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METHOD OF FORMING CONCRETE WALL MEMBERS

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5 Claims (Cl. 25-155)

This invention is a continuation in part of my application filed in the U. S. Patent Office, March 3, 1938, Serial No. 152,668, and relates to building wall members and particularly to a silo wall member, made of concrete, or cement and some suitable aggregate. When the wall member is to be employed in a silo, it is exposed to a wide range of temperature changes and its interior face is subjected to the acids of the ensilage.

It has been the experience that where the face portion of the concrete wall member is made in the usual manner, deterioration sets in due to the acid reactions in the wall member causing the surface of that member to be etched away.

For the purpose of structural strength and economy, the concrete wall member is made of cement as a binder and aggregate such as gravel, crushed rock or the like, and this etching action is particularly noted about the aggregate particles.

Heretofore in order to overcome this difficulty, the surface portions of the wall member have been coated with some sort of an acid repellent or acid resistant material or as to withhold the acids from contact with the wall member. This mode of treatment works entirely unsatisfactorily as long as the material may be held in contact with the wall member. It sometimes occurs, however, particularly in cold weather, that the coating material will contract and loosen or chip off. If it were economical and structurally sound as it is, the wall member could be made out of cement alone without an aggregate combined therewith and such a wall member would be very resistant to the action of the acids of the ensilage. The acids would tend to permeate the mass of the wall member immediately adjacent the inner or face surface but this penetration would become negligible in very short order due to the fact that what little reaction may occur, soon becomes stopped on account of the fact that the acids produced will clog up the minute pores of the cement and in themselves form a good acid seal. Since in this case there is no aggregate present, there would be no loosening effect as between the cement bond and the aggregate to set up the chipping or etching action resulting in the customary spalling of the wall member. However, as above indicated, it is neither practical nor economical to make the wall member solely of cement and, therefore, the cement and aggregate concrete must be protected in some manner.

It is a primary object of my invention to provide a protective zone adjacent the face of the

wall member which is normally presented toward the ensilage, and to create such a zone as will become permanent in nature as an acid resisting medium as well as a medium preventing any appreciable degree of acid penetration. It is a further primary object of my invention to provide as a structural part of the wall member rather than as an after application, an acid resistant film to be incorporated directly within the concrete and to be so sealed therewithin as to prevent loss of that material due to weather conditions or temperature changes.

These and many other objects and advantages of the invention will become apparent to those versed in the art in the following description of one particular form of the invention as is illustrated more or less diagrammatically in the accompanying drawing, in which:

Fig. 1 is a vertical section through a wall member within a mold;

Fig. 2, a detail on a greatly enlarged scale of a section through the inner face portion of the wall member on the line 2-2 in Fig. 1;

Fig. 3, a view in top perspective of a finished wall member; and

Fig. 4, a section similar to that shown in Fig. 1 but with the finished surface presented at the bottom of the mold.

Like characters of reference indicate like parts throughout the several views in the drawing.

In the present instance, the wall member 11 being described is that as employed in a silo wherein the thickness would be about two and one-half inches and the width about twelve and one-half inches with any desired length such as two and one-half feet. Preferably the member for this use would be provided with a groove on one side and a tongue on the other for matching when the members are placed one against the other, edge to edge to form the silo.

In a suitable mixing mill, sand is heated to a temperature above the melting point of the material to be employed as the acid resisting medium. Paraffin wax is easily handled, is sufficiently low in price to permit its economical use, and has certain qualities as will hereinafter become apparent to be an excellent acid resisting medium. To the heated sand is added the melted wax in the desired proportions. This will depend somewhat upon the size of the individual grains of sand, but in practice one particular proportion is one part by volume of wax to twelve parts of sand. As the wax is mixed through the heated sand, the wax distributes itself throughout the same almost immediately and uniformly with

little stirring being required. Approximately _____ minutes is sufficient to complete the wax _____ of the sand.

The sand thus coated and mixed with _____ is then dumped while hot into a revolving mixer which has already been charged with _____ and cement. The resultant mixture of sand _____ cement and water is churned and mixed for _____ four minutes until a smooth uniform mass is _____ obtained.

The foregoing mixture is then ready _____ for the facing layer 17 in the mold 10. _____ this facing mixture may be prepared _____ the following manner. The sand _____ initially heated and then placed with cement _____ the usual concrete mixer to be thoroughly _____ in the dry state for some such period _____ minute. Then while the mixer is turning _____ paraffin is added and the mixer continues _____ operation for a period of about three _____ minutes. The resultant mixture of sand, cement _____ paraffin, while still in the heated state, is _____ ferred to a paddle mixer which contains _____ water. The paddle mixer is operated for about _____ seven minutes. One particular proportion of _____ ingredients, although the invention is not _____ limited thereby, is as follows: equal parts of _____ cement and sand by volume (a cement _____ bag of cement), fifteen parts of _____ paraffin, and only enough water to produce the _____ resultant mixture as will vibrate down to _____ within the mold.

The mixture resulting from either process _____ is then ready for use in the mold 10. _____ ensuing steps in the molding process may _____ be described as follows. For example, as indicated in Fig. 1, the _____ concrete constituting the principal part of the _____ member 11 may be placed in the mold _____ and vibrated down to a level to leave an _____ portion of the mold into which the _____ mixture above prepared may be poured and _____ elled to a level substantially at the top _____ of the mold. This method forms a facing _____ at the top side of the mold. The other process _____ is to place the resultant paraffin mixture _____ mold initially, as indicated in Fig. 2, _____ vibrate that mixture to a level across the _____ floor and then add the principal body concrete _____ mixture thereover and vibrate it to the _____ top of the mold. In filling the mold _____ the body concrete on top of the facing, _____ of the mold are filled first over the _____ mixture.

As illustrated more or less diagrammatically _____ in Fig. 2, the upper side of the section _____ member 11 constitutes the inside face of the _____ member when it is positioned in the mold. _____ In this section, the major part of the thickness _____ of the wall member is represented by the _____ concrete 12 having the particles of aggregate _____ distributed therethrough and bonded in the _____ way by cement. The facing zone 17 is _____ sented by the smaller particles of sand 14 _____ having a coating of wax 15 therearound. _____ cement 16 flowed therebetween and down to _____ an intimate, integral bond with the concrete _____ 12. It is appreciated that the majority of the _____ particles of sand 14 will not be directly _____ facted or bonded with the cement therearound _____ but each particle of sand 14 will be separated _____ from that cement by reason of its envelopment _____ film of wax 15. This introduction of films _____ the sand particles in the facing zone forms the _____ gist of the invention.

Since each particle of sand is isolated

the cement by the film of wax therearound, _____ acids coming into the cement from the face by _____ capillary action do not come into contact with _____ the sand particles. Moreover by reason of the _____ fact that the cement is actually kept separate _____ from the sand particles, the capillaries in this _____ facing zone are extremely small and are easily _____ clogged before the acids can penetrate very far. _____ The wax film about each sand particle, of _____ course, resists any invasion of the acid and more- _____ over, particularly after the silo member has _____ been exposed to the weather through a summer, _____ this film upon becoming heated again will actu- _____ ally tend to spread through the fine capillaries _____ in and about the sand and form a more or less _____ continuous zone of wax through this facing por- _____ tion so that in time the film of wax becomes _____ somewhat distributed even through the cement _____ intervening between the sand particles. More- _____ over when the weather becomes cold, the wax _____ tends to shrink at a greater rate than does the _____ sand and cement, but the wax can not escape _____ and be removed from the facing zone by friction _____ and wear since it is entrapped within the shell- _____ like spaces between the cement and each grain _____ of sand. Therefore, when the weather warms _____ up again, or when the wall members become _____ warmed by the heat transmitted from the fer- _____ menting ensilage, the wax is still there and upon _____ expansion will refill that spacing.

In other words, by reason of the unique man- _____ ner of introducing the wax into the facing zone _____ of the wall member, the wax is not only placed _____ more deeply into the zone than it would be if it _____ were merely painted or spread on the surface, _____ but the wax is placed there in a permanent fash- _____ ion without danger of being scraped off, cracked _____ off by shrinking, or otherwise lost.

Referring again to the method forming the _____ individual member, the cast member is left in _____ the mold until it is hardened sufficiently that it _____ may be removed without damage. The removed _____ member is then cured in the usual manner. In- _____ cidentally by reason of the presence of the fac- _____ ing surface zone, the water does not leave the _____ member as quickly as it would otherwise and, _____ therefore, good curing conditions are extended _____ in a very beneficial manner.

Also it is to be noted that there is an actual _____ saving of labor in preparing the wall member in _____ the manner stated in that the wax may be intro- _____ duced into the wall member as described with _____ less labor than it could be by first putting the _____ member through a heating operation and then _____ immersing it in molten wax so that the wax may _____ penetrate the pores or capillaries of the mem- _____ ber, as has been done heretofore. While the _____ process has been described in reference to a silo _____ wall member, it is, of course, well adapted to other _____ concrete members such as building blocks and _____ the like where a water resistant surface zone is _____ desirable as well as an acid resisting zone.

While I have herein shown and described my _____ invention in minute detail, it is entirely obvious _____ that changes may be employed therefrom with- _____ out departing from the spirit of the invention and _____ I, therefore, do not desire to be limited thereby _____ beyond the limitations as may be imposed by the _____ following claims.

I claim:

1. That method of forming a concrete wall _____ member which comprises molding the major _____ thickness of the member, heating and coating _____ a mass of aggregate particles with a paraffin wax _____ film, mixing the film coated particles with cement

and water, applying the resultant mixture to a face of said member to form a zone of appreciable thickness thereon, the cement of the mixture bonding with the concrete of the member to form a resultant integral rigid member having a surface zone with individual film coated aggregate particles separated by a cured cement bond therearound and between adjacent particles.

2. That method of forming a concrete silo wall member which consists of mixing water, cement and aggregate to form concrete, pouring the concrete into a horizontally disposed mold to a level slightly below the top of the mold, settling and leveling the concrete to bring its upper face into a horizontal plane, heating a mass of sand, pouring liquefied paraffin wax into the mass in sufficient amount to thoroughly coat each particle of sand with a wax film, mixing the coated sand while hot with cement and water to a smooth condition, placing the sand-wax-cement-water mixture over said face in the mold to fill the mold, and allowing the resultant member to set and cure.

3. That method of forming a concrete silo wall member which consists of heating a mass of sand, liquefying a mass of paraffin wax, mixing the wax and sand together while hot in sufficient proportions to apply an enclosing wax film about each sand particle, dumping the waxed sand while hot into a mixture of water and

cement to disperse the wax coated particles therethrough, applying a layer of the resultant mixture over the floor of a silo member mold to form a face coating portion thereof, filling the mold over the face portion with a mixture of cement and aggregate, and allowing the cast to cure and dry into a rigid unified member.

4. In a method of forming an acid resisting facing for a concrete wall member which includes preparing a mixture of aggregate, cement and water, those steps which consist of heating and mixing the aggregate and cement together in the absence of the water, mixing liquefied paraffin with the hot aggregate and cement mixture, adding water thereto, and bringing into intimate contact therewith a body of mixed aggregate, cement and water to form the backing for said facing mixture.

5. In a method of forming an acid resisting facing for a concrete wall member which includes preparing a face mixture of aggregate, cement and water, those steps of heating one ingredient of said mixture in the absence of the water, mixing liquefied paraffin with that ingredient, mixing the other ingredient therewith and the water, and backing up that resultant mixture in intimate bonding contact with a mixture of aggregate, cement and water, and allowing the mass to cure into a unitary member.

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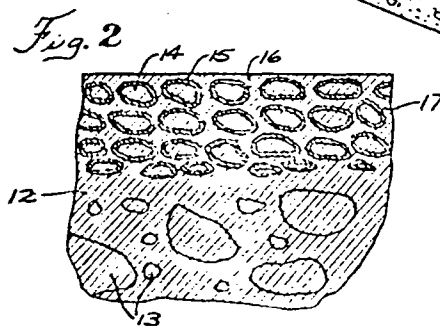
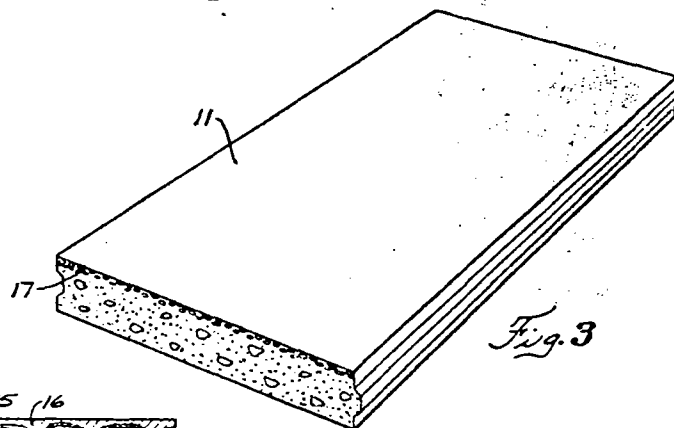
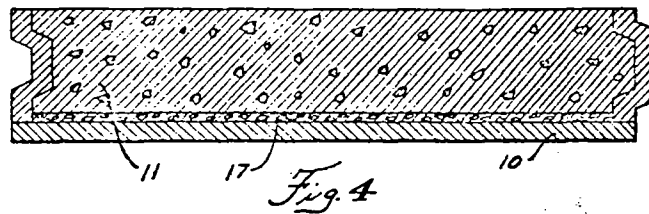
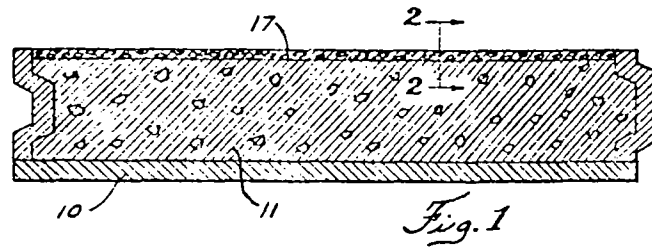
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