Search for Permanent Motion Pictures: Metal Film

HISTORICAL NOTE

By PETER MUGFORD

From the year 1910 to the year 1938, there was under development a photographic process known as the Kalograph or Carter process — after Dr. Robert W. Carter, originally a Toronto photoengraver. It involved making permanent and sharp photographic images on metal, with results claimed to be of a beauty superior even to the daguerreotype. All of this would be simply a curiosity, an anachronistic tour de force except that Carter was not interested in merely improving on the daguerreotype prints of 100 years earlier: he came to envision his process as a new and better way to make sound motion pictures.

In a serialized article in *American Cinematographer* (July, August and September of 1938), Carter described how his work began in 1910. With an organization that became known by 1920 as the Permanent Record Corp. (later evidently called the Taylor-Sloan Corp. of New York), he began searching for the ideal metal substrate on which to preserve truly permanent photographic images. In 1914, they succeeded in creating a chemically inert oxide surface on a sheet of aluminum-copper alloy. It was smooth, white, homogeneous, changeless on exposure to light and air, and compatible with silver emulsions and other light-sensitive mediums later developed. By 1917, they found that photographic images could be developed on this permanent white surface, using the sensitive salts of silver and platinum; excellent results were obtained by certain combinations of ammonium bichromate mordants and certain dyes.

By 1924, the Permanent Record Corp. sought impartial testing of their results: photographs on metal were given to the physics departments of leading universities to see if scientific ingenuity could fade them or discolor them. The conclusion reached was that the prints were indeed permanent. The images were actually baked into the oxide surface much as the "japanning" process bakes paint and varnish into a hard glossy surface.

In 1929, it seemed that the star of this new process after 20 years was finally rising. The Vatican Library inquired about reproducing ancient manuscripts and codices on metal sheets, and the works of Victor Hugo actually were preserved in this way. The process was thought to be ready for commercial development, so it was sold to British interests (Messrs. Permanent Reproductions, Ltd., Laurel Court, Windmill Road, W.5, Ealing, England), with Dr. Carter personally superintending. This part of the story is described by one Dr. Brown, editor of the *British Journal of Photography*, in the issue of April 12, 1929, based on his visit to the Ealing factory.

At the time the *British Journal of Photography* article was published, a British company had been formed, known as Permanent Reproductions, Ltd., and was operating in a factory located in Ealing, England. The process was called Kalograph and the editor of *British Journal of Photography* had visited the factory and wrote the short article about the process. No mention is made in this article of metal motion-picture film but Carter, in his second article in *American Cinematographer* describes a metal film "as thin as .004 of an inch." He states that new chemical and mechanical tests made in 1932 resulted in a metal film that would give an image "suited to motion pictures." He further states that ". . . we ran the metal film constantly 700 times through the sprockets, and, on critical examination, we found the film unaffected by the heat and the mechanical strain." The film was projected by light reflected from the surface images.

Finally, it was decided in 1929 that the process lent itself very well to making sound motion pictures on metal film as thin as 0.004 in (0.1 mm). Just consider the demonstrated advantages: images could be taken and projected using both sides of the film since light was reflected from the film rather than transmitted through it; black-and-white and color images would be brighter on a screen because the metal film reflected substantially more light than ordinary film transmitted; there would be no fire hazard as with nitrate film and no sound distortion due to shrinking as with nitrate and tri-acetate; splicing would be as easy as with ordinary film; developing time would be very rapid though grain would be almost invisible; and finally Carter's film could withstand the heat, light and flexing due to projection better than ordinary film.

And now we come to the great mystery: why have we heard no more of the Carter or Kalograph process after September of 1938? Did World War II perhaps interfere with its commercial development in England? Was perhaps the capital investment in conventional motion picture equipment too great to permit a new process—however interesting and attractive—to compete successfully? Why did the researchers, developers and promoters go so far and then give up?

Edit. Note: We want to thank several SMPTE members and other interested persons in the industry for calling this curious matter to our attention and supplying us with as many pieces of of puzzle as they have. These people include Mr. Peter Mugford of Toronto, Ont., Canada; Mr. Glenn E. Matthews of Rochester, N. Y.; and Dr. Walter Clark who was formerly with Kodak, Ltd., Harrow, England, and the Kodak Research Laboratories, Rochester, N. Y.

If any of our readers can provide additional information or answers to the long-standing questions concerning Carter's metal film process, we will be happy to collate them and present them in a future Historical Note.

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