

PATENT SPECIFICATION

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- (21) Application No. 15978/72 (22) Filed 6 April 1972
 (31) Convention Application No.
 2 116 813 (32) Filed 6 April 1971 in
 (33) Germany (DT)
 (44) Complete Specification published 30 April 1975
 (51) INT. CL.³ G03B 21/11
 (52) Index at acceptance
 G2J 41B 41C1 41C2 41D 41H 41L1 41T



(54) IMPROVEMENTS IN AND RELATING TO MICROFILM READING APPARATUS

(71) We, AGFA-GEVAERT AKTIEN-GESELLSCHAFT, a body corporate recognised under German Law, of Leverkusen, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to microfilm reading apparatus and especially to microfilm reading apparatus for the location and viewing of two or more microfilms held in parallel planes at a distance from one another, having an objective arrangement which can be set at will to one of the planes in order to project a film image from that plane for viewing.

In known microfilm reading apparatus of this type, the plane of focus of the objective is manually adjustable for optional viewing of the various microfilms.

The invention provides microfilm reading apparatus which comprises two or more holders for microfilm, each holder being arranged to hold microfilm in a plane which is parallel to and spaced apart from the plane or planes of microfilm held by the other holder or holders, two or more projection objectives, each projection objective being associated with a different one of the microfilm holders for projecting, in operation, a microfilm image from its associated holder onto a screen, and each holder and its associated projection objective being so arranged as to be movable laterally relative to each other in such a manner that the microfilm plane of the holder remains substantially constant, and wherein the apparatus also comprises means for optionally taking one objective out of operation and bringing another objective into operation.

With the arrangement of the invention, no adjustment of the plane of focus of an

objective is necessary for viewing a microfilm image from any one of the holders.

Advantageously, each holder and its associated projection objective are so arranged as to be movable laterally relative to each other in two directions which are normal to each other. Preferably, the holders are so arranged as to be movable relative to each other in such a manner that the microfilm plane of each holder remains substantially constant.

The means for optionally taking one objective out of operation and bringing another objective into operation may comprise means for so directing light onto the microfilm holders as to illuminate a predetermined area, the said means being movable relative to the optical axes of the objectives so that, by moving the said means, the light directed onto the holders by the said means can be directed to pass through any one of the objectives. The means for directing light onto the microfilm holders may comprise a diaphragm or a deflecting mirror, the diaphragm or the deflecting mirror being movable relative to the optical axes of the objectives.

Alternatively, the means for optionally taking one objective out of operation and bringing another objective into operation may comprise a diaphragm arranged to allow light to pass onto a predetermined area of any one of the holders positioned over it, the holders being movable relative to the diaphragm, and means for moving the objectives, which are offset with respect to one another in the direction of their optical axes by a distance equal to that between the planes of their associated holders, relative to the diaphragm so as to take one objective out of the path of light from the diaphragm and bring another objective into the said path. The means for moving the objective may comprise a support on which the objectives are mounted,

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which support is movable relative to each microfilm holder.

With the arrangement of the invention, each objective can be finely adjusted individually to the microfilm plane of its associated holder and can be switched in and out simply either by the actuation of a simple diaphragm or deflecting mirror or by movement in relation to the illumination path of rays.

This switching in and out takes place automatically if, according to a further advantageous feature of the invention, stops are provided which come into engagement with the movable holders for the microfilms at the end of their travel, and which are mechanically connected with the means for taking one objective out of operation and bringing another objective into operation. For this purpose the stops are preferably arranged on a slider which, when the objectives are arranged on a movable support, carries the support along with it or which, when movable means for directing light onto the holder is provided, by means of a lever reversing the direction of movement, shifts the limits of the path of rays of the light directed onto the holders, so as to take one objective out of operation and bring another objective into operation when any one of the holders engages a stop.

By means of these latter arrangements according to the invention, the bringing of a holder into its outer end position, in which the microfilm images on it are situated outside the area in which they can be viewed, can automatically switch out the objective associated with this holder and switch in the objective associated with another holder.

Several forms of the invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of one form of microfilm reading apparatus according to the invention; and

Figure 2 shows a portion of a further form of apparatus according to the invention.

Referring to Figure 1 of the drawings, a carriage 3 guided on guide rods 1 and 2 fixed to the apparatus has attached to it guide rods 4 and 5 for two hinged microfilm holders 6 and 7. The two microfilm holders 6 and 7 each have a transparent base plate 6a and 7a, respectively, held in a frame, and also a transparent cover plate 6b and 7b, respectively, which can be folded back from the base plate. The microfilm sheet which is to be viewed is inserted in each case between these two plates. In order to locate the required microfilm image, the microfilm holders 6 and 7 can

be grasped by their handles 6c and 7c and moved along their guide rails 1 and 2 or 4 and 5 in both co-ordinate directions. The two holders 6 and 7 can thus slide over one another at a distance a .

For the projection of the microfilm images onto an image screen (not shown), two projection objectives 8 and 9 are provided which are mounted immediately adjacent to one another on a lever 11 which is pivotable about a spindle 10 fixed to the apparatus. In the direction of their optical axis the two objectives 8 and 9 are off-set with respect to one another by an amount corresponding to the mutual distance a between the microfilm holders 6 and 7. Thus each of the two objectives 8 and 9 is sharply focussed onto a different one of the microfilms contained in the two microfilm holders, the objective 8 being focussed on microfilm contained in the holder 6 and the objective 9 being focussed on microfilm contained in the holder 7.

For the illumination of an image field 12, a lamp and condenser arrangement (not shown) is provided which casts its light onto this image field 12 by way of a deflecting mirror 13. A diaphragm 14 ensures that only the immediate vicinity of the image field 12 is illuminated. With the objectives 8 and 9 in the position shown in Figure 1, therefore, only the objective 8 receives light and can project an image along the illumination and projection ray path 15 by way of a deflecting mirror 16 onto the image screen. In this position, therefore, only the objective 8 associated with the lower microfilm holder 6 is switched in. If the rocker arm 11 is now pivoted in the direction of the arrow A until the upper objective 9 is in the path of rays 15, only this upper objective, which serves to project the microfilm images of the upper holder 7, is switched in. If the mirrors 13 and 16 were of suitable width, the objectives could of course be switched over by means of a corresponding displacement of the diaphragm 14 or of the illuminated image field 12.

For automatic control of the switch-over movement a further slider 19 is provided which is guided on pins 17 and 18 fixed to the apparatus and which carries stop pins 20 and 21, each of which projects into the path of one of the holders 6 and 7. The stops 20 and 21 are so arranged that they only come into engagement with the holders at the end of the path of movement of the holders 6 and 7, where the latter leave the projection area 12. The slider 19 also carries drive pins 22 and 23 which engage with the rocker arm 11. If the lower, right-hand, holder 6 is now brought into its right-hand end position, by way of the stop 20 and the drivepin 23 it carries along the

rocker arm 11 with it in the direction of the arrow A, so that instead of the objective 8 associated with this holder the objective 9 associated with the upper holder 5 7 is now switched in. The holder 7 can now be pushed freely in both co-ordinate directions in order to view its images, as long as it is not brought into its extreme left-hand end position, which by way of 10 the stop in 21 and the drive pin 22 would result in the rocker arm 11 pivoting back in the opposite direction to the arrow A and thus a switching back to the objective 8. When the holder in question is pushed 15 back into the rest position associated with it, the objective intended for viewing of the other holder is switched in automatically, without any further manipulation by the operator.

20 According to Figure 2, a mirror 26 of the illumination means can also be displaced by means of the slider 19 by way of a lever 25 which is supported on an axle 24 fixed to the apparatus and which 25 reverses the direction of actuation of the slider.

The illumination means which consists of a projection lamp 27, a reflector 28 and a condenser arrangement 29 is in this case 30 arranged on a slider 30 which is guided in guides 31 and 32 fixed to the apparatus, and engages by means of a pin 33 a fork-like part 25a of the reversing lever 25. The objectives 8 and 9 are in this case 35 arranged on a support 34 fixed to the apparatus, and cast their images by way of a correspondingly wide deflecting mirror 35 onto the image screen which is also not shown. With this arrangement, instead of 40 the objectives 8 and 9, the illuminated image field 12 shifts, and owing to the reversing effect of the lever 25, when the lower holder 6 is moved into its right-hand end position the image field 12 moves from 45 the objective 8 to the objective 9, so that the objective arrangement is switched over automatically in the correct manner for the projection of the images from the upper holder, and vice versa.

50 Although microfilm reading apparatus having two microfilm holders 6 and 7, respectively, has been described, it will be readily apparent from the above description how more than two such holders can 55 be arranged in accordance with the invention, an objective being provided for each holder having a suitable focal length.

WHAT WE CLAIM IS:—

60 1. Microfilm reading apparatus which comprises two or more holders for microfilm, each holder being arranged to hold microfilm in a plane which is parallel to and spaced apart from the plane or planes 65 of the microfilm held by the other holder

or holders, two or more projection objectives, each projection objective being associated with a different one of the microfilm holders for projecting, in operation, a microfilm image from its associated holder 70 onto a screen, and each holder and its associated projection objective being so arranged as to be movable laterally relative to each other in such a manner that the microfilm plane of the holder remains substantially constant, and wherein the apparatus also comprises means for optionally 75 taking one objective out of operation and bringing another objective into operation.

2. Microfilm reading apparatus as 80 claimed in claim 1, wherein each holder and its associated projection objective are so arranged as to be movable laterally relative to each other in two directions which are normal to each other. 85

3. Microfilm reading apparatus as 90 claimed in claim 1 or claim 2, wherein the holders are so arranged as to be movable relative to each other in such a manner that the microfilm plane of each holder remains substantially constant.

4. Microfilm reading apparatus as 95 claimed in claim 3, wherein stops are provided which come into engagement with the movable holders at the end of their travel, and which are mechanically connected with the means for taking one objective out of operation and bringing 100 another objective into operation.

5. Microfilm reading apparatus as 105 claimed in any one of claims 1 to 4, wherein the means for optionally taking one objective out of operation and bringing another objective into operation comprises means for so directing light onto the 110 microfilm holders as to illuminate a predetermined area, the said means being movable relative to the optical axes of the objectives so that, by moving the said means, the light directed onto the holders 115 by the said means can be directed to pass through any one of the objectives.

6. Microfilm reading apparatus as 120 claimed in claim 5, wherein the means for directing light onto the microfilm holders comprises a diaphragm movable relative to the optical axes of the objectives.

7. Microfilm reading apparatus as 125 claimed in claim 5, wherein the means for directing light onto the microfilm holders comprises a deflecting mirror, which is movable relative to the optical axes of the objectives.

8. Microfilm reading apparatus as 130 claimed in any one of claims 5 to 7, when dependent on claim 4, wherein the stops are arranged on a slider which, by means of a lever reversing the direction of movement, moves the means for directing light so as to take one objective out of

rocker arm 11 with it in the direction of the arrow A, so that instead of the objective 8 associated with this holder the objective 9 associated with the upper holder

5 7 is now switched in. The holder 7 can now be pushed freely in both co-ordinate directions in order to view its images, as long as it is not brought into its extreme left-hand end position, which by way of the stop in 21 and the drive pin 22 would result in the rocker arm 11 pivoting back in the opposite direction to the arrow A and thus a switching back to the objective 8. When the holder in question is pushed back into the rest position associated with it, the objective intended for viewing of the other holder is switched in automatically, without any further manipulation by the operator.

20 According to Figure 2, a mirror 26 of the illumination means can also be displaced by means of the slider 19 by way of a lever 25 which is supported on an axle 24 fixed to the apparatus and which reverses the direction of actuation of the slider.

The illumination means which consists of a projection lamp 27, a reflector 28 and a condenser arrangement 29 is in this case arranged on a slider 30 which is guided in guides 31 and 32 fixed to the apparatus, and engages by means of a pin 33 a fork-like part 25a of the reversing lever 25. The objectives 8 and 9 are in this case arranged on a support 34 fixed to the apparatus, and cast their images by way of a correspondingly wide deflecting mirror 35 onto the image screen which is also not shown. With this arrangement, instead of the objectives 8 and 9, the illuminated image field 12 shifts, and owing to the reversing effect of the lever 25, when the lower holder 6 is moved into its right-hand end position the image field 12 moves from the objective 8 to the objective 9, so that the objective arrangement is switched over automatically in the correct manner for the projection of the images from the upper holder, and vice versa.

50 Although microfilm reading apparatus having two microfilm holders 6 and 7, respectively, has been described, it will be readily apparent from the above description how more than two such holders can be arranged in accordance with the invention, an objective being provided for each holder having a suitable focal length.

WHAT WE CLAIM IS:—

60 1. Microfilm reading apparatus which comprises two or more holders for microfilm, each holder being arranged to hold microfilm in a plane which is parallel to and spaced apart from the plane or planes of the microfilm held by the other holder

or holders, two or more projection objectives, each projection objective being associated with a different one of the microfilm holders for projecting, in operation, a microfilm image from its associated holder onto a screen, and each holder and its associated projection objective being so arranged as to be movable laterally relative to each other in such a manner that the microfilm plane of the holder remains substantially constant, and wherein the apparatus also comprises means for optionally taking one objective out of operation and bringing another objective into operation.

2. Microfilm reading apparatus as claimed in claim 1, wherein each holder and its associated projection objective are so arranged as to be movable laterally relative to each other in two directions which are normal to each other.

3. Microfilm reading apparatus as claimed in claim 1 or claim 2, wherein the holders are so arranged as to be movable relative to each other in such a manner that the microfilm plane of each holder remains substantially constant.

4. Microfilm reading apparatus as claimed in claim 3, wherein stops are provided which come into engagement with the movable holders at the end of their travel, and which are mechanically connected with the means for taking one objective out of operation and bringing another objective into operation.

5. Microfilm reading apparatus as claimed in any one of claims 1 to 4, wherein the means for optionally taking one objective out of operation and bringing another objective into operation comprises means for so directing light onto the microfilm holders as to illuminate a predetermined area, the said means being movable relative to the optical axes of the objectives so that, by moving the said means, the light directed onto the holders by the said means can be directed to pass through any one of the objectives.

6. Microfilm reading apparatus as claimed in claim 5, wherein the means for directing light onto the microfilm holders comprises a diaphragm movable relative to the optical axes of the objectives.

7. Microfilm reading apparatus as claimed in claim 5, wherein the means for directing light onto the microfilm holders comprises a deflecting mirror, which is movable relative to the optical axes of the objectives.

8. Microfilm reading apparatus as claimed in any one of claims 5 to 7, when dependent on claim 4, wherein the stops are arranged on a slider which, by means of a lever reversing the direction of movement, moves the means for directing light so as to take one objective out of



operation and bring another objective into operation when any one of the holders engages a stop.

- 5 9. Microfilm reading apparatus as
claimed in any one of claims 1 to 4,
wherein the means for optionally taking
one objective out of operation and bringing
another objective into operation comprises
a diaphragm arranged to allow light to
10 pass onto a predetermined area of any one
of the holders positioned over it, the holders
being movable relative to the diaphragm,
and means for moving the objectives, which
are offset with respect to one
15 another in the direction of their optical
axes by a distance equal to that between
the planes of their associated holders, relative
to the diaphragm so as to take one
objective out of the path of light from the
20 diaphragm and bring another objective into
the said path.

10. Microfilm reading apparatus as
claimed in claim 9, wherein the means for
moving the objectives comprises a support
25 on which the objectives are mounted,

which support is movable relative to each microfilm holder.

11. Microfilm reading apparatus as
claimed in claim 10, wherein the support is
in the form of a rocker arm. 30

12. Microfilm reading apparatus as
claimed in claim 10 or claim 11, when dependent
on claim 4, wherein the stops are
arranged on a slider which carries the
movable objective support along with it so
35 as to take one objective out of operation
and bring another objective into operation
when any one of the holders engages a
stop.

13. Microfilm reading apparatus substantially
as hereinbefore described with
reference to, and as shown in, the accompanying
drawings. 40

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1975.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies
may be obtained.

