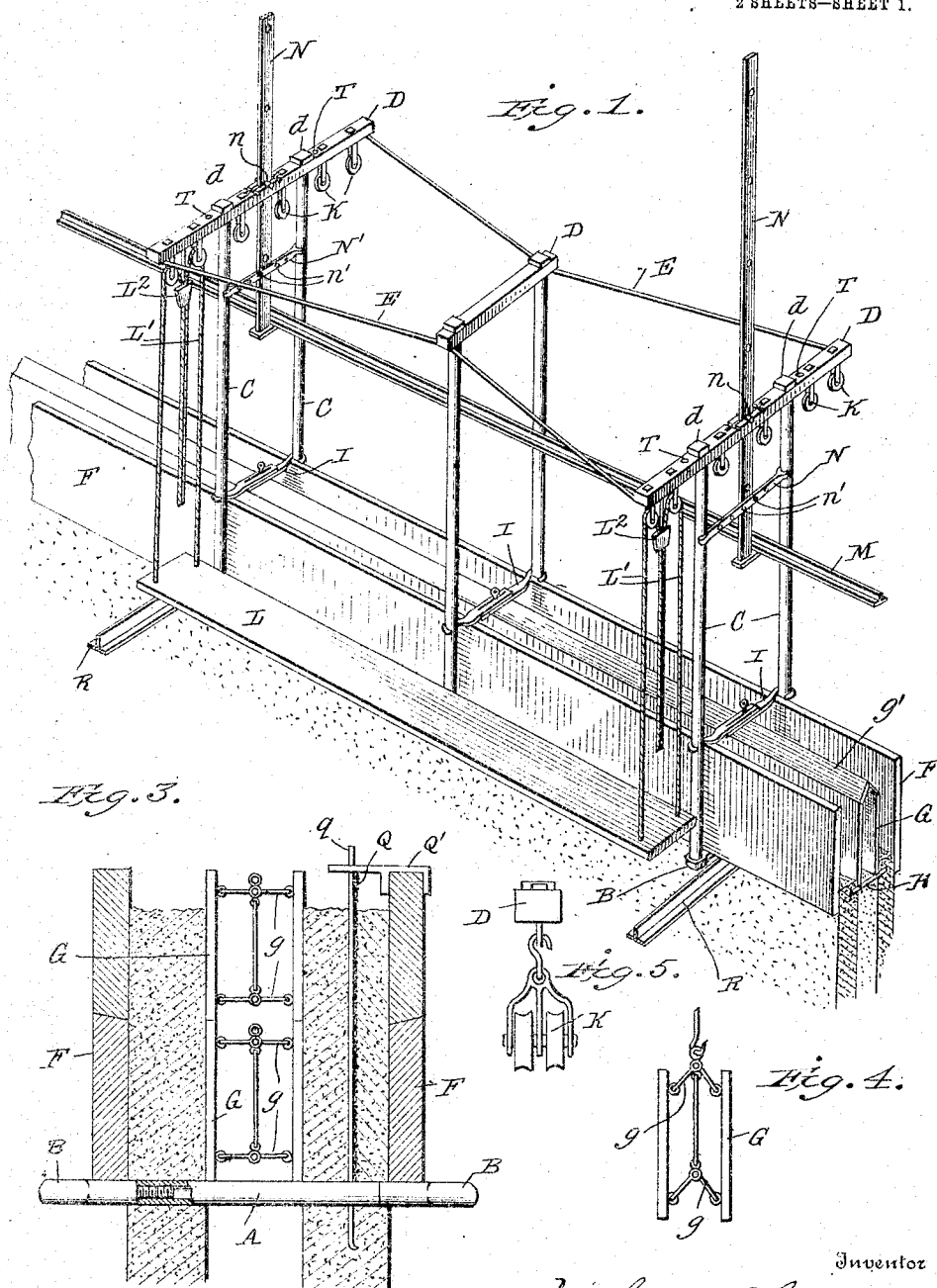


N. C. NEWERF.
 ADJUSTABLE APPARATUS FOR THE CONSTRUCTION OF CEMENT BUILDINGS.
 APPLICATION FILED JUNE 25, 1907.

947,160.

Patented Jan. 18, 1910.

2 SHEETS—SHEET 1.



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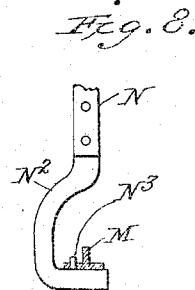
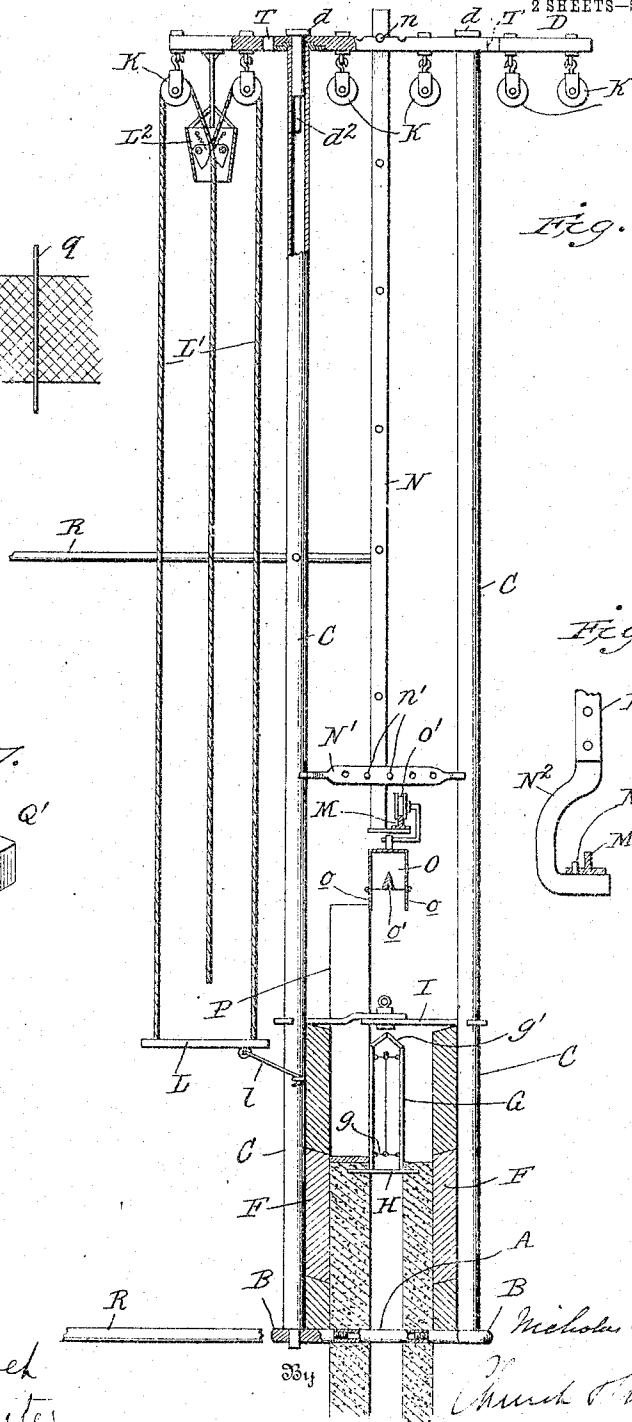
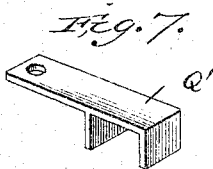
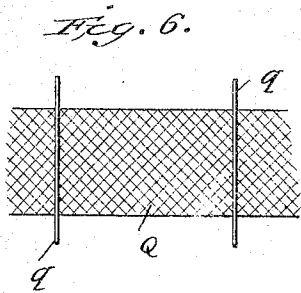
his Attorneys

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2 SHEETS—SHEET 2.



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ADJUSTABLE APPARATUS FOR THE CONSTRUCTION OF CEMENT BUILDINGS.

947,160.

Specification of Letters Patent.

Patented Jan. 18, 1910.

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To all whom it may concern:

Be it known that I, NICHOLAS C. NEWERF, of Buffalo, in the county of Erie, State of New York, have invented a certain new and useful Improvement in Adjustable Apparatus for the Construction of Cement Buildings; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

The invention relates to improvements in means or apparatus employed in the construction of walls and partitions of buildings where cement or artificial stone is placed in position when in a plastic condition to constitute, when set, the walls or partitions in monolithic form.

The object of the present invention is to provide a means or apparatus whereby not only will the walls and partitions be more satisfactory in respect to strength and economy of construction, but the building operations may be so harmonized that the labor and time consumed in placing the materials and in changing the forms from one position to another may be greatly reduced.

A further object is to provide an apparatus which may be successfully employed by relatively unskilled labor.

Referring to the accompanying drawings—Figure 1 is a perspective view of a section of wall and apparatus employed in its construction embodying the present improvements. Fig. 2 is a sectional elevation showing details of construction not apparent in Fig. 1. Fig. 3 is a detail section through a portion of the wall showing some of the forms and a facing section with the means for separating said facing section from the rough interior portion of the wall. Fig. 4 is a detail elevation of one of the internal collapsible forms. Fig. 5 is a detail of the preferred pulley arrangement for elevating the workmen's scaffold. Fig. 6 is a section of the foraminous partition for separating the facing section from the body of the wall. Fig. 7 is a view of one of the holders for said foraminous partition. Fig. 8 is a detail of the preferred form of track for the conveyer buckets and its hanger.

Like characters of reference in the several figures indicate the same parts.

The present invention is designed for building either hollow or solid walls, but

inasmuch as the hollow wall construction is that most generally adopted, particularly for the outside walls of buildings, the apparatus illustrated is adapted for the formation of walls of this character.

In accordance with the present invention it is proposed to dispense, as far as possible, with the necessity of employing scaffolding which must be supported from the surface of the ground and to provide an apparatus which finds itself supported entirely on the previously completed portions of the wall or partitions, as the case may be, such apparatus embodying not only the means for retaining the forms in place and shifting them from one position to another as the building of the wall progresses, but also the supporting means for the scaffolding on which the workmen stand or sit during the distributing and tamping operations incidental in the construction of walls of the character described.

In accordance with the ideas just outlined, the foundations having been laid, the walls have incorporated in them, preferably at the level of the top of the base or foundations suitable supporting and tie pieces A, which may be tubular throughout or formed with sockets at the ends for the reception of the screw threaded ends of supports B, adapted to project beyond the faces of the wall and to receive the lower ends of standards C. Said standards C are preferably tubular so as to afford the greatest strength for a given weight and the number of standards employed may be varied in accordance with the strength of the forms employed. Thus, where the forms are of light construction and liable to be deflected by the pressure of material between standards, a greater number of standards would be required, but in ordinary practice said standards may be located approximately six feet apart, and hence this number of tie pieces and supports should be located in proper positions in the walls at the floor level. The length of the standards C may be varied in accordance with the requirements of any particular building, but they are preferably of such length as to extend from one floor level to a considerable distance above the next higher floor level, inasmuch as it is proposed to build from one floor level to a point a few feet above the next floor level before shifting the uprights from one position to another. At their upper ends said standards

are connected by cross pieces D, usually removably held in place by pins *d* passing down into the uprights and said cross pieces D constitute the supporting means for the hanging portions of the structure. When the uprights and cross pieces are assembled in position, as shown in Figs. 1 and 2, they may be connected by brace rods E removably attached thereto in any suitable manner so as to facilitate the separation of the parts when it becomes necessary to shift the apparatus from one position to another.

The supporting pieces B preferably extend into the faces of the walls, in other words, the tie pieces A terminate within said faces, thus when the wall is completed the supports B may be readily removed and the small openings left by their removal filled with cement or plastic material corresponding to that of which the walls are formed. The body portions of said support B also extend a sufficient distance beyond the walls to permit of the insertion of the outside forms F between the outer faces of the walls and the uprights C, whereby said forms will be held against outward deflection and will constitute the retainers for the plastic material as it is placed in position and tamped. The internal hollow space is produced by locating internal collapsible forms G in position on the tie pieces A and in the preferred arrangement these collapsible forms are provided with toggle links *g* adapted to be flexed upwardly as shown in Fig. 4, when it is desired to collapse the forms and draw them up to a higher level. It is also preferred that the internal collapsible forms shall be made in relatively narrow sections and a succession of them employed as shown in Fig. 3, although if desired one or two may be employed in forming a narrow section of wall and upon their removal, short tie pieces H may be inserted for supporting them in their next higher position, as shown in Fig. 2, the tie pieces H also serving in the completed wall as additional ties between the inner and outer sections of the wall. As the work progresses, the successive sections of the wall are formed in the spaces left between the forms and additional forms are added as required, but in order to prevent any possible outward springing or yielding of the standards they are preferably temporarily connected immediately above the forms being used, by adjustable clamps I, said clamps I being moved up as the successive forms are put in position, but are usually left in place until each section of the wall has set and hardened.

Pulleys K are suspended from the cross pieces D, such pulleys, especially at the ends of the cross pieces, being preferably double pulleys as shown in Fig. 5, and over these pulleys ropes are passed for drawing up the forms, handling material and especially

for supporting the scaffolds L on which the workmen stand. The scaffolds L may be located on one or both sides of the wall as occasion requires and they are prevented from swinging by connections *l* extending to the uprights and suitably connected thereto by any temporary fastenings. For convenience the ropes L' which support the scaffolds may be held against reverse movement by automatic clamps L², as shown clearly in Fig. 2, thus when the workmen desire to elevate the scaffold they may do so without the necessity of tying the ropes, which in operations of this kind, would require some special skill to guard against accident.

To facilitate handling the material of which the wall is composed an adjustable track M is mounted on hangers N suspended from the cross pieces D, preferably between the uprights C and in the space to be subsequently occupied by the wall itself, thus the material may be loaded into buckets such as indicated at O, in Fig. 2, elevated to the track and hung on trolleys O' by which the buckets may be conveyed around the wall to any suitable position and dumped by the workmen by simply releasing the trap doors *o* in the bottom of the buckets. Where hollow walls are to be formed the buckets are preferably provided with discharge apertures at each side of a center partition *o'*, in order to direct the material to each face of the wall, and, in addition, the center or collapsible forms are preferably provided with an inverted V-shaped cover *g'* as shown clearly in Figs. 1 and 2.

The hangers N on which the track M is mounted are made vertically adjustable and are adapted to be held in place by cross-braces N' extending between the uprights C at suitable points. While any preferred means for adjusting the hangers N and for holding the lower ends of said hangers in proper position transversely of the wall may be used, it is preferred to employ a simple arrangement of pins, such as indicated at *n n'*. In Fig. 8 a preferred form of hanger and track is shown in which the hanger has a stirrup N² at the lower end whereby the track may be brought directly in line with the overhead point of support and the track itself is removably mounted on the stirrup and held in place by pins N³ projecting upwardly from the stirrup and adapted to enter or pass through sockets or openings in the flange of the rail M. With this construction, not only may the parts be readily taken down and reassembled, but a wide latitude for adjustment is provided both vertically and horizontally. Thus, for instance, the track may be properly inclined to cause the buckets to travel around or along the wall by gravity and by a proper

lateral adjustment the discharge may be made to take place above either face of the wall, or the track may be deflected to pass around window and door casings or other obstructions which it may be desirable or necessary to include in the wall construction. Where window or door casings are of unusual thickness, leaving insufficient transverse space for the buckets, said window or door casings are preferably made in sections. Thus, as shown in Fig. 2, the lower half of a window casing is in position at P and the track is elevated to a point above the half section of the casing, in which position the buckets are in convenient reach of the workmen and at the same time the section of the casing does not interfere with the movement of the buckets.

Where it is desired to form a wall with a casing having a different character from the body portion of the wall, as for instance, a special artificial stone facing, some difficulty has been experienced in forming the facing at the time when the wall is formed, and hence it has been common practice to make such facings as a separate portion, which is subsequently united to the body of the wall or to apply said facing in the form of a plastering after the body of the wall has been practically completed. In accordance with the present invention it is proposed to form the facing sections simultaneously with the body of the wall, and for this purpose there is introduced into the wall a foraminous partition, preferably a simple wire mesh partition Q, Figs. 3 and 6, which is held distended and in position by vertical rods q, with which removable brackets Q' carried by the forms may engage. Having positioned the partition or diaphragm as the wire mesh Q may be termed, the coarse material for the body of the wall is dumped in between the forms on the inner side of the partition and the finer material which is to constitute the facing of the wall is dumped on the outer side of said partition. The openings through the partition permit the two materials to unite thereby constituting a monolithic structure but the characteristics of the two materials are preserved and each may be tamped after the other is in place, without causing spreading or permitting the rough material of the body to penetrate the facing or appear on the outside of the wall. In addition, the foraminous partition constitutes a strengthening or reinforcement for the wall and to this extent is a mechanical advantage.

In constructing a building with apparatus such as herein described the scaffolds and standards are preferably so proportioned that the scaffolds will pass up between the joists or T-beams of the floors and ceilings. The drawings show joists or beams at R and the standards in proximity thereto sup-

port the scaffold while the intermediate uprights serve mainly to hold the forms in place. Ties and supports for the standards it will be understood are located at each floor level, but there may be a greater number if found necessary or desirable to properly carry the load and distribute the strains in the wall, for it is the intention that the whole apparatus shall be supported by the previously formed and set portion of the wall, a given height of wall, say one story, being completed before the apparatus is re-assembled at a higher level. In every instance a portion of the wall should be completed above the stays and supports of sufficient height to hold the standards when shifted to new positions. In practice, when the stays and supports are located at floor level it is found sufficient to complete the walls to the window sill level of the next story and after it has set or hardened the whole apparatus is elevated and positioned on the higher supports, the lower supports being removed and the holes left thereby filled with the plastic composition.

In order to release the outside forms and permit them to be raised to the floor above, before the adjustable knockdown frame is taken to pieces and assembled in its higher position, provision is made for spreading the standards without destroying their efficiency as portions of the frame. This object may be accomplished by providing additional holes T in the top cross pieces for the pins Z, thus the pins may be withdrawn, the standards spread at the top and the pins dropped into the outer holes. In lieu of this arrangement the pins may be made of two diameters as shown at Z² in Fig. 2, and when partially drawn out, or drawn out until the smaller diameter holds the standards, the latter may then be separated sufficiently to release the outside forms and this latter may be readily drawn up by ropes passing over the pulleys on the cross pieces. While the standards are being spread, the clamps I will operate to hold them until the desired adjustment has been effected.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In an apparatus for facilitating the building of concrete walls, the combination with the following instrumentalities, to wit, forms between which the plastic material is placed, standards for holding said forms in position detachably connected together through the previously completed portion of the wall below the forms and cross-pieces detachably connecting said standards at the upper ends, adjustable clamps connecting said standards in proximity to the forms and a conveyer track suspended below the cross piece and between the standards for

transporting concrete along the wall; substantially as described.

2. In apparatus for facilitating the construction of concrete walls, the combination of the following instrumentalities, to wit, forms between which the plastic material is placed, a skeleton frame embracing said forms for retaining the same in position and a conveyer track adjustably suspended from said skeleton frame in position to convey material along the wall; substantially as described.

3. In an apparatus for facilitating the construction of concrete walls, the combination of the following instrumentalities, to wit, forms between which the plastic material is placed, a knock-down skeleton frame supported by the previously completed portion of the wall, a conveyer track and a vertically adjustable hanger on which said track is mounted suspended between standards and means whereby the position of said track transversely of the wall may be adjusted; substantially as described.

4. In an apparatus for facilitating the construction of concrete walls, the combination of the following instrumentalities, to wit, forms between which the plastic material is placed, standards on opposite sides of said forms, removable supports mounted in the wall below said forms, a removable cross piece connecting the upper ends of the standards, a conveyer track suspended from said last mentioned cross piece and a scaffold suspended from said last mentioned cross piece on the outer side of the uprights; substantially as described.

5. In an apparatus for facilitating the construction of concrete walls, the combination with forms between which the plastic material is placed, a knock-down frame embodying standards detachably connected at their upper ends, and scaffolds suspended from the skeleton frame of a tie mounted in

the wall below the forms, and removable supports for the standards and skeleton frame mounted in the ends of said tie below the forms; substantially as described.

6. In apparatus for facilitating the simultaneous construction of the body portion and facing of concrete walls the combination with forms between which the plastic material is placed, of a foraminous diaphragm forming a permanent part of the wall and vertically arranged between said forms for separating the materials forming the body portions and facing of the wall and means for maintaining said diaphragm in position; substantially as described.

7. In apparatus for facilitating the simultaneous construction of the body portion and facing of concrete walls, the combination with the forms between which the plastic material is placed, of a vertically arranged foraminous partition forming a permanent part of the wall for separating the materials to form the body and facing of the wall, vertical rods for retaining said partition in position, and removable brackets for coöperation with said rods; substantially as described.

8. In apparatus for facilitating the construction of concrete walls, the combination with a knock-down skeleton frame embodying means for attaching the same to the outer sides of the walls previously completed and embodying cross pieces at the top, of vertically adjustable hangers carried by said cross-pieces and located between standards of the knock-down frame, a removable conveyer track carried by the said hangers and removable braces for positioning the lower ends of said hangers; substantially as described.

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