

THE FRANKLIN INSTITUTE OF THE STATE OF PENNSYLVANIA
FOR THE PROMOTION OF THE MECHANIC ARTS

Hall of the Institute,

Philadelphia, December 4, 1929.

Report No. 2914.

Investigating The Work of Mr. William N. Jennings,

of Philadelphia, Pennsylvania,

in the Photography of Flashes of Lightning.

Application dated _____

THE FRANKLIN INSTITUTE OF THE STATE OF PENNSYLVANIA

For the Promotion of the Mechanic Arts

Committee on Science and
the Arts Case No. 2914.

Hall of the Institute,
Philadelphia, December 4, 1929.

The Franklin Institute of the State of Pennsylvania, acting through its Committee on Science and the Arts, investigating the Work of Mr. William N. Jennings of Philadelphia, Pennsylvania, in the Photography of Lightning, reports as follows:

About fifty years ago, Mr. W. N. Jennings, at that time a young man employed by the Pennsylvania Railroad, became interested in photography and purchased his first photographic outfit from John Carbutt, the manufacturer of the Carbutt plates. This was a simple outfit consisting of a Scoville 4 x 5 camera fitted with a single Waterbury lens.

Being of a scientific turn of mind, after getting acquainted with the use of the apparatus for the ordinary work of exposure, development and printing, he began to take photographs out of the ordinary, making many photographs for the Pennsylvania Railroad.

Becoming interested in the lightning displays accompanying thunder storms, he began to consider the possibility of making a photograph

1 of a lightning flash for the especial purpose of finding out whether the zig-
2 zag form, as pictured by artists, was correct or not.

3 This work was begun in the summer of 1881 and the attempts proved
4 to be failures because the photographic plates were not sensitive enough to make
5 a record of the extremely short exposure.

6 In the meantime Carbutt had been developing a more sensitive
7 emulsion and in the late summer of 1882 furnished Mr. Jennings with a box of
8 "Rapid Eclipse" plates, with one of which Mr. Jennings made his first photo-
9 graph of a lightning flash on the evening of September 2, 1882, Plate I. This
10 photograph showed a main flash with three branches toward the ground, having
11 an irregular path but nothing of a zig-zag form, confirming Mr. Jennings' sus-
12 picion that such a path existed only in the mind of the artist.

13 His next successful lightning photograph, Plate II, was made
14 on the night of August 1, 1885, though he had made many exposures since 1882.
15 A print of this photograph was sent to the Scientific American with a letter
16 describing it and both were published in the issue of that Journal for September
17 5, 1885.

18 In the years that followed, Mr. Jennings took a great number of
19 lightning photographs, finding that while there was a great diversity of paths,
20 in no case was the zig-zag path ever found.

21 From the photographic plates made during these years, Mr. Jennings
22 made many lantern slides and used them to illustrate the lectures and addresses
23 that he gave on the subject. These lectures were given before scientific bodies
24 for several years, a number of them at The Franklin Institute and always illus-
25 trated with his lantern slides.

1 Many articles were printed in various Journals on different phases
2 of the subject. The "Photographic Times" printed an article on "Photographing
3 Lightning" in the issue of May 16, 1890 and another on "The Revenge of Jove" in
4 the same Journal on December 16, 1892. "Jove's Autograph", an illustrated
5 article, was published in "Electricity" on September 30, 1891 and a lecture with
6 lantern slide illustrations was given before the Electrical Section of The
7 Franklin Institute on November 5, 1891.

8 On invitation he gave an illustrated lecture on "Lightning
9 Flashes" at a meeting of the Royal Photographic Society of London, on March
10 23, 1897, which was reported in the "Photographic Journal" for April 30th of
11 that year. He also exhibited a group of his photographs of lightning at the
12 Imperial Victorian Exhibition at the Crystal Palace in September, 1897.

13 The publication of these lectures with the pictures of lightning
14 attracted a great deal of attention and Mr. Jennings received many letters from
15 well known scientists congratulating him on his results and discussing the mean-
16 ing of the different forms obtained.

17 Among these correspondents are: Joseph Leidy who wrote on
18 December 10, 1885 and said in acknowledging the receipt of a photograph of
19 lightning: "It is truly excellent, I had no idea such could be taken. I shall
20 take the opportunity of exhibiting it at a meeting of the Academy of Natural
21 Sciences"; Doctor Henry G. Piffard, the father of flashlight photography, also
22 wrote to express his appreciation of Mr. Jennings' work. Professor John
23 Trowbridge of Harvard, having heard of Mr. Jennings' work through Cleveland
24 Abbe, wrote for copies of the photographs and on receiving them wrote on May
25 8, 1899, "I wish to express my thanks for the remarkable photographs of light-

1 ning discharges which you have kindly sent to me. They are more striking and
2 varied than any I have seen. I shall take pleasure in calling the attention
3 of my students to them".

4 Cleveland Abbe, under date of February 6, 1899, wrote that he
5 was preparing an article on lightning for the Monthly Weather Review and on
6 receipt of some photographs from Mr. Jennings for this article said, "I think
7 your contributions are among the most interesting and valuable that we have".
8 M. G. Pellissier wrote from Paris on April 20, 1894, referring to the fact
9 that he had published an article in "La Lumiere Electrique" in which he had
10 described Mr. Jennings' photographs, having reproduced the illustrations from
11 the Journal of The Franklin Institute. A number of letters were received
12 from John Tyndall from 1885 to 1892. In a letter under date of June 22, 1892,
13 he says: "I hope you have preserved all your photographs. They will in the
14 end form a collection of the highest interest and importance. They are full
15 of interest, and will probably throw light upon some obscure points in the
16 subject of electricity". In another letter he says: "I owe you, and offer
17 you, my very best thanks for the exquisite photograph of a lightning flash
18 which you have been good enough to send me. Nothing so beautiful as your
19 successes in this line ever came under my observation".

20 This list of correspondents can be extended by including the
21 names of S. P. Langley, C. A. Young, John A. Brashear, Willis L. Moore, Edward
22 C. Pickering, Nikola Tesla and others, all of whom were interested in some
23 phase of Mr. Jennings' work.

24 One of the most beautiful types of the lightning discharges
25 photographed by Mr. Jennings was made on June 1, 1897 and called by him a

1 "branched" discharge. This is shown in Plate III and is remarkable for the
2 delicacy of the tracings of the terminal branches. Another form, extremely
3 rare, was photographed by Mr. Jennings and called by him, beaded lightning.
4 A print of this was included in his group of lightning pictures exhibited at
5 the World's Fair in Chicago in 1893 and is shown in Plate IV. M. Pellissier
6 was greatly interested in this photograph and published an illustration and
7 an article regarding Mr. Jennings' work in "La Nature" of April 24, 1894,
8 calling the photograph, the rosary.

9 A form called a "ribbon" photograph was made by Mr. Jennings
10 from the rear platform of an express train during a thunder storm one night
11 while crossing the prairies of North Dakota, Plate V. Mr. Jennings described
12 this discharge in an article in the Journal of The Franklin Institute and said,
13 "When lightning has once opened up a path in space, that is the line of least
14 resistance along which other discharges oscillate at short intervals. If
15 this path is moved by the wind, the subsequent discharge will take the form
16 of a ribbon. If the camera is moved across the path of what appears to be a
17 single discharge, we shall get the ribbon effect."

18 The possibility of producing the ribbon effect by a current of
19 air blowing across the direction of the electric discharge was proved in a
20 series of experiments made by Professor A. W. Goodspeed and Mr. Jennings in
21 the laboratory of the University of Pennsylvania by blowing a blast of air
22 across the direction of a single spark from an induction coil. The result
23 of this experiment is shown in Plate VI.

24 The fact that sometimes a lightning flash prepares a path for
25 successive flashes either in the same path or in one parallel to it, forming

1 a multiple flash, is shown in Plate VII. This was taken as a single flash,
2 the one at the right being the first and the other showing as a multiple or
3 ribbon flash.

4 In order to show that the lightning flash does not confine it-
5 self to one plane, Mr. Jennings placed two similar cameras, one hundred feet
6 apart, and obtained two negatives of the same discharge from which he made
7 prints for use in the stereoscope, Plate VIII. These were shown first at a
8 meeting of The Franklin Institute on May 18, 1892.

9 A form of lightning discharge that takes place from cloud to
10 cloud and is called a meandering flash is shown in Plate IX. This is liable
11 to take place near the end of a storm.

12 A very excellent example of an unusual flash is shown in Plate
13 X. While the main flash is of dazzling brilliancy the side branches are dark.
14 This phenomenon has given rise to a great deal of discussion as to its cause.

15 Mr. Jennings' article describing his photographs of lightning
16 were published in many American and foreign journals and he is known as a
17 pioneer in this field.

18 The Institute has been unable to find that any photograph was
19 taken prior to Mr. Jennings' photograph in 1882.

20 To succeed in photographing a lightning flash with the equip-
21 ment available in the early '80's was an achievement of no small proportions.
22 Furthermore, the photographs of Mr. Jennings' awakened a lively interest in
23 scientists both in this country and abroad as is amply attested by the many
24 letters received by him at the time.

25 In consideration of his pioneer work in the photography of

1 flashes of lightning, THE FRANKLIN INSTITUTE awards its JOHN PRICE WETHERILL
2 MEDAL to MR. WILLIAM N. JENNINGS, of Philadelphia, Pennsylvania.



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4 *Nauman Hayward*
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5 President.

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7 *Howard McClellan*
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8 Secretary.

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11 *Thomas D. Cope*
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12 Chairman of the Committee on
13 Science and the Arts.

COMMITTEE ON SCIENCE AND THE ARTS, THE FRANKLIN INSTITUTE

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PLATE I.



PLATE II.

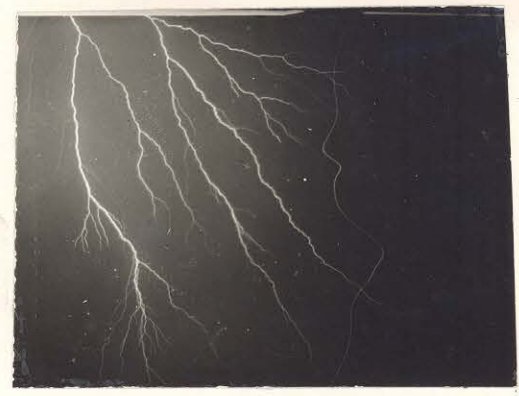


PLATE III.

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PLATE IV.

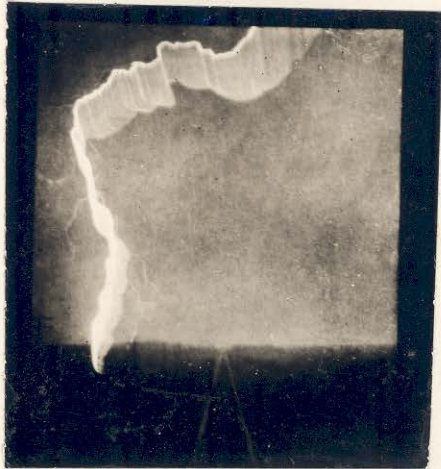


PLATE V.

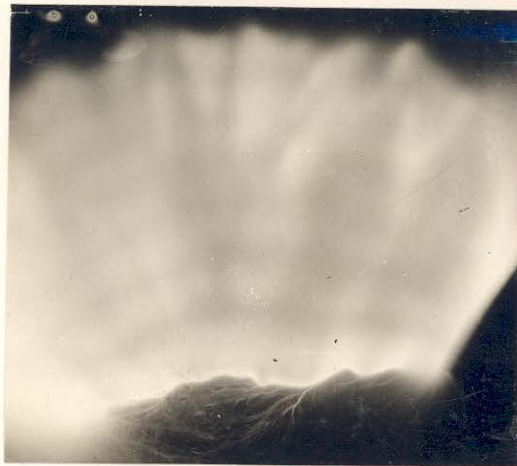


PLATE VI.

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PLATE VII.



PLATE VIII.



PLATE IX.

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PLATE X.