A reader for document cards having a read station with a pneumatically actuated electric switch assembly which is easily removable from the reader by swinging the assembly upwardly out of detent held position and then detaching the assembly from a multiple contact socket. The cards are fed to the read station from a hopper having document card pick rolls on its bottom which are moved into card picking position by a pneumatic actuator releasably held in a carrier from which the actuator may be easily removed for replacement. The pick rolls are carried by a swinging carrier in which the rolls are releasably held under spring pressure for easy replacement. The reader includes a stacker with a stacker full switch held by a pair of pins from which the switch may be detached for easy replacement.

13 Claims, 21 Drawing Figures
PNEUMATIC DOCUMENT CARD READER

BACKGROUND OF THE INVENTION

1. Field of the invention

The invention relates to readers for perforated document cards, and more particularly to such readers which perform their function by the application of pneumatics, the perforations swung.

2. Description of the Prior Art

Prior document card readers have generally been of the electrical type in which perforated document cards are fed over a read station having electrical contacts extending through and completing electrical circuits for reading the various perforations. Optical readers have also been generally used in which light shining through the perforations in document cards actuates light sensitive devices for providing indications of the particular perforations in the cards.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved document card reader of the pneumatic type with a read station comprising a pneumatically actuated electrical switch assembly which senses the perforations in document cards and which is easily removable from the reader for replacement. To this end, it is an object of the invention to provide such a switch assembly which is held in operative position in the reader by detent mechanism and which is received in an electrical socket from which the assembly may be withdrawn, after the assembly has been swung out of operative position against the action of the detent mechanism.

It is another object of the invention to provide a hopper in the reader for the document cards having pick rolls on its bottom which are moved into operative position for picking a card by means of a pneumatic actuator, the actuator being easily removed from a holder therefor for easy replacement.

It is also an object to mount the pick rolls by means of a swinging carrier, with the pick rolls being held in proper position with respect to a drive shaft and the carrier by means of a spring, so that the pick rolls may be removed for replacement simply by moving the pick rolls in an axial direction against the action of the spring.

It is also an object of the invention in connection with a card stacker in the reader to provide a stacker-full switch which is easily removed from mounting pins simply by sliding the switch off of the pins for easy replacement.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of the document card reader of the invention;
FIG. 2 is a sectional view taken on line 2–2 of FIG. 1;
FIG. 3 is a rear elevational view of the document card reader;
FIG. 4 is a top plan view of the reader;
FIG. 5 is an exploded perspective view of an electrically controlled pneumatic actuator used in the reader;
FIG. 6 is a rear view of one of the component blocks in the pneumatic actuator;
FIG. 7 is a sectional view taken on line 7–7 of FIG. 5;
FIG. 8 is a plan view of the pneumatic actuator in assembled condition;
FIG. 9 is an end view of the actuator;
FIG. 10 is an end view of the pneumatic actuator together with the fixture for holding the pneumatic actuator;
FIG. 11 is a side view of the fixture;
FIG. 12 is another side view of the fixture taken from the other side;
FIG. 13 is a perspective view of an air plenum constituting a part of the read station of the reader;
FIG. 14 is an exploded perspective view of a pneumatic read head assembly of the reader together with adjacent parts;
FIG. 15 is a bottom view of the read head assembly;
FIG. 16 is an elevational view of the read head assembly;
FIG. 17 is an exploded view of a document card pick roll assembly in the card hopper of the reader;
FIG. 18 is an exploded view of the upper portion of the card stacker of the reader;
FIG. 19 is a view of a micro-switch in the card stacker together with the socket receiving the terminals of the micro-switch;
FIG. 20 is a sectional view taken on line 20–20 of FIG. 14; and
FIG. 21 is a face view of a document card usable in the reader.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, a document card 20 of the type, adapted to be read by the reader of the invention, may be seen to have a print area on its upper portion and tiers 1, 2, and 3 on its lower portion. The card 20 may have punched openings 22 through it in the tiers, and these punched openings may be in 32 columns in each of the tiers. Each column may contain as many as six punched openings 22, and these may be labeled 1, 2, 4, 8, A and B. Therefore, the first 32 columns of punchings 22 may lie in tier No. 1; columns 33 to 64 of the punchings 22 may lie in tier No. 2 and columns 65 to 96 of the punchings 22 may lie in tier No. 3.

The reader of the invention comprises, in general, a hopper 24, a read station 26, and a stacker 28 for handling the document cards 20. The hopper 24, read station 26, and stacker 28 are all fixed with respect to a backbone or frame 30 of the machine.

The hopper 24 has a bottom 32 and front and rear walls 34 and 36. The bottom 32 has an upwardly extending portion 38, and oblong openings 40 are provided in the portion 38. A document pick roll 42 is disposed in each of the openings 40, and the rolls 42 are fixed onto a shaft 44. The rolls 42 are movable upwardly through the openings 40 by virtue of being rotatably mounted in a carrier 46 disposed beneath the bottom 32 of the hopper 24. The carrier 46 is swingably mounted by means of a flexure spring 48 so as to provide this vertical movement of the rolls 42.

One end of the shaft 44 is received in a cylindrical cavity 50 formed in carrier 46, and the other end of the shaft 44 is provided with a cavity 52 having flats 54. The carrier 46 has a shaft 56 rotatably mounted therein with external flats 58 on one end, and this end of shaft 56 extends into the cavity 52 with the flats 58 and 54.
providing a driving connection between shaft 56 and shaft 44. A spring 60 yieldably holds the driving end of the shaft 56 within the cavity 52 in shaft 44.

A document card throat 62 is provided at the forward end of the hopper 24 by means of a shoe 64 fixed on the bottom 32 of the hopper 24 and a downwardly tapering edge surface 66 on the front hopper wall 34. The clearance between the edge surface 66 and shoe 64 is just slightly greater than the thickness of a document card 20 so that only one card 20 may pass at a time through the throat 62.

The read station 26 comprises an air plenum 68 having a cavity 70 therein to which air under pressure is supplied as will be subsequently described. The plenum 68 has a row of ports 72 extending through its upper surface and in communication with the cavity 70, and these ports 72 have the same spacing as the openings 22 in aligned columns of the card 20; for example, aligned columns 1, 33 and 65. The plenum 68 has opposite side rails 74 and 76 fixed with respect to the plenum 68, and an undulating leaf spring 78 extends along the inner edge of the rail 74 in a groove 79 so as to force a document card 20 into firm sliding engagement with the rail 76 as the card passes through the read station. The spring 78 has a return bent end portion 78a fitting in a slot 74a in the rail 74. A pair of pins 80 and 82 extend upwardly from the rails 74 and 76 respectively, and a pin 84 having an enlarged tapered upper head 86 extends upwardly from the rail 76.

A pneumatic switch assembly 88 is disposed above the plenum 68. The assembly 88 has a row of ports 90 each of which is in register with one of the ports 72. The switch assembly may be of any suitable construction internally such as that disclosed in the co-pending application of D. F. Jensen, et al, for Pneumatic Reading System for Document Cards, Serial No. 156,728, filed June 25, 1971, and includes an internal electric switch which corresponds to each of the ports 90 and which is closed when air under pressure is applied to the port 90. The assembly 88 includes an inwardly extending flange 92 of insulating material which carries a contact strip 94 connected to each of the electric switches. The assembly 88 in its lower surface is provided with slots 96 and 98 for receiving the pins 80 and 82, respectively, and an opening 100 that becomes greater in diameter internally from the lower face of the assembly 88 so as to form a snap or detent connection with the pin 84.

The flange 92 has a slip connection with a connector or socket 102. The connector 102 is U-shaped in cross section and has a contact 104 on its inner surface for engaging and embracing each of the contact strips 94. The connector 102 has a pair of shaft portions 106 extending from its ends, and these are received in slots 107 formed in the frame 30. A pair of leaf springs 108 and 109 bear on the connector 102 and yieldably force the assembly 88 downwardly and forwardly so as to yieldably maintain the detent connection of the assembly 88 with the headed pin 84. An electric cable 110 provides respective connections to the individual contacts 104.

A card feed roll 112 fixed on a shaft 114 is provided for moving a card 20 into and through the read station 26, once the card has passed through the throat 62, and a pressure roll 116 mounted on a vertically disposed, leaf flexure spring 118 is provided for holding the card firmly in contact with the roll 112.

A card propelling roll 120 fixed on a shaft 122 is provided for moving the card 20 through the read station 26 and into the hopper 28. A pressure roll 124 mounted in a holder 126 and acted on by a spring 127 has a nip with the roll 120 to prevent slippage between roll 120 and the card 20. A combined emitter wheel and hand wheel 128 is fixed onto the shaft 122, and a magnetic emitter 130 is located in close proximity to the periphery of the wheel 128. The wheel 128 carries a plurality of circumferentially spaced pieces of magnetic material in its periphery so that an electric pulse is generated in the emitter 130 for each of these magnetic pieces for controlling reading circuitry connected with the switches in the assembly 88 by means of the cable 110.

The stacker 28 has a back 132, and a stacker-full switch 134 is disposed on the back 132. The switch 134 comprises a micro-switch unit 136 having an actuator 138. The unit 136 has a pair of openings through it and is removably held in place on the back 132 by means of a pair of pins 140 and 142 extending through the openings in the switch unit 136. A switch actuating arm 144 is swingably disposed on a shaft 146 carried by back 132 and has a return bent portion 148 adapted to lie on another shaft 150 carried by back 132. A return bent clip 152 also extends around the shaft 146 and overlies a portion of the arm 144 so that the clip 152 swings with arm 144. The downwardly depending portion of the clip 152 directs cards 20 into the hopper 28 as they move between rolls 120 and 124, and the arm 144 when moved by a stack of cards 20 in the hopper 28 contacts the actuator 138 and closes the switch within the unit 136 which may be connected to suitable circuitry for thereupon causing operation of the reader to cease. The switch unit 136 has a pair of output terminals 154 and 156, and an electrical connector 158 has a sliding fit on the terminals 154 and 156.

The carrier 46 for the pick rolls 42 is moved by means of a pneumatic actuator 160. The actuator 160 has a piston rod 162 that bears against the carrier 46 and moves the carrier 46 upwardly when the piston rod 162 is moved in this direction. The actuator 160 is held in position by a U-shaped fixture or holder 164 fixed to frame 30 and having arms 166 and 168 on the opposite sides of the actuator 160. The arm 166 has a relatively wide groove 170 on its inside surface, and the arm 168 has a relatively narrow groove 172 in its inside surface. The actuator 160 has a relatively wide tongue or rib 174 on one side and has a relatively narrow tongue or rib 176 on its other side, and the ribs 174 and 176 respectively enter and are contained in the grooves 170 and 172, assuring that the actuator 160 can only be inserted into the fixture 164 in one disposition therein. In order that the actuator 160 may be held firmly in position in the fixture 164, the arms 166 and 168 when free of the actuator 160 may be more closely spaced than when the actuator 160 is in position; and if desired, suitable mating protrusions and depressions may be provided in the inner surfaces of the arms 166 and 168 and the outer surfaces of the actuator 160 for detent action.

The actuator 160 has a pair of air inlet conduits 178 and 180 extending from one side thereof and has a pair
of electrical terminals 182 also extending from this side of the actuator 160. Corresponding openings are provided in the fixture 164 for receiving the conduits 178 and 180 and for receiving the terminals 182 so that proper connection to a supply of air under pressure (hereinafter described) and to electrical circuitry can be made when the actuator 160 is inserted into its proper position in the fixture 164.

The actuator 160 is formed by a block 184, a diaphragm 186, a block 188, tape 190, a block 192, tape 194, a diaphragm 196, tape 198, a block 200, tape 202, and a plate 204 connected together in the order just mentioned into a single assembly. The rod 162 is fixed to a piston 205 provided in a cavity 206 formed in the blocks 184 and 188. The conduits 178 and 180 are carried by the block 192. The conduit 180 is connected to a pair of small ports 207 and 208, and the conduit 178 is connected to a cavity 210 which is one of a series of cavities including cavities 212, 214 and 216. A divider 218 is provided between cavities 210 and 212, and a divider 220 is provided between cavities 214 and 216. An electric solenoid 222 is provided in a suitable central cavity in the block 192, and solenoid 222 has an axially movable armature 224 which constitutes a permanent magnet. The armature 224 carries a valve piece 226; and, when the armature 224 and valve piece 226 are at the limits of their upward movement in block 192, air jetting from the port 207 is blocked (although the valve piece does not seal the port 207), while air jetting from the port 208 is blocked when the armature 224 and valve 226 are at the lowermost limits of their movement. A magnet 228 is disposed in a suitable recess in block 200, and this constitutes magnetic means for acting on the armature 224 for bringing it to its uppermost position.

The cavities 212 and 214 are connected with the cavity 206 by suitable openings in the block 188 and tape 190. The cavity 216 is connected with atmosphere by means of a suitable recess 230 in the block 192.

The tape 194, the diaphragm 196 and the tape 198 are provided with cutouts, as illustrated, which are in alignment with certain portions of the blocks 192 and 200. In particular, the block 200 is provided with ports 232, 234, 236 and 238 extending therethrough which are in alignment with some of these cutouts and which are connected by channels 240 and 242 in block 200, these being for specific functions to be hereinafter described.

For driving the pick rolls 42 and the card propelling rolls 112 and 120, pulleys 244 and 246 are respectively fixed on shafts 122 and 56 and pulleys 248 and 250 are fixed onto shaft 114. The pulley 244 is preferably combined with the emitter 128, and the pulleys 248 and 250 are preferably provided on a single piece of material. All of the pulleys are of the peripherally serrated type for cooperating with internally toothed belts. The prime mover is an electric motor 252, and this has a simple toothed pulley 254 on its output shaft. An internally toothed belt 256 extends around the pulleys 254, 244, and 250, and a similar internally toothed belt 258 extends around the pulleys 248 and 246.

An air pump 260 is mounted on the rear end of the motor 252 and constitutes the source of air pressure for the actuator 160 and the read station 26. A conduit 262 is connected with an air filter unit 264. The unit 264 has a porous air filter 266 therein, and the unit 264 is closed by a cap 268 that screws onto the unit 264 and is located at the front of the machine just below the actuator 160.

A conduit 270 constitutes the output of the pump 260, and the conduit 270 is connected to an air plenum 272 formed in the backbone 30 of the machine. A pair of smaller diameter conduits 274 and 276 are respectively connected to supply pressure air to the read station 26 and to the actuator 160, in particular to the conduits 178 and 180 of the actuator 160.

In the operation of the reader, a stack of the document cards 20 is positioned in the hopper 24, face up, and with the print areas toward the front of the machine. The actuator 160 is energized for each of the cards 20 to be moved out of the hopper 24 toward the read station 26. The actuator 160 upon energization has its piston 205 and piston rod 162 moved upwardly, and the rod 162 swings the carrier 46 upwardly about its flexure 48. The pick rolls 42 are thus moved in the openings 40 through the bottom 32 of the hopper 24 so as to make frictional contact with the lowermost card 20 in the card stack. The shaft 44 and pick rolls 42 are driven from the motor 252 by means of the belt 256, the pulleys 254, 244, and 250, the belt 258 and the pulleys 248 and 246. The lowermost card 20 is thus moved through the throat 62 toward the read station 26.

The pneumatic actuator 160 is energized in order to cause this movement of the pick rolls 42 by applying an electric potential to the terminals 182. Air under pressure is supplied to both of the conduits 178 and 180 from the conduits 274, the plenum 272, the conduit 270, and the pump 260. The pump 260 derives the air that is compressed by the pump, as is apparent, through the air filter 264 and the conduit 270. The armature 224 has been held to the upper limit of its movement by the action of the magnet 228 on the magnetized armature 224; and, upon application of an electromotive force to the terminals 182, the solenoid 222 is energized and pulls the armature 224 and valve 226 downwardly to the limits of their movement. The valve 226 in this position diverts air jetting through the port 208 from the conduit 178, and this air flows sidewardly through the block 192 to atmosphere. Under these conditions, therefore, no jetted air is supplied through the port 234, the channel 240 and the port 236 onto the diaphragm 196; and the diaphragm 196 is therefore not sealed on the divider 218. Air under pressure is supplied to the cavity 206 from the conduit 178, and this air under pressure flows from the cavity 210 and through the cavity 212 to the lower side of the diaphragm 186. The air under pressure applied to diaphragm 186 moves the piston 205 and piston rod 162 upwardly so as to swing the pick roll carrier 46 and pick rolls 42 upwardly for picking a card 20 as above mentioned.

After the card 20 has moved out of the hopper 24, the solenoid 222 is de-energized, and the armature 224 and valve 226 move upwardly under the action of the magnet 228. In this position of the valve 226, it blocks and diverts the jet of air flowing through the port 207, allowing the air to vent upwardly through the associated recess in the block 192; and the jet of air through the port 208 in this case is directed through the
port 234, the channel 240, and the port 236 so as to seal the diaphragm 196 onto the divider 218. The flow of air under pressure from the cavity 210 to the cavity 212 and to the diaphragm 186 then ceases. Blockage of the port 207 by the valve 226 ceases the application of air under pressure onto the diaphragm 196 from the port 238, and the cavity 214 connected with the diaphragm 186 is thus opened to atmosphere through the cavity 216 and recess 230. The piston 205 and rod 162 then move back into their original positions under the weight of the carrier 46 and pick rolls 42, with the pick rolls at this time being out of engaging relation with a card 20 on the bottom of the stack of cards in the hopper 24.

As the document card 20 passes through the throat 62, the card is engaged between the rolls 112 and 116. The roll 112 is driven from the pulley 250 and the shaft 114 on which this pulley is mounted, and the card 20 passes through the read station 26. It will be noted that the leaf spring 118 holds the roll 116 cantilevered with respect to the roll 112, and this disposition of the roll 116, as well as the spring 78, holds the card 20 in engagement with the rail 76 as the card 20 passes through the read station 26. Any existing card holes 22 align with the holes 72 in the plenum 68 and the holes 90 in the switch assembly 88; and, initially, those of the holes 22 that actually exist in columns 32, 64, and 96 of the card 20 are read by the read station 26. In particular, the electric switches corresponding to the existing holes 22 in the card 20 are made or closed causing electric potential to appear on the contact strips 94 and the corresponding leads in the cable 110. Subsequently, with continued movement of the card 20, the holes 22 that actually exist in the following aligned columns 31, 63, and 95; 30, 62, and 94; etc., are read by the read station 26, with the corresponding switches in the assembly 88 being closed due to the air jetted through the aligned openings 72, 22, and 90. The closed condition of the switches within the switch assembly 88 are sensed at predetermined and desired times under the control of the emitter 130 and emitter wheel 128 in accordance with conventional practice.

As the card 20 moves through the read station 26, it is engaged by the roll 120 driven by means of shaft 122 and pulley 244, with the pressure roll 124 holding the card in engagement with roll 120; and the card 20 is thus moved into the stacker 28. In particular, the card 20 strikes the downwardly depending leg of the clip 152 and is thereby directed downwardly into the stacker. Subsequent cards 20 in the stack of cards within the hopper 24 pass in the same manner through the machine into the hopper 28 and are read by the machine.

When a sufficient number of the cards 20 have been read by the machine so as to fill the stacker 28 to the extent that the uppermost cards move the portion 148 off of its shaft 150 to a substantial extent, the arm 144 acting on the actuator 138 of the switch unit 136 closes the switch unit 136. Suitable circuitry connected with the switch unit 136 then has the effect of turning off the motor 252 and causing the reader to cease operation.

Various units in the machines are so constructed and connected with the rest of the machine that they may be easily removed and replaced in the event that these units become defective and inoperative. In order to replace the actuator 160, it is only necessary to grasp the opposite edges of the actuator 160 and pull it out of its holder 164. The defective actuator 160 may then be replaced. The assembly of the pick rolls 42 and the shaft 44 may be easily removed from the carrier 46, assuming that the pick rolls 42 need replacement, by moving the shaft 44 and pick rolls 42 rearwardly of the machine against the spring 60 and then swinging the pick roll-shaft assembly away from the cavity 50 and out of the carrier 46. This is best accomplished with the actuator 160 having been previously removed from its retaining fixture 164. In the event that the switch assembly 88 needs replacement, the assembly 88 is swung upwardly, initial swinging movement being against the action of the detent which includes the headed pin 84 cooperating with the sides of the opening 100. The swinging of the assembly 88 is with accompanying swinging movement of the socket 102 about its shaft portions 106 within the slots 107 of the frame 30. After the assembly 88 clears the headed pin 84, the assembly 88 is withdrawn from the socket 102 against the spring action of the contacts 104 and the socket 102 itself, thereby detaching the assembly 88 from the socket 102. The replacement assembly 88 may be put in place by moving the flange 92 into place between the legs of the socket 102 so as to mate the respective contacts 94 and 104, and the replacement assembly 88 is then swung downwardly so as to again mate the headed pin 84 with the sides of the opening 100 to put the replacement assembly 88 into its correct reading position. The swinging attachment of the assembly is also valuable in allowing easy access to the card path in the event of card jams. In the event that the micro-switch unit 136 becomes defective, it is only necessary to slide the electrical connector 158 off of the terminals 154 and 156 and then pull the microswitch unit 136 off of its supporting pins 140 and 142. A replacement switch unit 136 may then be put into the same position and disposition as the original unit 136. The cap 268 of the air filter unit 264 is located on the front of the machine just below the actuator 160; and, in the event it is desired to replace the filter 266, the cap 268 may be unscrewed from the front of the machine for this purpose. The spring 78 resiliently holds itself in the groove 79 and slot 74a, and this construction thus allows the spring to be snapped into and out of position for easy replacement.

What is claimed is:

1. A reader for perforated document cards comprising a hopper for the document cards, a read station, a stacker for the document cards, a pick roll, means for rotatably driving said pick roll, said pick roll being movably mounted at the bottom of said hopper and movable through an opening provided in the bottom of the hopper for moving a document card out of the hopper toward said read station, a pneumatic actuator for moving said pick roll through said opening in the bottom of the hopper so that the pick roll may act as aforesaid on a document card, said read station including a plenum having a plurality of air discharge ports in a face thereof and a
pneumatically actuated electrical switch assembly, and transport rolls for transporting a document card from said hopper between said plenum and switch assembly and then into said stacker, said switch assembly having an air reception port located opposite each of said first named ports whereby a switch in said assembly is actuated from air jetted through aligned pairs of said ports and through a document card perforation aligned with these aligned ports.

2. A reader as set forth in claim 1, said pneumatic actuator including an electric control solenoid therein for causing the actuator to be either operative or inoperative, said actuator being readily removable from the rest of the reader and having slideably detachable pneumatic and electrical connections therewith whereby the pneumatic and electrical connections may be readily broken and re-made, and electric socket means for completing electrical connections from said switch assembly and including slideably disconnectable electric contacts for ready connection and disconnection of the switch assembly with respect to the rest of the reader.

3. A machine for reading document cards comprising a read station and means for transporting document cards through said read station, said read station including a plenum having a plurality of air discharge ports in a face thereof and a pneumatically operated electrical switch assembly having an air reception port located opposite each of said first named ports, and electric socket means for making electrical connection with said switch assembly and releasable with respect to said assembly to allow the assembly to be disconnected with respect to the machine.

4. A machine for reading document cards as set forth in claim 3 and including means for releasably holding said switch assembly in document card reading position with respect to said plenum, and means for swingably mounting said socket means so that said switch assembly may be swung upwardly along with said socket means after being released and the switch assembly may then be disconnected with respect to said socket means.

5. A machine for reading document cards as set forth in claim 4, said switch assembly including a flange of insulating material carrying a series of contact strips electrically connected with pneumatically operated electrical switches in said assembly and said socket means including a female connector for embracing and receiving said flange and having an electrical contact for making contact with each of said contact strips on said flange.

6. A machine for reading document cards as set forth in claim 3, said socket means and said assembly having mating male and female connector parts carrying mating contacts and one of said parts being swingably mounted on the machine so as to allow said switch assembly to be swung upwardly out of card reading position with respect to said plenum prior to disconnection, and detent means for yieldably holding said switch assembly in document card reading position with respect to said plenum.

7. In a document card processing machine, means forming a hopper for a stack of document cards, a pick roll disposed at the bottom of said hopper and movable through an opening in the bottom of said hopper into and out of gripping relationship with respect to the lowermost card in a card stack in said hopper, means for rotatably driving said pick roll so that it propels the lowermost card out of the hopper when engaged therewith, a pneumatic actuator for moving said pick roll into gripping relationship with respect to the lowermost card in the card stack when the pneumatic actuator is in operative position, and a releasable holder for said pneumatic actuator for releasably holding the actuator in its said operative position whereby the actuator may be released from its said holder and withdrawn therefrom for replacement.

8. A document card processing machine as set forth in claim 7, said holder being U-shaped with a pair of opposite arms from which said pneumatic actuator may be withdrawn and holding the actuator in operative position due to the inherent resilience of said holder leading to move said arms together.

9. A document card processing machine as set forth in claim 7, said holder being U-shaped and receiving said pneumatic actuator and holding it between two opposite spaced arms thereof, said actuator including an electric solenoid for controlling the action of the actuator, said machine including slideably disconnecting pneumatic and electrical connections between the actuator and the rest of the machine which are respectively broken and completed when the actuator is moved out of or into operative position in said holder.

10. A document card processing machine as set forth in claim 7 and including a plurality of other additional pick rolls similar to said first named pick roll and all of which are fixed on a support shaft, said pick roll driving means including a fixed bearing portion having a recess for receiving one end of the pick roll shaft and a driving shaft portion having a non-round recess, the other end of said pick roll support shaft having a non-round cross section and being received in said non-round recess, and spring means for holding said driving shaft portion in engagement with said pick roll support shaft and allowing the pick roll support shaft to be moved axially to, in turn, move said shaft portion against said spring means whereby the assembly of said pick rolls and pick roll support shaft may be withdrawn from operative position by moving the assembly against said spring means and out of said first named recess.

11. In a document card processing machine, a stacker for receiving document cards, means for transmitting the document cards one by one into said stacker, and a stacker-full switch assembly adapted to be actuated by the document cards when they fill the stacker and including a pair of pins fixed with respect to the rest of the machine and extending through a pair of spaced openings in the switch assembly and allowing the switch assembly to be withdrawn from the pins and from the machine for easy replacement of the switch assembly.
12. A document card processing machine as set forth in claim 11, said switch assembly including a micro-switch unit having said openings therethrough and having an actuator button on its lower edge and the machine including an arm swingably mounted on a fixed shaft positioned adjacent to said switch unit and contacted by the uppermost cards in a card stack within the hopper and contacting said actuator button so as to actuate the micro-switch unit when the stacker is full of document cards.

13. In a transport for document cards, means providing a support surface over which the cards may move, a rail fixed on one edge of said support surface for acting as a guide for the document cards, a rail fixed on the other side of said surface and having a groove disposed between the rail and said surface and having a slot in its rear side adjacent one end of the rail, and an undulating leaf spring disposed in said groove and having a return bent portion extending into said slot which groove and slot yieldably hold the spring in position due to interaction with the sides of said groove and slot for firmly holding a document card in engagement with said first named rail as the document card moves over said surface.