No. 865,179. PATENTED SEPT. 3, 1907.

H. G. & J. W. HAYS.

COMPOSITION OR CONCRETE POST.

APPLICATION FILED DEC. 27, 1905.

2 SHEETS—SHEET 1.

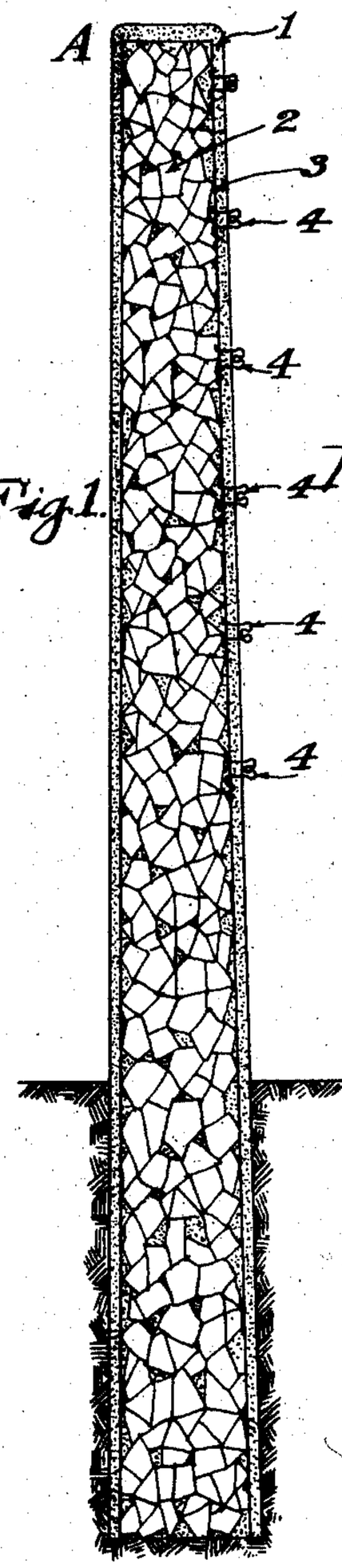

Fig. 1.

Fig. 3.

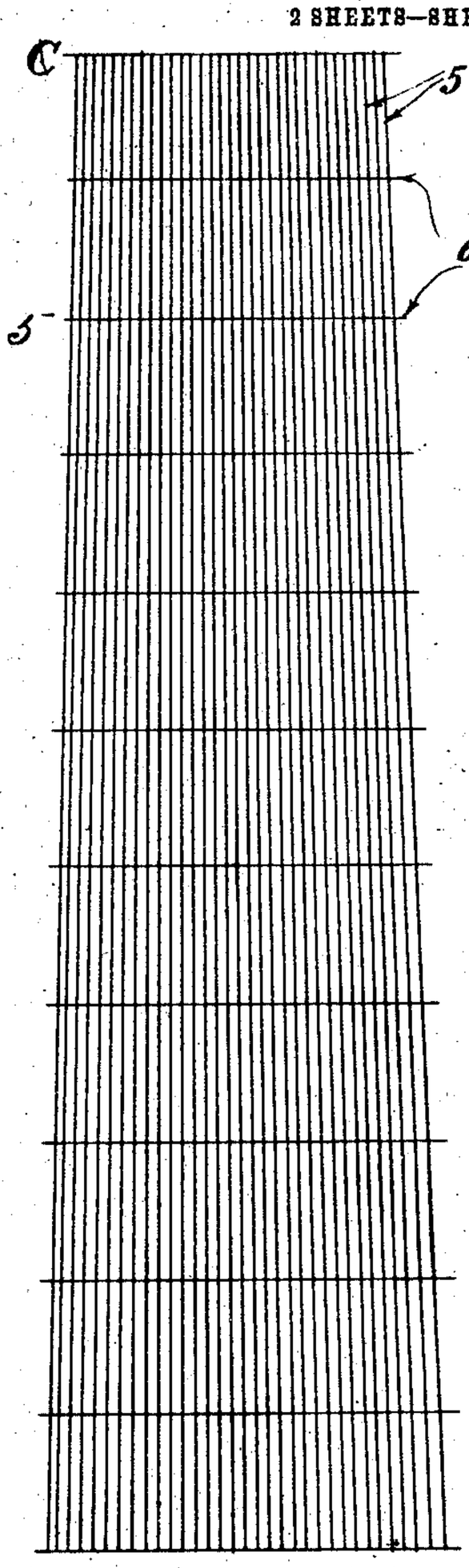

Fig. 5.

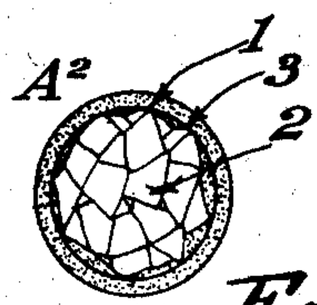

Fig. 2.

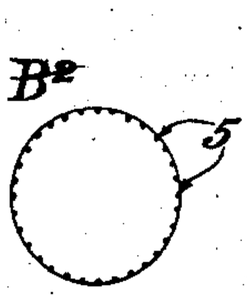

Fig. 4.

WITNESSES:

E. F. Grote

F. D. Arnott

INVENTORS

Harvey Grant Hays

Joseph Weller Hays

No. 865,179. PATENTED SEPT. 3, 1907.

H. G. & J. W. HAYS.

COMPOSITION OR CONCRETE POST.

APPLICATION FILED DEC. 27, 1905.

3 SHEETS—SHEET 2.

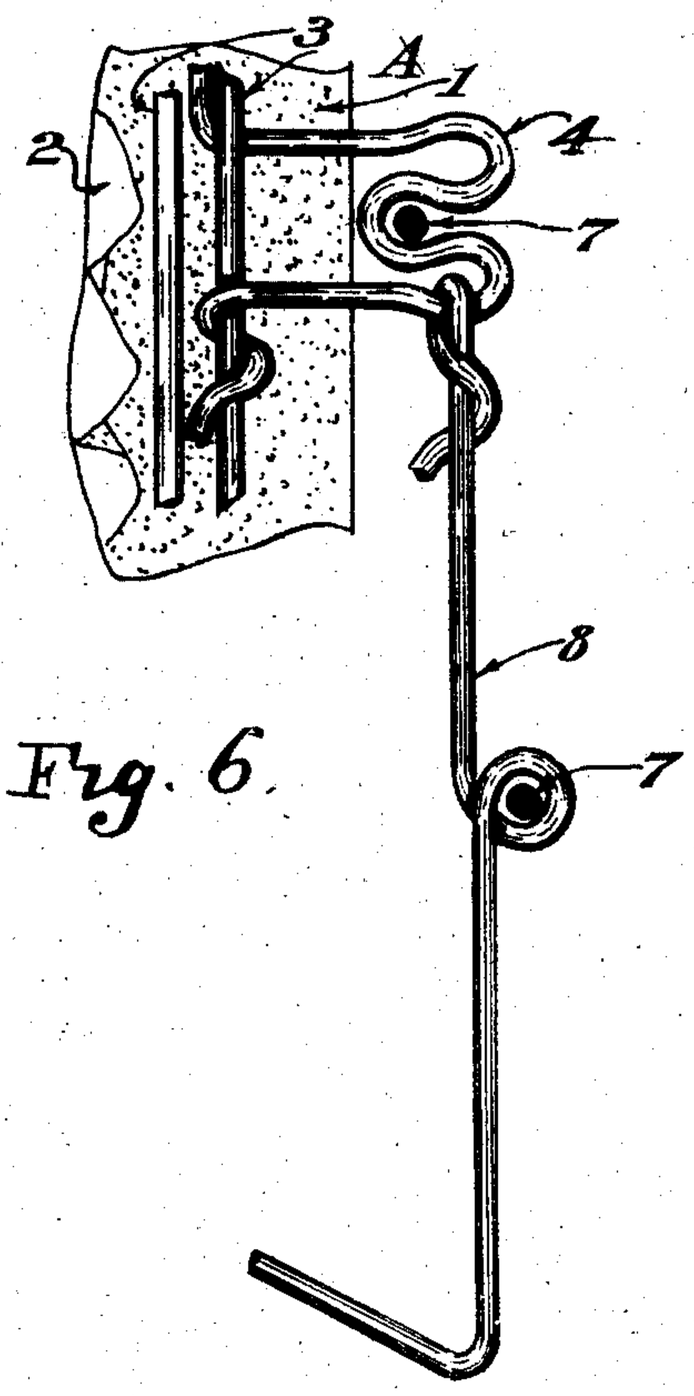

Fig. 6.

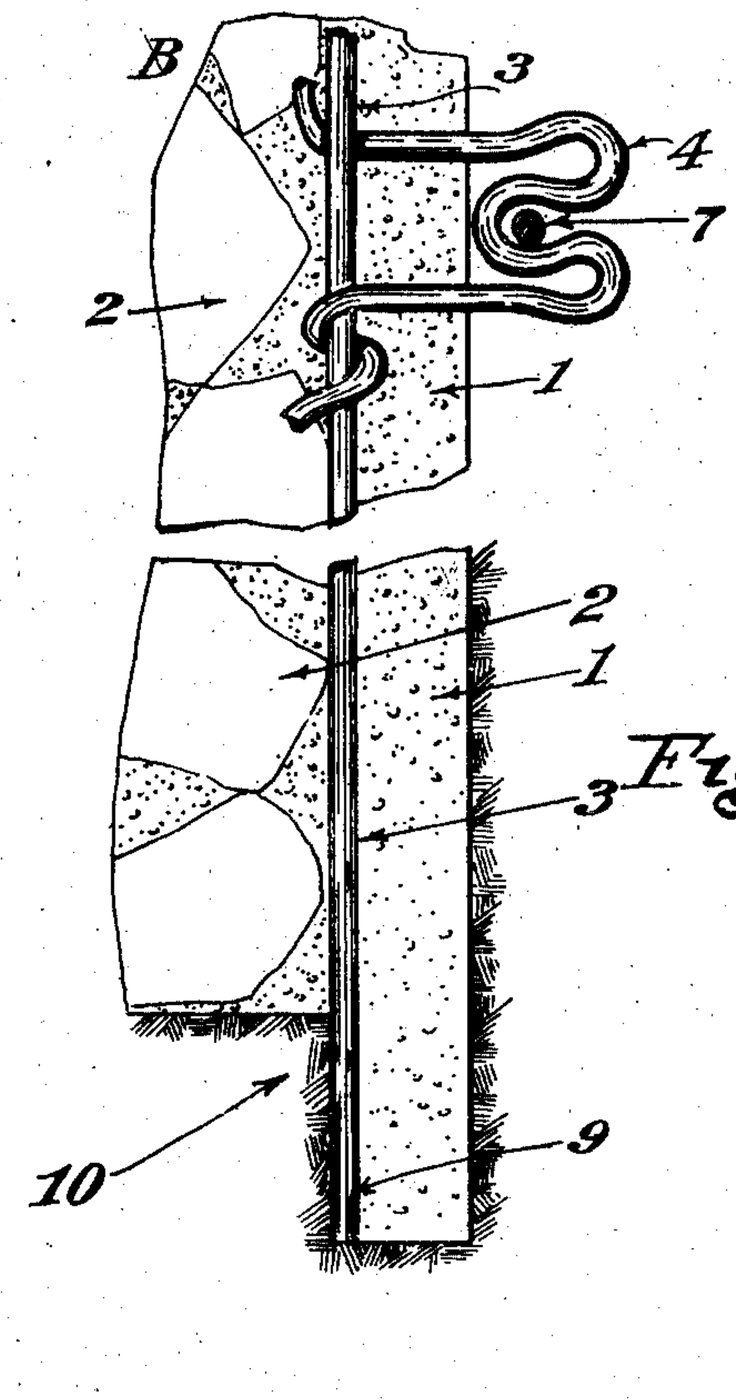

Fig. 7.

WITNESSES:

E. F. Grote

F. B. Allen

INVENTORS

Harvey Grant Hays

Joseph Weller Hays

UNITED STATES PATENT OFFICE.

HARVEY GRANT HAYS AND JOSEPH WELLER HAYS, OF CHICAGO, ILLINOIS.

COMPOSITION OR CONCRETE POST.

No. 865,179. Specification of Letters Patent. Patented Sept. 3, 1907.

Application filed December 27, 1905. Serial No. 293,526.

To all whom it may concern:

Be it known that we, HARVEY GRANT HAYS and JOSEPH WELLER HAYS, citizens of the United States, and residing, respectively, at No. 1211 Farwell avenue and 524 Morse avenue, in the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Composition or Concrete Posts, of which the following is a specification.

The main object of our invention is as follows:—To provide a composition or concrete post of superior strength, which can be manufactured by simple means and methods and at a low cost. We attain these objects by the means and construction shown in the following drawings, in which:—

Figure 1 represents a vertical section of the post and Fig. 2 a horizontal cross section of the same. Fig. 3 represents a reinforcing element or fabric shaped for the casting of a round post and Fig. 4 a horizontal cross-section of the same. Fig. 5 represents the same reinforcing element before being shaped for insertion into the mold for casting. It also represents in a general way the appearance of one member of such reinforcing element as might be used in a square or angular post. Fig. 6 represents a wire attaching means; also means that may be employed for supporting such wires or other elements as do not register with the "attaching means" embedded in the post. Fig. 7 illustrates the means employed for the conveyance of electricity from the wires or elements supported by the post to the soil in which the post is embedded.

In Fig. 1, 1 indicates an exterior shell of homogeneous composition and superior strength, extending completely about the post; 2 represents the interior core of the post, which is constituted chiefly of crushed rock, brick or other suitable coarse materials, the interstices being permeated and filled by a composition of the same character as that forming the exterior shell of the post; 3 indicates the reinforcing element and 4, stapling or wire attaching means.

In Fig. 3, 5 indicates longitudinal wires in the preferred form of reinforcing element. These wires are spaced apart at intervals and maintained in their relative positions by the cross-wires, 6. The same lettering applies in Fig. 5.

In Fig. 6 the stapling or "wire attaching" means 4, is shown on a larger scale and in such contact with a member of the reinforcing element, 3, as will insure electrical conduction. 7 indicates a wire supported by the staple, 4, and 8 the means employed for supporting such wires as do not register with the staples provided.

In Fig. 7, a broken section of the post is shown both above and below the ground line. The metal reinforcing element, 3, is exposed to the soil, 10, at the point 9, thus providing means for the grounding of an electrical discharge conducted from the wire, 7, by means of the staple, 4, to the reinforcing element 3.

It is desirable, if great strength is desired in a composition or concrete post, to place the reinforcing element as far as possible from the "neutral axis" thereof. We accordingly locate the reinforcing member at a greater distance from the "neutral axis" than from the surface of the post. We also extend the reinforcing element entirely about the post in such a manner that some portion thereof will be interposed between the "neutral axis" and any stress applied upon the post, no matter from what direction such stress may come.

The "neutral axis" in a beam or post is a plane in which the tensile and compressive forces terminate and in which the stress is therefore "neutral" or nothing. In other words, it is the line along which there is neither extension or compression. Now, a post of the character applicants have principally in mind, viz. a fence, telegraph or trolley post or the like, is subject principally to lateral strains and stresses, and when such a post fails, it will tend to break at or near the ground line. The fibers of the post on the side where the stress is applied will be torn apart, (the stress will be tensile), while the fibers on the opposite side will be crushed together, (the stress will be compressive). As there is tensile strain upon one side and compressive stress upon the other, there must of necessity be a point about midway between where these two forces, directly opposite in character, neutralize each other,—where there is neither tension nor compression. This has been designated by engineers as the "neutral axis", and in the case of such a post as is contemplated by our invention, the "neutral axis" will be a plane running longitudinally with the post, substantially through the center thereof and at right angles to the line of stress. Now, concrete will resist a large amount of compression and offers little resistance to tensile strains, and if used in construction where tensile strains are liable to occur, it must be reinforced against such strains. It is obvious that a concrete beam, as for instance a floor beam, will be subject to strains in substantially one direction and will require reinforcement against tensile strains originating from a stress applied in such direction, while such a post as we have in mind, may be subject to a strain from any direction and must be reinforced on all sides. It is also obvious that the reinforcing element employed should be located as near to the surface of the post as conditions of construction will admit, and as far as possible from the "neutral axis". If, for instance, such reinforcing element is placed at or near the center of the post, it would lie within or near the "neutral axis" and would tend to reinforce the post only to the extent of its ability to resist a strain tending to bend it. There would be no tensile strain upon it whatever.

If, furthermore, the reinforcing element should not extend entirely around the post, stress might be applied at a locality not offering reinforcement directly interposed between the strain and the "neutral axis"; such a post would accordingly be relatively weak against such stress. The strength of a reinforced concrete post lies primarily in the resistance of the reinforcing element to tensile strains, and secondarily to such resistance as the reinforcing element may offer to fractures in the concrete under compression on that side of the post where compressive stress occurs. Hence it follows if the reinforcing element encircles or belts the post, there will be less tendency to fracture between such element and the axis of the post, than exterior to it. This is another argument in favor of placing the reinforcing element as near as possible to the surface of the post, which is the construction herein described and shown in the drawings. A post or pillar supporting a dead weight is subject only to compressive strains, and distinction should be made between such a post and the one contemplated in our invention. We believe that the foregoing principles of construction, which our invention recognizes have not been disclosed by the prior state of the art.

The reinforcing element employed as shown in Fig. 3 and Fig. 5 is provided with openings or meshes which render it possible to provide the post with a core, constituted chiefly of coarse substances and to cast the post by means of pouring the more plastic element which is designed to form the exterior shell of the post. This element should be sufficiently liquid in its nature to insure percolation through the meshes of the reinforcing element and between the coarse substances of the core. The openings or meshes provided must be of a suitable size to retain the coarse substances within the core while permitting free passage of the plastic composition.

The amount of material required and consequently the cost of a post, increases in direct proportion with the diameter of the post, while the strength of the post increases in direct proportion with the square of the diameter. We are therefore able, by using a large proportion of cheap and coarse elements, such as crushed rock, etc., to increase the diameter of the post and add greatly to its strength, without employing more cement than would be necessary for a much smaller post if such coarse substances were not employed. Our construction also enables us to give the post a thin coating of fine composition on the exterior, completely concealing from view all of the coarse elements contained in the post. It follows that the resisting power of the reinforcing element increases in proportion to the square of its distance from the "neutral axis". Hence our reason for placing such element as near as possible to the surface of the post. We believe our invention embodies a great deal of novelty in these particulars.

We of course do not wish to be limited in the scope of our invention to a round post as illustrated in the drawings, nor to the particular form of reinforcing element employed as it is self evident that the construction described will apply to any form of post and that any reinforcing element provided with a multiplicity of openings or meshes and of suitable strength, will fully meet all of the requirements of our invention.

It is necessary to provide means for the support of wires at any desired point which may not happen to register with the attaching means embedded in the post. For this purpose we provide the member 8, shown in Fig. 6.

It is important to provide means for the grounding of an electrical discharge carried by a wire or other element atatched to the post. We accomplish this result through the constituent elements of the post and without employing any special means therefor, as shown in Fig. 7. The metal reinforcing element is exposed to the soil 10, at point 9. The staple 4, which is in "electrical contact" with the reinforcing element, 3, receives the current from the wire 7. The current is thus conveyed directly to the soil 10.

It will be seen that numerous details of the construction and methods herein shown and described may be altered, without departing from the spirit of our invention.

What we claim as our invention and desire to secure by Letters Patent, is:—

1. In a composition or concrete post, the combination of an inner core of coarse substances, cemented together by a binding substance; a thin outer shell of plastic and homogeneous composition; a meshed reinforcing element, disposed between said inner core and outer shell,—said reinforcing element immediately enveloping said inner core and running longitudinally therewith.

2. In a composition or concrete post, the combination of an inner core of coarse substances, cemented together by a binding substance; a thin outer shell of plastic and homogeneous composition; a reinforcing element, composed of a multiplicity of longitudinal members, spaced apart at intervals and maintained at such intervals by a multiplicity of transverse members, said transverse members being of smaller size and less strength than said longitudinal members, said reinforcing element completely enveloping said inner core and running longitudinally therewith.

HARVEY GRANT HAYS.
JOSEPH WELLER HAYS.

Witnesses:
E. F. GROTE,
F. B. ABBOTT.