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2,175,240

APPARATUS FOR PLACING REINFORCEMENT IN CONCRETE

Filed Nov. 5, 1937

2 Sheets-Sheet 1

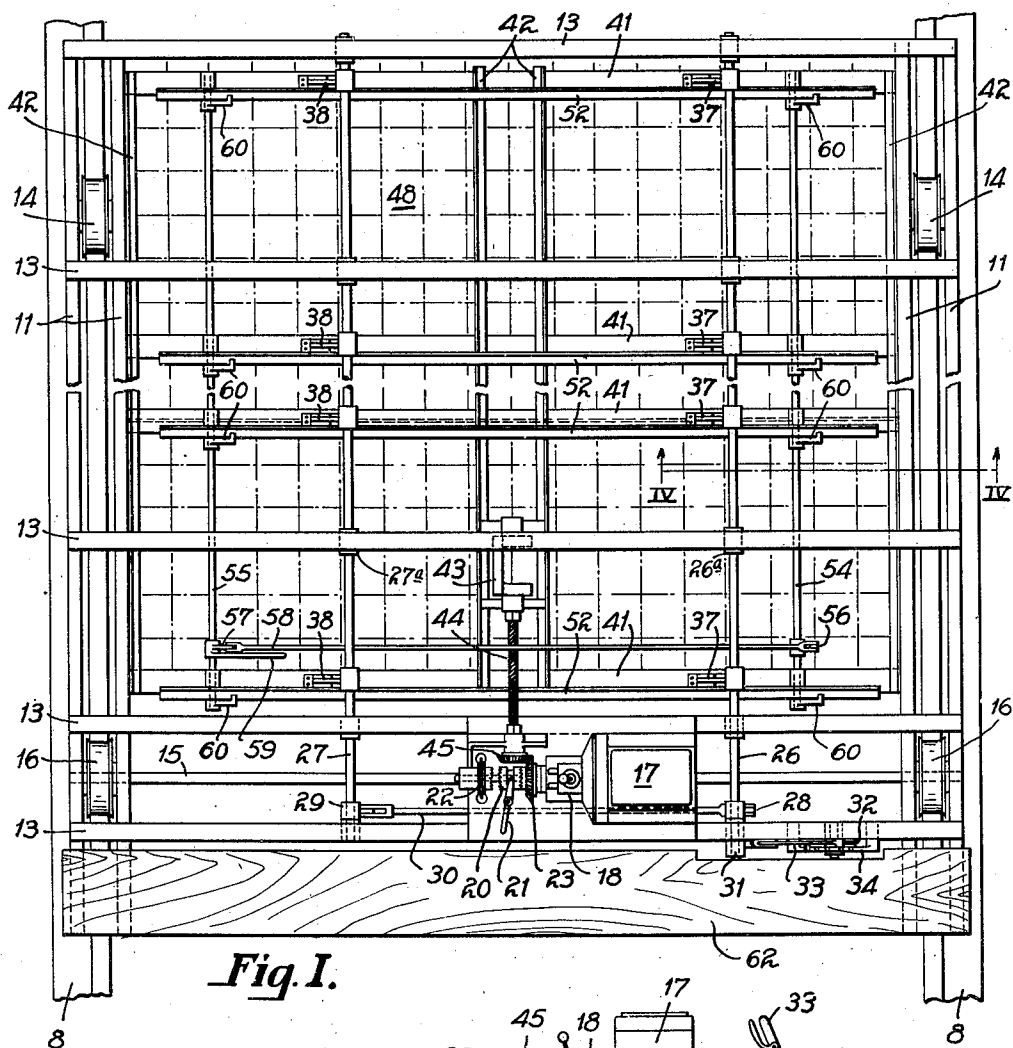


Fig. 1.

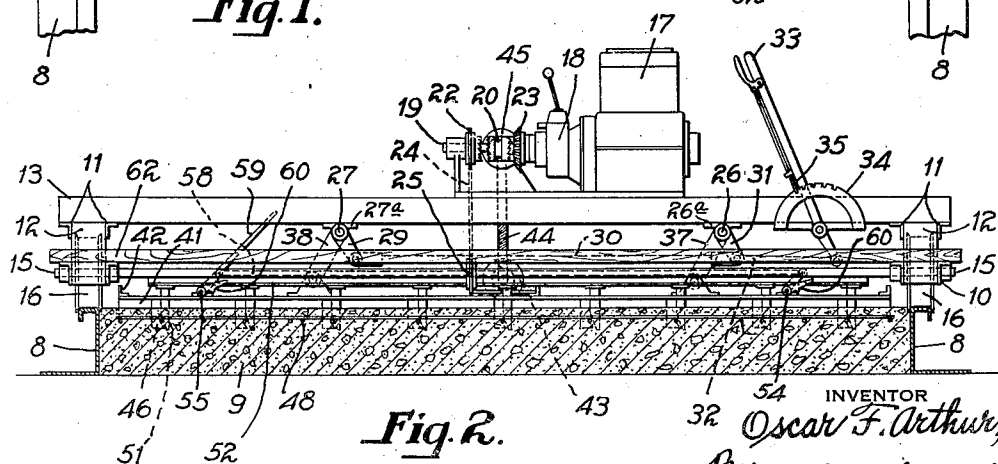


Fig. 2.

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Fig. 3.

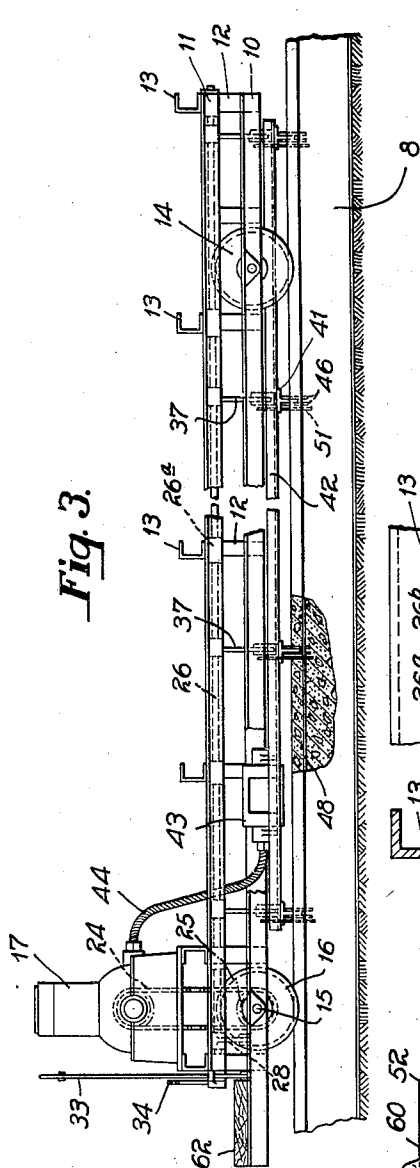


Fig. 4.

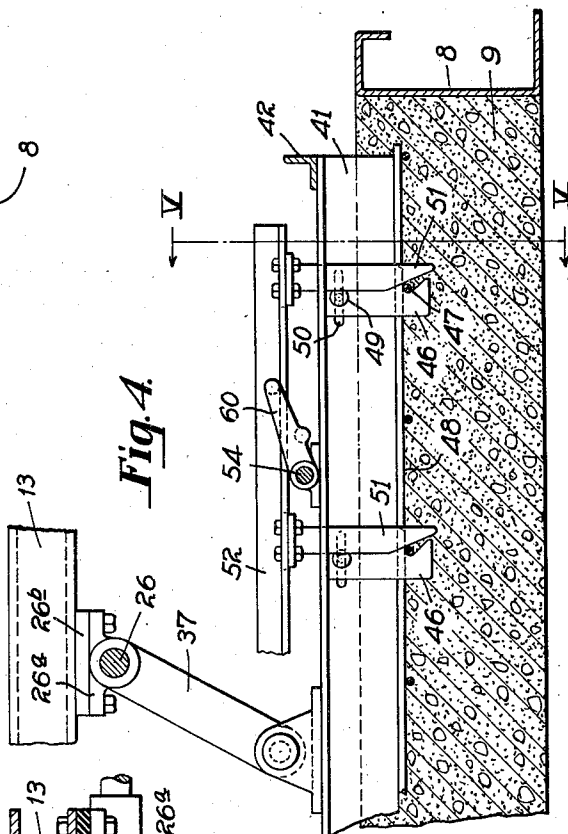


Fig. 6.

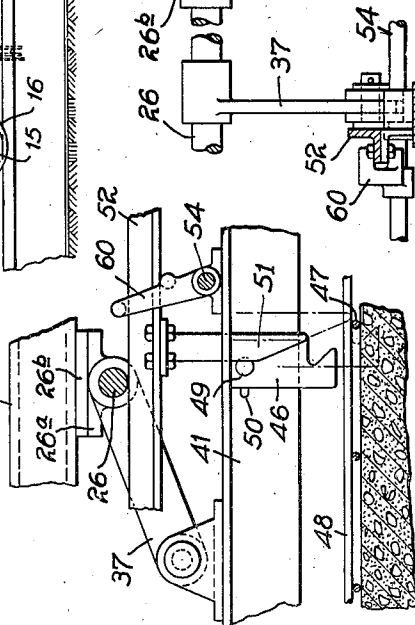


Fig. 5.

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APPARATUS FOR PLACING REINFORCEMENT IN CONCRETE

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8 Claims. (Cl. 94—39)

My invention relates to the installing of metal reinforcing members in concrete roadways, or the like.

In the installing of reinforcement mesh in concrete roadways, it is highly important (a) to effect an intimate bond between the mesh and the cement, (b) that there be no planes of weakness created in the concrete by the devices employed for installing the mesh therein, and (c) that the mesh be located at a desired uniform distance below the surface of the concrete, or in other words at a desired predetermined depth.

My invention has for its object the provision of a means and method whereby metal reinforcement can conveniently and accurately be handled and installed in such manner that the conditions above referred to are accomplished.

As shown in the drawings, Figure 1 is a plan view of a portion of an installing apparatus; Fig. 2 is an end view thereof; Fig. 3 is a side view thereof; Fig. 4 is an enlarged view taken on the line IV—IV of Fig. 1; Fig. 5 is a view taken on the line V—V of Fig. 4, and Fig. 6 is a view similar to Fig. 4, but showing certain of the parts in other positions.

The numerals 8 represent side forms for the concrete body 9, these side forms also serving as tracks for the truck or carriage to be hereinafter described. The truck comprises a frame having lower longitudinally-extending bars 10, pairs of upper bars 11, the upper and lower bars being connected by vertical plates 12 welded or riveted thereto, and the upper longitudinal bars being connected by cross bars 13 which are bolted or welded thereto. A pair of wheels 14 are journaled in the bars 10 at one end of the carriage, and a shaft 15 is journaled in the bars 10 at the other end of the machine. Traction wheels 16 are secured to the shaft 15.

An internal combustion engine 17, or other suitable form of prime mover, is mounted on two of the cross bars 13 and, through a change-speed device 18, drives a shaft 19 upon which is mounted a shiftable clutch member 20 that is slidably but non-rotatably mounted on the shaft. A lever 21 is provided for shifting the clutch member into and out of driving engagement with the clutch teeth on a sprocket wheel 22, and clutch teeth on a bevel gear wheel 23. The sprocket wheel 22, through a chain 24, has driving engagement with a sprocket wheel 25 that is secured to the shaft 15, so that when the clutch member 20 is shifted to the left, as viewed in Figs. 1 and 2, the carriage will be driven by the motor 17. The change-speed mechanism 18 may

be of the type used in automobiles, so that the carriage can be driven either forwardly or rearwardly.

Bearings 26a and 27a are provided on the under sides of the cross bars 13, for rock shafts 26 and 27. Rubber cushioning blocks 26b are inserted between the bearings and the cross bars (Figs. 4, 5 and 6) to prevent excessive transmission of vibrations to the main frame from the auxiliary, vibratable or movable frame herein-after referred to. Crank arms 28 and 29 are connected to the shafts 26 and 27 respectively, the crank arm 28 being connected to the crank arm 29 through a link 30. A crank arm 31 is secured to the rock shaft 26 and through a link 32 has connection with the lower end of a lever 33 that is pivotally mounted on one of the cross members 13, and is held in various set positions by a toothed quadrant 34 mounted on the cross bar and a pawl 35 carried by the lever. It will be seen that movements of the lever 33 will rock the shafts 26 and 27.

The shaft 26 carries a series of crank arms 37, and the shaft 27 carries a series of crank arms 38. These arms 37 and 38 serve as supports for an auxiliary movable frame, which comprises cross bars 41 of T-form and tie bars 42, the bars 41 extending transversely of the carriage and being rigidly connected by means of the longitudinally-extending tie bars 42. When the lever 33 is operated, the movable frame will be shifted in an arcuate path extending in a direction generally perpendicularly to the concrete. A vibrator 43 is mounted on certain of the tie bars 42 and is here shown as of the rotatable type, the rotating member being eccentrically weighted so as to impart vibrations to the movable frame. Rotatable vibrators of this type are well known in the art and need not be here described in detail. It will be understood that vibrators of the pneumatic hammer or other types could be employed for vibrating the frame.

The vibrator 43 is connected by a flexible shaft 44 with a gear wheel 45 which meshes with the gear wheel 23. When the clutch lever 21 is shifted to the left, driving connection will be effected between the motor 17 and the vibrator, and at this time the change-speed mechanism 18 will usually be set in "high gear" so as to effect rapid rotation of the vibrator 43. The vibrator may suitably be driven at several thousand revolutions per minute, and is here shown as rotating on a horizontal axis.

A series of hook members 46 are secured to each of the cross bars 41 of the auxiliary frame,

and are so located and spaced thereon that they will be brought into engagement with longitudinally-extending wires 47 of the wire mesh reinforcement 48 when the lever 33 is rocked in a counter-clockwise direction and the movable frame and the hooks shifted thereby from the position shown in Fig. 6 to that shown in Fig. 4. The mesh spacings are usually uniform, but in order to accommodate the hooks 46 to wires or rods of different spacings, the hooks 46 are adjustable on the bars 41. The upper ends of the hooks abut against the under sides of the flanges at the tops of the bars 41 and are connected to such bars by bolts 49 that extend through slots 50 formed in the bars 41, as shown more clearly in Figs. 4 and 5. The overhanging flanges of the bars 41 prevent the hooks tilting, and they can, of course, be slid to desired positions longitudinally of the slots 50 and tightened in such position by the bolts 49.

In order to securely but releasably hold the mesh in the hooks 46 during the insertion of the mesh into the concrete and during vibration thereof, I provide retaining fingers 51 which are bevelled at their lower ends so that when they are lowered to the positions shown in Fig. 4, they will hold the mesh in place on the hooks 46. The fingers 51 are carried by cross bars 52 and extend downwardly through slots in the flanges of the bars 41, whereby they are vertically guided and held against horizontal displacement relative to the bars 41. Rock shafts 54 and 55 are journaled in bearings which are mounted upon the upper sides of the cross bars 41 and are provided with crank-like extensions or arms 56 and 57 respectively, these arms being connected by a link 58 so that when the shaft 55 is rocked, the shaft 54 also will be rocked. A lever 59 is rigidly secured to the shaft 55 for the purpose of oscillating it and the shaft 54.

The shafts 54 and 55 are each provided with slotted or bifurcated crank blocks or cam lugs 60 into the slotted recesses of which loosely extend the flanges of the bars 52. When the lever 59 is oscillated, the shafts 54 and 55 will be rocked to thereby also rock the lugs 60 and cause raising and lowering movements of the fingers 51 relative to the bars 41 of the movable frame 39.

The truck or carriage may be of such width as to span a part width roadway, or made wide enough to span a full width roadway. In the case of a full width roadway (perhaps 18 ft. to 20 ft.) two movable vibrator frames usually would be placed on the truck, side-by-side.

In the operation of the apparatus, the sheets of reinforcement mesh may conveniently be stacked on the rearward part of the carriage, there being ample space for so piling the sheets of mesh, because the driving motor 17 and the operator are located at the forward end of the carriage, as shown more clearly in Fig. 3. By placing a supply of mesh on the carriage, it is readily accessible for use, and furthermore, kept out of the dirt along side of the roadway and protected from damage. A crane can be mounted on the carriage to load the mesh sheets thereon and to thereafter lift the sheets off the carriage, one-by-one, and place them on the concrete in front of the carriage, for engagement by the hooks.

The concrete is first struck off to bring it to the level of the side forms 8. Thereupon, a sheet of mesh is placed thereon and with the operator standing on a platform 62 at the front of the car-

riage, the clutch is operated to advance the carriage into position above the mesh sheet which is to be installed in the concrete. Thereupon, the lever 33 is rocked in a counter-clockwise direction to bring the hooks 46 into engagement with the wires 47 of the mesh. The lever 59 is then moved in a clockwise direction to force the fingers 51 into locking position, as shown in Figs. 2 and 4. The clutch is then so shifted as to set the vibrator into operation and the lever 33 is rocked further in a counter-clockwise direction to force the mesh into the concrete to a desired depth.

The vibration of the movable frame and hence of the mesh assists in effecting penetration of the mesh into the concrete without excessive disturbance of the concrete, since the range of horizontal movement is very slight and the mesh wires will readily be caused to pass the lumps of aggregate. Furthermore, the vibration will settle the concrete and effect an intimate contact of the mesh with the concrete so that it will be firmly bonded and there will be no slippage of the mesh members in the concrete after the concrete has set. When the mesh has been installed, the fingers 51 will be raised and the lever 33 swung in a clockwise direction to lift the hooks 46 out of the concrete. Usually it will be desirable to continue the vibration of the movable frame during the lifting of the hooks, so as to minimize disturbance of the concrete.

After removal of the hooks, a screed and finishing belt or float will be moved over the surface of the concrete to smooth the same and to fill any small voids which have been left therein by the hooks 46 and the fingers 51, and the depressions produced by the bars 41. These depressions in the surface of the concrete ordinarily will not be to a depth of more than two inches and can be avoided entirely if the hooks 46 and the fingers 51 are made of greater length. As shown on the drawings, the bars 41 rest upon the mesh and help to brace the same against upward deflections while it is being pressed into the concrete. The range of vibratory movements may be no more than one inch in a horizontal direction. Owing to this and to the fact that the downwardly extending projections or hooks 46 and fingers 51 are of narrow dimensions, there is a minimum of disturbance of the concrete and hence less tendency to produce definite lines of cleavage which would cause breaking of the concrete. The depressions produced by the bars 41 are transversely of the roadway and are readily closed by the screeding and smoothing operations which are performed by tools moving longitudinally of the roadway.

It will be understood that the apparatus can be employed in the installing of separate bars instead of mesh, since the bars could be placed in the hooks 46 and the apparatus operated in the manner above described.

I claim as my invention:

1. Apparatus for installing reinforcing members in plastic concrete, comprising holding members engageable with the reinforcing members at a plurality of points throughout the area of the reinforcement, simultaneously, and a pressure-exerting device operable upon said holding members simultaneously, to push them and the reinforcement into the concrete.

2. Apparatus for installing reinforcing members in plastic concrete, comprising holding members engageable with the reinforcing members at a plurality of points throughout the area of re-

inforcement, simultaneously, a pressure-exerting device operable upon said holding members simultaneously, to push them and the reinforcement into the concrete, and means for simultaneously vibrating the reinforcement.

3. Apparatus for installing reinforcing members in plastic concrete, comprising holding members engageable with the reinforcing members at a plurality of points throughout the area of the reinforcement, simultaneously, a pressure-exerting device operable to push said holding members and the reinforcement into the concrete, and means for simultaneously vibrating the reinforcement, the said holding members being movable as a unit, in directions generally perpendicular to the plane of the concrete.

4. Apparatus for installing reinforcing members in plastic concrete, comprising a main frame adapted to be positioned above the concrete, an auxiliary frame movably supported by the main frame, holding members carried by the auxiliary frame and engageable with reinforcing members, means carried by the main frame for pushing the auxiliary frame downwardly to force the reinforcing members into the concrete, and means for simultaneously vibrating the auxiliary frame.

5. Apparatus for installing reinforcing members in plastic concrete, comprising a frame adapted to be positioned above the concrete, downwardly-extending hook members carried by said frame, means for detachably maintaining the reinforcing members in said hook members, means for forcing the frame toward the concrete to embed the reinforcing members therein, and

means for simultaneously vibrating the said frame.

6. Apparatus for installing reinforcing members in plastic concrete, comprising a frame adapted to be positioned above the concrete, means for detachably and rigidly connecting the reinforcing members to said frame, means for moving the said frame to force the reinforcing members into the concrete, and means for simultaneously vibrating the frame.

7. Apparatus for installing reinforcing members in plastic concrete, comprising a frame adapted to be positioned above the concrete, downwardly-extending finger-like projections carried by said frame, means for detachably maintaining the reinforcing members on said projections, means for moving the frame perpendicularly to the plane of the concrete, to force said projections and the reinforcing members into the concrete, and means for horizontally vibrating the frame, the horizontal dimensions of the said projections and the distance of vibration being such that no extended lines of cleavage are produced in the concrete.

8. Apparatus for installing reinforcing mesh in plastic concrete, comprising a support for releasably maintaining a mesh sheet in a plane approximately parallel to the surface of the concrete, at a plurality of points, means for moving said support towards the concrete and thereby force the mesh into the concrete, and means for simultaneously vibrating the mesh.

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