

# Kev Franz's Journeys in Time

## (3) Rack and Tank

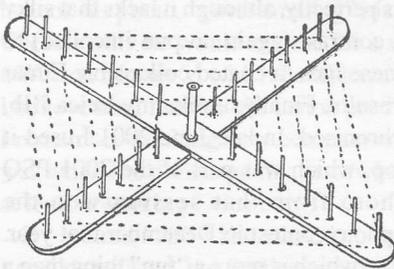
In my first week at Herschell's Films Pty. Ltd. I was introduced to rack and tank film processing. This "ancient" procedure had been used by pioneer filmmakers since the late 1890's – of course I didn't know that at the time, but the process captured my interest right from the start.

Perhaps it was the sheer size of the film drying drum that sparked my interest, or perhaps the fact that I was handling "professional" 35mm film that excited me. As the Junior Laboratory Assistant my first job was to clean a 35mm Technicolor feature film. I was shown how to carefully feed each reel on to the huge drying drum. This must have been 8 ft. in diameter and 10 to 12 ft. long, with a capacity of around 2,000 ft. of film.

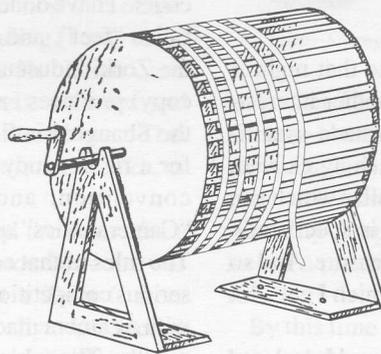
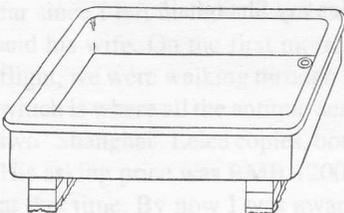
The film was attached – emulsion up, to the end of one of the dowel like slats that ran the length of the drum. A large number of these slats formed the outer circumference of the drum. Turning the drum by hand, the film was laid in a spiral - strand by strand around it. Slowly moving along the length of the drum each strand of film was laid as close as possible to the preceding strand without overlapping it. Care was taken not to pull the film tight, it must be kept slightly loose on the drum. Having mastered that procedure, I was handed a bucket filled with methylated spirits and a real chamois (not like the synthetic ones you get today). "Right", said the man, "saturate the chamois with metho, now wrap it around this first strand of film, then as I slowly turn the drum by hand, you work your way along the full 2,000 ft. length – keeping the chamois well saturated the whole time – right?" Gloves? No there were no rubber gloves, hands straight into the metho – ouch! I've had cold hands ever since.

What I had just learned was, of course, the procedure normally used to dry the film at the end of the developing process. The beginning took place in the darkroom in complete darkness when processing Panchromatic camera negative, or under yellow-orange safelights for processing positive prints. But before we go into the darkroom let me briefly explain the historical significance of rack and tank processing.

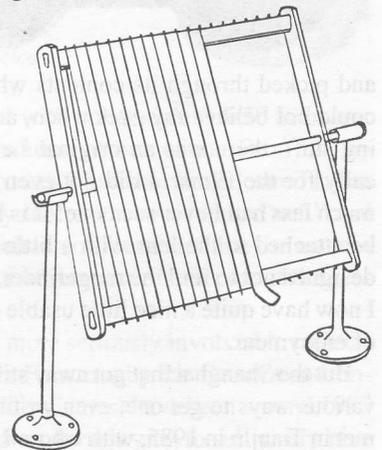
The photographic glass plates of the 1870's and 1880's were



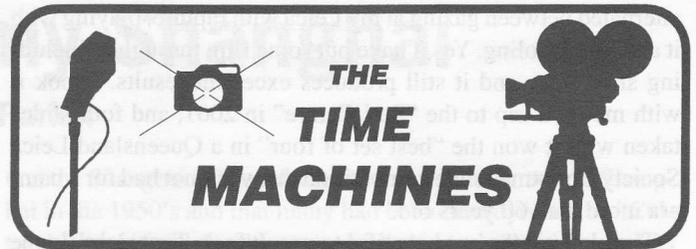
*In the pin frame system, the film was wound in a flat spiral progressively from the centre pins to the outer pins. The cross frame was made of wood or brass and was immersed in shallow dishes for processing. These were often made of stoneware.*



*A "squirrel cage" drum of the type used to process Australia's first films from 1896 on. The system was designed by Arthur Peters, Darkroom Manager of Falk Studios in Sydney at the request of Walter Burnett. The drum was partly immersed in a shallow tank of developer and slowly rotated, followed by a rinse, fix, and wash. The film remained on the drum to dry. First used to process Sestier's Film The Melbourne Cup of 1896, Arthur Peters was delighted with the results - they were "magnificent".*



*The flat wooden rack and deep wooden tank was the most commonly used system for professional Motion Picture processing in the early days. The film was wound in a zig zag pattern across the frame as it rotated on the centre axle. When loaded, the axle is removed and the loaded rack goes into the vertical developing tank.*



hopeless when it came to capturing moving pictures. The greatest scientific achievements of the era could not produce a sufficient number of images for more than a brief cycle of continuous movement and it was fairly jittery movement at that. The great breakthrough came in 1889 with George Eastman's commercial development of long thin lengths of clear flexible celluloid "film" for use in his Kodak Box Cameras. "We have created", he said, "a photographic film..." the first time the word film was used in relation to Photography.

In the hands of Laurie Dickson, Edison's Chief Assistant, the first rolls of 35mm film would at last produce successful Moving Pictures. The key – 800 images on every 50 ft. roll of flexible celluloid film. The next challenge was how to process these long lengths of film.

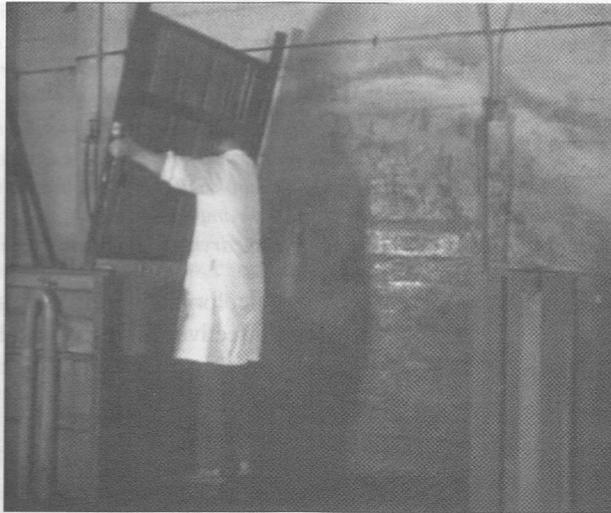
Reeling each roll off into a large bucket of developer and sloshing it about just didn't work, there was too much emulsion damage and blotchy uneven development. Some sort of large wooden frame was required to hold the long length of film while protecting the emulsion and providing even access for the developer, fixer and wash. Perhaps a shallow dish or tank could be used with, say, a thin wooden frame. Several different systems evolved with some of Australia's first films (e.g. the Melbourne Cup of 1896) being processed on a "squirrel cage" drum mounted over a shallow trough of developer. However, by the turn of the century (1900) the vertical rack and tank system had become the most popular.

A simple frame (a rack) was made of hardwood with two vertical studs connected top and bottom by two lengths of horizontal dowelling. An axle hole half way up the vertical studs allowed the frame to be rotated on a stand for loading and unloading the film. A frame 5 ft. wide and 4 ft. high will hold 200 ft. of film. Rounded metal nails spaced just under 1½" apart along the top and bottom of the dowels prevented the film overlapping and also helped to position the film when loading in the darkroom.

Most of the rack and tank equipment used in Australia was, I believe, "home made".

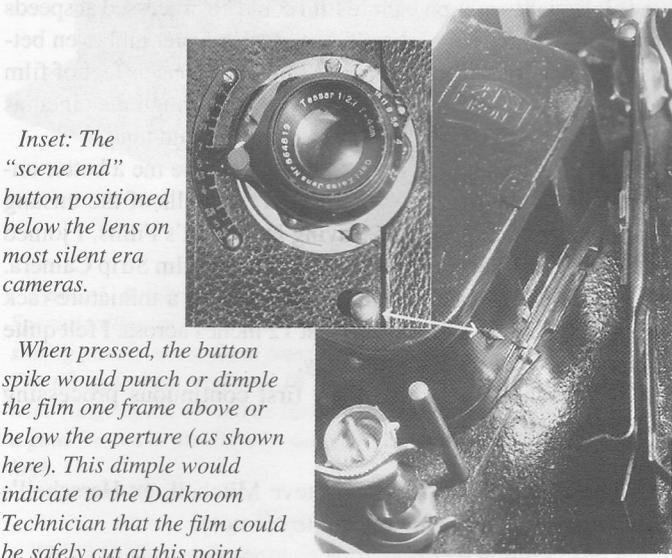
The exposed film was attached, emulsion out, to the left hand end of the top dowel, then as the rack was rotated the film was laid in a narrow zig zag pattern across both sides of the rack. For convenient one man operation in the darkroom, the rack size was limited to 200 ft. capacity, creating a problem that would haunt the industry for the next 30 years.

The first motion picture cameras used 50 ft. rolls of film giving less than one minute of filming time per roll. But by the early 1900's the new cameras could hold 200 ft. and even 400 ft. of film. As the developing racks only held 200 ft. the



*This still enlarged from the 1929 Documentary "Telling the World" shows Bertie Barker lifting the rack of processed neg. out of the final wash prior to drying on the big drum. I worked with Bertie some 20 years later - a very colourful character who was for many years Projectionist for the Commonwealth Chief Film Censor. Bertie kept us entertained with vivid descriptions of the banned scenes he cut from many films of the era: just kindergarten stuff by today's standards - or lack of them.*

*Photo by courtesy of ScreenSound Australia*



*Inset: The "scene end" button positioned below the lens on most silent era cameras.*

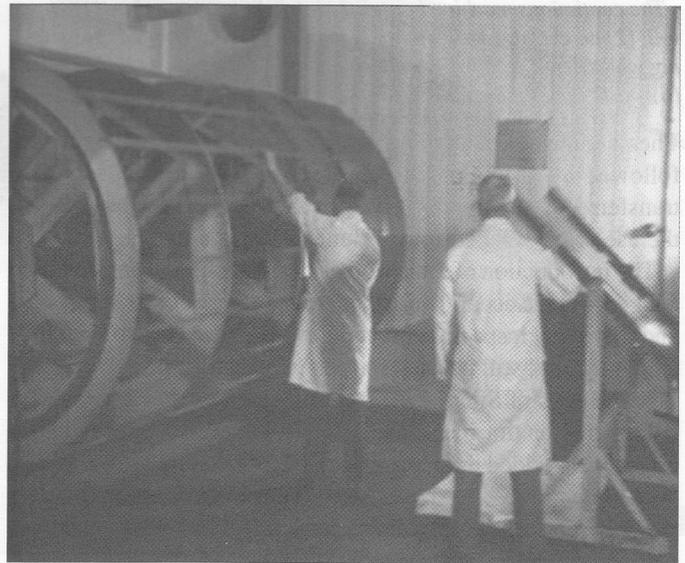
*When pressed, the button spike would punch or dimple the film one frame above or below the aperture (as shown here). This dimple would indicate to the Darkroom Technician that the film could be safely cut at this point.*

larger rolls had to be cut, and a cut through the middle of a shot would lose several frames and was definitely not on. So cameras were fitted with a notch button to punch a dimple or a small raised hole in the film at the end of each shot - assuming of course the cameraman remembered to hit the button. Then, in the darkroom the lab. technician would feel for the nearest notch around 200 ft. and cut the film between the shots. No notch - then you just took your chances - snip! and, when the shot was rejoined, you most likely ended up with a nasty jump cut in the middle of a beautiful pan.

The long narrow developing tanks were usually made of hardwood planks (Herschell's tanks were made of New Zealand Kauri) tightly screwed together and sealed with pitch. Three tanks (and sometimes four) were used in the usual sequence - neg. or pos. developer; first wash; fix; and final wash. The developer was sometimes pumped through a storage tank to increase its capacity and provide additional agitation in the film tank. The final wash was always with running water.

The loaded rack was placed in the developer and gently agitated up and down for short periods. About half way through the developing process the rack would be lifted out, inverted and returned to the brew, to ensure even development top to bottom. Strict time and temperature control was not used. As the early film emulsions were not sensitive to red light, the film could be examined under a

safe light and the skilled lab. technician could visually check the strength of the developing image. Usually, when the image could be clearly seen through the back of the film it was fully developed.



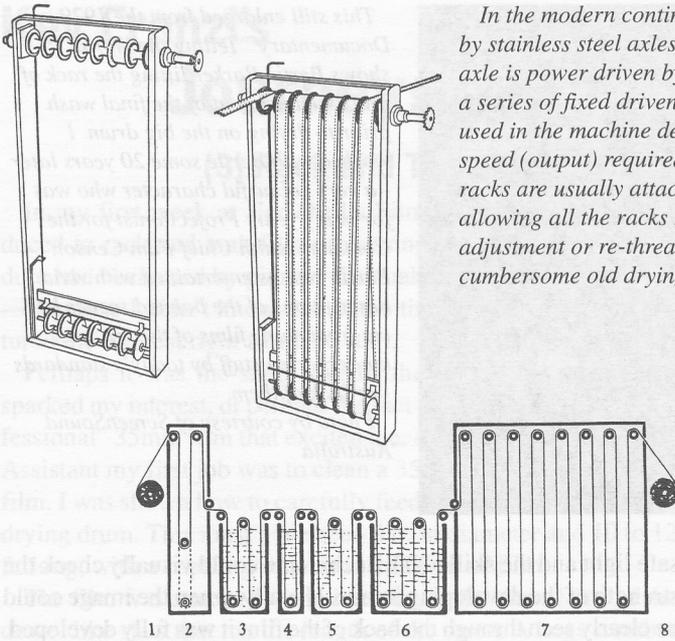
*Bertie and a workmate loading up the big drying drum at the Government's Cinema Branch in Melbourne (from "Telling the World" 1929). The big drum and the procedure shown were identical to those still used at Herschells Films in the late 1940's. Herschells also had a smaller 6 ft. diameter drum for drying single reels.*

*Photo by courtesy of ScreenSound Australia*



*Following the removal of the rack and tank system at Herschell's in 1952 members of the Lab. staff (l. to r. Stan Harder, Steve Mitchell and Doug Payne) relax in front of the 6 ft. drum end and a developing tank.*

*Photo by courtesy of Steve Mitchell*



The continuous machine in profile with (1) the undeveloped feed roll, (2) an elevator loop allows continuous (uninterrupted) processing while a new feed roll is spliced on, (3) developer, (4) rinse, (5) fix, (6) wash, (7) drying cabinet, (8) processed film take-up.

Then a quick wash and into the fixer with occasional agitation, followed by 15 minutes in the final wash. The film was then transferred to the big drying drum as described earlier, without the use of methylated spirits – unless it was a rush job.

The introduction of Panchromatic emulsions and anti-halation backings made accurate time and temperature controls essential and the visual inspection procedure was phased out for negative film but could still be used for positive print film.

In the days of Silent Cinema, rack and tank was also used to colour dye or tint black and white release print scenes or sequences for added dramatic effect. Night shots and snow scenes were tinted blue, fire scenes were orange or red. Jungle scenes were green and lamplit interiors amber. In the days before

In the modern continuous processing machine the rack's fixed horizontal dowels are replaced by stainless steel axles supporting a bank of free running flanged rollers on both shafts. The top axle is power driven by a bevel gear or chain drive. This in turn drives a single fixed sprocket or a series of fixed driven rollers to propel the film through the rack. The number of racks and tanks used in the machine depends on the process (e.g. neg., pos., reversal, or colour) and on the speed (output) required. The more racks and tanks the greater the output in a given time. The racks are usually attached to a counterbalanced frame assembly on the top of the machine, allowing all the racks to be raised completely clear of the processing solutions for cleaning, adjustment or re-threading. A large drying cabinet on the end of the machine replaces the cumbersome old drying drum

Technicolor, tinting and toning became quite an art and could be very effective. Toning could also be used with the special tinted base stock supplied by Eastman Kodak and other film manufacturers.

The introduction of Optical Sound in 1928 finally blew rack and tank processing out of the water (except for some small labs. in Australia, including Herschell's). Cameras used in sound film production now had 1,000 ft. magazines and the overall footage used in film production increased dramatically. Continuous processing machines could run 24 hours a day. Fitted with accurate temperature and replenishment controls vast quantities of very high quality motion picture film could be processed at speeds undreamt of a decade earlier. The quest for faster and even better machines continued to grow as multi millions of feet of film in both colour and black and white flowed through the cinemas of the world. A far cry from the days of rack and tank.

My brief association with rack and tank gave me a better understanding of that pioneering era and the skills of the unsung darkroom technicians. After leaving Herschell's Films, I joined the Society for Visual Education operating a Film Strip Camera. We processed the custom made film strips in a miniature rack and tank outfit using little racks just 12 inches across. I felt quite at home – it really was child's play.

P.S. Herschell's installed their first continuous processing machine in 1952.

To be continued.

Acknowledgment: Thanks to Steve Mitchell, ex-Herschell's Lab. Supervisor for being my aid to memory.

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new in Pentax box, with unused soft case. This lens is also made in Japan. So if any of you landscape photographers are looking for this type of lens, this is your chance. This particular 20-35 zoom AL retails around \$1500. My price is \$595 + post / ins. Ph: 08 9246 0478

**SELL:** Pentax-A 15mm f3.5. Like new in box, with case. This Pentax-A 15mm f3.5, ultra wide angle lenses, would have to be one of the most sought after lenses that Pentax have made. This lens has seen virtually very little use. It comes in its own case, in its own box, just like new, and because it looks like new, does not require a description report. You can still get these remarkable lenses from Pentax but only at special orders. C.R. Kennedys tell me that to purchase a new Pentax-A 15mm f3.5 lens, will set you back \$3500 retail so I am selling virtually the same lens for \$1500. This is really a purist, or connoisseurs lens, sharp corner to corner, and no barrel distortion like you get with most wide angle zooms. Ph: 08 9246 0478, or Email: tedward@perthinternet.com

**SELL:** Hasselblad A-12 120 complete roll film back. Is in excellent condition, with new dark slide, the back and insert have matching numbers 887. Works very well, no bad markings, torn leatherette, no dents. \$255 + post. Ph: 08 9246 0478, or Email: tedward@perthinternet.com

**SELL:** Pentax 67 Gear. I have just bought a Pentax 67 II outfit in order to acquire the camera body. (The camera has only shot 2 rolls of film.) Consequently I have a virtually unused Pentax 67 SMC 105mm f2.4 lens, in its original box for \$550 (New price approx \$995). I also have a Pentax SMC 160mm f2.8 lens that looks like it has never been used, also in original packaging for \$895. (New price approx \$1720). Other Pentax 67 gear includes Pentax

67 MLU camera body with pentaprism finder, \$850; Pentax SMC 75mm lens, beautiful condition, \$675; Pentax 67 auto bellows. Ex condition, \$875; Pentax 67 slide copier. Ex condition, \$395. Ph: 08 8272 5656

**SELL:** Durst Large Format Enlargers. Durst 138s enlarger. Recent model with roller bearing negative carrier, CLS 1000 Colourhead and EST 1000N stabilised power supply. 1000w power for bright focussing and large blow-ups. Shutter in light path ensures repeatable results. Glass and glassless inserts for all formats up to 6x7. Mixing box sets for 5x7, 4x5, and roll film. Also covers 6x17 panoramic format. Lenses available. Beautiful condition, had light use only, \$4250. Ph: 08 8272 5656

**SELL:** Durst 164 enlarger for all formats up to 10x8. CLS 2000 colourhead and EST 2000N stabilised power supply. Choice of 1000w or 2000w power for bright focussing and large blow-ups. Shutter in light path ensures repeatable results. Glass inserts in negative carrier with AR upper glass. Mixing box sets for 10x10, 4x5, and roll film. Twin column wind up baseboard. Lenses available. Good condition, has not been heavily used, \$4750. These enlargers are described by the US company specialising in large format enlargers World Images inc. as being the world's best, and having the most even illumination. Review these enlargers on www.durst-pro-usa.com These enlargers are designed for long term continual useage, and would be a lifetime investment. Ph: 08 8272 5656

**SELL:** Enlarging Lenses. Rodenstock Apo – Rodagon 50mm f2.8. Top of the range lens. Current design with preset aperture ring, multi-coated, mint condition, in jewel case, \$395; Schneider Componon S, 60mm f4 lens. Current design with preset aperture lever, beautiful condition, \$245; Schneider Componon S, 100mm f5.6 lens. Current

design with preset aperture lever. Covers 6x7 & 6x9, \$275; Rodenstock Rodagon, 105mm f5.6 lens. Current design with preset aperture ring, multi-coated, superb performance, pristine condition. Covers 6x7 & 6x9. As used by renowned US colour printer Clein, \$275; Rodenstock Rodagon 135mm f5.6 (covers 4x5"). Click stops can be disengaged for colour work if needed, \$245; Rodenstock Rodagon 210mm f5.6, lovely condition, covers 5x7", 4x5" and 6x17 panorama, \$450; Rodenstock Rodagon 210mm f5.6. Slight decentering in front element (only 1 or 2mm around outer edge and stable, will not affect performance, especially when stopped down even by 1 stop), \$220; Rodenstock Rodagon 150mm f5.6. Current design, superb performance, pristine condition, \$375. Ph: 08 8272 5656

**SELL:** Nikon F2 Photomic body (DP-1 finder), 1976, chrome, original neck strap and hard eveready case (CH-1), original owner's manual and sales brochure, working perfectly, all light seals in top condition, all leatherette perfect, no dents, very "clean" excellent plus overall, \$700 plus post or COD. Ph: 08 8344 3542 evenings.

**SELL:** Tamron SP 2X teleconverter, optimized optical design for Tamron telephoto lenses and zooms, original case and neckstrap, lens caps, near new condition, mint glass and body, \$125. Plus post or COD. Ph: 08 8344 3542 evenings.

**SELL:** Nikon HK-8 metal lens hood for Series E 36-72mm zoom (and other Nikon lenses?), convenient locking slip on / off type, excellent condition, \$25; Paterson Super System 4 daylight film developing tank, universal 35mm and 120/220 with one reel, unused, \$25; Jobo darkroom film hangers, unused, \$5 each; Hama "vacuum cleaner" kit, converts can of compressed gas duster into a small vacuum cleaner, unused, \$10; Filter 58mm UV, case,

new condition, \$15; Photocopies of instruction manuals for Nikon cameras: F2 non-metering, F2 Photomic, F2 S, F2 AS (early F2 edition with factual errors and later corrected edition). Photocopies of instruction manuals for Nikon Nikkor lenses: 50mm f1.4 AIS, 50mm f1.8 AID, 300mm f4.5 ED AI, teleconverters TC 200/300. Photocopies of instruction manuals for Nikon MD-2 motordrive (early 24 page edition), Nikon DR-3 right-angle viewing attachment, Nikon BR-2 macro adapter ring, Rollei P355 slide projectors, Tamron 300mm f5.6 SP lens. Photocopies \$6-\$15 including postage in Aust. Other items plus postage. Ph: 08 8344 3542 evenings.

**WANTED:** Nikon DP-12 metering finder (from Nikon F2 AS camera – small white "AS" on front of finder) fully working user condition (can look rough, but must work perfectly); Nikon focusing screens to fit F or F2 cameras: type G1 (at least useable condition) and standard type K (must be as new condition, viewed through camera without lens); Nikon HN-1 lens hood for Nikkor 28mm f2 AI lens; Hoya 67mm UV HMC or UV HMC Super filter; Hoya 72mm UV HMC or UV HMC Super filter; Nikon 72mm L37c filter; Original instruction manual for Nikon MD-2 motor drive, 32 page edition, mint or near mint condition (not photocopy); Pair of leaf springs to fit underside of any Nikon F2 finder; Original case for Tamron 300mm f5.6 SP lens (lens model number 54B); Issues of "Camera User", "Camera", "Camera & Creative Photography" and "Creative Photography" magazines from England, late 1970's to late 1980's. Ph: 08 8344 3542 evenings.

**WANTED:** Nikon MB-1 cordless battery pack, version with LED battery check, with or without AA battery holders, mint or near mint

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