(No Model.)

E. G. W. C. HOFFMANN.

LIGHTNING ARRESTER.

No. 553,528. Patented Jan. 28, 1896.

Fig 1.

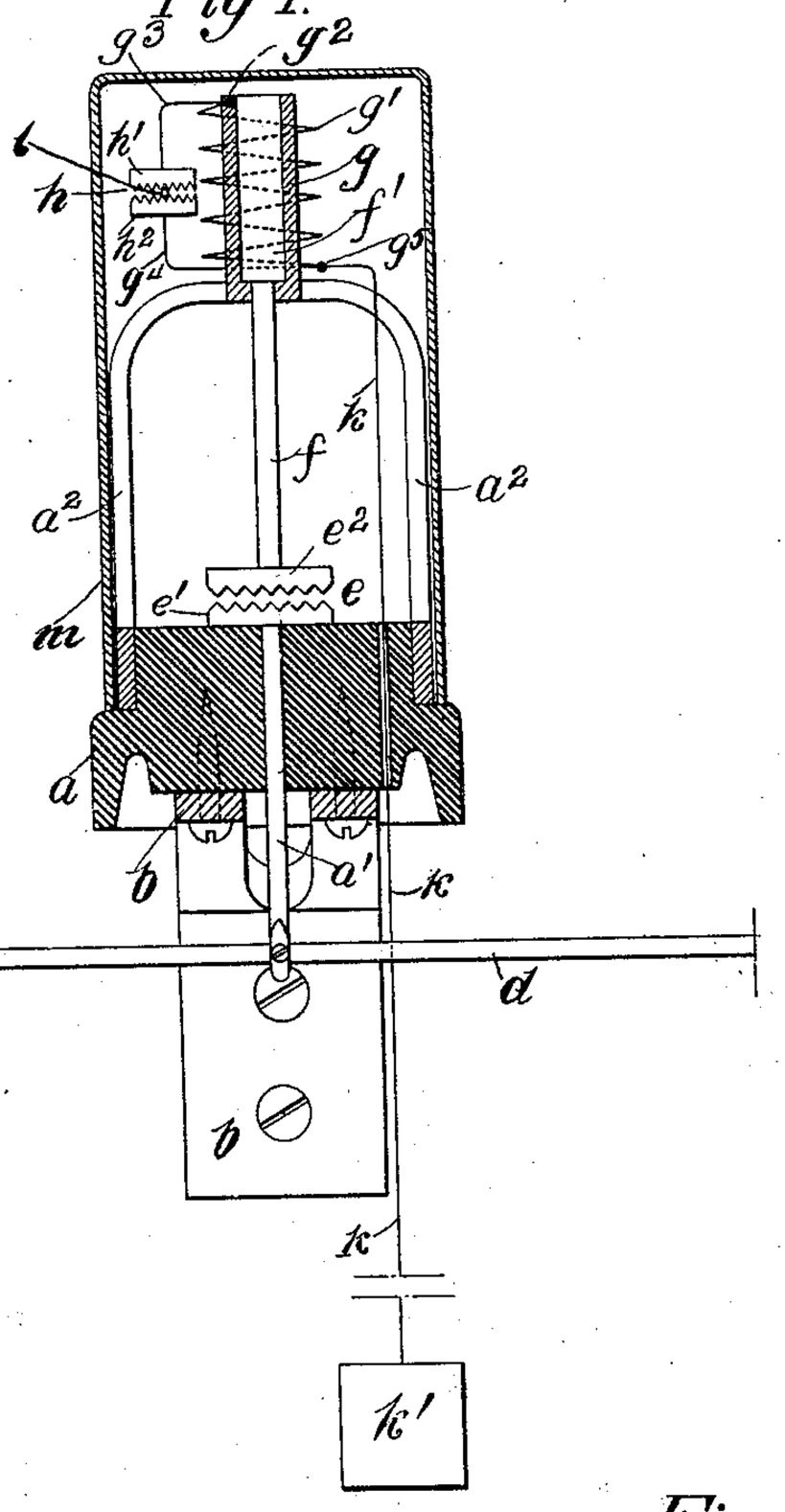

Fig 2.

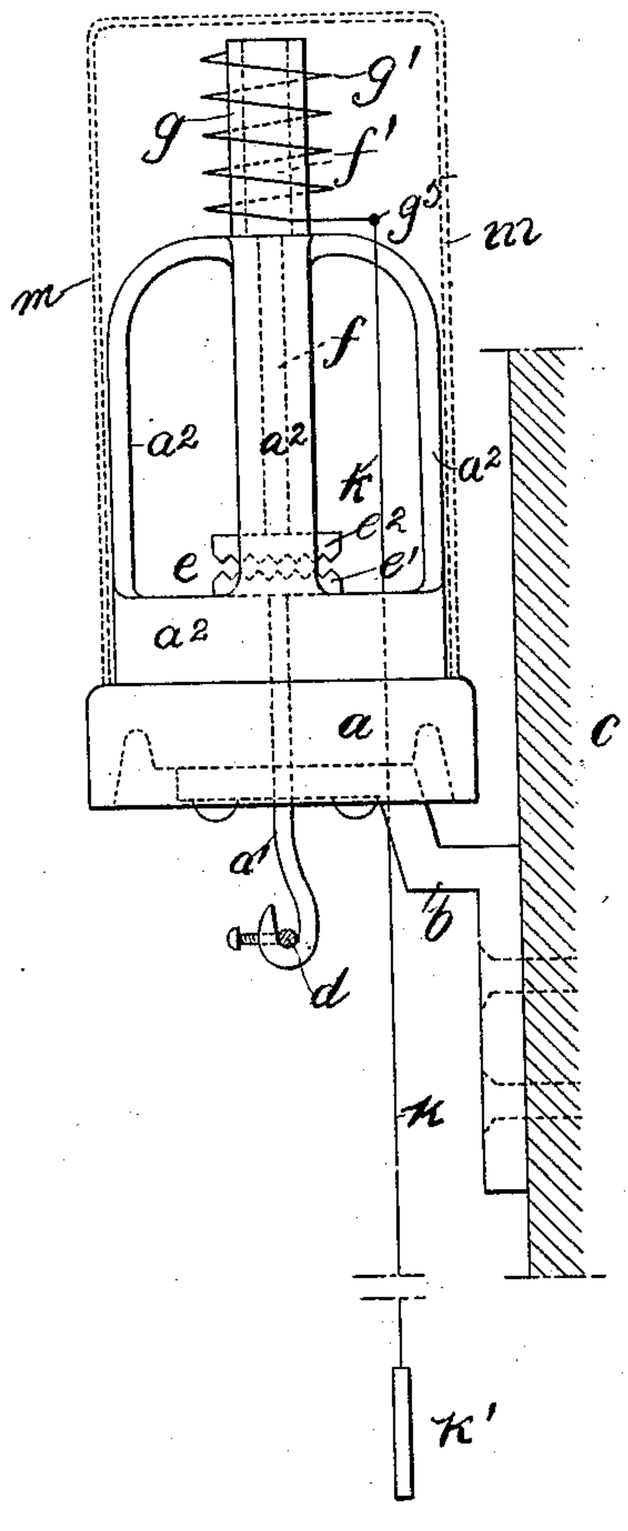

Fig 3.

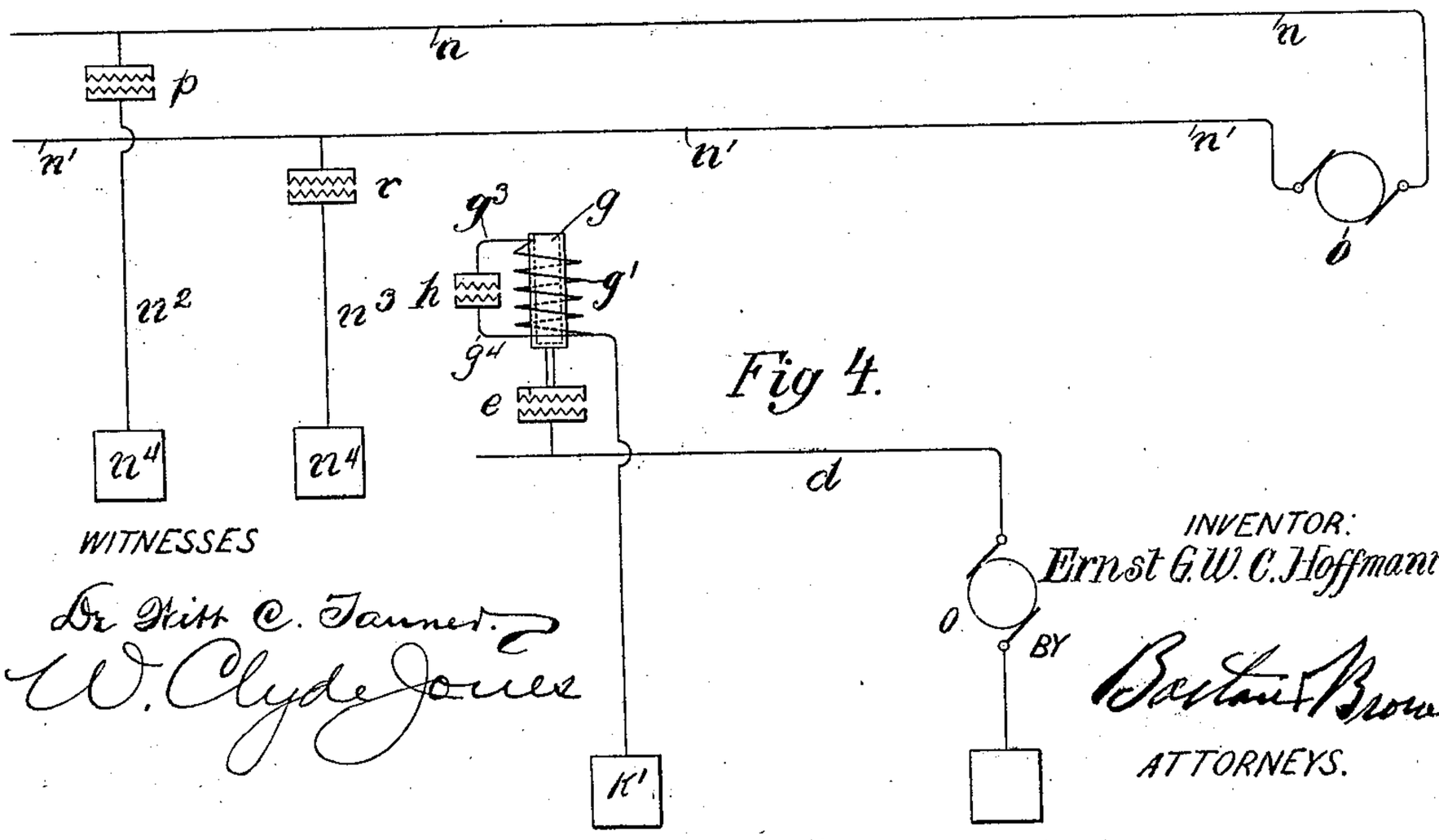

Fig 4.

WITNESSES

Dr Fitz C. Tanner.

W. Clyde Jones

INVENTOR:

Ernst G.W.C. Hoffmann

BY

Baxter Brown

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ERNST GUSTAV WILHELM CARL HOFFMANN, OF CHARLOTTENBURG, GERMANY, ASSIGNOR TO THE SIEMENS & HALSKE ELECTRIC COMPANY OF AMERICA, OF CHICAGO, ILLINOIS.

LIGHTNING-ARRESTER.

SPECIFICATION forming part of Letters Patent No. 553,528, dated January 28, 1896.

Application filed September 3, 1895. Serial No. 561,221. (No model.)

To all whom it may concern:

Be it known that I, ERNST GUSTAV WILHELM CARL HOFFMANN, a subject of the Emperor of Germany, residing at Charlottenburg, near Berlin, Germany, have invented new and useful Improvements in Lightning-Arresters with Arc-Extinguishing Devices, (Case No. 629,) of which the following is a specification.

This invention relates to an improved combined lightning-arresting and arc-extinguishing device for use with electric conductors, and has for its object to provide a simple, inexpensive, automatic and efficient device of this character which will prevent injury to the dynamo or other electrical apparatus, while avoiding short-circuiting of the current through the earth when the conductor or conductors are struck by lightning.

Reference is to be had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a central vertical sectional elevation of the lightning-arresting and arc-extinguisher device and a portion of the line conductor. Fig. 2 is a view taken at right angles to Fig. 1, with the casing indicated by dotted lines; and Figs. 3 and 4 are illustrative diagrams hereinafter referred to.

Like letters refer to like parts in the several figures.

The base portion a of the device is made of any suitable non-conductive or insulating material and is held by a bracket b to a cross-bar or post or other support c. The line-wire or electric conductor d is suitably held in the lower hook end of a metal rod a', which passes through the insulated base a, and at its upper end is electrically connected with the lower metal plate, e', of a primary arrester device e, which rests on the base a. The upper metal plate, e^2, of this arrester e is fastened to the lower end of a metal rod f, which at its upper end carries a shouldered head f', which by resting on the bottom of the hollow conductive core g, within which said head f' may move, sustains the arrester-plate e^2 at proper normal distance above the opposing plate e'. The core g is supported by a skeleton frame a^2 from the base a, and around it is wound the wire g', thus making a solenoidal magnet of usual form capable of attracting and drawing upward the rod $f\,f'$ and plate e^2 of the arrester e, as hereinafter described.

From one end, g^2 of the coil g' a wire g^3 extends to the upper fixed plate, h', of another and secondary arrester device h, the lower fixed plate, h^2, of which is connected by a wire g^4 with the other end, g^5, of the solenoid-coil g', whence a wire k extends to a suitable ground or earth plate k'. Between the plates h' h^2 of the arrester h is preferably placed a small fusible conductive body l to facilitate passage of lightning across the space between the plates. The two opposing plates of the arresters e h are preferably serrated, as is usual with devices of this character. A suitable inverted-cup casing m supported on the insulated base a protects the parts from rain or snow or adverse weather influences.

In order to more clearly explain the operation of my invention, I produce by way of comparison the illustrative diagram, Fig. 3, which indicates supply and return conductors n n', connected to a dynamo o and grounded by wires n^2 n^3 and corresponding earth-plates n^4, said ground-wires having ordinary two-plate lightning-arresters p r, respectively. In this instance, should lightning strike one of the conductors—say the line n—it would pass through or across arrester p to ground, and should the plates of the arrester be melted together by the stroke, and should there happen to be a slight ground connection, a constant loss of current of or from the dynamo would result.

Should lightning strike both lines n n' simultaneously, it would jump by heavy light arcs across between the plates of the two arresters p r to the earth connections and short-circuit the line through the dynamo and injure the machine, the current in this case being along line n, across arrester p, on wire n^2, through the earth and ground connections n, wire n^3, arrester r, and along wire n' to the dynamo. Should there be but one supply-conductor having a two-plate lightning-arrester, and the return be made through the earth, as in electric-railway systems, lightning striking the conductor would short-cir-

cuit the current through the dynamo and cut out the main line, while injuring the machine.

The diagram Fig. 4 illustrates the application of my invention when the line-wire *d* is a supply-conductor and the return to the dynamo is through the earth. It will be understood, however, that when two wires are used for supply and return conductors, as in Fig. 3, the arrester devices are applied to both conductors.

Referring now to Fig. 4 and also to Fig. 1 of the drawings, it will be seen that should lightning strike the line-wire *d* it will pass through the hanger *a'* and across between the plates e' e^2 of arrester *e*, and through the rod *f* to conductive core *g*, thence to connection g^2 and wire g^3, and through the plates h' h^2 and interposed fusible metal *l* of arrester *h*, and thence by wire g^4 to connection g^5, and by wire *k* to ground. Only a very small part of the static lightning-discharge will pass into or through the solenoid-coil *g'*, due to its resistance, and the rod f' *f* will not be drawn upward within the core *g*. A heavy current from the dynamo *via* line *d* and following the lightning will, however, traverse the solenoid-coil and energize its core *g* sufficiently to draw upward the rod f' *f*, and also the connected plate e^2, and thus separate the plates e' e^2 of arrester *e* sufficiently to automatically extinguish the arc between it wholly and normally to the line-wire *d* without injury to the arrester devices or the dynamo-machine. Immediately the arc is extinguished at the arrester *e*, the solenoid loses its attraction, and the upper plate, e^2, of this arrester falls, and the parts are restored to normal relative positions, (shown in Fig. 1 of the drawings,) ready for the next lightning-stroke of the line-wire. The fusible body *l*, which had facilitated passage of the static current through the opposing plates h' h^2 of arrester *h*, will be melted by the lightning, thus leaving an open space between the plates, ready for the next static discharge, and indicating by the melting of said body *l* that the apparatus has been struck by lightning.

I claim as my invention—

1. A lightning arrester for electric conductors, comprising primary and secondary arrester devices in circuit between the conductor and the earth, and a solenoid magnet interposed in circuit with the two arrester devices and controlling the arc of the primary arrester device; the secondary arrester having a fusible body interposed between its opposing plates or portions to facilitate the passage of the electrical discharge, substantially as described.

2. The combination, in a lightning arrester for electric conductors, of an insulated base *a*, a line wire support as *a'* held thereby and carrying a plate *e'*, a support a^2 on the base *a*, a conductive core *g* and solenoidal wire coil *g'* thereon, sustained by the support a^2, a rod f', *f* held by core *g* and carrying a plate e^2, said opposed plates e', e^2 forming a primary arrester *e;* wires g^3, g^4 connected with opposite ends of coil *g'*, a secondary arrester *h*, comprising opposing plates h', h^2 in circuit with wires g^3, g^4, and a ground connection *k* from the junction g^5 of the coil *g'* and wire g^4, substantially as described.

In testimony whereof I have affixed my signature in the presence of two witnesses.

ERNST GUSTAV WILHELM CARL HOFFMANN.

Witnesses:
OSCAR KIELEFELD,
JOHN B. JACKSON.