

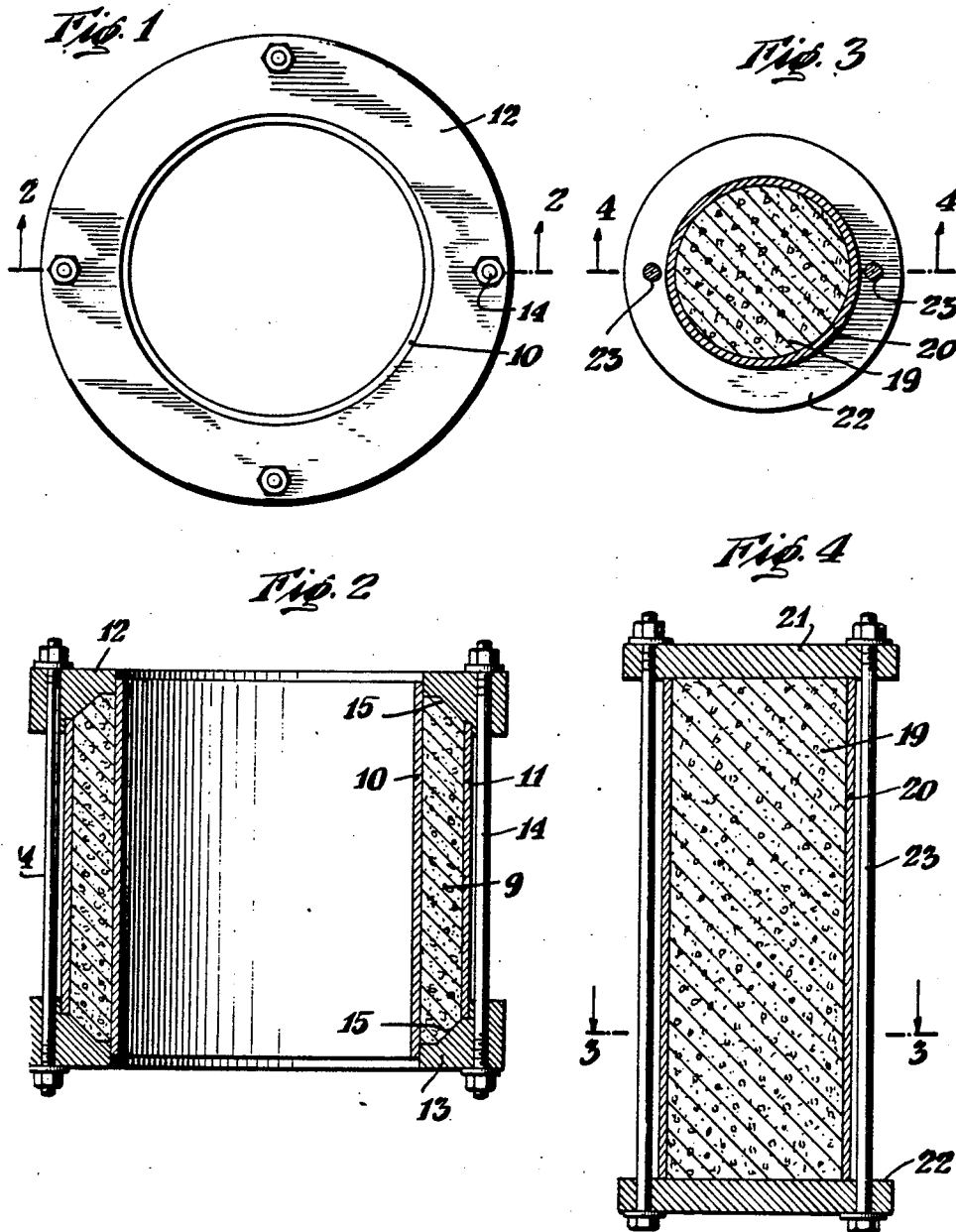
May 22, 1945.

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2,376,414

METHOD OF MAKING CONCRETE STRUCTURES

Filed June 27, 1942



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2,376,414

METHOD OF MAKING CONCRETE STRUCTURES

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Application June 27, 1942, Serial No. 448,828

7 Claims. (Cl. 25—155)

This invention relates to concrete and concrete structures and the method of making them.

An object of the invention is to improve the properties of concrete and concrete products, such as its strength, watertightness and bond to steel or other materials.

Other objects of the invention will be apparent from the following description and accompanying drawing taken in connection with the appended claims.

The invention comprises the features of construction, combination of elements, arrangement of parts and methods of manufacture and operation referred to above or which will be brought out and exemplified in the disclosure hereinafter set forth, including the illustration in the drawing.

In the drawing:

Figure 1 is a top view of a concrete pipe casting form used in carrying out the invention;

Figure 2 is a section on the line 2—2 of Figure 1; and

Figures 3 and 4 are transverse and longitudinal sections illustrating the forming of a concrete column.

A feature of the invention resides in the use of a gas generating agent in the concrete mixture and in confining the concrete during setting to prevent its free expansion. When concrete containing the gas generating agent, such as aluminum powder, for example, is restrained from expanding freely we have discovered that unusual benefits are obtained. The resulting concrete is found to have better strength, greater watertightness and to produce a better bond to steel.

One method of practicing the invention comprises mixing a concrete of Portland cement, aggregates, and water, and containing, in addition, a gas-generating agent, then pouring or placing the concrete in a form having covering or confining means to prevent free expansion of the concrete by the gas generated therein. The preferred gas generating material is powdered aluminum and it is preferably used in the proportions described in Billner Patent #2,023,001, issued December 3, 1935, namely, from 0.3 to .3 grains of aluminum powder per pound of dry cement powder.

Referring to Figures 1 and 2 of the drawing, which show a concrete pipe casting form, the concrete mix is poured between inside and outside cylindrical metal forms 10 and 11 to fill the space between them. Cast steel end cover rings 12 and 13 are clamped on the ends

of the form and secured tightly against the ends by tie-bolts 14 extending between them. The faces 15 of rings 12 and 13 may be formed to give any desired configuration to the ends of the concrete pipe.

The forms and end rings are left in place until the concrete sets. The gas generated during setting produces internal pressure but cannot cause any appreciable expansion of the concrete.

Figures 3 and 4 show the invention applied to the making of concrete columns. The concrete 19, containing a gas generating agent, is poured into a steel tube or cylinder 20 to fill it and end plates 21 and 22 are clamped in place by tie-rods 23 to maintain the concrete under confinement and resultant internal pressure during setting. The end plates and steel cylinder may subsequently be removed or cylinder 20 can, in some cases, be left on to further strengthen the column and protect the concrete.

We have found that this process results in a concrete of improved strength and watertightness. Where steel reinforcement is used it also produces an improvement in the bond between the concrete and the steel. The method further results in the reduction or elimination of "water gain" under the aggregate particles and under reinforcing bars. The contact between the cement paste and the aggregate and also to reinforcing members is promoted by the pressure.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not desired to be limited thereby but it is intended to cover the invention broadly within the spirit and scope of the appended claims.

What is claimed is:

1. The method of making a concrete structure which comprises preparing a concrete mix containing a gas generating agent, completely filling a form with said mix and completely enclosing said mix therein and restraining all the walls of said form against outward movement prior to any material generation of gas in said mix to prevent expansion of said concrete mix by said gas generating agent.

2. The method of making a concrete structure which comprises preparing a concrete mix containing an aluminum powder, completely filling a form with said mix and completely enclosing said mix therein and restraining all the walls of said form against outward movement prior to any material generation of gas in said mix to prevent expansion of said concrete mix by said aluminum powder.

3. The method of making a concrete body which comprises preparing a concrete mix containing a gas generating agent, completely enclosing said mix in a form and restraining the unexpanded mix by said form against any substantial expansion during the setting period thereof.

4. The method of making a concrete body which comprises preparing a concrete mix containing a gas generating agent, completely enclosing said mix in a form and restraining the unexpanded mix by said form against any substantial expansion during the setting period thereof, whereby a substantially non-porous concrete body is produced having higher strength than a body of similar composition which has been allowed to expand under influence of said gas generating agent, and higher strength than a body of similar composition without the presence of said gas generating agent.

5. The method of making a concrete body which comprises preparing a concrete mix containing aluminum powder, completely enclosing said mix in a form and restraining the unexpanded mix by said form against any substan-

tial expansion during the setting period thereof.

6. The method of making a concrete body which comprises preparing a concrete mix containing aluminum powder, completely enclosing said mix in a form and restraining the unexpanded mix by said form against any substantial expansion during the setting period thereof, whereby a substantially non-porous concrete body is produced having higher strength than a body of similar composition which has been allowed to expand due to the generation of gas by said aluminum powder, and higher strength than a body of similar composition without the presence of aluminum or other gas generating agent.

7. The method of making a concrete body which comprises preparing a concrete mix containing aluminum powder in proportions of from .03 to .3 gram of aluminum powder per pound of dry cement powder, completely enclosing said mix in a form and restraining the unexpanded mix by said form against any substantial expansion during the setting period thereof.

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