

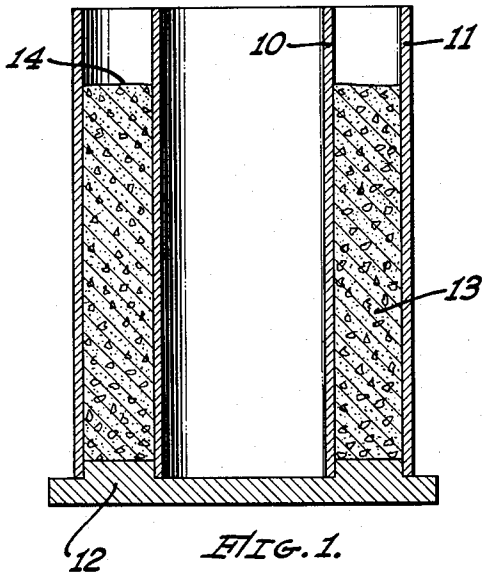
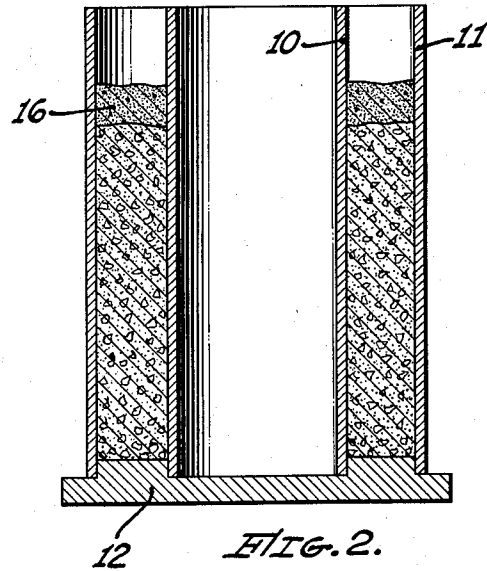
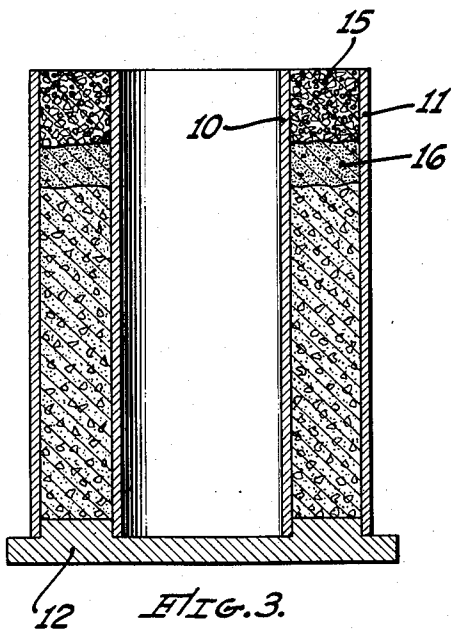
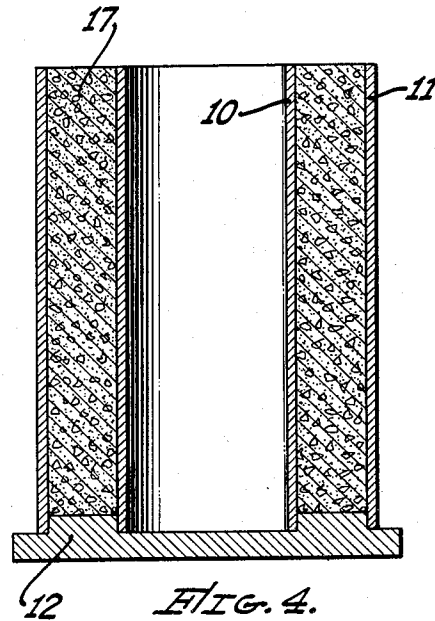
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METHOD OF CASTING CONCRETE PIPES AND THE LIKE

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## UNITED STATES PATENT OFFICE

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METHOD OF CASTING CONCRETE PIPES  
AND THE LIKE

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3 Claims. (Cl. 25-155)

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This invention relates to a method of casting or molding concrete, and is particularly advantageous in casting or molding concrete pipe and similar concrete structures.

A primary object of the invention is to provide a method of casting or molding concrete structures in such a manner as to obtain concrete containing the maximum amount of coarse aggregate and producing concrete of a given strength with a minimum amount of cement. To designers of structural concrete it is general knowledge that certain factors influence and determine the strength of the structure, i. e., the quality of the aggregate employed, the proportions used, the maximum size of aggregate particles used, the quantity of cement, the quantity of water used per unit volume, the absence of voids in the mass, and the density.

Heretofore, methods have been developed for casting or molding concrete wherein the mold or form is vibrated after having been filled with the mixed concrete. The vibration tends to consolidate the aggregate particles and to increase the strength of the mass by the elimination of voids and increasing the density of the concrete. However, when the concrete is vibrated the larger or denser aggregate particles tend to settle toward the bottom of the mold displacing water and the finer aggregate particles upwardly so that when the concrete is cured or allowed to set the larger aggregate particles will predominate in the lower part of the mold whereas at the top of the mold only the finer aggregates will be present. This results in concrete pipe and similar concrete structures being stronger at the lower part than at the top whereas, it is desired to have such structures of uniform strength from bottom to top.

The improved method is designed to promote such uniformity and yet retain all of the advantages attendant to vibrating the mold in order to eliminate voids, consolidate the mass, and increase its density.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a vertical section through a mold for making concrete pipe used to illustrate the method embodying the present invention and illustrating it as having been partially filled with mixed concrete prior to or during vibration;

Fig. 2 illustrates the condition of the concrete

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in the mold as a result of its having been vibrated;

Fig. 3 illustrates the mold and concrete after corrective measures have been taken to fill the mold and enable a uniform distribution of large aggregate particles to be obtained; and

Fig. 4 illustrates the condition of the mold and concrete after it has been vibrated a second time.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the mold illustrated is a simplified form of mold for producing concrete pipe consisting of an inner core 10 and an outer jacket 11 supported on a base 12. It will be appreciated, however, that the present invention is not confined to the making of concrete pipe but may be used in producing other concrete structures, and even when used to make concrete pipe there may be considerable variation in the details of construction of the mold.

In accordance with the present invention the mold is partially filled with concrete 13 composed of selected proportions of heavy or large-sized aggregate, such as rock, smaller aggregate such as pea gravel, sand, cement, and water. These ingredients of the concrete are thoroughly mixed together in any suitable manner such as by a concrete mixer, and when mixed, the mixture is poured or otherwise placed in the mold so as to fill it to a point near but definitely below the top of the mold such as is indicated by the level 14. When the mold is thus partially filled it is vibrated in any suitable manner such as by a vibrator applied to or attached to the jacket 11. Any means for vibrating the mold and its contents so as to consolidate the particles and to work out air pockets or voids may be employed.

When the mold has been adequately vibrated the concrete therein will be found to be in the condition somewhat as is illustrated in Fig. 2, wherein the larger or heavy aggregate particles have settled toward the bottom of the mold displacing the water, cement, sand, and finer aggregate particles upwardly. The result is that when the mold is merely vibrated the lower portion of the concrete casting has an adequate supply of the large or heavy rock particles which contribute materially to the strength of the casting. However, the upper portion of the concrete casting will be composed of only sand and small rock particles, and consequently, the upper portion is relatively weak. In order to correct this separation resulting from the vibration I complete the filling of the mold by adding thereto a mass indicated at 15 composed principally of

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large or heavy rock only. This large rock or heavy aggregate may have been mixed with cement and water or it may consist merely of wetted or even dry rock. The added mass contains very little, if any, sand or pea gravel. The added mass 15 thus initially occupies a position in the mold overlying the upwardly displaced sand and pea gravel indicated at 16 on Fig. 2, and the mold is thereafter vibrated a second time. The added mass 15, in the course of the vibration, also tends to settle and to displace the cement, sand, and pea gravel 16 upwardly therethrough. However, as the amount of the mass 15 that is added to the mold to fill it is relatively small, it is ordinarily not necessary to vibrate the mold the second time to any great extent and at all events vibration of the mold the second time is discontinued as soon as it is apparent that a fairly uniform mixture is obtained between the heavy aggregate 15 and the fines at 16. As a result, the final mixture in the mold, indicated at 17 on Fig. 4, has heavy or large-sized aggregate distributed substantially uniformly therethrough so that the pipe or other structure will be of substantially uniform strength from bottom to top. It will be appreciated that by this method all of the advantages of vibrating the mold are retained in that air pockets and voids can be effectively worked out and a dense mass secured.

It will also be appreciated that a relatively large amount of heavy aggregate can thus be introduced into the concrete to promote the strength and that in so doing, only a minimum amount of cement need be employed.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. The method of casting concrete structures such as pipe which includes filling a mold to a

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point near but below the top of the mold with wet concrete, vibrating the mold and then filling the remainder of the mold with principally large-sized aggregate and again vibrating the mold whereby the cement and fine aggregate which tends to collect at the top of the concrete initially placed in the mold as a result of the first vibration will tend to be displaced upwardly through the added aggregate and the article produced will have the large-sized aggregate distributed therethrough substantially uniformly from bottom to top.

2. The method of casting a concrete article so as to have substantially uniform consistency from bottom to top which includes partially filling a mold with wet concrete composed of cement, sand, pea gravel, and rock, vibrating the mold and thereafter adding to the mold rock with little if any pea gravel or sand and cement and again vibrating the mold whereby the cement, sand, and pea gravel which collected at the top of the concrete as a result of the first vibration will be displaced upwardly through the added rock during the second vibration, producing a concrete article of substantially uniform consistency.

3. The method of casting a concrete object so as to have substantially uniform consistency from bottom to top which includes partially filling a mold with concrete composed of wet cement, sand, and rock, vibrating the mold and thereafter filling the mold with wet cement and rock only and again vibrating the mold whereby the sand and cement which collected at the top of the concrete initially placed in the mold will be distributed upwardly through the added cement and rock during the second vibration producing a concrete article having an adequate supply of rock at the top of the mold.

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No references cited.