D. A. DICKEY.

MOLDABLE REINFORCING ELEMENT AND METHOD OF PREFORMING THE SAME.

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1,361,971.

Patented Dec. 14, 1920.

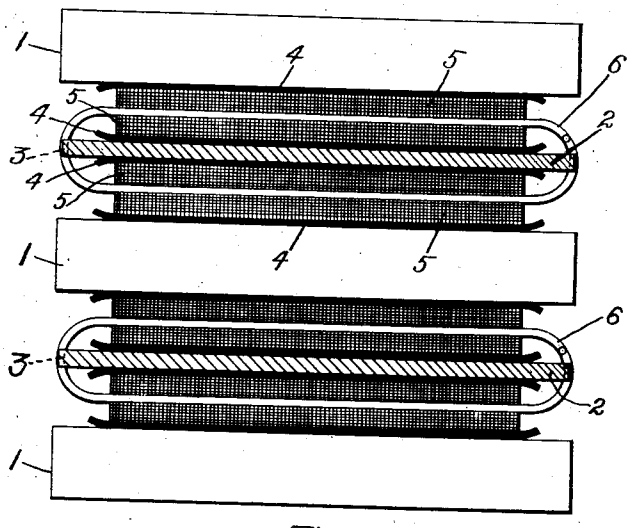

Fig. 1.

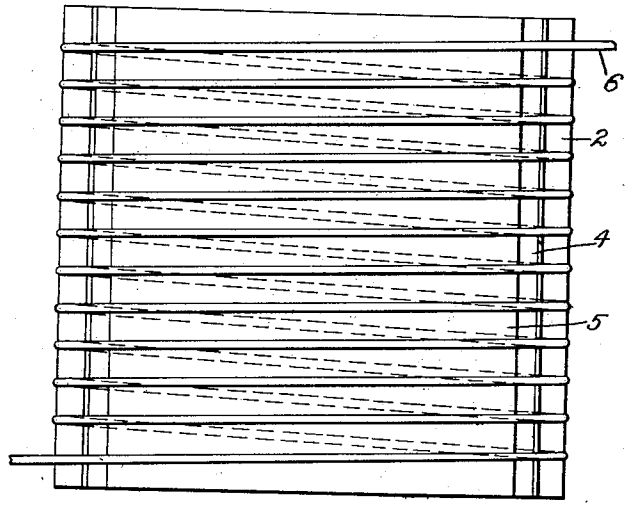

Fig. 2.

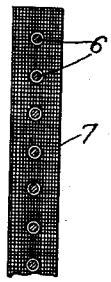

Fig. 3.

WITNESSES:

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MOLDABLE REINFORCING ELEMENT AND METHOD OF PREFORMING THE SAME.

1,361,971. Specification of Letters Patent. Patented Dec. 14, 1920.

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To all whom it may concern:

Be it known that I, DANIEL A. DICKEY, a citizen of the United States, and a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Moldable Reinforcing Elements and Methods of Preforming the Same, of which the following is a specification.

My invention relates to moldable reinforcing elements and it has, for its primary object, the construction of reinforcing elements which may be embodied in articles comprising superimposed layers of fibrous material impregnated with a binder.

Heretofore, in making articles of fibrous material impregnated with a binder, it has been found advantageous, in some instances, to employ wires to stiffen the articles in certain portions thereof. This was accomplished by employing suitable wires held in spaced, substantially parallel relation by tie wires which were objectionable on account of the fact that the tie wires required knotted portions which resulted in uneven or non-uniform portions in the finished article. In view of this, one object of my invention is to provide reinforcing elements composed mainly of wires held in flat, substantially parallel relation.

Another object of my invention is to so construct moldable reinforcing elements as to insure a rapid and, therefore, a decreased, cost of production.

With these and other objects in view, my invention will be more fully described, illustrated in the drawings, in the several views of which corresponding numerals indicate like parts, and then particularly pointed out in the claims.

In the drawings, Figure 1 is an end elevation of a plurality of heating elements of a press having reinforcing elements, shown in section, interposed between them, and being constructed in accordance with my invention; Fig. 2 is a plan view of a reinforcing element partially preformed in accordance with my invention, and Fig. 3 is an end elevation, parts being broken away, of a reinforcing element in readiness to be incorporated in a body of fibrous material impregnated with a binder which is to be molded.

In practising my invention I may construct a reinforcing element by employing a metal plate, on either side of which may be disposed a sheet of untreated material, after which layers of treated material may be disposed upon the untreated material and a suitable cloth-covered wire wound about the body thus formed so that the edges of the winding may engage the metal plate. Other layers of treated material may then be disposed upon the wire and covered with layers of untreated material. The unit thus formed may then be disposed in a suitable heated press and subjected to sufficient pressure to embed the wires in the treated material, heat being applied for a very short time to insure the binder being in an adhesive state but so it will not be cured before the unit is removed from the press. The body thus compacted may then be removed from the press, and edge portions of the wire cut at both sides so that the metal plate may be removed and, by so doing, a plurality of reinforcing elements, comprising layers of treated material having wires in substantially parallel spaced relation interposed between them, may be provided.

In Fig. 1 are shown reinforced elements disposed between heated elements 1 of a press. The reinforced elements may be formed by employing a metal plate 2 notched along its edges, as indicated at 3, and sheets of untreated material 4 may be disposed upon both sides of the plate, after which layers of treated material 5 may be superimposed upon the layers of untreated material.

The layers of untreated material 4 may be of any suitable material, such as "cast-iron" cotton cloth, and the treated material 5 may be duck or other fabric impregnated with a suitable binder such, for example, as a phenolic condensation product. The fabric may be impregnated with a phenolic condensation product and dried to facilitate its handling.

A wire 6, preferably cotton-covered and of suitable diameter, may then be wound about the metal plate 2 so that it seats in the notches in the edges of the plate. The wire may be covered and the covering may be impregnated to insure the wire being securely held in place. More layers of treated material 5 may then be disposed upon the wire and further layers of untreated material 4 may be disposed upon the treated material. The unit thus formed may be disposed in a

heated press or mold and subjected to sufficient pressure to embed the wire in the layers of treated material, heat being applied simultaneously to insure adhesive action of the binder but not for a sufficient length of time to cure or harden the binder. The unit may then be removed from the press, and the turns of wire may be cut adjacent the edges of the plate 2, after which the plate may be removed.

The layers of untreated material 4 are employed to facilitate the removal of the plate 2 and to protect the treated material 5 from exposure to grease or dirt during the compacting of the unit. When the wires have been cut and the plate removed, a plurality of reinforcing elements are provided, one of which is best shown in Fig. 3. The reinforcing element 7, here shown, is in condition to be employed in stiffening a molded body of fibrous material impregnated with a binder. The protective coverings of untreated material are left upon the exposed surfaces of the treated material until the reinforcing element is needed and the untreated material is then removed therefrom by merely pulling it off.

A reinforcing element, provided by my invention in the simple and inexpensive manner above described, is adapted for a wide variety of uses on account of the ease with which it may be handled. The reinforcing elements may be made in any desired length and width and cut into sections desirable for use in the particular body in which they are to be employed. For example, stiffening elements of this character have been employed in the construction of airplane propellers. It has been found advantageous to stiffen the leading edge of the propeller to provide a slightly variable pitch angle which increases the efficiency of the propeller and, consequently, of the motor driving it. This has been accomplished by placing a plurality of wires in the leading edge of the propeller before pressing and hardening in a mold. A reinforcing element constructed in accordance with my invention is particularly adapted for such application because the wires are securely held in place by material similar to that employed in the construction of the propeller and, on account of the binder not being thoroughly cured, the reinforcing element becomes an inseparable unit of the propeller when subjected to heat and pressure.

Although I have specifically described a reinforcing element embodying my invention and pointed out an application of it, it is obvious that minor changes may be made in the construction thereof and many applications may be found therefor and I desire that no limitations shall be imposed except such as are indicated in the appended claims.

I claim as my invention:

1. A moldable reinforcing element comprising a plurality of wires disposed in spaced relation and layers of sheet material impregnated with a binder in an uncured state disposed with the wires between them.

2. A moldable reinforcing element comprising layers of fibrous sheet material impregnated with a phenolic condensation product in an uncured state and wires interposed between the layers in spaced substantially parallel relation.

3. A method of preforming a reinforcing element that comprises disposing a plurality of wires in substantially parallel spaced relation between layers of fibrous material impregnated with a binder, subjecting the body thus formed to pressure to compact it and applying heat to insure adhesive action of the binder.

4. A method of preforming a reinforcing element that comprises impregnating layers of fibrous material with a phenolic condensation product, interposing a plurality of wires in substantially parallel spaced relation between layers of the impregnated material, disposing untreated material upon the exposed surfaces of the treated material, applying heat and pressure to the assembled body in a mold to compact it and to bring the phenolic condensation product into an active state and removing the untreated material therefrom.

5. A method of preforming a reinforcing element that comprises impregnating layers of duck with a phenolic condensation product, interposing a plurality of cotton-covered wires in substantially parallel spaced relation between layers of the impregnated material, disposing untreated material upon the exposed surfaces of the treated material, applying heat and pressure to the assembled body in a mold to compact it and to bring the phenolic condensation product into an active state and removing the untreated material therefrom.

In testimony whereof, I have hereunto subscribed my name this 28th day of Jan. 1919.

DANIEL ADAM DICKEY.