

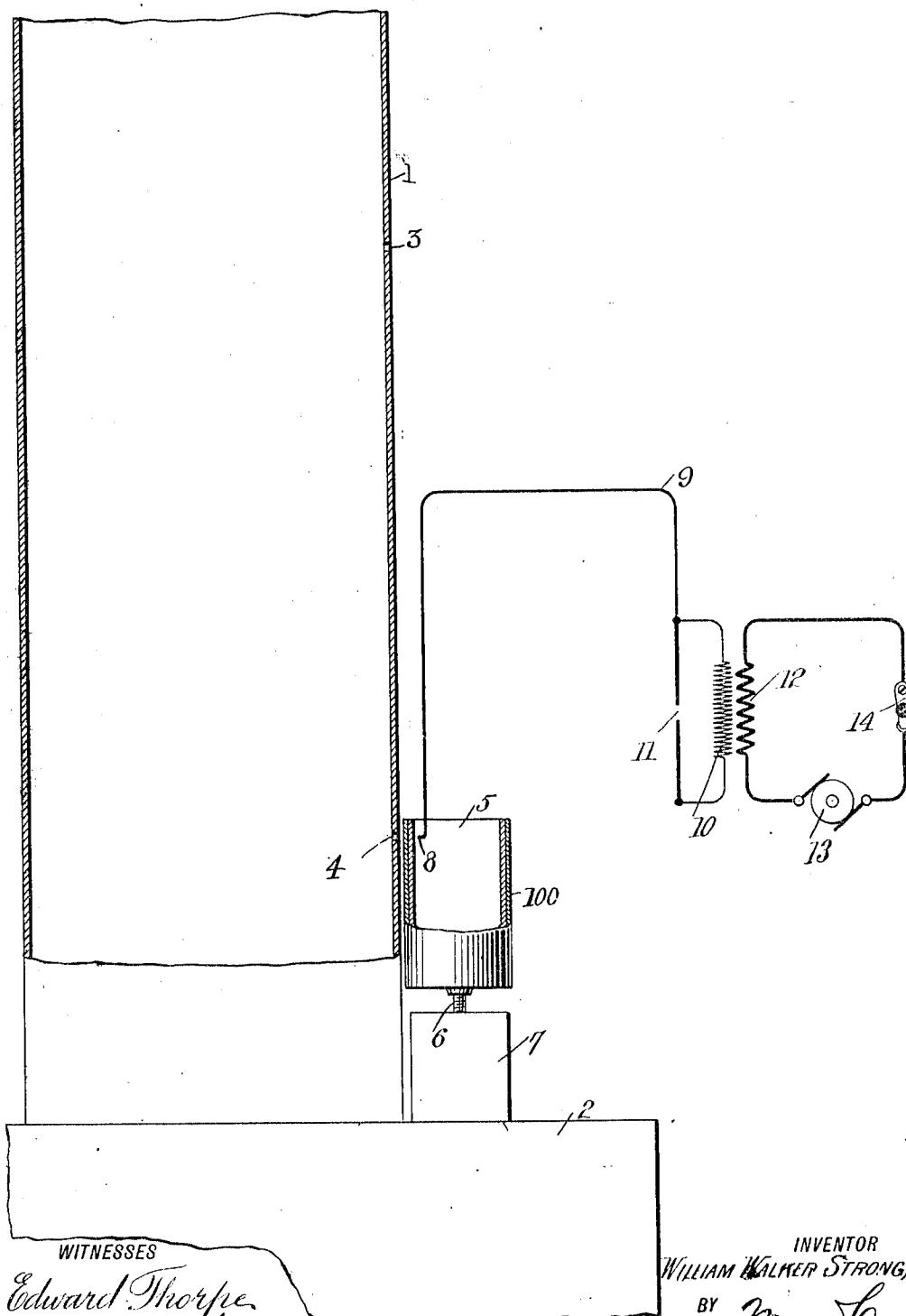
W. W. STRONG.

## METHOD OF COLLECTING PARTICLES PRESENT IN AN IONIZED MEDIUM.

APPLICATION FILED DEO. 28, 1912.

1,096,765.

Patented May 12, 1914.



WITNESSES

Edward Thorpe  
F. J. Gage Jr.

INVENTOR  
WILLIAM WALKER STRONG,

BY *Wm. C.*

**ATTORNEYS**

# UNITED STATES PATENT OFFICE.

WILLIAM WALKER STRONG, OF MECHANICSBURG, PENNSYLVANIA.

## METHOD OF COLLECTING PARTICLES PRESENT IN AN IONIZED MEDIUM.

1,096,765.

Specification of Letters Patent.

Patented May 12, 1914.

Application filed December 28, 1912. Serial No. 739,066.

To all whom it may concern:

Be it known that I, WILLIAM WALKER STRONG, a citizen of the United States, and a resident of Mechanicsburg, in the county 5 of Cumberland and State of Pennsylvania, have invented a new and Improved Method of Collecting Particles Present in an Ionized Medium, of which the following is a full, clear, and exact description.

10 This invention is based upon the ionization of different media, and proceeds upon the fact that particles present in an ionized medium may be collected through the use of an electric field.

15 While the invention in its broader aspect may be said to include a method of coating, the particular application of the invention is directed to a method of indicating the presence of solid liquid particles in an ionized

20 medium, such as, for instance, the presence of smoke in the gases given off by a furnace. There are various agencies which may effect the ionization of the medium, such as, for instance, the heat of a furnace, or the rays

25 of a Nernst lamp, of an electric bulb, or, in fact, any incandescent substance; such ionization is presumed in the performance of the invention to be described. Of course, as far as the performance of such invention is

30 concerned, the particular means for effecting such ionization is immaterial, the method having more to do with the collection, or with the bringing together of some or all of the particles present in such ionized me-

35 dium. The theory of ionization proceeds as follows: A medium within the influence of any ionizing agent is partly broken up into positive and negative ions, and particles or substances present in such ionized 40 medium partake of the charges of such ions, some of the particles acquiring a positive charge and others acquiring a negative charge.

45 In my invention I employ an electric field brought into the region of the ionized medium to bring together certain of the particles of the medium to places desired. The particles herein referred to consist of suspended liquid or solid matter and are therefore very large as compared with the size 50 of gaseous molecules. In most kinds of smoke, fumes, etc., these particles are of sufficient size to be seen by the naked eye.

55 As before mentioned, the application which I have made is utilized as a method of

indicating the presence of smoke, dust, fumes, mists, or other particles present in flues and pipes, as a means of checking the times when said smoke, dust, fumes, mists, etc., are given off through the flues and 60 pipes, and the relative amounts of said smoke, dust, fumes, mists, etc., at such times.

While any particular form of apparatus may be employed in the practice of the invention, the mechanism herein described is one embodiment which has been found to possess decided efficiency and adaptability.

In the accompanying sheet of drawings I have shown, more or less diagrammatically, 70 the arrangement of the different elements which, collectively, enable the method to be performed.

A chimney flue 1 leads from a furnace 2, the flue being provided with openings 3—4 75 communicating with the interior thereof, the particles present within the flue when the furnace is working being frequently charged, the medium surrounding these particles at the same portions of the flue being 80 in a state of ionization due to the fact that the material within the furnace is in an incandescent state.

It is convenient to make the flue or pipe of conducting material, such as sheet iron 85 or any other thin metallic substance. Under these conditions the metallic parts act as screens to the electric field, only lines of electric force passing through the opening such as 4. It is obvious that the thinner 90 the walls of the flue or pipe, the greater will be the number of electric lines of force passing through the opening 4, and therefore the greater effectiveness of the action of the electric field. The flue or tube may 95 be made of dielectric material however, in which case the action will be similar in nature to that taking place with a flue of conducting material.

The mechanism which is termed the recorder comprises a cylinder 5 of dielectric material, shown as mounted on a spindle 6, which is screw-threaded and in engagement with a suitable clock-work or motor 7; the outside of the cylinder carries a covering 100 105 on which the record is taken, such covering being paper or similar material. It will be noted that the cylinder is closely adjacent the opening 4 in the flue 1, the particular purpose of the clock-work being to not 110

only rotate the cylinder, but to cause the same to advance longitudinally of the flue, whereby the projection of the said opening would develop a helix on the said cylinder.

5 Within the cylinder 5, and opposite the opening 4, is an electrode 8, connected to one side of the secondary 10 of a suitable transformer by means of any convenient wire 9, the terminals of said secondary including a spark gap 11. The primary 12 of the transformer is actuated from any suitable source, such as a generator 13, the circuit embodying a switch 14.

After the transformer primary circuit is closed the flow of current therethrough will induce an electro-motive-force in the secondary, and an electric field will be set up in the vicinity of the electrode 8; the clock-work or similar motor 7 being started after the sheet 100 is placed on the cylinder, the turning of the cylinder will bring successively fresh portions of the sheet opposite the opening 4, and the said field will bring the moving particles within the flue through the opening adjacent the sheet, where they will be deposited. If the cylinder 5 and the sheet thereon are brought into a similar position opposite the opening 3 in the flue, and the same steps gone through, a deposit may not be obtained on the sheet 100 for the reason that such opening 3 may be beyond the ionized portion of the medium within the flue; that is, the positive and negative charges on the ions and particles have been neutralized, and movement of the particles, due to movement of the ions no longer occurs. As the cylinder continues to turn, the action of the field brings about the collection of the particles in the ionized medium, so that as long as combustion is taking place in the furnace, and the products of such combustion include solid or liquid particles, such solid or liquid particles will be deposited upon the sheet 100, the resulting deposit being an indication of the amount of solid or liquid matter given out by the flue or chimney, which matter may be made up of unconsumed products.

Since the smoke and fume problem is something that cities have to contend with, and since it is desirable that some means be available for keeping check on the smoke and fumes being belched from chimneys, the method herein described lends itself particularly as a means for bringing about such a record; the particular apparatus described may be conveniently contained in a suitable casing and placed in proper position within a boiler room, where the records may be removed at certain intervals. The operation, then, as described, consists in subjecting an ionized medium, and the particles therein, to the influence of an electric field, and in providing an element between the source of such field and the ionized medium, so that

the traveling of the particles under the influence of the field to the electrode will cause the particles to come into contact with and be received upon said element. Since in order to provide a commercially successful apparatus for performing the invention more or less structure is necessary, and since such structure must support the record sheet, and since this structure must be permeable to the electric field, this support is of dielectric material, as stated.

As previously noted, the method may be availed of in collecting particles which are present in an ionized medium, the particular manner of bringing about such ionization being immaterial, as such state of affairs may be effected by means of a Nernst glower, an electric lamp, or, in fact, any incandescent substance. In the performance of the method described, other apparatus than that illustrated may be availed of, the use of such apparatus, however, not departing from the spirit of the method disclosed.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The method of collecting particles present in an ionized medium, which consists in depositing the said particles on a member under the influence of an electric field.

2. The method of collecting particles present in an ionized medium, which consists in depositing the said particles on a movable member adjacent the source of an electric field.

3. The method of collecting particles present in an ionized medium, which consists in subjecting the medium and particles to the action of an electric field, and collecting the particles on a member positioned between an electrode and the said medium.

4. The method of collecting particles present in an ionized medium, which consists in subjecting the medium and particles to the influence of an electric field, and continuously collecting the particles on a suitable member positioned between the region of greatest intensity in the said field and the said ionized medium.

5. The method of collecting particles present in an ionized medium, which consists in subjecting the medium and particles to the action of an electric field, and placing a suitable member between the most intense part of the said field and the said medium, whereby the particles may be collected on the said member.

6. The method of collecting particles suspended in any fluid medium, which consists in subjecting the medium to the action of an electric field, and placing a suitable dielectric element between the source of the electric field and the said medium, whereby the particles may be collected on the said member.

7. The herein described method of collecting particles present in an ionized medium, which consists in subjecting the medium and particles to the action of an electric field, whereby the particles are caused to move by the force of the electric field and in interposing in the path of the moving particles a dielectric element upon which the particles may be deposited, and in continu- ously moving said element to distribute the deposit.

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

WILLIAM WALKER STRONG.

Witnesses:

GEO. C. COOVER,  
D. E. KAST.