To all whom it may concern:

Be it known that I, WALTER I. PENNOCK, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Apparatus for Collecting Atmospheric Electricity, of which the following is a specification.

My invention relates to a method of collecting electricity from a strata laden with electricity at high altitudes in the atmosphere, through the medium of a wire cable suspended from one or more balloons and in conveying this electricity to the earth's surface.

The object of my invention is to provide a conveyance of the electro motive force to be found in the upper strata of the atmosphere to the earth's surface; where it may be utilized for commercial and other purposes.

A further object of my invention is to provide a device or mechanism by which a suitable conductor may be elevated in the said strata and by which the said conductor may be transmitted to and collected at the earth's surface, from which point it may be conducted to any place where it is desired to use the same.

A further object of my invention is to support and anchor said device in any desired position.

A further object of my invention is to provide an improved method of collector through which the energy of the said upper strata of the earth's atmosphere may be collected and transmitted for various purposes to the earth's surface.

Other objects of my invention will appear in the specification and claims below.

For a further full, clear and complete disclosure of my invention, reference may be had to the following description and accompanying drawings, in which like reference characters refer to corresponding parts.

Figure 1 is an elevational view of one form or embodiment of my invention and Fig. 2 is a detailed view of one form of my improved collector.

The passage of the electrical current to the earth under ordinary conditions is prevented by an obstruction afforded by the dense lower strata of the atmosphere, which is a bad conductor of electricity, as shown by the electrodes of an ordinary static machine. When the electrodes are placed close together, the atmosphere is seen to carry the current across from one electrode to another, but if placed far apart the current is obstructed by the intervening air. The dense lower strata of the atmosphere affords one of the best non-conductors of electricity, as shown in the conduction of the electric current by telegraph, or trolley wires on the earth's surface, where only a small quantity of the electric current escapes through the atmosphere; while rarefied atmosphere affords a good conducting media, as shown by the vacuum tube. The upper strata of the atmosphere being rare in proportion to the altitude, and being a good conductor of electricity while the lower strata of the atmosphere being dense and affording a non-conducting media for the electric current, thus causes an obstruction to the electric current, or power in its passage to the earth's surface from the electric strata of the atmosphere under ordinary conditions. When, however, the cumulus clouds of a thunder storm pass over the surface of the earth, these clouds being of very great height, the moisture in said clouds forms a better conductor of electricity than does the dry air, with the result that the electricity in the upper strata of the atmosphere breaks through the said cloud as a streak of lightning and in that form reaches even to the earth's surface, while the thin or shallow strata of clouds, observed in the so-called "settled rain" storm, do not extend upward to a sufficient height to form a conducting medium for the electricity from the electric strata to the earth's surface. For this reason there is usually no lightning during the said latter variety of rain storm.

By means of my invention, I have provided a mechanism for collecting the electrical energy or power created by nature and stored in the upper strata of rarefied air of the earth's atmosphere and have provided a conductor for said electric energy to the earth's surface.

Referring now to the drawings 1 indicates what may be called the lower limits or boundaries of the strata of electric energy above the surface 2 of the earth.

3 indicates a balloon which is elevated to a high altitude until it enters the said stra-
tum. The said balloon 3 carries a bar 4 of
wood or any other suitable non-conducting
material suspended by insulating links 5 or
any other suitable form of insulation from
the balloon 3. Upon either end of the said
bar 4 I mount collectors, one form of which
I have illustrated as spheres of coiled wire
6—6' the outer ends 7 of which terminate
in sharp points. The inner turns of the said
spheres 6 and 6' are wrapped around the
wooden bar 4 and united as at 8 to a con-
ductor of electric energy, preferably a large
copper wire 9. This wire or conductor 9
extends to the earth's surface and may have
its end suitably attached to an electric ac-
cumulator or other piece of electrical appar-
atus. I have illustrated one form of my
invention in which the conductor 9 is con-
ected to one pole of a storage battery 10
on the earth's surface.

The spiral spheres 6, 6' are preferably
provided with a polished metallic surface
to form a good conductor of electricity and
the material of said spheres should also be
of such a character that it will not rust or
corrode or tarnish. A polished copper wire
or a copper wire plated with platinum or
gold or a solid platinum or gold wire may
be used for this purpose, inasmuch as these
materials are least affected by moisture and
the atmosphere. The said spheres or collec-
tors may be made of smooth wire as
shown in the sphere designated by the nu-
merical or of barbed wire, as is shown at 6'.
and illustrated on a larger scale in Fig. 2 of
the drawings. The latter form is prefer-
able inasmuch as it provides a large number
of points through which the electricity may
flow to the wire from the surrounding air
in the said upper strata of the earth's at-
mosphere.

In order that the supporting balloon 3
may be held in a relatively fixed position, it
should be suitably anchored to the earth's
surface. Inasmuch as the balloon 3 must
be elevated to a very high position, the
weight of the anchoring cables forms an
important consideration, and if desired or
necessary one or more supplemental bal-
coons 11, 11, 11 may be attached to each of
the anchoring cables 12, 12, 12 as illustrated
in Fig. 1, to relieve the balloon 3 of such
weight as would prevent it from ascending
into the said electrical strata. In order that
the electricity from the said upper strata
of the earth's atmosphere may not be con-
ducted down the anchoring cables 12, 12, 12,
I attach them to the supporting balloon 3
and to the supplemental balloons 11 and to
the earth's surface through suitable insu-
lating devices 14.

In the form of my invention illustrated
in Fig. 1, below the bar 4, I suspend a ring
13 of any suitable material from the bal-
loon 3, and attach the anchoring cables 12
thereo by means of insulating rings 14, 14,
14. I may also provide additional insulating
rings 14 between that portion of the
anchoring cables 12 between the balloon 3
and the supplemental balloons 11, and also
between that part of the cable 12 between
the supplemental balloons 12 and the earth's
surface. I may also provide, near the earth's
surface and at the lower end of the anchor-
ing cables 12, similar insulating links 14.
While I have described links as forming a
convenient form of insulating device for the
purposes above set forth, I do not wish
to be construed as being limited to the same,
inasmuch as any suitable non-conducting
connection may be used in place of the
links 14.

The terminals 15, 15 of the storage bat-
tery 10 may be connected to any piece of
electric apparatus which it is desired to run
or operate and if desirable one of the poles
of the battery is adapted to be connected by
the switch 16 with the earth's surface. The
lower ends of the anchoring cables 12 are
securely anchored to the earth's surface as
at 17.

With the apparatus arranged and con-
ected in the manner illustrated in Fig. 1, the
electric energy in the high strata of the
earth's atmosphere passes to and through
the conductive spiral spheres 6 or 6' to the
conductor 9 and is suitably stored or used
at the earth's surface, while the balloons 11
support a part of the weight of the anchor-
ing cables 12, and permit the balloon 3 to
ascend as high as is possible, or necessary
for it to enter the said electrical strata of
the earth's atmosphere. By arranging the
anchorage 17 of the cables 12 symmetrically
or in any other position than in a straight
line, the balloon 3 may be held in a sub-
stantially fixed position with relation to the
death.

While I have illustrated in the drawings
and have described in the specification a
form of apparatus in which my invention
may be carried out, it is obvious that the
drawings are more or less diagrammatic
drawings, that is to say, that the propor-
tions of the various parts are not neces-
sarily those which would operate to the best
advantage, inasmuch as certain portions
have been shown as greatly enlarged in the
drawings for the sake of clearness, and that
it is likely that more than one supplemental
balloon would be required for each cable in
order to support the weight of the same;
and to relieve the supporting balloon 3 of
such weight, as would prevent it from ascen-
ding into the high electrical strata of the
earth's atmosphere, but such changes in
form, proportion and arrangement I regard
as being fully within the aim and scope of
my invention, so long as such forms or modi-
fications fall within the scope of the append-
ed claims. It is also to be understood that the storage battery or accumulator which I have shown as being connected to my collector, is only a type of apparatus which can be operated by the current collected by the spheres 6, 6", and transmitted to the earth through the wire 9, and when I use the word "accumulator", I mean any piece of useful apparatus which is operated by the current transmitted thereto through the wire or conductor 9.

Having thus described my invention, what I claim and desire to protect by Letters Patent of the United States is:

1. The combination with an electrical collector comprising a bar of non-conducting material, and an open spherical conductor carried by said bar, of means to support said collector in the high electrical strata of the earth's atmosphere.

2. The combination with a balloon, of an electrical collector supported thereby and insulated therefrom, comprising a bar of non-conducting material, and a conductor wound spirally around said bar.

3. The combination with an electrical collector comprising a non-conducting bar, and a conductive wire wound thereon to form an open substantially spherical body, and means to support said collector in the high electrical strata of the earth's atmosphere.

4. The combination with a balloon, of an electrical collector carried thereby and comprising a non-conducting bar, and a polished wire wound spirally thereon to form an open substantially spherical body.

5. The combination with an electrical collector comprising a non-conducting bar, and a wire wound spirally thereon to form an open substantially spherical body, said wire being provided with pointed conducting projections, and means to support said collector in the high electrical strata of the earth's atmosphere.

6. The combination with a balloon, of an electrical collector carried thereby comprising a non-conducting bar, and a conducting wire wound spirally thereon to form open substantially spherical bodies upon the opposite ends thereof.

7. The combination with a balloon, of an electrical collector carried thereby comprising a non-conducting bar, a conducting wire wound spirally thereon to form open substantially spherical bodies upon the opposite ends thereof, an electrical accumulator, and an electrical connection between the said collector and said accumulator.

8. The combination with a balloon, and means to anchor said balloon, of an electrical collector supported by said balloon and insulated therefrom, an electrical accumulator, and a conductor connecting said collector and said accumulator.

9. The combination of an electrical collector, means to support said collector at a high elevation from the earth's surface and within the electrical strata of the earth's atmosphere, an electrical accumulator at the earth's surface, an electrical connection between said collector and said accumulator, and means to insulate said supporting means from said collector and from the earth.

In testimony whereof, I have hereunto set my hand this 25th day of June, 1907.

WALTER I. PENNOCK.

Witnesses:
HUGH F. QUINN,
WM. G. GLENN.