J. M. CORDRAY.

RAIN MAKER.

APPLICATION FILED AUG. 6, 1913.

1,103,490.

Patented July 14, 1914.

2 SHEETS—SHEET 1.

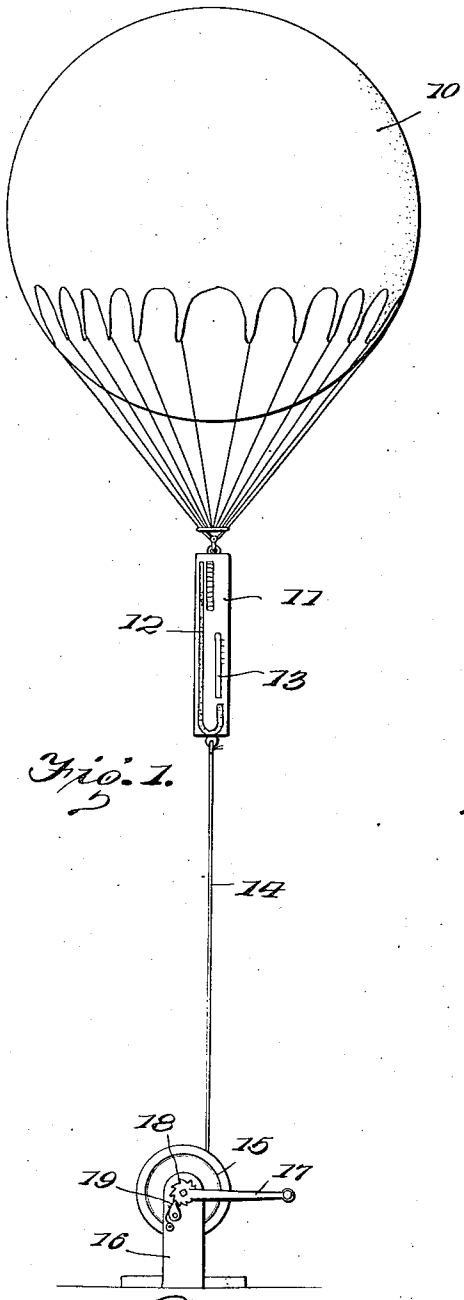

Fig. 1.

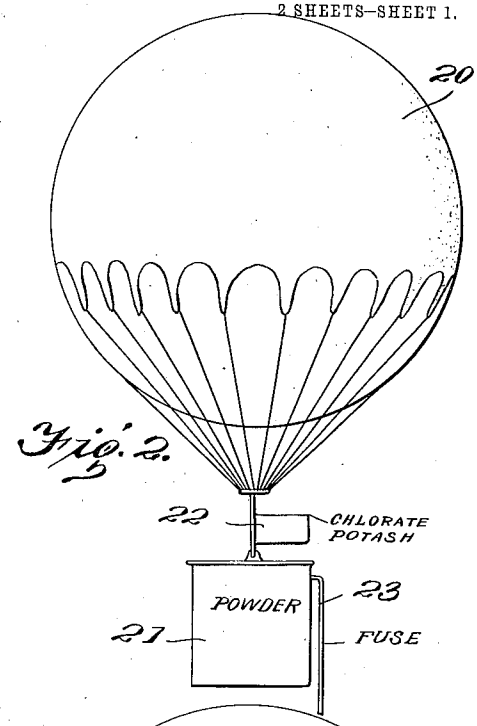

Fig. 2.

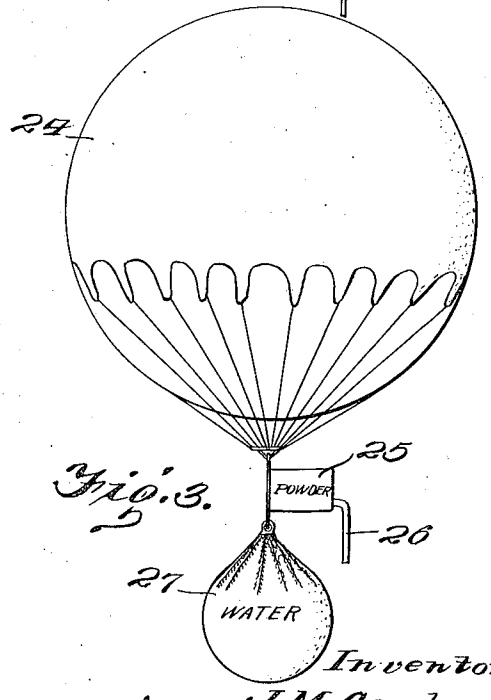

Fig. 3.

Witnesses

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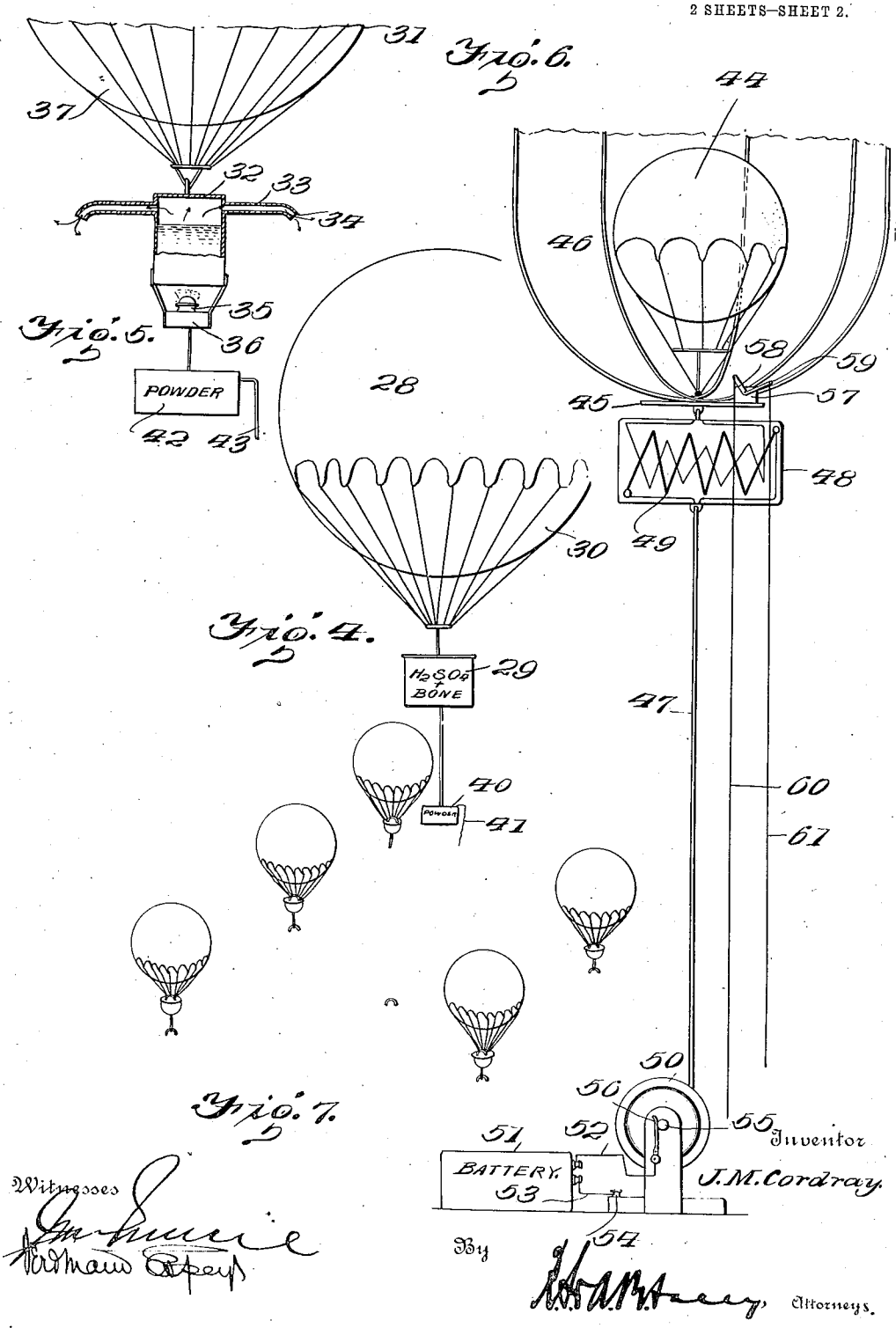

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

JAMES M. CORDRAY, OF LOS ANGELES, CALIFORNIA.

RAIN-MAKER.

1,103,490. Specification of Letters Patent. Patented July 14, 1914.

Application filed August 6, 1913. Serial No. 783,373.

To all whom it may concern:

Be it known that I, JAMES M. CORDRAY, citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Rain-Makers, of which the following is a specification.

My invention relates to methods of and apparatus for producing rain and the object of my invention is to provide a method which may be employed in those sections of the world where rain falls occur at widely separated periodic intervals to produce rain during what is ordinarily known as the dry season, although, of course, the same method may be employed in producing rain in other sections of the world during exceptionally prolonged droughts.

A further object of my invention is to accomplish this by supplying moisture, heat and nitrogen to the air at a considerable distance above the earth's surface and by violently agitating the air by means of explosives raised above the earth's surface, by balloons, kites or other suitable devices. I use explosives to agitate the atmosphere and with the nitrogen used, cause a moist condition to prevail, producing rain.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings, and then specifically pointed out in the claims which are attached to and form a part of this application.

In the drawings: Figure 1 illustrates a tethered balloon employed in testing the conditions of the atmosphere to determine the exact method or treatment to pursue; Fig. 2 illustrates one of a number of balloons employed in raising powder and chlorid of potash and exploding the powder and so scattering the potash; Fig. 3 illustrates one of a number of balloons employed in raising powder and water, the powder being exploded to scatter the water; Fig. 4 illustrates one of a number of balloons to be employed in raising a tank containing sulfuric acid and crushed bone, the bone and acid being intended as a ready means for generating nitrogen; Fig. 5 is a fragmentary view illustrating one of a number of balloons employed in raising water in tanks, the tanks being provided with a heater by means of which the water contained therein may be turned to steam to moisten and warm the atmosphere; Fig. 6 is a view showing a tethered balloon employed in electrically treating the atmosphere; Fig. 7 is a diagrammatic view, showing the manner in which the balloons shown in Figs. 2, 3, 4 and 5 are sent up in groups, 5 balloons of each type being sent up together.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

In order to insure a clear understanding of the principles upon which my method depends for its efficient operation, it will be noted that the most favorable conditions for rain are that the atmosphere be moist and uniform in density and that the wind, if any, be comparatively steady rather than gusty and that the atmospheric temperature be approximately between fifty and fifty-five degrees Fahrenheit.

In carrying out my invention I provide means for regulating the above conditions and thus producing rain. It will of course be apparent that in order to intelligently carry out the rain producing operation, it is necessary to first have an accurate knowledge of the atmospheric condition at the place and time of operation. In order to obtain this knowledge I provide a gas balloon 10 which is preferably filled with acetylene gas and which carries a support 11 upon which is mounted a barometer 12, thermometer 13 and any other instruments which may be necessary to determine the pressure, temperature, moisture of the air and the strength of the winds, such instruments not being described in detail as they form no part of the present invention.

A cable 14 is firmly secured by one end to the free end of the support 11 and by its other end to a winding drum 15 carried by a frame 16 which is firmly anchored or otherwise fixed to the ground. This winding drum is provided with a hand crank or windlass 17 by means of which the cable may be wound thereon, with a ratchet 18 and with a spring pressed pawl 19 engaging the ratchet to prevent unwinding of the cable therefrom, except as desired.

The first operation in the producing of rain under my improved method, consists in sending up the above described balloon

with the various instruments supported thereby to such a height as may be deemed advisable, permitting the same to remain at this height until the instruments have had an opportunity to register the atmospheric conditions and in then drawing the balloon back to earth by means of the windlass and winding drum and reading the various instruments to determine the density, temperature, humidity of the air and velocity of the wind. Having thus determined the atmospheric conditions by the above described test I now send up a plurality of balloons 20 each carrying a receptacle 21 containing giant powder and a second receptacle 22 containing chlorid of potash, time fuses 23 having their ends extending into the powder to explode the same when the balloons reach the proper height. The amount of powder and chlorid of potash required depends upon the existing conditions of the atmosphere, less being required if the atmosphere is comparatively moist and still or if the wind is steady than is required if the wind is gusty. In order to render the system effective, a number of these balloons, preferably five, should be released at the same time, these balloons being preferably equally spaced apart over a considerable area, say a square mile of territory, four of the balloons being arranged at the corners of a square, while the fifth is positioned at the center thereof. The central balloon is, under all circumstances, released slightly ahead of the others preferably about five seconds ahead, although this time will vary somewhat with the wind and other conditions at the time. For this reason the central balloon in Fig. 7 is shown in substantially the relative position it would occupy just prior to the release of the other balloons. The fuses of all the balloons are timed to ignite the powder at the same instant, and it will therefore be apparent that the powder carried by all the balloons will be exploded at the same time, although one of the balloons will be considerably higher than the others.

The next step in my operation consists in sending up a plurality of balloons 24 in identically the same manner in which the balloons 20 were sent up. Each of these balloons 24 is provided with a receptacle 25 containing giant powder and provided with a time fuse 26 and each of these balloons further supports a waterproof canvas bag or sack 27 filled with water which, upon the explosion of the powder, will be scattered through the air in the form of a mist. This water, because of the heat generated by the explosion and also because of its being so rapidly projected through the air by the explosion, will become heated and will also act to raise the temperature of the atmosphere as well as to moisten the air.

By means of the two latter operations the condition of the atmosphere is rendered more uniform and slightly moistened. In order however, to provide additional nitrogen for the air, I next send up a plurality of balloons 28, each of which carries an open tank or reservoir 29 containing finely crushed bone and concentrated sulfuric acid, the two uniting to generate nitrogen which passes off into the air. In order to protect the gas bags of the balloons 28 from the fumes of the acid, said bags are preferably provided with a shield 30.

In order to supply still more moisture to the air and also to raise the temperature of the same, I next send up a plurality of balloons 31, each of which carries a metallic tank or reservoir 32 closed at its ends and provided with laterally directed steam escape pipes 33, the terminals of which are bent downwardly as shown at 34. Supported beneath each of these tanks, is a crude oil burner 35 including an oil reservoir 36 containing sufficient oil to heat the burner supplied until all water contained in the tank has been converted to steam. As a means for protecting the gas bags of these balloons from the steam I preferably provide said balloons with shields 37.

It will of course be understood that the balloons 28 and balloons 31 are sent up in groups in the same manner as are the balloons 20 and 24, the central balloon in each case being released a few seconds before the others.

The size of the balloons must of course depend upon the weight which they are to support and the height to which they are to be sent and this in turn is determined by the test first made. The quantity of powder forming a charge for each of the balloons 20 will vary from 25 to 100 pounds, according to atmospheric conditions and I preferably employ about 10 pounds of chlorid of potash.

Each of the balloons 24 carrying water, preferably carries from 10 to 25 gallons of water according to atmospheric conditions, a comparatively small amount of powder however, being required with these balloons and this amount need not necessarily be varied.

Each of the balloons 28 will carry from 2 to 50 pounds of crushed bone and from 2 ounces to 1 gallon of sulfuric acid. Suspended below the container for the bone and acid, is a receptacle 40 containing giant powder and provided with a fuse 41 by means of which the powder may be exploded at any predetermined time to scatter any remaining acid and bone.

The tanks 32 carried by the balloons 31 are each so constructed as to hold anywhere from 10 to 50 gallons of water each, and the burner tank should be capable of carrying anywhere from 1 to 4 gallons of crude

oil for fuel. The burner should be so constructed that its wick will be properly shielded and all danger of the burner going out during the ascent of the balloon thus avoided. Below the burner tank is suspended a receptacle 42 containing from 10 to 50 pounds of giant powder and having a fuse 43 to explode the same and scatter any remaining water and oil when the balloon has reached a predetermined height.

The balloon 10 carrying the barometer, thermometer and other instruments may then be again sent up to determine the conditions of the atmosphere and thus determine whether the operation has been effective. Usually the above described operation should produce a copious rainfall within twenty-four hours. If, however, the atmospheric conditions are extremely adverse, and the desired effect is not obtained by the above operations, a balloon 44 should then be sent up carrying a copper disk 45 having a plurality of outwardly and upwardly directed, spaced copper wires 46, one of which is insulated from the plate. A double cable 47 of copper wire, the strands of which are insulated from each other, serves as a tether for this balloon, being attached to a box 48 containing an induction coil, conventionally shown at 49, the box being suspended beneath the disk 45. The lower end of this cable is secured to a winding drum 50 in such a manner that a circuit may be established through the wires of the cable from a battery 51 by wires 52 and 53, one of the wires of the cable being in electrical connection with the binding post 54, while the other is in electrical connection with a sleeve 55 upon the axle of the winding drum and against which a brush 56 engages. The upper ends of the wires of the cable 47 are connected to the ends of the primary winding of the induction coil, while the ends of the secondary winding of the coil are connected one to the disk 45 and consequently to all but one of the wires 46, while the other is connected to that wire 46 insulated from the disk. It will therefore be apparent that when current has passed from the battery through the primary winding of the induction coil, current generated in the secondary coil will be discharged between the ends of the wires 46 which are spaced to provide suitable spark gaps. The circuit may be controlled by a switch conventionally shown at 57, this switch being operated by crank arms 58 and 59 to which are attached the operating ropes 60 and 61. If the rope 60 is pulled the switch will be closed, while if the rope 61 is similarly pulled the switch will be opened.

The object of this structure is that in operation, when the switch 57 is opened, the current passing from the battery 51 through the cable to the disk and copper wires 46 causes a discharge of electric sparks through the atmosphere which, contacting with the static electricity in the atmosphere in connection with the agitated hot, cold and moist atmosphere causes electric explosions, rendering the atmospheric conditions still more favorable. The current is turned on intermittently from one to five seconds each time, this being repeated from one to five times, thereby condensing the moisture in the air and causing a copious rain fall.

Having thus described the invention, what is claimed as new is:

1. A method of producing rain which consists in violently disturbing the air above the earth, in then heating the air and in supplying moisture and nitrogen to the air.

2. A method of producing rain which consists in testing the air, in then violently disturbing the air above the earth, in then heating the air, in then supplying it with moisture and nitrogen and then treating the air electrically.

3. A method of producing rain which consists in successively sending up a plurality of gangs of aerial containers and in discharging their contents at predetermined elevations.

4. A method of producing rain which consists in testing the atmospheric conditions and in successively sending up a plurality of gangs of aerial containers and in successively discharging the contents of said containers at predetermined elevations.

5. A method of producing rain which consists in testing the atmospheric conditions and in successively sending up a plurality of gangs of aerial containers and in successively discharging the contents of said containers at predetermined elevations, the containers of each gang being simultaneously discharged.

6. A method of producing rain which consists in testing the atmospheric conditions and in successively sending up a plurality of gangs of aerial containers and in successively discharging the contents of said containers at predetermined elevations, one container of each gang being sent to a higher elevation than the others.

7. A method of producing rain which consists in successively sending up a plurality of gangs of aerial containers and in discharging their contents, the containers of each gang being sent up in spaced relation to each other.

8. A method of producing rain which consists in successively sending up a plurality of gangs of aerial containers and in discharging their contents at predetermined elevations, the containers of the first gang carrying an explosive and chlorid of potash, the containers of the second gang carrying an explosive and water, the containers of

the third gang carrying a nitrogen generating apparatus, and the containers of the last gang carrying a steam generator.

9. A method of producing rain which consists in sending up a plurality of aerial containers carrying explosives and exploding the same and in then supplying the air with nitrogen and moisture.

10. A method of producing rain which consists in violently disturbing the air at a predetermined elevation and in then sending up a plurality of aerial containers and discharging their contents to supply nitrogen and moisture to the air.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES M. CORDRAY. [L. S.]

Witnesses:

Mrs. M. A. CORDRAY,

E. T. PARKE.