





INVENTOR  
JOSE PUENTE  
BY *Remington, Shaw  
and Stephens*  
ATTORNEYS

## PROCESSING RACK FOR PHOTOGRAPHIC GLASS PLATES

### THE INVENTIVE IMPROVEMENT

The handling of photographic glass plates for various processes including cleaning, developing, shipping and storing has been relatively expensive and has involved many manual operations. The invention recognizes a way to improve on this in a simple rack for photographic glass plates that supports the plates satisfactorily for many of the present processes, including cleaning and developing.

The invention involves a realization of the characteristics and requirements for a successful plate holding rack, and proposes a simple structure that meets these requirements in an efficient and economical way. The inventive rack is suitable for automatic loading and unloading of glass plates, is designed in a modular form compatible with various processing equipment, and is reliable, functional and efficient.

### SUMMARY OF THE INVENTION

The inventive processing rack for photographic glass plates has a generally open frame supporting a pair of parallel shafts that carry gripping rollers. The gripping rollers have a plurality of evenly spaced, annular grooves for engaging opposite edges of the plates, and the rollers are resiliently biased against the edges of the plates. The frame includes means for limiting the depth of insertion of the plates between the rollers.

### DRAWINGS

FIG. 1 is a plan view of a preferred embodiment of the inventive processing rack;

FIG. 2 is a partially cut-away, elevational view of the processing rack of FIG. 1;

FIG. 3 is an enlarged, fragmentary, cross-sectional view of the processing rack of FIG. 2, taken along the line 3 — 3 thereof; and

FIG. 4 is an enlarged, fragmentary, cross-sectional view of the processing rack of FIG. 1 taken along the line 4 — 4 thereof.

### DETAILED DESCRIPTION

Processing rack 10 as shown in the drawings is formed with a generally open frame made of end plates 11 and tie rods 12. Processing or cleaning fluids are then free to flow through the space between end plates 11 to contact photographic glass plates 13 held in rack 10. Plates 13 are resiliently held between gripping rollers 14, and the depth of insertion of plates 13 between gripping rollers 14 is limited by rods 15 extending across the bottom region of rack 10.

Each of the rollers 14 is preferably formed of a plurality of independent rings 16 that are generally pulley-shaped and have an annular groove 17 as illustrated. This provides evenly spaced, annular grooves 17 along the length of rollers 14. Alternatively, rollers 14 can be integrally formed of a single, generally cylindrical piece having evenly spaced grooves 17.

Rollers 14 are mounted on a pair of parallel shafts 18 extending between end plates 11. Rollers 14 are preferably mounted on a compressible and flexible bushing 19 surrounding shafts 18 and fitting inside rings 16. Bushings 19 can be an independent annulus

for each of the rings 16, or a single piece of tubing extending the length of shaft 18 and supporting individual rings 16. Also, an integral, single-piece, grooved roller 14 can be supported on a length of compressible tubing 19. Foamed polyurethane is one satisfactory material for bushing 19. Then, as best shown in FIGS. 1 and 4, plates 13 can separate rings 16 slightly in fitting between rollers 14, and bushing 19 makes rollers 14 resilient relative to plates 13.

Shafts 18 are also preferably biased toward minimum separation for urging rollers 14 into resilient engagement with the edges of plates 13. To accomplish this, slots 20 are formed in end plates 11 to contain strings 21 engaging shafts 18 to bias shafts 18 toward the center of rack 10. Bars 22 cover the outside of slots 20 on end plates 11 to hold shafts 18 in place, and slotted bars 23 close the inside of slots 20 and movably support shafts 18 along the inside face of end plates 11. The spring bias support for shafts 18 and the flexible support provided by bushings 19 cooperate to produce a flexible grip on plates 13 to accommodate small variations in plate sizes. Shafts 18 can be separated by automatic machinery for unloading plates 13, and proper selection of springs 21 and bushings can regulate the gripping force applied to the edges of plates 13.

With the preferred independent rings 16, plates 13 can be automatically loaded or unloaded by processing machinery that engages and drives an opposed pair of rings 16, while braking and holding the neighbor rings in place to raise or lower a plate 13. Rack 10 is built in modular form that fit a variety of processing equipment, and it is preferably formed of materials that are compatible with developing processes, ultrasonic cleaning, and shipping and handling operations.

Persons wishing to practice the invention should remember that other embodiments and variations can be adapted to particular circumstances. Even though one point of view is necessarily chosen in describing and defining the invention, this should not inhibit broader or related embodiments going beyond the semantic orientation of this application but falling within the spirit of the invention. For example, those skilled in the art will appreciate the ways in which racks made according to the invention can be adapted to various processing equipment and handling operations.

I claim:

1. A processing rack for photographic glass plates, said rack comprising:

- a. a generally open frame;
- b. a pair of parallel shafts supported on said frame;
- c. gripping rollers supported on each of said shafts;
- d. said gripping rollers having a plurality of evenly spaced annular grooves for engaging opposite edges of said plates;
- e. means for resiliently biasing said rollers against said edges of said plates; and
- f. means arranged on said frame for limiting the depth of insertion of said plates between said rollers.

2. The rack of claim 1 wherein said biasing means comprises flexible bushings supporting said rollers on said shafts.

3. The rack of claim 1 wherein said shafts are movably supported on said frame, and said biasing means comprises spring means for urging said shafts toward a minimum separation.

3

4

4. The rack of claim 3 wherein said biasing means includes flexible bushings supporting said rollers on said shafts.

5. The rack of claim 1 wherein said gripping rollers comprise a plurality of rings rotatably mounted on said shafts, each of said rings forming one of said grooves.

6. The rack of claim 5 wherein said biasing means comprises flexible bushings supporting said rings on said shafts.

7. The rack of claim 5 wherein said shafts are movably supported on said frame, and said biasing means comprises spring means for urging said shaft

toward a minimum separation.

8. The rack of claim 7 wherein said biasing means includes flexible bushings supporting said rings on said shafts.

9. The rack of claim 1 wherein said frame includes a pair of end plates and tie-rods connecting said end plates, and wherein said shafts extend between said end plates.

10. The rack of claim 9 wherein said depth limiting means comprises rods extending between said end plates.

\* \* \* \* \*

15

20

25

30

35

40

45

50

55

60

65