March 28, 1939. J. M. SMITH 2,152,365

STRUCTURE FOR ELECTRICALLY CURING OR HARDENING MOIST WORKPIECES

Filed Feb. 3, 1937 2 Sheets-Sheet 1

Fig. 1.

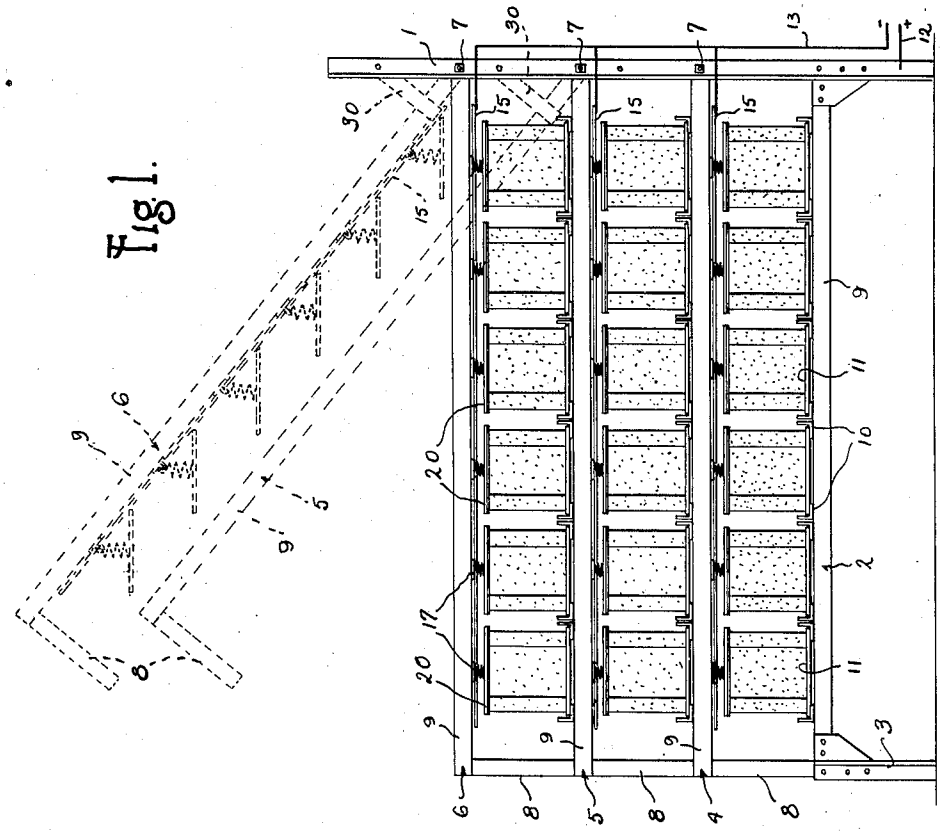
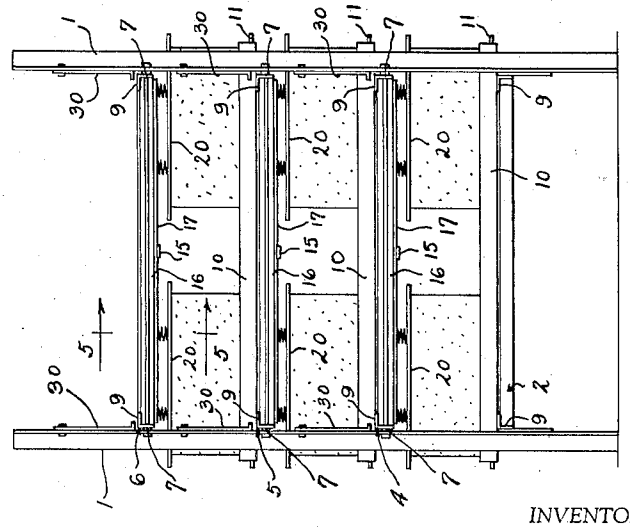


Fig. 2.



INVENTOR.
J. Miller Smith
BY Barnes, Kisselle, Laughlin & Raisch
ATTORNEYS

March 28, 1939. J. M. SMITH 2,152,365

STRUCTURE FOR ELECTRICALLY CURING OR HARDENING MOIST WORKPIECES

Filed Feb. 3, 1937 2 Sheets-Sheet 2

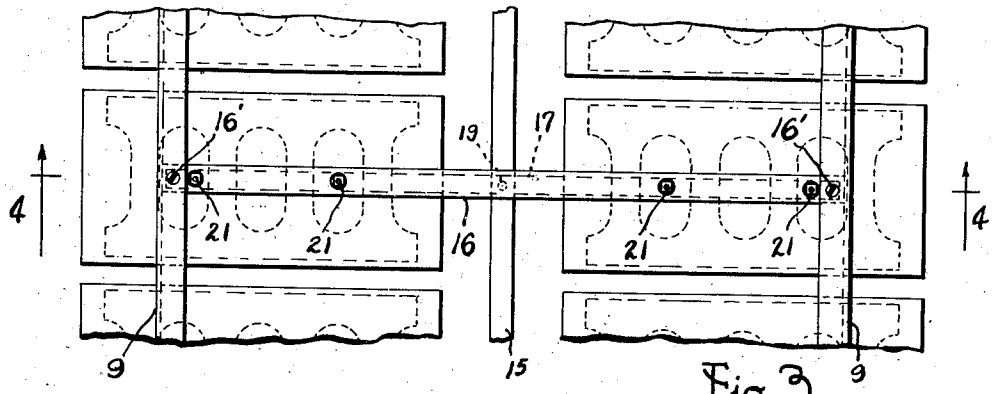


Fig. 3.

Fig. 4.

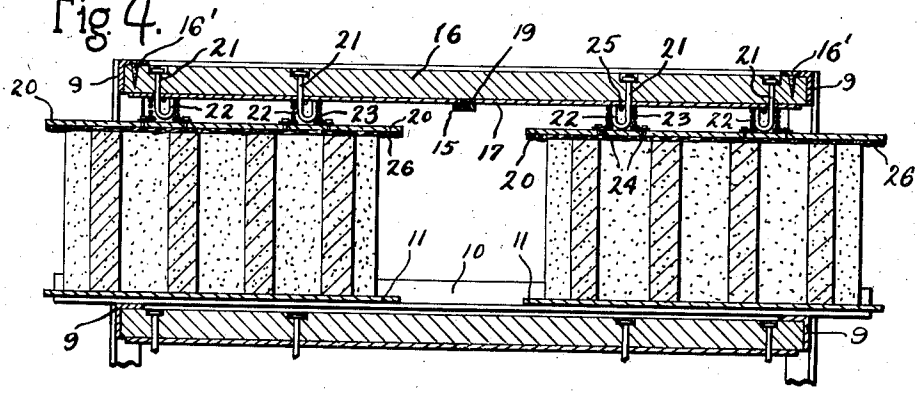


Fig. 5.

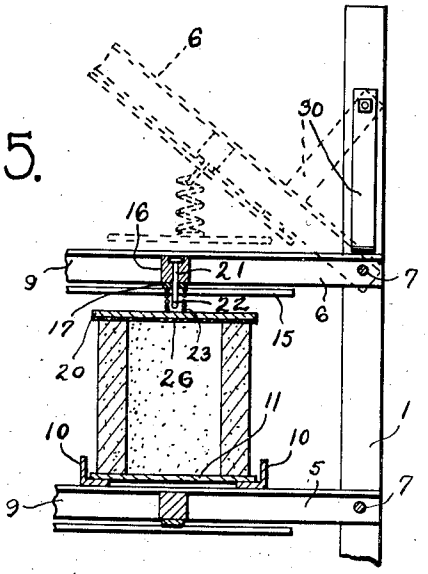
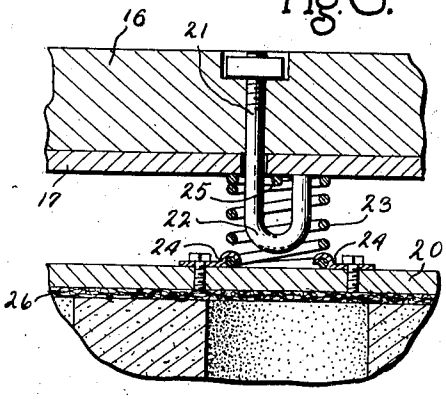


Fig. 6.



INVENTOR.
J. Miller Smith
BY
Barnes, Kisselle, Laughlin & Rusch
ATTORNEYS

Patented Mar. 28, 1939 2,152,365

UNITED STATES PATENT OFFICE

2,152,365

STRUCTURE FOR ELECTRICALLY CURING OR HARDENING MOIST WORKPIECES

James Miller Smith, Detroit, Mich., assignor to The Technical Development Corporation, Detroit, Mich., a corporation of Michigan

Application February 3, 1937, Serial No. 123,823

7 Claims. (Cl. 219—19)

This invention relates to a structure for the curing or hardening of work pieces such as blocks or other shapes formed of a wet mix of material. It has to do particularly with a structure which may take the form of a rack equipped with certain electrical conducting elements for the passage of electric current through the formed masses. The formed masses may be the so-called concrete block or cinder block, or a gypsum mass, or other water moistened mass through which electric current may be passed for raising the temperature, thus to cure or harden the mass, either by a chemical reaction or merely by a drying action where the water is evaporated, or the combination of both.

The invention is shown in connection with a rack which may be used with the so-called concrete or cinder block, and in which the electrical equipment, including electrodes or contact members are arranged to be brought into contact with the several blocks, applied with pressure thereto, and at the same time being so arranged on the rack that loading and unloading may be accomplished without interference from the electrical equipment. Other objects will appear as the detailed description progresses.

In the accompanying drawings:

Fig. 1 shows a side elevational view of a rack showing the same loaded with blocks and illustrating in broken lines how the rack may be handled for loading and unloading.

Fig. 2 is an end elevational view thereof.

Fig. 3 is a plan view of several blocks mounted on the rack.

Fig. 4 is a cross sectional view taken substantially on line 4—4 of Fig. 3.

Fig. 5 is an enlarged cross sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is an enlarged cross sectional detail view illustrating a contact plate mounting.

The rack may be of a more or less conventional structure provided with vertical posts or pillars at one end, as illustrated at 1, with a lower bed 2 supported at one end by a support 3. This bed may be of a fixed nature and above the bed 2 are superposed beds or supports 4, 5 and 6, one end of each being pivotally connected to the post as at 7. These beds may be swung upwardly, as illustrated in Fig. 1 by the broken lines, for loading and unloading, and the beds 4, 5, and 6 each have supporting legs 8 adapted to rest upon the next lower bed when the rack is loaded, as illustrated in Fig. 1. The beds may be held in upwardly swung position by latches 30. This is somewhat of a conventional form of rack; the beds 2, 4, 5 and 6 may comprise side rails 9 (Fig. 4) which may be of angle iron with suitable cross pieces 10.

In the rack as shown each bed is arranged to accommodate 12 blocks, the blocks being arranged in two rows as illustrated in Fig. 2. As these blocks, which may be concrete, come from the press in which they are formed, they may be on plates 11 of suitable metal, there being one plate for each block, and the blocks are loaded on the rack while continuing to be carried by or supported by their respective plates. The plates may be arranged to be supported by the cross members 10. After the lower bed is loaded the next higher bed may be positioned, as illustrated in Fig. 1, and loaded, and this process may be continued until the entire rack is loaded.

Suitable electrical connections are made for the passage of electric current through the several blocks. One connection may be through a lead wire 12 which may connect to the rack itself. The other lead wire 13 may be connected to three conductors, one for each of the beds 4, 5 and 6. The conductors are illustrated at 15 and may take the form of a piece of strap metal or rod.

Extending transversely across each of the beds 4, 5 and 6 are suitable supports 16 which may be of wood or other insulating material and they may be fastened to the side rails of the several beds in any suitable manner, as for example by screws 16'. The supports 16 may be adjustably lowered or otherwise adjusted to adapt the rack to blocks of different size. On the under side of each cross piece 16, a conductor is placed which may take the form of a piece of strap iron or the like as illustrated at 17 suitably secured to the cross piece, as for example by eye bolts 21, or other screws. There is a cross piece for each pair of blocks; that is to say where the rack is designed to take two rows of blocks with six blocks in a row, there will be six cross pieces. The conductors 15 run lengthwise of the frame and are connected to the conductors 17 as for example by a screw 19, or any other suitable way such as by welding.

The pallets or plates 11 constitute one electrical contacting element for each block; the insulating cross supports 16 carry contact plates, one for each block, these contact plates being illustrated at 20. The contact plates 20 are carried by these cross pieces so that when the several beds are swung to elevated position the contact plates are carried therewith as illustrated in Fig. 1. One way of doing this is by the use of U-shaped bolts 21, preferably 2 for each plate.

These bolts pass through the supporting member 16 and their U-shaped end lies below the plate 17, as illustrated at 22. A coil spring 23 surrounds the U-shaped portion of each bolt and one end of each spring is suitably attached to a plate 20. This may be done by clips 24, as illustrated in Fig. 6. The opposite end of the spring has a cross piece 25 which extends through the U-shaped part of the bolt, this cross piece 25 advantageously being the end part of the spring itself fashioned diametrically across the spring; or it may be a separate piece. Each of the frames 4, 5 and 6 is so equipped.

In many instances, such as in the case with the cinder block or any work piece formed from a coarse aggregate, the surface with which the plate 20 is to contact may be somewhat rough or irregular; in other words, it is not a smooth surface. Now in order to make an efficient electrical contact with such a surface each plate 20 may be equipped with a contact face as shown at 26. This contact face may be a suitable wire mesh or wire fabric or a sort of compressed or felted wire mesh capable of some compression and having such flexible characteristics as to adapt itself to the shape of the surface of the concrete block. This facing of metal fabric is, of course, suitably attached to each plate 20. Where, however, the work to be treated has smooth surfaces, the plates may contact directly therewith and the metal fabric dispensed with. The term metal fabric is used to denote any such metal structure of a mesh or fabric nature.

As before stated, the several beds may be loaded by swinging the upper beds upwardly as illustrated in Fig. 1, in which action the contact plates 20 and associated parts move therewith as illustrated. The portions 25 are, of course, caught in the U-shaped part of the bolts and serves to hold the plates 20 suspended. When the lower bed 2 is loaded the frame 4 is lowered into position and the several contact plates come down into contact with the blocks and assume the position as illustrated in Fig. 4. The weight of the frame, especially after it is loaded, serves to compress the springs 23, and the contact members are held tightly against the block, thus providing an efficient electrical contact.

After the frame has been so loaded suitable electric energy is supplied to the leads 12 and 13 and the current passes through the blocks. The moist condition of the blocks causes the blocks to serve as conductors, and the resistance therein raises the temperature to accelerate the chemical reaction or drying, or both. It is not necessary, so far as this invention is concerned, to go into the details of the voltage, amperage, etc., but it might be said that alternating current is to be used to avoid the electrolysis which is set up by the use of direct current although so far as the present operation in the apparatus is concerned, it may be used with direct current.

This materially shortens the time for hardening or curing the work and after a suitable curing or hardening time has past, the rack may be unloaded by a reversal of the loading process. It will be understood that the blocks may be fashioned into shape on the pallet plates 11. Therefore, each block is already in good electrical contact with its pallet plate. However, where the blocks are not directly formed upon a plate which may serve as a contact member, it is within the scope of this invention to use the metal fabric or metal mesh 26 for both contact plates 20 and 11. The current, of course, has the following path: Lead wire 13 to the several conductors 15, conductor plates 17 through the springs 23 to contact plates 20 and the metal pads 26, where they are used, through the several blocks in parallel, to the plates 11 and thence to the frame of the rack and lead 12.

I claim:

1. An apparatus for hardening or curing work pieces formed from a mix moistened or wetted with water, comprising in combination, a rack having a lower and fixed bed for receiving and supporting a plurality of work pieces, said rack having a plurality of superposed beds, some for supporting work pieces above the first mentioned work pieces and the superposed bed or beds being movable to facilitate loading and unloading of the rack, electrical conducting means on which each work piece is adapted to rest, an electrical contact means carried by each movable bed and arranged to contact with the upper surfaces of the work pieces on the next lower bed when the bed carrying said contact means is moved into loaded position, and electrical conducting means connected in circuit with the conducting means upon which each work piece rests and with the contact means whereby the work pieces are placed in electrical circuit with the conducting means.

2. An apparatus for hardening or curing work pieces formed from a mix moistened or wetted with water, comprising in combination, a rack having a lower bed and having posts at one end, one or more upper beds pivotally mounted on the posts on horizontal axes, said pivotally mounted beds arranged to be moved for loading and unloading the rack and arranged to be brought substantially into parallelism with the lower rack for loading and for supporting the work pieces, a metal plate upon which each work piece rests which in turn rests upon a bed, a plurality of contact plates swingably carried by each pivotally mounted bed and insulated therefrom, spring means interposed between each plate and the bed which carries the same, said plates adapted to be brought into contact with the upper surfaces of the work pieces on the next lower bed as the bed carrying the contact members is swung to loading position, said spring means arranged to flex whereby the contact members are urged into engagement with the pieces by spring pressure, and electrical conductors connected respectively to the rack and to the swingably mounted contact members.

3. An apparatus for hardening or curing work pieces formed from a mix moistened or wetted with water, comprising in combination, a rack having a lower bed and an upper bed pivotally mounted so as to be moved to and from operative position for loading and unloading, said lower bed adapted to support a plurality of work pieces and arranged to make electrical contact with the lower portions of the work pieces, a supporting member of non-electrical conducting material carried by the pivoted bed, a contact member, means comprising an elongated opening with a cross piece extending therethrough swingably and slidably connecting each contact member with the supporting member, spring means interposed between each supporting member and contact member for urging the contact member into engagement with a work piece on the lower bed as the pivoted bed is brought into loading position, and electrical conducting means connected to the rack and to the contact members carried by the pivoted frame.

4. In a rack for holding work pieces formed from a mix moistened or wetted with water and which work pieces are to be hardened or cured by the passage of electric current therethrough, the combination of a bed for supporting the work pieces, an electrical contact member upon which each work piece rests, a movably mounted upper bed, a supporting member of non-conducting material carried by the upper bed, means on the supporting member presenting an eye, a coil spring surrounding the eye, one end of the spring having a cross piece extending through the eye, a contact plate, means connecting the opposite end of the spring with the contact plate, said upper bed being arranged to be moved down over the work piece on the lower bed while the contact plate is held suspended by the eye and cross piece to bring the contact member into engagement with a work piece by flexure of the spring, and electrical conducting means connected to the contact member and to the contact plate.

5. A rack structure for holding a plurality of work pieces formed from a mix moistened or wetted with water and for hardening or curing the work pieces by passing electrical current therethrough comprising, a lower bed adapted to receive two rows of work pieces with the work pieces resting upon the bed, electrical contact members for supplying the work pieces, an upper bed swingable into position over the work pieces and adapted to itself support work pieces thereabove, a plurality of transverse supporting members of non-conducting material, a pair of contact plates slidably and swingably carried by each supporting member and each arranged to be brought into engagement with a work piece on the lower bed, spring means interposed between each contact plate and its supporting member, whereby the contact plates are brought into engagement with the work pieces by spring pressure, a metal strip carried by each supporting member and in electrical connection with the contact members, an electrical conductor extending lengthwise of the rows of work pieces and connected to the several strips, and electrical conducting means connected in circuit with the contact members and contact plates.

6. In a device for hardening or curing a work piece formed from a mix moistened or wetted with water, and which work piece has the characteristic of maintaining its geometric form during the hardening thereof, the combination of a metallic support for the work piece constituting an electrical conductor and connected to electrical conducting means, another conducting member adapted to be placed into contact with another surface of the work piece under pressure and which is connected to electrical conducting means whereby current may pass through the work piece, said conducting member comprising, a backing member and a facing pad of compressible metal fabric of such a flexible nature as to adapt itself to the irregular surface of the work piece.

7. In a device for hardening or curing a work piece formed from a mix moistened or wetted with water, and which work piece has the characteristic of maintaining its geometric form during the hardening thereof, the combination of a metallic support for the work piece constituting an electrical conductor and connected to electrical conducting means, another conducting member adapted to be placed into contact with another surface of the work piece under pressure and which is connected to electrical conducting means whereby current may pass through the work piece, said conducting member comprising, a metal plate of rigid structure and a contact portion carried thereby and formed of a pad of metal fabric of such flexibility and compressibility as to adapt itself to the shape of the surface of the work with which it is brought into contact.

J. MILLER SMITH.