

PATENT SPECIFICATION

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(21) Application No. 27090/75 (22) Filed 26 Jun. 1975

(23) Complete Specification Filed 22 Jun. 1976

(44) Complete Specification Published 5 Jul. 1978

(51) INT. CL.² E04G 15/00

(52) Index at Acceptance
E1S 4B

(19)



(54) PNEUMATICALLY CONTROLLED CORE FORMER

(71) I, KANDIAH THARMA NAYAGAM, a citizen of Malaysia, of No. 6B, 2nd Floor, Lorong Medan Tuanku Satu, Kuala Lumpur, Malaysia, 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 core formers for use in the construction of concrete or other structures.

It is among the objects of the present invention to provide a core former which is simple to erect and use, and one which can be used repeatedly without the need to completely dismantle it each time it is used.

According to the present invention, there is provided a core former comprising a pair of interengaging former elements each element having at least one shaping surface, a resilient sleeve surrounding the former elements and serving normally to bias them into a first position, and means for moving the former elements relative to one another, against the action of the resilient sleeve, into a second position.

Preferably, the resilient sleeve is of rubber or an elastomeric material having similar physical characteristics and the means for moving the former elements relative to one another are pneumatic means in the form of an inflatable rubber or other tube.

The invention is illustrated by way of example in the drawings accompanying the Provisional Specification in which,

Figure 1 is a plan view of a lower former element of a core former according to the invention,

Figure 2 is a corresponding vertical section showing the manner of assembling the former,

Figure 3 is a cross-section, on an enlarged scale, showing the former in its first or non-expanded position in an opening in the shuttering,

Figure 4 is a cross-section corresponding to

Figure 3 showing the former in its second or expanded position,

Figure 5 is a cross-section corresponding to Figure 3 and showing the former in its first or non-expanded position prior to withdrawal after forming a concrete structure, and

Figures 6, 7 and 8 are schematic side elevations on a small scale showing the use of the former in a continuous casting process.

Referring to the drawing, the invention is illustrated with reference to a core former which is provided to form an opening of oval cross-section in a concrete structure.

The former comprises a lower former element 1 having an arcuate shaping surface 2, the ends of the element each having an inwardly directed radially extending flange portion 3 and a hook-like portion 4 extending perpendicular to, and in continuation of, the portion 3. Spaced stiffeners or reinforcing plates 5 are positioned along the length of the element 1.

The former also includes an upper former element 6 having an arcuate shaping surface 7, the ends of the element each having an inwardly directed radially extending flange portion 8 and a portion 9 extending perpendicular to, and in continuation of, the portion 8. Spaced stiffeners or reinforcing plates 10 are positioned along the length of the element 6.

As shown in Figure 2 of the drawing, the former elements 1 and 6 are assembled by sliding the element 6 lengthwise relative to the element 1 so that the portions 9 enter into a position where they interlock with their co-acting hook-like portions 4 as shown in Figures 3 to 5 of the drawing. In this respect, it will be seen that the relative lengths of the portions 4 and 9 are such that limited relative movement between them is allowed to take place.

Furthermore, an endless inflatable tube 11 is positioned between the radially extending flange portions 3 and 8, the inflation valve 12 of the tube being fixed in an end plate 13 which is secured to the lower element 1 and

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serves to position the elements 1 and 6 relative to one another. A second end plate 14 is positioned at the other ends of the two elements 1 and 6 to retain them in position.

The tube 11 is preferably of rectangular cross-section and, when in its inflated condition, the depth thereof is between one half and three quarters of the width thereof.

The structure so formed is enclosed in an open-ended resilient sleeve 15 of rubber or the like. This sleeve is made to have a close fit and is such that it can be pulled over the two elements 1 and 6 without difficulty but, at the same time, is not loose when in place. The sleeve 15 serves to bias the elements 1 and 6 into the first or non-expanded position as shown in Figures 3 and 5 of the drawing.

In use, the core former is, as shown in Figure 3, positioned in a casting mould having spaced openings 16 each opening corresponding in cross-section to that of the expanded former. In order to move the elements of the former into the second or expanded position, air is introduced into the tube 11 by a pump means (not shown) via the valve 12 and this forces apart the former elements 1 and 6 against the action of the sleeve 15. This movement is continued until the portions 9 engage the hook-like portions 4 in which position the profile of the former corresponds to that of the opening required, as can be seen in Figure 4. At the same time as the two elements 1 and 6 separate, the side of the tube 11 adjacent the sleeve 15 expands and forces the sleeve away from the joint between the two former elements 1 and 6. The distance to which the sleeve is forced away from the said joint is controlled by the pressure in the tube 11, and in order to ensure that the pressure which forces the two elements 1 and 6 apart is greater than that applied to the sleeve 15, the tube 11 is shaped and proportioned in the manner hereinbefore described.

Concrete is then poured into the mould and allowed to set. Thereafter, the tube 11 is deflated so that the former elements 1 and 6 return to their first or non-expanded positions as shown in Figure 5. The former can then be removed and re-used.

Thus, it will be seen that the core former according to the invention has the advantage that it has no mechanical parts which can go wrong, and that it can be made in very small sections, or in very narrow but wide sections, in an economical way, for example, by extrusion, rolling or bending, to the desired profile. Furthermore, the former is completely rigid and is therefore self-supporting and does not require external support.

A further advantage is that, since relative movement between the former elements can be effected without shock, very early removal of the former from the mould is possible thereby saving valuable time.

In addition, the core former need not be

dismantled and re-assembled each time it is used since its expansion and contraction is effected by pneumatic means and therefore there are no removable parts. For this reason, the core former can be used to advantage to form long continuous castings in an automatic process.

Figures 6 to 8 of the drawing show schematically the manner of using the core former in an automatic casting process. Thus, as shown in Figure 6, one or more spaced formers F as hereinbefore described are attached, at one end, to a travelling inflation machine 17 arranged to move lengthwise of a mould 18. The other ends of the formers F are supported in a shuttering element 19 forming part of the mould 18. In this position, the formers are expanded and concrete is poured into the mould 18. When the concrete is set, as is shown in Figure 7, the formers are collapsed and the machine 17 is moved to a position where a further section of the mould 18 is exposed and the free ends of the formers are supported in the core formed in the previously cast section. This process is repeated in a step-by-step motion to provide castings of any desired length made up of integral sections.

It will further be appreciated that the former structure is totally enclosed at all times and therefore is completely protected against the ingress of dirt or concrete which could hinder its operation.

Although the invention has been described with reference to each former element having a single arcuate shaping surface, it will be obvious that the shaping surface may be of angular cross-section thereby presenting a plurality of surfaces.

WHAT I CLAIM IS:-

1. A core former device, comprising a pair of interengaging former elements each element having at least one shaping surface, a resilient open-ended sleeve surrounding the former elements and serving normally to bias the elements into a first position, and means for moving the former elements relative to one another, against the action of the resilient sleeve, into a second position.

2. A device as claimed in claim 1, in which the resilient sleeve is formed from rubber or elastomeric material having similar physical characteristics.

3. A device as claimed in claim 1 or claim 2, in which the means for moving the former elements relative to one another comprise pneumatic means.

4. A device as claimed in claim 3, in which the pneumatic means comprise an inflatable rubber or other tube positioned between inwardly directed co-acting means formed on the former elements, and pump means.

5. A device as claimed in claim 3 or claim 4, in which the former elements comprise a lower element having a least one shaping surface, a pair of oppositely extending inwardly



serves to position the elements 1 and 6 relative to one another. A second end plate 14 is positioned at the other ends of the two elements 1 and 6 to retain them in position.

5 The tube 11 is preferably of rectangular cross-section and, when in its inflated condition, the depth thereof is between one half and three quarters of the width thereof.

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15 In use, the core former is, as shown in Figure 3, positioned in a casting mould having spaced openings 16 each opening corresponding in cross-section to that of the expanded former. In order to move the elements of the former into the second or expanded position, air is introduced into the tube 11 by a pump means (not shown) via the valve 12 and this forces apart the former elements 1 and 6 against the action of the sleeve 15. This movement is continued until the portions 9 engage the hook-like portions 4 in which position the profile of the former corresponds to that of the opening required, as can be seen in Figure 4. At the same time as the two elements 1 and 6 separate, the side of the tube 11 adjacent the sleeve 15 expands and forces the sleeve away from the joint between the two former elements 1 and 6. The distance to which the sleeve is forced away from the said joint is controlled by the pressure in the tube 11, and in order to ensure that the pressure which forces the two elements 1 and 6 apart is greater than that applied to the sleeve 15, the tube 11 is shaped and proportioned in the manner hereinbefore described.

45 Concrete is then poured into the mould and allowed to set. Thereafter, the tube 11 is deflated so that the former elements 1 and 6 return to their first or non-expanded positions as shown in Figure 5. The former can then be removed and re-used.

50 Thus, it will be seen that the core former according to the invention has the advantage that it has no mechanical parts which can go wrong, and that it can be made in very small sections, or in very narrow but wide sections, in an economical way, for example, by extrusion, rolling or bending, to the desired profile. Furthermore, the former is completely rigid and is therefore self-supporting and does not require external support.

60 A further advantage is that, since relative movement between the former elements can be effected without shock, very early removal of the former from the mould is possible thereby saving valuable time.

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dismantled and re-assembled each time it is used since its expansion and contraction is effected by pneumatic means and therefore there are no removable parts. For this reason, the core former can be used to advantage to form long continuous castings in an automatic process.

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WHAT I CLAIM IS:-

105 1. A core former device, comprising a pair of interengaging former elements each element having at least one shaping surface, a resilient open-ended sleeve surrounding the former elements and serving normally to bias the elements into a first position, and means for moving the former elements relative to one another, against the action of the resilient sleeve, into a second position.

110 2. A device as claimed in claim 1, in which the resilient sleeve is formed from rubber or elastomeric material having similar physical characteristics.

115 3. A device as claimed in claim 1 or claim 2, in which the means for moving the former elements relative to one another comprise pneumatic means.

120 4. A device as claimed in claim 3, in which the pneumatic means comprise an inflatable rubber or other tube positioned between inwardly directed co-acting means formed on the former elements, and pump means.

125 5. A device as claimed in claim 3 or claim 4, in which the former elements comprise a lower element having a least one shaping surface, a pair of oppositely extending inwardly

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- directed flange portions, and a hook-like portion extending perpendicular to each flange portion, and an upper element having at least one shaping surface, a pair of oppositely extending inwardly directed L-shaped portions which co-act with the hook-like portions of the lower element, the pneumatic means being positioned between the flange portions of the lower element and the L-shaped portions of the upper element.
6. A device as claimed in claim 5, in which, when the pneumatic means is in the form of an inflatable tube, the tube is of generally rectangular cross-section.
7. A device as claimed in claim 6, in which, when in its inflated condition, the depth of the tube is between one half and three quarters of the width thereof.
8. A device as claimed in any one of claims 5 to 7, in which the lower and upper former elements are provided with spaced transverse reinforcing or stiffening plates.
9. A device as claimed in any one of claims 5 to 8, in which each former element has a single arcuate shaping surface.
10. Apparatus for forming a continuous casting comprising a mould, an inflation machine capable of travelling movement lengthwise of the mould, and a device as claimed in any one of claims 1 to 9 fixed to the inflation machine whereby in use, by moving the inflation machine in a step-by-step manner relative to the mould, the continuous casting is formed in integral sections.
11. A core former device, substantially as hereinbefore described with reference to Figures 1 to 5 of the drawings accompanying the Provisional Specification.
12. The method of forming a casting, substantially as hereinbefore described with reference to Figures 1 to 5 of the drawings accompanying the Provisional Specification.
13. The method of forming a continuous casting, substantially as hereinbefore described with reference to Figures 6 to 8 of the drawings accompanying the Provisional Specification.
14. Apparatus for forming a continuous casting, substantially as hereinbefore described with reference to Figures 6 to 8 of the drawings accompanying the Provisional Specification.
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