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Bennett

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[54] SMALL SLIDE TRAY

[75] Inventor: Frank P. Bennett, Northbrook, Ill.

[73] Assignee: GAF Corporation, New York, N.Y.

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[58] Field of Search 74/422; 206/73; 353/204, 353/116

[56] References Cited

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Primary Examiner—Louis R. Prince

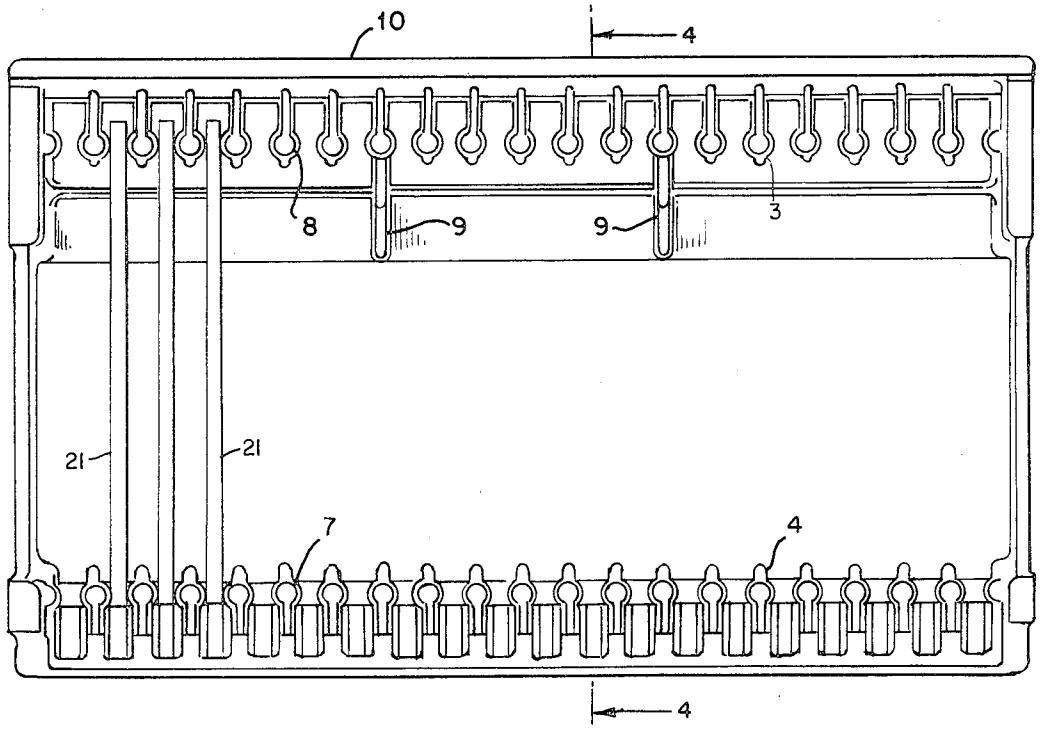
Assistant Examiner—Steven L. Stephan

Attorney, Agent, or Firm—Walter C. Kehm; Samson B. Leavitt

[57] ABSTRACT

A miniaturized slide tray with discontinuous septa for permitting a slide projector pusher to pass in a transverse manner into the tray for sequential slide advancement is provided. The tray rack is constructed of a compliant material to minimize mechanical "Q" and jumping when such tray is advanced by the projector index gear.

7 Claims, 4 Drawing Figures



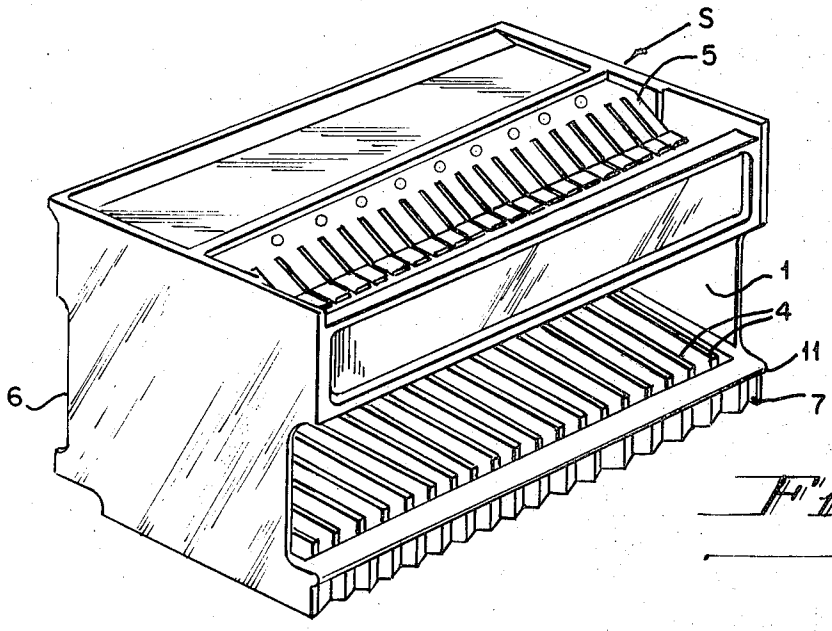


Fig. 1

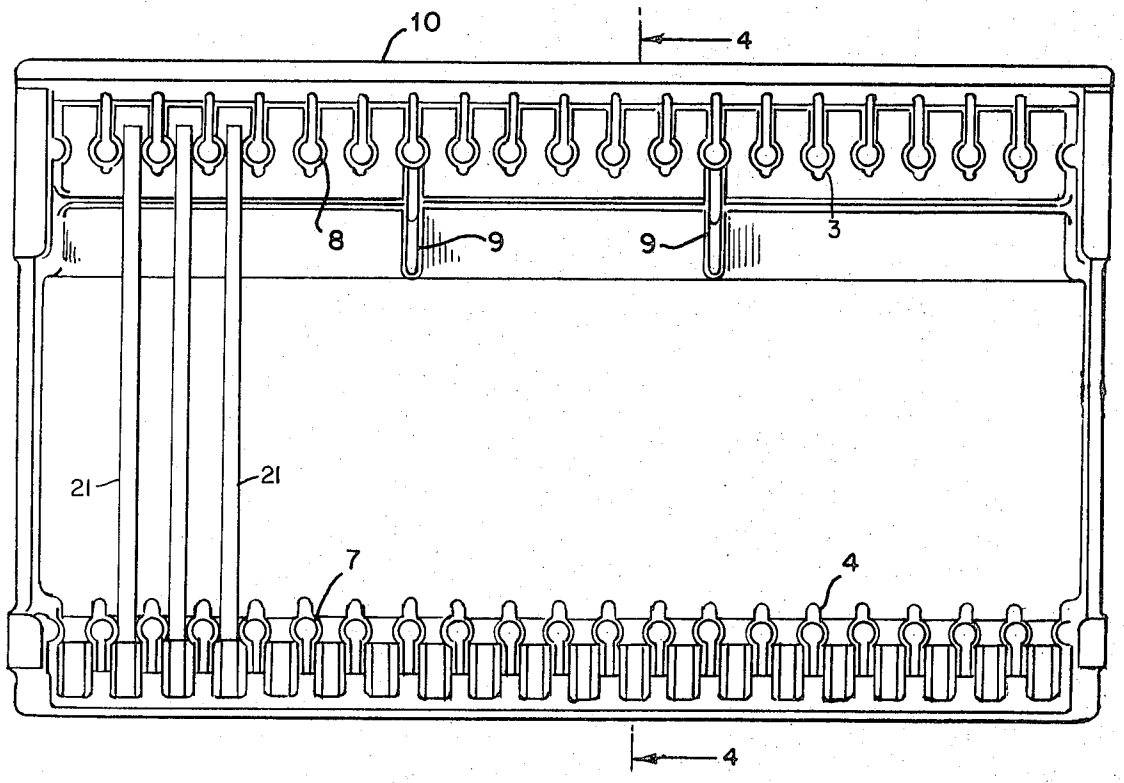


Fig. 2

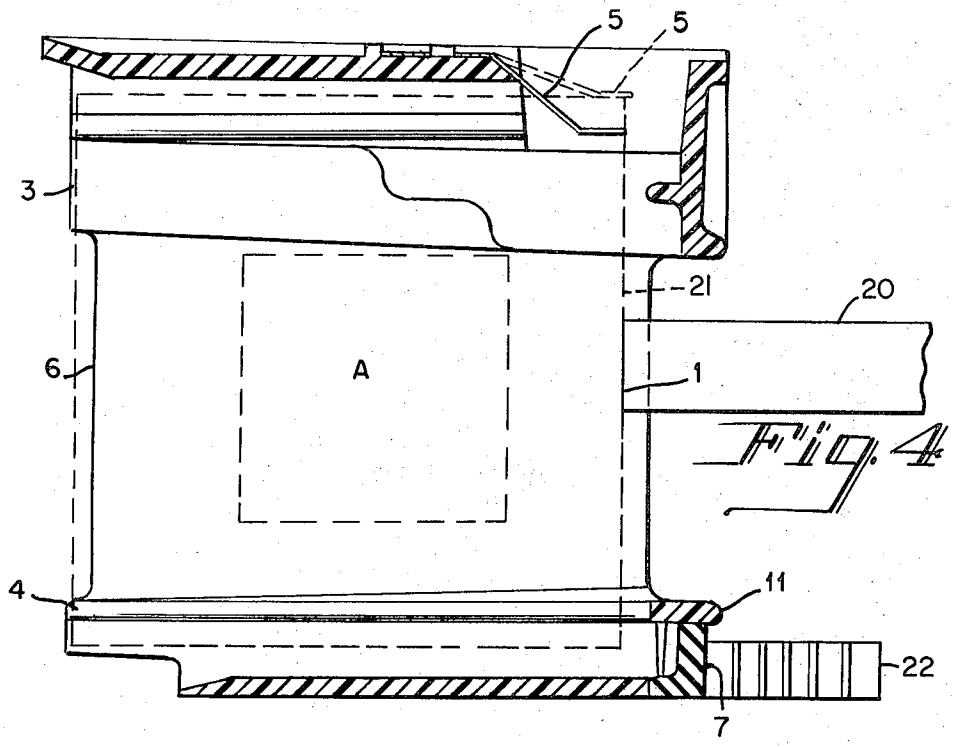
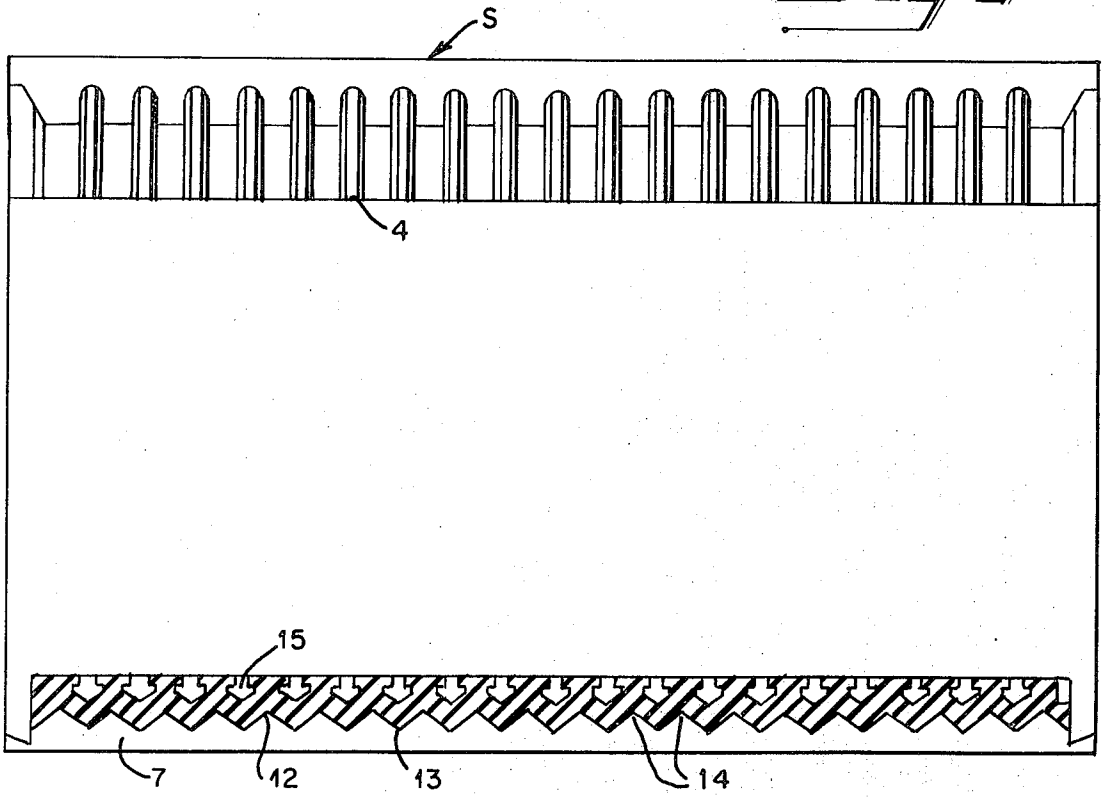


Fig. 4

Fig. 3



SMALL SLIDE TRAY

The present invention is directed to a slide tray, and more particularly to a slide tray adapted to provide means for accepting an equal number of slides as heretofore possible over a reduced area or length of space required for the storage of such slides.

Up to the present time, slide trays have been constructed with separate cells for each slide defined by septa which were continuous or uninterrupted to insure proper advancement of the slides without jamming.

By way of background, conventional slide trays have had cells or septa which are disposed to have distances therebetween to provide for slide storage between the septa and also to provide for clearance between the septa for the slide handling "pusher" element of the projector. Such trays have been customarily provided with a gear rack element where the pitch of the rack was equivalent to the slide spacing provided by the septa. In accordance with customary design practice, the pinion in the projector (which cooperates with the tray rack to advance the tray) is of the same pitch as the tray rack.

Obviously, if the spacing between the septa of the presently available trays are substantially reduced, the slide "pusher" element of the projector would not fit therebetween and would cause a "jam" condition if such a tray were placed in a projector. In order to prevent such jam condition, the septa in the tray would have to be modified in a manner that enables the pusher to pass between adjacent slides with adequate clearance as the adjacent slides being positioned by the septa.

The principal object of the present invention is to overcome the defects of prior art slide trays.

Another object of the present invention is to provide a slide tray having the same capacity as was heretofore available in decreased length and volume.

A further object of the present invention is to provide a slide tray having a rack member which is suitable for engagement with a slide projector such that alignment with the pusher of the slide projector and the advancement of slides is not in any way impaired.

Still another object of the present invention is to provide a rack member constructed of compliant material.

A further object of the present invention is to provide a slide tray having a central portion free from continuous septa permitting freedom of entry by the slide pusher for advancement of slides.

Another object of the present invention is to provide the upper and lower portion of the slide guide portion each with a guiding portions for adequately aligning the slide.

Another object of the present invention is to provide a means integral with the slide tray for alignment of the septa and the rack to enable advancement of the slide without jams.

A further object of the present invention is to provide a slide tray having a rack member designed to function in cooperation with the pinion gear of the slide projector in such a way that for each one-tooth incremental rotation of the projector pinion the slide tray is advanced a distance, equal to the pitch of the tray rack independent of differences between the pitch of the tray rack and the projector pinion.

Another object of the present invention is to provide a slide tray having a rack number which is not a true involute.

With the foregoing and other objects in view, there is provided, in accordance with the invention a miniaturized slide tray for use with a slide projector including a structural frame with discontinuous septa disposed within said structure; said septa having upper and lower portions in vertical alignment with one another, formed to have horizontal spaces therebetween sufficient to receive a series of slides; a spring retention member disposed on said structure adapted to cooperate with said septa in the positioning of said slides; and a rack means integral with a lower portion of said structural frame, adapted to engage an index gear of a slide projector as the slide projector pusher is urged to sequentally traverse said slide tray; said rack means being formed of a compliant material and shaped to provide for an incremental advance of the tray under the action of one-tooth movement of said slide projector index gear.

The present invention contemplates a slide tray with a rack portion having smaller circular pitch than the predecessor tray, but so designed as to cooperate with projectors already in the field, particularly with respect to the provision for clearance of the "pusher" element and to provide for an incremental mechanical advance of the tray under the action of one-tooth movement of the projector pinion, a distance equivalent to the reduced pitch of the tray rack in cooperation with a projector pinion of larger pitch. More particularly, the present invention is directed to a compact highly efficient trouble free slide tray, capable of accepting the same number of slides as previously known slide trays, such as have been described in U.S. Pat. No. 3,187,890, while achieving a reduction in the overall unit length per given number of slides. As will be understood from the slide tray hereinafter described, the septa defining separate storage areas for each of the slides are not continuous over the entire width of the slide tray. The portions of the septa which define the area for positioning the end portions of the slides, correspond to another on opposite wall portions of the slide tray.

A void or open area now exists where heretofore, there has been an extended L shaped rigid partition such as is described in the U.S. Pat. No. 3,187,890. By eliminating the rigid partitions in the slide tray, the possibility of having the pusher jam between septa is clearly avoided. The opening thus created by elimination of the center portions of the septum permits the pusher to traverse the full width of the slide tray for transfer of slides from the tray into the projector for viewing.

The present invention also makes use of a spring retainer member which is adapted to prevent the slides from being dislodged from the tray during handling. This arrangement is similar to that discussed and explained in U.S. Pat. No. 3,187,890.

An essential feature necessary to the successful operation of the present invention consists of rack teeth of rubber or other compliant material.

A small slide tray with rigid teeth, when indexed or urged to a new position through the action of the cooperating pinion in the projector, may be caused to "jump," particularly if the action of the pinion is aggressive. Such "jumping" is due to the high mechanical "Q" of the tray structure. The use of the compliant

rack material tends to destroy the high "Q" and even under severely aggressive action of the projector pinion, the tray will index from slide to slide smoothly and without malfunction. In a structure rigid teeth malfunctions are possible due to the "jumping" action of the tray. Such action may cause skipping over one or more slides in the sequence or complete misalignment and disengagement of the tray rack from the projector pinion.

An important feature of the present invention is to provide a slide tray which will operate with a large population of existing projectors, but where the tray has been shortened to provide higher slide storage density by altering the gearing relationship for which the projector was originally designed. The compliant tooth material, also provides for absorption of manufacturing tolerances and differences between existing projectors. This features insures the alignment of each successive slide with the pusher of the slide projector.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof will be best understood from the following description of specific embodiments when read in connection with the figures of the accompanying drawings showing the slide tray constructed in accordance with the invention.

In the drawings:

FIG. 1 is a perspective view of the slide tray showing one end and the top and side of the tray. This is the outboard or "pusher" side in relation to the tray position in a projector.

FIG. 2 is a side view of the tray from the inboard or aperture side of the tray. This is the side of the tray in which slides would be placed prior to projection.

FIG. 3 is a bottom view of the tray.

FIG. 4 is a transverse cross section through the tray taken along the line 4—4 of FIG. 2.

According to FIG. 1 a slide tray S of the present invention is shown in perspective with an opening 1 traversing the length of the tray, suitable for receiving a pusher of a slide projector. A slide pusher 20 (see FIG. 2) as it enters the interior of the tray S pushes the slide 21 held in place by the septa 3, 4. The central wall portion normally forming a septa is not found in the present design. The upper and lower portions 3, 4 (see FIG. 2) are aligned to permit slides to be sequentially inserted without concern for interference or engagement of adjacent slides by the pusher. A series of spring retaining members 5 each corresponding to respective pairs of septa and disposed therebetween serve to retain the slides in position when the tray is inserted into the projector for sequential advance of the slides when the tray is handled, as well as, to prevent inadvertent spilling of the slides. Another opening 6 running the length of the tray S, serves to receive slides as they are inserted into the tray. The tray S is provided with a rack 7 which is adapted to engage a gear pinion 22 of the slide projector (see FIG. 4) to enable tray advancement in conjunction with the movement of the slide projector pusher. The rack 7 is made of a compliant material in order to maintain the mechanical Q of the tray at suitable levels in order to eliminate slide tray malfunctions, such as jamming or jumping.

By eliminating the intervening partitions or sections normally found interior of the slide trays, it is possible to reduce the overall size of the slide tray per given number of slides.

FIG. 2 clearly illustrates the upper and lower portions 3, 4 respectively of the septa without any intervening portion. The individual septa portions 3, 4 are in the form of projections which are integral of the slide tray S have portions provided with a guide members 7, 8 for properly centering the slide as it is being positioned inside of the tray S. These guides 7, 8 function in conjunction with spring retaining members 5 to retain each slide within the tray and to position the slide for proper engagement by the projector "pusher" throughout its travel in the projector. The guides 7 and 8 are also of reduced thickness compared to corresponding septa in prior trays, thus permitting the slides 21 to be disposed closer together and thereby increase the slide capacity per unit length.

The upper portion of the slide tray S includes two overhanging support members 9 which are centrally disposed to add strength to the top portion of the slide tray S. Furthermore, these support members 9 prevent deflection of the top of the tray 10 in a manner that could conceivably defeat the slide retention properties of the spring members 5.

The lower portion 4 of the septa is cut out to enable tray engagement with a slide projector channel (not shown) assuring proper and positive movement of the tray as the sldes are being advanced. In FIG. 1, the slide tray includes an upper over extending edge or lip 11 for assuring a proper fit of the slide tray S into the projector.

As previously mentioned, one of the most essential features of the present invention is directed to the use of a highly compliant material for construction of the rack 7 which serves to engage the slide projector pinion in order to advance the travel of the tray as the slide proceeds in sequence. FIG. 3 illustrates the geometry of the rack design, which is such that the valleys 12 of each tooth 13 are in alignment with the center line of each septa portion 3. When compared to a prior art slide trays, such as that covered by U.S. Pat. No. 3,187,890 it has been found that the rack 7 of the present invention has a reduced pitch 14 of 0.175 inch, compared to a pitch of approximately 0.224 inch which is to be found in the slide tray covered by the aforementioned patent. The reduction in the pitch enables a higher density storage per linear area of slide tray. For an example, with the tray of the present invention it is possible to store in a given length 20 slides for viewing as compared to 16 based upon the design of the tray discussed in U.S. Pat. No. 3,187,890 having the same length. The rack 7 of the tray S and the slide projector gear teeth 22 (see FIG. 4) engage to permit the tray to advance by action of the projector pinion movement along the rack 7. The very nature of the present invention contemplates that the rack 7 not be a true involute. To eliminate the tendency of the tray to jump forward to cause a jam, a suitable compliant material such as polyvinyl chloride or rubber is used for the rack 7 and a Shore Hardness of about 45 to 55 has been found to be quite satisfactory. The rack 7 itself, is securely positioned to the body of the slide tray be means of a forced fit over a series of pointed elements 15 which are downward extensions of the lower septa 4. Correct alignment of the rack 7 with the slide spaces is thus assured.

The pitch of the rack 7 is equal to the pitch of the septa in order to assure a one-to-one relationship, such that, when there is movement of one rack tooth 13

there is an advance of one slide space; thus resulting in a direct relationship between the movement of the tray S and the sequential engagement of the slides by the pusher. From the above, it follows, that one incremental movement of the driving pinion 22 on the projector, advances the slide only 0.175 inch whereas the pinion gear advances 0.224 inch at the pinion pitch line. This difference permits the compacting of the tray enabling greater capacity compared to that of the prior art.

FIG. 4 illustrates the inventive design in cross section, clearly defining septa with a lower portion 4 and upper portion 3 defining a storage area A for slides that are not continuous over the width of the slide tray. A void or opening exists in area A to permit complete and trouble free movement of the slide projector pusher into the interior of the tray S across its full width. The rack 7 is of a compliant material which serves to minimize the difficulties as described above. Furthermore, positive alignment of each successive slide with projector pusher also assured by the geometry of rack 7.

It will be understood that certain changes may be made in the construction or arrangement of the slide-editing tray which is disclosed herein without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A miniaturized slide tray having increased slide capacity per unit length for use in a slide projector of the type having a slide pusher to transport slides between the tray and a projection gate and a rotatable indexing gear to advance the tray, said tray comprising a rectangular-shaped box having a first open side for receiving a plurality of slides, a second partially open side to permit passage of the slide pusher, a top wall having a series of downwardly extending parallel septa and a corresponding series of finger springs, and a bottom wall having a series of upwardly extending parallel septa, in alignment with the downwardly extending septa to define together with the downwardly extending septa and the finger springs a plurality of slide receiving spaces, said septa extending only partially from their respective walls to permit passage of the slide pusher therebetween and being sized and spaced such that the width of each slide receiving space corresponds to the thickness of each slide, and the width of two septa plus a slide receiving space is greater than the thickness of the slide pusher to permit the pusher to engage one slide and pass between the next adjacent slides; and an elongated rack means formed of compliant material and fixedly attached to one edge of the bottom wall, said rack having a series of teeth for engagement with the indexing gear, which teeth have a pitch corresponding to the distance between the centers of adjacent slide receiving spaces but less than the pitch of the indexing gear to provide for the incremental one-space advance of the slide tray for each incremental one-tooth rotation of said indexing gear.

2. A miniaturized slide tray as claimed in claim 1, wherein said rack means is not a true involute.

3. A miniaturized slide tray as claimed in claim 1, wherein said rack means has a pitch of 0.175 inches, and said indexing gear has a pitch of 0.224 inches.

4. A miniaturized slide tray as claimed in claim 1, wherein said rack means is made of polyvinylchloride.

5. A miniaturized slide tray as claimed in claim 1, wherein said rack means is made of rubber.

6. A miniaturized slide tray as claimed in claim 1, wherein said rack means is made of a compliant material having a Shore Hardness of 45 to 55.

7. A miniaturized slide tray as claimed in claim 1, wherein said rack means is attached to said slide tray by urging said rack means onto a series of downwardly pointing extensions of said lower septa portions.

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