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(72) Inventor PHILIP WALTON HOPKINS



(54) APPARATUS FOR HANDLING CYLINDRICAL MOULDS DURING THE CENTRIFUGAL MOULDING OF PIPES

(71) We, HUMES LIMITED, a company incorporated under the laws of the State of Victoria, Australia, of Humes House, 185 William Street, Melbourne, Victoria, Australia, 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 apparatus for handling cylindrical moulds during the centrifugal moulding of pipes.

The so-called "centrifugal" method of forming pipes involves placing in a moulding machine a hollow mould having an inside configuration complementary to the desired outside configuration of the pipe to be formed, spinning the mould about its axis at a speed slightly greater than the "fall-in" speed of material within the mould, and depositing liquid concrete or like material into the mould, e.g. by means of a conveyor. When the required thickness has been built up, the flow of concrete is stopped and the mould speeded up to cause centrifugal separation between the water and heavier particles. The mould is usually spun by means of "spinning discs" in frictional contact with its outer surface. These discs are generally fixed to parallel axles which lie in a horizontal plane.

However, considerable difficulty has been encountered in handling the moulds onto and off the machine. The moulds themselves are not only bulky and therefore inconvenient to carry except by specially designed and generally expensive equipment, but are also heavy particularly when they are "filled" with concrete after moulding has actually taken place.

In the past, moulds have usually been handled onto and off concrete pipe machines by means of overhead cranes.

Accordingly, the present invention provides apparatus for handling cylindrical

moulds during centrifugal moulding of pipes including:

at least one set of spinning discs to support a mould for rotation therebetween during centrifugal moulding;

a lifting framework reciprocable generally vertically between a raised position and a lowered position;

a sub-frame supported by said lifting framework, capable of supporting and moving at least two moulds simultaneously, and reciprocable therewith generally vertically and also reciprocable generally horizontally with respect to said lifting framework, said lifting framework and said sub-frame being so constructed and relatively disposed that a first mould can be placed on said sub-frame, said lifting framework moved to its raised position and said sub-frame moved horizontally to locate the first mould above said spinning discs, when said sub-frame is so located said lifting framework can be moved to its lowered position to locate the first mould on said spinning discs for moulding, a second mould can be placed on said sub-frame and, after moulding, the first mould can be removed from said spinning discs, and the second mould located on said spinning discs, by again moving said lifting framework to its raised position, moving said sub-frame generally horizontally and moving said lifting framework to its lowered position with the first mould clear of said spinning discs.

The following description refers in more detail to these essential features and further optional features of the invention. To facilitate understanding of the invention, reference is made to the accompanying drawing where these features are illustrated in preferred form. It is to be understood, however, that the essential and optional features of the invention are not limited to the specific forms of these features as shown in the drawing.

In the drawing:

Figure 1 is a schematic side elevation of apparatus according to the invention showing two moulds in moulding positions on spinning discs, and with additional moulds ready to be moved to the moulding positions,

Figure 2 is a similar view to Figure 1 but with a lifting framework in its raised position; and

Figure 3 is a view as in Figure 1 but showing a mould departing the apparatus.

The apparatus includes a set of spinning discs 4 for supporting moulds 8 therebetween. Preferably, there are a plurality of sets of discs in a set, so that the apparatus can accommodate a plurality of moulds at one time as shown. A lifting framework 5 is adapted to reciprocate generally vertically between a raised position shown in Figure 2 and a lowered position shown in Figures 1 and 3.

A sub-frame comprising sliding rails 6 has sets of fingers 7 to locate moulds thereon.

The apparatus is used as follows, carry-on and off being from right to left. With the moulds 8 in position to the right of the apparatus, supported by fixed rails 9, the lifting framework 5 is elevated to the position shown in Figure 2. Thus, the moulds at the right are lifted from the rails 9 by the sliding rails 6. The lifting fingers 7 on the sliding rails 6 retain the moulds in position on the sliding rails 6. The sliding rails 6 are moved to the left.

When the sliding rails 6 are fully positioned to the left, the lifting framework 5 is lowered placing the moulds 8, which previously were on the right, on the spinning discs 4 as shown in Figure 1 ready for filling. During moulding the lifting framework 5 is fully lowered and the sliding rails 6 moved to the right to locate the fingers 7 under the moulds on the spinning discs 4 and under fresh moulds waiting on the fixed rails 9 as shown in Figure 1.

After moulding the lifting framework 5 is raised as in Figure 2 and the sliding rails 6 moved to the left, simultaneously moving the fresh moulds over the spinning discs 4 and moving the filled moulds to a position over fixed rails 10 at the left of the spinning discs 4. The lifting framework 5 is then lowered as shown in Figure 3, to deposit the filled moulds on the fixed rails 10 and to repeat the cycle.

Thus it will be appreciated that the apparatus enables one or more moulds to be handled simultaneously and may be operated so that the moulds do not touch each other during the carry-on carry-off process.

It will be evident from the foregoing description that a relatively simple apparatus can effect direct handling of moulds

in centrifugal moulding operations for concrete pipes, without necessitating the use of overhead cranes. The apparatus may be automated readily, representing a substantial labour saving over the use of overhead cranes. Additionally, the problems arising from rolling inertia in roll-on, roll-off arrangements are avoided.

WHAT WE CLAIM IS:—

1. Apparatus for handling cylindrical moulds during centrifugal moulding of pipes including:

at least one set of spinning discs to support a mould for rotation therebetween during centrifugal moulding;

a lifting framework reciprocable generally vertically between a raised position and a lowered position;

a sub-frame supported by said lifting framework, capable of supporting and moving at least two moulds simultaneously, and reciprocable therewith generally vertically and also reciprocable generally horizontally with respect to said lifting framework, said lifting framework and said sub-frame being so constructed and relatively disposed that a first mould can be placed on said sub-frame, said lifting framework moved to its raised position and said sub-frame moved horizontally to locate the first mould above said spinning discs, when said sub-frame is so located said lifting framework can be moved to its lowered position to locate the first mould on said spinning discs for moulding, a second mould can be placed on said sub-frame, and, after moulding, the first mould can be removed from said spinning discs, and the second mould located on said spinning discs, by again moving said lifting framework to its raised position, moving said sub-frame generally horizontally and moving said lifting framework to its lowered position with the first mould clear of said spinning discs.

2. Apparatus as claimed in Claim 1, wherein said sub-frame comprises at least one pair of rails slidably mounted on said lifting framework.

3. Apparatus as claimed in Claim 2, wherein said rails include pairs of up-standing fingers arranged to engage moulds to locate the moulds on the rails.

4. Apparatus as claimed in any preceding Claim, wherein said set of spinning discs comprises three discs whereby said apparatus can accommodate two moulds at the one time.

5. Apparatus for handling cylindrical moulds during the centrifugal moulding of pipes substantially as hereinbefore described with reference to the accompanying drawings.



In the drawing:

Figure 1 is a schematic side elevation of apparatus according to the invention showing two moulds in moulding positions on spinning discs, and with additional moulds ready to be moved to the moulding positions,

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For the Applicants,
D. YOUNG & CO.,
Chartered Patent Agents.
9 and 10 Staple Inn,
London, WC1V 7RD.

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