United States Patent

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[54] **RETAINING PIN AND ACTUATION APPARATUS**
23 Claims, 18 Drawing Figs.

[52] U.S. Cl. 209/80.5
[51] Int. Cl. B07c 5/34
[50] Field of Search 209/80.5, 110.5

[56] References Cited
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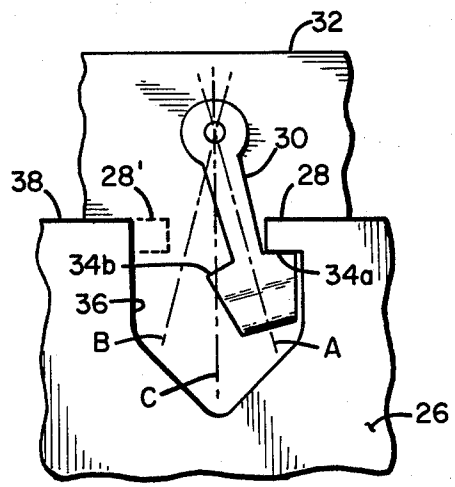
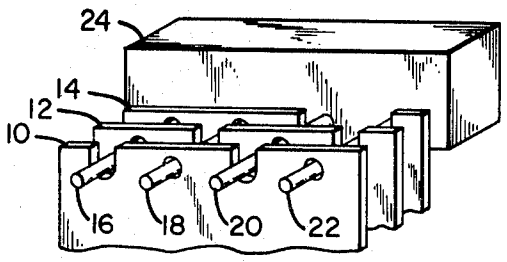
ABSTRACT: A selectively actuatable retaining pin for use with information bearing documents is disclosed. A selectively actuatable retaining pin having a ramp portion for assisting in the return of information bearing documents to the supported position is also shown. Various configurations of the selectively actuable retaining pins are shown, with each of the embodiments utilizing the return ramp. Various mechanical and pneumatic means for actuating a specific retaining pin are described.





PRIOR ART

Fig. 1

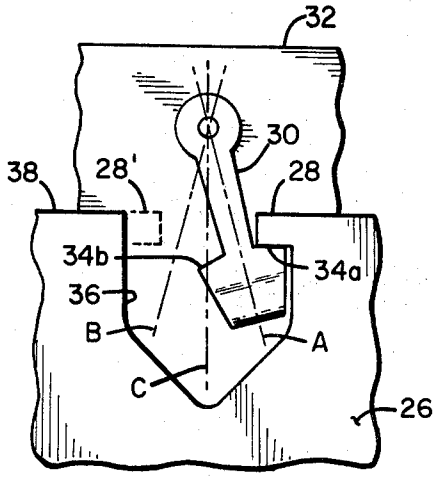


Fig. 2

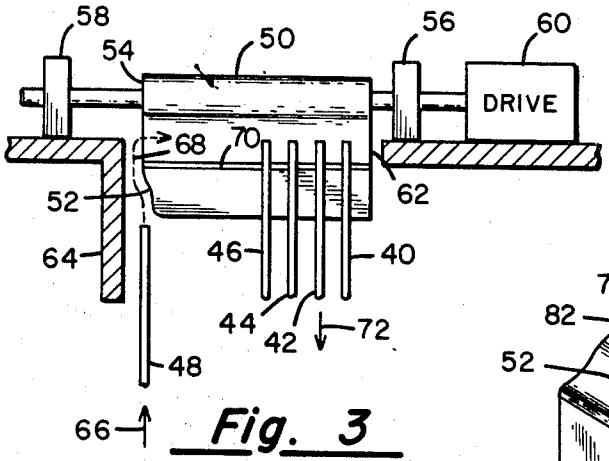


Fig. 3

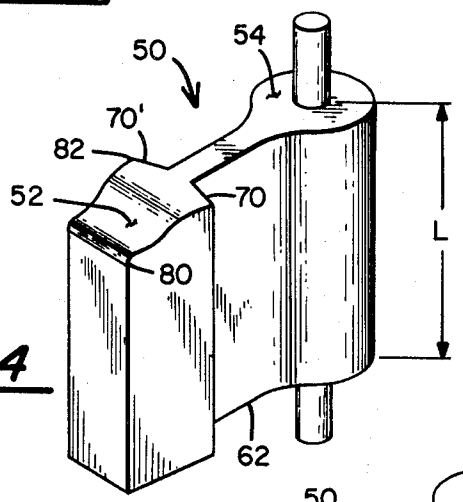
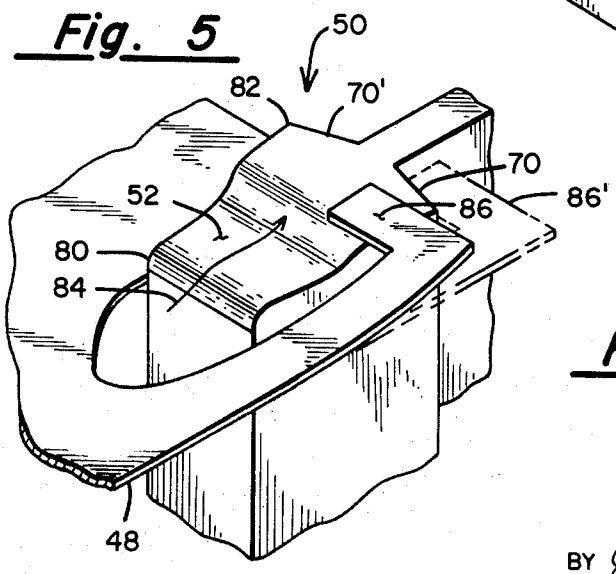


Fig. 4

Fig. 5



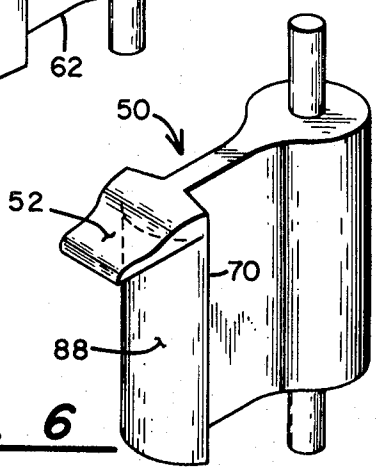


Fig. 6

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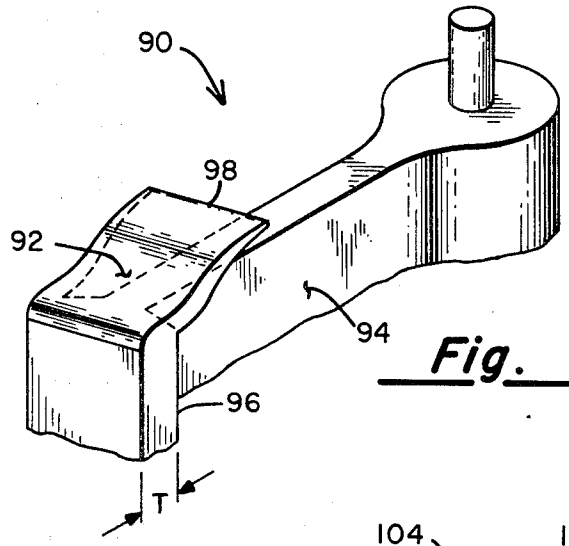

Fig. 7

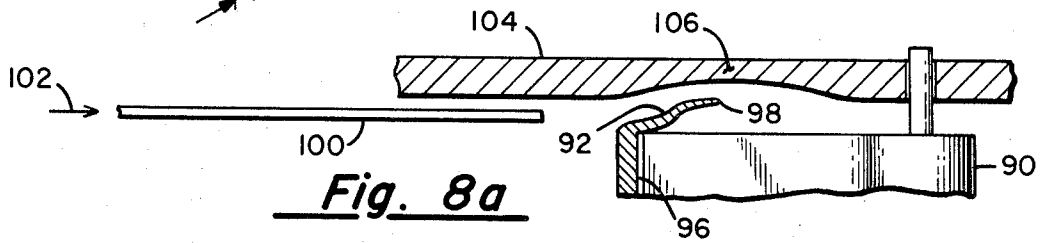

Fig. 8a

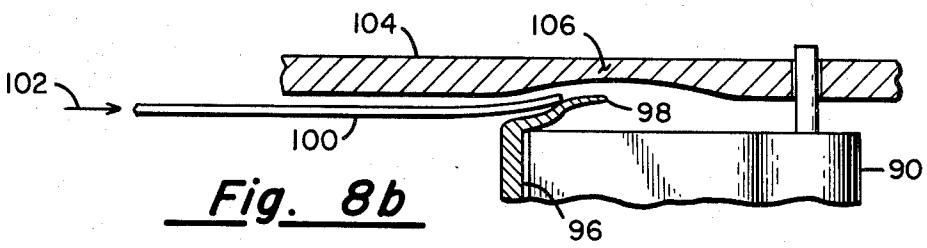

Fig. 8b

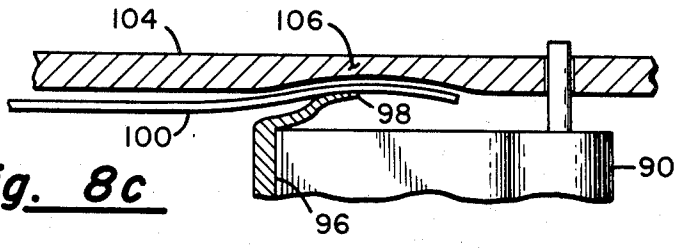

Fig. 8c

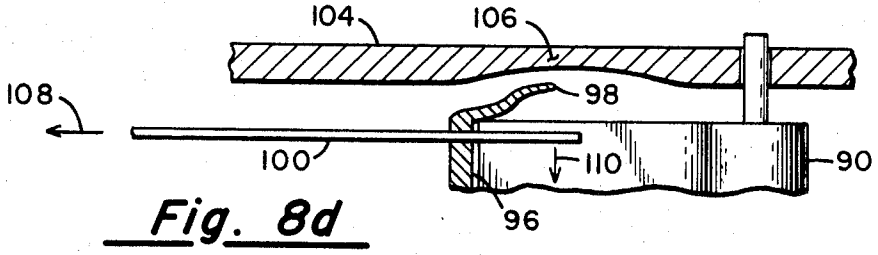

Fig. 8d

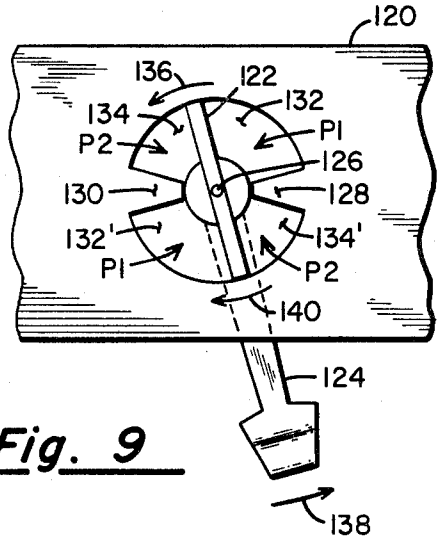

Fig. 9

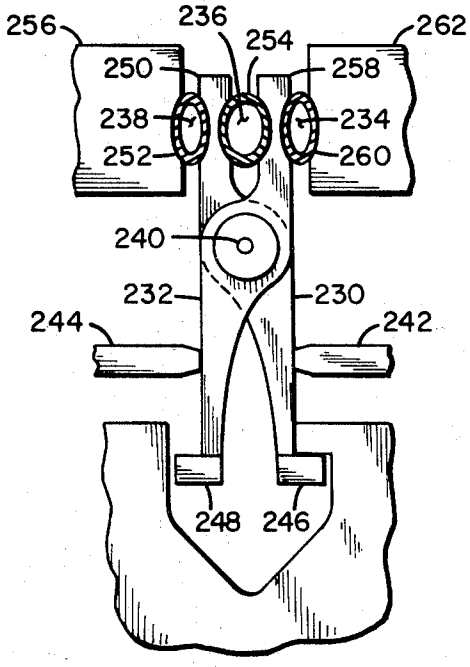

Fig. 14

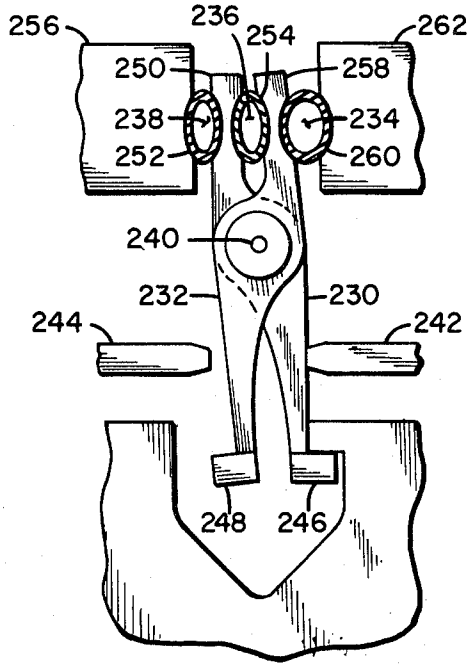

Fig. 15

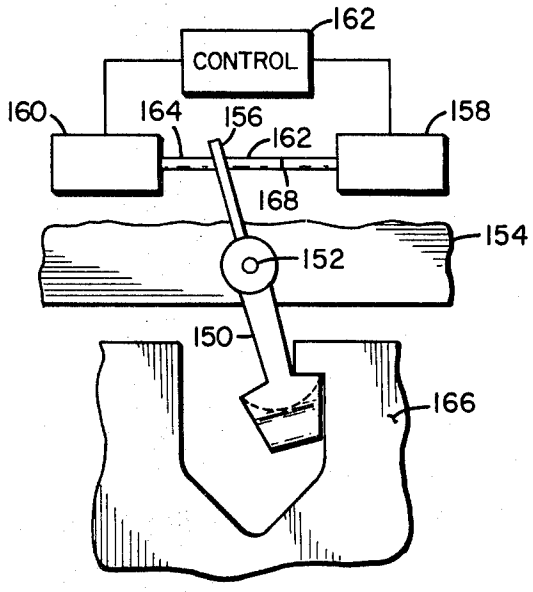

Fig. 10

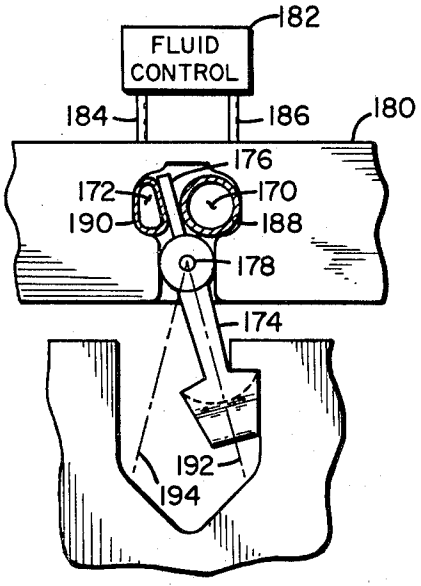

Fig. 11

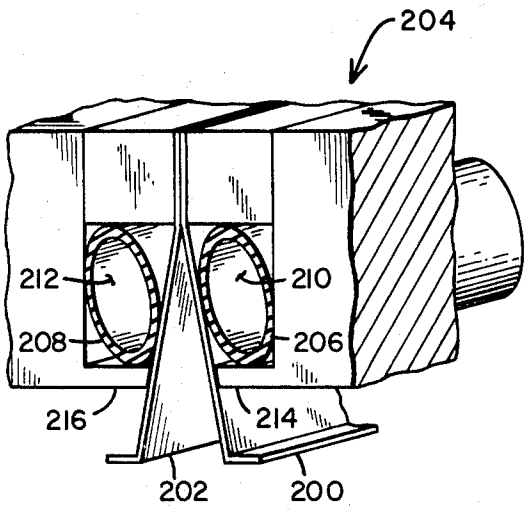

Fig. 12

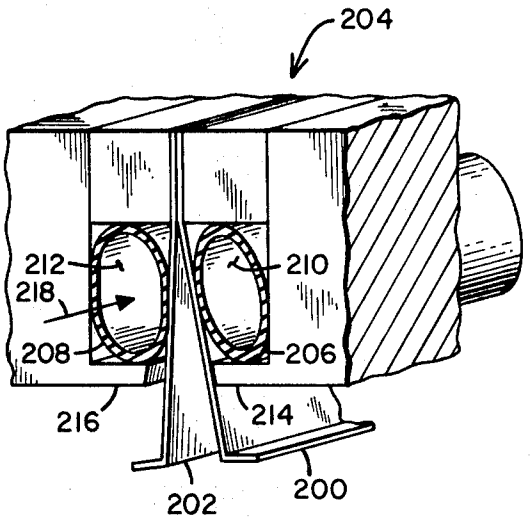

Fig. 13

RETAINING PIN AND ACTUATION APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to information processing and handling equipment. More specifically, the invention relates to the field of data handling apparatus employing information bearing documents that are capable of being individually selected from among a plurality of stacked documents. Still more specifically, the invention relates to a selectively actuable retaining pin having a ramp portion, and that can be utilized with documents having coded notches, and the documents arranged for cooperating with a plurality of the retaining pins for rendering the document selectable depending upon the appropriate actuation of the retaining pins associated therewith.

2. Description of the Prior Art

Information handling systems utilizing end-coded documents arranged in a side-by-side relationship and retained by a plurality of supporting pins are known in the prior art. The documents can be comprised of various materials known to the prior art; and, characteristically, can be a plastic or Mylar material coated with a magnetizable layer for permitting the recording and reading of data by magnetic recording and reading circuits. Methods of selection of a predetermined one of the end-coded documents known in the prior art include pulling selected ones of the support pins, thereby permitting the appropriate document to be freed from retention and available for reading or recording, and turning selected retaining pins or rods in support slots for freeing the selected documents. The disadvantages of pulling the retaining pins are many. With relatively large stacks of documents, the distance of pins travel can become excessive and render the rate of access extremely slow. Further, such systems most often have the retaining pins supported at one end only, thereby providing a structural wear problem for relatively large stacks of documents. Additionally, in order to return a document to the stack it is necessary to either provide a means for again pulling the appropriate combination of support pins to permit the document to be reinserted in the stack, or to provide auxiliary return paths and having the document inserted over the ends of the retaining pins. Either of these solutions are inadequate in high speed equipment in that they drastically reduce the cycling rate for the sequential selection of documents, and increase the cost of the structure and controls required in the document handling and retention portion of the system. Those systems in the prior art that utilize the rotatable selection of retaining pins with notched coding in the ends of the documents find advantage over the pulling of the retaining pins in that the rotatable retaining pins can be supported at both ends, thereby greatly enhancing the structural rigidity of the support system. However, the systems in the prior art that utilize the rotatable supporting pins also have the disadvantage common with that of the pulled retaining pins in that to reinsert a selected document in the stack it is necessary to rotate the appropriate retaining pins that provide support for the card being reinserted so that the document can be placed in the stack. Again, it is clear that such a sequence for reinsertion prohibits the selection of a subsequent document until such time as the document being reinserted has been moved to a position where the retaining pins can again be rotated to the retaining position for holding the document in place.

SUMMARY

In summary, then, this invention contemplates an improved selectively actuatable retaining pin for use in document handling apparatus employing end-coded documents arranged in a side-by-side relationship wherein the documents may be selected by the appropriate actuation of a combination of retaining pins for releasing one of the documents of the stack. The documents selected can be positioned anywhere within the stack of documents, but when returned to the stack are always returned at a predetermined end-location. The improved selectively actuatable retaining pin of this invention includes a document-return ramp portion for permitting the return of a document to the stack of documents with the retaining pins being in the locked or retaining position, or in a position in combination for the selection of some other document from the stack. This permits a subsequent document to be selected during the same time period that a previously selected document is returned to the stack. The invention includes in combination with the novel selectively actuatable retaining pins, improved apparatus for actuating selected ones of said retaining pins.

The primary object of this invention, then, is to provide an improved selectively actuatable retaining pin for use in document handling apparatus. Another object of this invention is to provide an improved selectively actuatable retaining pin having a ramp portion for permitting the return of documents to the stack of documents while the retaining pins are in a locked document retaining position or in a selection position specified for a different document. Still a further object of this invention is to provide an improved means for actuating a retaining pin. Yet a further object of this invention is to provide pneumatic means for actuating a retaining pin. These and other more detailed and specific objectives of the invention will become apparent when the detailed description of the preferred embodiment is considered in light of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagrammatic view of a portion of a prior art document handling apparatus employing retaining pins that must be pulled to make a document selection; FIG. **2** is a diagrammatic view of a retaining pin that is rotatable, together with a portion of a supported document; FIG. **3** is a diagrammatic view of documents arranged in a side-by-side relationship and illustrated a document being returned at the ramp shaped end of the retaining pin; FIG. **4** is a perspective view of one embodiment of the improved retaining pin of this invention; FIG. **5** is a diagrammatic view illustrating the return of a document to the stack with a retaining pin in the locked or document retaining position; FIG. **6** is an alternative embodiment of the improved retaining pin of this invention; FIG. **7** is a partial perspective view of another form of the retaining pin of this invention having the ramp portion offset from the body of the retaining pin; FIGS. **8***a*, **8***b*, **8***c* and **8***d* illustrate the path of document travel as the document is returned to the stack when the retaining pin illustrated in FIG. **7** is utilized; FIG. **9** illustrates one embodiment of pneumatic actuator for a retaining pin; FIG. **10** illustrates an electromechanical pin actuation arrangement; FIG. **11** is a diagrammatic view of an actuation system using a pair of opposed pneumatic chambers in which the pressures can be selectively altered for imparting motion to the retaining pin; FIG. **12** is a diagrammatic view of spring document-retaining members capable of being pneumatically actuated; FIG. **13** is a diagrammatic view of the elements of FIG. **12** with one of the spring document-retaining members being actuated by the application of pneumatic pressure thereto; FIG. **14** is an end diagrammatic view of a pair of rotatable retaining pins utilizing three pneumatic chambers for controlling the positions of the two retaining pins; and FIG. **15** is an end diagrammatic view of the structure of FIG. **14** with one of the retaining pins in the actuated position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Document handling equipment utilizing a plurality of stacked documents having hole and notch end-coding arrangements are known in the prior art. FIG. **1** illustrates a portion of such a prior art device. A plurality of documents such as **10**, **12**, and **14** are arranged to be supported by retaining pins **16**, **18**, **20**, and **22**. The retaining pins are mounted in pin control mechanism **24**. It is of course apparent that there are many portions of the document handling apparatus that are not illustrated in FIG. **1**, it being intended only to illustrate the

coding and pin arrangement for purposes of discussion of the document retention and selection operation. It can be seen that document **10** is supported by pins **18** and **22**, with pins **16** and **20** being disposed in notched end-openings. In order to select document **10** for removal from the stack, it is necessary for the pin control mechanism **24** to actuate pins **18**, and **22** by pulling them from the stack. When so pulled, it is clear that the document **10** will be free to be removed from the stack. The coding of the other documents **12** and **14** is such that the removal of pins **18** and **22** from the stack will still leave pins **16** and **20** supporting them, and they will be retained in a stacked relationship. It is of course well known that the number of pins will depend upon the number of documents to be included in the stacked arrangement for permitting a unique pin combination for the selection of each of the documents.

A consideration of the prior art arrangements indicates that when the stack of documents is relatively large, the distance of pin travel of the selected pins can be quite large. It is apparent that the longer the distance of the pin travel the longer the time that must be allowed for the selection of a new document. Since the goal of the document handling apparatus is normally to have the capability of handling as many documents as possible, this disadvantage of the time required for pulling pins is accentuated for those systems operating with large stacks of documents. When the document is to be returned to the stack, it is necessary to again pull the supporting pins. For document **10**, it would be necessary to again pull pins **18** and **22** in order to permit document **10** to be reinserted in the stack. As mentioned above, the time required to pull the pins for large stacks becomes a critical factor, and when it is necessary to pull the pins for reinsertion, the time is doubled for the consideration of sequencing of documents. Another problem that exists, is that the document must be maintained in an aligned position while the pins are allowed return to the retained position in order to prevent document dropout. The sequence of selection, then, is to pull the pins retaining the desired document, extract the document for utilization, repull the pins for reinsertion, align the document in the stack, and then permit the retaining pins to return to the retaining position. When this sequence has been completed, the pins retaining another selected document can be pulled and the sequence repeated.

The prior art retaining pins that are rotated, to release notched edges in the ends of the documents eliminate some of the problem incident to the pulling of retaining pins. The rotational operation of the prior art retaining pins eliminates the problem of being suspended at one end only, and can be made to operate at rates substantially faster than that of pulling of retaining pins. The operational rate can be also be made independent of the number of documents in the stack in that it is necessary only to rotate the retaining pin and not pull it through the entire depth of the stack. The prior art rotational systems do, however, have the disadvantage during reinsertion of a document in the stack of having to be rotated into a released position during reinsertion. This requires extra time and has the problem of document dropout. Accordingly, the system does not permit overlapping of the selection of a subsequent document during the reinsertion of a first document.

FIG. **2**, is a diagrammatic view of a retaining pin that is rotatable, together with a portion of a supported document. The document **26** has a support portion **28**, also referred to a retaining tab, at one side of a retaining pin receiving notch. The rotatable retaining pin **30** is mounted in a support housing **32**. The retaining pin **30** is provided with a first supporting surface **34***a* and a second supporting surface **34***b*. When pin **30** is in the retaining position shown, that is with its centerline arranged along axis A, the supporting surface **34***a* engages the retaining tab **28** and tends to hold document **26** in a supported position. Shown in dashed line at the left side of the notch opening, is a representation **28'** of an alternate supporting tab. In the absence of such a supporting tab **28'**, the notch side **36** is straight to the end **38** of the document. However, supporting tab **28'** can be included with the document **26** in a manner such that when the retaining pin **30** is in the position shown by dashed line B, the supporting surface **34***b* will contact tab **28'** and tend to support document **26**. In the absence of tab **28'**, when pin **30** is moved to the position indicated by dashed line B, the document **26** would be released from support by pin **30** and would be free to move if all other supporting pins are likewise selected. In a similar manner, when pin **30** is moved to a position indicated by dashed line C, the document **26** will be free to be removed since the surfaces **34***a* and **34***b* will fit between the ends of tabs **28** and **28'**.

It should be noted, that the arrangement of the tabs such as **28** and **28'** can result in various coding techniques. For instance, if the system is to be considered to be a two-position system only, there would be arrangements of either tabs or no tabs at one side only of the notch. As illustrated, the retaining pin **30** would be associated with tab **28**, when in the A position, or associated with a straight side at the right side of the notch in the absence of tab **28**. To select, for the two-position system, the pin **30** could be moved to either positions B or C and the selection would be made. In a two-position system there would be no tab **28'**. Alternatively, a three-position system can be utilized wherein tabs **28** or **28'** can exist, and where either side of the notch can be straight to the end portion **38**. This results in a three-position pin operation wherein the pin **30** can retain the document **26** either in the A position or in the B position depending upon the existence of the respectively associated tabs. The three-position system permits a greater capacity coding system with the same number of retaining pins. That is, in a two-position system, there will either be present or absent a retaining tab **28** in each of the coded slots. The presence or absence of these tabs can be directly represented in binary number system. However, in the three-position system there will be either present or absent tabs **28** and **28'**, thereby giving a higher ordered arrangement wherein a binary coded representation for selecting a desired document will have to be decoded to determine whether it is necessary to actuate the pin, and whether it is necessary to actuate to the right or left, to release the associated tab.

FIG. **3** is a diagrammatic view of a plurality of documents such as documents **40**, **42**, **44**, and **46**, arranged in a spaced-apart side-by-side relationship, and illustrates another document **48** being returned to the stacked relationship. FIG. **3** illustrates a single retaining pin **50** having a cross-sectional shape substantially as that shown in FIG. **2**, and, additionally, having a ramp portion **52** at the return end **54** of pin **50**. Pin **50** is rotatably supported at each end by support members **56** and **58**. A drive means **60** is coupled to the end **62** of pin **50**. Of course, the drive means **60** could equally as well be coupled to end **54**, or along the length of pin **50**. A guide portion **64** operates to cooperate with documents being returned, to guide them to a proper relationship with pin **50**. During the return of a document to the stack, the document is urged in the direction of arrow **66**. As document **48** is urged into the vicinity of ramp **52**, it is deflected as shown by dashed arrow **68**. It can be seen that the document **48** is held between guide portion **64** and ramp portion **52**. When the notched portion is moved above supporting surface **70**, the document **48** will be in a stacked relationship with the other documents. To select another document, such as document **42**, it is necessary for the drive systems **60** associated with the respective retaining pins **50** to actuate the retaining pins, thereby releasing document **42** for movement in the direction of arrow **72**. The utilization portion of the document handling apparatus is not illustrated.

FIG. **4** is a perspective view of one embodiment of the improved retaining pin of the invention, and illustrates a type of retaining pin, like pin **50** in FIG. **3**. In this configuration, the document-return end **54** is integrally formed with the ramp portion **52**. In this configuration, the retaining surfaces **70** and **70'** are utilized. This FIG. illustrates that the ramp portion **52** has a slightly rounded leading edge **80** with a sloping portion leading to rounded portion **82**. This rounded and sloped relationship assists the leading edge of the document in deflecting

outwardly and sliding over the ramp portion as shown by arrow 68 in FIG. 3. For the configuration of retaining pin illustrated in FIG. 4, it can be seen that the shape of the ramp portion 52 extends along the entire length L of the retaining pin 50.

FIG. 5 is a diagrammatic view illustrating the return of a document 48 to the stack of documents with the retaining pin 50 in the locked or document-retaining position. The direction of document movement is in the direction of arrow 84 over the ramp 52 of pin 50. It can be seen that the tab portion 86 is deflected outwardly as the document 48 proceeds in the direction of arrow 84. When the document 48 has proceeded far enough so that the tab 86 passes support surface 70, the tab will go into the position referred to as 86', shown in dashed line, and will engage support surface 70 to hold the document 48 in a retained position. It is clear, therefore, that it is unnecessary to have pin 50 in a released position in order to return a document to the stack.

FIG. 6 is an alternative embodiment of the improved retaining pin of this invention, wherein the mass of the retaining pin is reduced by having the ramp 52 of pin 50 have a portion extending beyond the lower surface 88 of the retaining portion of pin 50. It can be seen that the rounded portion of the pin, when compared with the configuration of the pin in FIG. 4, results in a greatly reduced mass for pins having a substantial length L.

FIG. 7 is a partial perspective view of an alternative embodiment of a document-retaining pin referred to generally as 90 and illustrates the ramp portion 92 offset from the body 94 of the retaining pin. In this arrangement, the thickness T of the retaining portion 96 can be minimized and the over all mass of the pin greatly reduced. In this arrangement, the document extends beyond the end 98 of ramp 92 and falls back to be retained on the surface of portion 96.

FIGS. 8*a*, 8*b*, and 8*c*, and 8*d* illustrate the path that a document travels as the document is being returned to the stack, when a retaining pin as shown in FIG. 7 is utilized. In FIG. 8*a*, there is illustrated a document 100 moving in the direction of arrow 102 as it approaches the pin 90 for reinsertion in the stack. It can be seen that a guiding wall 104 is provided for supporting the end of pin 90 and for forming a guide for the document 100. In this arrangement, wall 104 has a reduced cross section 106 in the vicinity of ramp 92 for guiding the end of document 100 outwardly and over the end 98 of ramp 92. FIG. 8*b* illustrates the leading end of document 100 as it impinges on ramp 92. FIG. 8*c* illustrates document 100 in a position where motion has stopped with the supporting tabs of the document beyond the ends 98 of ramp 92. Finally, FIG. 8*d* illustrates document 100 moving in the direction of arrow 108 toward contact with supporting surface 96. In this position, the tab end of document 100 is moving toward the stack of documents in the direction of arrow 110.

Having discussed several embodiments of document-retaining pins, attention will next be directed toward consideration of various configurations of pin actuation devices. FIG. 9 illustrates one embodiment of a pneumatic actuator for a retaining pin. In this arrangement, there is housing 120 for supporting a plurality of document-retaining pins. A vane 122 is fixed to the end of a retaining pin 124, which in turn is rotatably mounted at axis 126. The halves of vane 122 form a pair of variable chambers on either side of projections 128 and 130. That is, a chamber 132 and a chamber 134 is formed at the upper portion of the apparatus, and a chamber 132' and a chamber 134' is formed at the lower portion. Chambers 132 and 132' are coupled to a source of fluid pressure P1 (not shown) with the pressure P1 applied thereto causing rotation of vane 122 in the direction of arrow 136 and the movement of pin 124 in the direction of arrow 138. During the time of application of pressure P1, the chambers 134 and 134' are exhausted. To move the vane 122 in the direction of arrow 140, it is necessary to apply a pressure P2 to chambers 134 and 134' while exhausting chambers 132 and 132'. The protrusions 128 and 130 operation both to define the boundaries of the chambers, and as stops for controlling the extent of motion of vane 122, thereby limiting the movement of pin 124. In this arrangement, the fluid pressure can be exerted either by way of a pneumatic pressure or by the use of hydraulic fluids.

FIG. 10 illustrates an electromechanical pin actuation arrangement wherein a pin 150 is rotatably mounted at axis 152 in a support housing 154. The pin 150 has a vane 156 for cooperating with a pair of solenoids 158 and 160. A control portion 162 cooperates with solenoids 158 and 160. In the position illustrated, the armature pin 162 of solenoid 158 is urging vane 156 against the armature pin 164 of solenoid 160. In this arrangement, the document-retaining pin 150 is in the retaining position and supports document 166. In order to select document 166, it would be necessary for control 162 to provide a control signal to solenoid 158 causing armature pin 162 to be withdrawn to the dashed line position referred to as 168, and to provide a control signal to solenoid 160 causing armature pin 164 to be extended. The extension of armature pin 164 causes vane 156 to be urged to a position to come into contact with armature pin 162. Movement in this manner will cause pin 150 to be rotated out of supporting contact with the tab of document 166. In this configuration, the armature pins 162 and 164 operate both as stop mechanisms and as the actuation mechanism in conjunction with vane 156.

FIG. 11 there is shown a diagrammatic view of an actuation system using a pair of opposed pneumatic chambers 170 and 172 in which the pressures can be selectively altered for imparting motion to the retaining pin 174 by virtue of movement of vane 176. Again, the pin 174 is rotatably mounted about axis 178 in housing 180. A source of fluid control is derived from fluid control 182 through fluid conduits 184 and 186 which cooperate with chambers 172 and 170 respectively. The chambers 170 and 172 are formed by a pair of flexible tubes 188 and 190. The tubes 188 and 190 run along the length of vane 176 and are held within the housing 180. With a constant pressure applied from conduit 184 to chamber 172, the variation of pressure in chamber 170 from zero to some value, for instance twice the pressure of chamber 172, will cause the pin 174 to move from position indicated by dashed line 192 to the position indicated by dashed line 194. In this arrangement, it is of course clear that chamber 172 can be pressurized and sealed, thereby providing a firm and known cushion responsive to the pressure changes in chamber 170. Alternatively, a device can be operated such that as pressure is increased in chamber 170, the pressure is decreased in chamber 172. And for the reverse operation, it would then be necessary to decrease the pressure in chamber 170 while increasing the pressure in chamber 172. This later form of operation requires additional control in the fluid control 182.

In FIG. 12 there is a diagrammatic view of a spring-type document-retaining pin capable of being pneumatically actuated. In this arrangement, a pair of spring pins 200 and 202, respectively. Tube 206 forms a chamber 210 and tube 208 forms a chamber 212 in the position illustrated in FIG. 12, the pins 200 and 202 are urged due to their spring characteristic against stop portions 214 and 216, respectively. In this arrangement, they are in the document retaining position. In the document retaining position, the pressure in chambers 210 and 212 an be of a pressure value of anything less than the pressure necessary to overcome the spring force of pins 200 and 202.

In FIG. 13 there is illustrated the elements of FIG. 12 with all elements having the same reference numerals as referred to in FIG. 12, and illustrates the effect of applying a pressure in the direction of arrow 218 to cause the chamber 212 to be expanded against the surface of the pin 202. The application of this pressure causes pin 202 to be driven away from stop member 216 for a distance of sufficient to release a document that would otherwise be retained thereby. It is of course clear, that the actuation of pin 200 can be accomplished in a similar manner by the application of a pressure to chamber 210. The ramp portions are not illustrated it being understood that the ramp can be integrally formed on each of the pins 200 and 202

as illustrated in FIG. 6, or, alternatively, can be formed on the pins as shown in FIG. 7.

FIG. 14 is an end-view of a diagrammatic representation of a pair of rotatable document-retaining pins 230 and 232 utilizing three pneumatic chambers, referred to as 234, 236, and 238, for controlling the positions of the two retaining pins. In this arrangement, the pins 230 and 232 are separate and are each rotatably mounted at axis 240. In the retaining positions, pins 230 abuts stop member 242, and pin 232 abuts stop member 244. Pin 230 as ramp portion 246 and pin 232 has ramp portion 248. In this configuration, pin 230 is arranged with vane 250 intermediate tubing 252 and tubing 254. Flexible tubing 252 is retained between vane 250 and mount portion 256. In a similar manner, pin 232 has vane 258 intermediate tubing 254 and tubing 260. Tubing 260 forms chambers 234 and is retained between vane 258 and the mount portion 262. In the document retaining position, a constant pressure source (not shown) is applied to tubing 254 thereby charging chamber 236 to a predetermined pressure. At this time, the fluid pressure applied to chamber 234 and 238 are reduced substantially, thereby permitting the expansion of chamber 236 to hold vanes 250 and 258 in their outward most position as determined by stop members 242 and 24.

FIG. 15 is a diagrammatic view of the structure of FIG. 14 wherein pin 232 has been actuated and moved to the nonretaining position. Elements bear the same reference numeral as applied in FIG. 14. In this arrangement, the pressure applied to chamber 236 remains constant, and the pressure applied to chamber 238 is at a reduced level. The pressure applied to chamber 234 it substantially larger, for instance twice as large, as the pressure applied in chamber 236. This increase to pressure in chamber 234 causes movement of vane 258 for applying pressure to the tube 254, thereby tending to compress chamber 236. This compression of chamber 236 is transferred to chamber 238 with pin 232 thereby being moved to the nonretaining position. It is clear, that pin 230 is restrained from moving any appreciable distance in the direction of the document side by the action of stop member 242. The operation of pin 232 is similar.

It should be understood that the various elements and configurations shown are diagrammatic only and do not necessarily disclose precise dimensional relationship between the elements.

CONCLUSION

In viewing the foregoing discussion, when taken in light of the drawings, it is clear that the various stated objectives of the invention have been met. The various document-retaining pin configurations all utilize the ramp for deflecting the coded end of the document for allowing the document to be returned to the stack with the retaining pin in the lock position. It can be seen that such an arrangement permits an enhanced cycling rate for the document handling apparatus that employs this invention. By utilization of the ramp on the retaining pin, a document can be returned to the stack of documents simultaneously with the actuation of the appropriate combination of retaining pins for implementing the selection of the next subsequent desired document from the stack. The various pin actuation embodiments described provide enhanced operation in the control of the selection and actuation of the retaining pins. Further, the pneumatic actuation systems utilize sources of pneumatic pressures and controls that are normally found in high speed document handling apparatus, thereby providing easily controlled actuation of the retaining pins without requiring substantial additional hardware to perform the pin actuation, as is required when gears, rack and pinion, pall arrangements, and the like, are utilized.

Having, therefore, described in detail embodiments of the invention, with modifications in the structural relationships being evident to those skilled in the art without departing from the spirit and scope of the invention, what is intended to be protected by Letters Patent is set forth in the appended claims.

I claim:

1. For use in document handling apparatus having a plurality of documents arranged in a stacked side-by-side relationship in a supporting structure, with each of said documents having end-coded notches rendering said document individually selectable and removable from the stack, the document-retaining apparatus including: selectively actuatable document-retaining pin means for cooperating with the end-coded notches in the documents, said pin means having a document-retaining position and a document-releasing position, and said pin means including an elongated body portion having first and second ends, a document supporting surface for cooperating with the end-coded notches of the documents, mounting means for movably mounting said first and second ends, and ramp means associated with said first end for deflecting the end-coded portion of a document being returned to the stack for permitting the document to be returned to the stack with said pin means in said document-retaining and said document-releasing positions.

2. Document-retaining apparatus as in claim 1 wherein said pin means further includes a second document supporting surface, and a second document-retaining position for providing a three-position end-code for each of said pin means.

3. Document-retaining apparatus as in claim 1 wherein said ramp means includes leading surface means for cooperating with the end portion of a document as it is returned to the stack for deflecting the end away from the stack, ramp surface means integrally formed with said leading surface means and formed at a predetermined angle outwardly extending from the stack of documents, and turning surface means integrally formed with said ramp surface means for permitting the associated end-coded notch of the returning document to engage said document supporting surface.

4. Document-retaining apparatus as in claim 3 wherein said trailing surface means of said ramp means is integrally formed with and is an extension of said document supporting surface.

5. Document-retaining apparatus as in claim 3 wherein said leading surface means is formed with said first end of said body portion and said trailing surface means is separated from said body portion, and said document supporting surface extends toward said second end of said body portion from a position on said ramp means intermediate said leading surface means and said trailing surface means.

6. Document-retaining apparatus as in claim 3, and further including actuation means in cooperation with said selectively actuatable document-retaining pin means for selectively imparting motion to said pin means for causing the position of said pin means to be changed between said document-retaining position and said document-releasing position.

7. Document-retaining apparatus as in claim 6 wherein said actuation means includes vane means coupled to said pin means, and control means associated with said vane means for selectively imparting motion thereto for causing said pin means to be moved.

8. Document-retaining apparatus as in claim 7 wherein said control means includes fluid means for causing said pins means to be moved in response to change in fluid pressure in said fluid means.

9. Document-retaining apparatus as in claim 8 wherein said fluid means includes first expansible fluid chamber means in cooperative arrangement with one side of said vane means, and second expansible fluid chamber means in cooperative arrangement with another side of said vane means.

10. Document-retaining apparatus as in claim 7 wherein said control means includes first selectively actuatable solenoid means in cooperation with one side of said vane means, second selectively actuatable solenoid means in cooperation with another side of said vane means, and selection control means coupled to said first and second selectively actuatable solenoid means for selectively providing selection signals thereto for imparting desired motion to said vane means.

11. Document-retaining apparatus as in claim 3, and further including stop means in cooperation with said selectively actuatable document-retaining pin means for limiting the movement of said pin means.

12. Document-retaining apparatus as in claim 11, wherein said selectively actuatable document-retaining pin means includes spring means urging said pin means toward said stop means in said document-retaining position, and further includes control means in cooperation with said spring means for urging said pins means away from said stop means when actuated during the selection of a document associated therewith.

13. For use in document handling apparatus having a plurality of document arranged in a stacked side-by-side relationship in a supporting structure, with each of said documents having end-coded notches rendering each document selectable and removable from the stack, apparatus comprising: a plurality of selectively actuatable document-retaining pins for cooperating with the end-coded notches of the documents, each of said pins having at least one document-supporting surface, and first and second ends; housing means for movably supporting said pins in a predetermined spaced-apart relationship; actuation means coupled to said pins for selectively moving selected ones of said pins to document-releasing positions while others of said pins are retained in a document-retaining position for the selection of a desired document from any position in the stack; and ramp means associated with said first ends of said pins for permitting the document to be returned to the end of the stack while said pins are in said document-retaining position, and alternatively, while ones of said pins are in a document-releasing position for selecting a different document.

14. Apparatus as in claim 13 wherein said ramp means includes leading surface means for cooperating with the end-portion of a document as it is returned to the stack for deflecting the end away from the stack, ramps surface means integrally formed with said leading surface means and formed at a predetermined angle outwardly extending from the stack of documents, and trailing surface means for permitting the associated end-coded notches of the returning document to engage said document supporting surface.

15. Apparatus as in claim 14 wherein said actuation means includes vane means coupled to said pins, and control means associated with said vane means for selectively imparting motion thereto for causing the respectively associated pin to be moved.

16. Apparatus as in claim 15 wherein said control means includes fluid means for causing said pins to be moved in response to changes in fluid pressure in said fluid means.

17. Apparatus as in claim 16 wherein said fluid means includes for each of said pins, first expansible fluid chamber means in cooperative arrangement with one side of said vane means, and second expansible fluid chamber means in cooperative arrangement with another side of said vane means.

18. Three-position document-retaining apparatus for use in a document handling apparatus having a plurality of documents arranged in a stacked side-by-side relationship in a supporting structure, with each of said document having end-coded notches rendering each document selectable and removable from the stack, comprising: retaining pin means, each including first and second selectively actuatable document-retaining pins for cooperating with the end-coded notches of the documents, each of said pins having a document-supporting surface, first and second ends, and having a document-retaining position and document-releasing position; mounting means for movably mounting said first and second pins in a cooperative relationship with one another; and actuation means coupled to said first and second pins for selectively moving said pins between said positions for the selection of a desired document.

19. Three-position document-retaining apparatus as in claim 18 wherein said actuation means includes pneumatic control means in cooperation with said first and second pins for controlling the movement of said pin means.

20. Three-position document-retaining apparatus as in claim 19 wherein said pneumatic control means includes expansible chamber means associated with a portion of each of said pins for imparting motion thereto in response to controlling pneumatic pressures.

21. Three-position document-retaining apparatus as in claim 20 wherein said first and second pin each include vane means associated therewith, and said expansible chamber means includes a first pneumatic chamber in cooperation with one of said vane means, a second pneumatic chamber in cooperation with the other of said vane means, and a third pneumatic chamber in cooperation with both of said vane means, the movement of said first and second pins being determined by the pneumatic pressure relationship in said first, second, and third pneumatic chamber means.

22. Three-position document-retaining apparatus as in claim 20, wherein said first and second pins each include spring means for biasing said pins to a document-retaining position, and said expansible chamber means includes first and second pneumatic chamber means respectively associated with said first and second spring means for imparting movement to said first and second pins in response to increased pneumatic pressure therein.

23. Three-position document-retaining apparatus as in claim 18 and further including ramp means associated with each of said first and second pins, each of said ramp means including leading surface means for cooperating with the end portion of a document as it is returned to the stack for deflecting the end away from the stack, ramp surface means formed with said leading surface means and at a predetermined angle outwardly extending therefrom, and trailing surface means for permitting the associated end-coded notch of the returning document to engage said document-supporting surface.