March 3, 1931. W. UNDERWOOD 1,794,503

METHOD OF FORMING HOLLOW REENFORCED POSTS

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Fig.1.

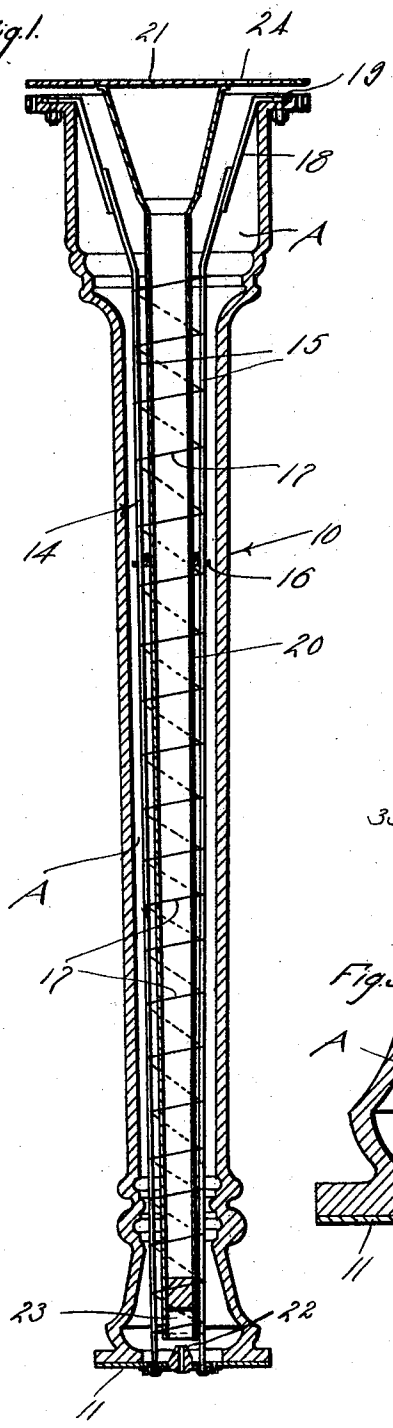


Fig.2.

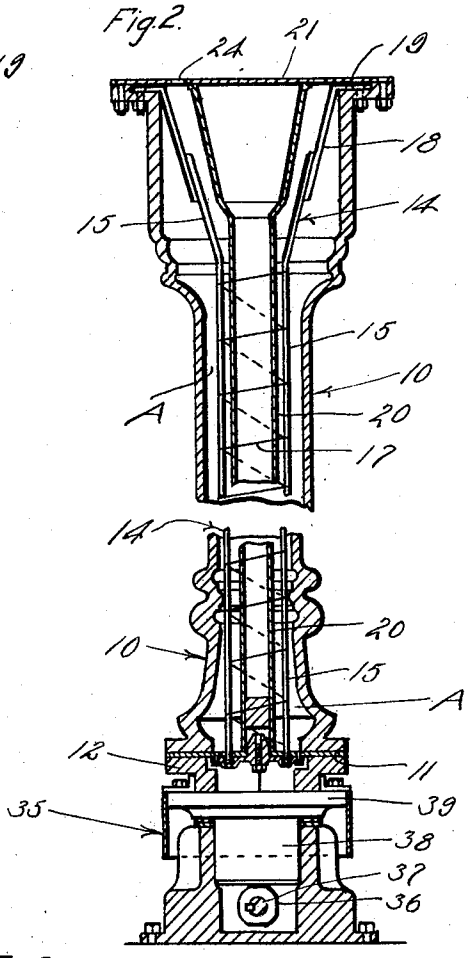
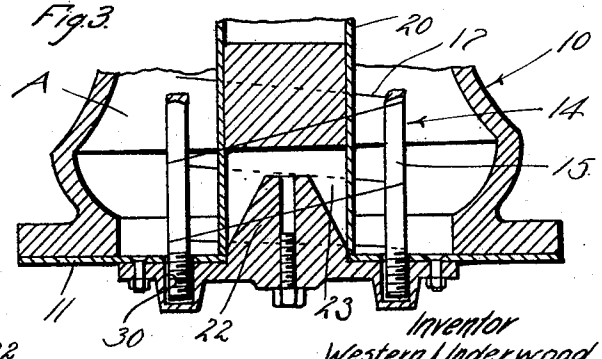


Fig.3.



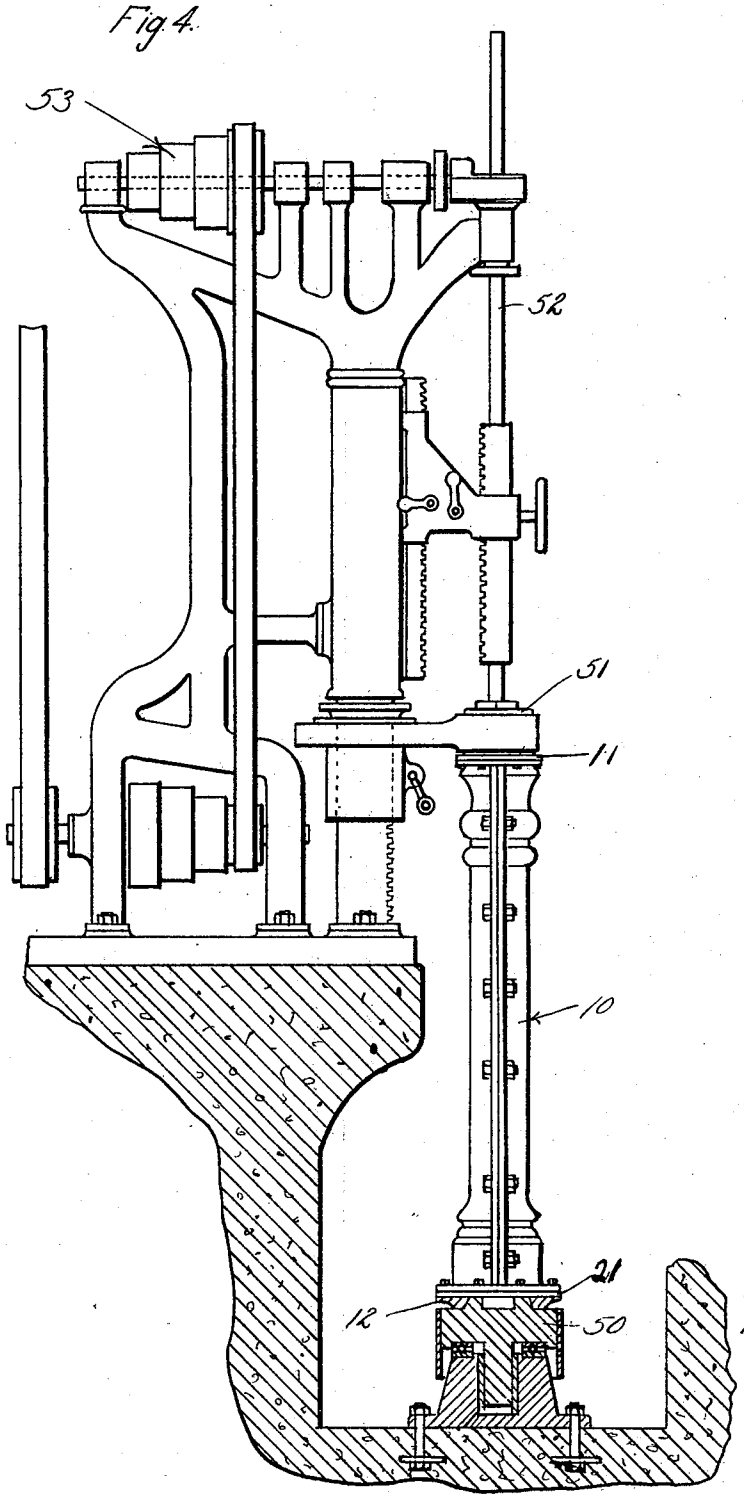
Inventor
Western Underwood
by W. K. Maxwell
his Attorney

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METHOD OF FORMING HOLLOW REENFORCED POSTS

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Fig. 4.



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Patented Mar. 3, 1931 1,794,503

UNITED STATES PATENT OFFICE

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METHOD OF FORMING HOLLOW REENFORCED POSTS

Application filed December 14, 1927. Serial No. 239,914.

This invention relates to a method of producing or forming hollow, reenforced monolithic objects, such, for instance, as posts or columns, and it is a general object of this invention to provide an improved effective and practical method of this character.

Columns and posts of various kinds, and particularly posts used for street lighting standards or electroliers, when formed or cast of cementitious material, require a metal reenforcing structure to give them the necessary strength, and require a longitudinal passage or opening to accommodate wires or other parts. Posts of the character mentioned are usually long, and therefore difficulty has been experienced in casting them with the necessary metallic reenforcements in the desired position. To overcome the difficulty of properly positioning reenforcements in cast monolithic posts, and at the same time permit of using the centrifugal method of casting, the reenforcements have been put under tension or artificial strains within the molds. This practice is not altogether desirable as the tensioned or strained reenforcement tends to return to its normal condition when released, and therefore tends to break its bond with the cementitious body cast around it. Further, in practice, when following the centrifugal method of casting, it is common to obtain the desired longitudinal opening through the casting by partially filling the mold, arranging it in a horizontal position and then depending upon centrifugal force to distribute the plastic material in the mold and leave an opening or void at the center. This practice leads to many difficulties, for instance, the equipment necessary to handle a large, long mold in a horizontal position and rotate it at the necessary speed for the centrifugal casting process, involves many mechanical complications, and further, the opening formed in the finished product being dependent upon the proper filling of the mold and the proper centrifugal casting action is not always perfect.

It is a general object of this invention to provide a method of forming or casting a hollow, reenforced, cementitious post structure whereby the undesirable features above referred to are eliminated or overcome.

It is an object of this invention to provide an effective, commercially practical method of forming a hollow, monolithic post with a free or unstrained metallic reenforcement definitely positioned therein.

It is a further object of this invention to provide an improved method of handling and operating a post mold reenforcement and core to produce a hollow, reenforced, monolithic post in a simple and practical manner.

Another object of the invention is to provide a method of packing or casting plastic material in a post mold, or the like, whereby the material is cast without undesirable voids and with a uniform dense outer surface.

The objects and features of the invention will be understood from the following detailed description of a typical manner of carrying it out, throughout which description I refer to the accompanying drawings, in which:

Fig. 1 is a longitudinal, detailed, sectional view of a post mold showing the reenforcement in place therein and showing the core being inserted;

Fig. 2 is a view similar to Fig. 1 showing the core set in place and showing the mold in vertical position on a vibrating machine;

Fig. 3 is an enlarged, detailed, sectional view showing the manner in which one end of the reenforcement is guided in the mold; and

Fig. 4 is a view showing the mold in position in a machine operatable to rotate it, certain parts being shown in section.

My invention is intended primarily for the manufacture of hollow, reenforced, cementitious or monolithic posts, such as are used in lighting standards or electroliers. This particular type of monolithic structure requires certain qualities in the finished product and has given rise to serious problems. For example, the design and proportioning of the ordinary lighting post require a fairly heavy metallic reenforcing structure in the cementitious body, and further require that such reenforcing be definitely and accurately positioned in the body. Further, in order to obtain the desired strength of the cementi-

tious body and the desired texture at the exterior of the body, it has been found advantageous to employ the centrifugal method in the casting of the body.

My invention provides primarily for the manufacture of a post of the character mentioned with the use of a sectional mold and core therefor, whereby the reenforcement for the post is definitely and freely held in position to be cast in the post, the filling of the mold with plastic material, for instance, a plastic cementitious mixture, and at the same time operating the mold so that the material is packed therein, operating the mold to equalize or uniformly pack the material in the mold, and then rotating the mold in a manner similar to that followed in the ordinary centrifugal casting process.

The mold used in carrying out my process may be a suitable sectional mold having a body 10 divided longitudinally into a plurality of sections, a cover plate 11 applied to the small or head end of the body, a mounting plate 12 to be applied over the cover 11 to facilitate mounting the mold in suitable machines, a mounting plate 13 for application to the base or large end of the body over the reenforcement and core to close the mold and facilitate its being handled in suitable machines, and various other parts, the details and functions of which may be varied as conditions require. It is to be understood, of course, that the body 10 of the mold is hollow or formed with an opening A, shaped and finished to give the post the desired proportioning and exterior design. The ends of the mold 10 vary, one being designed to form the head end of the post, the other being designed to form the base end of the post.

The reenforcement 14 to be embedded or cast in the post, may be a simple, open, metal structure including a plurality of longitudinal rods 15, a spacer ring 16 for the rods, transverse ties 17 binding the rods together, and foot brackets 18 on the base ends of the rods to be embodied in the base end of the post to have parts 19 projecting therefrom. The brackets 18 are adapted to be attached to the base end of the mold while the head ends of the rods are adapted to extend freely into sockets 30 in the cover plate 11.

The core to be used in the mold and in conjunction with the reenforcement, may include an elongate body 20 to be arranged longitudinally through the space A of the mold body 10, and a mounting plate 21 on the base end of the body 20 to be attached to the base end of the mold body 10. The mold cover 11 and the head end of the core body 20 co-operate so that the head end of the core body is held in the desired position in the space A. In the construction shown, a projection 22 is provided on the inner side of the cover 11 to extend into a socket 23 provided in the head end of the core body. It is to be noted that the core body is tapered longitudinally so that it can be withdrawn from the cast post through the base end of the mold. The mounting plate 21 is provided with one or more openings 24 to register with the opening A in the mold body 10 when the plate is applied to the mold body, as shown in Fig. 2. The openings 24 are provided to allow the plastic material to be filled into the mold. The parts are related so that the plate 13 covers the openings 24 when applied to the mold.

In accordance with the method provided by my invention, the cover 11 is applied to the mold body 10, and the reenforcement 14 is positioned in the mold space A with the projecting parts 19 of the foot brackets 18 attached to the base end of the mold body 10, and the head ends of the rods 15 guided by the sockets 30 in the cover 11. The core is then inserted or arranged in place through the base end of the mold so that the head end of the core body is guided or held in position by the cover 11, and the plate 21 is attached to the base end of the mold body 10. When the core is in place, it engages the spacer ring 16 of the reenforcement and thus spaces or guides the reenforcement in the space A.

The mold is now ready to be filled, and is arranged in a vertical position with its base end up. The desired plastic material, for instance, a suitable cementitious mixture, is then filled into the mold through the openings 24 and the plate 21, and as the mold is filled, it is vibrated so that the plastic material is settled or packed in a manner to fill into all parts of the opening A and around all of the parts of the reenforcement. The vibration of the mold continues while the mold is being filled, and results in a complete filling of the mold without voids or air pockets. The mold is preferably vibrated vertically. In Fig. 2 of the drawings, I have shown the mold mounted on a vibrating machine 35, which includes a cam 36 operated by a shaft 37 to vibrate a vertically movable stem 38 carrying a platform 39 on which the mold is supported. After the mold has been completely filled under the conditions just described, the vibration is preferably continued for a time in order that all of the material in the mold be thoroughly settled or packed to substantially the same extent. In practice, I have found it desirable to continue the vibration of the mold for a period of about five minutes after the mold has been completely filled.

In the preferred carrying out of my invention, I then close the mold by means of the plate 13, and turn it end for end so that the base end is down, as shown in Fig. 4. The mold is then spun or rapidly rotated about its longitudinal axis. This step of the process may be carried out in accordance with the

general practice followed in casting cementitious material centrifugally, the exact rate of rotation and the extent of rotation depending upon many factors, such as, the material being cast, the size and nature of the mold, the character of exterior desired on the cast product, etc. The rotation of the mold further packs or fills the plastic material into the mold body so that the exterior of the post or finished product is sharply cast and is dense.

In Fig. 4 of the drawings, I disclose a machine such as may be used in rotating the mold. In this particular machine the mold is mounted in a vertical position through the mounting plates 12 and 13. The machine includes a lower bearing platform 50 rotatably supporting the lower end of the mold, and a top bearing 51 rotatably supporting the upper end of the mold. The mold is rotated from a drive spindle 52 through the bearing 51, the desired speed of the spindle being obtained through a belt drive 53 embodied in the machine.

When the post has been completely formed or cast as above described, it is allowed to stand in the mold a short time, say a few hours, until it has set sufficient to permit of the core being withdrawn and the mold sections separated. In accordance with practice followed in the manufacture of products of this kind, the post, after being removed from the mold, is preferably allowed to stand in water until well set, after which its exterior is finished, for instance, acid etched, to give it the desired appearance.

From the foregoing description, it will be apparent that my present invention provides a process or method of manufacture which is simple and inexpensive, at the same time capable of being carried out economically on a commercial scale. Particular attention is called to the fact that the reenforcement is definitely and accurately held or guided in the mold space A without being put under tension or strain. This is a very important feature of the process, as it allows the reenforcement to set in the cementitious body under natural or normal conditions, thus assuring a proper and permanent bond between the reenforcing members and the cast body. Further, it is to be noted that the method of operating the mold and handling it results in a uniform and equalized packing of the material in the mold so that the finished post is without air pockets or voids and of substantially uniform density throughout its length. It also is to be noted that my invention provides for the manufacture of a post having all of the desirable characteristics of a post manufactured by the centrifual casting method and at the same time eliminates the complications and undesirable features that have heretofore attended the centrifugal method.

Having described only a typical preferred form of my invention, I do not wish to limit myself to the specific details set forth, but wish to reserve to myself any changes or variations that may appear to those skilled in the art or fall within the scope of the following claims:

Having described my invention I claim:

1. The method of packing plastic material into a mold of the character described including filling the material into the mold with the mold in a vertical position and vibrating the mold while it is being filled, turning the mold end for end, and then rotating it.

2. The method of packing plastic material into a mold of the character described including filling the material into the mold with the mold in a vertical position and vibrating the mold vertically as it is being filled, continuing the vibration of the mold after it is filled, then turning the filled mold over end for end, and then rotating the mold.

3. The method of casting a cementitious post with a metal reenforcement including placing the reenforcement in a mold to be free to expand or contract longitudinally of the mold and to be definitely positioned laterally in the mold, filling the mold with plastic cementitious material and then rotating the mold.

4. The method of casting a cementitious post with a metal reenforcement including placing the reenforcement in a mold to be free to expand or contract longitudinally of the mold and to be definitely positioned laterally in the mold, filling the mold with plastic cementitious material, vibrating the mold while it is being filled, and then rotating the filled mold.

5. The method of casting a cementitious post with a metal reenforcement including placing the reenforcement in a mold, with one end attached to one end of the mold and the other end guided against lateral movement by the other end of the mold to be free longitudinally of the mold, packing plastic cementitious material in the mold, and then rotating the full mold.

6. The method of casting a cementitious post with a metal reenforcement including placing the reenforcement in a mold definitely spaced at both its ends from a core in the mold and free to expand or contract longitudinally, packing plastic cementitious material in the mold, and then rotating the filled mold.

7. The method of casting a cementitious post with a metal reenforcement including placing the reenforcement in a mold, spaced in the mold from a core and having one end attached to one end of the mold, and the other end guided by the other end of the mold to be free longitudinally of the mold, filling plastic cementitious material into the mold with the mold in a vertical position, vibrating the mold

vertically while it is beng filled, continuing the vibration of the mold after it is filled, then turning the mold over end for end, and then rotating the mold about its central longitudinal axis.

8. The method of packing plastic material into a mold of the character described including filling the material into the mold with the mold in a vertical position and vibrating the mold vertically while it is being filled, turning the mold end for end, and then rotating it.

In witness that I claim the foregoing I have hereunto subscribed my name this 6th day of December, 1927.

WESTERN UNDERWOOD.