METHOD OF CURING CONCRETE AND LIKE PLASTIC MATERIALS.

To all whom it may concern:

Be it known that I, LEONARD A. BELLONBY, a citizen of the United States, residing at Montpelier, in the county of Washington and State of Vermont, have invented certain new and useful Improvements in Methods of Curing Concrete and like Plastic Materials, of which the following is a specification.

This invention is a divisional part of that disclosed in Patent No. 1,264,149, granted to me April 30, 1918, and relates to the method of curing concrete and cement products whereby the material is caused to set quickly thereby saving time, space and apparatus with the result of increasing the output of a plant of given size and materially reducing the cost of production besides enabling the product to be marketed in a relatively short space of time.

In carrying out the method I preferably employ the apparatus disclosed in my previous patent herein noted and shown generally in the accompanying drawing, which is a vertical section of a vat showing the parts associated therewith in elevation.

In accordance with the present invention, the material, such as concrete, cement or other similar plastic is subjected to steam, then to a bath of hot water and finally to hot air. The several steps are preferably carried out in a closed chamber, the plastic material being confined in trays or molds in such a manner as to admit of the steam, water and air coming in direct contact therewith.

The method can be best disclosed in connection with the apparatus shown in the accompanying drawing, in which the chamber illustrated comprises inclosing walls 5, a bottom 6 and a cover 30. A portion of the bottom 6 is depressed to form a sump 7. A rib 8 extends across the bottom 6 a short distance from one of the inclosing walls so as to form a shallow basin 10. The rib 8 is disposed adjacent the sump 7. A pipe 20 connects with the sump 7 and is provided in its length with a controlling valve. A pipe 18 connects with the basin 10 and is provided in its length with a controlling valve. The pipes 18 and 20 connect with a main pipe 17 with which a pump 24 cooperates. It is to be understood that a plant may embody any number of chambers although the present drawing illustrates but one. In the event of a number of chambers being employed, the pipe 17 is common to all the chambers and branch pipes 18 and 20 connect each chamber with the main pipe 17. The purpose of the pump 24 which may be of any type is to supply water to the pipe 17 and from thence to the chamber or to draw off the water from the chamber as may be required according to the step in the process necessary to produce the desired effect. It will be observed that the pipes 18 and 20 connect with the lowest portions of the basin and sump respectively so that all the water may be drawn off therefrom when required. One of the inclosing walls of the chamber is provided with a passage 16 which, at its lower end opens into the sump 7 and at its upper end is in communication with the upper portion of the chamber. This passage provides for a circulation and a return of the water from the upper portion of the chamber to the lower portion thereof.

A coil 9 is disposed in the lower portion of the chamber in such a manner so that its lowest portion is arranged within the basin 10 and its upper portion clears said basin. A pipe 22 connects with the coil 9 and is in communication with a source of supply of steam. When the basin 10 is supplied with water, the lower portion of the coil 9 is immersed therein whereas the upper portion of the coil is clear of the water contained in the basin. Steam being supplied to the coil, heats the water in the basin to such an extent as to cause vapor or steam to be created. This vapor or steam rising from the water contained in the basin 10 comes in contact with the upper portion of the coil and is superheated or made comparatively dry. This dry steam is utilized in the first step in the method of treating the concrete, cement or other plastic material.

A bottom 31 is located within the lower portion of the chamber a short distance above the coil 9 and is supported upon beams 11. An opening 12 is formed in the bottom 31 near one end thereof. A plurality of ledges 13 are located upon the inner walls of the chamber and are spaced a proper distance one above the other. The ledges 13 constitute rests for trays 32 which are adapted to receive the material to be treated. The rest next above the bottom
31 is provided with an opening 14 dia-
metrically opposite the opening 12 of the
bottom 31 and the rest second above the
bottom 31 has an opening 15 above the
opening 12. The rests 13 in order have
openings in opposite ends as clearly indi-
cated, the purpose being to cause the me-
dium circulating through the chamber to
take a tortuous or zig zag course, thereby
insuring that each tray or container be sub-
jected alike to the medium couring through
the chamber. The trays 32 when in posi-
tion engage the rests and in conjunction
therewith close the space between the walls
of the chamber, so that the medium in
its circulation through the chamber is com-
pelled to pass through the opening provided
in the rest 13 for its passage. This will be
plain on reference to the drawing.

In carrying out the method a concrete or
other analogous self setting plastic is
placed in a tray 32 or other form of con-
tainer or mold according to the desired
shape to be imparted thereto. The trays
illustrate one form of mold for slabs or
building units but such trays are representa-
tive of any type of mold or container.
The material thus confined in the tray or
mold is placed in the chamber in layers in
the manner set forth. It is to be understood
that the chamber may contain any number
of trays or molds holding the material to be
treated, the same being arranged so that the
medium will come in direct contact with the
material and hasten the setting thereof,
which is essential in order to increase the
output of a plant of given capacity. After
the material has been placed in the chamber
the cover 30 is arranged so as to close the
top of the chamber and is secured in place
in any manner. Water is now supplied to
the basin 10 and the coil 9 is heated by pass-
ing steam therethrough. As the steam
circulates through the coil 9 the water in the
basin 10 is heated and steam or vapor rises
therefrom, and coming in contact with the
upper portion of the coil above the basin is
superheated or rendered comparatively dry.
This dry steam circulates through the cham-
ber in a tortuous path and comes in contact
with the material contained in each of the
trays or molds 32. Any water of condensa-
tion accumulating in the upper portion of
the chamber above the topmost rest 13 and
tray 32 is returned to the lower portion of
the chamber into the sump 7 by way of the
passage 16. The material is subjected to
the vapor or steam bath for a period ap-
proximating thirty minutes after which the
chamber is flooded with water which is sup-
plied thereto through the pipes 18 and 20.
The water is supplied to the chamber so as
to cover the topmost tray or mold and its
contents. The steam is continued through
the coil 9 thereby heating the water in the
chamber to the boiling point, such water
circulating between the rests and trays in a
manner set forth so as to heat the material
uniformly. The water in the chamber is
kept at the boiling point for approximately
three hours and this step further hastens the
setting of the material which was prelimi-
narily effected by the vapor bath, the water
preventing the too rapid drying of the ma-
terial. The water is now drawn off from the
chamber through the pipes 18 and 20 and
the coil 9 is maintained in its heated
condition by the circulating of steam there-
through. After the water has been com-
pletely drawn off the air contained in the
chamber is heated by means of the coil 9,
and this hot air circulating through the
chamber completes the process of curing the
material. The material in its final step is
subjected to the hot air for a period of about
thirty minutes. After the material has been
subjected to the final step the cover 30 is
removed from the chamber and the material
is removed and will be found set sufficiently
hard to admit of it being handled and
placed upon the market. It will be under-
stood that the method saves considerable
time and enables the output of a plant to be
more than doubled and obviates the necessity
for providing a great number of trays or
molds since the same may be more fre-
quently used than is possible by the process
generally in vogue. During the process the
material is subjected to a pressure of twenty
to sixty pounds while confined in the valve
or chamber. Cured thus under pressure the
product possesses considerable strength and
is extremely hard.

Having thus fully described my inven-
tion what I claim as new and desire to se-
cure by Letters Patent, is:

1. The method of curing concrete and
analogous self setting plastic material,
the same consisting of subjecting the same to a
heated vapor bath, then to a bath of hot
water and finally subjecting the same to
hot air.

2. The method of curing concrete and
analogous self setting plastic material which
consists in subjecting the same to dry steam,
then to a bath of hot water and finally sub-
jecting the same to hot air.

3. The method substantially as herein de-
scribed of curing cement and analogous self
setting plastic material which consists in
confining the same in a closed chamber and
while so confined subjecting the same to
vapor in a heated state, boiling water and
hot air in succession.

4. The herein described method of treat-
ing concrete and like plastic material which
consists in subjecting the same to hot vapor,
then treating the same to a bath of boiling
water, and finally drawing off the water and
subjecting the material to hot air.
6. The herein described method of treating concrete which consists in placing the same in a mold and while so confined subjecting it in succession to hot vapor, boiling water and hot air.

6. The herein described method of treating concrete and analogous plastic material which consists in confining the same in a mold, then inclosing the same in a chamber and while so inclosed subjecting it in successive order to dry steam, boiling water and hot air.

7. The herein described process of treating concrete and analogous self setting plastic material which consists in confining the same in a mold, then inclosing it in a chamber and while so inclosed subjecting the material to dry or superheated steam for a period approximating thirty minutes, then to a bath of boiling water for a period of about three hours and finally to a bath of hot air for a period approximating thirty minutes.

In testimony whereof I affix my signature in presence of two witnesses.

LEONARD A. BELLOMBY.

Witnesses:
B. Grout,
FRANCIS T. SHERIDAN.