

Nov. 29, 1955

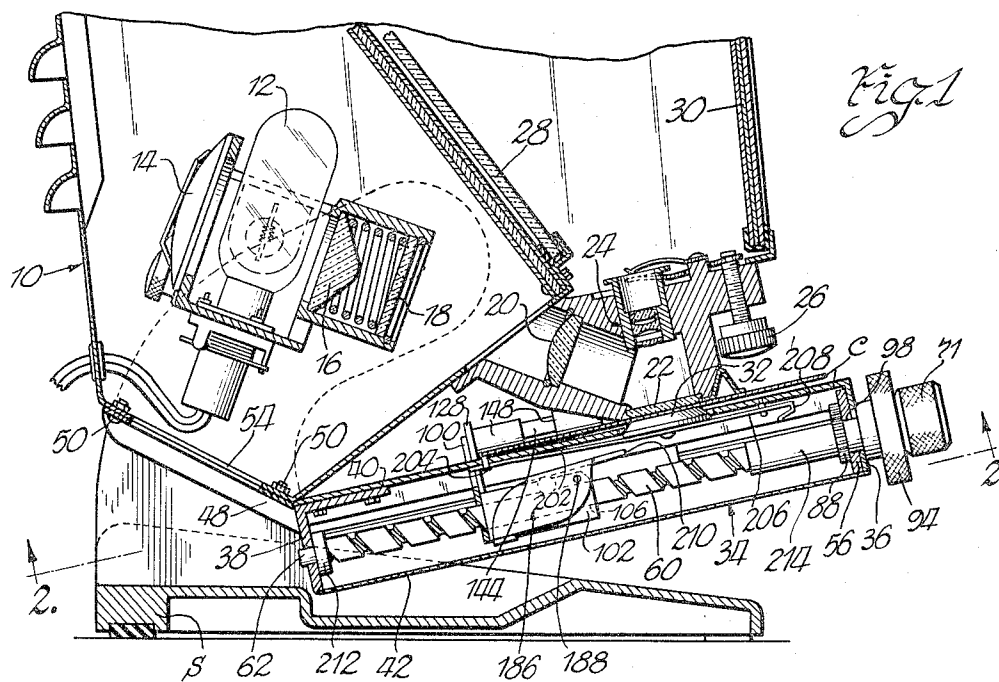
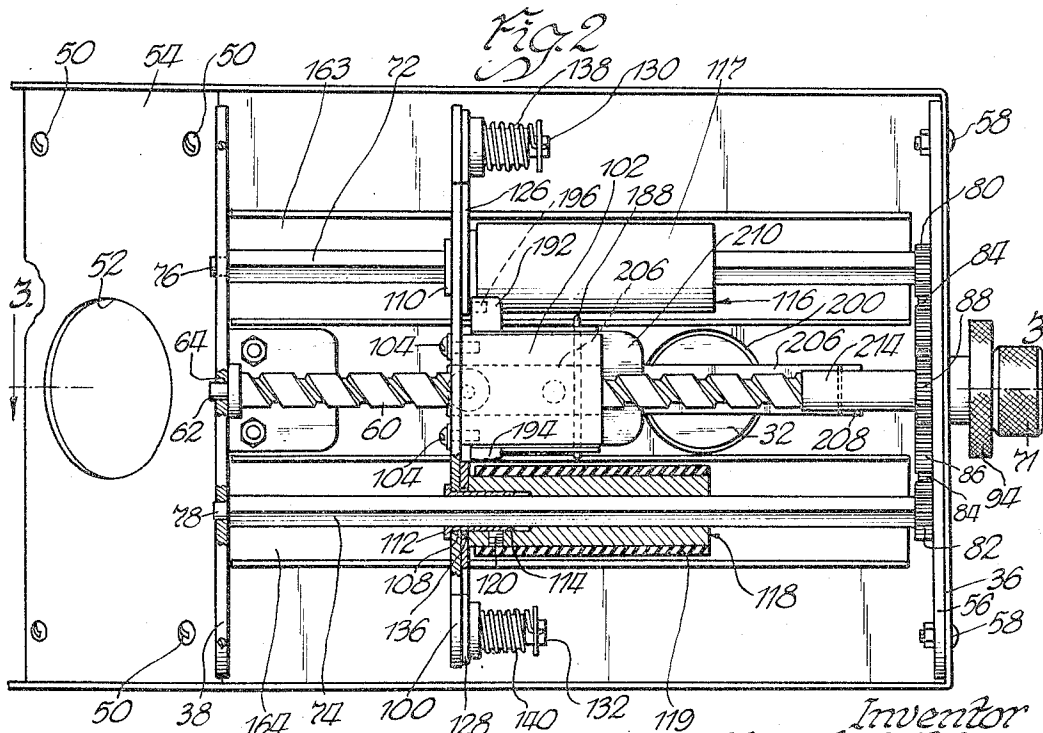
E. O. PETERS

2,724,988

MICROPHOTOGRAPH CARRIER

Filed May 3, 1952

3 Sheets-Sheet 1



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by Bair, Freeman & Molinare
Atty's.

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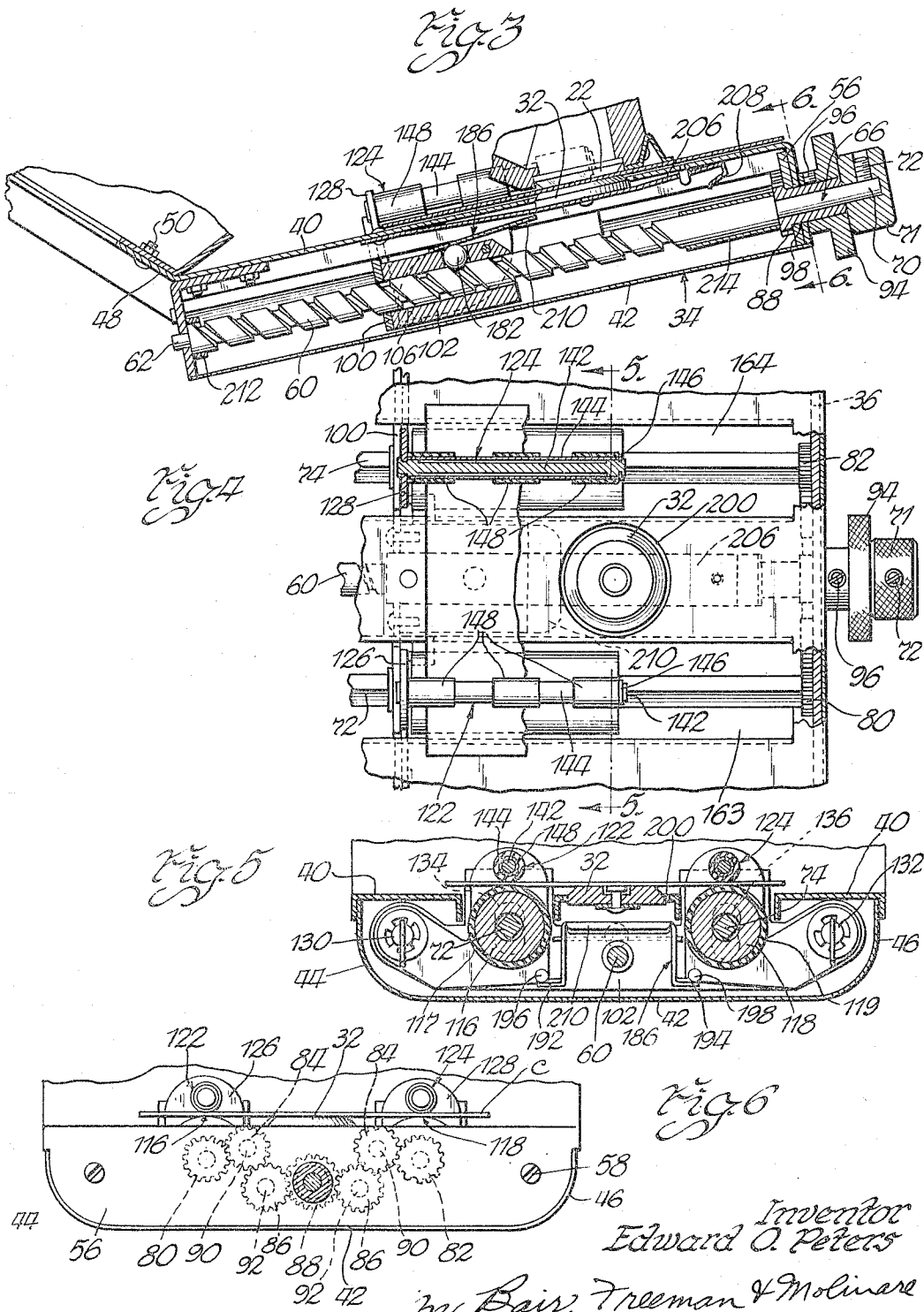
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3 Sheets-Sheet 2



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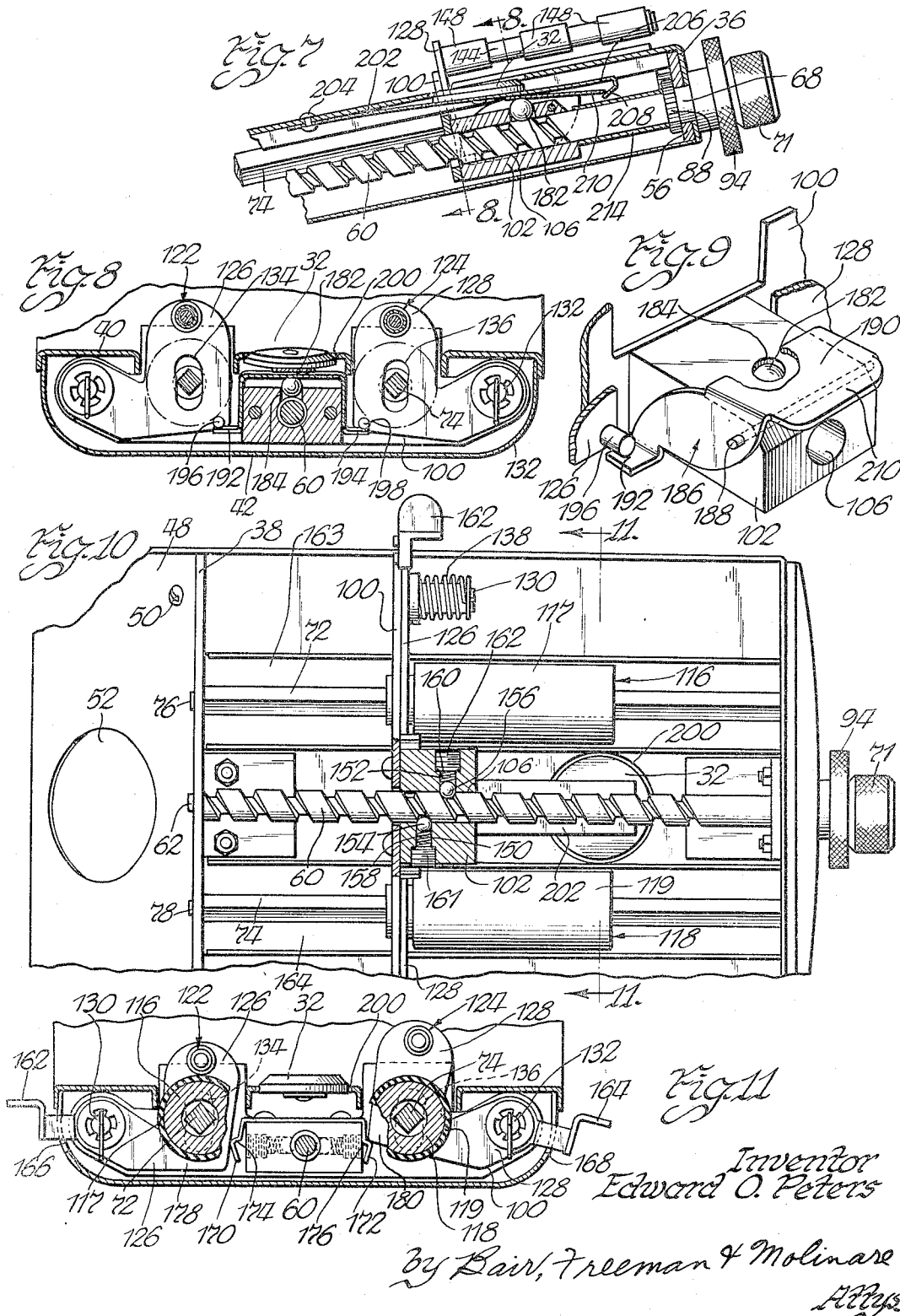
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MICROPHOTOGRAPH CARRIER

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1

2,724,988

MICROPHOTOGRAPH CARRIER

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Application May 3, 1952, Serial No. 285,877

12 Claims. (Cl. 88—26)

This invention relates to a carrier for moving objects carried thereby in directions transverse to each other, and more particularly to a microphotograph carrier arranged to selectively position a microphotograph that is being used with a microphotograph reading machine.

This microphotograph carrier is for use particularly with a microphotograph reader of the type described in the copending application of Peters and Brietzke, Serial No. 246,824, filed September 15, 1951, now Patent No. 2,700,917, of February 1, 1955.

As was pointed out in said copending application, the frames and guides of microphotograph carriers heretofore made have been constructed very accurately, and nearly perfect adjustment of the plane of the carrier with respect to the axis of the lens of the microphotograph reader was essential. The cost of such custom work is very great. The invention in the copending application sought to eliminate the microphotograph carrier as a means for maintaining the microphotograph at a fixed distance from the focusing lens.

However, the microphotograph when used with the microphotograph reader in the copending application was to be manipulated by hand. An automatic positioning means for use with the microphotograph reader described in said copending application is still a desirable machine.

One of the objects of this invention is to provide a microphotograph carrier for use with the microphotograph reader of the type described in said copending application, which carrier is of simple construction and which carrier provides for easy, accurate, and convenient positioning of the microphotograph with respect to the microphotograph reader.

Another object of this invention is to provide a microphotograph carrier having a simple declutching mechanism for a moving portion thereof which is driven by a screw member, which declutching mechanism prevents jamming of the carrier when further travel thereof is halted.

A further object of this invention is to provide a microphotograph carrier wherein the microphotograph is clamped onto the carrier and including automatic means for releasing the clamped microphotograph.

And still another object of this invention is to provide a microphotograph carrier for a microphotograph reader, wherein the microphotograph is clamped onto the carrier, and wherein a portion of the microphotograph is clamped between members of the microphotograph reader, and including automatic means for simultaneously releasing the microphotograph clamping member on the carrier and the clamping member on the reader whereby the microphotograph is completely released.

And still a further object of this invention is to provide a microphotograph carrier characterized by its novel arrangement of its parts and its simplicity and inexpensiveness of construction.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this in-

2

vention will be pointed out with particularity in the claims annexed to and forming part of this specification.

A preferred embodiment of the invention is shown in the accompanying drawing, in which—

Figure 1 is a side view partially in cross section of a portion of a microphotograph reader having the microphotograph carrier mounted thereon.

Figure 2 is a view looking upwardly at the microphotograph carrier with the housing therefor removed and with portions in cross section, and is taken substantially on line 2—2 of Figure 1.

Figure 3 is a view taken on line 3—3 of Figure 2.

Figure 4 is a fragmentary view looking downward into the portion of the carrier upon which the microphotograph is positioned, and with parts of the housing of the carrier broken away.

Figure 5 is a cross section view taken on line 5—5 of Figure 4.

Figure 6 is a view taken on line 6—6 of Figure 3 showing the gear train arrangement for the lateral movement drive.

Figure 7 is a fragmentary view similar to Figure 3, showing a portion of the mechanism release operatively engaging and displacing a clamping member of the microphotograph reader so as to release the microphotograph.

Figure 8 is a view taken on line 8—8 of Figure 7.

Figure 9 is an isometric view, with parts broken away, of the release mechanism for spreading the clamping means for the microphotograph both on the microphotograph carrier and on the microphotograph reader.

Figure 10 is a fragmentary view similar to Figure 2 showing a modified form of the clutch mechanism between the carrier and the lead screw and showing a manual release mechanism for the microphotograph clamping means of the carrier.

Figure 11 is a cross section view taken on line 11—11 of Figure 10.

Referring now to the figures, there is shown in Figure 1 a microphotograph reader casing generally indicated at 10, having therein a light source 12, a reflector 14, condenser lenses 16, 18, and 20, contact glass 22, focusing unit 24, focusing knob 26, mirror 28, and viewing screen 30. A clamping member 32 is provided for clamping the microphotograph card C against the contact glass 22. The microphotograph reader is mounted on a stand S.

A microphotograph carriage and drive therefor is enclosed in a casing generally indicated at 34, which is mounted on microphotograph reader casing 10. The casing 34 has a front wall 36, a rear wall 38, a flat top side 40, and a bottom wall 42, which wraps around at 44 and 46 to totally enclose the microphotograph carriage and drive mechanism therefor.

The casing 34 has a mounting flange 48 extending therefrom for mounting the casing and carrier therein on reader casing 10 by means of bolts 50. Flange 48 has an aperture 52 therein adapted to register with an aperture 54 in reader casing 10, through which passes cooling air for light source 12.

Referring again to the microphotograph carrier and housing therefor, a bearing plate 56 is positioned adjacent the inner side of front wall 36 and is secured thereto by means of bolts 58 or the like.

The drive means for the microphotograph carriage includes a lead screw 60 having a reduced stud 62 at one end journaled in a bore 64 through rear wall 38. The other end of lead screw 60 has a reduced stem 66 extending therefrom and journaled in sleeve 68. The extended end 70 of stem 66 has a control knob 71 mounted thereon and secured thereto by means of a set screw 72.

Extending parallel to the lead screw 60 and spaced on opposite sides thereof are a pair of shafts 72 and 74 of

3

square cross section. The rearward ends of the shafts 72 and 74 have reduced cylindrical stubs 76 and 78 which are journaled in bores in rear wall 38. The forward ends of shafts 72 and 74 are provided with similar stubs (not shown) journaled in bores in bearing plate 56.

Shafts 72 and 74 have gears 80 and 82 respectively mounted thereon in driving connection therewith. Gears 80 and 82 are driven by means of a gear train comprising gears 84, 86, and drive gear 88. Gears 84 and 86 are journaled on studs 90 and 92 extending from bearing plate 56. The drive gear 88 is formed integrally with sleeve 68. Sleeve 68 has a control knob 94 mounted thereon and secured thereto by means of a set screw 96. The sleeve 68 is rotatably journaled in bore 98 through bearing plate 56 and front wall 36.

Referring now to the carriage, best shown in Figures 2, 3, 4, 5 and 8, the carriage includes a mounting plate 100 having a central block 102 secured thereto by means of screws 104. There is a central longitudinal bore 106 through said block 102 and through said plate 100, through which extends lead screw 60.

Mounting plate 100 also provides a pair of apertures 108 in which are journaled sleeves 110 and 112. The sleeves 110 and 112 each have a square bore 114 therethrough, adapted to receive the square shafts 72 and 74. Mounted on sleeves 110 and 112 are drive rollers 116 and 118, which are secured thereto by means of set screws 120. The drive rollers 116 and 118 are provided with sleeves 117 and 119 of rubber or of some other suitable resilient material. By the means just described, the rollers 116 and 118 are connected in driving relation to shafts 72 and 74 through sleeves 110 and 112.

Clamping rollers 122 and 124 are associated, respectively, with the drive rollers 116 and 118. Each clamping roller extends parallel to the associate drive roller and is positioned above the associate drive roller. The clamping rollers are secured to plates 126 and 128 which are pivotally mounted on studs 130 and 132 extending from mounting plate 100. The plates 126 and 128 are provided with elongated arcuate slots 134 and 136 to accommodate the sleeves 110 and 112 and to permit swinging of plates 126 and 128. Coil springs 138 and 140 are positioned concentrically on studs 130 and 132 and are each connected at one end to the associate stud and at the other end to the associate plate. These coil springs 138 and 140 serve to bias the clamping rollers toward the drive rollers in clamping position.

Each clamping roller itself includes a central stem 142 secured to the associate mounting plate. A sleeve 144 is rotatably mounted on the stem 142 and is restrained from axial movement thereon by the associate plate at one end and by a snap ring or restraint 146 at the other end. Bands 148 of rubber, or other suitable resilient material, are positioned on sleeve 144.

One form of the drive connection between lead screw 60 and the carriage is shown in Figure 10. This drive connection comprises a pair of spaced bores 150 and 152 in central block 102, balls 154 and 156 respectively in said bores, and springs 158 and 160 resiliently biasing the respective balls into driving engagement with the threads of the lead screw 60. The springs 158 and 160 are retained in position by means of plugs 161 and 162 threaded into block 102.

The balls 154 and 156 are of greater diameter than the depths of the lead screw groove and therefore a portion of the ball is positioned in the lead screw groove and the other portion of the ball engages part of central block 102, in driving engagement therewith. When the lead screw is rotated, and the balls are forced to follow the lead screw groove, such rotation of lead screw 60 results in the carriage traveling longitudinally of the lead screw.

The top side 40 of the carriage housing 34 is slotted at 163 and 164 to provide for the projection therethrough of rollers 116 and 118 and the portion of the plates 126

4

and 128 which extend above the rollers 116 and 118 and on which the clamping rollers 122 and 124 are mounted. These slots are elongated to provide for movement of the carriage along the length of the lead screw.

In the form of the invention illustrated in Figures 10 and 11, the clamping rollers 122 and 124 are adapted to be manually swung away from the drive rollers 116 and 118. The plates 126 and 128 are provided with thumb levers 162 and 164 extending outwardly through slots 166 and 168 in the carriage housing. The thumb levers 162 and 164 afford means for swinging the clamping rollers away from the drive rollers. The slots 166 and 168 are elongated to provide for movement of the carriage along the length of lead screw 60.

Means are provided for maintaining the clamping rollers spaced from the drive rollers. These means include resilient latches 170 and 172 mounted on block 102. The resilient latches 170 and 172 have shoulders 174 and 176 adapted to cooperate with corners 178 and 180 of the swingable plates 126 and 128, in the manner shown in Figure 11, where plate 128 is latched in a position where the clamping roller 124 is spaced from the associate drive roller 118. Very little upward force on thumb lever 164 is necessary to unlatch the plate 128, whereupon the clamping roller 124 is again biased by spring 140 against the drive roller 118.

In the preferred form of the invention shown in Figures 1 to 9, automatic means are provided for spreading the clamping rollers from the drive rollers. The drive connection between the lead screw 60 and central block 102 includes a single ball 182 in vertical bore 184 in central block 102. A toggle member 186 of inverted U-shape is pivoted on a pin 188 extending through block 102. The saddle portion 190 of U-shaped member 186 is adapted to engage ball 182 and force it into driving engagement with the threads of lead screw 60.

The U-shaped member 186 has flanges 192 and 194, respectively, adapted to engage the underside of studs 196 and 198 extending, respectively, from pivotal plates 126 and 128. Springs 138 and 140 which bias the clamping rollers 122 and 124 toward the drive rollers 116 and 118, also serve to cause studs 196 and 198 to engage flanges 192 and 194 to keep the U-shaped member 186 pivoted to a position where the ball 182 is maintained in driving engagement with the threads of lead screw 60.

When further travel of the carriage along the lead screw 60 is halted, then the further twisting of the lead screw serves to force the ball 182 upwardly over the engaging thread of lead screw 60, thus forcing the ball 182 outwardly of bore 184. The ball 182 engages the saddle surface 190 of U-shaped member 186 and pivots the U-shaped member 186 about the pivot pin 188. The flanges 192 and 194 engage the studs 196 and 198 and pivot swingable plates 126 and 128 upwardly about the studs 130 and 132. This serves to move the clamping rollers 122 and 124 away from their associate drive rollers 116 and 118.

Upon further rotation of the lead screw, the ball 182 will again enter the groove of the lead screw 60, and springs 138 and 140 will bias the clamping rollers 122 and 124 back toward the drive rollers 116 and 118, and, simultaneously, through the cooperation of studs 196 and 198 and flanges 192 and 194, the U-shaped toggle member 186 will be restored to its original position.

The top side 40 of the carriage housing is provided with an aperture 200 through which the clamping member 32 is adapted to move for clamping a portion of the microphotograph card C against the contact glass 22. The clamping member 32 is secured to a leaf spring 202 which in turn is secured to the top side 40 by means of a rivet 204.

Upon the clamping rollers 122 and 124 being swung away from the drive rollers so as to release the microphotograph, it is also desired to withdraw the clamping member 32 from glass 22. Accordingly, the leaf spring

202 is extended at 206 and a hook 208 is provided at the extended end thereof. The U-shaped toggle member 186 is provided with a flange 210 adapted to enter the hook 208, as shown in Figure 7. When ball 182 moves outwardly through bore 184 so as to pivot the U-shaped member 186 to cause displacement of the clamping rollers 122 and 124, the flange 210 also moves downward to draw the leaf spring 202 with it and cause the clamping member 32 to be drawn away from contact glass 22.

The lead screw 60 is long enough to accommodate the maximum required movement of the carriage for microphotograph cards of all sizes. The U-shaped toggle member 186 is adapted to be actuated, to pivot the clamping rollers 122 and 124 away from the drive rollers 116 and 118, when the movement of the carriage along the lead screw 60 is halted. Stop members are provided which cooperate with portions of the carriage so as to cause the toggle member to be actuated at certain points along the length of the lead screw 60. These stop members include a rear stop member 212 and a front stop member 214. The rear stop member 212 is concentric with lead screw 60 and is adapted to butt against rear wall 38. The front stop member or sleeve 214 is concentric with lead screw 60 and is adapted to butt against drive gear 88 on sleeve 68.

The rear stop 212 also serves to space the carriage from the rear wall 38 so that the heads of screws 104 are not jammed against rear wall 38. The front stop 214 is of considerable length so as to reduce the length of the central block 102. The front stop 214 may be easily and accurately trimmed to a proper length so that the carriage will be halted at the precise point where pivoting of the toggle member 186 results in the proper engagement of flange 210 with hook 208.

The control knob 71, for controlling the movement of the carriage along the length of the lead screw 60, and the control knob 94, for controlling the movement of the drive rollers 116 and 118, are positioned concentrically with each other and closely adjacent each other. This puts all of the necessary controls in a position where they are easily manipulated by an operator, without the operator having to fumble for the controls.

The controls are also so arranged that they move in directions which are consistent with the directions in which the microphotograph card C appears to move upon the viewing screen 30 of the microcard reader. For example, when knob 71 is rotated clockwise the carriage moves forwardly in the direction from rear wall 38 toward the front wall 36 of the carriage housing 34. As it appears on the screen to the operator, the card then appears to be moving upwardly across the screen. Since clockwise rotation is generally associated with forward progress of most items associated with rotatable members, it will be seen that this clockwise rotation of knob 71 brings about movement of the card in a direction which is generally associated with the direction of rotation of that member.

Similarly when control knob 94 is rotated counterclockwise for the purpose of going from one page to the next following page, as viewed on the screen 30, such counterclockwise movement is associated with the general direction of movement obtaining when one turns the pages of a book in sequential order. In going from one page to the next succeeding page, which pages are printed on a continuous strip, one moves the strip from right to left which is generally in a counterclockwise direction. The rotation of knob 94 thus is properly associated with the direction in which the microphotograph card appears to move on the screen of the viewer. It is to be noted that while the counterclockwise rotation of control knob 94 brings about this result it is necessary that the gear train including gears 88, 86, 84 and 80 cause the drive rollers to rotate in a clockwise direction; and while the card appears to be moving from right to left on the screen 30 of the microphotograph

viewer, actually the card is moving from left to right on the carriage, and vice versa.

It is also pointed out that the complete release of the microphotograph, including the spreading of the clamping rollers 122 and 124 and the depressing of the clamping member 32, takes place when the carriage is in the forward position. When the carriage is in the forward position then the bottom portion of the microphotograph is being viewed on the viewer and usually that is the end of the card. Thus, the release of the microphotograph takes place at a point where normally one would want to release the microphotograph, having finished with it and desiring to insert a new microphotograph on to the carriage.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In a carriage moving apparatus, a carriage, means mounting said carriage for movement only in opposite directions, a lead screw parallel to the directions in which said carriage is adapted to move, a block carried by said carriage, said block having a bore therethrough, said lead screw extending through said bore in said block, said block having at least one recess therein opening into said bore therethrough, a member positioned in said recess, resilient means in said recess biasing said member outwardly from said recess into said bore, a portion of said member adapted to enter between threads on said lead screw while another portion thereof remains in engagement with said block, so as to establish an operative connection between said lead screw and said block, the rotation of the lead screw causing said member and thereby the carriage to move longitudinally of said lead screw, and said member adapted to move out from between the lead screw threads and become disengaged therefrom when said carriage is restrained from further motion along said lead screw.

2. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a carriage adapted to support the object, means for moving the carriage in opposite directions, means on the carriage for selectively moving the object carried thereby in opposite edgewise directions transverse to the directions in which the carriage is adapted to move, means engaging opposite sides of said flat object to restrict removal of the object from the carriage, the latter means affording said selective edgewise movement of the object in opposite directions on the carriage, and means operative upon said carriage reaching its limits of movement for rendering said latter means inoperative, whereby the object carried by said carriage may be removed therefrom.

3. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a carriage adapted to support said object and movable only in opposite directions, means on said carriage for moving the object carried thereby in opposite directions transverse to the directions in which the carriage is adapted to move, said last means comprising a plurality of pairs of opposed rollers, each pair of opposed rollers including one roller mounted to be bodily movable toward and away from the other of said pair of rollers, each pair of rollers adapted to be selectively spaced apart to permit introduction therebetween of an object and adapted to be moved together to engage opposite sides of said object, means for rotating one of

7

each pair of rollers simultaneously to effect movement of said object selectively in opposite directions, and means operative upon said carriage reaching its limits of movement to spread apart the rollers of each of said pairs of rollers, whereby the object gripped therebetween may be released.

4. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a lead screw rotatably journaled at its ends in a frame, a pair of shafts extending parallel to and on opposite sides of said lead screw and rotatably journaled at their ends in said frame, a carriage connected to said lead screw for movement along the length thereof as said lead screw is rotated, a pair of drive rollers slidably and non-rotatably mounted on said pair of shafts and movable with said carriage, a first control knob for rotating said lead screw, a second control knob coaxial with said first control knob and positioned closely adjacent thereto for rotating said pair of shafts and drive rollers thereon, and said connection between the carriage and the lead screw including a member engaging said carriage and movable into and out of the groove between threads on said screw, said member riding up over a screw thread as the screw is turned so as to render said connection inoperative upon the movement of said carriage along said lead screw being halted.

5. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a carriage movable in opposite directions, a pair of drive rollers movable with said carriage and adapted to move an object carried thereby in opposite directions transverse to the directions in which said carriage is adapted to move, a clamping roller associated with each drive roller extending parallel thereto and mounted on said carriage for swinging toward and away from the associate drive roller respectively to grip or release an object therebetween, means biasing each clamping roller toward its associate drive roller, and means for selectively maintaining said clamping roller in a position spaced from its associate drive roller.

6. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a carriage movable only in opposite directions, a pair of drive rollers movable with said carriage and adapted to move an object carried thereby in opposite directions transverse to the directions in which said carriage is adapted to move, a clamping roller associated with each drive roller extending parallel thereto and mounted on said carriage for swinging toward and away from the associate drive roller and for gripping or releasing an object therebetween, means biasing each clamping roller toward its associate drive roller, means for selectively swinging each clamping roller away from its associate drive roller, and means for maintaining said clamping roller spaced from said drive roller.

7. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a lead screw rotatably journaled at its ends in a frame, a pair of shafts extending parallel to and on opposite sides of said lead screw and rotatably journaled at their ends in said frame, a carriage adapted to move along the length of said lead screw, a pair of drive rollers slidably and non-rotatably mounted on said pair of shafts and movable with said carriage, a clamp roller associated with each drive roller and extending parallel thereto, each clamping roller being mounted on said carriage for swinging toward and away from its associate drive roller, a member engaging said carriage and releasably engaging the threads of said lead screw and adapted to move out of engagement with said threads upon the movement of said carriage along said lead screw

8

being halted while said lead screw continues to be turned, a toggle member adapted to be actuated by said member as the member is moved out of engagement from said screw threads, to swing the clamp rollers away from their associate drive rollers and to maintain said rollers spaced apart until said member again restores operative connection between said lead screw and said carriage by again entering between threads of said lead screw.

8. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a lead screw rotatably journaled at its ends in a frame, a pair of shafts extending parallel to and on opposite sides of said lead screw and rotatably journaled at their ends in said frame, a carriage adapted to move along the length of said lead screw, a pair of drive rollers slidably and non-rotatably mounted on said pair of shafts and movable with said carriage, a clamp roller associated with each drive roller and extending parallel thereto, each clamp roller being mounted on said carriage for swinging toward and away from its associate drive roller, a member engaging said carriage and releasably engaging the threads of said lead screw and adapted to move out of engagement with said threads upon the movement of said carriage along said lead screw being halted while said lead screw continues to be turned, a toggle member adapted to be actuated by said member as the member is moved out of engagement from said screw threads, to swing the clamp rollers away from their associate drive rollers and to maintain said rollers spaced apart until said member again restores operative connection between said lead screw and said carriage by again entering between threads of said lead screw, and means biasing each clamping roller toward its associate drive roller, said biasing means being operative to bias said member toward a position for operative connection of the carriage to the lead screw.

9. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus comprising a lead screw rotatably journaled at its ends in a frame, a pair of shafts extending parallel to and on opposite sides of said lead screw and rotatably journaled at their ends in said frame, a carriage releasably connected by a member movable into and out of said lead screw groove for movement along the length thereof as said lead screw is rotated, a pair of drive rollers slidably and non-rotatably mounted on said pair of shafts and movable with said carriage, a clamp roller associated with each drive roller and extending parallel thereto, each clamp roller being mounted on said carriage for swinging toward and away from its associate drive roller, means biasing said clamp rollers toward their associate drive rollers, and means biasing said member toward a position to operatively connect said carriage and lead screw.

10. In combination, a microphotograph viewer including an objective glass, and a clamping member positioned opposite said objective glass and mounted for movement toward and away from said glass, said clamping member being operative to clamp a microphotograph against said objective glass; and a positioning apparatus for moving a microphotograph carried thereby in directions transverse to each other, said positioning apparatus comprising a carriage movable selectively in a first pair of opposite directions, and means on said carriage for moving said microphotograph selectively in a second pair of opposite directions transverse to said first pair of directions, members on said carriage swingable toward and away from each other respectively for gripping and releasing said microphotograph, and means operative upon said carriage reaching its limit of movement in one direction for simultaneously moving apart the members which grip the microphotograph, and for moving said clamping member

9

away from said objective glass so as to release the microphotograph which is clamped therebetween.

11. In combination, a microphotograph viewer including an objective glass, and a clamping member positioned opposite said objective glass and mounted for movement toward and away from said glass, said clamping member being operative to clamp a microphotograph against said objective glass; and a positioning apparatus for moving a microphotograph carried thereby in a first pair of directions, said positioning apparatus comprising a carriage, means for selectively moving said carriage in opposite directions, two pairs of rollers movable with said carriage and positioned on opposite sides of said objective glass and clamping member, each pair of rollers including a drive roller and an associated clamping roller swingable toward and away from said drive roller, said drive rollers adapted to support a microphotograph thereon, said clamping rollers and drive rollers adapted to cooperate to grip a microphotograph therebetween, said clamping member clamping a portion of the microphotograph between said pairs of rollers against said objective glass, means for rotating said drive rollers to move said microphotograph selectively in a pair of opposite directions transverse to said first pair of directions, and means operative upon said carriage reaching its limit of movement in one direction for simultaneously moving the clamping rollers away from the drive rollers and for moving the clamping member away from said objective glass, so as to release the microphotograph therebetween.

12. A positioning apparatus for moving a flat object carried thereby in directions transverse to each other and in a plane parallel to said flat object, said apparatus com-

10

prising a carriage adapted to support said object and movable only in opposite directions, a lead screw parallel to the directions in which said carriage is adapted to move and operatively connected thereto to move said carriage in said directions, means on the carriage for moving the objects supported thereon in opposite directions transverse to the direction in which the carriage is adapted to move, and the connection between the carriage and lead screw including a block carried by said carriage, said block having a bore therethrough, said lead screw extending through said bore in said block, said block having at least one recess therein opening into said bore therethrough, a member positioned in said recess, resilient means in said recess biasing said member outwardly from said recess into said bore, and a portion of said member adapted to enter between threads on said lead screw while another portion thereof remains in engagement with said block, so as to establish an operative connection between said lead screw and said block.

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