United States Patent [19]

Maier et al.

[11] **3,881,813**

[45] **May 6, 1975**

[54] **HOLDER FOR MICROFORMS IN MICROIMAGE RETRIEVING APPARATUS**

[75] Inventors: **Albert Maier**, Munich; **Günther Lüder**, Taufkirchen; **Josef Pfeifer**, Unterhaching, all of Germany

[73] Assignee: **Agfa-Gevaert Aktiengesellschaft**, Leverkusen, Germany

[22] Filed: **Apr. 20, 1973**

[21] Appl. No.: **353,134**

[30] **Foreign Application Priority Data**

Apr. 28, 1972 Germany 2220923

[52] **U.S. Cl.** **353/27**

[51] **Int. Cl.** **G03b 21/11**; G03b 23/08

[58] **Field of Search** 353/25-27, 353/22, 23

[56] **References Cited**

UNITED STATES PATENTS

2,423,513	7/1947	Meyer	353/12
2,600,261	6/1952	Pennington	353/30
3,320,854	5/1967	Wally	353/27
3,352,201	11/1967	Broumscombe	353/27
3,625,603	12/1971	Jansons	353/27
3,743,399	7/1973	Smith	353/27

FOREIGN PATENTS OR APPLICATIONS

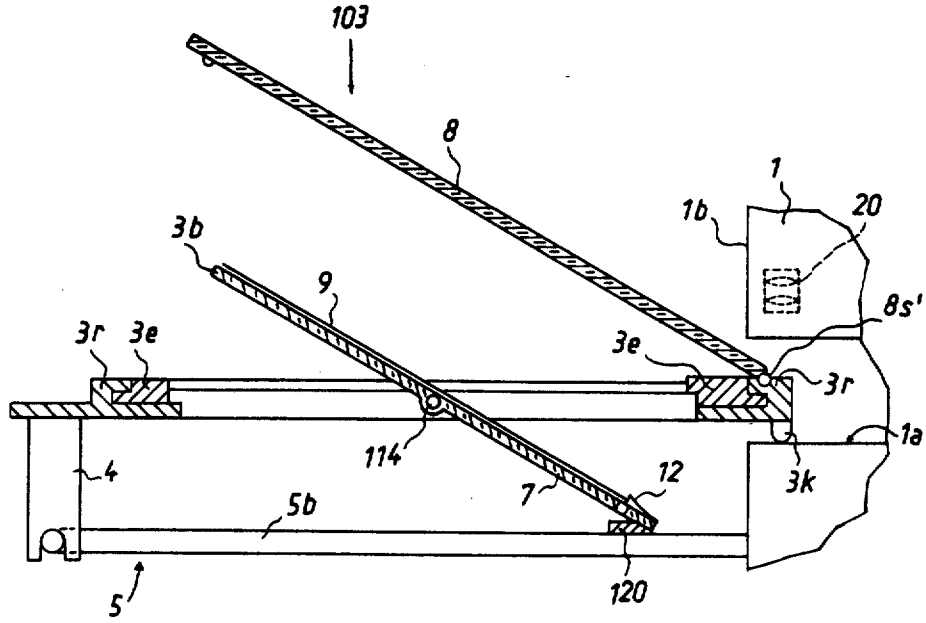
942,117	1/1949	France	353/27
699,594	12/1930	France	353/27
960,737	4/1950	France	353/27

Primary Examiner—Samuel B. Rothberg
Assistant Examiner—A. J. Mirabito
Attorney, Agent, or Firm—Michael S. Striker

[57] **ABSTRACT**

A reader for microforms wherein the holder for one or more microforms consists of a carriage which is movable in a horizontal plane relative to the projection lens in the housing and a flat receptacle which is movable in and is separable from the carriage. The receptacle has a frame and a transparent base plate which supports one or more microforms and is mounted directly in the base, in a bearing member which is rotatable in the frame, or in a bottom wall which is pivotable relative to the frame. A transparent top plate is attached to the carriage or to the frame of the receptacle to normally overlie one or more microforms on the base plate.

8 Claims, 10 Drawing Figures



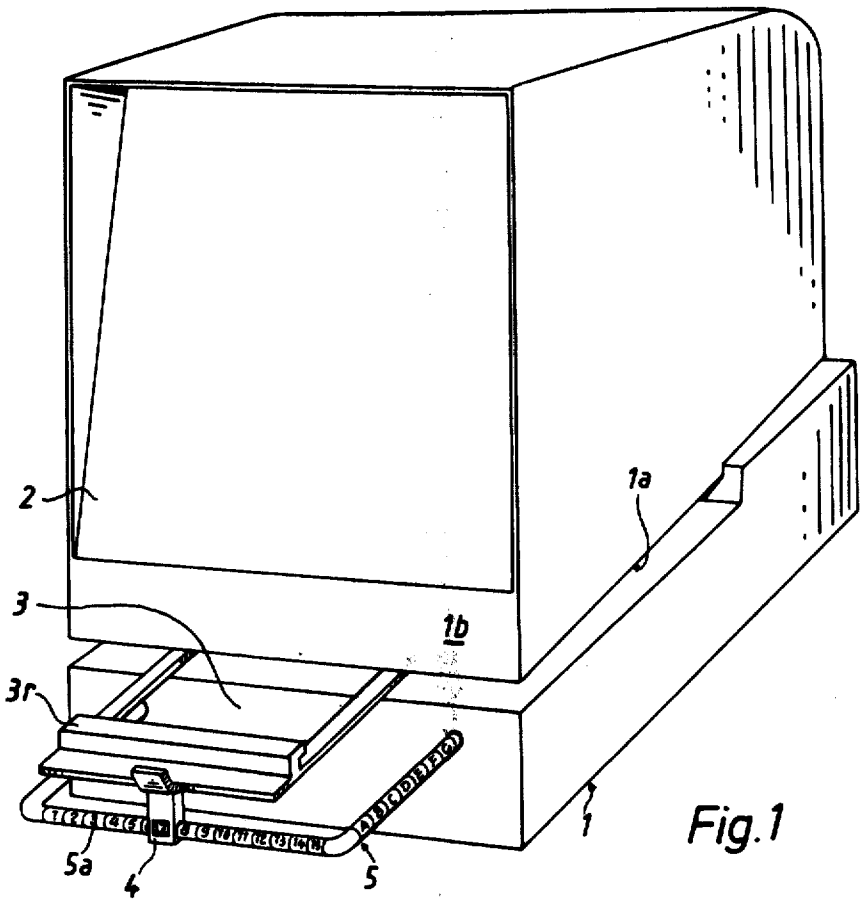


Fig.1

Fig.2

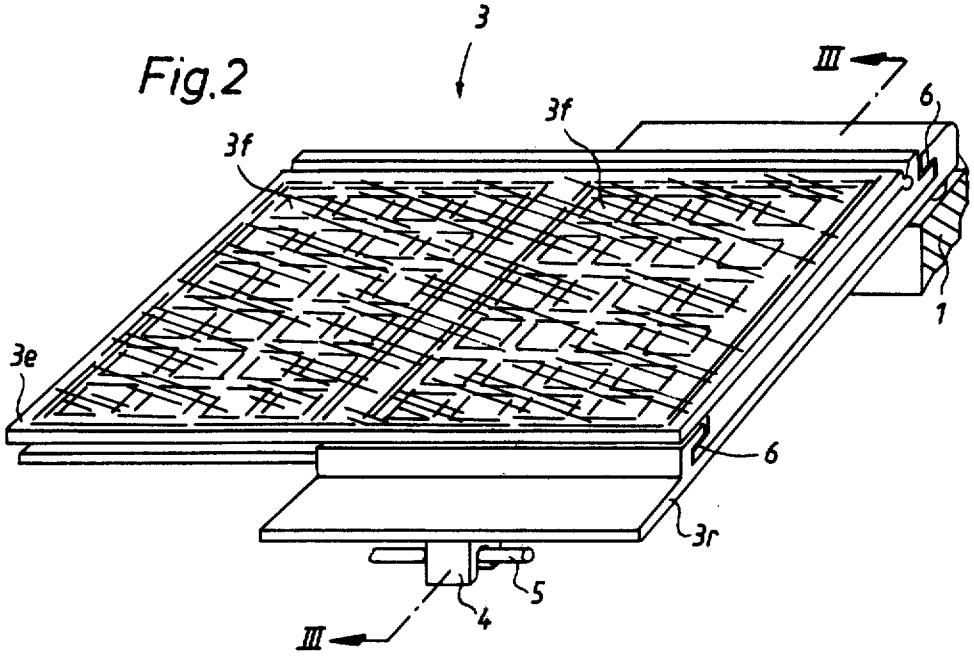
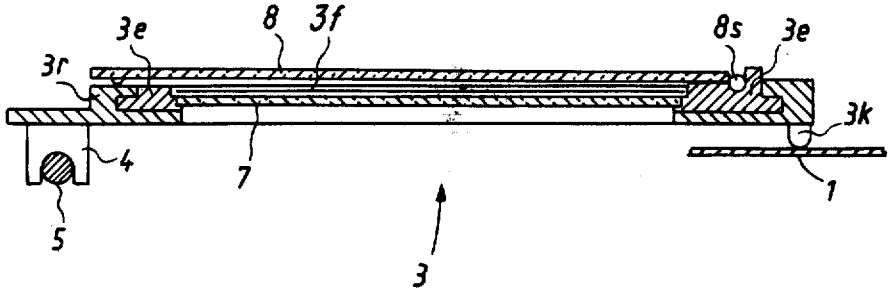


Fig.3



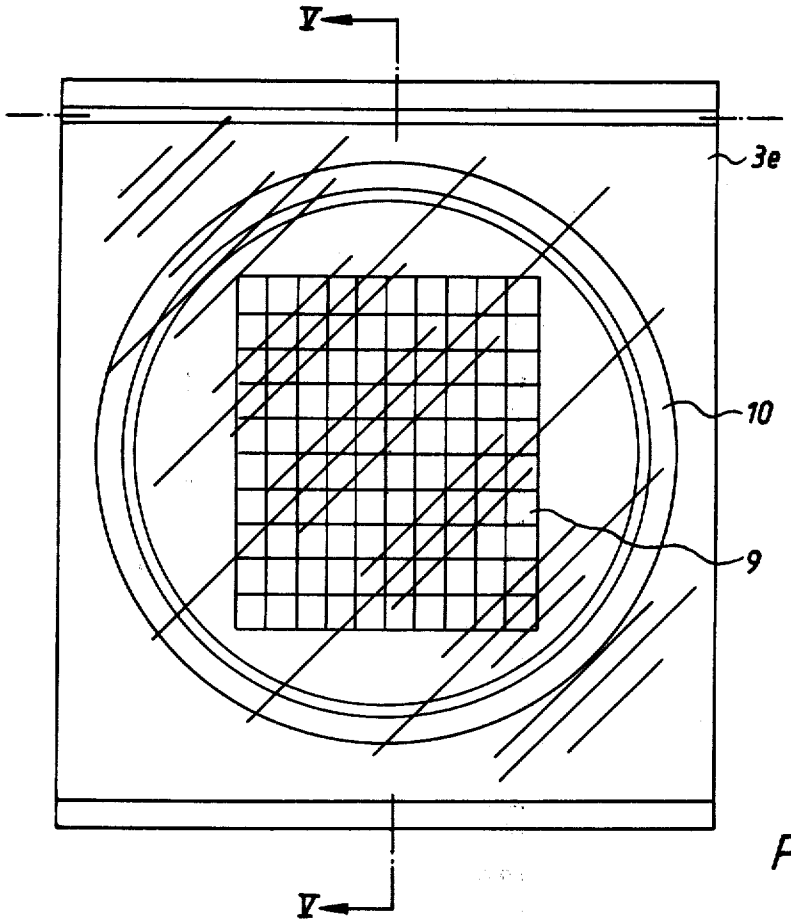


Fig.4

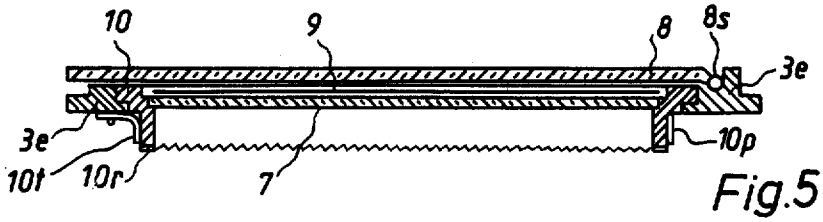


Fig.5

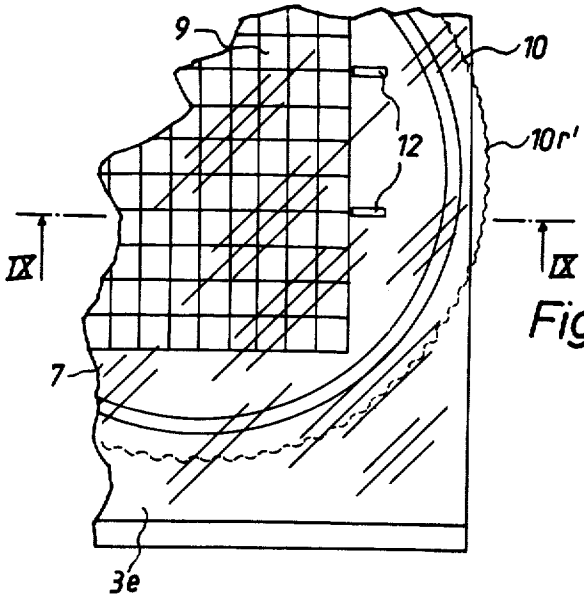


Fig.6

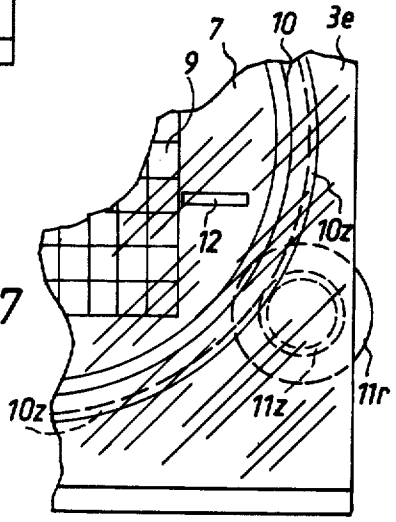


Fig.7

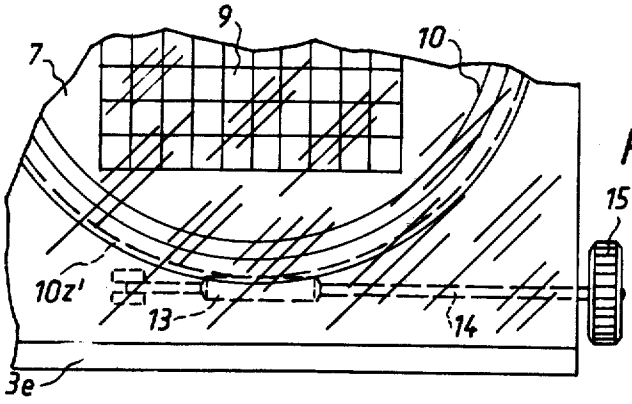


Fig.8

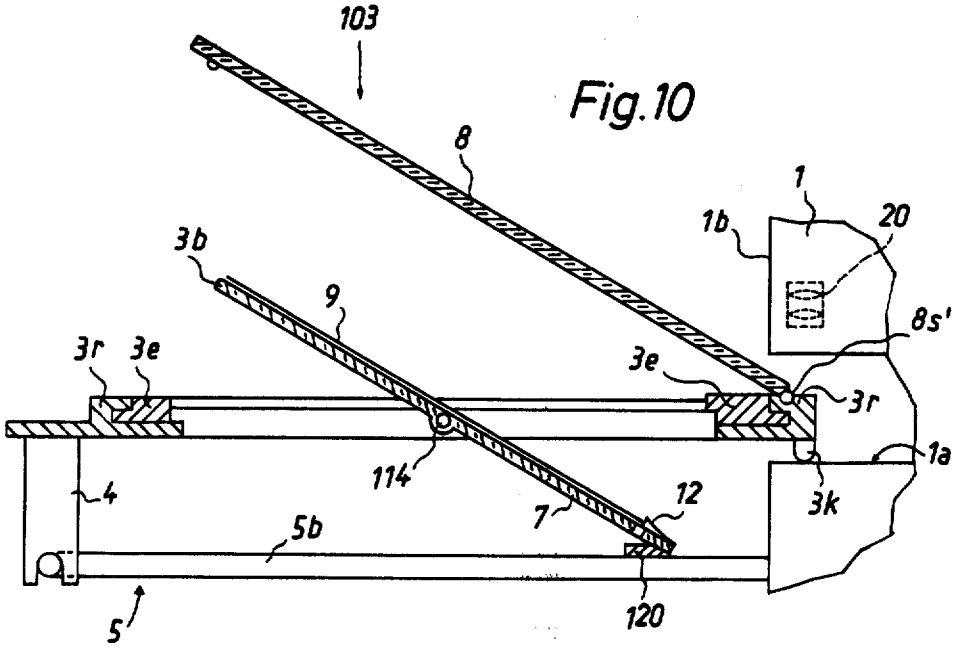


Fig.10

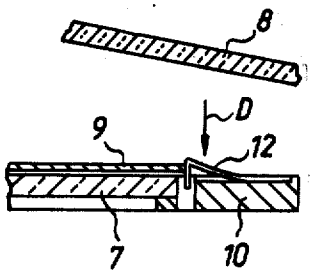


Fig.9

HOLDER FOR MICROFORMS IN MICROIMAGE RETRIEVING APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

The microimage retrieving apparatus of the present invention constitutes an improvement over and a further development of apparatus disclosed in the commonly owned copending application Ser. No. 315,484 filed Dec. 15, 1972 by Albert Maier et al.

BACKGROUND OF THE INVENTION

The present invention relates to microimage retrieving apparatus in general, and more particularly to improvements in apparatus for reading discrete microfilm sheets or microforms. Still more particularly, the invention relates to improvements in holders which can support one or more microforms and can move such microforms relative to one or more projection lenses in the housing of a microimage retrieving apparatus.

It is already known to provide a microfilm reader with one or more holders in the form of horizontal platforms which are movable relative to the housing but cannot be readily detached from or reinserted into the housing. This affects the versatility of such apparatus. Thus, it takes a relatively long interval of time to remove a microform from a permanently or substantially permanently installed holder before the holder can receive another microform. When different microforms must be viewed at frequent intervals, it is desirable to leave the microform in its holder and to simply insert or remove the holder with the microform. It is further desirable to equip the microimage retrieving apparatus with holders which can accept larger or smaller microforms as well as several microforms at a time. Still further, it is often desirable to turn or rotate the image of a microform on the viewing screen. In accordance with the presently prevailing practice, the turning of images is effected by rotating the projection lens. This necessitates a rather complex lens mount.

SUMMARY OF THE INVENTION

An object of the invention is to provide an apparatus which can be used for reading of microforms and which is more versatile than presently known microform reading apparatus.

Another object of the invention is to provide the microform reading apparatus with novel and improved holders which can receive and properly support one or more microforms, which permit for removal or insertion of microforms while remaining attached to the housing of the microfilm reading apparatus, and which can be readily removed from and reinserted into the housing of the apparatus with one or more microform therein.

A further object of the invention is to provide a microimage retrieving apparatus with novel and improved means for rotating the image of a selected portion of a microform on the viewing screen.

An additional object of the invention is to provide the improved holder with novel means for locating one or more microforms and with novel means for facilitating insertion or removal of microforms.

Still another object of the invention is to provide a novel and improved holder which can be used in certain presently available types of microimage retrieving apparatus or which necessitates a minor and inexpensive conversion of conventional apparatus.

The invention is embodied in an apparatus for retrieving microimages which are stored on sheet-like microforms. The apparatus comprises a housing for at least one projection lens which is preferably mounted immediately behind the front wall of the housing at a level below the viewing screen, and at least one improved microform holder which includes a carriage mounted in the housing for movement in at least one direction (preferably in a plane which is normal to the optical axis of the lens), and a flat receptacle which is separably supported by the carriage. The receptacle can be mounted in the carriage for movement with respect thereto in a plane which is normal to the axis of the lens and comprises a microform supporting light-transmitting base plate or panel.

The receptacle may further comprise a frame which is guided by and is separable from the carriage, a plate-like apertured bearing member which is rotatable in the frame and carries the base plate so that the image of a microform on the base plate can be rotated by rotating the bearing member relative to the frame, or a bottom wall which supports the base plate and is pivotably mounted in the frame to thus allow for more convenient placing of microforms onto or removal of microforms from the base plate.

A light-transmitting top plate or panel can be pivotably attached to the carriage or to the frame to normally overlie the microform or microforms on the base plate.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The improved holder itself, however, both as to its construction and its mode of operation, together with additional features and advantages thereof, will be best understood upon perusal of the following detailed description of certain specific embodiments with reference to the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a microimage retrieving apparatus having a holder for microforms which embodies one form of the invention;

FIG. 2 is an enlarged perspective view of the holder;

FIG. 3 is a sectional view as seen in the direction of arrows from the line III—III of FIG. 2;

FIG. 4 is a plan view of the receptacle of a second holder having means for rotatably mounting a microform therein;

FIG. 5 is a sectional view as seen in the direction of arrows from the line V—V of FIG. 4;

FIG. 6 is a fragmentary plan view of a receptacle which constitutes a first modification of the receptacle shown in FIGS. 4 and 5;

FIG. 7 is a fragmentary plan view of a receptacle which constitutes a second modification of the receptacle shown in FIGS. 4 and 5;

FIG. 8 is a fragmentary plan view of a receptacle which constitutes a third modification of the receptacle shown in FIGS. 4 and 5;

FIG. 9 is an enlarged fragmentary sectional view as seen in the direction of arrows from the line IX—IX of FIG. 6; and

FIG. 10 is a longitudinal vertical sectional view of still another holder.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1, there is shown a microimage

retrieving apparatus which comprises a housing **1** having a horizontal slot **1***a* and a front wall **1***b* which is provided with a projection screen or viewing screen **2.** The screen **2** is preferably a plate of glass having a matte surface. The improved holder for microforms is shown at **3.** This holder comprises a carriage **3***r* which is movable in the slot **1***a* of the housing **1** toward and away from the viewing screen **2** as well as in parallelism with the front wall **1***b*. The carriage **3***r* is separably coupled to a U-shaped supporting device **5** by means of a prop **4.** The mounting of the supporting device **5** and the nature of the prop **4** are described in detail in the aforementioned copending application Ser. No. 315,484 of Maier et al. It suffices to say that the device **5** serves as a support for the outer or front end portion of the carriage **3***r* and is shiftable with the carriage toward and away from the front wall **1***b* of the housing **1.** In addition, the carriage **3***r* and its prop **4** are movable lengthwise of the web **5***a* of the supporting device **5.** This enables an operator to place any desired portion of a microform into register with the optical system of the apparatus. The optical system may comprise one or more projection lenses **20** (one such lens is shown in FIG. **10**) which are preferably mounted in the housing **1** immediately or closely behind the front wall **1***b* at a level below the viewing screen **2.**

Referring to FIGS. **2** and **3,** there is shown a complete holder **3** which comprises the aforementioned carriage **3***r* and a flat polygonal receptacle including a light-transmitting bottom panel or base plate **7** mounted in a rectangular frame **3***e* and a light-transmitting top panel or plate **8** which is articulately connected to the frame **3***e* by a hinge **8***s* so that it can be pivoted to and from the illustrated position in which it overlies two discrete microforms **3***f* resting on the upper side of the base plate **7.** The carriage **3***r* has one or more legs **3***k* which slide along a horizontal supporting surface in the slot **1***a* of the housing **1.** The carriage **3***r* is provided with two elongated parallel guide means **6** in the form of grooves which extend in parallelism with the front wall **1***b* of the housing **1** and receive complementary tongues of the frame **3***e*. This enables the operator to shift the receptacle including the holder **3***e* relative to the carriage **3***r*. In addition, and as explained above, the carriage **3***r* can be moved by the operator toward or away from the viewing screen **2** as well as lengthwise of the web **5***a* of the supporting device **5.** Such movements of the receptacle with and relative to the carriage **3***r* enable an operator to rapidly place any selected portion of a selected microform **3***f* into registry with the lens **20** in the housing **1.**

The lower portion of the housing **1** receives a light source (not shown) which emits a beam of light whereby such beam passes through the base plate **7,** through a selected portion of a microform **3***f*, through the top plate **8** and thereupon reaches the lens **20** so that the image of the selected portion of a microform is projected onto the viewing screen **2.** The upper portion of the housing **1** receives suitable prisms, mirrors and/or other optical elements which project the image onto the screen **2.**

In order to detach the receptacle from the carriage **3***r*, the operator simply withdraws the carriage from the slot **1***a* to such an extent that the entire frame **3***e* is exposed. The frame **3***e* is then ready to be shifted lengthwise of the grooves **6** to be detached from the carriage. The entire holder **3** can be detached from the housing **1** by disengaging the prop **4** from the web **5***a* of the supporting device **5.** If the operator wishes to remove one or more microforms **3***f* from the space between the base plate **7** and top plate **8,** the top plate **8** is pivoted about the axis defined by the hinge **8***s* so that the microforms are immediately accessible and can be removed for storage or for replacement by one or more different microforms.

FIGS. **4** and **5** illustrate the receptacle of a modified holder having a carriage (not shown in FIGS. **4** and **5**) which may be identical with the carriage **3***r* of FIGS. **2** and **3.** The modified receptacle comprises a frame **3***e* which is slidably receivable in the carriage, an apertured plate-like bearing member **10** which is of circular outline and is rotatably mounted in the frame **3***e*, a base plate **7** which is mounted in and overlies the aperture of the bearing member **10,** and a top plate **8** which is connected to the frame **3***e* by means of a hinge **8***s*. FIGS. **4** and **5** show a single rectangular microform **9** which is supported by the base plate **7** and is overlapped by the top plate **8.** The bearing member **10** has a downwardly extending cylindrical portion **10***r* having a serrated lower end face which can be grasped by one or more fingers to facilitate rotation of the base plate **7** and of the microform **9** thereon. The top plate **8** need not share the angular movements of the base plate **7** and bearing member **10** relative to the frame **3***e*.

If desired, the receptacle of FIGS. **4** and **5** can be provided with a simple detent structure which serves to yieldably hold the bearing member **10,** base plate **7** and a microform **9** on the base plate **7** in a selected angular position. As shown in FIG. **5,** the detent structure may comprise a set of vertical external ribs or teeth **10***p* provided on the serrated cylindrical portion **10***r* of the bearing member **10** and a leaf spring **10***t* which is attached to the underside of the frame **3***e* and rides over the teeth **10***p* when the bearing member **10** rotates. A portion of the bearing member is accessible from below when the frame **3***e* is at least partially withdrawn from the slot of the housing.

FIG. **6** illustrates a portion of the receptacle which forms part of a holder constituting a first modification of the holder including the receptacle of FIGS. **4** and **5.** The frame **3***e* again supports a rotatable ring-shaped bearing member **10** for the base plate **7** and one or more microforms **9.** The downwardly extending cylindrical portion **10***r* shown in FIG. **5** is replaced by a radially outwardly extending flat annulus **10***r'* which is serrated on its periphery and a portion of which extends laterally beyond the frame **3***e* so that it can be readily located and engaged by one or more fingers of the operator. The manner in which the top plate (not shown in FIG. **6**) is mounted on the frame **3***e* is preferably the same as shown in FIG. **5.**

FIG. **7** shows a portion of a flat receptacle which constitutes a second modification of the receptacle shown in FIGS. **4** and **5.** The bearing member **10** in the frame **3***e* is provided with a ring gear **10***z* which meshes with a second gear **11***z* rotatably mounted at the underside of the frame **3***e*. The second gear **11***z* is coaxial with a preferably knurled knob **11***r* a portion of which extends laterally beyond the frame **3***e* so that it can be readily located and engaged by fingers of the operator. By rotating the knob **11***r*, the operator can rotate the bearing member **10,** base plate **7** and microform or microforms **9** on the base plate **7** by way of the gears **11***z* and **10***z*.

FIG. 8 illustrates a further receptacle which constitutes a third modification of the receptacle shown in FIGS. 4 and 5. The frame 3*e* supports a rotatable ring-shaped bearing member 10 for the base plate 7 and one or more microforms 9. The periphery of the bearing member 10 is provided with a worm wheel 10*z'* which meshes with a worm 13 on a horizontal shaft 14 mounted at the underside of the frame 3*e*. The right-hand end portion of the shaft 14 is provided with a knurled knob 15 which can be rotated by hand to thereby rotate the base plate 7 and one or more microforms 9 thereon by way of the shaft 14, worm 13, worm wheel 10*z'* and bearing member 10.

It is clear that each of the receptacles shown in FIGS. 6, 7 and 8 can be provided with detent means similar to those shown in FIG. 5 in order to yieldably hold the base plate 7 in a selected angular position.

FIGS. 6 and 7 further show elastic locating elements 12 one of which is shown in greater detail in FIG. 9. The purpose of locating elements 12 is to enable the operator to properly position the microform or microforms 9 on the base plate 7. As shown in FIG. 9, each of the locating elements 12 is a leaf spring which is secured to the upper side of the bearing member 10 and normally extends upwardly beyond the upper side of the base plate 7 so as to serve as an abutment for the adjacent edge portion of the microform 9. When the top plate 8 is pivoted to its operative position (see the arrow D), its underside depresses the upstanding portions of locating elements 12.

It is clear that the locating elements 12 need not necessarily be mounted on the bearing member. For example, and referring again to FIG. 5, such elastic locating elements can be mounted on the frame 3*e* so that they partially overlap the rotatable bearing member 10.

Referring finally to FIG. 10, there is shown a further holder 103 which is mounted on the supporting device 5 in the same way as described in connection with FIG. 1. The holder 103 again comprises a rectangular carriage 3*r* having a prop 4 which is attached to the web of the supporting device 5 and one or more legs 3*k* which slide along the surface below the slot 1*a* in the housing 1. The frame 3*e* of the flat receptacle which is removably received in the carriage 3*r* carries a horizontal pintle 114 for an apertured bottom wall 3*b* which receives the base plate 7. One or more microforms 9 are placed onto the base plate 7 and abut against one or more elastic locating elements 12 on the bottom wall 3*b*. When the top plate 8 (which is connected directly to the carriage 3*r* by a hinge 8*s'*) is pivoted to the position shown in FIG. 10, the bottom wall 3*b* can be pivoted on the pintle 114 so as to allow for more convenient removal of microforms 9 from the base plate 7 as well as for more convenient placing of fresh microforms onto the base plate. One or both legs 5*b* of the supporting device 5 can be provided with suitable stops 120 for the bottom wall 3*b*. The elastic locating elements 12 of FIG. 10 (only one shown) are positioned on the bottom wall 3*b* in such a way that they prevent slippage of properly positioned microforms 9 relative to the base plate 7 while the bottom wall 3*b* dwells in the illustrated inclined position.

The bottom wall 3*b* may form an integral part of the base plate 7.

The improved holder is susceptible of many additional modifications. For example, the frame 3*e* may have a square, rectangular of any other polygonal outline. Moreover, the housing 1 can support two or more holders at different levels, and each such holder may include a flat receptacle for one or more microforms. The manner in which the housing can support several holders is illustrated in FIG. 3 of the aforementioned copending application Ser. No. 315,484.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features which fairly constitute essential characteristics of the generic and specific aspects of our contribution to the art and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. In an apparatus for retrieving microimages which are stored on sheet-like microforms, a combination comprising a housing for at least one projection lens; and at least one microform holder including a carriage mounted in said housing for movement in at least one direction, and a flat receptacle separably supported by said carriage, said receptacle including a microform supporting light-transmitting base plate, a frame and an apertured bottom wall mounted in said frame for pivotal movement about an axis located in the general plane of said base plate, said base plate being mounted in and being pivotable with said bottom wall.

2. A combination as defined in claim 1 wherein said receptacle further comprises locating means for maintaining at least one microform in a predetermined position on said base plate.

3. A combination as defined in claim 1 wherein said holder further comprises a top plate overlying said base plate and consisting of light-transmitting material.

4. A combination as defined in claim 3, further comprising means for articulately connecting said top plate with said carriage so that the top plate is pivotable to and from a position in which it overlies a microform on said base plate.

5. A combination as defined in claim 3, wherein said top plate is articulately connected to said frame and is movable to and from a position in which it overlies a microform on said base plate.

6. A combination as defined in claim 1 wherein said receptacle further comprises a plurality of elastic locating elements for maintaining at least one microform in a predetermined position relative to said base plate.

7. A combination as defined in claim 6, wherein said locating elements are provided on said frame.

8. A combination as defined in claim 1, wherein said carriage comprises elongated guide means and said receptacle is movable lengthwise of said guide means.

* * * * *