



Individual letters e.g. "a" should be shown
in italics throughout.



PATENT SPECIFICATION

DRAWINGS ATTACHED

1142266

1142266



Date of Application and filing Complete Specification: 14 Feb., 1967.

No. 7121/67.

Application made in Japan (No. 5582) on 30 Jan., 1967.

Complete Specification Published: 5 Feb., 1969.

© Crown Copyright 1969.

Index at acceptance: —B5 A(1D1A1X, 1R29X, 1R50, 1R55)

Int. Cl.: —B 28 b 7/00

COMPLETE SPECIFICATION

Method of Manufacturing Prestressed Concrete Poles, Piles and the Like

We, NIPPON CONCRETE KOGYO KABUSHIKI KAISHA, a corporation organized under the laws of Japan, of 8-3, 1-chome, Shimbashi, Minato-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to methods of manufacturing prestressed concrete poles, piles and the like.

The present invention has for its object to stretch, simultaneously, a multiplicity of steel tendons or reinforcing steel wires in a mould to impart uniform stress to the wires.

Another object of the present invention is to place concrete material in the mould for consolidation therein while securely maintaining the multiplicity of reinforcing steel wires in the stretched state.

Yet another object of the invention is to provide a simple means to facilitate the manufacture of prestressed concrete poles, piles and the like on a mass production basis.

Attention now is particularly directed to the accompanying drawing, which illustrates an apparatus of appropriate construction usable in performing the method of the present invention and in which:

Fig. 1 is a side elevation, partly in section, of the apparatus;

Fig. 2 is a front end elevation of same partly in section taken along the line II—II in Fig. 1;

Fig. 3 is a fragmentary enlarged longitudinal section showing the concrete cast with the steel wires maintained in their stretched state;

Fig. 4 is a transverse cross section taken along the line IV—IV of Fig. 3 with dis-

tance pieces shown in front elevation or section; and

Fig. 5 illustrates one modification of the distance pieces.

Referring to the drawing and particularly to Figs. 1 and 2, reference numerals 1 generally indicates a wheeled platform having a plurality of support brackets 10 for supporting a mould 2 and serving the purpose of carrying the mould to any desired place. The mould 2 shown is generally of truncated conical shape and is comprised of a pair of mould segments of semicircular cross section having longitudinal flanges 21 hinged together on one side and those bolted together, as at 24, on the other side of the mould. Numeral 23 indicates longitudinal ribs formed on the outer periphery of the mould 2.

The mould 2 also has on its opposite ends flanges 22 to which are closely secured respective end discs 3 each having a central opening 3a. Arranged outside of said end discs 3 are anchor plates 4 and 5, respectively, which have a multiplicity of aligned through holes to receive reinforcing steel wires W to be anchored of their opposite ends to the plates.

At both ends, each of the steel wires W is formed with an enlarged head W1 or carries a clamp nut W2 for the anchoring purpose. Obviously, each of the end discs 3 also is formed with through holes in alignment with those formed in the anchor plates 4 and 5 to permit the steel wires W to be arranged in the hollow interior of the mould 2 and through the end discs.

Referring further to Figs. 3 and 4, a plurality, four in the illustrated example, of distance pieces 6 are arranged between one of the end discs 3 and the adjacent anchor plate 5 for the purpose of maintaining the

wires W in a state stretched by actuation of the anchor plate 5 as described hereinafter. For positioning the distance pieces 6, U-shaped brackets 13 are welded or otherwise secured to the outer face of the end disc 3, as clearly shown in Fig. 4, to receive the respective distance pieces 6, each of which includes a body portion 60 of square section to snugly fit in the associated U-shaped bracket 13. A stud 16 is threadably fitted to the body of each of the distance pieces 6 for adjustment of the axial distance provided thereby between the associated end disc 3 and adjacent anchor plate 5.

One modification of the distance pieces 6 is shown in Fig. 5, which takes the form of studs 6a threadably fitted to the anchor plate 5 for abutting engagement at their end with the adjacent end disc 3.

For actuation of the anchor plate 5, a hydraulic jack means 7 is provided as seen in Figs. 1 and 3, which has an internal tubular bearing surface 8 to receive the anchor plate 5, for sliding engagement therewith and also has a plunger 9 with its end 19 threaded for threadable engagement with the anchor plate 5.

In practicing the method of the present invention with the apparatus described above, reinforcing steel wires are first cut at a desired fixed length and each end of the wire lengths is upset to form an enlarged head W1 or threaded to carry a nut W2 or otherwise worked providing for anchoring action. A multiplicity of steel wires W thus prepared are inserted through the aligned holes formed in the opposite end discs 3 and anchored at their opposite ends to the respective anchor plates 4 and 5 (see Fig. 1). The wheeled platform 1 is placed adjacent the engaging end of hydraulic jack 7 in alignment therewith and the anchor plate 5 is positioned in the tubular end of the jack 7 for sliding movement therein. Upon energization of the hydraulic jack 7, the anchor plate 5, previously secured to the threaded end 19 of the jack plunger 9, is moved to the right, as viewed in Fig. 3, apart from the adjacent end disc 3 and the steel wires W anchored to the anchor plate 5 are correspondingly stretched as shown in Fig. 3. Subsequently, a plurality of distance pieces 6, previously adjusted to the specified length, are mounted in the respective U-shaped brackets 13 on the end disc 3 to maintain the adjacent anchor plate 5 in its position moved apart therefrom and the steel wires W in their stretched or tensioned state. Then, the threaded connection between the jack plunger 9 and anchor plate 5 is released and the jack 7 is moved axially in relation with the mould 2

to disengage the anchor plate 5 from the tubular bearing surface 8 in the adjacent end of the jack 7.

Subsequently, an appropriate amount of concrete material is poured into the interior of the mould through a central opening 40 (Fig. 1) provided at the other, left, end thereof while the mould 2 is being turned on its axis by a drive means not shown so that the poured concrete forms under the centrifugal force into a hollow truncated conical shape of an appropriate radial thickness extending about the inner peripheral surface of the mould 2 and consolidates. Subsequently, the mould 2 and other members including anchor plates 4, 5 are disassembled to obtain a desired truncated conical pole or pile.

Though description has been made herein with particular reference to the fabrication of truncated conical poles or piles, it should be readily understood that the principles of the invention can also be employed in fabricating straight cylindrical poles or piles by the use of a straight cylindrical mould in place of the truncated conical one used in the apparatus shown.

WHAT WE CLAIM IS:—

1. A method of manufacturing prestressed concrete poles, piles and the like comprising the steps of anchoring a multiplicity of reinforcing steel wires at their ends to two opposed anchor plates arranged outside of the respective ends of a truncated conical or cylindrical mould with end discs closely secured thereto, outwardly drawing one of said anchor plates by appropriate means to stretch the reinforcing steel wires, subsequently arranging distance pieces between said one anchor plate and the adjacent end disc to maintain the reinforcing steel wires in their stretched state, and placing concrete material in the mould for consolidation therein.

2. A method defined in Claim 1 in which said distance pieces are adjustable in their effective length by means of studs threadably carried by the respective distance pieces.

3. A method defined in Claim 2 in which each of said distance pieces has a body portion of square section fitted in a U-shaped bracket secured to the associated end disc.

4. A method defined in Claim 1 in which said distance pieces are provided in the form of a plurality of studs threadably fitted in said one anchor plate for contacting engagement with the outer face of the adjacent end disc.

5. A method of manufacturing prestressed concrete poles, piles and the like, the method

wires W in a state stretched by actuation of the anchor plate 5 as described hereinafter. For positioning the distance pieces 6, U-shaped brackets 13 are welded or otherwise secured to the outer face of the end disc 3, as clearly shown in Fig. 4, to receive the respective distance pieces 6, each of which includes a body portion 60 of square section to snugly fit in the associated U-shaped bracket 13. A stud 16 is threadably fitted to the body of each of the distance pieces 6 for adjustment of the axial distance provided thereby between the associated end disc 3 and adjacent anchor plate 5.

One modification of the distance pieces 6 is shown in Fig. 5, which takes the form of studs 6a threadably fitted to the anchor plate 5 for abutting engagement at their end with the adjacent end disc 3.

For actuation of the anchor plate 5, a hydraulic jack means 7 is provided as seen in Figs. 1 and 3, which has an internal tubular bearing surface 8 to receive the anchor plate 5, for sliding engagement therewith and also has a plunger 9 with its end 19 threaded for threadable engagement with the anchor plate 5.

In practicing the method of the present invention with the apparatus described above, reinforcing steel wires are first cut at a desired fixed length and each end of the wire lengths is upset to form an enlarged head W1 or threaded to carry a nut W2 or otherwise worked providing for anchoring action. A multiplicity of steel wires W thus prepared are inserted through the aligned holes formed in the opposite end discs 3 and anchored at their opposite ends to the respective anchor plates 4 and 5 (see Fig. 1). The wheeled platform 1 is placed adjacent the engaging end of hydraulic jack 7 in alignment therewith and the anchor plate 5 is positioned in the tubular end of the jack 7 for sliding movement therein. Upon energization of the hydraulic jack 7, the anchor plate 5, previously secured to the threaded end 19 of the jack plunger 9, is moved to the right, as viewed in Fig. 3, apart from the adjacent end disc 3 and the steel wires W anchored to the anchor plate 5 are correspondingly stretched as shown in Fig. 3. Subsequently, a plurality of distance pieces 6, previously adjusted to the specified length, are mounted in the respective U-shaped brackets 13 on the end disc 3 to maintain the adjacent anchor plate 5 in its position moved apart therefrom and the steel wires W in their stretched or tensioned state. Then, the threaded connection between the jack plunger 9 and anchor plate 5 is released and the jack 7 is moved axially in relation with the mould 2

to disengage the anchor plate 5 from the tubular bearing surface 8 in the adjacent end of the jack 7.

Subsequently, an appropriate amount of concrete material is poured into the interior of the mould through a central opening 40 (Fig. 1) provided at the other, left, end thereof while the mould 2 is being turned on its axis by a drive means not shown so that the poured concrete forms under the centrifugal force into a hollow truncated conical shape of an appropriate radial thickness extending about the inner peripheral surface of the mould 2 and consolidates. Subsequently, the mould 2 and other members including anchor plates 4, 5 are disassembled to obtain a desired truncated conical pole or pile.

Though description has been made herein with particular reference to the fabrication of truncated conical poles or piles, it should be readily understood that the principles of the invention can also be employed in fabricating straight cylindrical poles or piles by the use of a straight cylindrical mould in place of the truncated conical one used in the apparatus shown.

WHAT WE CLAIM IS:—

1. A method of manufacturing prestressed concrete poles, piles and the like comprising the steps of anchoring a multiplicity of reinforcing steel wires at their ends to two opposed anchor plates arranged outside of the respective ends of a truncated conical or cylindrical mould with end discs closely secured thereto, outwardly drawing one of said anchor plates by appropriate means to stretch the reinforcing steel wires, subsequently arranging distance pieces between said one anchor plate and the adjacent end disc to maintain the reinforcing steel wires in their stretched state, and placing concrete material in the mould for consolidation therein.

2. A method defined in Claim 1 in which said distance pieces are adjustable in their effective length by means of studs threadably carried by the respective distance pieces.

3. A method defined in Claim 2 in which each of said distance pieces has a body portion of square section fitted in a U-shaped bracket secured to the associated end disc.

4. A method defined in Claim 1 in which said distance pieces are provided in the form of a plurality of studs threadably fitted in said one anchor plate for contacting engagement with the outer face of the adjacent end disc.

5. A method of manufacturing prestressed concrete poles, piles and the like, the method



being substantially as hereinbefore described with reference to Figures 1 to 4 of the accompanying drawings, with or without the modification of Figure 5.

HASELTINE, LAKE & CO.,
Chartered Patent Agents,
28, Southampton Buildings,
Chancery Lane, London, W.C.2.,
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1969.
Published by the Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

