J. G. BALSILLIE.

PROCESS AND APPARATUS FOR PROCURING AND STIMULATING RAINFALL.

APPLICATION FILED DEC. 23, 1916.

1,284,982. Patented Nov. 19, 1918.

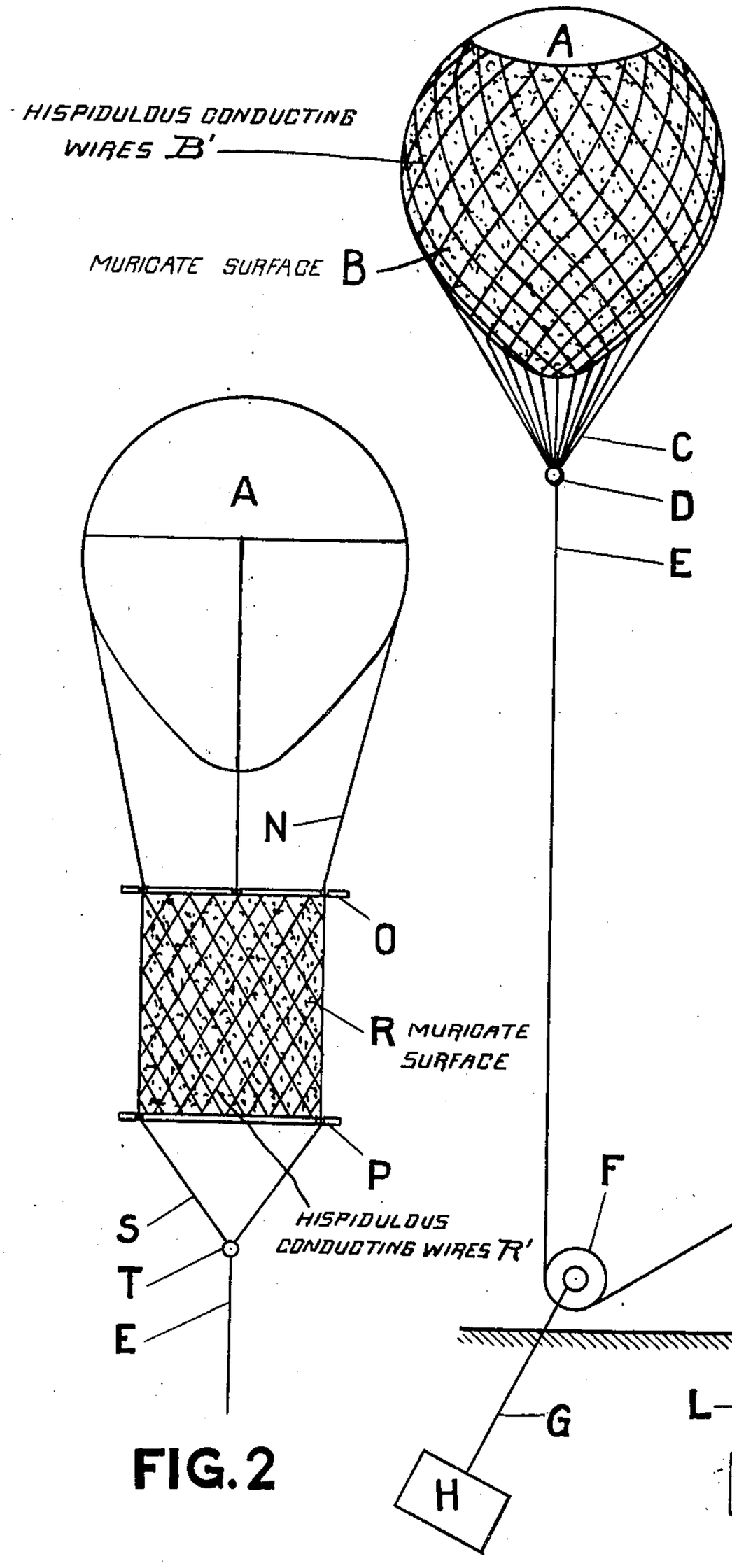

FIG. 3

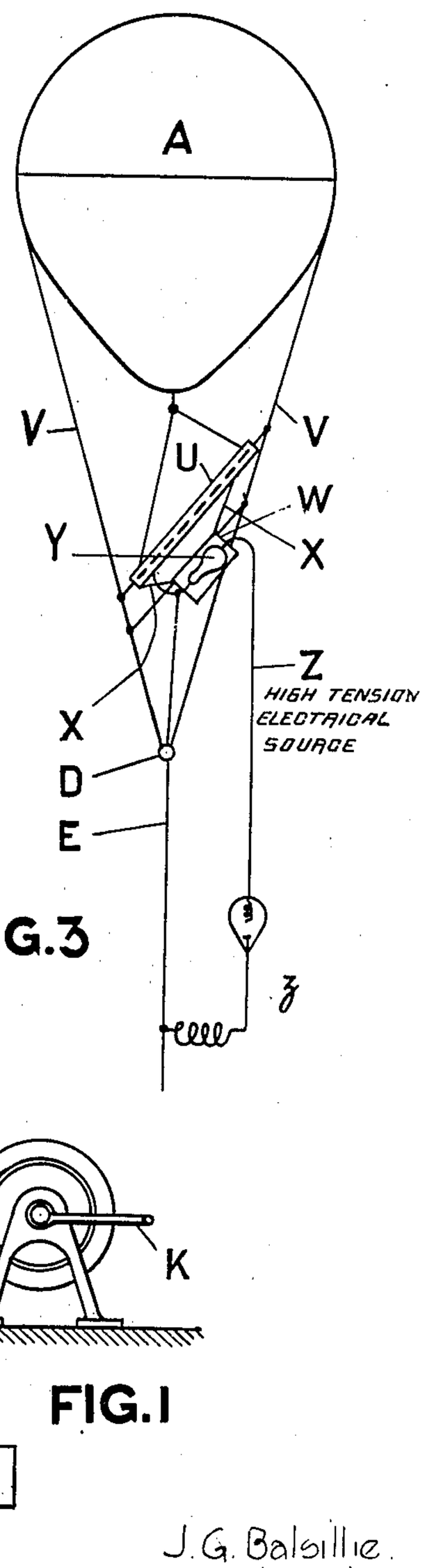

FIG. 2

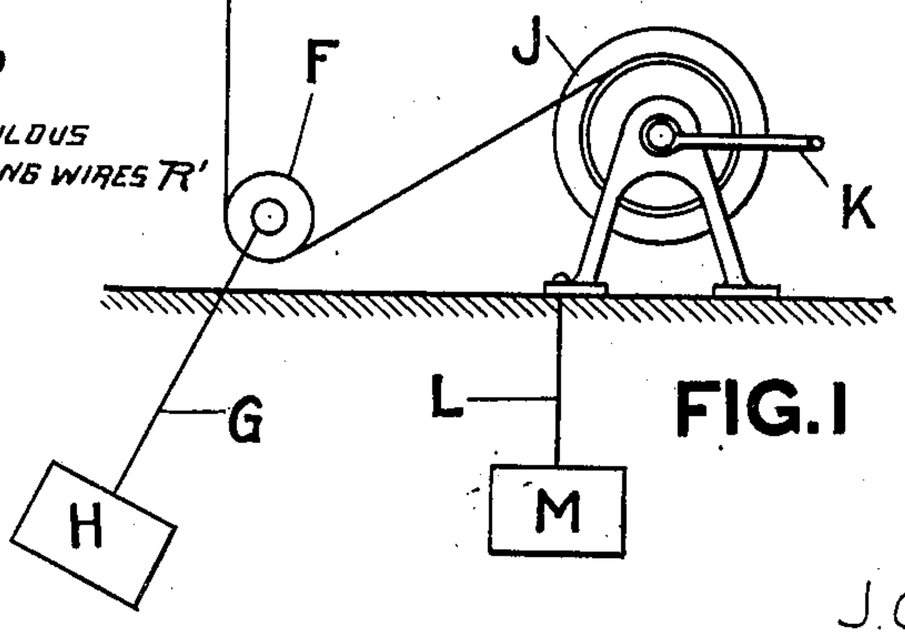

FIG. 1

J. G. Balsillie.
Inventor.
By Elmer Gordon Marks
Attorney.

UNITED STATES PATENT OFFICE.

JOHN GRAEME BALSILLIE, OF MELBOURNE, VICTORIA, AUSTRALIA.

PROCESS AND APPARATUS FOR PROCURING AND STIMULATING RAINFALL.

1,284,982. Specification of Letters Patent. **Patented Nov. 19, 1918.**

Application filed December 23, 1916. Serial No. 138,668.

To all whom it may concern:

Be it known that I, JOHN GRAEME BALSILLIE, a subject of the King of Great Britain and Ireland, residing at 360 Collins street, Melbourne, Victoria, Australia, have invented new and useful Improvements in Processes and Apparatus for Procuring and Stimulating Rainfall, of which the following is a specification.

This invention relates to means and apparatus for procuring and stimulating rainfall by electrical agency.

The atmosphere is known to contain transient zones of electrified air, and it is also known that aqueous particles constituting clouds are invariably charged with electricity, and that the potential distribution throughout such atmospheric zones and clouds is usually uneven. It is also known that the sign and the potential gradient of regions of the atmosphere are varied or altered by these charged zones or clouds.

I have discovered that if the potential gradient between earth and such atmospheric zones and clouds is diminished or canceled, particularly at times preceding rainfall, or at times when rain is falling, rainfall is procured or stimulated.

My present invention consists in means for utilizing this discovery for procuring and stimulating rainfall.

In carrying out my invention an electrical conductor is used to form a path for flow of energy between earth and such atmospheric zone or cloud, said conductor being connected to a good electrical earth at the lower end, and at the upper end having a terminal of electrically conductive material.

To secure practically effective electrical connection between the terminal and such atmospheric zone or cloud, it is necessary that the terminal have upon it great numbers of fine metallic points to effect intrinsic contact therewith, mere superficial contact with a plane surfaced terminal of whatever practical size being of small effective value. This terminal is therefore muricated, that is, constituted of a mat or fabric sheet of considerable surface, constructed of or including in its structure hispidulous conductive wires, tapes, or filaments, which provide it with a great multiplicity of electrically conductive points or edges. This mat or sheet is closely covered with such wires, tapes, or filaments, and is made of the largest practicable size; a dimension of 2 to 10 square yards is ordinarily effective.

It is also possible to augment the connection of the terminal to an atmospheric zone or cloud by directing Röntgen rays on to such terminal, which in this case may be an extensive plane or muricate conductive surface connected to the earthed conductor. Practical difficulties are, however, involved in using Röntgen rays for this purpose, and it is preferred to operate without them.

In the accompanying semi-diagrammatic drawings,—

Figure 1 represents a balloon station in which the aerial terminal is clothed on the balloon envelop. Fig. 2 represents an alternative arrangement of the same in which the aerial terminal is suspended from the balloon. Fig. 3 represents an arrangement which may be adopted when a Röntgen tube is used in connection with the aerial terminal for establishing effective conductivity between the earthed conductor and the atmospheric region to be tapped.

A is a balloon having sufficient surplus buoyancy at high elevation to support the hereinafter described parts pendent from it. As shown in Fig. 1, the envelop of the balloon is inclosed in a conductive muricate fabric B, indicated diagrammatically by the dotted or stippled surface and the balloon is fastened by stirrup C and coupler D to a conductive leash or tail rope E. This conductive leash or tail rope forms the earth conductor. It is electrically connected at the upper end to the hispidulous wires, tapes or filaments woven in the cover B on the balloon envelop and indicated diagrammatically by the lines B′, Fig. 1. At the foot, the leash or tail rope E is carried around a snatch block F, which is secured, as shown at G, to an earth anchor H, said anchor and connection serving also to electrically earth the block F and through it to earth the conductor E. The fall of the conductor E is wound on the barrel of a winch J, and said winch is fitted with a crank handle K or a power attachment whereby the leash may be paid out or hauled in as required. As a safety precaution, the winch may be earthed by a line L leading to an earth plate M.

In the arrangement shown in Fig. 2, a gaff O is carried by suspensory lines N from the balloon A, and between the gaff O and a parallel gaff P an area of muricate conduc-

tive material R is supported. The lower gaff P is connected by lines S to a coupler T at the head of the conductive leash or tail rope E, and said leash or tail rope is electrically connected to the hispidulous wires, tapes or filaments R′ contained in the muricate terminal R.

As shown in Fig. 3, a muricate terminal, such as R, (Fig. 2) is carried on a frame U, hung by the suspensory lines V from the balloon in an angular position, and a box of oiled silk or other protective material W is supported by slings X from the frame U. Within the box W a Röntgen ray tube Y is connected between the earthed conductor E and a separate pendent conductor Z. The tube Y is positioned in the box W so that its rays are directed on to the muricate terminal surface contained in the frame U. Obviously any other method of supporting the Röntgen tube in proximity to the muricate terminal may be adopted, and in the case of the arrangement shown in Fig. 1, the tube would be supported by the stirrup C. The conductors E and Z are respectively connected to a suitable source of high tension electrical energy *z* located on earth.

The efficiency of the terminal to establish electrical connection is improved by supporting it so that the air may blow freely through it.

When it is required to obtain more general rainfall than is procured by the operation of a single station as already described, a plurality of such stations may be used, situated at considerable distances apart—say 1 to 10 miles—and preferably arranged in a linear row transverse of the prevalent wind direction. These several stations operate simultaneously.

When wind conditions are favorable, a box kite is preferably used instead of a balloon as an aerial support for the terminal and the pendent conductor or conductors.

Alternately, muricate conducting surfaces may be used on the kite planes in place of similar surfaces suspended therefrom.

In operation, the balloon or kite is maintained continuously, subject to weather interference, at an elevation of 3,000 to 6,000 feet, more or less, above the earth's surface, higher elevation being desirable in irregular or hilly country.

At times when the terminal is, by reason of its conductive connection to earth, at a potential different from the potential of the atmospheric zone or cloud in which it is supported, energy will pass, and said potential difference will thereby be diminished or canceled; precipitation of rain thereafter supervenes, usually after an interval of several hours, the maximum concentration of fall usually occurring to the leeward of the station.

What I claim as my invention and desire to secure by Letters Patent is:—

1. A process for procuring and stimulating rainfall, consisting in diminishing or canceling the potential gradient existing between ground and elevated zones of atmosphere and clouds by establishing and maintaining an electrically conductive path therebetween.

2. A process for procuring and stimulating rainfall, consisting in means for establishing and maintaining intrinsic electrical connection with elevated zones of the atmosphere and clouds through a muricate terminal located therein and electrically connected to ground.

3. In apparatus for procuring and stimulating rainfall, the combination with a grounded conductor of means providing effective electrical connection between said conductor and elevated zones of the atmosphere and clouds.

4. Apparatus for the purpose herein set forth, comprising an air-borne support, a muricate conductor terminal carried thereby, a conductive leash from said terminal to earth, and means for paying out and heaving in said leash.

5. Apparatus for the purposes set forth, comprising a plurality of electric conductor stations simultaneously operating, each of said stations comprising means providing an effective electrical connection between elevated zones of the atmosphere and clouds and the ground.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN GRAEME BALSILLIE.

Witnesses:
W. I. Davis,
H. C. Campbell.