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Holbert

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[54] AUTOMATIC LINE TRAVERSE AND DIP FILM PROCESSOR

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[21] Appl. No.: **85,407**

[52] **U.S. Cl.** .....**95/89 D,** 95/89 R, 95/90, 95/90.5, 95/95, 95/96, 95/97, 95/99

[51] **Int. Cl.**.....**G03d 3/00,** G03d 3/04

[58] **Field of Search**.....95/89 D, 90, 90.5, 91, 95, 95/96, 97, 99

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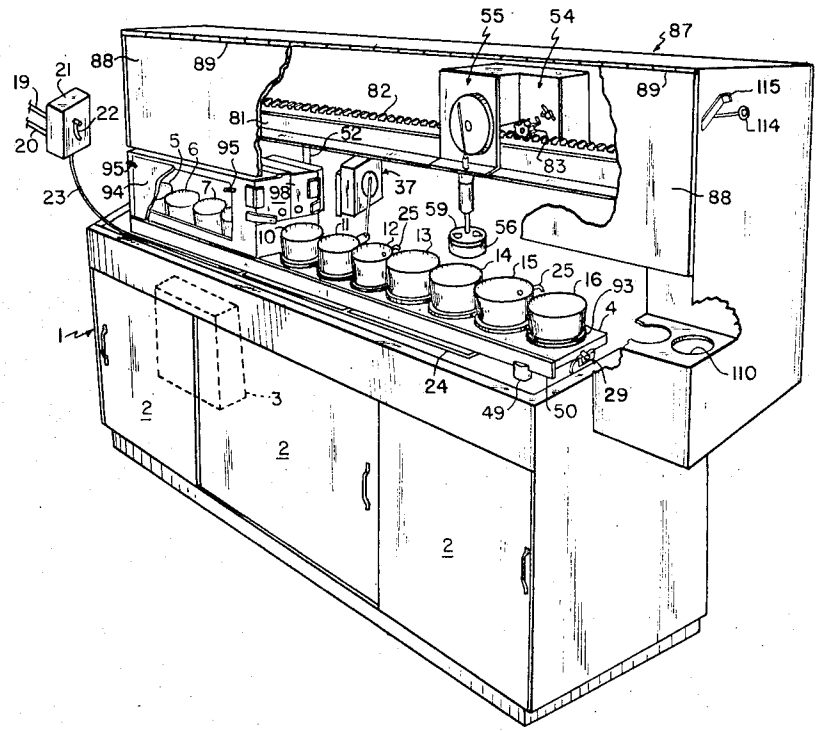
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[57] **ABSTRACT**

The automatic film processor will successively dip the film in processing solutions within a dark box, remove the film from the dark box, successively dip the film in further processing solutions, and finally dry the developed film. The processing solutions are held in individual containers carried in and projecting through a pivotal rack, which rack is selectively vibrated at relatively high frequency and rocked at a relatively low frequency, according to a program. The lower ends of the solution containers project into a water bath maintained at a desired temperature, with the water bath being fed by a piping system passing incoming water into the wash containers with overflow into a dump trough separate from the water bath.

14 Claims, 11 Drawing Figures



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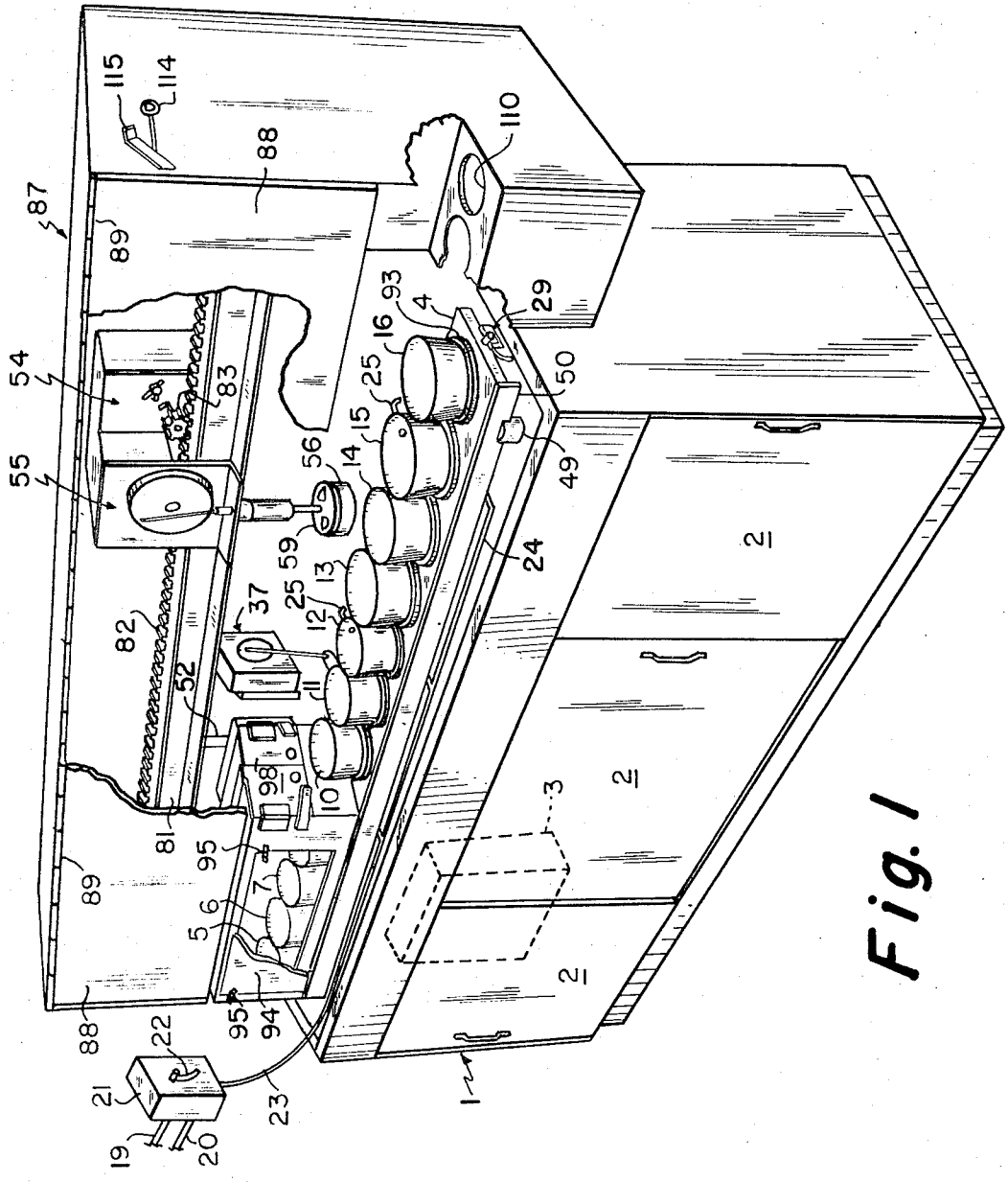


Fig. 1

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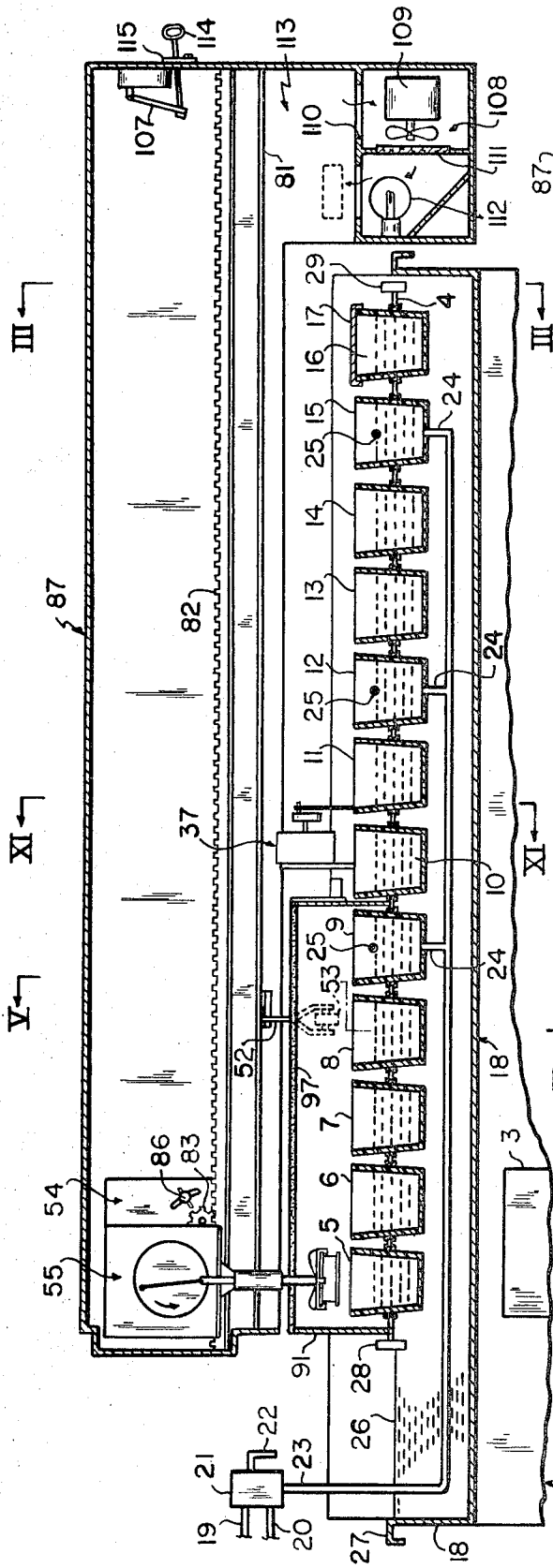


Fig. 2

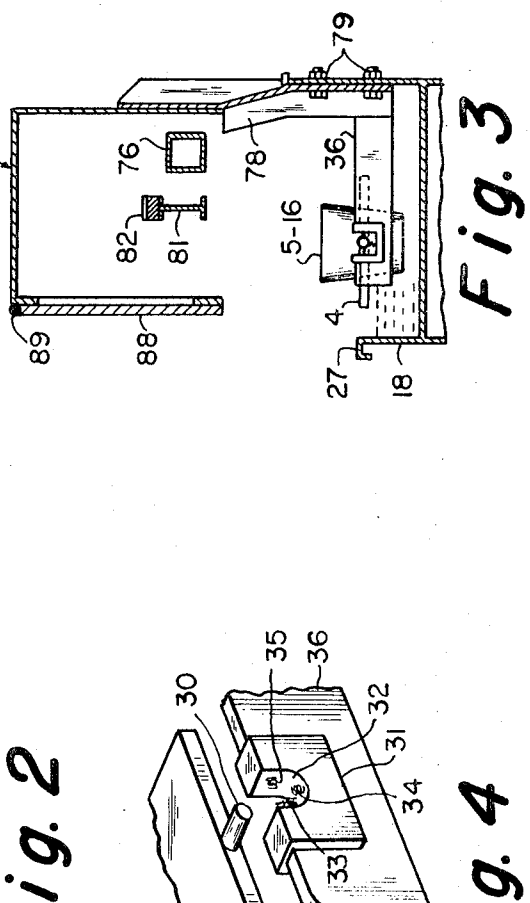


Fig. 3

Fig. 4

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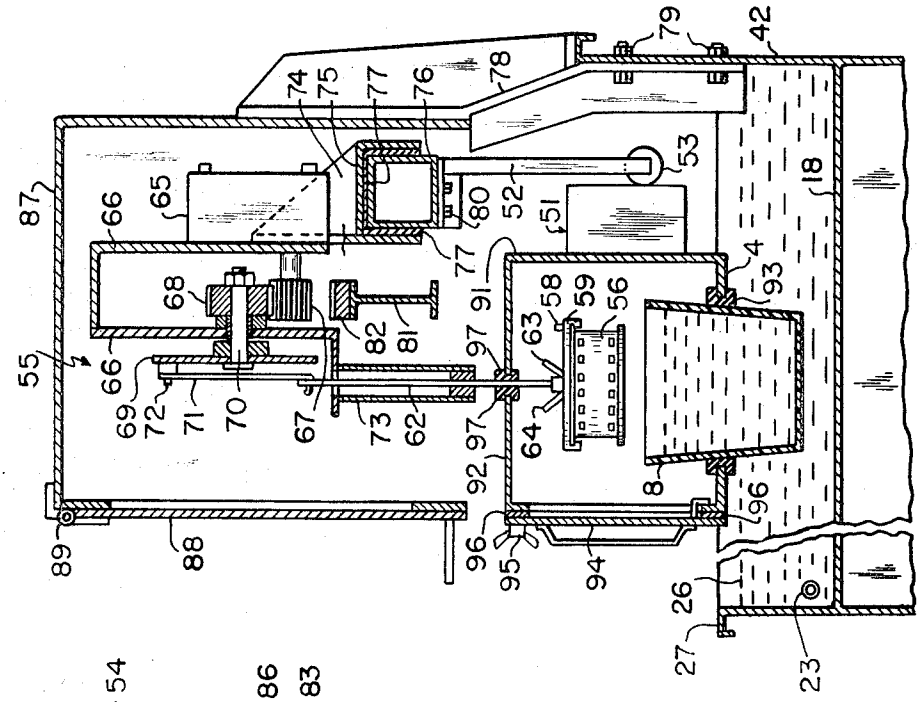


Fig. 5

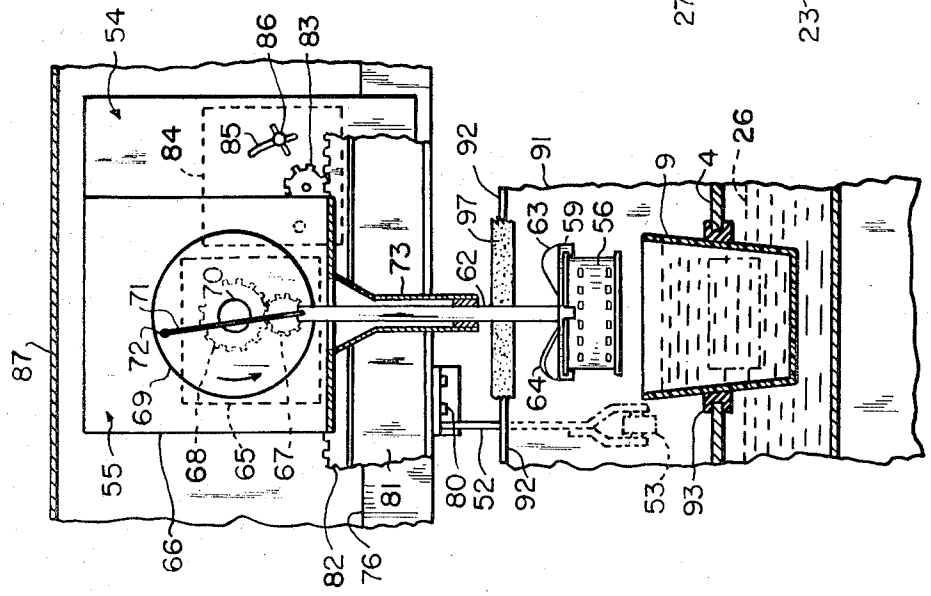


Fig. 6

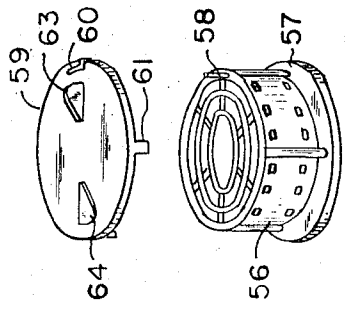


Fig. 7

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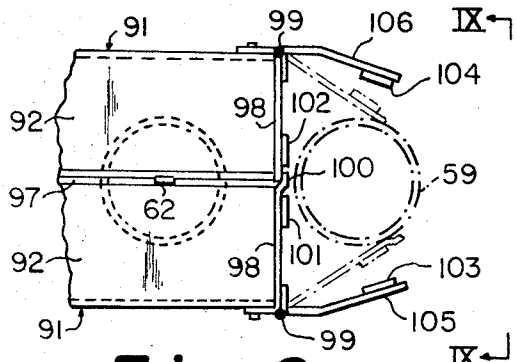


Fig. 8

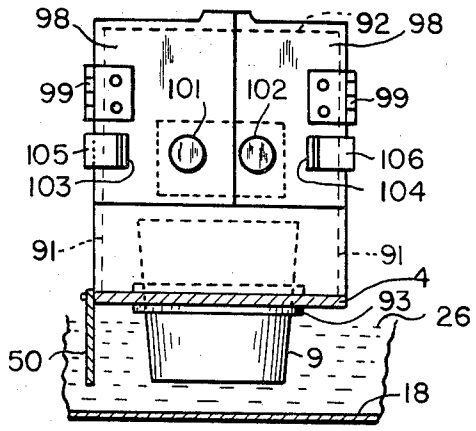


Fig. 9

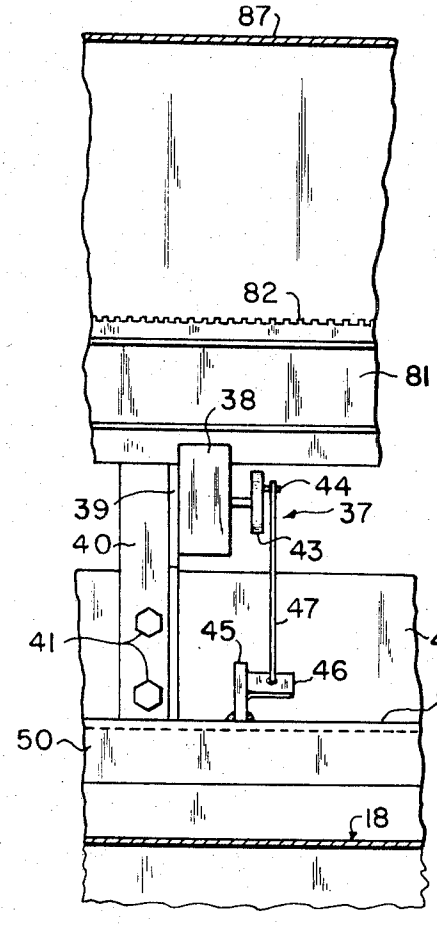


Fig. 10

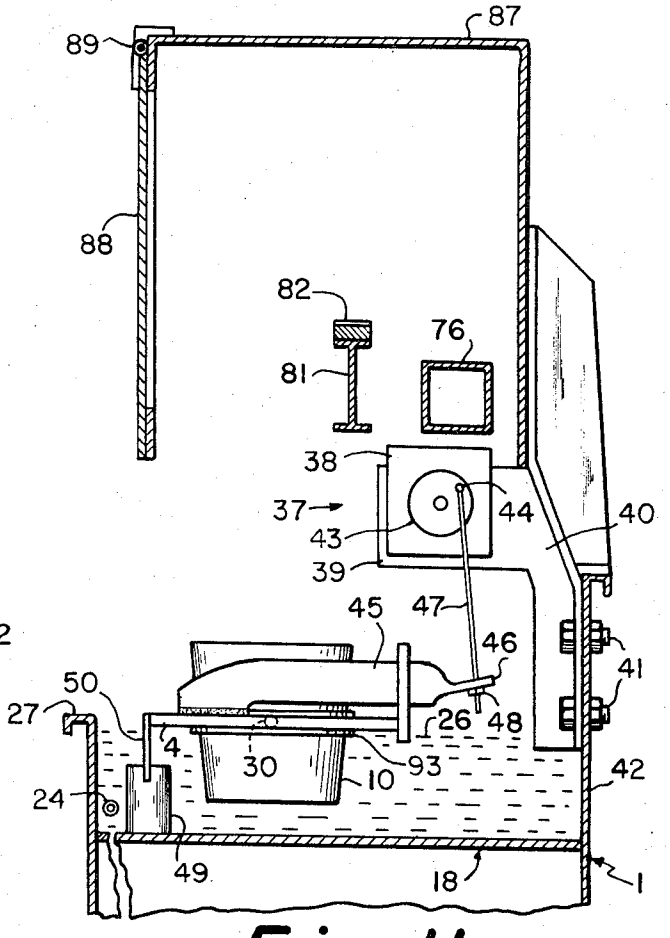


Fig. 11

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AUTOMATIC LINE TRAVERSE AND DIP FILM PROCESSOR

BACKGROUND OF THE INVENTION

There are many organizations that require the processing of film in small batches and as fast as possible. Such organizations might be schools, television stations, laboratories, or the like. Expensive and complicated equipment exists for this purpose, but is beyond the means of such organizations in that it has not proved practical. Heretofore reliance has been upon outsiders or the manual processing of film, which is quite time consuming and imprecise. These problems become more severe with the processing of color film wherein the number of steps involved in the processing is considerable. If the processor is distracted during his operations, for example, by telephone call, the film will most likely be ruined.

SUMMARY OF THE INVENTION

The film to be processed is carried by a line traverse carriage moved by a suitable programmed drive means such as an electric motor driven rack and pinion, so that the film will travel from one processing station to another, for example, between processing solutions. A linkage and motor driven eccentric will selectively dip the film into the desired solution with which it is aligned by the movable carriage. The linkage is sufficiently flexible to allow vibration and rocking of the processing solution, which will correspondingly produce relative vibrations, rocking and rotation of the film with respect to the adjacent fluid.

During the initial processing steps, the film is moved within a dark box by the linkage passing through a light sealed longitudinal slot. After the processing within the dark box, the carriage will cause the film reel to strike doors held closed by rubber friction so that the doors will be released and swing to an open position where they will be held by permanent magnets. Thereafter, the processing may be carried out in the light.

The various processing solutions, including water washes, are respectively within a plurality of containers depending through and carried by a rack, which rack is mounted for pivotal movement about a horizontal axis. Periodically, the rack is rocked about its axis at a low frequency to move new solution into the area of the film. This rocking motion is uniform for all of the containers, because the horizontal axis is symmetrically placed with respect to each of the containers. The film is carried by a rotatably mounted holder having fluid reaction blades on it, so that the rocking motion of the rack will cause the processing solution to move with respect to these blades and to rotate the carried film. Also, 60 cycle vibrations are transmitted to the rack for gently moving the respective solutions among the emulsion grains.

The lower depending portions of the processing solution containers project into a uniform temperature water bath for maintaining the processing solutions at a desired temperature, by a re-circulating temperature controlled method. Heat transfer between the containers and solutions is enhanced by the above-mentioned rocking and vibration. Water wash containers on the rack are fed by a piping system supplying incoming water to the bottom of the containers, with overflow water from the wash containers falling into the dump trough of the sink, which dump trough is separate from the water bath.

BRIEF DESCRIPTION OF THE DRAWING

Further objects, features and advantages of the present invention will become more clear from the following detailed description of a preferred embodiment, with reference to the accompanying drawing, wherein:

FIG. 1 is a perspective view of the film processor according to the present invention, with portions of the cabinet broken away to show the internal mechanisms;

FIG. 2 is a cross-sectional view taken along a vertical plane passing through the pivoting axis of the container rack of FIG. 1, with portions of the lower cabinet removed;

FIG. 3 is a cross-sectional view taken along line III—III of FIG. 2;

FIG. 4 is an enlarged exploded perspective view os the pivotal mounting for the rack that carries the solution containers;

FIG. 5 is an enlarged cross-sectional view taken along line V—V of FIG. 2;

FIG. 6 is an enlarged view of a portion of FIG. 2 but with the carriage in a different position;

FIG. 7 shows an exploded view of the film carrier and film;

FIG. 8 is a plan view illustrating the manner in which the doors are opened by advancement of the reel of film.

FIG. 9 is a front view of the doors for the dark box taken along line IX—IX of FIG. 8 and rotated 90°;

FIG. 10 is an enlarged view of another portion of FIG. 2 showing the mechanism for periodically rocking the solution container rack; and

FIG. 11 is a side view of the mechanism shown on FIG. 10 and taken along line XI—XI of FIG. 2.

DETAILED DESCRIPTION OF THE DRAWING

In the following detailed description of a preferred embodiment for the present invention, it is understood that the specifically illustrated and described structure has considerable merit in its own right, but equivalent and quite different structures are also contemplated.

As shown in FIG. 1, the film processor according to the present invention includes a lower cabinet structure 1 having a plurality of doors 2, providing access to a storage area and a timing mechanism 3, which controls the sequence of film processing operations and their duration. The timing mechanism 3 is connected to a suitable electric power source in a conventional manner.

As more clearly shown in FIG. 2, the upper portion of the lower cabinet structure 1, supports a rack 4, that carries a plurality of containers 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16, which may be of acid resistant synthetic resin and hold 32 ounces. Each of the containers contains a processing solution and is preferably in the form of an inverted truncated cone made of a suitable plastic material and provided with a tightly fitting cap 17. Although only one cap 17 is shown, it is understood that caps may be provided for all of the containers to prevent evaporation and oxidation of the solutions, when film is not being processed, and the caps being removed during processing. The rack 4 has a plurality of aligned holes into which the containers

are respectively dropped so that the tapered side walls of the containers will engage the edges of the holes to support the containers with their lower portions depending from the rack 4 into an upwardly opening trough or basin 18 formed in the upper portion of the lower cabinet structure 1.

Incoming hot and cold water lines 19, 20, respectively, are connected to the mixing valve 21 so that positioning of the selector handle 22 will determine the temperature of water passing from the valve 21 into the single processing water supply line 23. Branch water lines 24 lead from the supply line 23 to the bottom portions of the wash containers 9, 12, and 15. The water supplied by the lines 24 adjacent the bottom of each of the containers 9, 12, 15, will be fresh and mixed with the water in the containers to cause an overflow through the outlet pipes 25. The vertical orientation of the container inlet and outlet is important because the chemicals washed from the film will tend to rise in the water. As shown in FIG. 1, the outlet pipes 25, extend traversely beyond the rack 4, so that they will discharge their water into the dump trough behind the basin 18. The water temperature and level 26 within the basin 18, is automatically maintained by a re-circulating temperature controlled unit which may be conventional. Although the desired temperature has been selected by the handle 22, a major portion of the supply line 23, and branch lines 24, extend through the water within the basin 18 adjacent its forward wall 27 for heat transfer purposes to avoid abrupt temperature changes within the wash containers 9, 12, 15.

The rack 4, and thus carried containers, are mounted for pivotal movement about a horizontal axis contained in the plane of FIG. 2, by means of oppositely disposed bearings 28, 29. These bearings are substantially mirror images of each other so that only one will be shown and described in detail with respect to FIG. 4. Bearing pin 30 cantilevered from the end of the rack 4 is mounted within a bearing block 31 having an upwardly opening channel 32. Three conventional coils springs 33, 34, 35, are mounted within respective bores within the bearing block 31, so that their axes are perpendicular to the axis of the pin 30 and at 90° spaced locations with respect to each other for engaging and providing a resilient pivot mounting for the pin 30, which structure is shown exploded in FIG. 4. With the bearing block 31 rigidly mounted within a stationary frame plate 36, the rack 4 will be mounted for pivotal movement and limited resilient transverse movement.

For periodically rocking the rack about the axis of bearings 28, 29, at low frequency, there is provided a crank mechanism 37 as most clearly shown in FIGS. 10 and 11. An electric motor 38 is rigidly mounted on a cantilevered plate 39 that is rigidly mounted by a bracket 40, which in turn is secured by bolts 41 to the rear vertical wall 42, that in part forms one side wall of the basin 18. The drive shaft of the motor 38 carries a disk 43 having an eccentric pin 44 thereon. A sheet metal lever arm 45, is rigidly mounted, for example by welding, to the upper surface of the rack 4 and extends to a terminal bent end 46, which has a lost motion connection with a connecting link 47, extending to the eccentric pin 44. Thus, by rotating the disk 43, through the gear reduction motor 38, at a very slow speed, the lever arm 45 is slowly pivoted counter-clockwise as viewed in FIG. 11, to correspondingly pivot the rack 4 about its bearings 28, 29. After the pin 44, has been lifted to its highest position, the lost motion connection between link 47 and arm end 46, will allow the rack 4 to pivot clockwise at its own speed. This lost motion connection is formed by a nut 48 adjustably threaded on the lower end of the link 47, which link 47 passes through a hole in the end 46 that is smaller than the nut 48. Preferably, the link 47 is constructed of a very thin, for example, 1/32nd of an inch, stainless steel ribbon or wire. The rack 4 is biased in the clockwise direction by a resilient block 49, preferably rubber, that engages a depending flange 50 at one side of the rack 4. A plurality of these blocks 49 may be provided along the longitudinal extent of the rack 4 and flange 50.

The rack 4 and thus the containers and solution mounted thereon will be vibrated at a frequency substantially greater than the previously described rocking motion by means of an electrically powered 60 cycle vibrator 51 that is shown in FIG. 5 as being rigidly connected to the rack 4. Except to say that the vibrator 51 will vibrate the rack 4, at a 60 cycle frequency, for example, and at a low amplitude, a detailed description of the vibrator will not be given since it may be generally of and conventional type. However, the vibrating action is enhanced according to the present invention by a resilient leaf spring 52, rigidly depending from stationary upper frame structure to carry at its lower end a roller 53, in engagement with one face of the vibrator 51. This face will vibrate relative to the face rigidly mounted on the rack 4. Further, the spring mounting 33–35, for the pivot pins 30 of the rack 4 will further enhance the action of the vibrator 51.

Vibration of the rack 4 will cause a gentle movement of the processing fluids between the emulsion grains of the film to increase the speed of the processing and produce more uniform results. The periodic low frequency high amplitude rocking of the solutions by the mechanism 37, will change the fluid that is in contact with the film.

Programmed traverse of the film from one solution container to another and dipping of the film into a selected container will be under operation of the timer 3 and respective traverse and dipping mechanism 54, 55.

As shown in FIG. 7, 35 mm color film 56, for example, is loosely wound on a conventional NIKOR film processing reel 57, which is provided with an upwardly extending locator pin 58. Carrier plate 59 of the present invention is provided with a bayonet slot 60 for the reception of the pin 58 and with depending spring arms 61 about its periphery to engage the wound film 56. The dipping mechanism 55 rotatably supports the carrier plate 59 by relatively rigid rod or arm 62. Oppositely extending fluid reaction blades 63, 64, are mounted on the top surface of the carrier plate 59, so that when the rocking mechanism 37 rocks the rack 4 to cause relative movement between the film carrier plate 59 and adjacent fluid, there will be rotation of the carried film about a vertical axis. This general rotation will further the action of the rocking motion in changing the fluid that is in contact with the film.

As shown in FIGS. 5 and 6, the dipping mechanism 55, includes a shaded pole electric motor 65 rigidly mounted on a carriage 66 for driving a horizontal axis

spur gear 67 which is in meshing engagement with a larger spur gear 68 for speed reduction. The spur gear 68 in turn drives a disk 69 by means of drive shaft 70 journalled on the forward wall of the carriage 66. A crank arm defined by 1/32nd inch thick stainless steel ribbon or wire 71 extends between the upper end of the rod 62 and an eccentric pin 72 carried by the disk 69. This ribbon 71 will allow pivotal movement about any horizontal axis, rotational movement about a vertical axis and general vibrations of the rod 62 relative to the pin 72 while providing a tension connecting link. By operating the motor 65, the gears 67, 68 are rotated to in turn rotate crank defined by the disk 69 and pin 72. By rotation of the pin 72 eccentrically with respect to the shaft 70, the rod 62 will be vertically reciprocated to lower the film 56 in a selected solution container or to raise the film 56 out of a container. To generally limit transverse movement of the rod 62 and thus the film 56 during rotation of the disk 69, a guide sleeve 73 pivotally receives therethrough the rod 62 and is mounted rigidly on a lower portion of the carriage 66.

The carriage 66 is horizontally moved in the plane of FIG. 2 by the traverse mechanism 54 for selectively vertically aligning the rod 62 with the central vertical axis of a desired container 5–16. For this purpose, the carriage 66 has a rigidly carried bracket 74, shown in FIG. 5, which has a downwardly opening rectangular bearing channel 75, slidably and supportingly engaging a stationary and hollow box beam 76 with the interposition of bearing material plates 77, for example, constructed of Teflon. The beam 76 extends for substantially the full length of the processor and is connected at various points by means of vertically extending brackets 78, rigidly secured by bolts 79 to the stationary rear wall 42, with bolts 80 rigidly interconnecting the box beam 76 and brackets 78. Thus, the main weight of the carriage 66 is supported for line traverse along the box beam 76. To provide further stability and drive for the carriage 76, a stationary I-beam 81 is provided on its upper surface with a toothed rack gear 82, which is in meshing engagement with a spur gear 83 mounted on the carriage 66 for rotation about an axis parallel with the axis of shaft 70. A suitable shaded pole electric motor and gear reduction drive 84 is fixedly mounted on the carriage 66 to drive the spur gear 83 and thus move the carriage 66 longitudinally along the box beam 76. The spur gear 83 is mounted for movement into meshing engagement with the rack gear 82 and for movement out of engagement with the rack gear 82 along an arcuate path coaxial with an arcuate slot 85, by means of a bolt and wing nut 86 extending through the slot 85. Thus, the wing nut may be loosened and the bolt moved along the arcuate slot 85 for moving the spur gear 83 toward and away from the rack 82. In this manner, after the timer 3 has operated the line traverse mechanism 54 to move the carriage 66 from the illustrated position in FIG. 2 to the right-hand most position in FIG. 2, where the film processing operation is completed, the spur gear 83 may be moved out of meshing engagement with the rack 82 so that the carriage 66 may be quickly and manually moved back to the illustrated position in FIG. 2 to allow another programmed sweep to the right.

An upper cabinet structure 87, is provided to generally shield the above-described mechanisms 54, 55. This upper cabinet structure has a front door 88 mounted by a piano hinge 89 for pivotal movement at its top about a horizontal axis. A suitable lever (not shown) may be provided to swing the door 88 between its closed position illustrated in FIG. 1 and some opened position where the lever will engage a bracket to hold the door in its upper open position. With the door open, the mechanisms 54, 55 are exposed for adjustment and maintenance.

Many steps in film processing must be carried out in the absence of light, while light is of no concern in others of the steps. It is highly advantageous that normal lighting be allowed within the film processing room so that other activities may be carried out by personnel, particularly with automatic processing not requiring the attention of the personnel so that they may be engaged in other activities requiring light. Further, it is desirable that the processes not requiring the exclusion of light be carried out in the open for inspection, replenishment of fluid, and general access to the machine for various maintenance and processing purposes. According to the present invention, the processes involving the processing fluids within containers 5, 6, 7, 8 and 9, are the only ones that require the exclusion of light, with the example being the processing of 35 mm color film. Thus, a box structure having side walls 91 and a top wall 92 is sealingly secured on the rack 4 to light enclose the containers 5–9. A suitable resilient material 93, for example sponge rubber, lines the holes in the rack 4 to provide a light seal between the containers within the box structure and the corresponding holes in the rack 4. Operator access to the dark box 91, 92 is provided through a door 94 hinged at 95 to pivot about a horizontal axis. A resilient light sealing gasket 96 is provided around the entire periphery of the door 94 and adjacent rigid surfaces of the dark box 91, 92.

The film movement within and through the dark box is provided by a slot to accommodate the rod 62 and doors to permit exit of the film. The longitudinally extending slot in the top wall 92 of the dark box is lined with a resilient light sealing gasket 97 to sealingly allow movement of the rod 62 through the top wall 92 from a position vertically aligned with container 5 to a position vertically aligned with container 10. Also, the resiliency of the gasket 97, is sufficient to allow complete light sealing of the dark box without interfering with the vibration and rocking of the dark box that is carried on the rack 4.

Between containers 9 and 10, the dark box is provided with two oppositely opening exit doors 98, which are substantial mirror images of each other. Each door is mounted for movement about a vertical axis by respective hinges 99, particularly as shown in FIGS. 8 and 9 for movement between a closed position light sealing the dark box and an open position permitting movement therethrough of the film 56 and carrier 59. The overlapping adjacent vertically extending portions of the doors 98 are provided therebetween with a suitable resilient gasket (not shown) to assure tight sealing. Also, these overlapping portions are metallic and held together by an interference fit of adjacent door edges as shown or biased together by rubber friction resulting from an interference fit between door gaskets at 100.

In moving from a position vertically aligned above container 9 to a position vertically alined above container 10, the film carrier 59 will strike the doors 98 with sufficient force to overcome the rubber friction and move them about their hinges 99 outwardly as shown in dotted lines in FIG. 8. In the dotted line position of FIG. 8, the magnets 101, 102 will come under the influence of respectively oppositely poled permanent magnets 103, 104 carried by stationary brackets 105, 106, to further pivot the doors 98 about their hinges 99 to fully opened position where they are locked by the magnetic forces. In resetting the processor for another run, the doors 98 must be manually moved from their open position to their closed position after the film carrier 59 moves into the dark box when the carriage 66 is manually repositioned.

After the film has been processed by all of the solutions in containers 5-16, the carriage 66 will strike a limit switch 107, as shown in FIG. 2 to operate a drying unit 108. The drying unit 108 includes an electric motor driven fan 109 for drawing air downwardly through opening 110 and forcing the air outwardly through air filter 111 into heat exchange contact with a conventional light bulb 112 so that heated air may move upwardly into a drying chamber 113 containing therein the wet film. After sufficient drying time, the entire processor automatically shuts down. For locking and releasing the switch 107, there is provided a movable bar 114 and stationary bracket 115.

OPERATION

To further understand the above embodiment of the present invention, which is specifically illustrated, a typical operation will be considered for processing a roll of 35 mm color film. However, it is to be understood that the specifically illustrated embodiment as well as the readily applied modifications may be operated in similar and quite different manners.

A roll of exposed, but undeveloped, color 35 mm film is rolled in a conventional manner upon a NIKOR processing reel as shown in FIG. 7 and connected with the carrier plate 59 by means of interengagement of the pin 58 and bayonet slot 60, as well as the spring arms 61 tightly clamping the film 56 on the outside. Thus, the film will be mounted on the mechanism and the carriage 66 is thereafter moved along the box beam 76 to a position where the film is directly vertically above container 5 within the dark box 91, 92; this movement of the carriage 66 is accomplished by appropriately moving the nut and bolt assembly 86 within the arcuate slot 85 to lift the spur gear 83 out of engagement with the rack 82 so that the carriage may be manually slid into the abovementioned position.

The mixing valve 21 is adjusted for a sufficient time to assure that the water temperature within the basin 18 and the temperature of the various solutions within containers 5–16 are uniform and appropriate for the particular film being processed, for example, 85° F. After this steady state condition has been reached, conventional mechanisms are employed to maintain the temperature of the solutions and bath automatically. The covers 17 are removed from all of the containers 5 – 16 immediately before processing, and they have assured that the solutions have been maintained fresh and clean. Thereafter, the doors 98 of the dark box are closed to light seal the dark box, it being understood that up to this point the lights have been out or a protective light has been used whenever the film 56 has been opened to the environment of the room containing the processing equipment. Since the film is now within the light sealed dark box, the normal lights of the room may be turned on and kept on for the remainder of the operation.

After the above initial setup, the timer 3 is actuated to control and complete the remainder of the operation without requiring any further intervention of an operator or the like. Under the influence of the timer 3, the dipping mechanism 55 will be actuated to lower the film into a pre-hardener solution within container 5 where the film will remain for 2 minutes and 45 seconds. During this time, the vibrator 51 will be actuated for 30 seconds and the rocking mechanism 37 will rock the rack 4 twice during the 30 second vibration period. After completion of the above, the dipping mechanism 55 will raise the film out of the container 1, the traverse mechanism 54 will move the film to the next postion vertically aligned with container 6 and the dipping mechanism 55 will lower the film into container 6.

The film will remain in the neutralizer solution within container 6 for 45 seconds. During this time, the vibrator 51 will be actuated for 15 seconds and the rocking mechanism 37 will produce one rock. Thereafter, the dipping mechanism 55 will remove the film from container 6, the traverse mechanism 54 will align the film with container 7, and the dipping mechanism 55 will lower the film into container 7. The film will remain within the first developer solution within container 7 for 7 minutes, during which time the vibrator will be actuated continuously. Also, there will be one rock each 15 seconds for the entire 7 minutes.

From the above, it is seen that the dipping mechanism 55 and traverse mechanism 54 successively move the film from one container to another in a straight line as dictated by the timer, so that this operation will not hereinafter be described in detail.

The film stays within the first fixer solution of container 8 for three minutes, during which there is continuous vibration and one rock each 15 seconds. After a four minute washing in container 9, the film carrier plate 49 will strike the doors 98 of the light box 91, 92 in travelling from container 9 to container 10 so that the doors 98 will be opened and held opened by their magnets. Thus, the film will be exposed to the normal room lighting for its processing after container 9.

The film is held within the color developer within container 10 for 8 minutes, 45 seconds. During this time, vibration will be continuous and there will be one rock each 15 seconds.

The film will stay in the second fixer of container 11 for 3 minutes. During this time, vibration will be continuous and there will be one rock each 15 seconds.

The film will be held within the second wash solution of container 12 for 4 minutes.

The film will be held in the bleach solution of container 13 for 5 minutes. During this time, vibration will be continuous and there will be one rock each 15 seconds.

Film will be held within the fixer solution of container 14 for 6 minutes. During this time, vibration will

be continuous and there will be one rock each 15 seconds.

The film will be held within the wash water of container **15** for 6 minutes.

The film will be held within the stabilizer solution of container **16** for 1 minute.

Thereafter, the carriage **66** will move to its extreme right-hand position, as viewed in FIGS. **1** and **2**, so that it will strike the limit switch **107**. Switch **107** will energize the motor **109** to dry the film with filtered heated air. After drying, the machine will automatically shut down and the film may remain where it is indefinitely.

Further modifications, embodiments and variations are contemplated within the spirit and scope of the present invention, as defined by the following claims.

What is claimed is:

1. A film processing apparatus, comprising: a rack having a plurality of means for holding a corresponding plurality of separate chemical film processing solution containers; means mounting said rack for pivotal movement about a horizontal axis; drive means for pivoting said rack about said axis; a plurality of containers mounted in said rack; dark box means cooperating with said rack and light enclosing only some of said containers and being mounted for rocking movement with said rack; and means for moving film from a container within said box means, through said box means and to a container outside of said box means.

2. The apparatus of claim **1**, including a vibrator mounted on said box means; a cantilevered stationarily mounted arm extending adjacent said vibrator; and roller means mounted on the terminal end of said cantilevered arm in engagement with said vibrator.

3. The film processing apparatus of claim **1**, including a stationary water bath tank below said rack for containing water; and means mounting said containers on said rack so that said containers extend directly into such water in said tank for oscillating movement within such water as said rack pivots for improving heat transfer between such water within the tank and the containers.

4. The apparatus of claim **3**, wherein at least one of said containers is a water wash container and has a bottom inlet and an outlet pipe extending transversely beyond said water bath tank to a free terminal end directing overflow away from and out of liquid communication with said water bath tank; and further including flexible conduit means extending in part through the water in said tank and conducting water under pressure through said inlet.

5. A film processing apparatus, comprising: a rack having a plurality of means for holding a corresponding plurality of separate chemical film processing solution containers; means mounting said rack for pivotal movement about a horizontal axis; drive means for pivoting said rack about said axis said mounting means including pins respectively extending horizontally outwardly from each end of said rack in axial alignment with each other, and a bearing block having spring means mounting therein said pin to resiliently form the pivotal mounting for said rack; and said spring means including three coil springs mounted with central axes each intersecting the center line of the respective pins and forming angles with respect to adjacent spring center lines of 90°.

6. A photographic film developing apparatus, comprising: a substantially light impervious developing box having an exit end; two doors hinged at their outer edges to the exit end of said box for moving between a closed position sealing said exit end and an open position, the inner edges of said doors sealingly engaging each other in the closed position; stationary door support members mounted respectively adjacent each of said doors in their open position; mechanical means for supporting film within said box and for moving film from within said box, against said doors to thereby move said doors from their closed position to their open position, and outside of said box; means adjacent said box to normally hold said doors in their closed position and release said doors in response to said mechanical means moving against said door; and magnetic latch means between said doors and respective ones of said stationary support members for holding said doors in their open position.

7. The apparatus of claim **6**, wherein said mechanical means includes a slot extending through one wall of said box and running perpendicualr to said doors in their closed position; a support arm extending through said slot for holding film at one end and for attachment at its opposite end to a driving mechanism; and resilient sealing means within said slot for sealing the opening of said slot and allowing passage longitudinally of said support arm.

8. The film developing apparatus of claim **6**, further including: means for holding at least one liquid chemical bath within said box; said mechanical means further moving the film from within said means for holding at least one liquid chemical bath to a position removed from said means for holding at least one liquid chemical bath and in said box; means for holding a processing fluid bath outside of said box and separate from said means for holding a liquid chemical within said box; and said mechanical means further moving the film from its position outside of said box downwardly into said means for holding a processing fluid bath.

9. The photographic film developing apparatus of claim **8**, wherein said doors extend in a single vertical plane in their closed position; said mechanical means including a horizontal slot extending through the top wall of said box perpendicular to and intersecting the vertical plane of said doors in their closed position aligned with the sealingly engaging edges of said doors, drive means outside of said box and having a translating power path parallel to said slot, and an arm extending through said slot for carrying film at one end and connected at its opposite end to said drive means; and resilient means within said slot for light sealing said slot while allowing longitudinal movement of said arm within said slot.

10. A film processing apparatus, comprising: a sealed light impervious processing box having a hole in its lower portion; a water bath tank freely in light communication with the outside light environment of said box and spaced below said box; means for holding a photographic film processing chemical within said box, including an opaque fluid container increasing in horizontal cross section from its bottom toward its top and having means light sealingly engaging the edges of said hole to allow the bottom portion of said container to extend directly into said water bath tank for prevent-

ing light from the vicinity of said water tank to pass into said box through said hole.

11. The film processing apparatus of claim **10**, including: power means for supporting photographic film and moving the photographic film from within said opaque fluid container to a position removed from said opaque fluid container and in said box, and then to a position outside of said box; said box including at least one hinged door having a closed position wherein it is light sealed around its periphery and an open position permitting passage of the photographic film as it is moved by said power means; means normally holding said door in its closed position and releasing said door in cooperation with said power means for movement of said door to said open position with passage of the film from the inside to the outside of said box; means for holding a processing fluid outside of said box and separate from said container; and said drive means further moving the photographic film from its position outside of said box downwardly into said means for holding a processing fluid.

12. The film processing apparatus of claim **11**, wherein said door extends in a vertical plane in its closed position; said power means includes a horizontal slot extending through the top wall of said box perpendicular to and intersecting said door in its closed position, drive means outside of said box and having a translating power path parallel to said slot, and an arm extending through said slot for carrying film at one end and connected at its opposite end to said drive means; and resilient means within said slot for light sealing said slot while allowing longitudinal movement of said arm within said slot.

13. A film processing apparatus, comprising: means for mounting a plurality of containers carrying different processing fluids, along a predetermined generally horizontal path; a stationarily mounted toothed rack extending generally parallel to and above said path; a highly flexible elongated support member having means at its lower end for carrying film to be processed by fluid within said containers; a carriage mounted for movement parallel with said rack and path; means mounted on said carriage for guiding said support member along a substantial portion of its length for only vertical movement; an electric motor mounted on said carriage; an eccentric crank drivingly connected to said electric motor; a crank arm drivingly connected between said crank and the upper end of said support member above said guide means; and means for moving said carriage generally parallel to said path, including a gear rotatably mounted on said carriage in toothed engagement with said rack and an electric motor drivingly connected to said gear.

14. The apparatus of claim **13**, including a support rail extending generally parallel to said path and said rack; and said carriage having bearing means in supporting engagement with said support rail transversely spaced from said rack for supporting a portion of the carriage weight; and said rack facing upwardly to supportingly receive said gear and support the remaining portion of the carriage weight.

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