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METHOD FOR THE PRODUCTION OF PROTECTION LAYER ON ARMATURE IRON FOR MOULDING INTO CONCRETE, ESPECIALLY LIGHT CONCRETE OR SIMILAR MATERIALS

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The present invention refers to a method for the production of protection layer against rusting on armature irons, which are moulded into concrete, especially steam-hardened light concrete, or similar materials.

It has earlier been proposed that the armature irons before they are mounted into the moulds and covered by the mould concrete or corresponding mass, be provided with a layer of cement or of the same mass, from which the object of concrete is produced.

However, it has proved that the adaption of the cement layer is a time consuming step. Practical tests thus have proved that the cement, usually used for the present purpose is hardening during a time of about 24 hours. Therefore, in the practical production of armature irons with rust protection of the above mentioned kind, it is of essential importance that the binding time of the cement is shortened. In order that one shall be able to handle the armature irons before the cement has bound, it has already been proposed to add glue stuff, which does not influence the binding of the cement. It has also been proposed to quick-dry the layer of cement or immediately to make same object of steam hardening at an increased temperature, but these methods have not been found to be satisfactory, because the result has been that there emanated cracks, or the layer of cement was partly washed away.

The present invention is based upon a series of tests with different kinds of temperature hardening, that means one has introduced the armature irons into atmospheres of different moisture degree and different temperatures but at substantially normal air pressure, and one has further combined different such treatments mutually so that one treatment is first made, thereafter another and so on. In these tests, one has further concentrated oneself upon finding out the most suitable treatment time in each separate atmosphere. This invention forms the result of these systematical tests.

According to the invention, the layer of cement is made object of a pre-hardening in moist air of somewhat more than ordinary room temperature, and thereafter of final hardening in moist saturated atmosphere of somewhat lower temperature than the boiling temperature of the water. Preferably, the first mentioned temperature should be in the order of magnitude of 40° C., and the latter one in the order of magnitude of 70°–80° C. After this hardening, thus made in two stages, the layer of cement may eventually be impregnated by rust-protection means, which should preferably be formed by a non-drying impregnation oil. This oil may thereafter be made object of drying at an increased temperature. The increased temperature suitably is provided thereby that the impregnation takes place immediately after finishing the latter drying stage of the cement, when the armature irons still have a temperature only slightly lower than the drying temperature, that is 70° to 80° C.

In the practical tests it has proved that one may provide

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a rust-protection layer with very advantageous properties in the above mentioned manner. The layer may be produced very rapidly. As a matter of fact about one hour of hardening in each stage is fully sufficient, and if impregnation by means of oil is taking place, a consequent drying time for the oil of half an hour is fully sufficient, thus together a total working time of 2½ hours. The layer obtains high rigidity properties, it shows no tendency of forming flaws or crackles in the iron, and it gives a good hold for the concrete. The rust protecting properties are so highly developed that one could not by otherwise available means provide anything more reliable as long as such methods are not used as plating with precious metals or the like which are not economically possible.

When executing the method according to the invention, one proceeds in the following way:

After the armature irons have been well cleaned, they are dipped in well worked, preferably activated slurry of cement and water, to which eventually suitable rust protection means may have been added. The cement slurry should not be more than about 6 hours old, because in the opposite case its binding may have proceeded so far that the rigidity of the layer of cement will not surely be sufficient. After dipping the armature irons are introduced into a moist atmosphere of about 40° C., which is easily provided by means of surplus steam from some steam plant present on the place, for instance an autoclave provided for hardening light concrete. In order to get the best use of the steam, it may be suitable to carry on all of the process consecutively so that the armature irons are automatically floating from the dipping vessel into an atmosphere tunnel, from which they are after the movement of about one hour carried on through the sluice into a second atmosphere tunnel. In this latter tunnel they stay also for the time of about one hour. The atmosphere in the latter tunnel is formed by moist saturated air of about 70° to 80° C. temperature. Immediately after the armature irons have passed the output sluice of the latter tunnel they are brought down into a bath, containing the impregnation fluid. In this bath they remain only such a short while that the impregnation fluid scarcely has time to penetrate well into the hardened layer of cement. Thereafter the armature irons are left to cool and after the lapse of about half an hour they are usable for building or moulding purposes. It may be advantageous to keep the bath of impregnation fluid somewhat heated in order that the armature irons should not be cooled too strongly in this bath. Alternatively, one may provide the impregnation by painting or spraying, both methods easily being made automatic so that they enter in the correct phase as compared with the continuous transportation of the armature irons through the above mentioned tunnels.

For maintaining the correct degree of moisture in the two atmosphere tunnels one may use low pressure steam, preferably surplus steam.

Of course, it is not necessary that the rust-protection treatment takes place in the above described continuous way, but it may also, especially when it is a case about manufacturing in a smaller scale, take place discontinuously so that a number of armature irons are simultaneously provided with cement slurry, thereafter simultaneously introduced into a chamber with an atmosphere of the first mentioned kind, and finally simultaneously introduced in a second chamber with an atmosphere of the latter kind. Instead of carrying the armature irons from one chamber to the other, one may also keep them in the same chamber during the whole hardening time, and after the lapse of about one hour add the required quantities of steam or hot air, respectively, for the change of the character of the atmosphere.

The quantity of rust protection oil and cement used is, in

spite of the complete rust-protection obtained, very low. Thus, in plant manufacturing, with a total use of rust-protection oil of 0.5 kilogram per sqm. iron surface, the corresponding consumption of cement is 1.0 to 1.5 kilograms of cement.

What is claimed is:

1. The method of producing a rust-protection layer on reinforcing irons to be used for reinforcing concrete which consists of the steps of coating a bar of iron with a layer of Portland cement slurry, introducing the coated bar into a moist atmosphere of approximately 40° C. for approximately one hour so as to preharden the cement, subsequently subjecting the coated bar to a final hardening in a moist saturated atmosphere of approximately 70° to 80° C. temperature, and then impregnating the hardened cement with a thin non-drying oil.

2. A method according to claim 1 in which the final hardening has a duration of approximately one hour.

3. A method according to claim 1 in which the non-drying oil is preheated.

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