

# Film History

## The History of Sound-on-Film

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## HISTORICAL DEVELOPMENT OF SOUND FILMS\*

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Hollywood.]

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### Introduction

**In this introduction I should like to set down the purpose of this paper, to say something about the way in which I propose to treat the subject matter contained therein, and perhaps even to make a few personal**

remarks.

**First, the purpose. There have been various documents published relating to the history of sound recording on film, but they have not been complete, nor have they, in most instances, attempted to rate the relative value of the contribution made by the various inventors. Since I am somewhat in the same position as the famous chemist Berthelot, who was declared to have been the last one who would know the whole of chemistry, I propose to undertake to arrange the technical contributions leading up to the commercialization of sound motion pictures in chronological order, and to attempt this evaluation.**

**Perhaps I may be forgiven for this apparently egotistical point of view, because I was fortunate to have participated in bringing about the commercial development of sound motion pictures; and for at least a short period of time I was probably the only individual who had heard practically every sound record and knew intimately those engaged in making them. Late in 1926 I was, like Berthelot, overcome by a feeling of helpless futility; it was then that the art began such rapid expansion that I could no longer keep up with the tremendously increased number of sound records.**

**In dealing with this development, I shall more particularly restrict my remarks to the photographic methods of sound recording and shall list in considerable detail the steps taken in the development of the Fox-Case system. The section of this paper which deals with the work of Theodore W. Case contains abstracts from correspondence which he kindly made available to me, and from the notes of the Case Research Laboratory, which he organized shortly after I joined him in 1916; I therefore know, of my own knowledge, that these notes were kept with a high degree of accuracy and detail, and are correct. I have quoted directly from these records in some instances, since they are available to the future historian—the original Case Laboratories having been made a museum in the city of Auburn, New York (now known as the Cayuga Museum of History and Art).**

**The remaining parts of the paper, dealing with the work of others, may have been treated in somewhat less detail: first, because much has already been written regarding their work and it seems unnecessary to repeat it here (except to the extent required for a clear chronological development of the subject), and, second, because I was more directly and intimately concerned with the work of Mr. Case.**

**To the uninitiated, this account may prove dry reading at best; it is intended to do no more than appeal to those having a substantial interest in, and present knowledge of, the art. If it enables those now devoting their time and energy to the perfection of sound pictures to see something of the stages by which we arrived at our present state, it will have served its purpose.**

## **PART 1. EARLY STEPS IN THE HISTORY OF SOUND RECORDING**

1857: Leon Scott patented in France what seems to be the first method of recording sound.<sup>1</sup> This disclosure shows the use of a stylus connected to a membrane through a series of levers and a method of tracing figures

corresponding to speech, song, etc. on paper covered with lampblack. The paper was attached to a cylindrical drum, which could be rotated by hand and moved forward by a screw. He called the instrument the "phonautograph".

1862: Another example of early interest concerning the nature of sound is found in the work of one Doctor Jan N. Czermak of Vienna, who succeeded in photographing the vocal chords in action.<sup>2</sup>

1877: Thomas Edison brought out his epoch-making invention, the first phonograph. It was similar in principle to the phonautograph but differed in that he used tinfoil on the cylinder and had his stylus attached directly to the vibrating diaphragm. In his later models, wax was used as the recording medium.

1878: Professor E. W. Blake, of Brown University, published a paper on "A Method of Recording Articulate Sounds by Means of Photography".<sup>3</sup> This describes a mirror actuated by a microphone and the moving of a beam of light over a photographic plate.

1880: A. G. Bell patented the method of using selenium for detecting sound signals sent over a modulated light beam.<sup>4</sup> The experiments in light telephony leading up to this patent were carried on in 1879.

1880: Charles E. Fritts filed a patent application in the United States entitled "Recording and Reproduction of Pulsations or Variations in Sounds and other Phenomena".<sup>5</sup> This application is remarkable in its completeness, broad scope, and length of time in the patent office. As finally granted, on Oct. 31, 1916, it covered 26 pages and had 96 claims. It is doubtful if Fritts did anything practical; he confined himself to putting down a large number of ideas and variations on paper. Claim 84 of his patent reads "The method of making a sound record which consists in photographically affecting a sensitive surface in accordance with sound waves".

1886: A. G. Bell, C. A. Bell, and S. Tainter patented both a variable-area and variable-density method of recording a sound-modulated light beam through a small slit upon a photographic film.<sup>6</sup> Both a physical slit and an optical slit are disclosed.

This seems to me to be an important patent that has heretofore been overlooked. It clearly anticipates Ries, as may be seen from the following quotations: "According to the record part of the invention a variable beam of light is caused to pass through a fine slit or other opening, and an image of the slit enlarged, diminished, or of the same size is then projected, by means of one or more lenses or other suitable devices upon a sensitized tablet which is moved progressively in front of the slit"; and "Sometimes it is desirable to use a second slit close to the recording tablet".

1887: The work of Hedick, a Dutch inventor, using flames that could be varied by sound waves, should be noted.<sup>7</sup>

1887: C. J. Hohenstein patented a more sensitive method of recording a sound modulated light beam "by reflecting light from a small pivoted mirror several times, focusing beam of last reflector, which is parabolic, upon a photographic film".<sup>8</sup> This is quite similar to the optics of the recording system later developed by General Electric.

1892: Demeny's "Chronophotophone" combined a disk phonograph and a magic lantern arranged with slides.<sup>9</sup>

1894: Edison brought out the "Kinetoscope."<sup>10</sup> This was a peep-show device using ear tubes to catch the sound, and rather crudely brought about synchronization of sound and picture.

1900: J. Poliakoff filed a patent application on the focusing of a light beam

upon a photoelectric cell, through a positive photographic sound record moving uniformly across the beam, the photoelectric cell being connected to a telephone circuit.<sup>11</sup> This disclosure is interesting in that it mentions the first use of a positive record and also a photoelectric cell for reproducing.

1901: Ernst Ruhmer began publication of his work on sound recording.<sup>12</sup> Since he was a professor, his interest was more academic than commercial. He devised the "photo-graphophon", an instrument something like the sound camera of today. With this he recorded and reproduced speech using arc lights and Gehrke tubes as light sources, and selenium cells in reproducing. His film speed was rather high, being of the order of three meters per second. Ruhmer's original "photographophon" and some sound records were brought to this country by the Fox Film Corporation. The apparatus was practical and the records show clear definition of the recorded sounds (Fig. 1). Although Ruhmer never commercialized his work, he says in one article: "For practical uses the application of the photographophon in combination with the kineomatograph whereby on one and the same film both motion and speech may be recorded should be kept in mind." Also in another article, "As far as simplicity is concerned the glow light tube surpasses all other previous means for the perception of alternating current curves."

1902: An inventor named Hulsmeyer obtained a patent on producing photographic sound records.<sup>13</sup> This describes "an oscillating mirror which is varied by sound-electric impulses and which re-reflects a beam through a plate on a photographic strip, through a slit, said plate having a transmission varying in the direction of motion of the reflected beam in proportion to the sine of the angle' "

1902: On November 8 a patent application was filed by William Duddell covering a method of variable area recording and reproducing, under the title of "An Improved Phonograph". The patent shows a comprehensive knowledge of the subject and mentions making photographic copies.

1903: Wilhelm Asam filed a patent to produce records for phono-graphs using a reflecting diaphragm to modulate a light beam.<sup>14</sup>

1904: F. W. LeTall patented a method for modulating electrically a vapor discharge.<sup>16</sup>

1904: A patent was granted to V. Poulsen (filed in 1901) on a method of magnetizing a moving paramagnetic wire or tape by means of sound waves.<sup>16</sup> It also showed means of demagnetizing or obliterating the magnetic variations along the wire.

1906: Eugene A. Lauste, formerly an Edison employee, with Robert R. Haines and John S. Pletts filed a patent application on "method and means for simultaneously recording and reproducing movements and sounds".<sup>17</sup> Although Lauste has been credited by some writers as having the master patent on talking pictures, one is impressed upon examining his patent that he really does not express himself too clearly regarding his technique.

1907: J. F. Dirzuweit patented a photographic method of recording and reproducing sound. He also shows the use of a gas discharge tube for recording. The claims of this patent are rather broad, for instance, "Claim 8-A sound recording apparatus comprising a photosensitive surface and a source of actinic rays movable relative one to the other, and means for exciting said source of actinic rays by and in accordance with sound waves".

1907: Carl Laemmle, of Universal Pictures Corporation, tried to commercialize the "Synchronoscope", a system using a phonograph.<sup>18</sup> He

achieved some success, but it was found that the regular records used were too short.

1907: Dr. Lee de Forest filed his patent application on the "Audion" covering the addition of a third electrode or grid to the Fleming valve.<sup>19</sup> This became a basic patent of great importance, as it showed the way to make amplification of electrical impulses possible.

1908: A. Manuelli, a resident of Italy, obtained a French patent having "as its object a bicinematographic photophonic machine for public and private displays adapted to insure fixedness of projection, stereoscopic effect, photographic reproduction of sound, etc." He describes a complicated machine using three films.<sup>20</sup>

1908: About this time Edison again brought out another version of his talking picture device, this time called the "Camera-phone". The picture was photographed to synchronize with a phonograph record. As no close-ups were then employed, exact synchronism was not an important factor. It was accepted for a short time only, as a novelty.

1908: J. F. Child patented the making of a photographic record of a manometric gas flame and the use of selenium in reproducing the record.<sup>21</sup>

1910: R. O. P. Berglund, of Sweden, patented recording sound using a mirror attached to a microphone diaphragm, thus modulating a light beam and recording the variations on a sensitive disk or film.<sup>22</sup>

1911: C. G. Timm obtained a Swedish patent similar to that of Berglund.<sup>23</sup>

1911: F. D. Pudumjee, of India, described a method of using a mirror attached to a vibrating diaphragm to produce a photophono-graph.<sup>24</sup>

1912: I. H. MacCarty, a resident of the United States, obtained a French patent covering "simultaneous recording by means of photography upon one and the same films of animated views and articulate or other sounds with a view to insure synchronous reproduction of such views and sounds".<sup>26</sup> (His drawing of a combined sound and picture film showed a much keener appreciation of the problem than was shown by Lauste.)

1913: Edison brought out the "Kinetophone".<sup>26</sup> This apparatus tried to create synchronism of picture and sound by using a belt connection between a phonograph on the stage and a projector in the picture booth. It had a run of about sixteen weeks in the B. F. Keith theater in New York, but attained no great commercial success.

1913: A patent application for recording sound filed by E. E. Ries was granted in 1923.<sup>27</sup>

The following claim from the recording patent gives an idea of its scope: Claim 14-"The method of producing motion pictures and photographic sound records concurrently upon the same photographic film, which consists in moving a photographic film through a camera at a speed adapted to produce a given number of pictures per second, simultaneously moving said film at the same rate per second across the back of a screen having a narrow aperture which exposes the sensitized surface to light in a continuous line or band parallel to the line of pictures and of uniform width throughout its length, limiting the area of exposure to the area of the aperture, and varying the degree of exposure of said line or band in accordance with sound waves impressed upon a sound translating device, whereby said sensitive surface when developed will present adjacent to the pictures a continuous line or band of uniform width and having alternating sections of varying degrees of density of translucency representing continuous waves corresponding to the sound waves impressed upon the sound translating device."

A similar patent covering reproducing was also filed in 1913 and granted

in 1926.<sup>28</sup>

In view of the decision in the de Forest-Stanley case, where the Ries reproducing patent was held infringed, it is interesting to note that Ries came to Auburn to see Case in 1923 and offered to sell his patents for one thousand dollars. Also, that opinions by Thompson and Gifford (Mr. Case's patent attorneys) in 1925 were to the effect that it was very doubtful that these patents would be upheld in Court. Ries later sold these patents and several other applications to the de Forest company.

1914: H. G. Stocks filed a patent application covering the process of recording sound photographically by modulating a mercury lamp for the purpose of making an optical phonograph.<sup>29</sup>

1915: H. C. Bullis filed a patent application that was granted in 1920, describing a double system method of recording sound and picture on separate films, running synchronously through a single machine, and the use of marking lights to enable matching of sound and picture after the films were processed.<sup>30</sup>

1916: T. H. Nakken obtained a patent on a means for converting sound waves into light variations; also a patent on means for transforming light impulses into electric current impulses.<sup>31</sup>

The various Nakken patents were purchased by the Warners, after having been offered for sale for some time by the inventor.

1918: A. C. Rutzen received a patent to engrave a sound track on a moving picture film adjacent to the picture. J. Balance received a similar patent in 1906. Again in 1926, E. H. Foley proposed the use of a separate film for an engraved sound record. None of these methods has been practical. F. L. Madelar cut his record on the back of the film in the nitrocellulose base with a diamond stylus. Later, similar patents were granted to A. L. Curtis and J. Kaiser.<sup>32</sup>

1918 on: During the summer of this year, experimental work was begun by the German Tri-Ergon group consisting of Josef Engi, Joseph Massole, and Hans Vogt.<sup>33</sup> They worked out a system of making sound, motion pictures using a glow discharge lamp in photographing the sound. The sound was recorded on special film having standard-sized pictures and a space outside of the sprocket holes for the sound band. At the time this system was brought to this country by Fox (1926) it had many novel features but the results were quite inferior to those obtained by Fox-Case methods.

Tri-Ergon obtained about eighteen patents on their system between April 1919 and July 1923. Some of these patents-such as the printing patent, the flywheel patent, and the photoelectric cell patent- were so basic that they later were the cause of extensive litigation and nearly became controlling factors in sound recording and reproduction. The Supreme Court reviewed the flywheel patent and held it Invalid (Mar. 4,1935).

1918 on: J. Tykociner, at the University of Illinois, worked out a system for producing talking pictures.<sup>34</sup> This work was quite academic and no attempt was made to commercialize it. Variable-density recording was used. Sound and picture were combined on the same film, the sound track being placed inside the sprocket holes and adjacent to the pictures. The system was called "Phonactinion". The sound was recorded by modulating luminous gas discharge devices. Tykociner's paper contains a rather extensive discussion on recording sound. He made several demonstrations before scientific societies. Later he suggested a novel means of recording that was considered quite seriously by Case at one time. This consisted of forming a glow discharge between two closely spaced semiconductors in air. The separation of the electrodes acted somewhat like a slit, in that it

limited the area of exposure on a photographic film placed adjacent to the glow. So far as I know, the merit of this method of recording has never been verified.

1920: D. A. Whitson filed a patent application for producing sound records by passing a beam of light through a Kerr cell, and modulating the latter magnetically, the resulting light being photographed on a moving film through a slit.<sup>35</sup>

1921: Prof. H. O. Rankine, of England, worked out a method of recording sound photographically using a constant light source and controlling the light beam from this source by means of a mechanical "light valve". He used one fixed grid and one movable unit that was controlled by the sound impinging upon a microphone diaphragm. This work was academic and in the nature of a laboratory demonstration.

1921: Grindell Matthews devised a mechanical method of recording sound photographically by producing vibrations of a beam of light from a constant light source.

1921: A demonstration by Professors Aurbenius and Montellius was described in the London Times, Sept. 24, 1921. Two films were used, one for picture and one for sound. They were run in separate machines geared together. The sound record was produced in a manner similar to that employed by Matthews.

1923: The Peterson-Poulsen system was worked out in Denmark.<sup>36</sup> It used a variable-area method of sound recording on a separate film run synchronously with camera and projector. The sound record was made using an oscillograph and a small slit. The process was exploited by Tonfilm, in Germany. The reproducer used a selenium cell.

1923: A United States patent was Issued to E. Peterson, showing a variety of arrangements of a magnetic wire imbedded in the marginal portion of a motion picture film.

## **PART 2. THE WORK OF CASE AND de FOREST-1911-1925**

The results secured by the early workers were, by limitation of existing equipment, rather crude and did little more than demonstrate the principles of sound recording and reproduction. It was Theodore W. Case who, more than anyone else at this time, began to realize that, if sound pictures were to serve as a medium for entertainment, it would be necessary to perfect the system to such an extent that the illusion created in the reproduced sound and pictures be good enough to make one forget the mechanics of the system and think only of the event portrayed. Accordingly, in putting together the Case system each step was studied and developed with the idea of incorporating the best engineering practice available at the time. The way was made easier because of the developments made during the first World War, including improved microphones, better vacuum tubes, amplifiers, loudspeakers, etc.

1911: Case began experimenting on sound recording while a student at Yale. In a letter to his mother, Jan. 22, 1911, he writes: "Most of my time now is taken up in experimenting with my Selenium Cell with the idea in mind of photographing sound waves and using the positives as records for a new kind of Phonograph or rather it would be called a Lithograph I suppose."

And on Feb. 12, 1911 he writes: "Yesterday I at last succeeded in transmitting sound by light. I used the principle of the manometric flame. The eye could not detect the variation of the light at all but it was registered perfectly in the varying of the resistance of the selenium. The reproduction of the voice was perfect. Next, I have to set up an apparatus for my delicate photographing of the light variations. It is very interesting work and gives me something to do alright."

1913: Case began experiments at Auburn, New York, and devoted himself to trying to find a practical means of converting light into electricity.

1916: E. I. Sponable, upon graduating from Cornell, joined Case and with him started the Case Research Laboratory. Case's experimental work was moved from the cellar of his home at 196 West Genessee Street to a new laboratory designed by Sponable and built at 205 West Genessee Street. A three-stage audion amplifier was purchased from the de Forest company. This was used to test a large number of crystals and minerals for the property of changing resistance when illuminated. About nineteen new substances were found and studied. It was at this time that Case first met de Forest.

1917: The "Thalofide" Cell (containing a light sensitive change-of-resistance material similar to selenium but a form of thallium oxy-sulfide particularly sensitive to infrared radiation) was discovered.<sup>37</sup> This was used as the receiving element in an infrared signal and communication system developed for and used by the Navy during the first World War. During this time the Case Research Laboratory, working in conjunction with the Naval Experimental Station at New London, Connecticut, was entirely devoted to war work and carried on extensive research in the transmission and amplification of speech and signals in connection with its infrared system.

1918 to 1922: De Forest began work on talking motion pictures. He filed patent applications on methods of recording in 1919, and during 1922 carried on experiments in Germany trying to record sound by modulating a high-frequency gas discharge tube.<sup>38</sup>

1920 to 1922: Case discovered the barium photoelectric cell and began its development.<sup>39</sup> In its final form it was used in a recorder for making permanent records of the light variations of daylight and sunlight.

1920: De Forest purchased Thalofide Cells from the Case Research Laboratory.

Oct. 1922: Case saw de Forest in New York regarding extraneous noises in Thalofide Cells that de Forest was trying to use for reproducing sound.

Oct. 1922: Case, while in London, witnessed a demonstration of Rankine's experiments in sound recording.

Nov. 1922: Upon his return from abroad, Case was invited by de Forest to visit his studio. De Forest spoke of trouble he was having in trying to record sound with high-frequency discharge tubes. He exhibited and reproduced a short piece of sound film. This was barely understandable. He apparently was about at the stage he speaks of in his SMPE article<sup>10</sup>- "I well remember the grim satisfaction I felt when, for the first time in reproducing a photographic record of my voice, I was able clearly to determine whether or not it was being run backwards!"

Nov. 1922: A crude sound camera was made at the Case Laboratory and a sound picture made of a modulated oxy-acetylene flame. This was the same manometric flame that had previously been developed for use in infrared telephony.

De Forest at this time tried recording with tungsten filament lamps with



practically no success. Case suggested to him the use of a hydrogen-filled lamp as having faster reaction. The Case Laboratory made up several hydrogen-filled flashlight lamps for de Forest, and also tried some of them for sound recording using a four-stage amplifier. The results were poor because of the large amount of unmodulated light.

Dec. 1922: De Forest's relations with Case are indicated in the following excerpt from a letter from de Forest to Case:

"As per our telephone conversation I am mailing you today six blanks, two of each capillary diameter. Kindly fill these with nitrogen and exhaust as soft as possible, i. e. to give them maximum brilliancy and minimum voltage. Paint with bronze the two balls at each end of the tube and wrap same carefully with tinfoil and glass. Then apply to these terminals alternating high voltage.

"I hope you can get these tubes to light up at 3000 or 4000 volts. You might put in a needle spark gap in shunt as approximate voltage indicator.

"I suggest that you put a drop of mercury in some of these tubes to see if this does not considerably soften the discharge, at least when the tubes get hot enough to liberate the mercury. I am also requiring you to be so good as to make up two or three ballast resistances using very fine tungsten filament and hydrogen gas. Believe that the bulb lamps are usually filled with hydrogen at atmospheric pressure, but am not informed on this point.

"I believe if I can get a proper ballast system in series with the short filament lamp I can record the voice photographically by this means. This, of course, is an ideally simple matter compared with the high-frequency light.

"I shall await receipt of these tubes and your further suggestions with great interest."

1922: Case found that the gas discharge in an argon-filled vacuum tube whose filament was coated with alkaline earth oxides could be easily modulated at a low voltage, and it seemed to Case suitable for sound recording purposes. This tube had been previously used in his infrared signal system. This observation led to the development of the Aeo light, and was a big step in making this system of sound recording practical. Previous to this discovery by Case, de Forest had been using nitrogen-filled tubes operating on a high-frequency circuit at 3000 to 4000 v and giving a very limited photographic light output. The Aeo light operated on direct current at 200 to 400 v, and gave off radiation which was highly actinic.

1922: A Powers projector was converted into a sound camera at the Case Laboratory. Also the Aeo light was improved by using helium gas instead of argon, thus increasing its actinic light. Soon it was found that these recording lights could be operated without heating their cathodes.

The following abstracts from the Case Research Laboratory records indicate the stages in the development of sound recording during the period from 1923 to 1925, inclusive:

Jan. 10, 1923: A conference was held among Case, Sponable, and Thompson (patent attorney for Case) to discuss the patentability of Helio light (later named Aeo light) .41

Jan. 11, 1923: It was found that nonoxide coated filaments in vacuum tubes were not good for sound recording and that a cathode discharge was more desirable.

Jan. 13, 1923: Case wrote to de Forest telling him that oxides. in the recording lights effected an improvement when the filaments were operated cold. Later it was found that this oxide coating was photo-active.

Jan. 26, 1923: A letter was received by Case from de Forest about the lights containing oxides. It also mentioned trying two small ball electrodes, oxide coated. This proved impractical because the area was not great enough on small ball electrodes and an arc discharge started too easily.

Feb. 10, 1923: Case suggested to de Forest that he remove the lens from the Hello light system to get rid of "blasting" he had been getting.

Feb. 14, 1923: A new sound camera designed by Sponable and built by the Precision Machine Company of New York was completed and first tested. Sound records were made with good results.

Feb. 23, 1923: Case and Sponable visited the de Forest studio in New York. De Forest's first combination of pictures with sound was seen and heard. These were made using Case Hello lights. The forming of a company was discussed and a contract permitting de Forest to make commercial use of Aeo lights and Thalofide Cells was negotiated but not signed.

Mar. 5, 1923: De Forest notified Case he had completed eight combination pictures.

Mar. 13, 1923: De Forest exhibited his sound motion pictures to newspaper men at his New York studio. At this exhibition, the sound system included a Case helium-nitrogen filled barium-oxide-coated recording lamp operating on direct current at low voltage and giving a moderately concentrated glow on the plate cathode, A Western Electric amplifier provided the driving power for the Helio light. The Case Thalofide Cell was used in the reproducing system. De Forest, in his discussions with the press, referred to the Case Helio light as his "Photion". The reproduced sound showed bad mechanical motion and poor quality.

Mar. 14, 1923: Case suggested, in connection with his recording lights, the use of an oxide-coated filament as a cathode. This resulted in more light and longer life.

Mar. 17, 1923: DeForest wrote to Case saying that the latter's efforts "to improve his photion light were well justified so Phono film could be brought out soon" and that Case was entitled to broad claims on the oxide-coated filament. De Forest said he would give Case full credit for work done in perfecting his Photion tube.

Apr. 4, 1923: De Forest gave a demonstration of his sound pictures before the New York Electrical Society. In describing his recording light he stated he was using a high-frequency gas light; he gave Case credit only on the Thalofide Cell, and for valuable suggestions and improvements to "Phonofilm,"

Apr. 15, 1923: The first public exhibition of de Forest "Phono-film" was given at the Rivoli Theater, New York.

Apr. 18, 1923: Case perfected the Thermophone for use as a microphone. This was used in making many of his early sound records.

May 7, 1923: It was found that helium purified in a calcium arc further lowered the operating voltage of Helio lights.

May 13-14, 1923: Case and Sponable visited the de Forest studio and observed weaknesses in de Forest's methods of sound recording and reproduction.

June 28, 1923: The Precision Machine Company rebuilt the Case sound camera in an effort to reduce the amount of flutter it was causing in the recording of sound tracks.

July 3, 1923: A letter received from de Forest said that the Case Helium Photion light "had gone bad". It had been in use since May 7, 1923, and the letter raised the question as to whether it should be recoated. De Forest

suggested that adding a trace of mercury would avoid certain British patents.

July 11, 1923: De Forest cited a German patent which contained an admission that it is old in the art to use a discharge containing a metallic vapor. De Forest used this patent on which to base his belief that any existing patent difficulty could be avoided by introducing mercury. It was possible that the coated electrode of the Aeo light producing green barium vapor in the discharge would be equivalent to introducing a metallic vapor.

Aug. 30, 1923: The contract referred to under date of February 23, between the de Forest Phonofilm Company and the Case Research Laboratory, was consummated. This contract granted de-Forest a commercial license to use Aeo lights and Thalofide Cells in taking and reproducing sound pictures.

Aug. 31, 1923: The following quotation is taken from the Case Laboratory notes: "A trip was made to New York for the purpose of aiding the de Forest Phonofilm Company in setting up their 9-A amplifier and also to test out the Case air-thermo microphone under studio conditions. A comparison of the static microphone using the old set-up previously made at the studio with the same microphone using the 9-A amplifier was made. These two films were also compared with a film made using the air-thermo microphone on the 9-A amplifier system. At New York, it appeared that the voice reproduction on the air-thermo microphone was slightly better and clearer than the records made using the static microphone. The films when run at this laboratory, seemed to indicate that there was little difference in these films; if anything, the static microphone was of slightly better quality. "De Forest was shown our method of wiring up the 8-A and 9-A amplifiers for reproducing. This system was a great improvement over the two 7-A boxes which he was using. This improvement was in quality rather than loudness.

"A number of experiments of the talking moving pictures were witnessed at the Phonofilm studio. These indicated that the product had been greatly improved over the old films seen on previous trips. In the case of music records the film from this laboratory seemed to be of slightly better quality than those shown there." Both Case and Sponable were present during these conferences.

Oct. 8, 1923: De Forest informed the Case Laboratories that he now had twenty-five films worthy of exhibition in theaters. Did we have a supply of Aeo lights?

Nov. 14, 1923: De Forest mentioned a recording he had made of a speech by Dr. F. Crane, saying "one can understand every word first time through."

Dec. 7, 1923: De Forest said that the thermo-microphone supplied him by Case was "wonderful", and that the Aeo light was "working fine".

Jan. 23, 1924: For recording sound, de Forest had originally used an optical system imaging the glow discharge on a slit of the order of three mils wide; it now occurred to him that a narrower slit, say 1.5 mils, might be better.

He recognized the problem of getting sufficient light with the narrower slit.

Jan. 1924: Sponable had considered the redesign problems involved in converting a Bell and Howell camera for recording sound on the same film with the picture. Bell and Howell was authorized to rebuild one of their cameras in accord with this design, which involved photographing the sound at the sprocket through a slit in contact with the film and with the Aeo light placed directly behind the slit.

Feb. 8, 1924: In the same way, a Bell and Howell standard picture printer was redesigned to provide both sound and picture printing apertures and

exposure control shutters. This work was done locally.

Feb. 8, 1924: Case wrote: "I think it would be better to do away with the slit entirely in the sound reproducing chamber as a slit is liable to become dust clogged being so small and the best method of procedure will be to construct a light with a very fine short straight filament and place a lens in front of this so as to suit-ably produce an image of the filament which may be brought to the size desired, say one and one-half thousandths of an inch and allow this image to pass through the sound record, spread, and then cover the Thalofide cell."

Spring 1924: De Forest had about twenty outfits giving roadshows. in theaters.

Feb. 28, 1924: A letter received from de Forest explained lack of Case publicity and stated that Phonofilm was a combined invention of de Forest and Case.

Mar. 25, 1924: The Bell and Howell camera modified for sound was received at Auburn and was tested. The motion was unsatisfactory.

May 9, 1924: Case suggested that the slit be protected by placing a glass wedge in the slit opening. Previous slits were susceptible to dirt and dust and were cleaned by opening and closing, or by an air Jet.

July 9, 1924: E. B. Craft, of the Western Electric Company, advised Case and Sponable that Western Electric would probably be willing to grant a license for the Laboratory to use amplifiers commercially.

July 25, 1924: De Forest began using the Case design of camera in which the sound was photographed on the film at the sprocket position. (This same method of recording is still in use in newsreel cameras today.)

July 25, 1924: De Forest asked Case to make recordings of Coolidge and La Follette in Washington. De Forest was to supply a professional cameraman. (These pictures, photographed on August 11, were the first news sound pictures of importance ever made-Fig. 5.)

Aug. 1924: A small sound recording studio was constructed in the basement of the Case Laboratory. This consisted of a room about 10 ft sq with a 6-ft ceiling. The walls were made of hair felt. The camera was placed outside of the studio and its lens imaged the interior through a hole in one of the studio walls.

Incandescent lighting was used to the extent of twelve 1000-w lamps. The subject could not exist in the studio for more than a few minutes at a time without coming out for air.

Dec. 8, 1924: To indicate the general character of work at the de Forest studio the following is taken from notes of Dec. 8, 1924:

"A visit was made to the de Forest studio. Reproduction was heard on the de Forest system using the slit arrangement. It was found that their slit was set at about four mils. When this was brought down to one and one-half mils the reproduction was very good, although the quality was not quite as good as with the focused filament arrangement. A focused filament set-up was made for de Forest using some lamps made in his factory. In these lamps the filament was held straight by spring tension, being the same arrangement as used in his amplifier tubes. The filament diameter of the lamps used was about one-half mil. The reproduction on this focused filament arrangement seemed to be very good. The Vitalux lens was used and improvement will probably be noticed when de Forest obtains the special Bausch & Lomb 1:1 objective which we had developed.

"Aside from a noticeable improvement in his reproducing apparatus the situation at the de Forest studio had not changed appreciably. He had made a number of Phonofilms. One, a Christmas number, included a song by

Mme. Rappold in a Christmas tree setting followed by a church scene with choir boys singing and ending with a trumpet chorus in supposedly a heavenly setting. All of this number was slightly sour and it is doubtful whether or not it could be used commercially."

Jan. 12, 1925: Case devised a slit with cover-glass protection.<sup>42</sup> This was a very important step in making sound recording practical. This slit consisted of a small piece of quartz about 0.25-in. square and 0.04-in. thick. One side was coated with chemically deposited silver and a slit about 0.001 in. X 0.120 in. was ruled in this silver coating. A thin cover glass was then cemented on top of the silver and the cover glass was ground and polished down to a thickness of less than 0.001 in., including the cement. The slit was then mounted in a steel shoe that could be placed in contact with the film at the camera sprocket. The Aeo light was set close to the quartz slit, thus eliminating the use of a lens to focus the glow discharge on the film and ensuring the maximum amount of light reaching the film.

May 13, 1925: De Forest borrowed the rebuilt Bell and Howell camera from Case in order to make sound pictures of Dr. Elliott in Boston.

Sept. 1925: Business complications terminated the working arrangement between de Forest and Case. Case, having gone this far in the talking picture field, decided to continue the work and finish up some of the technical problems that were still not solved.

During the fall of 1925, the Case Laboratory started building their first sound reproducing attachment. After considerable deliberation it was decided to design this to operate below the projection head rather than above, as had been de Forests previous practice. This was decided upon for three reasons: First, it was desired to incorporate a large flywheel that would give sufficient inertia to iron out all inequalities that might be transmitted from the projection head. Second, in the Bell and Howcll camera the sound came after the picture and a better printer design was possible if the sound was not transposed to a position ahead of the picture. And, last, which seemed important at that time, an attachment was wanted that would not run sound films previously made, which in some instances were quite bad. Sponable laid out this design and supervised local mechanics in executing it. It was here that the industry received its 141/2-in. hangover-the sound and corresponding picture were displaced by 141/2 in. or 20 frames. This early attachment was very similar in principle and design to the present ERPI type 206.

Sept. 14, 1925: It became apparent that great mechanical accuracy was required in making the recording camera; this is emphasized by the following quotations from the Case Laboratory records:

"The camera was received back from Bell & Howell Company on September 12. Tests were begun oh this camera September 14. The first test taken was made of voice and piano. When this was reproduced it was found that the camera still had a bad sprocket pulse. The eccentricity of the sprocket was determined with an indicator. It was found that it was running off about .5 of a mil on one end and .7 of a mil on the other. This, together with a noticeable high spot in the gears, was sufficient to account for the pulse observed."

"We tried the shaft alone in its bearing and found that it was run-ning fairly true. The sprocket, when tried alone on an arbor running true, was found to be 21/2 mils off and also slightly out of round. We made inquiry as to the best machinists around here and after trying a number of shops found that Doyle & Wall, 322 Pearl Street, Syracuse, seemed to be the best to do further work on the camera. They are used to working with a tolerance of

.1 mil and seemed to fully appreciate our problem."

Nov. 23, 1925: "After returning to Auburn Case went over the patents on sound recording and after calling Mr. Thompson into conference it was decided that the field was much more open than we had previously supposed. De Forest gas discharge patent seemed to be limited to the use of alternating current. Also it seemed questionable whether a court would uphold such patents as the Ries and the Fritts. Mr. Thompson was sent to New York to get the opinion of Mr. Gifford, supposedly one of the best attorneys in the matter of patents. Mr. Gifford's opinion in this matter seemed to confirm Thompson's, that is, that the field was open and that no one seemed to have any fundamental patents on the system of talking moving pictures."

Dec. 8-10, 1925: "About a year ago we approached the Western Electric Company regarding the use of their amplifiers or commercial showing of the talking pictures. At that time Mr. Craft advised us to go ahead and use them for this purpose and stated within a few weeks the Western Electric Company would submit a contract to us covering some form of a license agreement. Nothing further happened regarding this agreement at that time. Now that we are interested in using these amplifiers for possibly road show work and having severed connections with the de Forest outfit E. I. Sponable went to New York for the purpose of seeing Mr. Craft and if possible, obtain his O.K. to go ahead with their amplifiers for any commercial work we should want to do."

"On seeing Mr. Craft we explained to him the situation and re-called to his mind our conversation of last year. He stated that since that time considerable water had gone over the dam and that they were now interested in talking moving pictures themselves. Further, that they were negotiating or had completed negotiations with Warner Bros. to furnish the latter company with apparatus and technical aid to enable this moving picture firm to produce and market talking moving pictures. Considerable discussion of the subject resulted in Mr. Craft's saying that he believed we were further along in the art than they were and that he saw no reason why both the Case Research Laboratory and the Western Electric Company should not get together and compare their accomplishments and possibly enter into some agreement with a moving picture company whereby both the Western Electric Company and the Case Research Laboratory would benefit. He further stated that he would like to send two of his technical men up to Auburn to hear our films and look over our developments. After they had returned and reported to him he would then try to arrange a meeting between representatives of this laboratory and the commercial men of the Western Electric Company."

"Before the call on Mr. Craft the Keith-Albee people were visited for the purpose of determining whether or not they would be interested in obtaining our talking moving pictures for an act of vaudeville. Mr. Oakford of the booking department of the Keith people was given information regarding our system. He was very much interested in what we told him and stated that he would take it up with men higher up in the company and advise us regarding their interests. He reported the following day that he had talked with the vice president of the Keith company and that the latter was very much disturbed to think that he would dare to bring up the subject of talking moving pictures to them again. They admitted that they had been stung on the thing twice, once about fifteen years ago where they invested considerable money in stock of a talking picture outfit, and later in certain connections with the de Forest company. The vice president of the Keith

company stated positively that they were not interested in talking moving pictures."

Dec. 15, 1925: "In our conference with Mr. Craft last week, he intimated that the use of amplifiers in talking moving pictures would come under their public address work and that at least for two or three years we would be unable to use amplifiers for this purpose without the permission of the Western Electric Company." "In order to check up this point it was thought best to talk it over with Dr. W. R. Whitney of the General Electric Company. This was done by E. I. Sponable on December 15. Dr. Whitney stated that the situation was really something that Mr. A. G. Davis (vice president of the General Electric Company) was more fitted to give an opinion on than he. After describing the situation to Mr. Davis he stated that he believed that the talking moving pictures did not come under the public address work and that at present the amplifier situation was quite muddled, there being almost an endless number of patents in this connection. Sometime within the next year they hope to clear this situation by placing all these patents in the hands of the Radio Corporation. Mr. Davis stated that he believed we should see Mr. David Sarnoff, president of the Radio Corporation, and get his opinion regarding our requirements. He very kindly suggested that he would arrange such a meeting for us and is doing so at the present time."

"Dr. Whitney as usual was very nice in this connection and took the attitude that he was particularly anxious to aid anyone who was doing good research like the work carried on at the Case Research Laboratory."

Dec. 17, 1925: "Dr. Crandall and Dr. MacKenzie of the Bell Telephone Laboratories were sent here by Mr. Craft: They were shown our talking films and all parts of the taking and reproducing system were explained to them in detail."

"We gathered from them that our films were very good. They stated that they believed that in their own recording that their ground noise might be slightly less but discounting the fact that we were not using as good loud speakers or telephone equipment as they have they thought our stuff to be remarkably good. They noted the simplicity of design of the camera and projector and commented on the fact that such a design could be readily commercialized."

"We gave them data concerning our photoelectric cells and recording lights. They stated that they would like to order these various devices so that they could determine their constants using their own apparatus at the Bell Laboratories."

Jan. 4, 1926: An opinion was received from Mr. Adams, head of the patent department of RCA: "He stated that due to de Forest's original patent having expired that de Forest now had no more right to use amplifiers or to make vacuum tubes than anyone else and that the field now seemed to be completely controlled by the Radio Corporation as the result of patents held by the General Electric Company and relating to the manufacture of vacuum tubes and their use in various circuits."

"With reference to whom has the right to supply amplifiers for use with talking moving pictures he stated that this right rested with the Radio Corporation or- at least would rest with them when certain patents now under negotiation are finally turned over to them. Further, that he believed from the agreement with the Bell Telephone Company that the Radio Corporation reserved the right to use amplifiers in the connection with talking moving pictures for themselves."

Jan. 7, 1926: A meeting was arranged with Adams and his as-sociate, Capt.

Ranger.

"The only new thing which developed was at this meeting Adams reversed a statement which he had made at a previous conference with E. I. Sponable, that is, that both the Radio Corporation and Western Electric Company would have rights to use amplifiers for talking moving picture work. He stated that he would talk the matter over with Mr. Sarnoff and advise us shortly regarding some arrangement for starting a company to handle the talking picture situation."

"Previous to this meeting of Adams and Ranger, Mr. Case and Mr. Sponable were at the Bell Telephone Laboratories to see Mr. Craft. We told Mr. Craft that we had checked up the amplifier situation with reference to talking moving pictures and had found that the General Electric Company seemed to believe that they controlled the rights for the use of amplifiers in this connection. Craft then stated that it was really something that both companies had a joint right in and that in case the General Electric Company should use amplifiers for this purpose they would possibly have to obtain permission to do so from the Western Electric Company. Mr. Craft further stated that he was anxious to get a report from his men regarding our Aeo lights and photoelectric cells which they wished to examine."

"We went down to Dr. Crandall's office where we saw the Western Electric system of film recording. Inasmuch as our visit was rather unexpected they seemed to have considerable difficulty in getting their apparatus to work properly. The showing which they made during this exhibition was not impressive to us. They were, however, using fairly high quality amplifiers and a laboratory model of a loudspeaker which gave excellent and true quality of reproduction. They showed a number of records taken of the Capitol Theater music including pipe organ, orchestra and singing. They also showed one talking record made in their own laboratories. The talking record was not good and when reproduced on a cone such as we use, it was extremely bad. Their recording of music reproduced seemingly well although possibly part of this was due to the high quality of the music recorded, that is, the Capitol Theater orchestra. After hearing these records we attended a luncheon with Messrs. Adams and Ranger noted above and then returned again to the Bell Telephone Laboratories. During this time the apparatus had apparently been given an overhauling and the showing or reproduction was much better than that heard during the morning. It is interesting to note here that with the Western Electric reproducing amplifier which they were using they found it necessary to add an equalizer to correct for a discrepancy in their photoelectric cell. Without the equalizer the low frequencies came through in great predominance. Adding the equalizer decreased the volume to about 1/30 and brought the quality to approximately normal. Their photoelectric cell was connected to the first tube using 20 megohm resistances. In our work we use about two megohms across the cell and about 50,000 ohms across the first bulb. It is possible that we compensate for the equalization in this manner."

Jan. 29, 1926: Case and Sponable visited the Warner Theater to see a demonstration of Maxfield's Vitaphone.

"We all agreed that the showing was very good and of commercial quality. However, we believe that our own reproduction was better with regard to illusion and naturalness. In the Western Electric system they were using the large public address system thus accounting for the large range without distortion. Their loudspeaker was apparently of the horn type placed above the screen."



"After lunching with MacKenzie we returned to the Bell Telephone Laboratories where we met Dr. Crandall and proceeded to Mr. Craft's office. Mr. Craft advised us that his men had only made a preliminary report to him but it seemed that we had nothing in our system which would be of particular use or addition to the Western Electric system."

"Mr. Craft, however, was reluctant to give up our system entirely and said he would like to know more about it. Inasmuch as the reproduction of the film was the real test, we suggested that the Western Electric Company send us some of their film, both voice and music. We could then reproduce it at Auburn and at least satisfy ourselves regarding the merits of the two systems. They did not care to submit some of their film already taken and stated that they would take two numbers and send them up to us the following week."

"We then left the Western Electric Company and proceeded to Captain Ranger's office in the Radio Corporation building. We advised Captain Ranger that we were now ready to go ahead with the talking pictures with them or arrange for licensing the use of their amplifier system. We asked him to bring these things to Mr. Adams' attention and arrange for a get-together to talk the situation over. After leaving Captain Ranger we stopped at the office of Mr. Gifford where we talked over the patent situation. He had already prepared an opinion regarding the de Forest and Ries patents, this opinion being that these patents were of questionable value. Our talk with him seemed to further his conviction regarding their questionable value and he stated that he would send us the written opinion in the near future."

Feb. 13, 1926: Case devised a way to avoid film splice clicks by using graded opaque at the join.

Feb. 15 to Mar. 1, 1926: Case and Sponable discussed with Whitney and Stone (a vice president of General Electric Company) the possibility of combining the Case system with the work of their inventor, C. A. Hoxie. General Electric engineers, Robinson and Marvin, came to Auburn and went over the Case system. They were very pleased with it. Stone, however, would not admit the Case system added materially to that of General Electric and no agreement was reached.

Mar. 19, 1926: John Joy, who knew Sponable at Cornell, paid a friendly visit to the Case laboratory. Technically, he represented Courtland Smith who had just joined the Fox Film Corporation. Joy reported concerning the Case talking picture system to Smith and the latter requested Case to bring his equipment to New York to demonstrate to the Fox people.

Apr. 8, 1926: Max Mayer (a dealer in theatrical equipment) came to Auburn to witness the Case talking pictures. He pronounced the demonstration to be perfect, but advised Case that a feature picture would be necessary to sell the system to a producer. Case considered making this.

May, 1926: Case organized the Zoephone Company to take over and handle the Case system of talking pictures.

Responding: to Courtland Smith's suggestion, reproducing apparatus was taken to New York and successful demonstrations given before representatives of the Fox company at Parlor B on 10th Avenue, at the Nemo Theater, and at William Fox's home in Woodmere.

Mr. Fox was at first suspicious of the process; however, a close-up of a canary bird singing while perched on the top of its cage seemed to convince him that the sound was not a matter of trickery.

June 8-24, 1926: The reproducing equipment was installed in the Fox Film building, 850 Tenth Avenue. Recording equipment was brought from

Auburn and about 300,000 feet of test records were made in a temporary hair felt studio room partitioned off on the large stage of the Fox building. The purpose of these tests was to convince Fox of the practicability of making sound pictures under studio conditions. The results were entirely successful.

July 23, 1926: An agreement was reached between Case and Fox resulting in the formation of the Fox-Case Corporation. In general, Case turned over all patents and rights in his system of talking pictures to the new company (exclusive of amplification, in which he had no rights to give). Case agreed to continue his laboratory for the purpose of making recording lights, photoelectric cells, and for general development purposes.

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## **HISTORICAL DEVELOPMENT OF SOUND FILMS\***

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## **PART 3. COMMERCIALIZATION OF MOVIE-TONE BY FOX**

Aug. 1926: De Forest brought suit against Fox and Case, charging infringement of the Ries recording and reproducing patents, two of his patents covering the use of a gas discharge for sound recording, and a patent on the use of a light-sensitive cell with an audion amplifier. (De Forest had purchased the Ries recording patent October 15, 1925. He did not, however, actually acquire the Ries reproducing patent until November 16, 1926, although it is believed he held an option on this and several Ries applications before this time.)

De Forest did not press the suit for trial; it was finally allowed to lapse on the court calendar.

Aug. 1926: At the time of the formation of the Fox-Case Corporation, Sponable came to New York to take part in commercializing the Case system. With him came Mr. D. B. Eldred to assist in the business management of the company. Eldred, Case's brother-in-law, had joined the Case Laboratories in 1925. Courtland Smith was made general manager of the Fox-Case Corporation. "Movietone" was chosen as the name of the sound picture system. The industry is greatly indebted to Courtland Smith for his foresight and aggressiveness in hastening the commercialization of sound-on-film. He did more than anyone else to convince the "doubting Thomases" of the business that sound motion pictures were a reality and that the days of the silent film were numbered. He was instrumental in starting and developing Movietone News and later the Newsreel Theater. During this time plans were worked out for a sound picture producing unit. Sponable designed and built two studios at the Fox Annex at 460 West

54th Street. These were the first studios, except for experimental rooms, wholly designed for sound recording purposes. They were built to exclude all outside noise and with the best acoustic treatment known at the time.

Dr. Paul Sabine, acoustic engineer of the Riverbank Laboratories at Geneva, Illinois, acted as a consultant in this work.

Sept. 1926: Fox and Smith negotiated with the General Electric Company for rights to use vacuum-tube amplifiers commercially. The deal was nearly completed and General Electric equipment was brought from Schenectady to New York. At the final closing the parties did not agree, and General Electric withdrew their equipment.

It is interesting to note here that, if this arrangement had gone through, the whole setup of the future sound business would have been changed. The Western Electric Company would probably have concentrated more and more on disk, and the Fox-General Electric group would have led in the development of sound-on-film.

Oct. 25, 1926: The first test recording was made on the new Fox-Case Corporation stage. The next day a test recording was made of Harry Lauder. Typical of his Scotch character, he stopped singing during the middle of the recording of the song "Roamin' in the Gloamin'" and said, "This is a test"-to be sure it would not be used commercially.

Nov. 4, 1926: Work was begun on making a number of one-reel short subjects with Racquel Meller, using regular motion picture production technique.

Dec. 1926: Prior to this time, negotiations were carried on with the Western Electric Company to give Fox rights to use their amplification patents and apparatus commercially. These culminated in an agreement or sublicense from the Vitaphone Corporation (see Part 5) in which Fox, among other things, agreed to pay a royalty of about 8 per cent of his gross business in the sound field.

Jan. 21, 1927: The first public showing of Fox-Case "Movietone" subjects was given at the Sam Harris Theater in connection with the premiere of "What Price Glory". The sound features were not advertised. The showing was made using a Case sound attachment with Western Electric main amplifiers. No stampede resulted, but neither was there an unfavorable audience reaction.

Feb. 1927: Sponable developed a screen suitable for picture projection and still transparent to sound without causing distortion. This enabled the use of loudspeakers directly behind the screen and was a great help in improving the illusion. This was immediately accepted by the industry.

Feb.-Mar. 1927: The first field recording unit was assembled. With it, out-of-door recordings of a West Point review were made and the outfit was then sent to Italy for the purpose of making a record of the Pope and Mussolini.

Mar. 11, 1927: The Roxy Theater, designed by S. L. Rothafel as the "last word" in motion picture palaces, opened in New York. Two weeks after its opening, Fox obtained control of the Roxy and laid plans to convert it for showing sound on film.

Apr. 1927: Fox-Case made a new agreement with Electrical Research Products, Inc., superseding the Vitaphone sublicense. Electrical Research Products had been formed January 1, 1927 as a subsidiary of the American Telephone and Telegraph Company, for the purpose of handling the sound equipment business, instead of the Western Electric Company.

May 1927: A showing of a West Point review as a sound feature was given at the Roxy Theater.

May 6, 1927: Fox-Case Corporation's Field Outfit No. 1 recorded a speech by Mussolini and a number of Italian army subjects. This work was done by B. Miggins as cameraman and E. Kaw and D. F. Whiting as soundmen.

May 25, 1927: A program was opened at the Harris Theater containing Movietone subjects. This included a silent version of "Seventh Heaven" and several sound shorts.

June 12, 1927: Fox-Case recorded the Lindbergh welcome at Washington. Charles Gilson operated the camera, E. H. Hansen the sound equipment. The showing of this, together with his take-off, and the Mussolini pictures referred to above, created the second big sensation in the public showing of sound pictures (the "Jazz Singer" being the first).

Sept. 1927: An all-sound program made up of the feature picture "Sunrise" with synchronized score, and the Mussolini pictures, opened at the Times Square Theater. This showing was made on a Western Electric sound-on-film installation.

Oct. 28, 1927: The first "Movietone News" was shown at the Roxy Theater. The issue contained the following subjects:

- (a) Niagara Falls
- (b) Romance of the Iron Horse
- (c) Army-Yale Football game at Yale bowl
- (d) Rodeo in New York

Oct.-Nov. 1927: Sponable surveyed the Fox West Coast studios with a view to converting them for sound work, and drew up designs for the first unit. The building of these studios was held up by Fox, owing among other reasons to the estimated cost of \$250,000 being too high.

Nov. 1927: Case suggested "noise reduction" in an affidavit dated November 28, 1927, quoted below:

"It is of great advantage when photographing sound on film to have the ground noise level as low as possible between words or sounds when there is nothing on the film in the form of modulation to cover up the ground noise. A method of doing this has suggested itself to my mind as follows: If the recording light which itself is modulated or by another method is modulated mechanically is only eliminated while modulation is not going on in the circuit this would mean that when no modulation is present the light would be reduced to a minimum automatically or might even be put out entirely. This would mean that between modulation or between words or between sounds the negative sound record would be unexposed or white upon development. This, on the positive, would be reversed or black thereby reducing any ground noise that there might be between words or sounds. The method of accomplishing this could be the same as is at present used in the transoceanic telephony where it is essential that automatically only one sending station is in operation. As soon as active modulation ceases in one direction and starts in the other direction the modulation passing in the circuit actuates a relay mechanism to instantly put into action this sending station. In other words in our simple modulation circuit any alternating or pulsating currents would actuate a mechanism to bring the recording light up to the brilliancy desired for the best operation of the system and while no modulation was passing, the light would automatically be reduced to the point where no record would appear on the film.

"This is signed and witnessed at 9:40 A.M., November 28, 1927 and I am now going to call up Dr. McKenzie at the Western Electric Company and

inform him of this idea so that it can be put into operation, if they so desire, on their mechanical method of recording sound. Is I Theodore W. Case" During the last of 1927 and the first months of 1928, there was much activity in organizing and in developing sound equipment by the Fox-Case Corporation. Sound News outfits were put in the field at the rate of one or two a month. Various short subjects and productions were made in the studios, largely to learn the best uses for sound and its limitations. Many silent pictures were synchronized. A test was made combining Technicolor with sound. A cartoon was made with sound effects.

May 10, 1928: A non-exclusive agreement was made between ERPI and Fox-Case-effective April 2, 1927. The royalty arrangement was changed from 8 per cent of the gross to \$500 per negative reel for domestic release and a schedule for release in foreign countries that added up to a second \$500.

May 1928: Equipment for three studio recording units was ordered by Fox-Case in anticipation of its coming West Coast studio demands.

During the spring of this year, Winfield Sheehan, in charge of production at the Fox West Coast Studios, who did not believe too strongly in sound in the beginning, came East and was anxious to arrange to get started on West Coast studio sound productions. He had taken over two news outfits that were originally assigned to West Coast news work. With these the Fox studio made a two-reel dialogue comedy. "The Family Picnic".

June 18, 1928: This opened as part of the program with "The Air Circus" (synchronized sound) at the Globe Theater in New York.

June 25, 1928: A Movietone field projector truck was used on Broadway to ballyhoo "The Red Dance" at its premiere. This out-of-door portable sound projection unit was a development of Fox-Case that has been used to some extent for political and commercial purposes.

It now became Sheehan's desire to get into sound as quickly as possible. This was accelerated by the fact that other producing companies were already starting. He brought various members of his producing staff East to work out a way of starting this work, and placed his Movietone development under the direction of his studio manager, Ben Jackson. They returned to Hollywood on July 12, 1928, taking practically the entire staff of engineers from Fox-Case. Operations were planned on a large scale.

July 1928: Equipment for nine West Coast recording units was ordered.

July 28, 1928: Several Movietone stages were started at Fox Hills, on a location which was previously used to corral Tom Mix's horses. These were erected under the direction of Mr. Sheehan, with C. H. Muldorfer as architect and H. K. Weeks as construction engineer. The completion of these sound studios and accessory buildings was accomplished with great speed and with much credit to the men responsible for the work. The whole plant took form in approximately ninety days.

Aug. 1928: Equipment for twelve more West Coast recording units was ordered, making a total of twenty-four.

Sept. 1928: Equipment for three European recording units was ordered. These orders from Fox, together with those of other companies coming into the field, swamped the facilities of the Western Electric Company and made deliveries of equipment very uncertain.

This period was marked by a rapid growth of the technical staff of the Fox-Case Corporation. Many contributions were made by various individuals, particularly L. B. Hoffman, L. W. Davee, A. J. Sanial, H. E. Bragg, H. F. Jermain, Walter Hicks, R. F. Nicholson, and W. F. Jordan. Nineteen newsreel field outfits were operating. The crews of these units did much to

overcome the initial difficulties of field operation.

Sept. 1928: Fox Movietone City was dedicated. (This is the present Twentieth Century-Fox Studios at Beverly Hills, Calif.)[1946]

Oct. 6, 1928: The Fox Movietone News release was increased from one to two issues per week.

Dec. 1928: "In Old Arizona", the first out-of-door recorded feature picture, was shown at the Criterion Theater in Los Angeles. Quoting Franklin: "This film was photographed and recorded outdoors against a sweeping background of natural beauty, and in its sound recording achieved its highest artistic success up to that time. Filmed and recorded right in the vast open spaces, the scenes and human voice and all the accompanying sounds were reproduced with a clearness and naturalness that attracted wide attention. The Movietone process caught and reproduced with fidelity not only the voices of the actors, but actually the natural sounds of the outdoors: "The whispering of the wind, the song of the birds. The picture was thus notable in combining the perfected technique of the silent film with the faithful recording of music, dialogue and sound."

Subsequent Fox pictures that were well received and helped to advance the art of sound recording included the all-talking pictures "Through Different Eyes" and "Hearts in Dixie".

Dec. 3, 1928: Fox Movietone News release was increased to three issues per week.

During the year 1928, appreciable general progress was made in perfecting Movietone technique; one point of note was the perfecting of the Aeolights by Case, increasing their useful life and uniformity.

Sponable organized a research department to which was assigned the problem of improving sound recording apparatus, particularly with a view to reducing its weight and improving its portability and ease of operation—as well as the over-all problem of improving recording and reproducing equipment and techniques. Fifty-six field units were scheduled for assignment all over the world; three special Aviation Units were activated; to meet the need for such an increase in personnel, Bragg was sent to interview recent graduates at various technical institutions. Well over 100 engineers were now engaged in the sound recording field.

Feb. 28, 1929: Fox acquired control of Loew's and MGM.

Mar. 1929: Fox announced that all silent product would be discontinued and only Movietone pictures would be made.

July 15, 1929: The Fox Movietone News release schedule was increased to four issues per week.

July 18, 1929: William Fox was injured in an automobile accident; this may have seriously affected the following up of his involved negotiations.

July 1929: British Movietone News, the first foreign sound news-reel producing company, was started.

Aug. 1929: A merger of Fox Film, Fox Theaters, and Loew's was planned.

Sept. 20, 1929: Fox negotiated a deal acquiring Fox-Case stock from Case and exchanging Fox Theater stock to be redeemed September 1, 1930. Fox then formed the Fox-Hearst Corporation, Hearst acquiring about 24 per cent of original Fox-Case stock with option to buy about 25 per cent more. Fox made a separate agreement with Case to have the latter run his laboratory until July 23, 1930:

Sept. 1929: Fox and Hearst united their sound newsreels and agreed that each would release two per week.

Sept. 17, 1929: An all-Grandeur show opened at the Gaiety Theater with

Grandeur News and "Fox Movietone Follies".

Sept. 28, 1929: Hearst Metrotone News released its first issue.

Nov. 2, 1929: The Embassy Theater was opened with the first all-sound news program and called "The Newsreel Theater".

1930: The crash of 1929 found the Fox structure in such a condition of over-expansion that it became necessary for Fox to sell out.

Controlling interests in Fox Film and Fox Theaters were acquired by a group headed by Harley Clarke, who became president of the Fox companies.

Sound-on-film by this time was well established as a commercial success and was displacing sound-on-disk as a release medium. The Western Electric light-valve method of sound-on-film recording was commercially perfected. As Fox Film was a licensee of ERPI, and as such paid the regular royalty rates, it decided to give up its own method of Aeolight recording and use in entirety the Western Electric system.

#### **PART 4. FOREIGN PROGRESS IN SOUND FILMS AND RELATIONS WITH FOX**

Sept. 1922: The first showing of acoustic films was made at the Alhambra Theater, Berlin. These were made using the Tri-Ergon method with the sound recorded on a film about 42-mm wide and the sound placed outside the sprocket holes. (This system was worked out by three inventors—Engl, Massole, and Vogt, who had formed a sound-film company called the Tri-Ergon A.G., of Zurich.)

July 1926: F. A. Schroeder, who was the American representative of the German group, brought their system to the attention of Courtland Smith.

Aug. 1926: John Joy went to Europe to investigate Tri-Ergon for Fox.

Dec. 1926: At Joy's request Dr. Engl brought a complete unit of the German apparatus to New York for examination and tests. Records were made and shown under the direction of Dr. Engl; the results were judged to be fair, but not so good as Movietone. This was to some extent the result of the use of condenser loudspeakers in the German system. The equipment as a whole was typically German in design and offered few features that could be advantageously combined with the Movietone system.

July 1927: Fox took over rights to the German system for North America and rejected a chance to acquire the world rights. This soon proved to be a mistake, since the patents became troublesome in foreign countries, and royalties were collected on them.

Shortly thereafter, Joy and Schroeder went to Europe to get an extension of scope to the Fox agreement to permit use throughout the world. Also during this time, UFA of Germany acquired a license under the German system.

Feb. 1928: During the interval since July 1927, Tri-Ergon had tried to bring together all German companies interested in sound pictures including Siemens and Halske, AEG, and others. This was not entirely successful as Siemens and Halske and AEG wanted too much and Tri-Ergon would not agree to their stand.

Aug. 1928: Tri-Ergon formed a German operating company backed by the Commerce and Private Bank and called Tonbild Syndicate A.G. (or Tobis)



with rights in Germany, Switzerland, and Austria.

Sept. 1928: Negotiations were carried on by Joy and Rogers for Fox with Tri-Ergon and Tobis to make a working arrangement to record and reproduce sound throughout the world under Tri-Ergon patents. No agreement was reached.

Nov.-Dec. 1928: Schlesinger, of London and South Africa, who had purchased the de Forest Phonofilm Company, attempted negotiation with Tobis and Tri-Ergon for joining de Forest and Tri-Ergon on a world basis. This did not go through.

Jan. 1929: Siemens and Halske and AEG combined interests in the sound picture field by organizing a company called Klangfilm.

Klangfilm attempted to release a picture made by RCA in America in one of the UFA Theaters in Berlin. Tobis stopped this with an injunction on the grounds that the picture was recorded by double system, i. e., sound and picture separate, and recombined in a single positive. It was claimed this infringed Tri-Ergon patents. The result of the court's decision, sustained by the higher court, made Klangfilm make a working agreement with Tobis. During this time Fox interests kept up communication with representatives of Tobis and Tri-Ergon for the purpose of making a working arrangement through American Tri-Ergon to permit Fox to record and reproduce throughout the world under the German patents. No such arrangement was agreed upon.

Apr. 1929: Attempts were being made at this time by various groups to Join together the various Tri-Ergon interests and Klangfilm in opposition to Western Electric progress in foreign countries. Nothing resulted from this.

June 1929: Kuckenmeister, a German phonograph manufacturer, through connections with Oyens and Sons, a Holland banking firm, became interested in organizing a holding company to unite various Tri-Ergon interests, not controlled by Fox, into one group. This was concluded in June 1929, and called "Acoustic Products Company of Holland".

About this time Tri-Ergon started suits against Electrical Research Products, Inc., and during the summer obtained injunctions restraining the reproduction of all American pictures on ERPI apparatus in Germany. Some of the original decisions have since been sustained so that, except by special agreement with Tobis, American sound films were prevented from being released in Germany. Warner Brothers obtained a special license from Tobis and have released their films.

May-Aug. 1929: Joy attempted to obtain a working agreement with Tobis to protect Newsreel recording and allow release of Fox products in Germany. No arrangement was concluded.

Various conferences were held among representatives of ERPI, Tobis, Siemens, and AEG both in Europe and in America. No agreement was reached.

Sept. 1929: Schlesinger concluded an arrangement with Kuckenmeister in which his British company was allied with Tobis and Klangfilm.

Advantages Fox could have had were now being acquired by others.

Oct. 1929: Tobis brought suit against Movietone in Germany and Austria. All Fox Newsreel trucks were removed from these countries.

During the last six months of 1929, both Tobis and Klangfilm moved forward, both in theater installations and in the production of sound pictures. They made an alliance with a French producing company, and arranged to begin sound work in France.

June 1930: Will Hays headed a committee in Paris which met to deal with foreign sound problems and to attempt a settlement of German relations.

This tangled situation was finally ironed out and a compact was arrived at on July 22 permitting the showing of American films abroad.

## **PART 5. SOUND WORK UNDER THE WESTERN ELECTRIC SYSTEMS**

1925-'26: Major development of the disk system of sound motion pictures, later trade-named "Vitaphone", was carried on by a group in the Bell Telephone Laboratories headed by Dr. J. P. Maxfield. At about the same time, another group headed by Dr. Crandell and Dr. MacKenzie were working out a sound-on-film. system using a "light valve" designed by Dr. Wentz in the recording.

Apr. 20, 1926: Western Electric Company entered into a contract with Warner Brothers and W. J. Rich, a financier, giving them an exclusive license for recording and reproducing sound pictures under the Western Electric system. The Vitaphone Company was formed.

June 1926: The Vitaphone Company opened a recording studio at the Old Manhattan Opera House, 34th Street, New York.

Aug. 6, 1926: Warner Brothers gave their first public performance of Vitaphone at the Warner Theater, New York, showing a scored picture "Don Juan" and several shorts including a talk by Will Hays, and songs by Martinelli, Marian Talley, and others. This received favorable comment from some papers, enthusiastic comment from others, and grave doubts from the industry that talking pictures would ever be commercial.

Dec. 1926: The Vitaphone corporation gave Fox a sublicense to use Western Electric equipment in the field of sound pictures.

Dec. 31, 1926: Western Electric had equipped about twelve theaters with sound installations for Vitaphone.

Jan. 1, 1927: Electrical Research Products, Inc. (ERPI) was formed as a subsidiary of Western Electric and AT&T to commercialize equipment for the sound motion picture field, the equipment business having been bought back from the Vitaphone Company. The name Vitaphone was retained by Warner Brothers for their sound picture system.

Spring 1927: Vitaphone recording was moved to Hollywood.

Feb. 23, 1927: MGM, First National, Paramount, Universal, and PDC, termed "The Big Five", agreed to stand together for the purpose of determining the right sound system and used the facilities of the Hays organization for this investigation.

Apr.-Aug. 1927: ERPI made their first light-valve installation in the Fox Movietone studio at 54th Street and 10th Avenue, New York. This was installed at ERPI's expense and operated experimentally by Bell Telephone Laboratory engineers. The ERPI film processing specifications were rigid and their technique of operation was not sufficiently advanced to impress the Fox group that the light-valve system offered any commercial improvement over the Case system then in use.

Apr. 19, 1927: Warners secured 100 per cent ownership in Vita-phone by purchase of W. J. Rich's interests.

Oct. 1927: Warners released "The Jazz Singer". This is spoken of as the turning point in the coming of sound, and served to convince the industry

of its potentialities.

Dec. 31, 1927: One hundred and fifty-seven theaters were equipped for sound, of which fifty-five included film units. The rest were disk only.

Apr.-May 1928: ERPI contracts were signed by the "Big Five" group. This ensured the general use of talking pictures. The Warner contract was revised when ERPI took over the equipment business and a new Fox license was also signed about this time. Victor and First National announced the release of their product under the name of "Firatone". The ERPI licenses granted during this period included the following companies: Paramount, United Artists, Metro-Goldwyn-Mayer, First National, Universal, Christie, Hal Roach, and Victor Talking Machine Company.

May-Dec. 1928: There was great activity in getting studios equipped for recording. Everyone wanted to start at once and equipment was at a premium, with deliveries most indefinite.

At about this time, sound equipment and recordings were standardized to a sufficient extent that apparatus made by either RCA or ERPI could satisfactorily play the product made with the other equipment. In the beginning, ERPI tried to restrict the use of its equipment to sound tracks made on the Western Electric system.

July 1928: Paramount began recording in Hollywood on a temporary channel and first used sound in their picture "Warming Up", with Richard Dix.

July-Sept. 1928: Their first all-talking picture was "Interference", directed by Roy Pomeroy. This was followed by "The Doctors Secret" and others. During this early work in a temporary studio, many of the scenes were made at night to avoid outside noises.

Dec. 1928: Paramount began recording in its new sound studios on regular channels.

Dec. 31, 1928: ERPI had 1046 theaters wired for sound, of which 1032 were for sound-on-film.

Jan. 1929: Warner Brothers became interested in the Pacent sound system and approved Pacent installations in April 1929. ERPI began suit against Pacent for patent infringements.

Aug. 3, 1929: The first issue of Paramount Sound News was released.

Dec. 31, 1929: The tremendous growth of the sound motion picture business in a little over two years is evidenced by the fact that there were 77 ERPI recording channels in operation in the United States. ERPI also had equipped about 4000 theaters in this country and some 1200 in Europe. Most of the theater installations were for both sound-on-film and sound-on-disk.

Also at this time it became evident that there was a trend to favor sound-on-film over sound-on-disk for theater release purposes.

Apr. 1930: Warner Brothers announced the purchase of an interest in the T. H. Nakken patents. These patents related to the use of a photoelectric cell and an amplifier. (Subsequently they were used as a basis for litigation.)

## **PART 6. SOUND WORK UNDER THE RCA SYSTEM**

1925: About this time, a small group of engineers at Schenectady, headed by C. A. Hoxie, experimented on recording sound on film photographically, using a special oscillograph as the recording unit and making records of the variable-area type. This sound-on-film system was called the "Pallophotophone". Also at this time, Hewlett (a research engineer in the General Electric laboratory) was perfecting his induction-type loudspeakers, and Rice and Kellogg (also General Electric research men) were developing their electro-dynamic cone speakers.

Feb. 1927: During the year 1926, probably stimulated by the work of Western Electric and others, the General Electric group combined their Pallophotophone with moving pictures and held a demonstration at the State Theater, Schenectady, in February 1927, before a group of newspaper men and engineers. Their system of combined pictures and sound was called the "Kinegraphophone". The demonstration included speech and several musical numbers produced by amateur talent. Later this demonstration was given at the Rivoli Theater in New York.

Mar. 1927: It was reported that five of the big producers were negotiating with General Electric to compete with Movietone and Vitaphone.

1926-'27: The research laboratory of the Westinghouse Electric and Manufacturing Company, not to be outdone, carried on the development of a system of sound recording, using for its light modulator the Kerr cell based on the principle of the rotation of a beam of polarized light by electrostatic means.

Toward the end of 1927, Paramount released its picture "Wings", with a sound score prepared by the General Electric group. This score was used in several different ways. At the Criterion Theater, New York, the airplane sounds were taken from disk recordings using a multiple turntable device and synchronized by an operator back stage. The effects were reproduced in other theaters through the use of condenser-discharge devices as well as from a score recorded on film.

1928: The sound picture work of General Electric and Westinghouse was combined into one system and handled by a new subsidiary of the Radio Corporation of America called RCA Photo-phone, Inc. The variable-density Kerr cell method of recording was dropped, and the variable-area system further perfected under the name of Photophone. RCA Photophone announced to the trade that it had perfected reproducing apparatus and would equip theaters.

Oct. 1928: Shortly thereafter, RCA acquired the B. F. Keith and Orpheum chain of theaters and the FBO Producing Company. A subsidiary was formed called Radio-Keith-Orpheum. Through this producing organization, sound pictures made by Photophone's methods were introduced to the public. The first efforts along these lines were limited to the presentation of musical accompaniment; the first picture was "The Perfect Crime", which included some dialogue sequences. Important stage plays were acquired by the RKO producing organization, including the very successful "Rio Rita", which they produced as a sound picture.

Feb. 9, 1929: RKO Productions, Inc., announced that they had selected "Radio Pictures" as the trade name for RKO Productions (which was the motion picture producing and distributing unit of the Radio-Keith-Orpheum Corporation, sponsored by the General Electric Company, the Westinghouse Electric and Manufacturing Company, and National Broadcasting Company).

An affiliation was subsequently effected with the Pathe Exchange, Inc., which adopted the RCA Photophone System of recording in the production

of sound motion pictures. The first Pathe production shown with a musical synchronization was "Captain Swagger" with Rod La Rocque; and this was followed by several others in rapid succession. The Pathe organization also released a sound newsreel recorded by the Photophone process.

Jan. 1929: RCA closed a deal for the acquisition of the Victor Talking Machine Company.

Mar. 1929: RCA, Tobis, and Klangfilm announced a working agreement.

Dec. 31, 1929: RCA Photophone had equipped for sound about 1200 theaters in the United States, and about 600 abroad.

Dec. 1929: It was announced that RCA Photophone would shortly center all of its sound picture development work at Camden, N. J., combining the General Electric and Westinghouse groups who had previously operated independently.

## **PART 7. MISCELLANEOUS SOUND SYSTEMS**

May 22, 1926: Thomas A. Edison declared no field exists for talking pictures.

Nov. 1926: A device called the "Remaphone" was brought out. It consisted of a Victor "Electrola" with two turntables connected by a shaft to the two projection machines in the booth.

Feb. 1927: Synchronophone Corporation offered a new synchronization device for use in small theaters and provided music from disks.

Spring 1927: Vocafilm and Orchestraphone were made available for synchronizing pictures. The Orchestraphone was designed primarily for small theaters and initially tried in Chicago.

July 1927: Vocafilm gave a showing using its sound picture system at the Longacre Theater, New York.

Dec. 1927: Orchestraphone, marketed by the National Theater Supply Company, was shown at the Tivoli Theater, New York.

Bristolphone was demonstrated before the Franklin Institute.

Apr. 1928: Motion pictures were transmitted over telephone between Chicago and New York.

Aug. 1928: M. A. Schlesinger bought control of the de Forest Phonofilm Company. He had previously held an option to purchase the company; this option had expired in 1927. General Talking Pictures was formed as the new operating company.

Nov. 1928: Acoustic Products (Sonora) acquired manufacturing, distributing, and licensing rights to Bristolphone.

Dec. 1928: Cinetone, a sound device for home use, was offered by DeVry.

Jan. 1929: Pacent started installations approved by Warners.

Sept. 1929: Powers Cinephone was placed on the market.

Dec. 1929: At the end of this year, there were 234 different types of theater sound equipments in use; most of these, produced by the independents, were for sound-on-disk. The total number of theaters equipped for sound of all makes in the United States was 8741. Of these installations, ERPI and RCA had provided 4393.

As has been indicated in the introduction, these notes have treated certain developments very fully and have made only the briefest mention of some others. This is not to be construed as a judgment of relative importance

alone: rather, it also has been decided on the basis of what has previously been written on the subject, and the authors more intimate knowledge of certain details. For example, the material on the Case work has, for the most part, never before been made public; and even this could not be reviewed in great detail in an article of this kind. It is hoped, however, that enough has been told to give the reader a concise picture of what took place during this rather brief development period.

It has seemed appropriate to end this history in the early thirties, since at this time sound-on-film had completed the initial stages of its development, and had justified its existence as a commercial achievement of the first order.

***[Ed. Note.-Following Mr. Sponable's paper a film was exhibited demonstrating early sound-on-film, containing the following subjects:]***

#### **Subject Speed fps Date**

T. W. Case, close-up 75 March 1924  
 Man with harmonica 75 March 1924  
 T. W. Case (tuxedo) 80 April 1924  
 Man playing harp 80 April 1924  
 Man and duck 85 May 12, 1925  
 T. W. Case, close-up 85 May 1925  
 Chinese boy playing ukulele 85 June 1926  
 Raquel Meller 90 November 1926  
 Harold Murray 90 November 1926  
 Sunrise (Scored silent) 90 June 1927

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## **De Forest Phonofilms in Australia**

### **Rushcutters Bay Studio - Sydney**

***From an article by Ian C. Griggs on De Forest Phonofilms,  
published in Cinema Papers.***

Established in June 1925, under the direction of retired Army captain W. Hawkins, an Australian, they made a few synchronised sound-on-film shorts, mainly surrounding the Duke of York's visit to Australia in 1927. The company had its head office at 129 Bathurst Street, Sydney.

On 6 July 1925, a demonstration of sound-on-film took place at the Piccadilly Theatre, Sydney, and public screenings were held at the Prince Edward Theatre throughout November and December of 1925.

The Bulletin reported that "the system's chief usefulness will probably be in the educational sphere to begin with", and although generally happy with the event, the writer added: ". . . however the speakers belong to a nation that suffers from the American accent. During the screening of a portion of Traviata, this writer momentarily got the illusion that the image of the singing damsel was made of sound and blood, but it wasn't sufficient of an illusion to make him want to rush round to the stage door with a box of chocolates and a taxi . . . ". Once again, the presentation of perfect lip-sync gained praise and congratulation.

It was not till November 1926, that the Australian division had expanded to such proportions that it could set up a plant and begin public demonstrations at Sydney's Prince Edward Theatre. Here a season of the films ran from November 6 till November 9 - the first exhibition of the company's talking pictures in an Australian theatre. The general public was amazed at the invention, but the Bulletin still criticized the American accent, remarking that the voices were "muffled". Captain Hawkins announced in January 1927 that he had had numerous enquiries from local exhibitors regarding the installation of plants in their cinemas, but he could not release the unique attraction until he had sufficient stock from England and America to maintain continuously full programs. In the meantime all the gear necessary to actually produce Phonofilms was en route to Australia by ship - Bell & Howell Phonofilm cameras, microphones, mixing panels and amplifiers - all of which arrived in time to capture, in sound, the arrival of the Duke and Duchess of York at Sydney, on Saturday, March 26, 1927.

During 1926 and 1927, regular screenings of imported sound-on-film shorts made by DeForrest overseas, were screened under contract at several Union Theatres.

On April 4, 1927, some of the Phonofilms recently obtained from overseas were screened at the studio for members of the Press, local Chambers of Commerce and others. This time, reported the Sydney Morning Herald, ". . . the voices ring out with as much clarity as they would on the best type of gramophone record . . ." The writer then went on to say that Sir William Joynson-Hicks, in a speech on the General Strike, ". . . came to the ear with amazing truth to nature, synchronizing so perfectly with the facial expressions and gestures, that the Home Secretary in the flesh could not have made a much stronger impression." Also appreciated was the lack of titles, although it appears De Forrest should have used stereophonic sound to please the Sydney critic who commented on the problem of localization of the voices on a big screen!

Their Rushcutters Bay, Sydney, studio was opened by the Minister for Trade and Customs, Senator Herbert E. Pratten,

on 6 April 1927, in a film that captured his speech at the opening ceremony. The studio was built in the old cable-tram sheds at Rushcutters Bay, which were converted into a sound studio, enabling the company to, at last, commence local production, and distribution of films, as well as proper demonstrations now being possible at a higher level.

At the opening ceremony of the new studio, the company issued a policy announcement offering the system to any interested local exhibitors.

In the statement, Captain Hawkins mentioned that a projectionist could learn all he would need to know in 24 hours, and added:

"The Company is prepared to offer showmen service on the following lines:

(1) The exclusive rights for Phonofilms will be sold under a contract system covering a period, to only one showman in each district or town.

(2) This Company will install the necessary apparatus at its own expense, and during the term of the contract, its expert, at no expense to the showman, will keep in constant touch to instruct a new operator to do anything that may be required of him.

(3) Under the contract also, this Company will supply to the showman, at no extra expense to him, a regular program of Phonofilm, varying from 1000 to 2000 ft., or more, as the case may be, and will do this bi-weekly or tri-weekly, as may be required.

(4) Following the signing of the contract, the apparatus will be installed in the various districts in the order in which the contracts were made."

The arrival of the Duke of York was the first actuality film shot, the sound being recorded by a land-line to the studios. On the Sunday, the sound cameras recorded the children's welcome to the Duke and the Renown Band performing in his honour at Taronga Park Zoo. The completed films were shown to the Press at the new studios the following week, and they were very well received. Favourable comments were made on the unique atmosphere evoked by the actuality films; the speeches, cheering crowds, and the general effects gave an apparition never before achieved with the silent newsreel. They went on to make a sound-on-film recording of the Duke of York's speech at the opening of Parliament in Canberra. This film was made under some difficulty as De Forrest only had rights to film the opening, not to record the sound. They got around the problem by taking the speech off a radio broadcast in Sydney and marrying it up to the film shot by Walter Sully in Canberra, although this proved to be not very satisfactory due to the sound breaking-up on several occasions. Although at this time, more than 50 British and 100 U.S. cinemas were equipped with Phonofilm apparatus, the Australians were less inclined to give it a go. Besides the Prince Edward demonstrations of 1926, the only other known takers were the Lyceum in 1927, the Melbourne Majestic, with its six week season from July 23 to September 10, 1927, and a



lone suburban exhibitor, Harold V. Hoskins who signed up his Lindfield Theatre for a 12 month contract. Unfortunately, no details exist of Hoskins' programs, although those of the Melbourne majestic included President Coolidge's speech, Colonel Lindbergh, the Radio Franks singing Hoorah for Radio, a short entitled Jazz versus Opera, Dick Henderson with Straight Bananas and Club Alabama, a saxophone sextet performing Hoak and Liebestraum, and an unidentified singer rendering Mighty Like a Rose. Of these, the Radio Franks (Messrs Wright and Bessinger, tenor and baritone) came to light in a trunk found at Windsor, N.S.W.

The Melbourne Argus of July 23, 1927, reported inter alia, that ". . . in every case, the sound synchronized exactly with the corresponding actions. Some sounds were too faint and others were distorted, but the trouble appeared to be principally due to the loudspeakers used to reproduce the sound. At times the volume and pitch varied, but that, too, appeared to be due to altered adjustment on the speakers."

We must remember that at this time, there were no perforated screens and at the Prince Edward in Sydney, for example, several loudspeakers were placed on the stage, with one each side of the front stalls for reinforcement.

Arthur Hansen was a cameraman for the company, along with Len Jordan who set up the studio and did the lab work, and Mill as sound technician, all under the supervision of De Forrest's right hand man Harry Jones from America. Mill had a fallout with the company and was subsequently replaced by Ward.

Just as the company was starting to gain a foothold with sound-on-film, with much interest from both exhibitors and public alike, they wound down their activities because of a lack of trained production personnel and a shortage of films. This forced De Forrest to sell his operation to M. A. Schlesinger, of London and South Africa in August 1928. There is little doubt that De Forrest was in financial difficulties throughout 1927, also there was the matter of a court case against Case Laboratories for patent infringement, which matter never got past the filing stage, lapsing for want of time.

Mention is made above about some De Forrest shorts found in an old trunk at Windsor N.S.W. in early 1976. This was an unexpected bonus that came with the purchase of an old trunk for \$3 at a clearance auction. Inside the trunk were five complete De Forrest shorts: The Antidote - a short 1200ft drama, The Bubble - a musical short, I'm in Love Again - dancing and music, Remember and Hoorah for radio - two songs by the Franks. All the films were in an excellent state of preservation and now have copies, re-synched for modern projectors, housed in the National Film Archive of Australia. There is no trace of any of the company's Australian production.

[Home](#)