

Jan. 21, 1969

P. O. JONELL ET AL
METHOD AND MACHINE FOR THE MANUFACTURE OF
LENGTHENED OBJECTS OF CONCRETE
Filed Jan. 28, 1966

3,423,492

Fig. 2

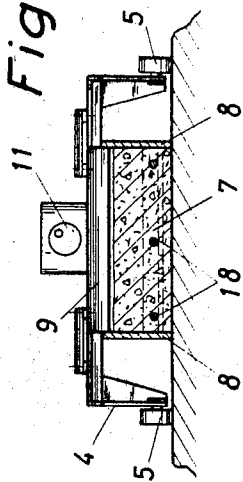


Fig. 3

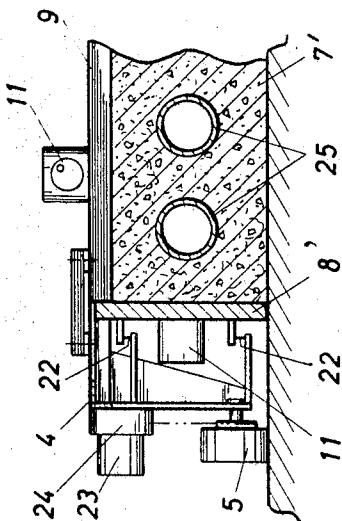
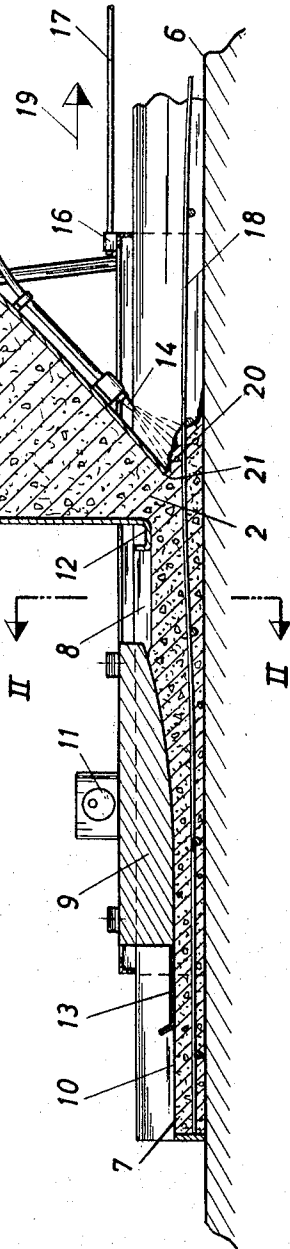


Fig. 1



Per Olof Jonell and
Sven Melker Nilsson INVENTORS

BY Wendroth,
Gind and Bonack, attys.

1

3,423,492

METHOD AND MACHINE FOR THE MANUFACTURE OF LENGTHENED OBJECTS OF CONCRETE

Per Olof Jonell, Engelbrektsgatan 24, Goteborg, Sweden,
and Sven Melker Nilsson, Radhusvagen 6, Kallered,
Sweden

Filed Jan. 28, 1966, Ser. No. 523,602

Claims priority, application Sweden, Feb. 5, 1965,

1,467/65

U.S. Cl. 264—70

Int. Cl. B28b 1/08, 1/14

5 Claims 10

ABSTRACT OF THE DISCLOSURE

A method and apparatus for the manufacture of concrete objects by means of a sliding mould, a concrete mixture is fed from a container down on a bed by moving the container over the bed and forming the concrete mixture on the bed into a layer having longitudinal borders parallel to each other. The concrete mixture in the container has a water-cement number less than about 0.32. Water is added to the concrete layer on the bed at the front end of the layer and the layer is compacted by vibrating the layer after a stripping of its upper surface by means of a slide having a vibrator. The vibration is carried out so that the water-cement number in the concrete during the vibration is partly equalized but after the completed vibrating operation is somewhat lower in the upper portion of the layer than in the lower portion of the same.

According to a known method for moulding concrete elements by means of horizontally sliding moulds, such elements being beams, slabs etc. the concrete is fed out through an opening at the lower end of a container down on a plane bed. The container is slowly moved forwards on the bed. In the direction of movement there is after the container arranged a slide provided with a vibrator by means of which the concrete layer formed on the bed is vibrated and compressed. The container and the vibrating slide are moved with an even speed over the bed. The method requires that the concrete has a great resistance when it leaves the layer formed in such a way that the product maintains its shape without sagging or bursting. The method further requires that the concrete has such a consistency and floating ability during the vibration that the iron rods of the reinforcement, when such is used, are completely embedded and enclosed by the concrete. With very thin slabs the vibrator must work in such a way that, simultaneously as the slide is pressed down, it is also given a returning movement. By means of the last mentioned movement the friction between the slide and the concrete creates a rearwardly directed force which prevents the occurring of fissures in the concrete.

When there is a question of manufacturing very thin slabs of concrete, e.g. with a thickness less than about 3 cm., it is difficult at this low height to feed the concrete from the container evenly and regularly and to obtain a product without detrimental fissures and cavities (visible mostly on the surface). So as to fulfil the requirement explained in the foregoing it is usual to give the concrete a water-cement number, i.e. the weight relationship between the water and the cement in the concrete mixture, of more than about 0.33–0.35. At the vibration of such a concrete the surface will be rich in water and sticky. This means that the said friction force in rearwards direction will diminish and disappear. The result is a formation of fissures in the concrete. The stickiness of the surface causes the concrete locally to be attached to the slide

2

and there to obtain a pumping effect which causes the forming of cavities in the surface.

The purpose of the present invention is to eliminate the above drawbacks and to render possible by means of moulding with a sliding mould a production of concrete objects with a thickness less than 3 cm. whereas the product obtained has no detrimental fissures or cavities. Further, the product will have a resistance which has not been possible to attain by means of previously known methods. The main feature of the invention is to be seen therein that the concrete mixture in the container is given a water-cement number that does not exceed about 0.32, preferably about 0.25–0.27, and therein that water is continuously added on the concrete layer fed to the bed at the front end of the same. Due to the fact that the concrete mixture in the container has the low water-cement number indicated in the foregoing, the mixture will, without being stuck to the container walls, evenly flow out at the lower end of the container in such a way that an even layer is formed on the bed. Due to the low water-cement number of the mixture the final product will have a great resistance provided that the compression will be sufficient.

When feeding the concrete out from the container, there will at the front end of the layer, seen in the direction of movement of the forming machine, be formed a slope with a certain falling angle and when water is sprayed against this slope a part of this water will flow down on the bed where it will thus form a small gathering of water. At the subsequent vibration of the concrete layer this water or at least a part of it will due to the compression be pressed up towards the upper surface of the layer and there will thus occur an equalizing of the water-cement number throughout the layer. However, the quantity of the water sprayed onto said slope will not be greater than the compressed concrete layer under the slide not becoming sticky. It is hereby ensured that the final product leaves the forming machine with smooth surfaces, i.e. not only the lower surface turned towards the bed but also the parallel longitudinal borders and the upper surface of the object will be free of cavities and fissures. The method also makes it possible to give the concrete in the lower portion of the slab a higher and a sufficiently great water content in such a way that the reinforcement which normally is arranged in this layer will be completely embedded in the concrete. For the reason that one also obtains a higher water content in the upper layer than in the lower one, there is obtained a stronger concrete in the upper region which as known is desirable from the resistance point of view.

The invention also has reference to a machine for carrying the invention into effect.

The invention will now be described with reference to the accompanying drawings, showing diagrammatically embodiments of a machine for carrying the invention into effect. In the drawings:

FIG. 1 shows a vertical longitudinal section through a machine according to the invention,

FIG. 2 shows a cross section through the same machine on the line II—II in FIG. 1, and

FIG. 3 shows a cross section through a machine according to a modified embodiment.

The forming machine shown in the drawings comprises a container 1 with an opening 2 extending in the transverse direction of the machine for feeding out the concrete mixture 3 in the container.

The container 1 is carried on a stand 4 with running wheels 5 for the displacement of the machine on a plane bed 6. So as to form the sides of the concrete layer or the concrete object 7 manufactured by means of the machine there are arranged parallel side walls 8. The machine is

further provided with a slide 9 for forming the upper side 10 of the object 7. The slide 9 is provided with a vibrator 11 for compressing the concrete layer 7 in vertical direction. Reference letter 12 denotes a stripper at the rear border of the container 1 intended for the smoothening of the upper surface of the concrete mass when it has left the container. The slide 9 is at its rear end provided with a somewhat resilient steel plate 13 which prevents the concrete layer from forming a transverse elevation, viz. a so-called pressure bank.

The container 1 is frontally provided with a number of spraying jets 14 which by means of a hose 15 are in communication with a hose (not shown) for water under pressure. The jets 14 are directed against the front border of the feeding opening 2.

The displacement of the machine over the bed 6 in the embodiment shown in FIGS. 1 and 2 is supposed to be carried out by means of a rope or wire 17 attached with one end to the front end of the machine at 16, said wire 17 or the like by means of a winch (not shown) being wheeled up as the towing of the machine proceeds towards this end of the bed.

Reference numeral 18 denotes a number of reinforcing rods which extend in the longitudinal direction of the final concrete object 7.

When the machine by means of the wire 17 is towed in one direction as indicated by means of the arrow 19 in FIG. 1, the rather dry concrete mixture (a water-cement number of 0.25-0.27) is fed or flows through the opening 2 down onto the bed 6 whereby there is formed the slope 20 of the concrete mixture inclining frontwards and somewhat downwards with a certain falling angle below the front border 21 of the opening 2. Onto this slope there is sprayed water from the jets 14 as evenly as possible. A part of the water then flows down against the bed 6 where thus the water-cement number of the layer will be the highest one. The upper surface of the concrete layer will automatically be smoothened by the stripper 12. The front border 21 must be situated on a lower level than the stripper 12. By means of the slide 9 the concrete layer is compressed due to the vibrations of the vibrator 11 and thereby the desired density of the layer is obtained. By means of compression a portion of the water is pressed upwards in such a way that there is obtained a certain equalizing of the water content in the whole of the layer. However, the water contents at the upper surface will never be so high that there occurs any risk that the slide 9 be stuck to the layer. It is hereby ensured a smooth and firm range in the final product also at the upper surface. This effect is obtained by means of a correct choice of the level of the frontal border 21 which may be adjustable in vertical direction. The product will be very firm and there is no risk for its being distorted. The machine may be displaced with a rather high speed.

When there is a question of manufacturing rather thin concrete objects, there is as a rule no need of vibrating the lateral borders of the objects. In FIG. 3 there is shown a modification of the machine according to FIGS. 1 and 2 provided with lateral walls 8' which, by means of springing means 22, are carried on the stand 4 and provided with a vibrator 11 for the vibration of the walls. It is hereby rendered possible to compress the concrete layer 7' also in horizontal direction.

In the modification shown in FIG. 3 the machine is supposed to be driven by means of an electric motor 23 which via a gear device 24 drives the running wheels 5. In such a case there is no need of any rope or wire 17.

By means of tubular cores 25 it is possible continuously

to shape longitudinal holes in the concrete object 7'. The cores 25 are moved continuously together with the forming machine over the bed 6.

The machine can be used also for the manufacture of concrete poles for reinforcing the ground.

The invention has been described in the foregoing for purposes of illustration only and is not intended to be limited by this description or otherwise except as defined in the appended claims. Other means than the jets 14 may be used for the addition of the water in finely dispersed form to the concrete mixture when the latter has left the container 1. It might further be advisable to arrange a feeder screw in the container 1 or another means for an even feeding of the concrete mixture from the container.

What we claim is:

1. A method for the manufacture of lengthened objects, in particular rather thin objects of concrete, by means of a sliding mould, comprising feeding a concrete mixture from a container down on a bed by continuously moving said container over said bed, forming said concrete mixture on said bed into a layer having longitudinal borders parallel to each other, using a concrete mixture in said container with a water-cement number less than about 0.32, continuously adding water to the concrete layer on said bed at the front end of said layer, compacting said layer by vibrating the layer after a stripping of its upper surface by means of a slide having a vibrator, said vibration being carried out so that the water-cement number in the concrete during the vibration is partly equalized but after the completed vibrating operation is somewhat lower in the upper portion of said layer than in the lower portion of the same.

2. A method as set forth in claim 1 wherein said concrete mixture in said container has a water-cement number less than about 0.25-0.27.

3. A method as set forth in claim 1 wherein said concrete layer at the front end forms a slope and said water continuously added flows down along said slope so that the water-cement number in the concrete in the vicinity of said bed is somewhat higher than at the upper surface of said layer.

4. A machine for the manufacture of lengthened objects of concrete comprising a container for a mixture of concrete having a discharge opening at the lower end, a stand carrying said container, means for displacing said stand along a bed, said stand having side walls for forming the longitudinal sides of a layer of concrete formed on said bed, a stripper arranged on the rear end of said container for smoothening the upper surface of said layer, a water spraying device arranged in front of said container to spray water continuously against the front end of said layer, a slide provided with a vibrator and arranged behind said stripper for the vibration of the upper surface of the layer formed.

5. A machine as set forth in claim 4 wherein said side walls are provided with means for vibrating the side portions of said concrete layer.

References Cited

UNITED STATES PATENTS

1,814,172 7/1941 Martinet ----- 25-99

ROBERT F. WHITE, *Primary Examiner.*

J. H. SILBAUGH, *Assistant Examiner.*

U.S. Cl. X.R.

25-32, 41, 103