Feb. 22, 1955 J. BAKKER 2,702,424

PROCESS OF MANUFACTURING PRESTRESSED CONCRETE

Filed March 7, 1952

Fig. 1.

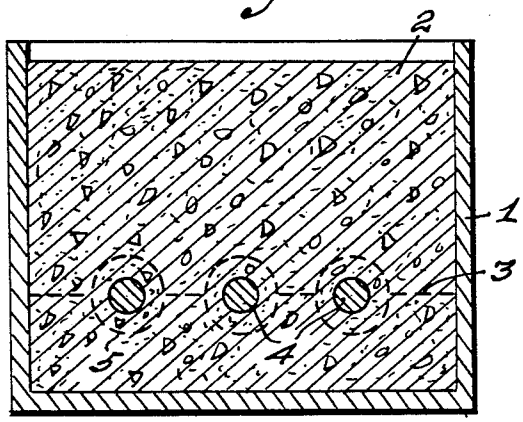
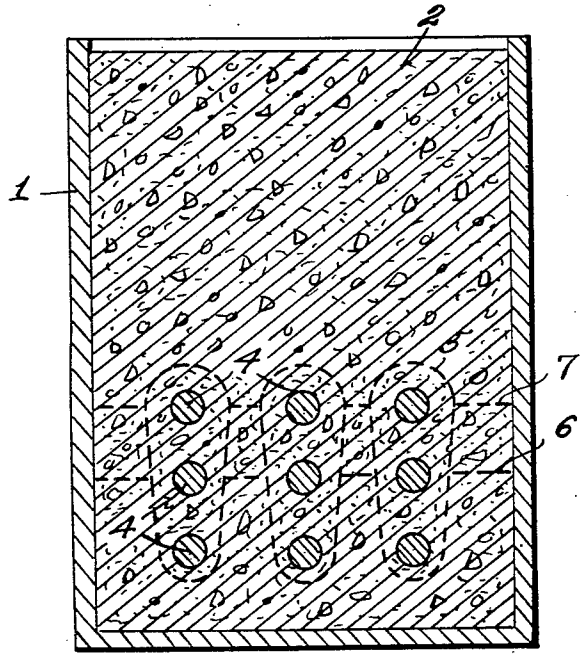


Fig. 2.



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PROCESS OF MANUFACTURING PRESTRESSED CONCRETE

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5 Claims. (Cl. 25—154)

The invention relates to a process of manufacturing prestressed concrete.

Usually such concrete is manufactured in heavy moulds with respect of which the reinforcement is stretched, after which the concrete is poured in the mould and after sufficient hardening of the concrete the stress of the reinforcement is enabled to exercise a prestressing pressure on the concrete.

Beside the known method also a method, in which the concrete piece is manufactured with channels for the reinforcement or the reinforcing elements, through which the reinforcement or the reinforcing elements are inserted after hardening of the concrete, which reinforcing elements are then stretched, after which the channels are filled with mortar under pressure. With this method indeed no heavy moulds are necessary, but the degree to which the channels are filled is not verifiable, so that no certainty exists about the good quality.

The invention now aims at providing a process which gives the advantages of the above methods without the drawbacks thereof.

According to the invention two kinds of concrete with different hardening times are used and the filling of the mould occurs in such a manner that the reinforcement lies surrounded along its whole length by a layer of the relatively slower setting concrete in the relatively quicker setting concrete, after which, after sufficient hardening of the relatively quicker setting concrete, but before the relatively slower setting concrete has hardened, the reinforcement is stretched. With this method, as well as with the last described known method, no heavy moulds are necessary, but at the same time certainty is obtained that the armouring lies well embedded along its whole length in the concrete and is thus protected against corrosion. Besides a very good adhesion between the reinforcement and the surrounding concrete is guaranteed.

The invention makes use of the known fact that it is possible to retard or accelerate the hardening time of normal concrete by adding definite chemical substances to it.

The process according to the invention can be performed in several ways, dependent on the needs. Thus when it is desired to use normal concrete, it is possible to use normal concrete round the reinforcement and for the rest so called accelerated concrete. This method will be the most suitable for small or simple work pieces, with which the surrounding of the reinforcement requires only little time. In other cases it will be recommendable to use so called retarded concrete round the reinforcement and for the rest normal concrete. This latter method, besides, has the advantage that only a relatively small amount of specially prepared concrete is necessary.

In practice appropriately first the relatively quicker setting concrete is poured in to the level of the reinforcement or of a part thereof, after which grooves are pressed in the concrete which is still in a soft condition, in which grooves the reinforcement or the concerned part thereof is laid and then is surrounded by the relatively slower setting concrete, whereafter the mould is further filled with the relatively quicker setting concrete, if necessary interrupted for surrounding the higher parts of the reinforcement with relatively slower setting concrete.

The invention at the same time comprises the articles or constructions of prestressed concrete manufactured according to the above method.

The invention will now be further elucidated with reference to a pair of examples of performance shown diagrammatically in cross-section in the drawing.

In Figure 1 the numeral 1 indicates a mould for a beam or girder 2 with a reinforcement consisting of three reinforcing elements 4 lying in the same horizontal plane 3. When manufacturing such a girder first the relatively quicker setting concrete 2, for instance normal concrete, is poured in the mould to the level 3 of the reinforcement. Then grooves 5 are pressed in the concrete when it is still soft, after which the reinforcing elements are arranged and are surrounded on all sides along their whole length with the relatively slower setting concrete 5. This can take place by hand or with a syringe. Thereafter the mould is further filled with the relatively quicker setting concrete. When this latter concrete is sufficiently hardened, the reinforcement can be stretched while the relatively slower setting concrete has not yet hardened.

After hardening of the relatively slower setting concrete the stress of the reinforcement can be transmitted to the concrete. Under definite circumstances, namely when the reinforcement is anchored with respect of the relatively quicker setting concrete, it is even not necessary to await the hardening of the relatively slower setting concrete.

Figure 2 shows a cross-section of a beam or girder like that of Figure 1, but of greater height with a reinforcement, of which the reinforcing elements 4 lie in several (three) planes above one another. In this case, if desired, it is possible to pour first the relatively quicker setting concrete to the level 6 of the second row of reinforcing elements, but it is also possible to pour the relatively quicker setting concrete immediately to the level 7 and to press grooves or slots in the soft concrete and further to act according to the method described with reference to Figure 1.

The deep slots or grooves need not be pressed in the concrete, but may also be formed with the aid of filling pieces.

When the concrete is first poured in to the level 6, it will be necessary to interrupt the pouring of the relatively quicker setting concrete at the level 7, after surrounding of the two undermost rows of reinforcing elements, for surrounding the uppermost row with relatively slower setting concrete.

The term "normal concrete" has reference to a concrete containing no agents for increasing or decreasing or otherwise influencing the setting time of the concrete.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:

1. A process of making prestressed concrete comprising the steps of introducing concrete into a molding zone, forming a seat in the concrete, locating a reinforcement within the seat, surrounding the reinforcement with a relatively slower setting concrete and stretching the reinforcement after sufficient hardening of the concrete but prior to hardening of the slower setting concrete.

2. A process as defined in claim 1 including the further step of introducing a relatively faster setting concrete into the molding zone above the slower setting concrete.

3. A process of making prestressed concrete comprising the steps of introducing a relatively quick setting concrete into a molding zone, forming at least one seat in the quick setting concrete prior to hardening of the quick setting concrete, locating a reinforcement in the seat, surrounding the reinforcement with a slower setting concrete, stretching the reinforcement after sufficient hardening of the quick setting concrete but prior to hardening of the slow setting concrete and thereafter adding a relatively quick setting concrete into the molding zone above the quick setting concrete, the slower setting concrete and the reinforcement.

4. A process as defined in claim 3 wherein said slower setting concrete is "normal concrete."

5. A process as defined in claim 3, wherein said quick setting concrete is "normal concrete."

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