Dec. 11, 1973 V. E. ANDREEV ET AL 3,778,491

METHOD OF ERECTING MONOLITHIC CONCRETE AND REINFORCED CONCRETE CONSTRUCTIONS

Filed July 8. 1970 4 Sheets-Sheet 1

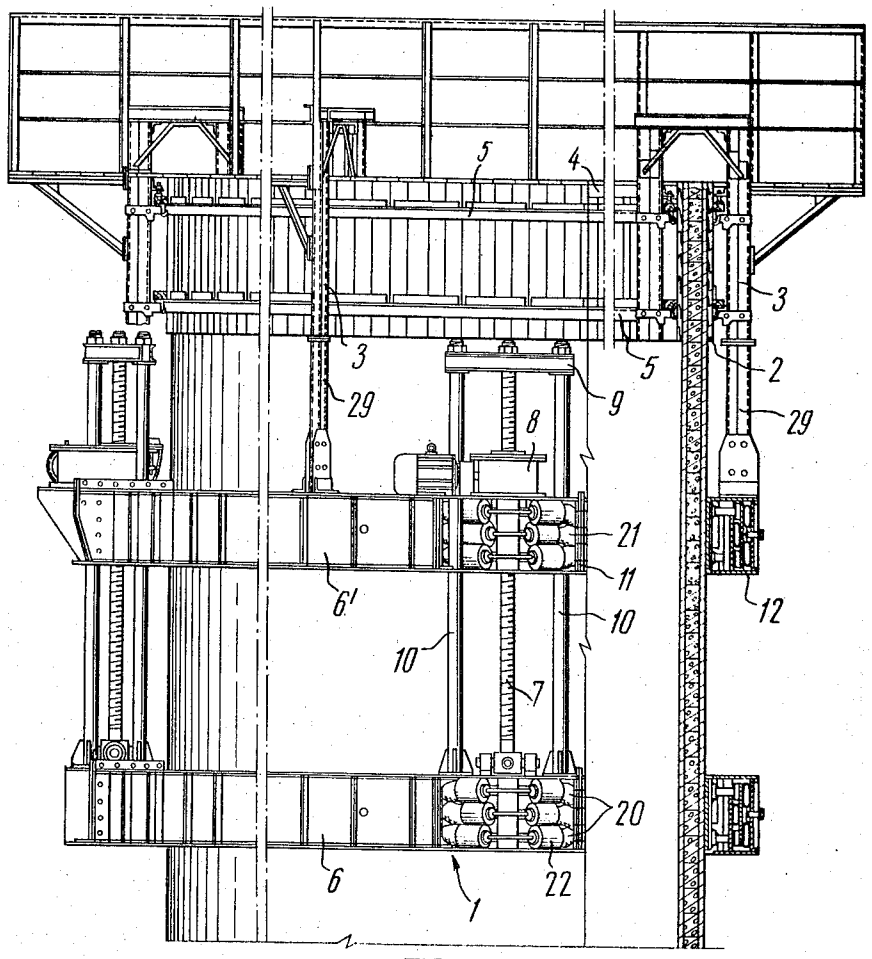


FIG 1

Dec. 11, 1973 V. E. ANDREEV ET AL 3,778,491
METHOD OF ERECTINC MONOLITHIC CONCRETE AND REINFORCED CONCRETE CONSTRUCTIONS
Filed July 8. 1970 4 Sheets-Sheet 8

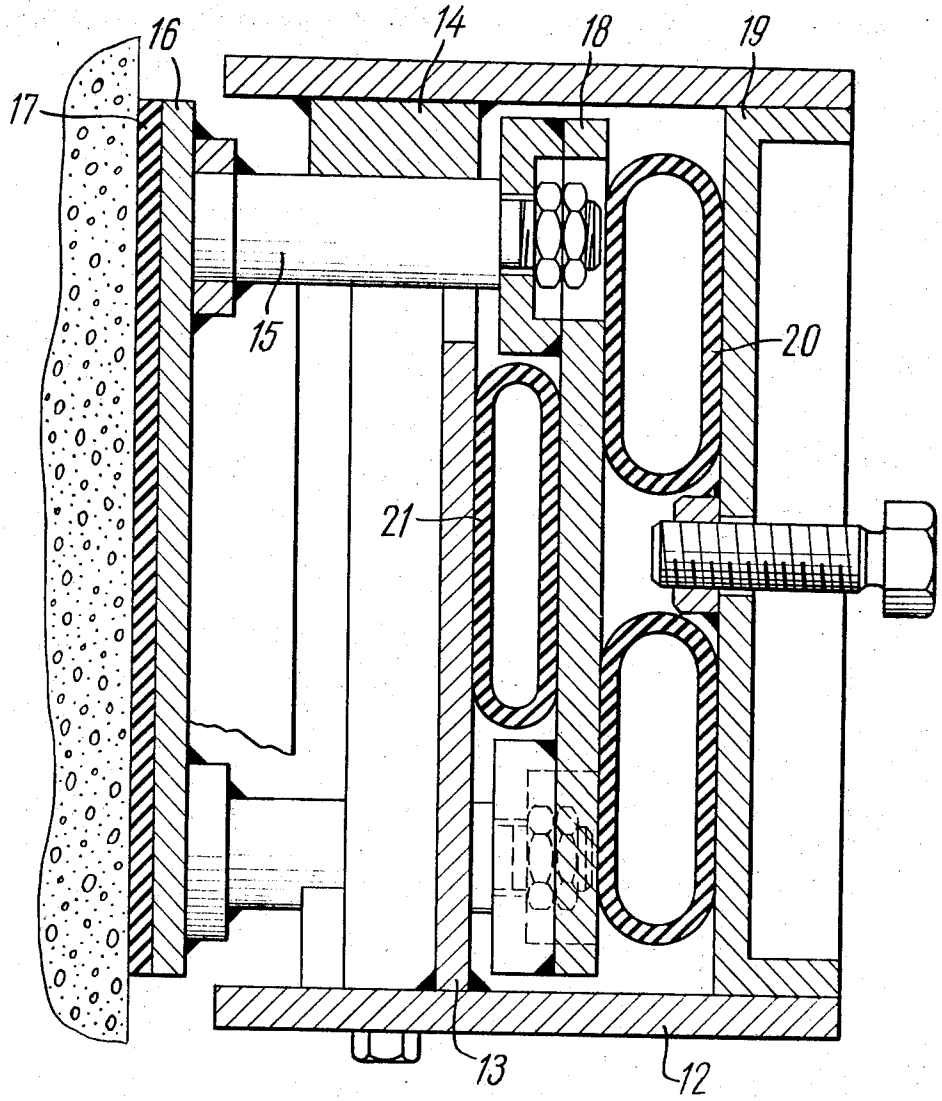


FIG. 2

Dec. 11, 1973 V. E. ANDREEV ET AL 3,778,491
METHOD OF ERECTING MONOLITHIC CONCRETE AND REINFORCED CONCRETE CONSTRUCTIONS
Filed July 8. 1970 4 Sheets-Sheet 3

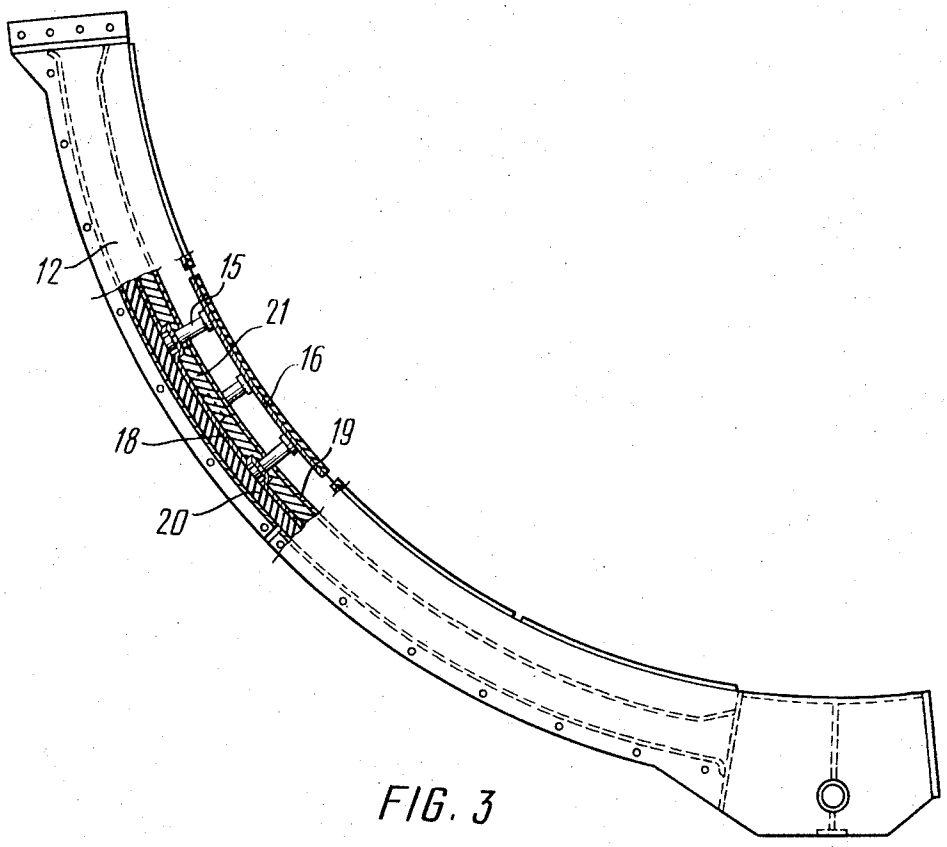


FIG. 3

Dec. 11, 1973 V. E. ANDREEV ET AL 3,778,491
METHOD OF ERECTING MONOLITHIC CONCRETE AND REINFORCED CONCRETE CONSTRUCTIONS
Filed July 8, 1970 4 Sheets-Sheet 4

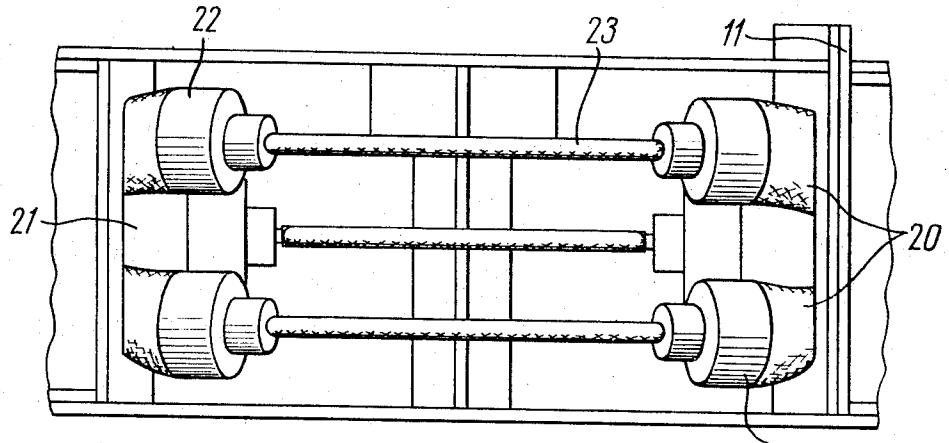


FIG. 4

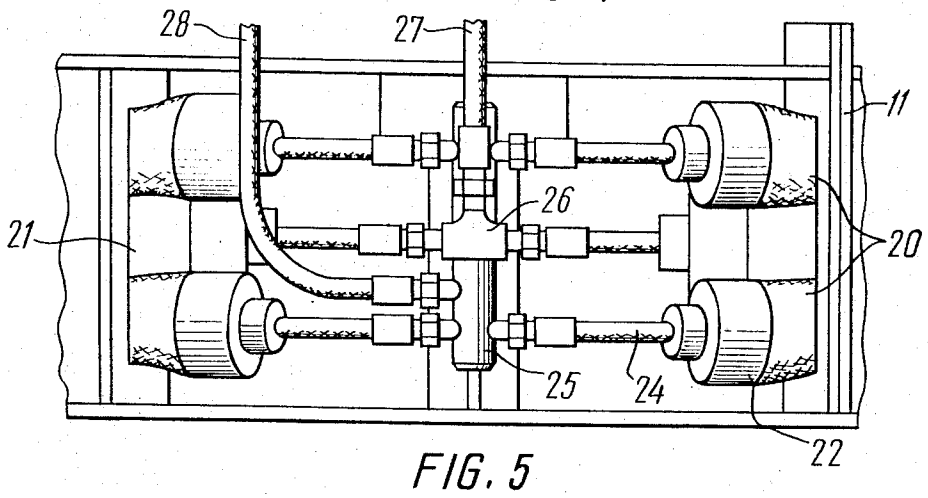


FIG. 5

United States Patent Office 3,778,491 Patented Dec. 11, 1973

3,778,491

METHOD OF ERECTING MONOLITHIC CONCRETE AND REINFORCED CONCRETE CONSTRUCTIONS

Valentin Efimovich Andreev, ulitsa Artema 84, kv. 78; Vyacheslav Ivanovich Pankovsky, ulitsa Cheljuskintsev 151, kv. 60; Yakov Davidovich Zengin, ulitsa Universitetskaya 93, kv. 28; and Taras Fedorovich Golub, ulitsa Universitetskaya 18, kv. 19, all of Donetsk, U.S.S.R.; and Alexei Nikolaevich Buryabash, deceased, late of Donetsk, U.S.S.R.; by Nelya Vasilievna Buryabash, adminstratrix, ulitsa Kirova 151v, kv. 2, Donetsk, U.S.S.R.

Filed July 8, 1970, Ser. No. 53,140
Int. Cl. E04b 1/16; E04g 11/22
U.S. Cl. 264—32 1 Claim

ABSTRACT OF THE DISCLOSURE

The erection of monolithic concrete and reinforced concrete construction in which the casing rests on the side surfaces of the erected part of the construction due to friction forces and simultaneously a pitch vertical displacement of the casing is effected in the course of concreting, with support members being disposed one above the other in at least two stories and interconnected by hoists, and the support members being equipped with shields made extensible in the horizontal direction to hold the casing on the side surfaces of the erected part of the construction.

BACKGROUND OF THE INVENTION

The present invention relates to the field of construction dealing with the erection of monolithic concrete and reinforced concrete constructions and, more particularly, to a method for accomplishing the same.

The prior art method of erecting monolithic concrete and reinforced concrete constructions lies in that prior to the beginning of concreting, the casing is mounted in the position as required in accordance with the design, whereupon, jack rods having jacks resting thereon are installed in said casing. Then, concrete mixture is placed into the casing and is packed by vibrators. After the concrete has acquired the stripping strength, the casing is started to be raised simultaneously with concrete placing. As the casing is raised, the jack rods are elongated, either with the aid of welding, or thread joints.

Conventional devices used for erecting constructions in the above-described method usually comprise N-shaped frames intended to hold the casing in the working position (jack frames) and mounting mechanisms for pitch vertical displacement of the casing, which comprise jacks (hoists) and support members in the form of plates by means of which the latter rest upon the jack rods.

When erecting monolithic concrete and reinforced concrete constructions in accordance with the conventional method and employing conventional devices, the latter have to be mounted at a distance of 1.5–2 m. one from another, since the supporting power of the jack rod is limited. When erecting constructions having a great perimeter of the walls, this necessitates the mounting of a large number of jacks, which considerably hampers their use as sliding of the support members (plates) that may occur in the course of the casing hoisting, and results in the casing skewing, bending of the jack rods and defects in the constructions being concreted.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method of erecting monolithic concrete and reinforced concrete constructions, which does not necessitate the use of a great number of mechanisms for displacing the casing.

Another object of the present invention is to provide a method of erecting monolithic concrete and reinforced concrete constructions, which makes it possible to considerably simplify the process of erecting constructions by eliminating a number of auxiliary operations necessitated by mounting, subsequent elongation of the jack rods and replacement thereof in the case of bending, as well as defects resulting from the casing skewing.

Still another object of the present invention is to provide a method for erecting monolithic reinforced concrete constructions, which ensure a high quality of constructions being erected.

These and other objects of the present invention are accomplished in that the method of erecting monolithic concrete and reinforced concrete constructions consists in first mounting the casing and depositing and packing a concrete mixture therein, then, during the casing pitch displacement, the casing is forced to rest on the side surfaces of the erected part of the construction due to friction forces.

The device for erecting monolithic concrete and reinforced concrete constructions in accordance with the present method comprises N-shaped frames for holding the casing in the working position; mechanisms for a pitch vertical displacement of the casing, connected with the frames; hoists of the mechanisms for pitch vertical displacement of the casing; support members of the mechanisms for displacement of the casing, disposed one above the other in at least two stories and interconnected by the hoists; clamping shields mounted in the body of the said support members capable of being displaced in the horizontal direction, with the upper support members being connected with the N-shaped frames holding the casing in the working position.

To move the clamping shields in the body of the support members, it is expedient to provide cylinders of an elastic material and filled with a working liquid or gas.

The subject-matter of the present invention resides in that due to the fact that the casing rests upon the side surfaces of the erected portion of the construction in the course of the casing pitch displacement, it is unnecessary to employ the jack rods on which the mechanisms for displacement of the casing rest. Moreover, this makes it possible to use mechanisms for displacement of the casing having a greater load capacity and, consequently, to decrease the number thereof. For instance, for 100,000 m. of casing up to 60 hoists were usually used, while the present method requires not more than 16 hoists.

Since the present method allows the employment of jack rods to be eliminated, it becomes possible to eliminate all auxiliary operations necessitated by their mounting, elongation in the course of the casing hoisting and replacement in the case of bending and, consequently, the causes of undesirable stops of the casing and the resultant defects of the construction being concreted.

As a result of the simplification of the technological process of erecting monolithic constructions, the efficiency of labor is 2–2.5 times higher.

To make the subject-matter of the present invention readily understood, the following description of an exemplary embodiment of the device for erecting a reinforced concrete cylindrical tower is given with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a general partially sectional view of the device according to the present invention.

FIG. 2 is an enlarged cross-sectional view of a support member;

FIG. 3 is a top partially sectional view of a fourth part of a support member;

FIG. 4 is a side view of the butt connection of the parts of a support member; and

FIG. 5 is a side view of the butt connection of the parts of a support member with distributing blocks connected to a pump station.

DETAILED DESCRIPTION OF THE INVENTION

As is shown in the drawing, the device comprises a mechanism **1** (FIG. 1) for a pitch vertical displacement of a casing **2**, N-shaped frames **3** for holding the casing in **2** in the working position and a working platform **4** resting upon arch centers **5** of the casing **2**.

The mechanism **1** for a pitch vertical displacement of the casing **2** comprises two annular support members **6** and **6'** which are disposed one above the other and are interconnected by screws **7** of hoists **8**. Each screw **7** is secured by one end portion to the lower annular support member **6** by means of a hinge, and by its other end portion to a cross-member **9** mounted in guides **10** which are loosely passed through holes of the upper annular support member **6'** and are fastened to the lower support member **6**.

Each of the annular support members **6** and **6'** comprises four parts joined one to another with the aid of bolt connection **11**. A body **12** (FIGS. 2 and 3) of every part of the members **6** and **6'** accommodates stationary partitions **13** and guides **14** along which slides **15** having clamping shields **16** rigidly secured thereto slide, with the outer surface of the clamping shields **16** being covered with a layer of rubber **17**.

The other end portions of the slides **15** have movable partitions **18** secured thereon. Disposed between rear wall **19** of the body **12** and the movable partition **18** are cylinders **20** of an elastic material, and between the stationary partition **13** and the movable wall **18** is a cylinder **21** also of elastic material.

The cylinders **20** and **21** of the adjacent parts of a support member are clamped at their end portions by chuck grippers **22** (FIG. 4), and are interconnected by flexible hoses **23**.

At one of the butt connections the end portions of the cylinders **20** and **21** are connected by means of flexible hoses **24** (FIG. 5) with distributing blocks **25** and **26** connected to a pump station (not shown in the drawing) by flexible hoses **27** and **28**.

The upper annular support member **6'** is connected with N-shaped frames **3** by uprights **29** (FIG. 1).

The present method is illustrated by means of an example showing the operation of the above-described device.

Prior to erection of a cylindrical monolithic reinforced concrete tower, the inner and outer casings **2** (FIG. 1) are mounted on a prepared foundation with an already mounted concrete reinforcement, and are connected by the N-shaped frames **3**. Then, the annular support members **6** and **6'** are disposed one above the other outside the casing.

The working platform **4** is secured to the arch centers **5** of the casing **2**, and a concrete mixture is delivered by a crane to be placed into the casing and packed by poker vibrators.

After the concrete has acquired a stripping strength, the casing is started to be raised simultaneously with the concrete deposition into the casing.

The casing is raised in the following way:

The hoists **8** are activated, and, due to the fact that the upper annular support member **6'** is connected with the N-shaped frames holding the casing **2**, the member **6'** starts moving upward together with the casing along the screws **7** until it reaches the cross-member **9**. Then, the hoists **8** are deactivated, and a working liquid or gas is started to be delivered under a pressure of 4–5 atm. through the flexible hose **28** (FIG. 5), and the distributing block **25** into the cylinders **20** (FIG. 2). Hence, the cylinders **20** press upon the movable partition **18** by pushing off the rear wall **19** of the body of the support member, thus displacing the clamping shields **16** in the horizontal direction. The shields **16** are brought to the side surface of the erected part of the cylindrical tower and are tightly pressed thereagainst.

Then, the hoists **8** are again activated, the lower annular support member **6** starts rising along with screws **7**, whereas the upper annular member **6'** resists the whole load (exercised by the casing and the weight of the support members), and is held on the construction by friction forces arising between the clamping shields **16** and the side surface of the construction.

At this moment the concrete reinforcement is elongated along the whole perimeter of the construction.

When the lower annular member **6** reaches the upper annular member **6'** (i.e. has passed the distance equal to a preset pitch), the hoists **8** are deactivated and a working liquid or gas is supplied into the cylinders **20** of the lower annular support member **6**, as a result of which the latter in a manner similar to that of the upper member is also pressed against the side surfaces of the construction and is held thereon.

Thereupon, the pressure of the working liquid or gas is dropped in the cylinder **20** of the upper support member **6'** by opening the stop cock or the pump station. Concurrently, the working liquid is supplied into the cylinder **21** of the same member, as a result of which the cylinder **21** forces the working liquid out of the cylinder **20**, thus moving the clamping shields **16** away from the side surface of the construction.

After the hoists **8** are activated, the upper annular support member **6** is raised along with the casing for a pitch.

During the casing hoisting, the concrete mixture is continuously deposited and packed, and the cycle of operation of the device is repeated.

What is claimed is:

1. A method of erecting monolithic concrete and reinforced concrete constructions, comprising the steps of providing spaced annular inner and outer members defining a casing, with the annular space between the members providing a forming zone, supporting the inner and outer members in such spaced relationship, mounting the casing on a prepared foundation, positioning upper and lower annular supports about the casing, connecting the upper annular support member to the support for the casing, interconnecting the upper and lower annular support member for stepped vertical movement, providing each annular support member with a shield displaceable horizontally toward and away from the casing, introducing a concrete mix into the forming zone of the casing and packing the concrete mix, after the concrete mix has acquired a stripping strength, moving the upper annular support member and hence the casing upwardly to a predetermined position, arresting the movement of the upper annular member, displacing the shield of the upper annular support member horizontally to the side surface of the erected part of the construction whereby the shield is tightly pressed thereagainst, moving the lower annular support member upwardly while the upper annular support resists the entire load exercised by the casing and the weight of the support members and is held on the construction by the friction forces arising between the

shield and the side surface of the construction, continuously introducing the concrete mixture into the forming zone while the casing is being raised, stopping the movement of the lower annular support member when the lower annular support member, reaches the upper annular support member, displacing the shield of the lower annular support member horizontally to be pressed against the side surface of the erected part of the construction, thereafter moving the shields of the upper annular support member horizontally away from the side surface of the construction, and repeating the above cycle.

References Cited

UNITED STATES PATENTS

2,706,842	4/1955	Keffer	25—131 SB
3,497,579	2/1970	Barron	264—33

FOREIGN PATENTS

1,300,200	1962	France	425—63
172,018	12/1965	U.S.S.R.	25—131 SB
1,186,816	4/1970	Great Britain	25—13 SB

ROBERT F. WHITE, Primary Examiner

J. H. SILBAUGH, Assistant Examiner

U.S. Cl. X.R.

264—33; 425—63