **123**, **131**, **139**, a video strip is floated into a channel of one of the three slidably movable drawer disconnect blocks **125**, **133**, **141**.

The structure of each of the disconnecting blocks **125**, **133**, **141** is shown in detail by FIG. **7**. Each of the aforesaid disconnecting blocks is manually engageable by means of an integral finger grip **193**, and manually operable at tube interruption **195**. Underneath the grip **193** and adjacent thereto, the disconnecting blocks **125**, **133**, **141** have an upper horizontal channel **197**, which provides strip passage through the block when it is in its depressed position (opposite to the position shown in FIG. **7**). Underneath the horizontal channel **197**, each disconnecting block provides a lower horizontal channel **199**, which provides strip passage through the block, when the block is in its uppermost position (as shown in FIG. **7**). Between the two horizontal channels **197**, **199**, each disconnecting block also has a curved and angular channel **201**, which extends downwardly and to the right from an input end **203**, into a merging type intersection **205** at its output, with the output side of lower horizontal channel **199**.

For maintaining the disconnecting blocks **125**, **133**, **141** in their upper or normal position, or their depressed position, a pair of vertically spaced spring biased balls **207**, **209** are provided, which engage suitable surfaces on one side of the block and detent it into one or the other position.

When the disconnecting block **125**, **133** or **141** is in its upper or normal operating position, inlet **203** of its angular curved channel **201**, is in alignment with an output channel **211** of the interchange unit **171**, so that video strips may be returned to their file drawers from a buffer or read/write station. These strips thus pass from the interchange unit **171**, into channel **201**, and then back into the effective horizontal channel for passage either to another read/write selector station or return to a file box for storage.

With block **125**, **133** or **141** it its upper-normal position, it will be further noted that the lower horizontal channel **199** lines up with the adjacent stationary horizontal channels in the top of drawer **15**. As a result, any strips are free to pass right through the block in a left-to-right direction, if so desired.

If it is determined that a file drawer **15** is to be removed from the video strip file **11**, each of the three disconnect blocks is thereupon depressed. When this

occurs, the angular curved channel **201** is thus disconnected from each associated interchange unit **171**, and the upper horizontal channel **197** assumes a position in registration and alignment with the other adjacent horizontal channels, so that a strip may pass directly through the block in a horizontal direction, just as it did through channel **199**.

The video strip file **11** of the present invention has been designed for the inclusion of three cyclic buffers, or read/write stations, such as the aforementioned buffers **41**, **43**. As a consequence of this, there are provided three interchange units **171**, such as the type shown in FIG. **8**. Each of the interchange units **171** serves as an upper file conduit structure for floating strips out of one of the read/write station selectors **121**, **129**, **137** of any drawer **15**, and sending them to an associated cyclic buffer. After the buffer has either read or recorded the video information from the strip, the interchange unit **171** then provides a conduit for floating the strip back to its selected file drawer **15** so that it may be returned to its storage slit in a file box **17**.

Each interchange unit **171** is structured to provide sixteen input duct sections **215** and 16 output duct sections **217**. An input channel **191** of one of the input duct sections **215** is disposed in aligned registration with an output **163** (FIG. **6**) of one of the read/write station selectors **121**, **129**, **137**, and an oppositely disposed output channel **211** (FIG. **7**) of one of the output duct sections **217** is disposed in aligned registration with an input end **203** of disconnect block channel **201**, so that each video strip selected from a file drawer **15** may be removed therefrom, floated through the interchange unit to one of the read/write stations, and then rapidly returned to its storage box.

As further shown in FIG. **8**, each interchange unit **171** includes an incoming strip channel **219** which extends generally from one end to the other, on one side of a main air duct **221**, and an outgoing strip channel **223** extending parallel to channel **219** from one end to the other on the other side of main air duct **221**. The input duct sections **215** provide appropriate strip carrying channels which curve the video strips upwardly and to the left (as shown by the broken lines of FIG. **8**) for the passage to a read/write station through the incoming strip channel **219**. After the strip has been desirably processed in the buffer, it is returned to its drawer and file box by means of the energization of one of the solenoids **225**, which act upon a movable block (not shown) to provide a flow path for the video strip (in reverse fashion to input duct section **215**) out of the outgoing strip channel **223**, through an output channel **211** (FIG. **7**) of the interchange unit, and back into the top horizontal conduit of one of the file drawers **15**.

For providing fan blown air to impel the video strip toward the read/write unit (i.e. upwardly and to the left, viewing FIG. **8**), and away from the read/write unit (i.e. downwardly and to the right, viewing FIG. **8**), the main air duct **221** is provided. Duct **221** extends in a direction parallel to the channels **219**, **223** and provides appropriate air flow which is fed uniformly to the channels **219**, **223** to assure movement of video strips therethrough in the desired directions.

One form of the read/write stations **41** and **43** which may be effectively used with the present invention, is shown in FIG. **9**. The station functions as a cyclic strip buffer, and for this purpose, it includes a loop shaped conduit **231** secured to a base plate or flange **233** that has a loop shaped air duct **235** formed on the other side thereof. The air duct **235** is suitably constructed to provide a fan driven air source, received from one of the tubular arms **37**, or **39** (FIG. **1**), for uniform application to the loop shaped conduit **231**. More specifically, fan driven air flow, applied to a loop shaped strip channel **237** of conduit **231**, serves to float each video strip continuously through the conduit in a predetermined direction, and at a substantially constant linear velocity.

For receiving video strips into the loop-shaped channel **237**, each read/write station includes an entrance slit **239** which is disposed for cooperation with an exit slit (not shown) of the interchange unit **171**. Thus, each of the read/write stations is coupled to end **241** (FIG. **8**) of the interchange unit so that the incoming strip channel **219** of the interchange unit communicates with the entrance slit **239** of the read/write station, to allow video strips to travel into the read/write stations from the interchange unit **171**.

As further shown in FIG. **9**, the entrance slit **239** for the read/write station or buffer is located in an upstanding portion **243** of the loop shaped conduit **231**. Spaced toward the other side of the top of conduit **231**, there is another upstanding portion **245**, which provides an exit slit **247**. Slit **247** faces outwardly and in a direction opposite to the direction in which entrance slit **239** faces.

On the top side of the read/write stations or buffers **41**, **43** as further shown in FIG. **9**, there are two cross-over connectors **249**, **251**, the cross-over connector **249** serving as a strip input connection which may be mechanically coupled to the end **241** of the interchange unit **241** for passing strips into entrance slit **239**, and the cross-over connector **251** serving as a strip output connection for feeding a video strip back into end **241** of the interchange unit **171**, from exit slit **247**, after it has been processed in the buffer.

The top of the read/write station also includes an air duct **253** for connection to one of the aforementioned tubular ducts **37**, **39**, and consequent receipt of fan blown air into the buffer duct **235**.

As has been previously known in the art, at the bottom of each of the read/write stations, a suitable stepping motor **255** is located, for driving one or more heads across the video strip during its movement in the enclosed loop of the buffer.

It will thus be seen that one of the read/write stations such as **41**, **43** is located toward the rear of video strip file **11**, near its rear (as shown in FIG. **1**), so that video strips may be selected from their associated file slits, fed from their drawers into a transverse interchange unit **171**, and then forwarded into a read/write station for processing.

For providing the desired source of fan blown air in the top of each file drawer **15**, and thus implementing the floating movement of video strips between the left corner horizontal tube section **119** and the right corner horizontal section **143** (FIG. **1**), it should be noted that underneath these sections and the channel supporting structures located between them, I have provided underlying air ducts **261** and **263**. Each of these air ducts feeds air into the generally horizontal channel path on the top side of the drawer **15**, for impelling strip move-

ment between left tube section **119** and right tube section **143**.

For returning the video strips to their respective storage slits in the file boxes **17** after they have been processed by the buffers, a structural arrangement on the right side of each drawer **15**, generally similar to the left side thereof is provided (See FIGS. **1** and **10**). Essentially, however, the structure for returning strips to their file boxes differs principally from that for taking them out, in that a separate solenoid **271** and a horizontally slidable flow direction block **273**, actuated by the solenoid **271**, is utilized for changing the channel path to return each processed video strip to its individual file box **17**. In like manner to the binary diverter mechanism **51** located on the left side of each box **17**, the same type of mechanism **51** is provided on the right side of each file box for selecting in binary fashion the desired flow path in accordance with the return address of each video strip, to return it to its specific slit in the file box **17**.

Considering further the file structures as shown in FIGS. **2** and **10**, after a strip passes through the channel turn of the corner tube section **143**, it heads in a downward direction through vertical channel **275**. Fan blown air is fed to this channel for floating the strip in a downward direction by means of panel air duct **49**, feeding into downwardly directed inlet passages **109** and exhausting ports **111** of the vertical downside tube **277**.

The vertical downside tube **277** has a series of interruptions **279** formed therein for the location of the flow diverting blocks **273**. Each interruption **279** is located slightly above horizontal alignment with a file box **17** and its associated binary diverter mechanism **51**, to provide the selectable option of two alternative flow paths for each strip before it reaches the horizontal level of its associated file box **17**. Thus, more particularly, as illustrated for the uppermost block **273** of FIG. **10**, it is located for sliding movement in tube interruption **279** just above the level of the first diverter housing **69**. Block **273** includes a curved and angular channel **281** which couples at its input end **283** to vertical channel **275**. Channel **281** extends downwardly and to the left (viewing FIG. **10**) from its input end **283**, to provide an output end **285** for communication with an angular outlet channel **287**. The outlet channel **287** is coupled to a flexible channel **289** like flexible channel **101** on the other side of each file box. Flexible channel **289** is coupled at its output to a slit **67-1** at the input side **67** of diverter mechanism **51**.

In addition to the curved and angular channel **281**, each slidably movable selector block **273** includes a vertical channel **291** which provides a vertical path for strip movement through the block **273** when it is in its left (viewing FIG. **10**) or solenoid actuated position.

For selectively actuating the block **273** to either its diverting or vertical bypass positions, the left side of block **273** is secured to a movable magnetic plunger **293** of solenoid **271**. The plunger **293** extends through an aperture in a solenoid support **295** secured to the left side (FIG. **10**) of vertical tube **277**. In addition, the main portion of plunger **293** extends through coil **297** of the solenoid **271**, which has its other end supported by a suitable recess **299** formed in a vertical base plate **301**.

For normally maintaining the flow diverter block **273** in its left position (viewing FIG. **10**), a coiled compression spring **303**, surrounds a portion of solenoid plunger **293**. Spring **303** runs in compression between shoulder **305** of the plunger and a fixed shoulder **307** located at the right side of the solenoid, so that a continuous compressive force of spring **303** urges the block **273** into its left (or bypass) position. When solenoid **271** is energized by suitable control circuitry, the block **273** is actuated so that plunger **293** moves to the right from its left position. Passageway or channel **281** thereupon communicates with vertical channel **275** and angular outlet channel **287** to return the strip to a file slit via the binary diverter mechanism **51**.

The binary diverter mechanisms **51** (FIG. **4**) on the right side of each file box **17**, work in generally the same fashion as those on the left side of each file box, to return each processed strip to a storage slit of an appropriate file box **17** and drawer **15** in accordance with its address.

As shown in FIG. **11***a*, a single read/write station or buffer **341** having a read/write transducer **343** may effectively process strips received from the upside horizontal channels **345** of all drawers **15** of a file box **11**. All strips thus enter into a cross-over path **347** for handling by the buffer and are returned to their file box via path **349**.

Alternatively, at the top of each file box drawer **15** there may be a separate buffer loop, such as the buffer loop **441** with its read/write transducer **443**. Each buffer loop **441** may thus serve all the strips in a file box drawer.

As a further alternative, on the upside of each file box drawer, an individual read/write transducer **543** may be located in each upside horizontal channel **545** for handling any strip fed into the horizontal channel at the top of the file box drawer.

As will be obvious to those skilled in the art, it may be desirable to positively stop each video strip in its associated storage slit of the file box **17**, after the strip has been returned thereto from the buffer or processing loop of the system. One technique which may be used for doing this, is illustrated in FIGS. **12***a* and **12***b*. FIG. **12***a* shows a perspective view of a file box **617**, and FIG. **12***b* shows a fragmentary section of the file box compartment taken in a plane parallel to a strip. As shown therein, the file box **617** includes a pair of oppositely disposed air vents **619** and **620** which are located on the sides or opposed vertical walls **622**, **624** of each box. From following the dash line arrows A of FIG. **12***b*, it will be noted that the strips return to the strip starting section, by means of the flow of fan propelled air outwardly through the air vent section **619**, **620**. With the strip returning from right to left in FIGS. **12***a* and **12***b*, after it passes the air vent section, it reaches successively, an air choke section, a vacuum pad section, and a strip deceleration section. The air choke section is constructed to facilitate the exodus of all the fan propelled air from the air vent section. The vacuum pad section involves a single vacuum vent **626** in side wall **626** of the box **17**, which together with the file box structure, allows a vacuum to be selectively applied to the strip in the vacuum vent and vacuum pad section. Thus, viewing FIG. **12***b*, the arrows V indicate the vacuum force applied to each strip for allowing it to

stop as a result of friction in the box. After the vacuum pressure has been applied to each strip for stopping it in the box, the strip deceleration section provides a zone in which the front or lead end of the strip will stop, as a result of friction.

It will now, therefore, be seen that I have shown and described a new and improved video strip file, designed for effectively and flexibly moving a large number of video strips into a cyclic buffer and returning them to their addressable storage slits in a completely automatic fashion. This video strip file is efficient, relatively inexpensive, and has a large number of advantageous applications.

While in accordance with the Patent Statutes, I have described what at present are considered to be the preferred aspects of my invention, it will be obvious to those skilled in the art that various changes or modifications may be made therein without departing from the spirit of the present invention.

What I claim is:

1. A data processing system for processing selected magnetic tape strips from a storage file therefor, said data processing system comprising:
- at least one elongated storage file box having a plurality of elongated slits formed therein;
- said slits being disposed in spaced apart parallel relationship;
- each of said slits providing a closed passageway having first and second ends opening outwardly from said file into oppositely disposed ends of said file box;
- a plurality of magnetic tape strips each of which is normally stored in an associated one of said slits;
- tubular conduit means disposed externally of said file box for coupling the first end of each said slit to the second end thereof, thereby to provide a closed passageway between the ends of said slit;
- said tubular conduit means including two discrete strip diverter mechanisms, one of which is located adjacent to each end of said storage file box,
- one said strip diverter mechanism being located at one end of said box and binary actuated to selectively direct an addressed strip out of its associated storage slit for movement through said closed passageway toward said transducer means, and
- the other of said strip diverter mechanisms being located at the other end of said box and binary actuated to selectively direct an addressed strip through said passageway and back into its associated storage slit after said strip has passed said transducer means;
- transducer means disposed externally of said file box and in communication with said tubular conduit means;
- an air drive means applicable to said slits for exertion of a force upon each tape strip located in said storage file box to float said strip continuously from one end of the other of said slit, through said conduit means and past said transducer means;
- and a braking means disposed between the input and output ends of the file box to control air flow adjacent the strip during its return to an associated slit in the file box for enabling said air driven strip to stop in its file box slit without producing any wear and tear upon said strip.

2. A data processing system for processing selected magnetic tape strips from a storage file therefor, said data processing system comprising:
- at least one elongated storage file box having a plurality of elongated slits formed therein;
- said slits being disposed in spaced apart parallel relationship;
- each of said slits providing a closed passageway having first and second ends opening outwardly from said file into oppositely disposed ends of said file box;
- a plurality of magnetic tape strips each of which is normally stored in an associated one of said slits;
- tubular conduit means disposed externally of said file box for coupling the first end of each said slit to the second end thereof, thereby to provide a closed passageway between the ends of said slit;
- said tubular conduit means including two discrete strip diverter mechanisms, one of which is located adjacent to each end of said storage file box,
- one said strip diverter mechanism being located at one end of said box and binary actuated to selectively direct an addressed strip out of its associated storage slit for movement through said closed passageway toward said transducer means, and
- the other of said strip diverter mechanisms being located at the other end of said box and binary actuated to selectively direct an addressed strip through said passageway and back into its associated storage slit after said strip has passed said transducer means;
- transducer means disposed externally of said file box and in communication with said tubular conduit means;
- an air drive means applicable to said slits for exertion of a force upon each tape strip located in said storage file box to float said strip continuously from one end to the other of said slit, through said conduit means and past said transducer means;
- said file box including a braking means disposed between its input and output ends, which braking means comprises successively an air vent section, an air choke section, a vacuum pad section and a strip deceleration section,
- said sections providing control of air adjacent said strip during its return to an associated slit in the file box, to enable said air driven strip to stop with its front end located in the deceleration section.

3. A data processing system for processing selected magnetic tape strips from a storage file therefor, said data processing system comprising:
- at least one elongated storage file box having a plurality of elongated slits formed therein;
- said slits being disposed in spaced apart parallel relationship;
- each of said slits providing a closed passageway having first and second ends opening outwardly from said file into oppositely disposed ends of said file box;
- a plurality of magnetic tape strips each of which is normally stored in an associated one of said slits;
- tubular conduit means disposed externally of said file box for coupling the first end of each said slit to the second end thereof, thereby to provide a closed passageway between the ends of said slit;

said tubular conduit means including two discrete strip diverter mechanisms, one of which is located adjacent to each end of said storage file box,

one said strip diverter mechanism being located at one end of said box and binary actuated to selectively direct an addressed strip out of its associated storage slit for movement through said closed passageway toward said transducer means, and

the other of said strip diverter mechanisms being located at the other end of said box and binary actuated to selectively direct an addressed strip through said passageway and back into its associated storage slit after said strip has passed said transducer means;

transducer means disposed externally of said file box and in communication with said tubular conduit means;

an air drive means applicable to said slits for exertion of a force upon each tape strip located in said storage file box to float said strip continuously from one end to the other of said slit, through said conduit means and past said transducer means;

said tubular conduit means including a series of longitudinally spaced apart pairs of diametrically opposed inlet passageways, with alternate pairs of exhausting ports located between each pair of inlet passageways and the next pair of inlet passageways;

said air drive means providing a source of fan driven air entering the tubular conduit means through said inlet passageways to provide a substantially uniform flow of air throughout said tubular conduit means.

4. A video strip file for storing, reading from, and writing video information upon, magnetic tape strips, said file comprising:

a housing;

a plurality of drawers removably mounted in said housing;

said drawers each having a plurality of elongated storage file boxes removably secured thereto;

each said storage box having first and second oppositely disposed ends;

said boxes being disposed in parallel relationship in each drawer so that the first ends thereof are located in proximity to each other on one side of said drawer, and the second ends of the boxes are located in proximity to each other on the other side of said drawer;

each said file box having a series of elongated slits formed therein and opening into said first and second ends of said box;

said slits being disposed in spaced apart parallel relationship and having first and second ends corresponding respectively to the first and second ends of their associated file box;

a plurality of magnetic tape strips one of which is normally stored in each associated one of the slits in said boxes;

tubular conduit means externally of each said file box and supported by said drawer for coupling the first ends of the slits of said boxes to the second ends of the slits of said boxes;

said conduit means including strip diverter means for directing any one of said strips out of its slit at said first end of a storage file box and returning said one strip to the same slit at the second end of its associated storage file box;

said strip diverter means comprising first and second groups of slidable strip diverting blocks;

said first group of diverting blocks being located adjacent the first end of each file box and binary actuated for movement in a direction perpendicular to said strip slits to provide outwardly convergent strip diverting passageways to steer a strip toward a transducing means from said first end of said file box;

said second group of diverting blocks being located adjacent the second end of each file box and binary actuated for movement in a direction parallel to the direction of movement of said first group of blocks to provide inwardly convergent strip passageways for steering the strips toward the second end of said file box after processing by said transducing means;

said transducer means logistically associated with said drawer and disposed in operable communication with strips passing through said conduit means;

an air drive means selectively applicable to said slits for exertion of a substantially uniform force upon any strips located in said file box slits to float one of said strips continuously from one end to the other end of said slit, through said conduit means for reading from and writing upon said strip at said transducer means;

and a braking means disposed between the input and output ends of each of the file boxes to control air flow adjacent the strip during its return to an associated slit in the file box for enabling said air driven strip to stop in its file box slit without producing any wear and tear upon said strip.

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