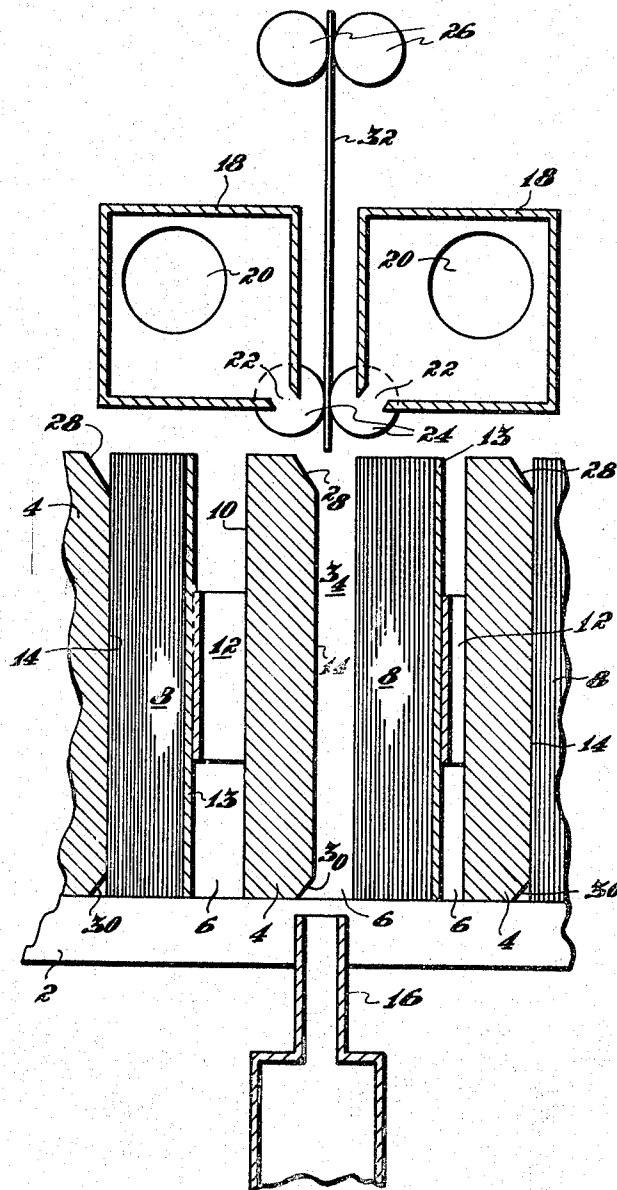


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INSERTION OF FILE CARDS
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METHOD AND APPARATUS FOR THE AIR ASSISTED INSERTION OF FILE CARDS

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This invention relates in general to a card filing system in which card decks are stored in a plurality of separate pockets in an indexable filing drum, and in which individual cards may be automatically and selectively removed from and returned to such pockets. More specifically, the present invention is directed to a novel method and apparatus for the air assisted insertion of file cards into their respective pockets in such a card filing system.

The method and apparatus of the present invention are particularly suited for use in a card filing system of the type shown and described in U.S. patent application, Serial No. 279,260, filed May 9, 1963, now Patent No. 3,225,770 and assigned to the assignee of the present invention, and the specification of that application is incorporated herein by reference. Basically, the card filing apparatus disclosed in the above application comprises an indexable filing drum rotatable about a horizontal axis and having a plurality of separate storage pockets or compartments located around its peripheral surface. The pockets are radially accessible from the outer surface of the drum, and their bottoms are provided with air ejection openings. The file cards are coded by means of notches cut into their upper edges, and a row of extensible fingers located at an access station adjacent the uppermost pocket of the drum are selectively movable to a position overlying the top edges of the cards in the pocket at the station. A nozzle is provided adjacent the bottom of the pocket at the access station for issuing a stream of air through the ejection opening therein.

To remove a desired card from the filing drum, the latter is first indexed to bring the pocket in which the desired card is located to the access station. Selected ones of the fingers corresponding in position to notches in the card to be selected are then extended over the top edges of the cards in the pocket. Following this, the nozzle adjacent the bottom of the pocket at the access station is opened to issue a stream of air through the ejection opening, and at the same time the drum is rotated through a small arc relative to the nozzle to effect the scanning of the cards in the pocket by the air stream. The laminar drag of the air stream across the surfaces of the cards tends to pull them outwardly, but the fingers extending over their top edges prevent the ejection of any card not having notches corresponding to the positions of the fingers. The desired card is not subject to such a restraint, however, and moves into the fingers to the depth of the notches under the influence of the air stream, thereby identifying that card as the selected one. The nozzle is then closed, the extended fingers are retracted, and the selected card is withdrawn by means of a drive roller transport mechanism.

The card filing system of the above application is also provided with a pair of plenum chambers positioned above and on either side of the transport mechanism for preventing the withdrawal of more than one card from the pocket by the transport mechanism, such as might tend to occur due to static adhesion between the surfaces of the cards. To this end, the plenum chambers are provided with downwardly converging outlet nozzles which direct streams of air against both sides of the selected card as it is being withdrawn from its pocket to prevent the cards adjacent to it from also being pulled

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out of the pocket. In effect, these air streams impinge against the upper edges of any adhering cards tending to strip them off of the selected one, and, in addition, they create a downward laminar drag against the sides of cards which tend to urge them back into the pocket.

To implement the insertion or reinsertion of cards into the pockets, the system is further provided with electrically operated compression fingers which are inserted through holes provided in the side walls of the pocket at the access station and into recesses in its front wall. The drum is then rotated slightly against the restraint of the fingers to compress the cards therein against the rear wall and create an entry space. In-filing may then be effected by reversing the transport mechanism to move the card down into the entry space. To assist the guiding or funneling of the card into the entry space, the upper edge of the front wall of each pocket is beveled, thus preventing any banging of the lower edges of the cards against the upper surface of the wall and avoiding card edge damage. While this compression finger arrangement is adequate for performing the function of creating an entry space, the elimination of the fingers and their associated electrical control circuitry would, of course, be desirable if simpler but equally effective means could be provided for creating the space.

Accordingly, it is a primary object of this invention to provide a novel method and apparatus for effecting the insertion of a file card into its storage pocket.

It is a further object of this invention to provide such a method and apparatus which does not require a compression finger mechanism and associated electrical control circuitry, but which utilizes other structure already present in a card filing system of the type described in the above application.

It is a further object of this invention to provide such a method and apparatus which employs air streams to create an entry space in a pocket for a file card and which thereafter assists in the actual insertion of a card into the created space.

It has been found that these objects may be fulfilled by utilizing the air streams issuing from the outlet nozzles of the plenum chambers originally provided to prevent the withdrawal of more than one card from the selected pocket. Briefly, if these downwardly converging air streams are directed into the wedge-shaped space between the beveled upper edge of the front wall or partition of a closed pocket and the front card of the deck, the resulting stream is partially deflected off the beveled edge and against the surface of the front card, to thereby compress the cards toward the rear wall of the pocket against the force of a biasing spring and thus create an entry space. The transport mechanism may thereafter be reversed to insert the card into the created space, and once the lower edge of the card enters the air stream the laminar drag of the latter against the sides of the card further assists its downward insertion. Furthermore, the lower edge of the front wall of each pocket may also be beveled, and the ejection nozzle located beneath the pocket at the access station may be opened during the card insertion operation. The air issuing from the ejection nozzle will then be similarly deflected off of the lower beveled edge and against the surface of the front card to assist in creating the entry space.

The foregoing and other objects, features and advantages of the invention will be readily apparent to those skilled in the art from the following more detailed description of a preferred embodiment of the invention as illustrated in the accompanying drawing.

The single figure of the drawing is a sectional elevation of a portion of the card selecting apparatus of the above

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application modified slightly in accordance with the teachings of the present invention.

Referring now to the drawing, there is shown a portion of a rotatable filing drum 2 provided with partitions or walls 4 which define a plurality of pockets 6 therebetween for holding decks of cards 8. One surface of each of the partitions, which may be designated the rear wall 10 of the pocket which it defines, is provided with a leaf spring 12 bearing against a compression plate 13 for urging the deck of cards toward the opposite surface or front wall 14 of the pocket.

The bottoms of the pockets 6, defined by the outer peripheral surface of the rotatable drum 2, are provided with openings into which the ejection nozzle 16 extends. As described earlier in connection with the card filing system of the above application, the stream of air issuing from the ejection nozzle 16 is directed through the opening in the bottom of the pocket at the access station for urging the selected card out of the pocket.

Positioned directly above the access station are a pair of plenum chambers 18 having pressurized air inlets 20 and downwardly converging outlet nozzles 22. In the card filing system of the above application these nozzles are employed to direct streams of air at the card ejected from the pocket at the access station as it is being fully withdrawn by the transport mechanism to prevent adjacent cards from adhering thereto and also being withdrawn. As shown in the drawing, the outlet nozzles 22 of the plenum chambers are located adjacent drive roller pairs 24 and 26 of the card transport mechanism. These drive rollers function to eject and inject cards from and into their pockets, depending upon the direction in which they are rotated. The upper and lower edges of the front wall 14 of each partition are beveled to provide surfaces 28 and 30 whose function in this invention will be described below.

In operation, when it is desired to reinsert a card 32 into its pocket, the drum 2 is rotated slightly, as necessary, to align the card with the front of the pocket as shown in the drawing. If a new card is being added to the filing system, it will first be necessary to index the drum to bring the proper pocket to the access station before the alignment rotation is effected. The pressurized air inlets 20 for the plenum chambers 18 are then opened to issue downwardly converging streams of air from the outlet nozzles 22. The streams of air merge into a single resulting stream which is directed into the wedge-shaped space between the beveled surface 28 of the front wall of the closed pocket at the access station and the front card of the deck. The stream is then partially deflected off of the surface 28 and against the front card in the deck. This compresses the cards against the spring 12 and forces them toward the rear wall 10 of the pocket to create the desired entry space 34. The drive rollers 24 and 26 are then rotated in the proper direction to drive the card into the entry space so created. When the lower edge of the card enters the air stream the resulting laminar drag against the sides of the card creates an additional downward force which further assists in the insertion of the card into the entry space.

In an optional mode of operation, the ejection nozzle 16 may also be opened at the same time that the plenum chamber nozzles are opened. This will direct an upward stream of air into the wedge-shaped space between the lower bevel surface 30 of the front wall 14 and the front card of the deck. In the same manner as was described above, this stream of air is partially deflected off of the beveled surface and against the card deck, thereby assisting in the compression of the cards against the spring 12 and toward the rear wall of the pocket to create an entry space.

In addition, the air stream issuing from the ejection nozzle 16 may, under the proper conditions, provide some cushioning effect to lessen the impact of the inserted card against the bottom of the pocket defined by the drum

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portion 2, which would tend to reduce edge damage and prolong the life of the cards.

As may be seen from the foregoing, the existing structure of the card filing system disclosed in the above application may be advantageously employed for creating entry spaces to facilitate in-filing operations, thus obviating the need for a compression finger mechanism and its associated electrical control circuitry. Furthermore, when the air streams from the plenum chambers are utilized as described, they afford an additional advantage by reason of their assistance in the actual insertion of a file card into its entry space.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions and substitutions and changes in the form and details of the method and apparatus illustrated and described, and in their operation, may be made by those skilled in the art without departing from the spirit of the invention. For example, while the air in-filing method and apparatus of the invention have been described as applied to a particular type of card filing system, it is obvious that the teachings of the invention may be applied to numerous other types of card filing systems of the open pocket type. It is intended, therefore, that the invention be limited only as indicated by the scope of the following claims.

What is claimed is:

1. An apparatus for inserting a card into a deck of similarly dimensioned cards held in a file pocket having a bottom, a front wall with a beveled upper edge and a rear wall, and in which the deck is normally compressed together and held against the front wall by a biasing spring, comprising:

(a) means defining first and second air outlets positioned adjacent the top of the pocket and oriented in such a manner that their outlet streams downwardly converge and are partially deflected off the beveled upper edge and against the deck, to thereby overcome the force of the biasing spring and urge the deck toward the rear wall to create an entry space between the front wall and the deck, and

(b) drive roller means for transporting a card between the first and second air outlets and into the file pocket, whereby the outlet streams create a drag against the sides of the card to assist its insertion into the entry space.

2. An apparatus as defined in claim 1 wherein the front wall has a beveled lower edge, and further comprising means defining a third air outlet positioned adjacent the bottom of the pocket and oriented in such a manner that its outlet stream is partially deflected off of the beveled lower edge and against the deck to thereby assist in urging the deck toward the rear wall to create the entry space.

3. An air in-filing apparatus for creating an entry space in a card pocket between a front wall thereof provided with a beveled upper edge and a card deck contained in the pocket and normally biased against the front wall by spring means, and for thereafter assisting the insertion of a card into the entry space, comprising:

(a) first and second plenum chambers having means defining downwardly converging air outlets positioned in such a manner that the resulting air stream is partially deflected off of the beveled upper edge and against the card deck, to thereby overcome the force of the spring means and urge the card deck away from the front wall to create an entry space, and

(b) drive roller means for transporting a card downwardly between the air outlets, whereby the air stream creates a drag against the sides of the card to assist its insertion into the entry space.

4. An air in-filing apparatus as defined in claim 3 wherein the front wall is provided with a beveled lower

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edge, and further comprising an air nozzle positioned adjacent the bottom of the card pocket in such a manner that its outlet stream is partially deflected off of the beveled lower edge and against the deck to thereby assist in urging the card deck away from the front wall to create the entry space.

5. A method of filing a card in a pocket defined by front and rear walls and having a deck of cards therein, comprising the ordered steps of:

- (a) directing a stream of air against the front end of the deck of cards to compress them against the rear wall and thereby create an entry space between the deck and the front wall, 10
- (b) introducing the card to be filed into the entry space so created, and 15
- (c) directing the stream of air along at least one side of the card to be filed while it is being introduced into the pocket, thereby creating a drag against the side of the card to assist its insertion into the entry space. 20

6. A method of filing a card in a pocket having a deck of cards therein, the pocket including a front wall having a beveled upper edge and an opposed rear wall, and spring means between the rear wall and the deck for compressing the deck against the front wall, comprising: 25

- (a) directing first and second downwardly converging streams of air against the beveled upper edge of the front wall, whereby the streams are partially deflected off of the edge and against the front of the deck to urge it toward the rear wall against the force of the spring means, thereby creating an entry space between the deck and the front wall, and 30
- (b) introducing a card to be filed into the entry space so created. 35

7. A method of filing a card in a pocket as defined in claim 6 wherein the card to be filed is introduced into the pocket between the first and second air streams, whereby the streams create a downward drag against the sides of the card to assist its insertion into the entry space. 40

8. A method as defined in claim 7 wherein the front wall of the pocket is provided with a beveled lower edge, and further including the step of directing an upward

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stream of air at the beveled lower edge, whereby the upward stream of air is partially deflected by the beveled lower edge toward the front of the deck to assist in creating the entry space.

9. Apparatus for filing cards, comprising

- (a) a pocket for storing a deck of cards, said pocket having opposed front and rear walls,
- (b) compressible means operable to maintain a deck of cards contained within the pocket biased toward said front wall,
- (c) an air outlet for directing a stream of air against the front of the deck of cards contained in the pocket,
- (d) means for directing air through said air outlet at a velocity sufficient to overcome said compressible means and thereby create an entry space adjacent the front wall, and
- (e) means for inserting a card to be filed into the entry space so created.

10. The method of filing a card in a pocket defined by front and rear walls and having a deck of cards contained therein, said front wall having a beveled upper edge, comprising the ordered steps of:

- (a) directing a stream of air against the beveled upper edge of said front wall so that the stream is partially deflected off of the beveled edge against the front end of the deck of cards, said stream being operative to compress the deck of cards against the rear wall and thereby creating an entry space between the deck and the front wall, and
- (b) introducing the card to be filed into the entry space so created.

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