Nov. 29, 1932. H. SORENSEN 1,889,268

METHOD TO COOL THE INTERIOR OF A SEAMLESS BLOCK OF SETTING CONCRETE

Filed Oct. 5, 1931

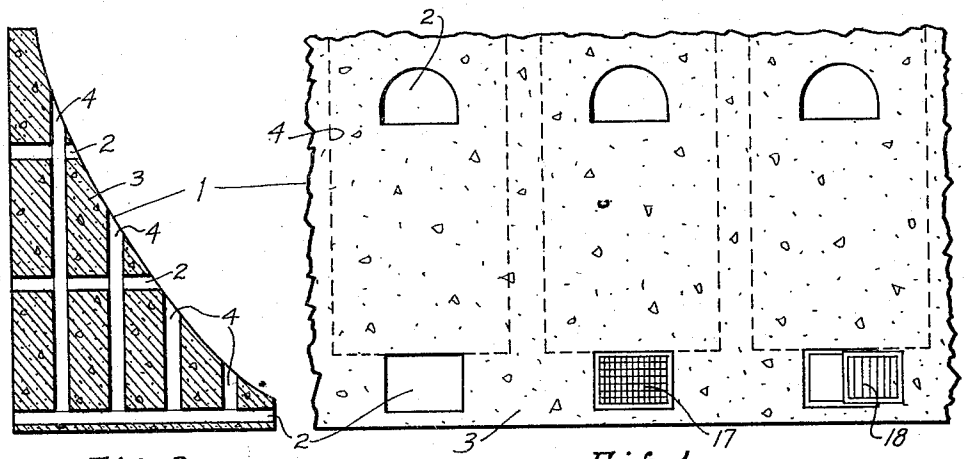


Fig. 3

Fig. 1

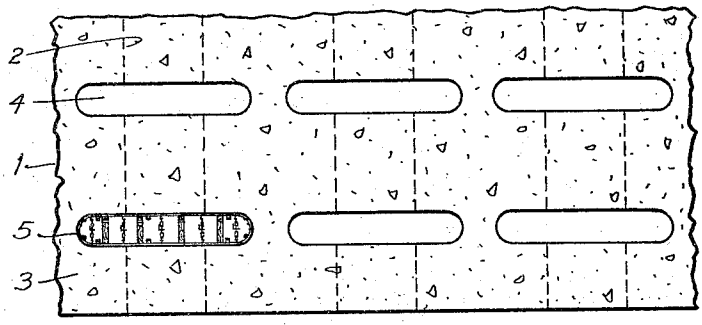


Fig. 2

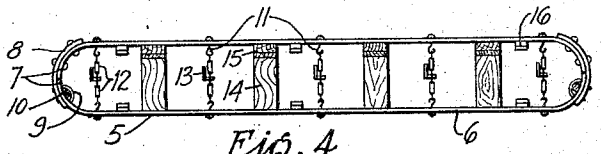


Fig. 4

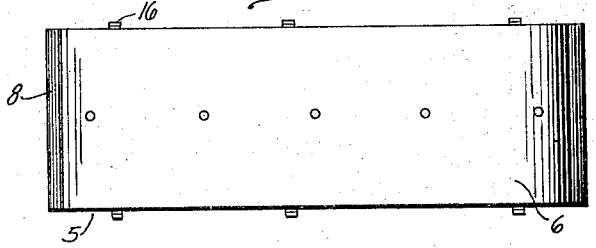


Fig. 5

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METHOD TO COOL THE INTERIOR OF A SEAMLESS BLOCK OF SETTING CONCRETE

Application filed October 5, 1931. Serial No. 566,971.

In concrete structures, which contain large blocks of concrete, a formidable heat is created in the concrete, during its setting process, which is detrimental to the structure.

My invention consists of a simple and effective way in which to counteract those destructive heat forces by means of cooling air, and while my invention may equally well be used for other concrete structures, I have described it, in the following specification and the accompanying drawing, as a concrete dam cooling system.

In the drawing:—

Fig. 1 illustrates the fragment of the face of a concrete block of a dam, which is erected in accordance with my invention.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a vertical section of a concrete block illustrating the principles of my invention.

Fig. 4 is the enlargement of a plan view of the one section of a metal casing.

Fig. 5 is a side view of Fig. 4.

In the drawing, where similar numerals designate similar parts, numeral 1 designates a concrete block. Numeral 2 designates tunnels. 3 designates the concrete. 4 designates air shafts. 5 designates casings. 6 are the sides of casings 5. 7 are the ends of casings 5. 8 are plates attached to ends 7. 9 are staples. 10 are wedges. 11 are hooks. 12 are chains. 13 are snaps. 14 are wooden braces. 15 are wooden wedges. 16 are guide lugs. 17 are aircooling devices. 18 are regulators for the flow of air.

Dealing with Fig. 1 and 2 I first cast, at the base of block 1, a series of suitably spaced horizontally placed tunnels 2, in concrete 3, throughout the width of block 1. Inside of tunnels 2, at suitably spaced intervals, I cast vertically extending air shafts 4. Each of the tunnels 2 have a series of air shafts 4 commencing in the roofs of tunnels 2, so that the air, in air shafts 4, is drawn from tunnels 2. Air shafts 4 open out through the top of each part of dam 1, which is being erected. The air shafts 4 are cast in concrete 3 by means of casings 5, casings 5 serving as the forms for air shafts 4. While casings 5 may be made of any suitable material, I prefer to make casings 5 of thin sheet metal for the reasons which I will state below. Casings 5 form a temporary lining for air shafts 4 until concrete 3 has set.

In Fig. 4 and in Fig. 5 I have shown enlarged details of casings 5. I prefer to give casings 5 an elongated shape, and to make them out of thin sheet metal 6, in two halves with curved ends 7. To the outside of ends 7, on the one half of casings 5, I attach curved plates 8. These curved plates 8 extend past those ends 7 to which they are attached and they overlap the ends 7 of the opposed halves of casings 5. I attach staples 9 to the inside of the extending part of plates 8. Staples 9 engage suitable slots in ends 7 of the opposed halves of casings 5. Wedges 10 are driven into staples 9 and then hold the two of the opposed ends 7 together. Inside of casings 5 there are a series of opposed hooks 11. When the two halves of casings 5 are put together, chains 12 are hooked to hooks 11 and tightened by means of snaps 13. Braces 14, by means of wedges 15, are then driven between the two halves of casings 5. I prefer to make 14 and 15 of wood. Although casings 5 are made of thin sheet metal 6, they are now firmly held together, while at the same time being braced against outside pressure by means of braces 14. Casings 5 are composed of sections placed above each other. Guides 16 serve the purpose of holding the sections of casings 5 in line with each other, when these sections are placed one on the top of the other. Guide lugs 16 are attached to the inside of casings 5.

Whenever desired I place aircooling device 17 in the entrance to tunnels 2, whereby I may lower the temperature of the air, which rushes in through the mouths of tunnels 2, due to the draught caused by air shafts 4. The vertical placement of air shafts 4 greatly facilitates the draught of the air. There is a continuous flow of cooling air ascending through air shafts 4.

I may also place regulators 18, at the mouths of tunnels 2, whereby I may regulate, or divert, the flow of the air, which is drawn

in by the chimney draught action of air shafts 4.

It will be understood that spaced walls of cooling air are continually playing up along the inside of block 1, on concrete 3, during the setting process of concrete 3. The chimney action, of the air shafts 4, draws that cooling air through the mouths of tunnels 2.

It is important that the openings of tunnels 2 are sufficient to allow the necessary body of air to sweep up the sides of shafts 4, and it is equally important that the area of shafts 4 is also sufficient to take care of said body of air. Further:—I have stated, that tunnels 2 and shafts 4 are suitably spaced, meaning thereby that the thickness of concrete 3, which is situated between the spaced shafts 4 and spaced tunnels 2, must be limited to a thickness, that will allow the heat, which is generated by the setting concrete 3, to readily reach shafts 4 and tunnels 2, from where it is carried away, or absorbed, by the air, that flows from tunnels 2 upwards through shafts 4.

In the manner, which I have explained, I automatically counteract the destructive heating forces of the setting concrete 3, by means of the above referred to cooling walls of continuous flowing air, during the erection of the block 1.

Due to the fact that I use thin sheet metal 6, in casings 5, the coolness of the air will transplant itself to concrete 3, through the sides of casings 5. Water, from above, may also be played or sprayed, upon casings 5, to facilitate the cooling process. The water will drain through tunnels 2.

Had I availed myself of the usual method of using lumber for the forms for air shafts 4, instead of sheet metal 6, as the lining for air shafts 4, the heat from the setting concrete 3 would have been prevented from reaching shafts 4, and very little of the coolness from the air would have reached concrete 3, due to the insulation which the lumber would have created.

As block 1 goes up, and the lower layers of concrete 3 become set, the tunnels 2 and the air shafts 4, which have kept those lower parts of concrete 3 cool, may be filled with concrete. Before that is done the casings 5 are easily removed by first extracting wedges 10 and 15 and opening snaps 13. Those casings 5 may then be used for the erection of the upper layers of block 1.

The upper series of tunnels 2 and the air shaft formations 4, which are cast into the upper layers of concrete 3, in the same manner as previously described, will take care of the cooling process of the upper layers of concrete 3 in block 1.

In Fig. 3, which illustrates the vertical section of a finished block 1, I have illustrated my invention, as it was used during the erection of block 1, and in Fig. 3, as well as in Fig. 1, I have illustrated the upper tunnels 2 and air shaft formations 4, to which I have made reference above.

Various modifications of structure may be made without departing from the spirit of my invention.

I claim:—

1. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

2. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing metal lined vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, and passing an air current into said intakes and upwardly through said shafts to dispel the generated heat.

3. In the method of casting a seamless block of concrete of such size as would ordinarily crack of become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

4. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated metal lined vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, and passing a current of air

into said intakes and upwardly through said shafts to dispel the generated heat.

5. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, an air cooling device operating in said air intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

6. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated metal lined vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, an air cooling device operating in said intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

7. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, a regulator controlling the openings of said intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

8. In the methol of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, regulators controlling the openings of said intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

9. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated metal lined vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, regulators controlling the openings of said intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

10. In the method of casting a seamless block of concrete of such size as would ordinarily crack or become weakened upon setting in the absence of heat dispelling means therein, comprising providing air intakes in the base of the block, providing elongated metal lined vertical air shafts in said block in communication with the air intakes and extending therefrom to the top of the block, positioning said intakes and shafts throughout the block at such intervals as will enable heat generated by setting of the concrete to be conducted thereto, air cooling devices operating in said intakes, regulators controlling the openings of said intakes, and passing a current of air into said intakes and upwardly through said shafts to dispel the generated heat.

HENRY SORENSEN.