with extremely low distortion could well be used for sound film reproduction.

Probably the most serious obstacle to the production of high-quality sound by a portable system is the difficulty of obtaining a loudspeaker of wide frequency range without excessive size and weight. This limitation may always exist for a completely portable system. It is a limitation primarily at the low-frequency end of the response. Nothing prevents our reproducing a wider range of high frequencies than we are doing at present, and these contribute greatly to naturalness and intelligibility of speech. Perhaps it is fair to say that the low-frequency limitation is not too serious, since we are primarily interested in *talking* motion pictures.

Conclusion

You will have noticed that my discussion has been predicated upon an entirely new design for a projector. I believe that this is necessary if we are to obtain the full quality of performance of which 16mm films are capable. I am convinced that such a projector, once in existence, would be of great value to the Armed Services and to all who are interested in the many educational applications of the motion picture. I have presented these thoughts in the hope that they may help someone at some time in the not too distant future to create a machine capable of this higher standard of performance.

Letter to the Editor

From a Pioneer — About the History of Sound Motion Pictures

[Editor's Note: Samuel Wein holds more than 100 patents for inventions in electronics, plastics, photography and chemistry. As he relates in his letter, he was a pioneer in television and sound-on-film. He experimented with selenium light-sensitive cells as early as 1914. Early in his career he did research work for Thomas A. Edison, and worked with other well known scientists, such as Charles P. Steinmetz, Elias E. Ries, and Allen B. Du Mont (of the Jenkins Television Corp.). He has published widely. Two of his books are *Metallizing Non-Conductors* and *Metallic Coatings on Non-Metallic Materials*. Besides the two early articles cited below, there is also an article about Mr. Wein's early work by John B. Brennan, Jr., "Light Sensitive Cells Make Talking Pictures Possible," in *Radio News*, 11: 723.]

Mr. Edward W. Kellogg (whose "History of Sound Motion Pictures" appeared in the June, July and August 1955 *Journals*) has suggested that I write you about my early efforts in recording sound photographically and reproducing it by means of light-sensitive cells. Two papers of mine, "Talking Motion Pictures and Selenium" and the "Gripenberg Selenium Cell," appeared in the *Electrical Experimenter*, June 1915. The first paper was the very first disclosure showing the use of a light-sensitive cell with an amplifier circuit. In this case I made use of a variable-density soundtrack. The disclosure showed the use of the manometric capsule as the variable light source, although in 1915 I patented the use of a gas-filled tube (neon, helium, etc.), the patent was "abandoned" for lack of interest by the industry at that time. The variations in light were amplified by a resistance-coupled or alternatively by a transformer-coupled amplifier.

The results were crude, but this was the germ of an idea that has steadily grown to its present development. The light-sensitive cell that I used at that time was the now extinct selenium cell. The expression "frequency response" (speed) of the cell to light was unknown at that time (1915). In 1916 I used the vacuum and the gas-filled potassium hydride photo-cell and thereafter I used the (1930) Becquerel type of light-sensitive cell (liquid-type).

You may also be interested to learn that my inventions were cited in certain early patent litigations (Tri-Ergon). I was not one of the litigants, but served as an expert. I demonstrated sound on film as early as 1913–1914 without pictures, using the Ruhmer film actually made as early as 1905. The Simon arc was the source of modulated light.

I think the above may be of interest to you.

June 9, 1956

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Erratum

Michael Rettinger, "Replaceable pole tip caps for CinemaScope magnetic reproduce heads," *Jour. SMPTE, 65:* 652–655, Dec. 1956

The engravings for Figs. 2A, 2B and 2C were interchanged. The drawing for Fig. 2A is in the Fig. 2B position; that for Fig. 2B is over the Fig. 2C wording; and the illustration for Fig. 2C is in Fig. 2A position.