

**(12) EUROPEAN PATENT APPLICATION**

**(21)** Application number: **85109598.4**

**(51)** Int. Cl.<sup>4</sup>: **G 03 B 27/32**

**(22)** Date of filing: **30.07.85**

**(30)** Priority: **03.08.84 JP 120181/84**  
**03.08.84 JP 120182/84**  
**03.08.84 JP 163606/84**  
**03.08.84 JP 163607/84**

**(43)** Date of publication of application: **12.02.86**  
**Bulletin 86/7**

**(84)** Designated Contracting States: **CH DE LI**

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**(54)** **Apparatus for inspecting reversal film.**

**(57)** A reversal film inspecting apparatus is arranged such that a roll of photographic paper which has already been subjected to printing is successively fed from one of the takeup means to the other, and has a print paper inspection board disposed between these takeup means. A moving means receives a reversal film slide from a desired one of a plurality of reversal film slide housing pockets formed in a magazine and moves the received slide to an observation window, and a reloading means returns a reversal film slide which has been observed at the window to the associated pocket in the magazine. Thus, it is possible for the operator to check pictures on a roll of photographic paper on the inspection board and to unload from the magazine a reversal film slide corresponding to a picture which needs to be re-printed for observation and further to input correction information required for re-printing in accordance with need.

## SPECIFICATION

TITLE OF THE INVENTION

APPARATUS FOR INSPECTING REVERSAL FILM

BACKGROUND OF THE INVENTIONField of the Invention:

5       The present invention relates to a reversal film  
inspecting apparatus which allows an operator to check  
pictures on a roll of photographic paper which has been  
printed from mounted reversal film slides and subjected to  
development and to take out reversal film slides corresponding  
10   to the inspected pictures for the purpose of correcting  
printing conditions in accordance with need.

Description of the Prior Art:

A reversal film slide which allows an image thereon to  
be projected by means of a projector is mounted in a  
15   frame-like mount made of thick paper, a synthetic resin or  
the like.

When printing is effected on a roll of photographic  
paper from mounted reversal film slides, a plurality of  
reversal film slides are loaded into a magazine and are  
20   successively unloaded therefrom such as to be subjected to  
printing on a roll of photographic paper, whereby it is  
possible to carry out an effective printing operation.

It is conventional practice to provide a visual check  
for inspecting the printed state of each of the pictures

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which have been printed on a roll of photographic paper and subjected to development. If the printed state of a picture is judged to be poor, it is necessary to unload from the magazine the reversal film slide which corresponds to that  
5 picture for the purpose of effecting re-printing, which fact involves a disadvantageously troublesome operation and leads to a substantial reduction in the printing efficiency.

#### SUMMARY OF THE INVENTION

In view of the above circumstances, it is a primary  
10 object of the present invention to provide a reversal film inspecting apparatus for checking the printed state of pictures on a roll of photographic paper which has been printed from reversal film slides and subjected to development, the apparatus permitting any desired reversal  
15 film slide corresponding to a particular picture to be readily and reliably unloaded from and reloaded into a magazine.

To this end, the invention provides a reversal film inspecting apparatus in which a roll of photographic paper  
20 which has been subjected/<sup>to</sup>printing is successively fed from one of the takeup means to the other and which has a print paper inspection board disposed between these takeup means, characterized by comprising moving means which receives a reversal film slide from any desired one of a plurality of  
25 reversal film slide pockets formed in a magazine and moves

this reversal film slide to an observation window, and reloading means which returns a reversal film slide which has been subjected to observation to the associated pocket of the magazine.

5 By virtue of the above-described arrangement, it is possible for an operator to provide a visual check on pictures on a roll of photographic paper on the print paper inspection board. As regards a picture which needs to be re-printed, it is possible for the operator to unload from  
10 the magazine the reversal film slide corresponding to this picture for the purpose of observing the image of light transmitted by the film slide and to input correction information required for re-printing in accordance with need on the basis of the result of observation.

#### 15 BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent from the following description of the preferred embodiment thereof, taken in conjunction with the accompanying drawings, in  
20 which like reference numerals denote like elements, and in which:

Fig. 1 is a perspective view of a reversal film inspecting apparatus in accordance with one embodiment of the present invention;

25 Fig. 2 is a perspective view of the inspecting

apparatus shown in Fig. 1 as viewed from the rear thereof;

Fig. 3 is a perspective view of a roll of photographic paper;

Fig. 4 is a sectional view of a feed roller and press  
5 rollers;

Fig. 5 is an exploded perspective view of a magazine;

Fig. 6 is a partially cutaway perspective view of a magazine driver;

Fig. 7 is an enlarged view of pockets formed in the  
10 magazine;

Fig. 8 is a sectional view taken along the line VIII-VIII of Fig. 5;

Fig. 9 is a plan view of the magazine and the magazine driver;

15 Fig. 10 is a plan view of the magazine driver;

Fig. 11 is a perspective view of a magazine mounting board and its associated elements, which shows the connecting portion between the magazine and the magazine driver;

20 Fig. 12 is a perspective view of a magazine securing structure;

Fig. 13 is a sectional view taken along the line XIII-XIII of Fig. 15, which shows reloading means;

Fig. 14 is an exploded perspective view of the  
25 reloading means;

Fig. 15 is a partially cutaway plan view of moving means;

Fig. 16 is a perspective view of a pivoting arm;

Fig. 17 is a perspective view of an input machine  
5 equipped with a magazine;

Fig. 18 is a schematic front elevational view of a printer which has magazines respectively mounted on its supply and reception sides; and

Fig. 19 is a perspective view of a checking machine on  
10 which a magazine is mounted.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

##### Structure of Inspecting Apparatus Body:

Referring first to Fig. 1, a reversal film inspecting apparatus 10 in accordance with one embodiment of the  
15 invention includes an apparatus body 12 which has takeup shafts 14 and 16 rotatably supported on two sides thereof, respectively. The takeup shafts 14 and 16 are rotated in both forward and backward directions by means of the rotational forces respectively derived from motors 18 and  
20 20. In this embodiment, a roll of photographic paper 22 which is wound up on the takeup shaft 14 is passed over a print paper inspection board 24 and is then wound up onto the takeup shaft 16.

The print paper inspection board 24 has guide bars 26  
25 and 28 secured thereto on the upper and lower sides,

respectively, of the photographic paper 22 for guiding the same. The mounting positions of the guide bars 26 and 28 are adjustable laterally of the print paper inspection board 24 in accordance with the lateral dimension of the  
5 photographic paper 22.

Sensors 30 and 32 are respectively secured to the guide bars 26 and 28. It is possible by means of the sensors 30 and 32 to detect small perforations 34 and 36 which are previously formed in the photographic paper 22 in the  
10 printing process, as shown in Fig. 3. Each of the small perforations 34 represents the boundary between two adjacent frames 22A on the photographic paper 22, while each of the small perforations 36 serves as a sorting mark which represents the leading portion or the end of a series of  
15 frames 22A being processed for a single customer.

The guide bar 28 further has a check plate 38 secured thereto in such a manner as to oppose the photographic paper 22 passing through the space between the inspection board 24 and the check plate 38. The check plate 38 is formed with a  
20 rectangular window 40 which enables an operator to check the frames 22A and to put a check mark 42 on a frame 22A which has an image in an inappropriately printed condition, thereby allowing such a frame to be distinguished from frames 22A which carry images in an appropriately printed  
25 condition. The check mark 42 enables a frame 22A with the

mark 42 to be detected in accordance with any difference in terms of the infrared reflectance in a process carried out thereafter in another section (not shown).

Fig. 4 shows a feed roller 44 and press rollers 46, 48, 5 which are disposed between the print paper inspection board 24 and the takeup shaft 16. The feed roller 44 is larger in diameter than the press rollers 46 and 48. The feed roller 44 engages with the portion of the photographic paper 22 which extends from the inspection board 24 to the takeup 10 shaft 16 in such a manner as to change the course of the photographic paper 22. A motor (not shown) is connected to the feed roller 44 so as to apply a driving force to the photographic paper 22.

The press rollers 46 and 48 are pressed against the 15 feed roller 44 and clamp the photographic paper 22 between the same and the feed roller 44, thereby allowing the driving force of the feed roller 44 to be reliably transmitted to the photographic paper 22.

The press rollers 46 and 48 respectively have 20 smaller-diameter portions 46A and 48A at their axially central portions and therefore are separated at these portions from the surface of the photographic paper 22. In other words, the press rollers 46 and 48 are designed to cause both lateral edge portions alone to be pressed against :25 the feed roller 44. The length of the smaller-diameter



portions 46A and 48A is substantially equal to or larger than the lateral dimension of the rectangular window 40 of the check plate 38 disposed on the inspection board 24. Thus, there is no fear of the check mark 42 drawn on the 5 photographic paper 22 being transferred to the press rollers 46, 48.

The apparatus body 12 further includes an input board 50 which has a control lever 52 disposed in its central portion. Thus, the speed of winding up the photographic 10 paper 22 by the takeup shafts 14 and 16 is adjusted by controlling the rotational speed of the feed roller 44, and the inspection operation is thereby facilitated.

The input board 50 is provided with a display window 54 and input buttons 56 corresponding thereto, whereby it is 15 possible to input information required to correct the printing conditions in relation to a frame 22A which needs to be re-printed.

The input board 50 is further provided with an observation window 58 which permits observation, by means of 20 an illuminator, of the image of light transmitted by a mounted reversal film slide 60 (see Fig. 15) which corresponds to a frame 22A on the photographic paper 22 requiring input of correction information and fed out from a reversal film slide housing magazine 62. Thus, it is 25 possible for the operator to accurately decide how to

correct the printing conditions by visually checking the image of light transmitted by the slide 60.

Structure of Reversal Film Slide Housing Magazine:

Referring now to Fig. 5, the reversal film slide housing magazine 62 in accordance with this embodiment is constituted by a plurality of trays 116 which are piled up one upon another in such a manner as to form a hollow cylinder as a whole. Each of the trays 116 has the shape of a plate-like ring having a bore 118 in its center and is formed from a synthetic resin by means of molding. Each tray 116 has eight pockets 120 radially formed thereon, as also shown in Figs. 7 and 8. Each pocket 120 is designed to receive one reversal film slide 60 which is constituted by a piece of reversal film 60A retained on a frame-like mount 60B. The pockets 120 on each tray 116 are constituted by grooves which are formed radially thereon. One reversal film slide 60 is inserted into each pocket 120 in the direction of the arrow A and housed therein.

Stoppers 124 project at the inner end of each pocket 120 in such a manner as to abut against both corners at the leading end of a reversal film slide 60 when inserted. Further, each pocket 120 has notches 126 and 128 respectively cut therein from its inner and outer ends. These notches 126 and 128 are rectangular in plan view. Thus, each tray 116 has a planar configuration in which it is constituted by

portions which are connected together at the pockets 120 through cross pieces 130 each constituted by the portion of the bottom of each pocket 120 which is left between the notches 126 and 128.

5       The trays 116 are piled up one upon another such as to form a multistage structure. Connecting bolts 132 are received through the piled trays 116, and top and bottom plates 134 and 136 are respectively secured to the upper and lower ends of the piled trays 116, thus forming a cylindrical  
10 shape as a whole. In an assembled state, therefore, the upper side of each of the pockets 120 on one tray 116 is closed by the bottom surface of the tray 116 which is placed thereon, thus forming a reversal film slide housing magazine 62 of a cylindrical structure with through-holes extending  
15 radially thereof.

As shown in Fig. 8, one end of a leaf spring 140 is secured to the bottom surface of each tray 116 by a rivet 138. The distal end of the leaf spring 140 presses both lateral edges of an inserted reversal film slide 60 against  
20 the bottom surface of the corresponding pocket 120, thereby preventing the slide 60 from undesirably coming out of the pocket 120.

The top plate 134 has its axis portion rotatably supported by an upper frame plate 142. On the other hand,  
25 the bottom plate 136 has a cylindrical shaft 144 projecting

axially from its inner peripheral portion and is rotatably supported by a lower frame plate 148 through a bearing 146 which is mounted on the outer periphery of the cylindrical shaft 144. Four supports 150 are interposed between the  
5 upper and lower frame plates 142 and 148 in such a manner as to firmly fix them to each other.

A synthetic resin cover 152 is interposed between the upper and lower frame plates 142 and 148 such as to cover the outer periphery of the piled trays 116. The cover 152  
10 has, as also shown in Fig. 9, an opening 154 formed in one portion thereof, the longitudinal axis of the opening 154 extending axially of the piled trays 116. More specifically, since in this embodiment a plurality of trays 116 are piled up such as to form a multistage structure, each of the  
15 pockets 120 allows a reversal film slide 60 to be inserted and removed in the radial direction of the piled trays 116. In addition, the pockets 120 are arranged such that those which are formed on the respective trays 116 constitute a multistage pocket structure which has its longitudinal axis  
20 extending axially of the piled trays 116, and eight rows of pockets 120 are therefore provided around the axis of the piled trays 116. Among the eight rows of pockets 120, only one row is permitted to communicate with the outside through the opening 154.

25 As shown in Fig. 9, the opening 154 is defined by a

protuberant portion 156 of the cover 152 which projects outwardly therefrom with a gradually narrowing shape in plan view. Accordingly, even when a reversal film slide 60 is in a state wherein it has not been completely forced into a pocket 120 and a portion of the slide 60 therefore projects from the outer end of the pocket 120, this slide 60 is properly pushed into the pocket 120 when the trays 116 are rotated within the cover 152 since at that time the projecting portion of the slide 60 is pressed inwardly by the protuberant portion 156.

The bottom plate 136 has a click groove 158 formed in a portion of its bottom surface, the click groove 158 having its longitudinal axis extending radially of the bottom plate 136. The click groove 158 receives the distal end portion of a click leaf spring 160 which has its proximal end secured to the lower frame plate 148. Thus, the rotation of the trays 116 is regulated at one position thereof in such a manner that, when the click leaf spring 160 is fitted in the click groove 158, no pocket 120 opposes the opening 154. Accordingly, when the reversal film slide housing magazine 62 is transported, no slide 60 falls through the opening 154 even if the magazine 62 is accidentally tilted.

A pair of arms 162 are respectively secured at their central portions to two edge portions of the upper frame plate 142. Grip rods 164 are stretched between the arms 162

at both ends thereof, each grip rod 164 having both ends thereof secured to the arms 162. Thus, it is possible for the operator to grip the grip rods 164 and raise the magazine 62 when it is transported.

5        One of the arms 162 is formed on its outer side with a pair of power supply terminals 166 and a pair of positioning bores 168. The terminals 166 are used for supplying electric power to a memory device 170 which is secured to the upper surface of the upper frame plate 142 and is  
10       constituted by an IC memory or the like. On the other hand, the positioning bores 168 respectively receive positioning pins of an associated machine, thereby accurately positioning the magazine 62 relative to the machine. Further, the arm 162 is provided at its central portion with upper and lower  
15       photocouplers 172 and 174. When receiving a signal from an associated machine, the photocoupler 172 sends this signal to the memory device 170, while the photocoupler 174 delivers the signal processed in the memory device 170 to the associated machine.

20       The memory device 170 has stored therein data about the location of each of the slides 60, that is, information as to which slide 60 is housed in which pocket 120. In addition to the above-described data, the memory device 170 can store printing correction conditions for each reversal  
25       film 60A, the number of prints required and so forth.

#### Construction of Magazine Driver:

As also shown in Fig. 6, a magazine driver 175 includes a tubular member 178 standing on the upper surface of a machine board 176. A feed screw 180 is rotatably supported  
5 at the axis portion of the tubular member 178 in such a manner that the longitudinal axis of the feed screw 180 extends vertically. A gear 182 is secured to the lower end portion of the feed screw 180, while a gear 186 is secured to the output shaft of a motor 184 which is mounted on the  
10 machine board 176, and a timing belt 188 is stretched between the gears 182 and 186. Thus, the feed screw 180 is rotated about its vertical axis by the rotation of the motor 184.

The feed screw 180 has a ball screw nut 190 screwed  
15 thereon. The nut 190 is secured to the central portion of a support plate 192. Both end portions of the support plate 192 respectively extend through openings 194 which are formed in the tubular member 178 in such a manner that the longitudinal axis of each of the openings 194 extends  
20 longitudinally of the tubular member 178. The ends of the support plate 192 are then secured to a lifting board 196 through respective brackets 195. The lifting board 196 has the tubular member 178 extending through its central portion, one end of the lifting board 196 being secured to a  
25 lifting wall 198. The lifting wall 198 is adapted to be

able to move vertically while being guided by a fixed wall 200 which stands on the machine board 176.

A cylindrical wall 201 is secured to the support plate 192, and an externally toothed ring gear 204 is rotatably supported by the cylindrical wall 201 through a bearing 202. The ring gear 204 is meshed with a gear 208 secured to the output shaft of a motor 206 which is mounted on the support plate 192. Thus, it is possible for the ring gear 204 to rotate around the tubular member 178 by means of the driving force of the motor 206.

The lower end portion of a cylindrical mounting board 210 is secured to the externally toothed ring gear 204. The mounting board 210 extends through the area between the lifting board 196 and the tubular member 178 in such a manner that the upper end of the mounting board 210 projects upwardly beyond the lifting board 196. As shown in Fig. 11, the cylindrical shaft 144 of the bottom plate 136 opposes the mounting board 210. Thus, the reversal film slide housing magazine 62 is mounted on the lifting wall 198.

As shown in Fig. 11, the cylindrical shaft 144 has a pair of engagement projections 212 and 214 projecting therefrom toward the cylindrical mounting board 210, each engagement projection having engagement slanted surfaces 216 formed at two sides thereof. On the other hand, the mounting board 210 is formed with engagement recesses 218



and 220 for respectively receiving the engagement projections 212 and 214. Each of the engagement recesses 218 and 220 has engagement slanted surfaces 222 which respectively abut against the engagement slanted surfaces 216.

5       The engagement projection and recess 212, 218 have the same circumferential length as each other, and the engagement projection and recess 214, 220 also have the same circumferential length as each other. In this case, however, the circumferential length of the engagement  
10 projection and recess 212, 218 is shorter than that of the engagement projection and recess 214, 220. Accordingly, it is impossible for the engagement projection 214 to be inserted into the engagement recess 218. Thus, the reversal film slide housing magazine 62 is mounted on the cylindrical  
15 mounting board 210 only at a predetermined position in its rotation about its axis. After the magazine 62 has been mounted on the mounting board 210, the trays 116 can be rotated around the tubular member 178 by the rotation of the mounting board 210.

20       The externally toothed ring gear 204 has a collar portion 205 extending radially from the upper end thereof. The collar portion 205 has eight pocket position detecting bores 205A formed therein in such a manner that they are spaced about the axis of the ring gear 204 such as to  
25 correspond to the eight rows of pockets 120 which are

arranged about the axis of the magazine 62 when mounted on the mounting board 210. These pocket position detecting bores 205A can be detected by a sensor 223A which is mounted on the bottom surface of the lifting board 196. Further, a loading/unloading position detecting bore 205 is formed in the collar portion 205 adjacent to one of the eight pocket position detecting bores 205A. The bore 205B can be detected by a sensor 223B which is disposed in parallel to the sensor 223A.

As shown in Figs. 6 and 9, a push-out means 224 is mounted on a top plate 223 of the tubular member 178. In the push-out means 224, a pair of guide bars 228 are stretched between a pair of guide brackets 226 which stand on the top plate 223. A moving board 230 is slidably supported on the guide bars 228. A plate-like pusher 232 is secured to the moving board 230 in such a manner that it is possible for the pusher 232 to move together with the moving board 230.

Further, a rack 234 is secured to the moving board 230 and is meshed with a pinion 236 which is rotatably supported by the tubular member 178. The pinion 236 is rotated by means of the driving force of a motor 238, thereby allowing the moving board 230 to move along the guide bars 228.

Accordingly, as the motor 238 is actuated, the pusher 232 pushes out a reversal film slide 60 which is disposed at

an unloading/reloading position from the associated pocket 120, and the slide 60 thus pushed out is taken out through the opening 154 of the cover 152. More specifically, when a pocket 120 is disposed within the moving locus of the pusher 232, the slide 60 housed in this pocket 120 is placed at the unloading/reloading position. In the magazine 62, the cylindrical mounting board 210 is, as will be clear from Fig. 6, vertically moved by means of the driving force of the motor 184 together with the lifting board 196 and is rotated by means of the driving force of the motor 206, whereby a desired pocket 120 is aligned with the unloading/reloading position, thus enabling the slide 60 housed in this pocket 120 to be inserted into the apparatus body 12 through an insertion opening 64 formed therein, as shown in Fig. 13.

For the purpose of properly aligning a desired pocket 120 with the unloading/reloading position, a pair of optical fibers 239A and 239B are mounted on the tubular member 178 such as to face outwardly thereof and oppose each other, as shown in Fig. 8, and light is projected from the optical fiber 239A and received by the optical fiber 239B. In this case, the quantity of light received by the optical fiber 239B differs depending upon whether or not any of the ribs 116A which project radially from the inner end of each of the trays 116 is present within the optical path of the light projected from the optical fiber 239A. Therefore, a

difference in terms of the quantity of light received by the optical fiber 239B is detected, and the height of the magazine 62 is thereby controlled. The rotation of the magazine 62 is suspended when the sensor 223A detects a particular pocket position detecting bore 205A, and a row of pockets which includes a desired pocket 120 is thereby disposed at the unloading/reloading position.

It is to be noted that the rotational position of the magazine 62 is not known at the time when the magazine driver 175 is started after the magazine 62 has been mounted on the cylindrical mounting board 210. The motor 206 is therefore adapted to rotate the magazine 62 until the loading/unloading position detecting bore 205B is detected by the sensor 223B.

The moving board 230 has a striker 240 projecting therefrom in such a manner as to oppose sensors 242 and 244 which are previously mounted on the top plate 223 of the tubular member 178 at a predetermined distance. Thus, it is possible to detect the amount of movement of the moving board 230 from the position wherein the plate-like pusher 232 is in the state such as that shown in Fig. 9 to the position wherein the pusher 232 which has passed through a notch 246 formed at the upper end portion of the tubular member 178 pushes out the slide 60 at the unloading/reloading position from the associated pocket 120 through the opening

154.

Fig. 12 shows a structure for securing the reversal film slide housing magazine 62 which is mounted at the upper end portion of the lifting wall 198. Each of parallel links 5 270 and 272 is pivotally supported at one end thereof by the upper end portion of the lifting wall 198 through a bracket 268. The respective upper end portions of the links 270 and 272 are pivotally supported by a connecting block 274, thereby allowing the connecting block 274 to come in and out 10 of contact with the magazine 62 while maintaining its horizontal state.

Handle levers 278 are pivotally supported through pins 276 by brackets 269, respectively, which are secured to the lifting wall 198. A grip rod 280 is secured to the 15 respective distal ends of the handle levers 278, and a pin 282 is stretched between the respective intermediate portions of the handle levers 278. The pin 282 opposes arms 284 each projecting from one end of each of the parallel links 270. Thus, when the operator pivots the grip rod 280 20 about the pins 276, the connecting block 274 is moved toward the magazine 62 through the parallel links 270.

A tension coil spring 286 is stretched between each of the handle levers 278 and the associated bracket 269. By pulling and pivoting the tension coil springs 286 in such a 25 manner that their axes respectively pass the prolongation

lines of the axes of the pins 276, it is possible for the connecting block 274 to be selectively placed at two positions, that is, one in which the connecting block 274 is separated from the magazine 62 and the other in which the former is in contact with the latter. More specifically, when each of the tension coil springs 286 is disposed on one side of the prolongation line of the axis of the corresponding pin 276, the springs 286 maintain the connecting block 274 in a position which is most extreme with respect to the magazine 62. If, in this state, the operator moves the grip rod 280 in such a manner that the connecting block 274 is moved toward the magazine 62, the axis of each of the tension coil springs 286 moves to the other side of the prolongation line of the axis of the corresponding pin 276, whereby the springs 286 cause the connecting block 274 to approach the magazine 62.

The connecting block 274 is provided with positioning pins 290, power supply terminals 292 and photocouplers 294, 296, which respectively correspond to those which are provided on the magazine 62.

#### Construction of Moving Means and Reloading Means:

Referring now to Figs. 13 and 14, the apparatus body 12 has conveyor belts 380 and 382 rotatably supported by respective sprockets 384 and 386 in such a manner as to oppose the insertion opening 64. Thus, a reversal film

slide 60 fed through the insertion opening 64 is transferred to the conveyor belts 380 and 382 and is moved by the action of the sprockets 384 which are connected to a motor (not shown).

5       A pair of press rollers 388 and 390 are disposed on each of the conveyor belts 380 and 382. These press rollers 388 and 390 are rotatably supported by a lifting bracket 392 and are pressed against the respective conveyor belts 380 and 382 by means of the biasing force of tension coil  
10       springs 394 which are interposed between the lifting bracket 392 and the apparatus body 12. Thus, the slide 60 is pressed against the conveyor belts 380 and 382 so that the driving force is reliably transmitted to the slide 60 from the conveyor belts 380 and 382.

15       A pivoting arm 396 is pivotally supported at its distal end portion by the lifting bracket 392. The proximal portion of the arm 396 is pivotally supported by a fixed bracket 402 through a pin 400. Accordingly, it is possible for the lifting bracket 392 to move vertically while  
20       maintaining its horizontal state and for the rollers 388 and 390 to individually come in and out of contact with the conveyor belts 380 and 382.

Referring to Fig. 15, a pivoting arm 404 is disposed on the side of the conveyor belts 380 and 382 which is remote  
25       from the magazine 62 in such a manner that the distal end

portion of the arm 404 can oppose the belts 380 and 382.

The pivoting arm 404 has a shaft 406 secured to the other end thereof as shown in Fig. 15. The shaft 406 is rotated by a motor 408, and it is thereby possible for the pivoting arm 404 to pivot by about  $90^{\circ}$  from the solid-line position to the imaginary-line position shown in Fig. 15. Thus, it is possible to transfer a reversal film slide 60 from the conveyor belts 380 and 382 to the observation window 58 and vice versa.

As shown in Fig. 16, the pivoting arm 404 has a pair of arms 410 and 412 projecting from its distal end portion at right angles. The arms 410 have an L-shaped cross-section and are adapted to support a reversal film slide 60. A leaf spring 414 is secured to one end of each of the arms 410 and 412 by a screw 416 for the purpose of retaining a slide 60 which is inserted into the area defined between the spring 414 and each of the arms 410, 412.

It is to be noted that a structure may be employed in which the observation window 58 is closed by a shutter exclusive of the time when a slide 60 is positioned at the observation window 58 as shown by the imaginary line in Fig. 15.

A rod 418 which serves as a reloading means is, as shown in Figs. 13 and 14, disposed above the conveyor belts 380 and 382. A pair of parallel links 420 and 422 are



pivotally supported at their respective distal ends by the rod 418 through respective screws 424 and 426. The other ends of the parallel links 420 and 422 are pivotally supported by a slide block 432 through respective screws 428 and 430. Accordingly, as the parallel links 420 and 422 pivot, the rod 418 lowers while maintaining its horizontal state and can enter the moving locus of the slide 60.

The slide block 432 is supported by a guide bar 434 and is moved in the moving direction of the slide 60. Further, a pin 421 projects from the central portion of the link 420, and an arm 437 which is driven by a rotary solenoid 436 mounted on the apparatus body 12 abuts against the pin 421. Thus, after the rod 418 has entered the moving locus of the slide 60 as shown by the imaginary line in Fig. 13, the slide block 432 is moved toward the magazine 62. By virtue of this arrangement, it is possible for the rod 418 to enter the moving locus of the slide 60 and push the slide 60 into the associated pocket 64 of the magazine 62 by the horizontal movement of the slide block 432.

#### Operation of the Embodiment:

Reversal film slides 60 which have already been subjected to printing are respectively housed in the pockets 120 of the reversal film slide housing magazine 62 in accordance with the order in which they have been printed. This magazine 62 is mounted on the rear of the reversal film

inspecting apparatus 10. On the other hand, a roll of photographic paper 22 which has already been subjected to printing is mounted on the takeup shaft 14 of the inspecting apparatus 10, and the leading end portion of the photographic paper 22 is retained by the takeup shaft 16.

With the control lever 52 actuated, the photographic paper 22 is wound up onto the takeup shaft 16 at an appropriate speed, and while doing so, the operator inspects the printed state of each of the frames 22A on the photographic paper 22 which passes along the print paper inspection board 24.

Since the photographic paper 22 has already been formed with the small perforations 34 and 36 shown in Fig. 3, the perforations 34 and 36 are respectively detected by the sensors 30 and 32 as the photographic paper 22 moves on the inspection board 24. Accordingly, the frames 22A passing along the inspection board 24 can be identified at any time in the inspecting operation in terms of which frame 22A corresponds to which reversal film slide 60 in the magazine 62.

When the operator judges that the printed state of the picture on a particular frame 22A of the photographic paper 22 is defective and this frame 22A needs to be re-printed, the operator draws a check mark 42 on that frame 22A within the rectangular window 40, as shown in Fig. 1. Any frame

22A with a check mark 42 is cut off as a defective print when the photographic paper 22 is cut at the small perforations 34 in the subsequent process (not shown).

Additionally, when a frame 22A with a check mark 42 is wound up onto the takeup shaft 16, there is no fear of the check mark 42 being transferred to the press rollers 46 and 48 since the press rollers 46 and 48 are respectively provided with the smaller-diameter portions 46A and 48A which have a longitudinal dimension larger than the lateral dimension of the rectangular window 40.

When the printed state of the picture on a frame 22A is judged to be defective, the operator inputs printing conditions which are required to effect re-printing by actuating the input buttons 56 and thereby stores the printing conditions in the memory device 170. In response to the operation of the input buttons 56, the pocket 120 housing the reversal film slide 60 which corresponds to the frame 22A formed with the check or NG mark 42 is retrieved and moved such as to oppose the insertion opening 64 by the action of the lifting board 196 which is moved vertically and that of the cylindrical mounting board 110 which is rotated by the motor 106. The slide 60 is then pushed out toward the insertion opening 64 by the action of the pusher 232. At the same time, the conveyor belts 380 and 382 are actuated to move in such a manner as to receive the slide 60

as well as feed the same to the arms 410 and 412 and cause the slide 60 to be retained by the leaf springs 414.

The pivoting arm 404 is moved from the solid-line position to the imaginary-line position in Fig. 15 by

5 driving the motor 408 in such a manner that the distal end portion of the arm 404 is disposed at the observation window 58. In consequence, the slide 60 is turned by 90°, which fact makes it possible for the operator to observe and check the picture on the slide 60 in its natural or correctly  
10 placed position and hence to input accurate printing conditions for a re-printing operation and store them in the memory device 170.

After the operation of inputting required re-printing conditions has been completed, the pivoting arm 404 is  
15 pivoted by 90° to return to the solid-line position in Fig. 15, and the central portion of the slide 60 is retained by the conveyor belts 380 and 382. The slide 60 is then moved toward the insertion opening 64 by means of the driving force of the conveyor belts 380 and 382. At the  
20 same time, the rod 418 is lowered by means of the driving force of the rotary solenoid 436 in such a manner as to oppose the rear of the slide 60, and the slide 60 is then reloaded into the associated pocket 120 of the magazine 62 by the movement of the rod 418.

25 Thus, the operation of inspecting the reversal film

slides 60 which have already been subjected to printing is successively repeated, and a magazine 62 housing any slide 60 which needs to be re-printed is returned to the printing machine, while a magazine 62 housing slides 60 all of which  
5 need not be re-printed is transported to the checking machine in the subsequent process.

Operation Conducted When Magazine is Connected to Input Machine:

Fig. 17 shows the arrangement in which a reversal film slide housing magazine 62 is connected to an input machine  
10 500. In this arrangement also, the magazine 62 is connected to the input machine 500 through a magazine driver 175 in a manner similar to that in the case of the above-described inspecting apparatus. This arrangement is similar to that which has already been described in that it is possible for  
15 any desired pocket 120 to be aligned with an unloading/reloading position which is coaxial with a conveying path 502 of the input machine 500.

The input machine 500 is arranged such that a plurality of slides 60 are disposed on an illuminator 504, and the  
20 operator provides a visual check for each of the slides 60 to judge the printed state of the picture on each slide 60 and records printing conditions required to re-print any slide 60 which carries an improperly printed picture into the memory device 170 mounted in the associated magazine 62  
25 by the use of operating buttons 506. Those of the slides 60

which have already had their re-printing conditions input are passed through an obverse/reverse judging means 508 which is disposed at an intermediate portion of the slide conveying path 502 and are successively reloaded into  
5    respective pockets 120 of the magazine 62, data on their respective housed positions being stored in the memory device 170.

It is to be noted that, if, prior to a series of slides 60, a perforated sorting card 60C for identifying the kind  
10    (e.g., customer number, date and so forth) of each of the series of slides 60 is fed into a pocket 120 of the magazine 62, the processing carried out subsequently is facilitated.  
Operation Conducted When Magazine is Connected to Printer:

Fig. 18 shows the arrangement in which a reversal film  
15    slide housing magazine 62 which has already been subjected to the processing carried out in the input machine 500 shown in Fig. 17 is mounted on the supply side of a printer 510 through a magazine driver 175. A similar magazine 62 is disposed on a magazine driver 175 on the reception side of  
20    the printer 510 which is opposite to the supply side thereof. In this state, the magazine 62 on the reception side is empty, that is, no slide 60 has yet been housed therein.

In this printer 510, reversal film slides 60 in the  
25    respective pockets 120 are successively fed to a printing

board 514 through a conveying path 512. After the slides 60 have been printed on a roll of photographic paper 22, the slides 60 are successively housed in the magazine 62 on the reception side through a conveying path 516.

5       Accordingly, the respective unloading/reloading positions of these magazine drivers 175 are aligned with the conveying paths 512 and 516 in a manner similar to the above, and each of the conveying paths 512 and 516 is provided at one end thereof with an unloading means which is  
10       similar to the conveyor belts 382, 384 and a reloading means which pushes a slide 60 into a pocket 120.

      Further, the contents recorded in the memory device 170 of the magazine 62 on the supply side are transferred to the memory device 170 of the magazine 62 on the reception side.  
15       Operation Conducted When Magazine is Connected to Checking Machine:

      Referring next to Fig. 19, a reversal film slide housing magazine 62 which has already been subjected to the processing carried out in the reversal film inspecting  
20       apparatus 10 is connected to a checking machine 518 through a magazine driver 175 in a manner similar to the above. In the checking machine 518, as the final process, the reversal film slides 60 are successively pushed out of the respective pockets 120 and are fed out by means of a conveyor 520 and  
25       then deposited on a conveyor 524 through a mounting board

522. A sorting card 60C which is disposed at the top of a series of slides 60 ordered by an individual customer is pushed out by a pusher 526 in a direction orthogonal to the slide discharging direction when it is discharged onto the mounting board 522, the sorting card 60C thus being housed  
5 in a stock casing 528.

Accordingly, the slides 60 which are deposited on the conveyor 524 are piled up in series for each of the orders placed by individual customers and are checked against  
10 corresponding sheets of photographic paper which have been cut into individual picture frames by a cutting machine (not shown) before being put into respective bags.

It is to be noted that, after the processing at the reversal film inspecting apparatus 10 has been completed, a magazine 62 containing any slide 60 which needs to be  
15 re-printed is returned to the printer 510, and after a re-printing operation, the magazine 62 is sent to the inspecting apparatus 10 again and is then transported to the checking machine 518.

20 In the description above, the inspecting apparatus 10, the input machine 500, the printer 510 and the checking machine 518 are previously provided with the respective magazine drivers 175, and a magazine 62 alone is successively mounted on these magazine drivers 175 so as to move reversal  
25 film slides 60. However, the arrangement may be such that



**0 171 029**

the magazine 62 is moved together with a magazine driver  
175.

WHAT IS CLAIMED IS:

1. A reversal film inspecting apparatus in which a roll of photographic paper which has already been subjected to printing is successively fed out from one of a set of two  
5 takeup means to the other and which has a print paper inspection board disposed between these takeup means,  
characterized by comprising moving means adapted to receive a reversal film slide from any desired one of a plurality of reversal film slide housing pockets formed on a  
10 magazine and to move the received reversal film slide to an observation window, and reloading means for returning the reversal film slide moved by said moving means to the associated pocket of said magazine.
2. A reversal film inspecting apparatus according to  
15 Claim 1, wherein the reversal film slide moved to said observation window is employed to decide a correction value for correcting printing conditions.
3. A reversal film inspecting apparatus according to Claim 1, wherein said moving means moves a reversal film  
20 slide to said observation window by turning the slide through an angle of approximately  $90^{\circ}$ .
4. A reversal film inspecting apparatus according to Claim 1, wherein a check plate is disposed between said two  
takeup means, said check plate being formed with a window  
25 which enables a check mark to be put onto said photographic

paper, and wherein the intermediate portion of said photographic paper which extends from said check plate to said other takeup means is clamped by a roller which has a smaller-diameter portion formed at its central portion, the  
5 length of said smaller-diameter portion being set such as to be substantially equal to or larger than the lateral dimension of said window, thereby preventing any check mark from being transferred to said roller.

5. A reversal film inspecting apparatus according to  
10 Claim 1, wherein said magazine has the shape of a hollow cylinder which has a plurality of slide housing pockets provided radially thereof and in a multiplicity of stages axially thereof, and further comprising a mounting board for mounting said reversal film slide housing magazine, and  
15 driving means adapted to rotate as well as vertically move said mounting board to a predetermined position, thereby aligning a desired slide housing pocket in said magazine with an unloading/reloading position.

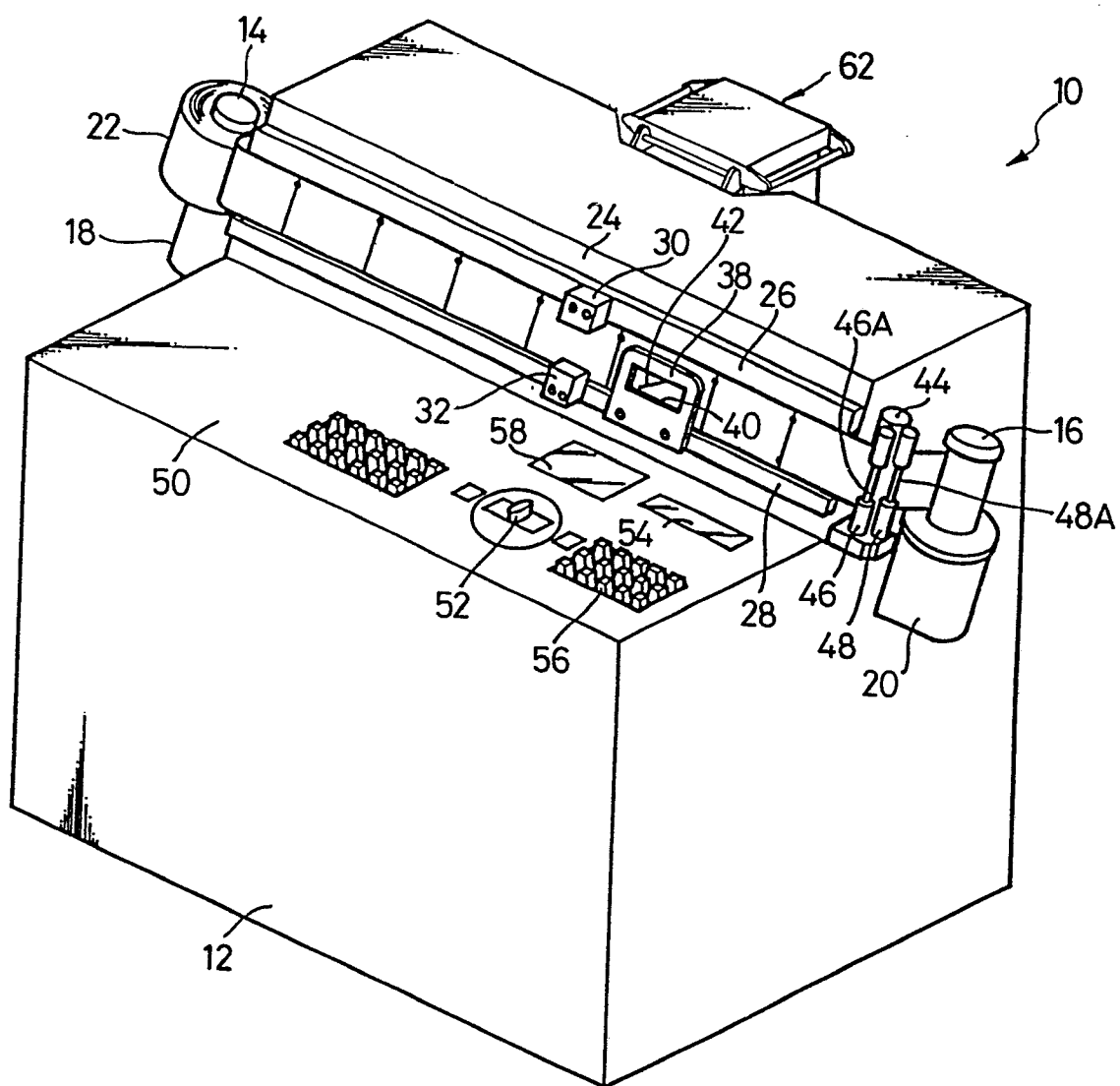
6. A reversal film inspecting apparatus according to  
20 Claim 5, further comprising push-out means positioned within a bore formed in said magazine such as to oppose said unloading/reloading position and push out a reversal film slide in a desired pocket in the radial direction of said magazine.

25 7. A reversal film inspecting apparatus according to

Claim 1, wherein said magazine is constituted by a hollow cylindrical housing body which has a plurality of pockets provided radially thereof in such a manner that it is possible for reversal film slides to be loaded and unloaded  
5 radially of said housing body, said pockets being formed in a multiplicity of stages axially of said housing body.

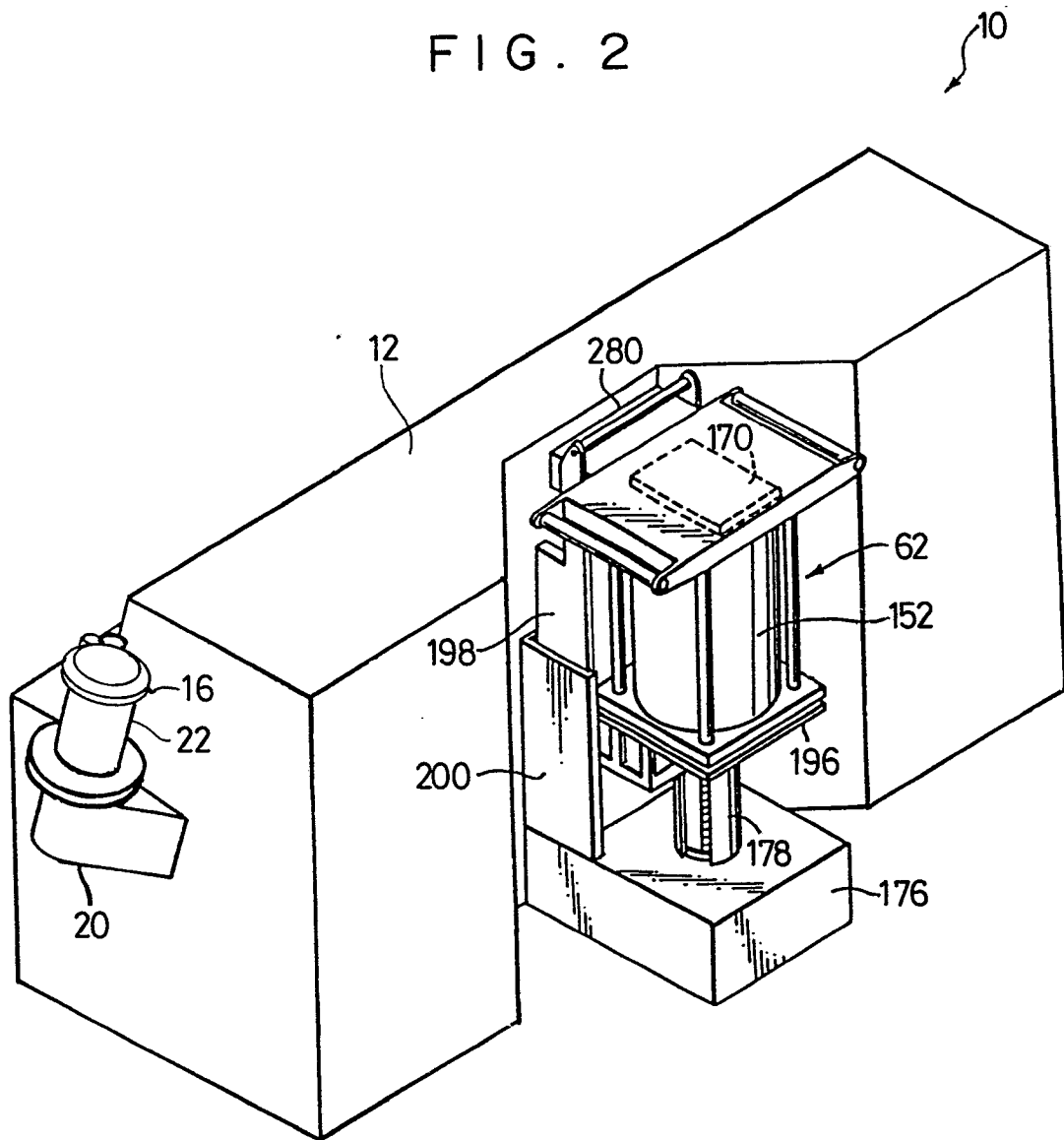
1/15

FIG. 1



2/15

FIG. 2



3/15

FIG. 3

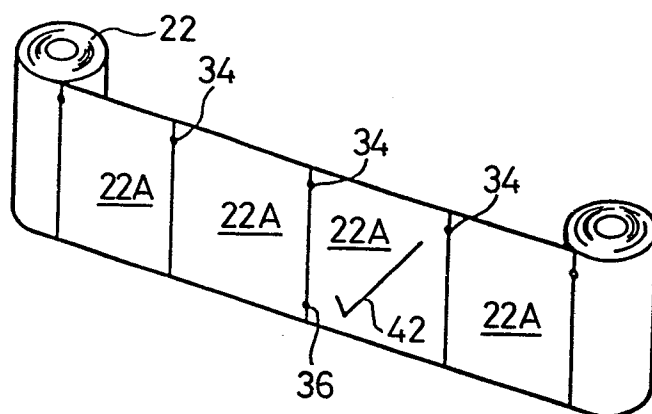
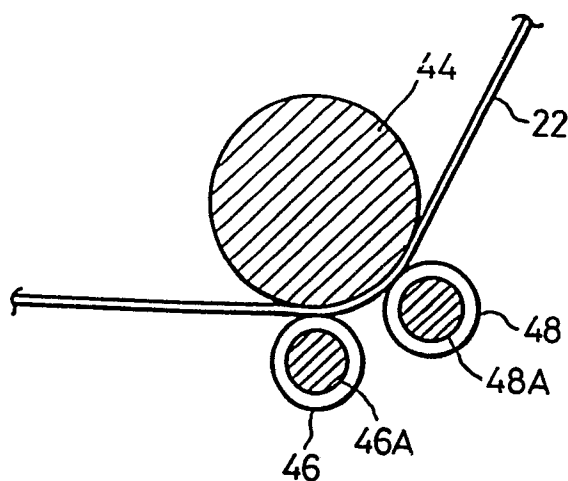


FIG. 4

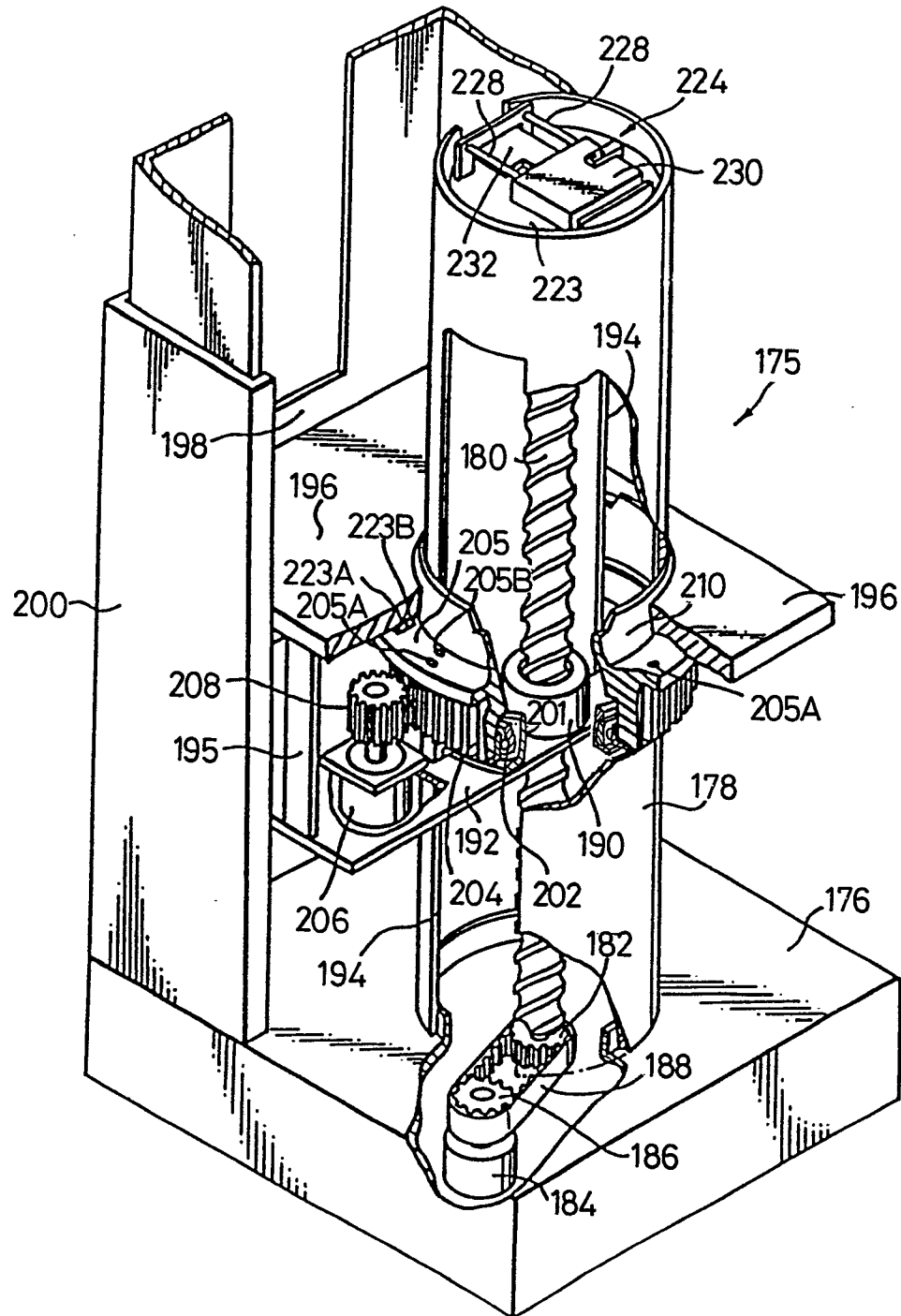






5/15

FIG. 6



6/15

FIG. 7

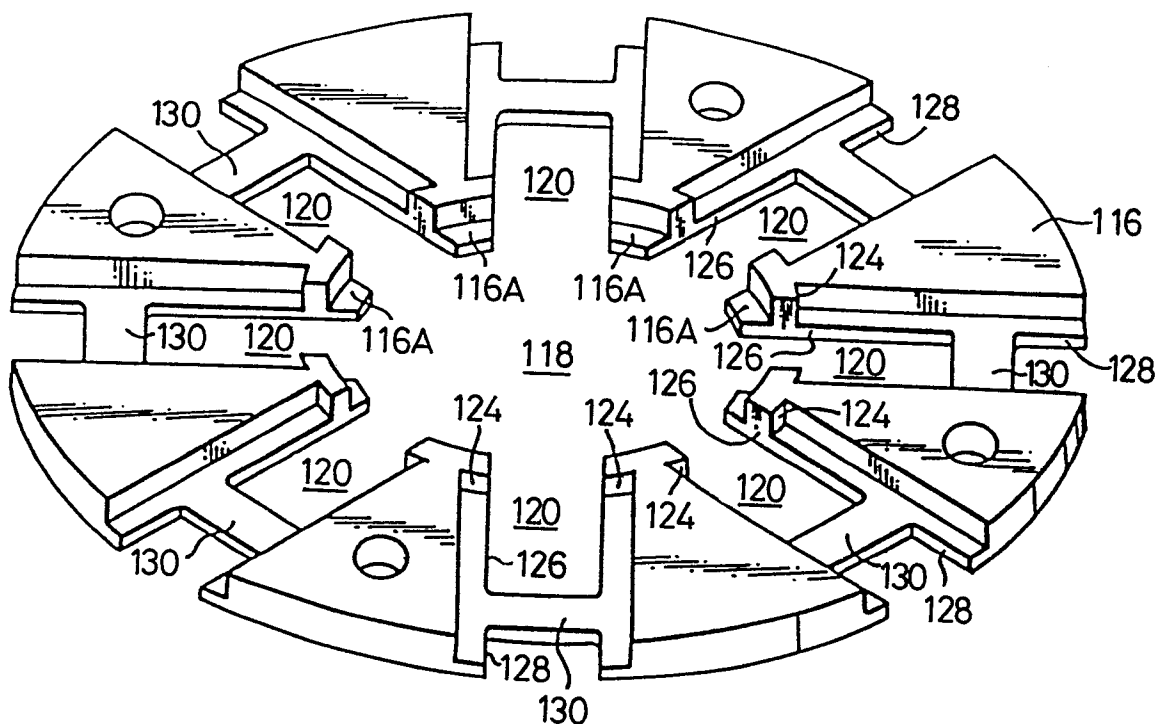
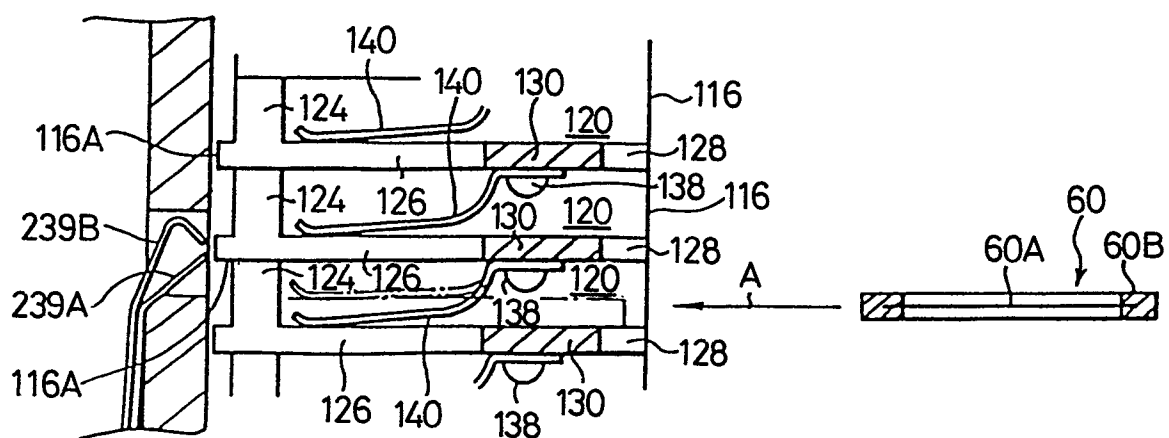
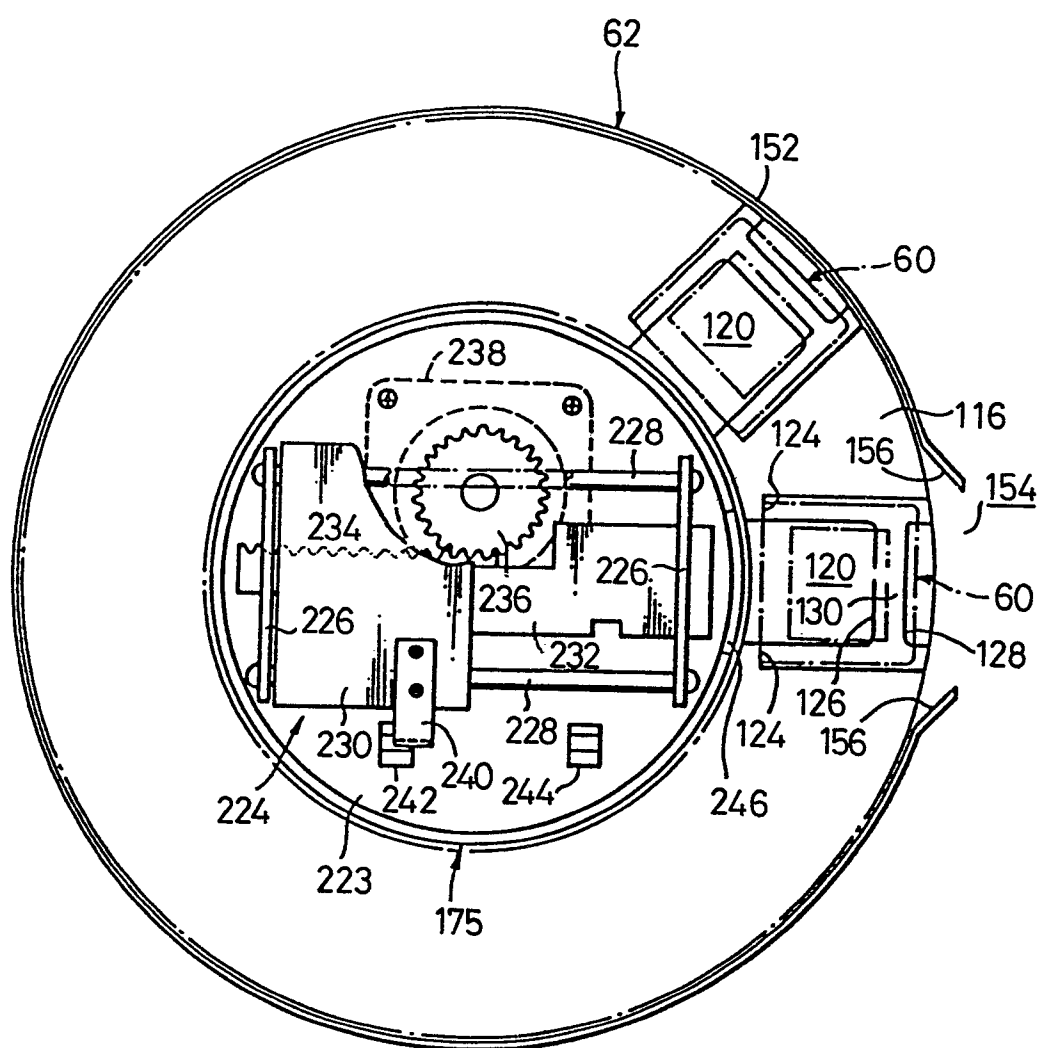


FIG. 8



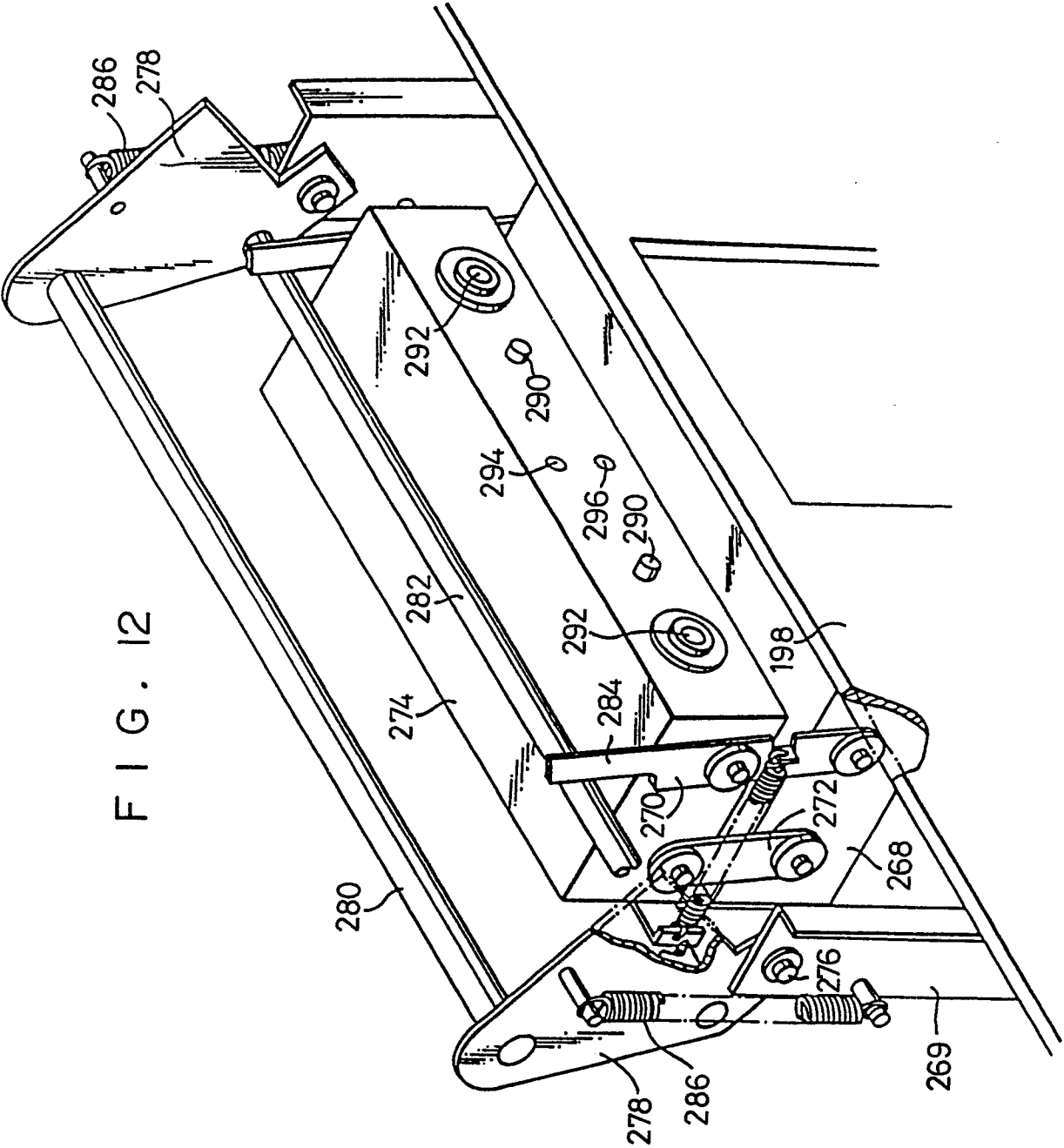
7/15

FIG. 9





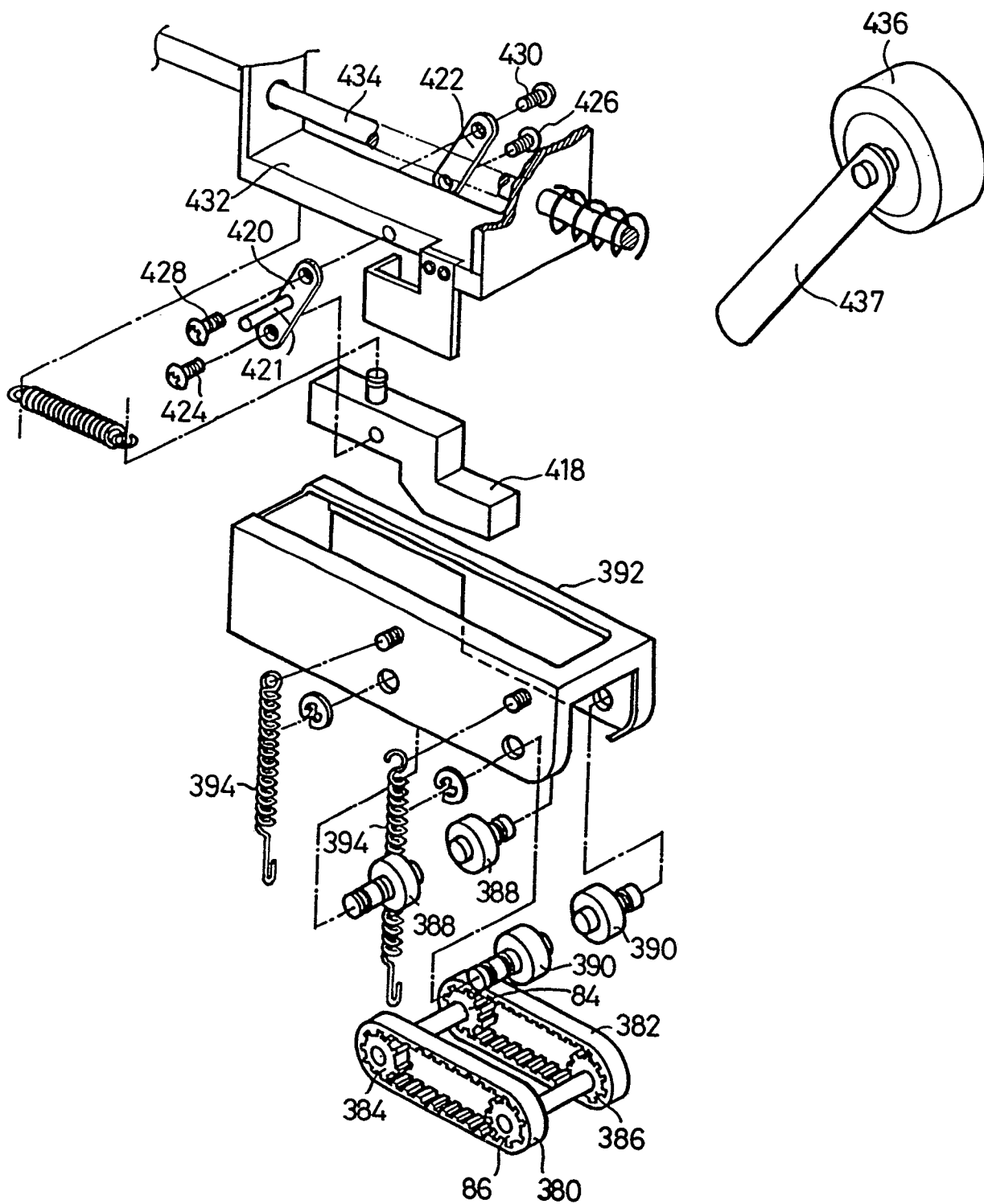
9/15





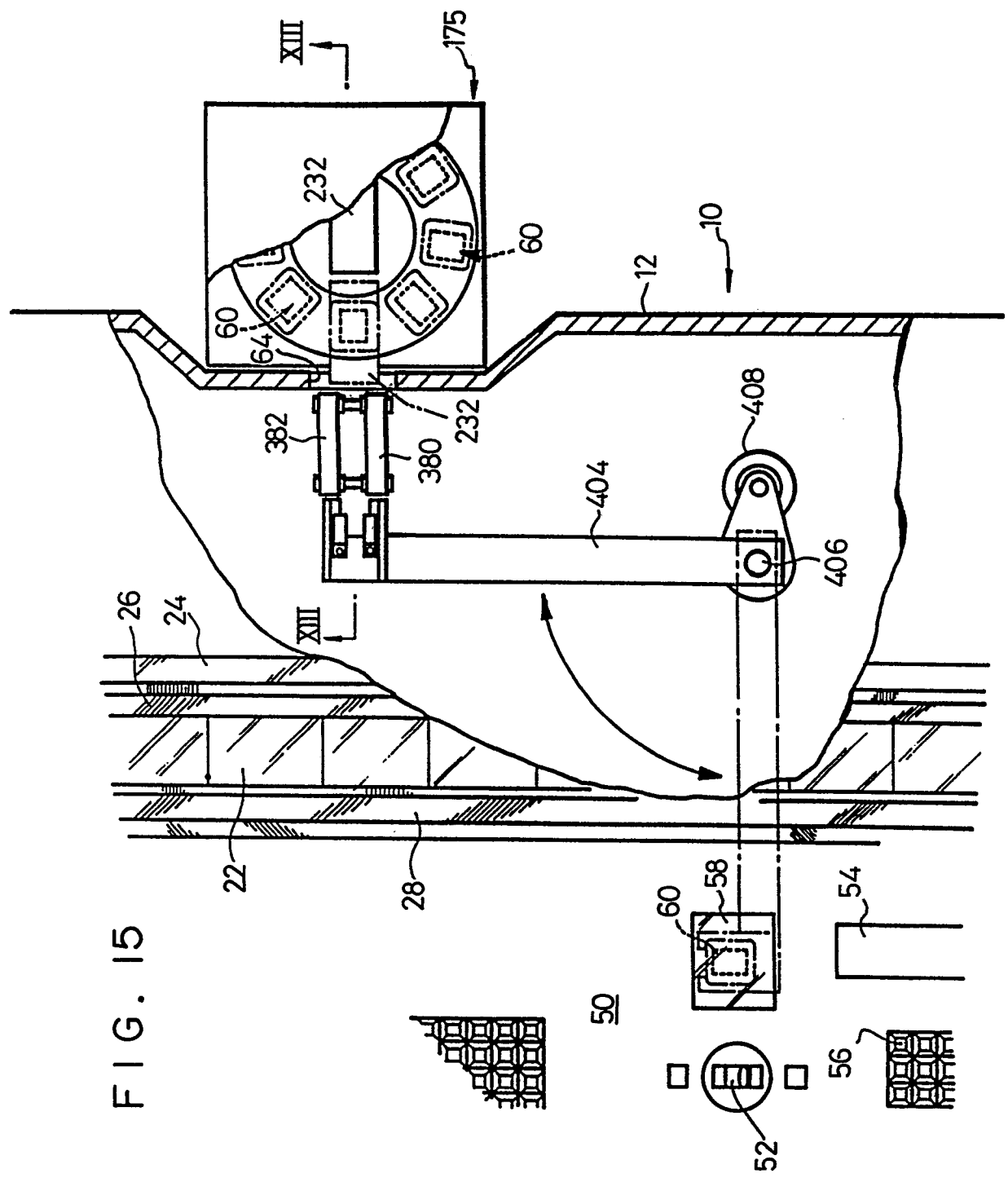
11/15

FIG. 14



12/15

FIG. 15





13/15

FIG. 16

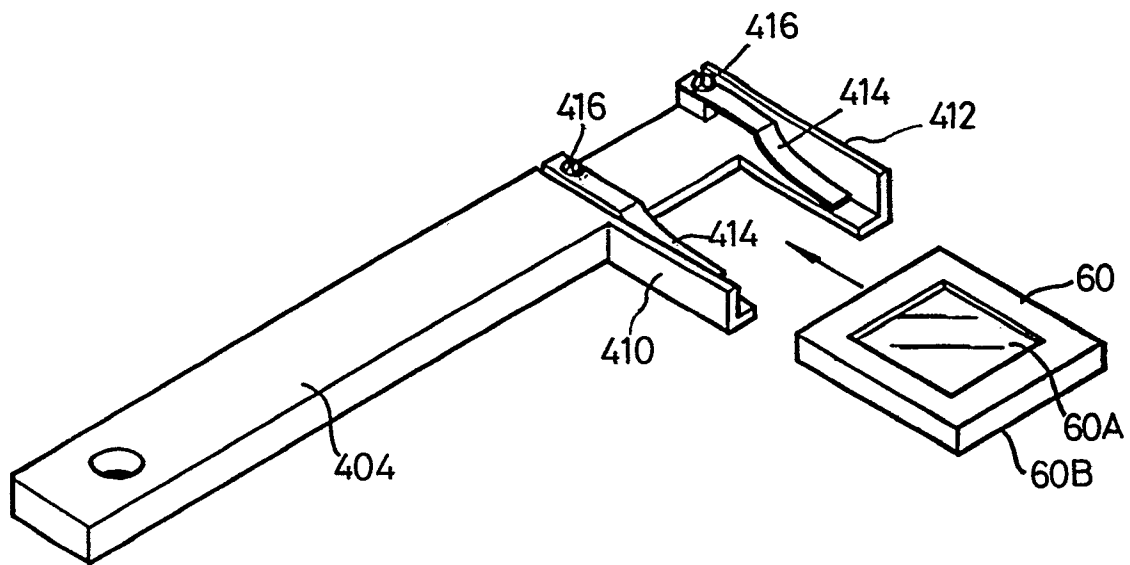
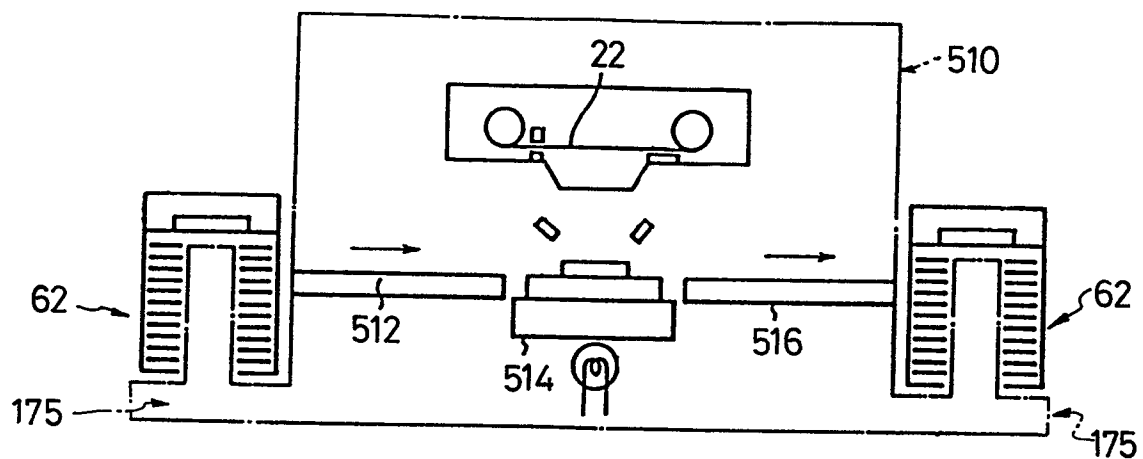
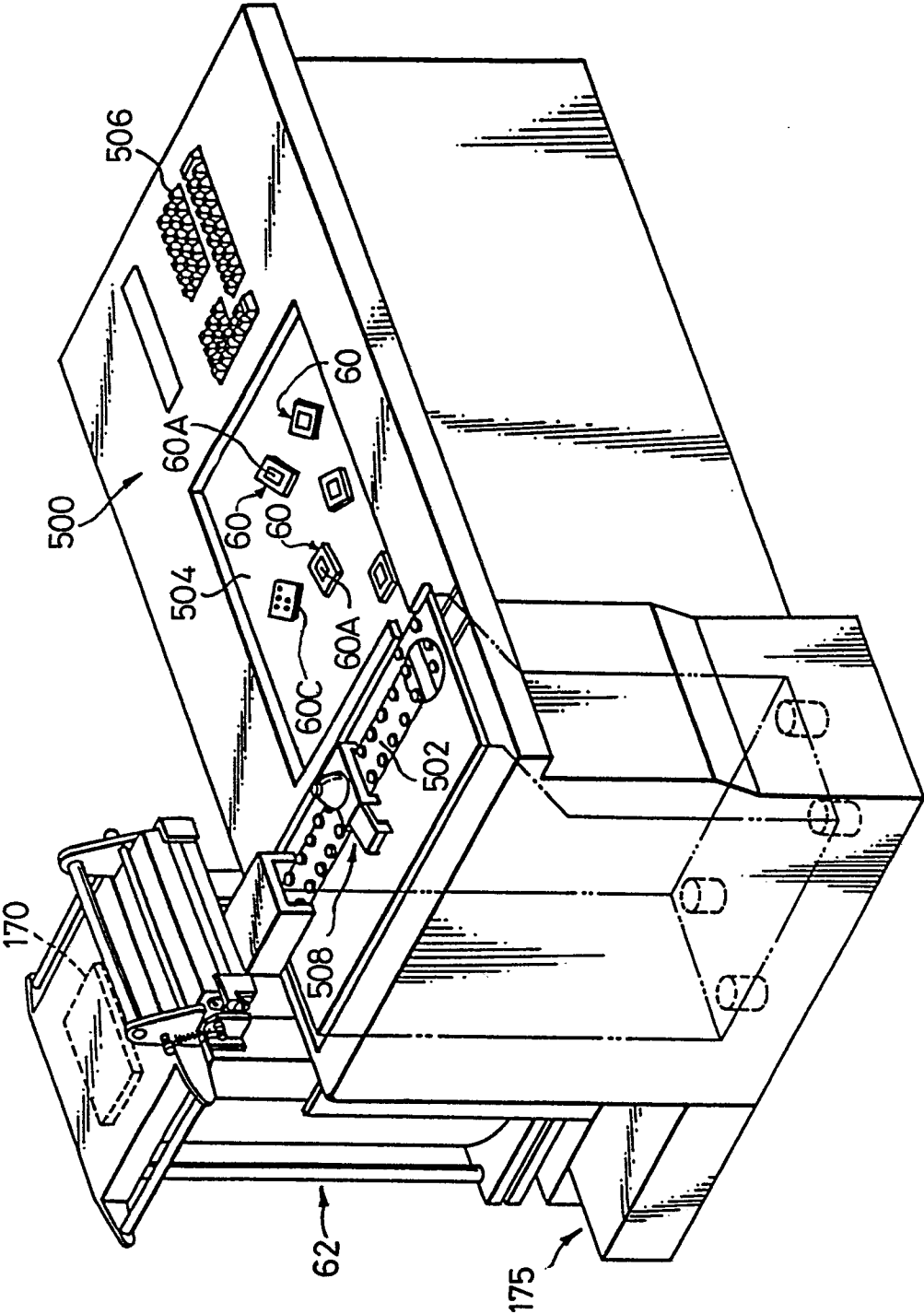


FIG. 18



14/15

FIG. 17



15/15

FIG. 19

