W. E. DAVEY.

PROCESS OF REINFORCING TREES.

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958,478.

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Fig. 1.

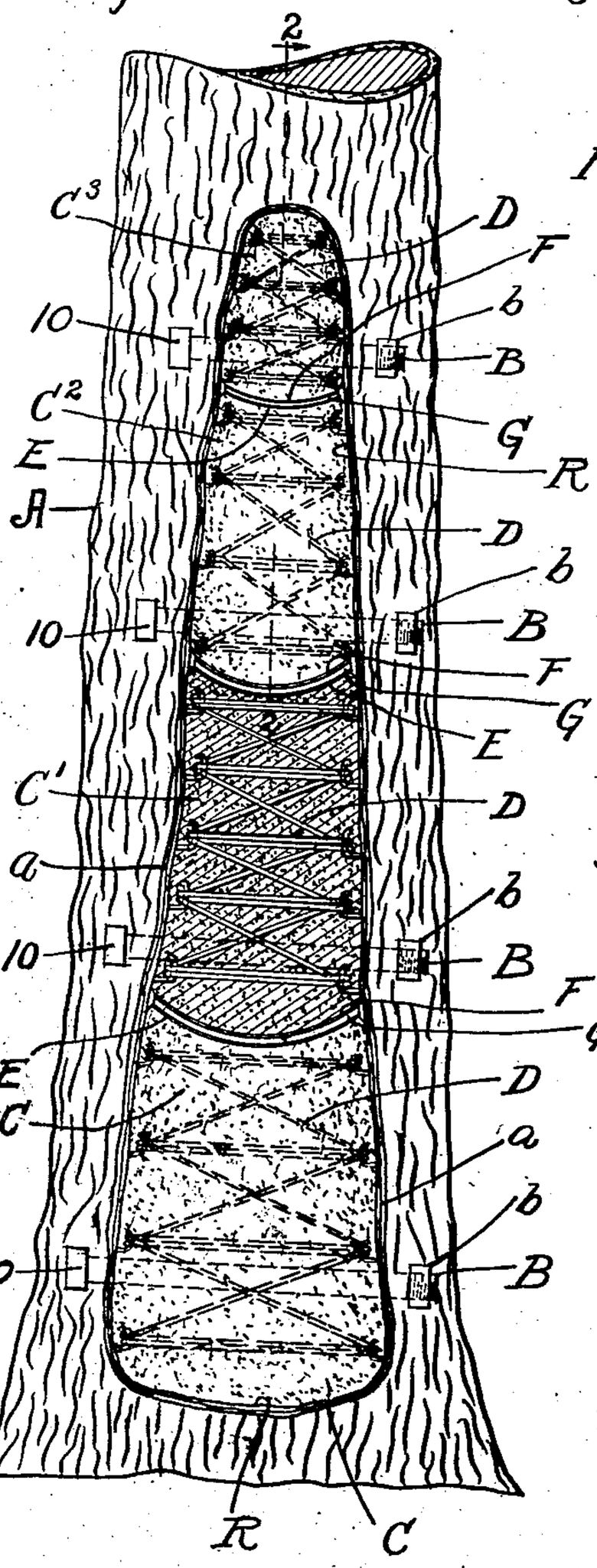

Fig. 2.

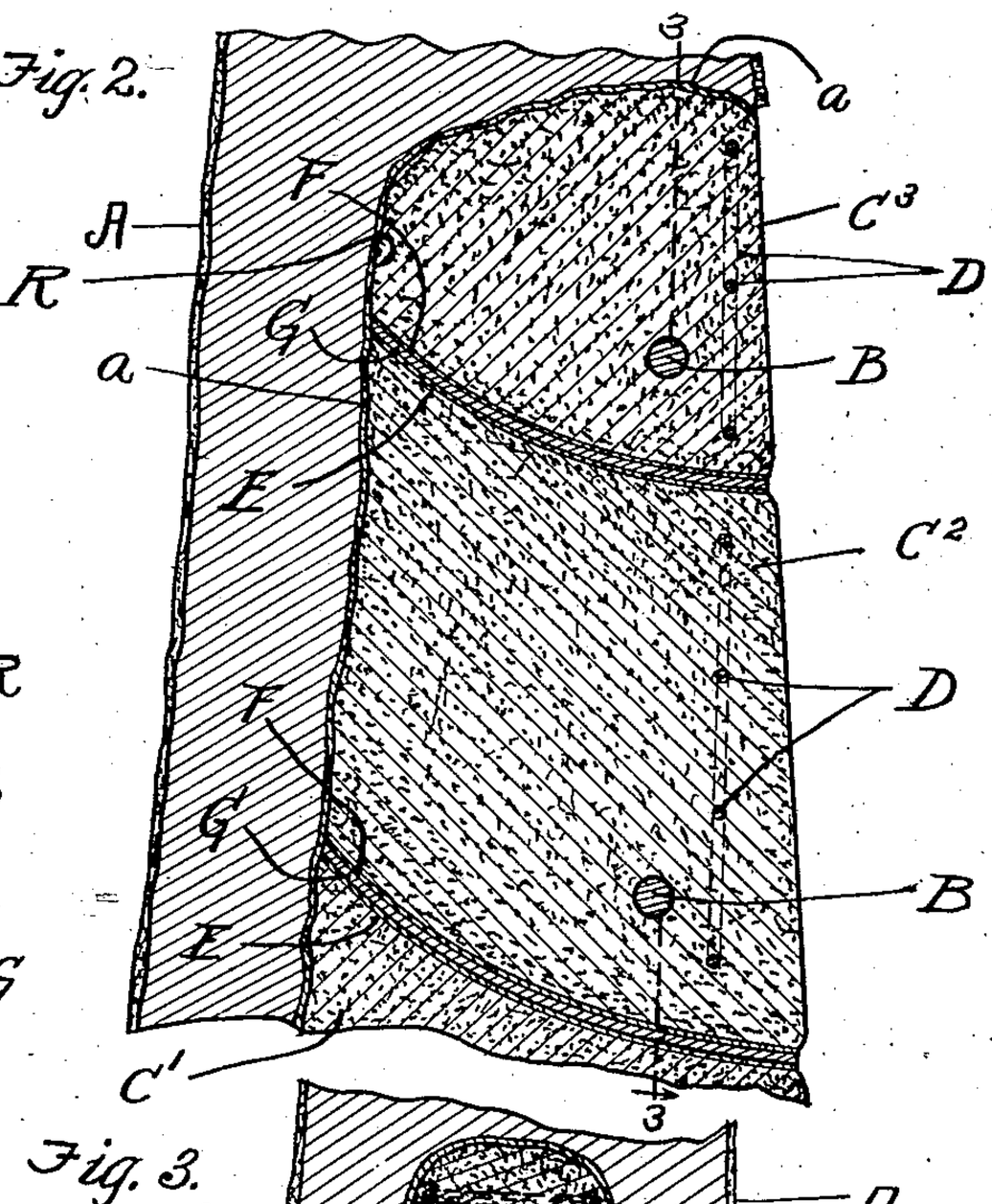

Fig. 3.

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PROCESS OF REINFORCING TREES.

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To all whom it may concern:

Be it known that I, WELLINGTON E. DAVEY, a citizen of the United States of America, residing at Kent, in the county of Portage and State of Ohio, have invented a certain new and useful Process of Reinforcing Trees; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to an improved process of reinforcing trees whose trunks have holes or cavities therein extending to the exterior and longitudinally of the trunks.

The primary object of this invention is to reinforce the hollow portion of the trunk and to have the cavity filled in such a manner that a slight lateral yielding of the trunk to wind pressure against it will not result in injury to the filling.

Another object is to compose the said filling of sections and to have adjacent filling-sections arranged the one above the other and to contour oppositely arranged end surfaces of the said adjacent sections to permit a slight lateral swaying of the upper of the said sections with the trunk independently of the lower of the said sections and thereby reduce to a minimum the liability of injury to the filling by wind pressure against the trunk.

Another object is to render the upper of adjacent filling sections independent of the lower of the said sections by supporting the said upper filling-section from the trunk independently of the said lower filling-section and thereby prevent the weight of the said upper filling-section bearing downwardly on the said lower filling-section.

Another object is to compose the filling of metal-reinforced concrete sections and not only to have each metal-reinforced concrete section supported from the trunk independently of the adjacent metal-reinforced concrete section or sections but to have the metal reinforcement of each metal-reinforced concrete section independent of the metal reinforcement of the adjacent metal-reinforced concrete section or sections so as to prevent the transmission of any strain tending to crack or injure one of the metal-reinforced concrete sections to the adjacent metal-reinforced concrete section or sections and to accommodate and facilitate the renewal of any one of the metal-reinforced concrete sections without interfering with the adjacent metal-reinforced concrete section or sections.

Another object is to cushion adjacent end surfaces of adjacent filling-sections to accommodate some expansion of the said filling-sections toward each other without liability of cracking or injuring the said sections by a force or agency tending to result in such expansion.

Another object is to prevent water being blown or driven by the wind or other force between adjacent sections of the filling at the joint formed between the said sections and to so form the said joint that any water or moisture which may have access to the oppositely arranged end surfaces of the said sections will be drained to the exterior of the trunk.

Another object is to prevent any water which may obtain access to the under surface of the upper of adjacent filling-sections from entering the lower of the said filling-sections but instead to drain such water to the exterior of the trunk.

Another object is to interpose a layer of compressible and elastic material between adjacent filling-sections and to interpose layers of oiled paper or the like between the said compressible and elastic layer and the said filling-sections and thereby avoid frictional adherence of the said compressible and elastic layer to the said filling-sections and render the joint formed between the said elastic and compressible layer and the said filling-sections waterproof so as to prevent any impregnation of the said compressible and elastic layer with moisture which may find access to the adjacent end surfaces of the said filling-sections.

With these objects in view, and to the end of realizing any other advantages hereinafter appearing, my improved process consists in the steps hereinafter described, pointed out in the claims and illustrated in the accompanying drawings.

In the said drawings, Figure 1 is a side elevation of a portion of the trunk of a tree which is mechanically reinforced in accordance with my invention. One of the metal-reinforced concrete filling-sections is shown in section in this figure. Fig. 2 is a vertical section on line 2—2, Fig. 1, looking in the direction indicated by the arrow. Fig. 3 is a vertical section on line 3—3, Fig. 2,

looking in the direction indicated by the arrow. Figs. 2 and 3 are drawn on a larger scale than Fig. 1.

In the said drawings, A indicates an interiorly hollow portion of the trunk of a tree, said portion of the trunk having its internal cavity *a* extending to the exterior and up and down or longitudinally of the trunk. The said hollow portion A of the trunk is mechanically reinforced as will hereinafter appear.

In carrying out my improved process all decayed or unsound foreign matter is firstly removed from the walls of the cavity *a*, whereupon the said walls are antiseptically treated by covering or coating the same, as at R, with a composition of pine tar and resin mixed preferably in equal proportions by measure. The resin and pine tar are heated in a vessel until they become liquid when they are thoroughly stirred together, and the hot mixture is applied to the walls of the cavity *a*. The mixture of pine tar and resin acts as a disinfectant and destroys all vermin and germs which may still adhere or have had access to the walls of the cavity *a*. The coating of the said walls with the said mixture also renders the walls impervious to moisture because the said mixture is a waterproof composition. Preferably opposite side walls 6 and 6 of the cavity *a* upon applying the antiseptic waterproof coating R thereto are mechanically tied together at predetermined vertically spaced points by bolts B and nuts *b*. Each bolt B extends substantially horizontally between the walls 6 of the cavity *a* and transversely of and through the cavity. Preferably each bolt B extends into two bolt-holes 7 and 7 which are formed in the opposite walls 6 and 6 respectively of the cavity and arranged in line endwise. Each wall is provided therefore with vertically spaced bolt-holes 7 and each bolt B extends from within a bolt-hole in one of the said walls into the opposite bolt-hole in the other of the said walls. Each bolt B has its head 10 abutting against the exterior of one of the walls 6, and a nut *b* which is screwed onto the shank of a bolt bears against the exterior of the other of the said walls.

The walls 6 of the cavity *a* in addition to mechanically tying the said walls together by the bolt B and nuts *b* as hereinbefore described are shown mechanically laced together at suitable points vertically by strands of wire D drawn several times across the cavity between the said walls and suitably attached to the said walls. Each wire lacing D extends from a point a suitable distance below and forwardly of the upper of adjacent bolts B downwardly to and in front of the lower of the said bolts. Each wire lacing D is arranged therefore forward of a bolt B near the front of the cavity *a*. Upon the application of the bolts B and wire laces D the lower portion of the cavity *a* is filled with concrete C to a point in suitable proximity to but below the second lowermost bolt and preferably to a point between the uppermost end of the lowermost wire lacing and the last-mentioned bolt so that the said wire lacing and the lowermost bolt are embedded in and constitute the metal reinforcement of the said lowermost section of the metal-reinforced sectional concrete filling built up within the said cavity, which filling is composed of sections arranged and built up the one above the other, and, whereas C represents the concrete of the lowermost filling-section, as already indicated, C′, C² and C³ respectively indicate the concrete of the remaining filling-sections which compose the remainder of the filling within the cavity *a*, and the concrete of each filling-section embeds one of the bolts B and the wire lacing D which extends forward of the respective bolt so that the concrete of each filling-section is supported and reinforced independently of the concrete of the remaining filling-sections and the metal reinforcement of each filling-section, comprising the bolt and wire lacing instrumental in supporting and reinforcing the concrete of the said filling-section, is wholly independent of the metal reinforcement of the concrete of the adjacent section or sections of the filling. It will be observed therefore that my improved process consists more especially in a building up within the cavity *a* of the filling-sections one above another and supporting adjacent filling sections from the trunk but independently of each other.

The top or upper end surface of the lower of adjacent filling-sections is shaped or contoured concavely, and the bottom or lower end surface of the upper of the said filling-sections is shaped or contoured convexly. Preferably the oppositely arranged end surfaces of adjacent filling-sections are shaped or contoured to curve or slope upwardly and rearwardly from the front of the cavity *a*, as shown in Fig. 2, and to curve or slope upwardly and laterally toward the walls 6 of the cavity, as shown in Figs. 1 and 3.

A layer of waterproof material, such, for instance, as oiled paper which will not adhere to a layer of felt or other elastic and compressible material, and which is impervious to moisture, is laid on and covers the top or upper end surface of the lower of adjacent filling-sections.

A layer F of waterproof material, such, for instance, as oiled paper which will not adhere to a layer of felt or other elastic and compressible material, and which is impervious to moisture, covers the bottom or lower end surface of the upper of adjacent filling-sections.

Between adjacent waterproof layers E and F is interposed a layer G of felt or other

compressible and elastic material, and the said layer of compressible and elastic material constitutes a packing or cushion between adjacent filling-sections, but of course the said intermediate and cushioning layer is applied before the application of the upper layer F of the adjacent waterproof layers. Of course before building up the upper of adjacent metal-reinforced concrete sections of the filling in the cavity *a* the top or upper end surface of the lower of the said sections is shaped or contoured so as to slope from its central portion upwardly and laterally toward the walls 6 and 6 of the cavity as shown in Figs. 1 and 3, and rearwardly and upwardly from the front of the cavity or exteriorly of the trunk, as shown in Fig. 2, to render it capable of draining any moisture which may find access to the said surface to the exterior of the trunk, whereupon are applied the layers E, G and F interposed between the said surface and the upper of the said filling-sections.

It will be observed therefore that my improved process also comprises not only the building up of a filling within the cavity *a* in sections one above another and shaping the top or upper end surface of the lower of adjacent filling-sections as hereinbefore described, but in the application upon the building up of the said lower filling-section of two layers E and F of waterproof material and a layer G of compressible material interposed between the said waterproof layers, preparatory to building up the said upper filling-section.

By the process hereinbefore described it will be observed that the hollow portion A of the trunk of the tree is braced by a metal-reinforced concrete filling which occupies the cavity *a* in the said portion of the trunk, and that the upper of adjacent filling-sections is supported independently of the lower of the said filling-sections so as to prevent the weight of the upper of the said filling-sections bearing downwardly on the lower of the said filling-sections and so as to prevent the transmission of any strain tending to crack or injure one of the said filling-sections from being transmitted to the other of the said filling-sections and to accommodate the renewal of either of the said filling-sections without interfering with the adjacent metal-reinforced concrete section or sections of the filling. It will also be observed that the sectional filling accommodates a slight lateral swaying of the trunk by wind pressure against it without injury to the filling, and not unimportant is the curving or sloping of oppositely arranged end surfaces of adjacent filling sections so as to drain any moisture having access thereto to the exterior of the trunk and to facilitate a slight lateral swaying of the upper of adjacent filling-sections with the trunk independently of the lower of the said filling-sections and thereby reduce to a minimum the liability of injury to the filling by wind pressure against the trunk. It will be seen also that the interposition of packing or elastic and compressible material between adjacent end surfaces of adjacent filling-sections to thereby cushion the said surfaces accommodates some expansion of the said filling-sections toward each other without liability of cracking or injuring the said sections by a force or agency tending to result in such expansion. It will also be observed that by the joint formed between adjacent filling-sections as hereinbefore described the blowing or driving of water by the wind or other force between the said sections at the said joint is substantially prevented and any water or moisture which may obtain access to the lower end surface of the upper of adjacent filling-sections is not only prevented from entering the lower of the said filling-sections but is drained to the exterior of the trunk.

The bolt B of the metal reinforcement of each filling-section, to interfere as little as possible with the capacity of the said filling-section to somewhat sway laterally independently of the adjacent metal-reinforced concrete section or sections of the filling, is preferably located near the lower end of the metal-reinforced concrete section through which it extends and forward of the center of the last-mentioned section.

It is obvious that the trunk of a tree upon swaying laterally will move farther at the upper of adjacent filling-sections than at the lower of the said filling-sections, and hence to render the sectional filling most suitable for the gradual increase in the movement of the trunk upwardly from the base of the trunk during any swaying of the trunk the upper of adjacent filling-sections is made shorter than the lower of the said filling-sections.

What I claim is:—

1. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another.

2. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and contouring the upper end surface of the lower of adjacent filling-sections to permit a slight lateral swaying of the upper of the said adjacent filling-sections with the trunk independent of the lower of the said adjacent filling-sections.

3. An improved process of reinforcing a

tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another and supporting the upper of adjacent filling-sections independent of the lower of the said adjacent filling-sections.

4. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and supporting adjacent filling-sections from the trunk independent of each other.

5. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, contouring the upper end surface of the lower of adjacent filling-sections to permit a slight lateral swaying of the upper of said adjacent filling-sections with the trunk independent of the lower of the said adjacent filling-sections and supporting said upper filling-section from the trunk independent of said lower filling-section.

6. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and contouring the upper end surface of the lower of adjacent filling-sections so as to slope upwardly from the exterior of the trunk between opposite side walls of the cavity.

7. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising the building up within the cavity of a filling in sections one above another, and contouring the upper end surface of the lower of adjacent filling-sections so as to slope upwardly from the exterior of the trunk between opposite side walls of the cavity and laterally and upwardly toward the said walls.

8. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and cushioning oppositely arranged end surfaces of adjacent filling-sections.

9. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and making the upper of adjacent filling-sections shorter than the lower of the said adjacent filling-sections.

10. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a metal reinforced concrete filling in sections one above another, shaping the top or upper end surface of the lower of adjacent metal-reinforced concrete sections to permit of a slight lateral swaying of the upper of the said sections with the trunk independent of the lower of the said sections, and making the said upper section shorter than said lower section.

11. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the said cavity of a filling in sections one over another, and covering the top of the lower of adjacent filling-sections with compressible material before building up the upper of said adjacent filling-sections.

12. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another; shaping the upper end surface of the lower of adjacent filling-sections to permit a slight lateral swaying of the upper of said adjacent filling-sections independent of the lower of said adjacent filling-sections, and preparatory to building up said upper filling-section placing over said surface a layer of compressible material interposed between two layers of waterproof material.

13. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and preparatory to building up the upper of adjacent filling-sections placing over the upper end surface of the lower of said adjacent filling-sections a layer of compressible material interposed between two layers of oiled paper.

14. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of a filling in sections one above another, and preparatory to building up the upper of adjacent filling-sections placing over the up-

per end surface of the lower of said adjacent filling-sections a layer of felt interposed between two layers of waterproof material.

15. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process consisting, first, in antiseptically treating the walls of the cavity and then building up within the cavity metal-reinforced concrete sections one above another to fill the cavity and forming such a joint between adjacent filling-sections in building up said sections as to permit a slight swaying of the upper of said sections laterally independent of the lower of said sections.

16. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of metal-reinforced concrete sections one above another and placing cushioning material over the top of the lower of adjacent metal-reinforced concrete sections before building up the upper of said adjacent sections.

17. An improved process of reinforcing a tree having a cavity which is formed in the trunk of the tree and extends to the exterior and longitudinally of the trunk, said process comprising a building up within the cavity of metal-reinforced concrete sections one above another and applying the metal reinforcement for each metal-reinforced concrete section to the trunk before building up the concrete portion of said filling-section.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

WELLINGTON E. DAVEY.

Witnesses:
C. H. DORER,
B. C. BROWN.