

PATENT SPECIFICATION

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(54) MOULDING ELONGATED ARTICLES IN CONCRETE OR OTHER MOULDING MATERIAL USING AN ELONGATED MOULD AND AN AXIALLY INTRODUCED POURING PIPE

(71) I, YASUSHI ISHIHARA, a Japanese Citizen, of No. 16-1, I-Chome, Takeoka, Kiyose-City, Tokyo, Japan, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to moulding apparatus comprising a long mould for moulding elongated articles in concrete or other moulding material comprising an elongated mould and a pouring pipe introduced into the interior of the mould, substantially parallel to the longitudinal axis thereof, and also to a method of using such apparatus. The invention more specifically relates to supporting the pouring pipe. The articles may be, for instance, concrete piles or pipes.

Passing concrete into a mould in the form of a steel moulding frame in the process of manufacturing long concrete pipes utilising centrifugal force has usually been time-consuming and laborious. There has already been proposed a method which utilises a concrete pump to save labour. This comprises the steps of placing support means for a pouring pipe in the form of a cantilever in front of the outlet of the concrete pump and introducing a front or forward end of the pouring pipe, supported by the support means, into the hollow interior of a cylindrical moulding frame of steel carried on a flat car by moving the flat car parallel to the axis of the pouring pipe. This method is disadvantageous, however, in that the cantilever support means should be necessarily of large size, since the pouring pipe is supported merely by the cantilever support means and the part of the pouring pipe which is in the interior of the moulding frame is held without any support. This means that the length of said part which can be introduced into the moulding frame is limited.

According to the present invention there is provided moulding apparatus suitable for moulding elongated articles in concrete or

other moulding material and comprising an elongated mould and a pouring pipe mounted for movement into the mould in alignment substantially parallel to the longitudinal axis of the mould for filling the mould with concrete or other moulding material, wherein the mould is provided with internal support members therein for supporting the pouring pipe within the interior of the mould when in such alignment which internal support members are such that they can be retracted from the interior of the mould.

The invention provides moulding apparatus as defined in Claim 1 and a method of moulding as defined in Claim 7, and extends to long concrete articles moulded by the method of the invention.

A preferred embodiment of moulding apparatus in accordance with the invention is now described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a side view of the moulding apparatus, partly in section;

Figure 2 shows on an enlarged scale a pair of support levers for the pouring pipe, in end view; and

Figure 3 is a section taken along a line A—A in Figure 1.

The moulding apparatus of the drawings is for example for the production of long cylindrical piles.

A pouring pipe 2 with bearing flanges 4 axially extending integrally therewith on both sides is connected by a water-tight joint 3 to the outlet of a pump 1 for liquid concrete or other moulding material and is horizontally supported by a suitable number of external support members in the form of support levers 16; the support levers 16 carry rollers 17 and are vertically supported by stands 19 but are pivotal about axes 21, which stands 19 are, in turn, positioned at such intervals that the flexion of the pouring pipe 2 may be maintained at a minimum in spite of the weight of concrete pumped therethrough. There is a suitable number of

internal support members in the form of support rods 7 (see Figure 3) at such intervals that when the pouring pipe 2 is introduced into the hollow interior of a moulding frame 5, the pouring pipe 2 may be supported by these support rods 7 without excessive flexion of the pouring pipe 2. It should be noted here that the support rods 7 extend through respective sockets 6 fixed to both sides of the moulding frame 5 by means such as welding. The moulding frame 5 has a casing 10, internal ribs 9 and end lugs 11.

The assembled moulding frame 5 is held by support blocks 15 on a flat car 12 at a predetermined position and the flat car 12 is moved on rails 14 toward the concrete pump 1 so that the forward end of the pouring pipe 2 is introduced into the hollow interior of the frame 5, parallel to the axis of the frame 5, and simultaneously a skid 13 mounted on base of the flat car 12 may be urged against successive rollers 18 mounted between each pair of support levers 16 at middle points thereof. Thus the support levers 16 are successively pushed down from their positions in which they support the pouring pipe 2 to the positions at which they lie under the skid 13, allowing the flat car 12 to move further towards the pump 1. The flanges 4 on the pouring pipe 2, whose forward end is thus introduced into the hollow interior of the moulding frame 5, now smoothly move on rollers 8 mounted around the front ends of the support rods 7 projecting into the moulding frame 5.

Concrete or other moulding material is poured when the forward end of the pouring pipe 2 reaches a point adjacent the opposite end of the moulding frame 5, the flat car 12 then being moved away from the pump 1 as the material is poured and passed through said pouring pipe into the hollow interior of the moulding frame 5, until pouring is completed. The support levers 16 for the pouring pipe 2 automatically return into their vertical positions under the effect of coil springs 20 as the flat car 12 is moved away from the concrete pump 1, and again support the pouring pipe 2. After the completion of pouring, the support rods 7, relieved from their function of supporting the pouring pipe 2, are removed through the sockets 6 and the sockets 6 are filled with plug bolts (not shown) to prevent material from flowing out therethrough.

The pouring pipe 2, which of a relatively small thickness and is for instance commercially available gas pipe, may be horizontally supported in a satisfactory manner on the support rods 7 and support levers 16, so that its thickness need only be sufficient to resist the pressure of concrete flowing through the pouring pipe 2. The use of the support rods 7 and support levers 16 may

substantially facilitate the production of cylindrical concrete pipes, piles, and the like of a length that is too great or of a diameter that is too small, to be obtained by the pouring pipes which have conventionally been employed.

WHAT I CLAIM IS:—

1. Moulding apparatus suitable for moulding elongated articles in concrete or other moulding material and comprising an elongated mould and a pouring pipe mounted for movement into the mould in alignment substantially parallel to the longitudinal axis of the mould for filling the mould with concrete or other moulding material, wherein the mould is provided with internal support members therein for supporting the pouring pipe within the interior of the mould when in such alignment, which internal support members are such that they can be retracted from the interior of the mould.

2. Moulding apparatus as claimed in claim 1, wherein the internal support members are in the form of rods.

3. Moulding apparatus as claimed in either claim 1 or claim 2, wherein the internal support members are retractable generally transversely to the longitudinal axis of the mould.

4. Moulding apparatus as claimed in any one of the preceding claims, and further comprising external support members, movable relative to the mould, for supporting the pouring pipe outside the mould, which external support members successively retract from their pouring pipe supporting position, so as to avoid obstructing the mould, when the pouring pipe is being introduced into the interior of the mould, and return again into said position as the pouring pipe is withdrawn from the interior of the mould during or after the pouring operation.

5. Moulding apparatus as claimed in claim 4, wherein the external support members are pivoted levers.

6. Moulding apparatus having internal and external pouring pipe support members substantially as herein described with reference to, and as shown in, the accompanying drawings.

7. A method of moulding an elongated article in concrete or other moulding material using moulding apparatus as claimed in any one of claims 1 to 5, comprising introducing the pouring pipe into the mould substantially parallel to the longitudinal axis thereof and supporting the pouring pipe within the mould on the internal support members, pumping concrete or other moulding material through the pouring pipe, withdrawing the pouring pipe and withdrawing

internal support members in the form of support rods 7 (see Figure 3) at such intervals that when the pouring pipe 2 is introduced into the hollow interior of a moulding frame 5, the pouring pipe 2 may be supported by these support rods 7 without excessive flexion of the pouring pipe 2. It should be noted here that the support rods 7 extend through respective sockets 6 fixed to both sides of the moulding frame 5 by means such as welding. The moulding frame 5 has a casing 10, internal ribs 9 and end lugs 11.

The assembled moulding frame 5 is held by support blocks 15 on a flat car 12 at a predetermined position and the flat car 12 is moved on rails 14 toward the concrete pump 1 so that the forward end of the pouring pipe 2 is introduced into the hollow interior of the frame 5, parallel to the axis of the frame 5, and simultaneously a skid 13 mounted on base of the flat car 12 may be urged against successive rollers 18 mounted between each pair of support levers 16 at middle points thereof. Thus the support levers 16 are successively pushed down from their positions in which they support the pouring pipe 2 to the positions at which they lie under the skid 13, allowing the flat car 12 to move further towards the pump 1. The flanges 4 on the pouring pipe 2, whose forward end is thus introduced into the hollow interior of the moulding frame 5, now smoothly move on rollers 8 mounted around the front ends of the support rods 7 projecting into the moulding frame 5.

Concrete or other moulding material is poured when the forward end of the pouring pipe 2 reaches a point adjacent the opposite end of the moulding frame 5, the flat car 12 then being moved away from the pump 1 as the material is poured and passed through said pouring pipe into the hollow interior of the moulding frame 5, until pouring is completed. The support levers 16 for the pouring pipe 2 automatically return into their vertical positions under the effect of coil springs 20 as the flat car 12 is moved away from the concrete pump 1, and again support the pouring pipe 2. After the completion of pouring, the support rods 7, relieved from their function of supporting the pouring pipe 2, are removed through the sockets 6 and the sockets 6 are filled with plug bolts (not shown) to prevent material from flowing out therethrough.

The pouring pipe 2, which of a relatively small thickness and is for instance commercially available gas pipe, may be horizontally supported in a satisfactory manner on the support rods 7 and support levers 16, so that its thickness need only be sufficient to resist the pressure of concrete flowing through the pouring pipe 2. The use of the support rods 7 and support levers 16 may

substantially facilitate the production of cylindrical concrete pipes, piles, and the like of a length that is too great or of a diameter that is too small, to be obtained by the pouring pipes which have conventionally been employed.

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1. Moulding apparatus suitable for moulding elongated articles in concrete or other moulding material and comprising an elongated mould and a pouring pipe mounted for movement into the mould in alignment substantially parallel to the longitudinal axis of the mould for filling the mould with concrete or other moulding material, wherein the mould is provided with internal support members therein for supporting the pouring pipe within the interior of the mould when in such alignment, which internal support members are such that they can be retracted from the interior of the mould.

2. Moulding apparatus as claimed in claim 1, wherein the internal support members are in the form of rods.

3. Moulding apparatus as claimed in either claim 1 or claim 2, wherein the internal support members are retractable generally transversely to the longitudinal axis of the mould.

4. Moulding apparatus as claimed in any one of the preceding claims, and further comprising external support members, movable relative to the mould, for supporting the pouring pipe outside the mould, which external support members successively retract from their pouring pipe supporting position, so as to avoid obstructing the mould, when the pouring pipe is being introduced into the interior of the mould, and return again into said position as the pouring pipe is withdrawn from the interior of the mould during or after the pouring operation.

5. Moulding apparatus as claimed in claim 4, wherein the external support members are pivoted levers.

6. Moulding apparatus having internal and external pouring pipe support members substantially as herein described with reference to, and as shown in, the accompanying drawings.

7. A method of moulding an elongated article in concrete or other moulding material using moulding apparatus as claimed in any one of claims 1 to 5, comprising introducing the pouring pipe into the mould substantially parallel to the longitudinal axis thereof and supporting the pouring pipe within the mould on the internal support members, pumping concrete or other moulding material through the pouring pipe, withdrawing the pouring pipe and withdrawing



the internal support members prior to the setting of the concrete or other moulding material.

8. A method of moulding an elongated article in concrete or other moulding material, substantially as herein described

with reference to, and as shown in, the accompanying drawings.

9. An elongated concrete article moulded by a method as claimed in either claim 7 or claim 8.

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