Nov. 14, 1950 J. G. A. JOHNSON 2,529,500

APPARATUS FOR DRYING AND EXPEDITING THE SETTING OF PLASTIC CONCRETE

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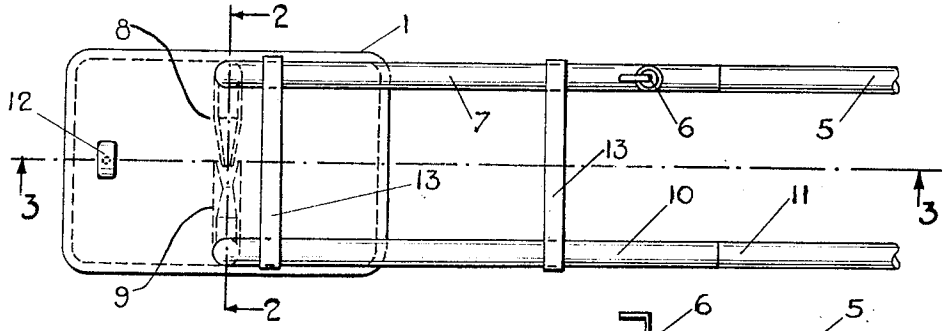


FIG. 1.

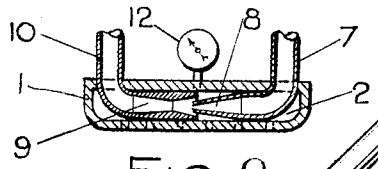


FIG. 2.

FIG. 3.

FIG. 6.

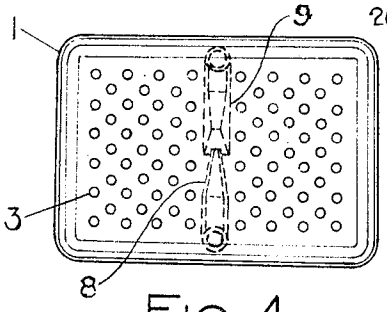


FIG. 4.

FIG. 5.

WITNESSES.

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APPARATUS FOR DRYING AND EXPEDITING THE SETTING OF PLASTIC CONCRETE

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3 Claims. (Cl. 25—1)

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My invention relates to a new apparatus for treating concrete and other hydraulic cement mixtures shortly after they are poured in place for hardening.

It is well known that the quantity of mixing water generally required for producing a plastic, workable concrete mixture is considerably greater than is needed for the hydration of the cement. It is also known that the strength of concrete increases with a decrease in the quantity of mixing water relative to the cement content and that the strength increases with the density of the concrete mass.

The object of my invention is therefore to provide an apparatus whereby a substantial portion of the mixing water, which is not required to hydrate the cement, is extracted from the wet concrete mix while simultaneously closing the voids left by the extracted water. I accomplish this desirable result by applying a low suction to the concrete and concurrently consolidating the concrete with a trowelling, rodding or vibratory motion of the processing tool on the surface of or inside the concrete mass. My preferred apparatus is adapted to contact and apply a low suction to the concrete, thereby drawing water and entrapped air through a perforated, screened plate or wall into an enclosed compartment. The suction is induced by a partial vacuum that is created in the compartment by a compressed air operated jet ejector. The ejector also exhausts the extracted water and air into the atmosphere.

Two forms, which my invention may assume are exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a plan view of my preferred hand operated apparatus for surface treatment.

Figure 2 is a cross section on the line 2—2 of Figure 1 showing the ejector.

Figure 3 is a cross section on the line 3—3 showing the intake tube and the suction chamber.

Figure 4 is a plan view of the perforated under side of the suction chamber.

Figure 5 is a section through my preferred apparatus for interior treatment of concrete.

Figure 6 is a cross section on the line 6—6 of Figure 5.

In the drawing, where like reference characters represent corresponding parts, 1 denotes the body of my apparatus for surface treatment, which is preferably made of rigid metal construction, comprising an enclosed pump chamber 2 with its bottom provided with perforations 3 and a porous material 4, preferably metal gauze, at the perforations to screen the concrete aggregate and prevent solid matter to enter the chamber. The compressed air enters the tool through the flexible hose line 5 and after passing the air control valve 6, the intake tube 7 and the jet nozzle 8 is discharged into the atmosphere through the jet throat 9, the exhaust tube 10 and the flexible hose line 11. A vacuum gauge 12 is shown connected to the suction chamber and 13 indicates braces between the intake and exhaust tubes. Figures 5 and 6 show an adaptation of my apparatus for interior treatment of deep concrete sections, comprising a flexible hose line 14 from an air compressor not shown on the drawing, an intake pipe 16 extending close to the bottom 22 of the tubular body 21. The jet nozzle 17 is shown attached to the lower end of the pipe 16 and the jet throat 18 is held in position by a threaded connection to the bottom 22 of tube 21. The position of the jet nozzle can be readily adjusted by turning pipe 16 in the threaded connection 19. The tubular body 21 encloses the annular suction chamber 24 and its walls are shown provided with perforations 23 and a screen 25 to prevent solid matter from entering the chamber. A vacuum gauge 20 is connected to the upper part of the chamber. A conventional concrete mold is also shown with side forms 26, stiffeners 27, tie rods 28, bottom plate 29 and support beams 30.

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My apparatus for surface treatment is operated as follows: The tool, which is adapted for unwatering shallow concrete pours such as floor slabs and pavements, is connected to an air compressor and is provided with a suitable discharge hose. When used it is moved over the concrete surface until the concrete has attained a firm consistency suitable for final finishing thereof. My apparatus for interior unwatering of plastic concrete can be operated with a plunger-like motion inside the mass or can be placed in fixed position in the concrete and operated with simultaneous suction and vibratory actions. The latter case refers to my preferred procedure of making precast concrete products such as pipes and shallow wall and floor slabs. I have found that my processing apparatus can be removed from the concrete pour and the side forms stripped within a few minutes after the jet-suction operation is started, leaving a compacted, non-slump concrete, which retains its moulded shape. The action of the air jet is selfexplanatory. The jet is able to create a low vacuum inside the suction chamber of the tool while continuously discharging air and water therefrom. I have found that the employment of high vacuum is undesirable as the con-

crete in the immediate vicinity of the suction surface thereby dries out and stiffens too rapidly and assumes a porous texture with distinct water channels created by further flow of water. A low suction action is also essential for permitting the movement of my apparatus over a concrete surface. Movement or vibration of my tool effects a progressive compaction of the concrete mass as the water is withdrawn by suction.

Many variations can be made in the construction and use of my device. So for instance a practical tool for treating road slabs may comprise two rollers, carrying a continuous screener belt mechanically operated for movement over the concrete surface, with a suction chamber attachment located between the rollers above the lower portion of the screener belt; the whole device being preferably carried on wheels, which engage the marginal forms of the concrete pour. Such a tool would be a combined unwatering and finishing machine and would produce a perfectly aligned pavement surface.

It is thus to be noted that I do not limit my invention to the forms shown on the drawing as it is evident that alterations may be made in the mode of operations and in the construction of my device without departing from the spirit and scope of my invention. Inasmuch as I use a combination of known elements to achieve a new and useful result I do not only claim the apparatus as part of my invention but also the method described in the specification.

Having described my invention what I claim as new therein and desire to secure by Letters Patent is:

1. Apparatus for drying and expediting the setting of wet concrete comprising a body enclosing a chamber having an air injection nozzle, an outlet member adjacent the discharge end of said nozzle, said member having a bore with a contraction therein, the body having a wall with an exterior surface to make contact with the concrete, said wall having inlet openings therein, and screening means over said openings to prevent particles of concrete entering said chamber, so that air issuing from the nozzle removes water from the chamber and atomizes the water in its passage through the outlet member.

2. Apparatus for drying and expediting the setting of wet concrete comprising a body enclosing a chamber having an air injection nozzle, an outlet member adjacent the discharge end of said nozzle, said member having a bore with a contraction therein, the body having a wall with an exterior surface to make contact with the concrete, said wall having inlet openings therein, and screening means over said openings to prevent particles of concrete entering said chamber, so that air issuing from the nozzle removes water from the chamber and atomizes the water in its passage through the outlet member, said body being flat, and the wall for making contact with the concrete being the bottom wall thereof.

3. Apparatus for drying and expediting the setting of wet concrete comprising a body enclosing a chamber having an air injection nozzle, an outlet member adjacent the discharge end of said nozzle, said member having a bore with a contraction therein, the body having a wall with an exterior surface to make contact with the concrete, said wall having inlet openings therein, and screening means over said openings to prevent particles of concrete entering said chamber, so that air issuing from the nozzle removes water from the chamber and atomizes the water in its passage through the outlet member, said body being tubular, the wall for making contact with the concrete being the side wall between the ends, the air inlet openings being disposed in said wall along the length of said body.

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No references cited.