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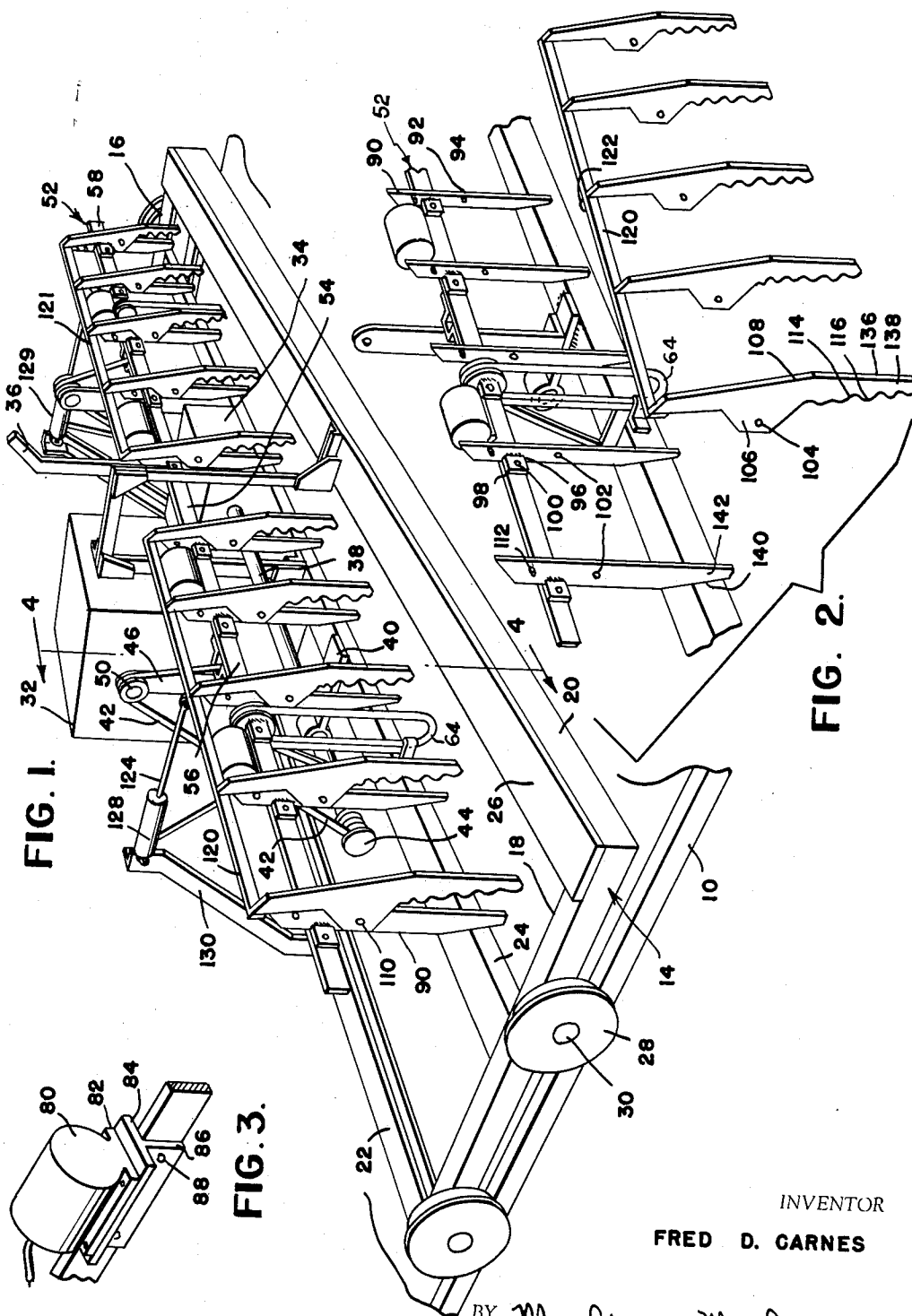
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APPARATUS FOR PLACING CORRUGATED JOINTS IN CONCRETE

Filed Oct. 10, 1951

3 Sheets-Sheet 1



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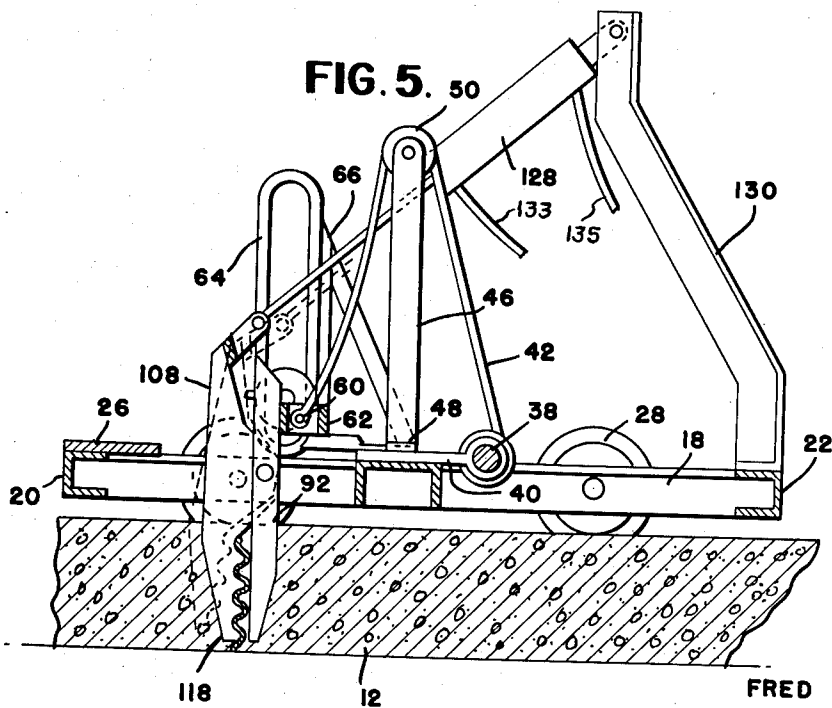
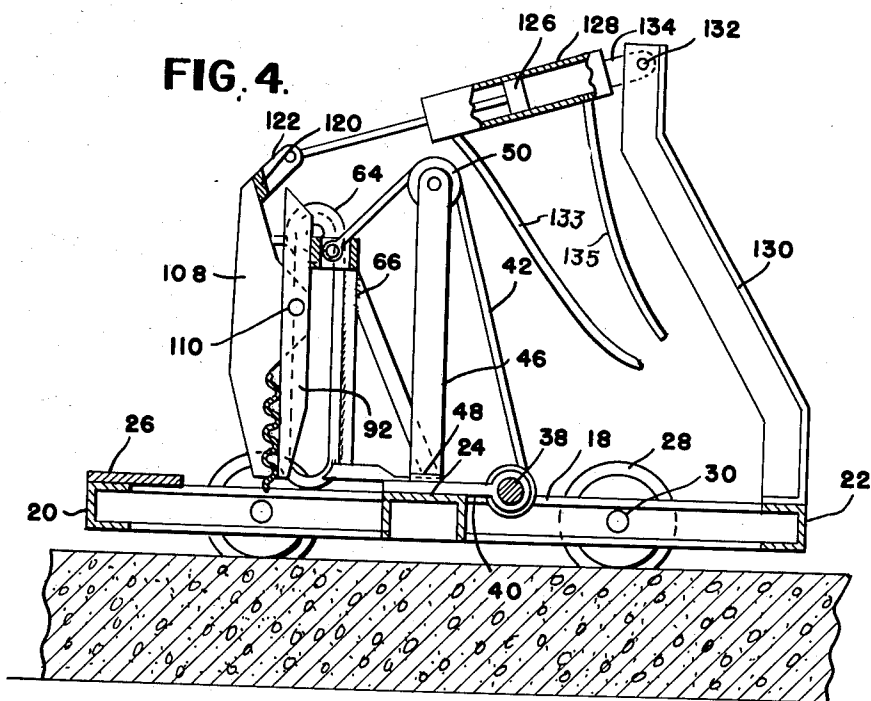
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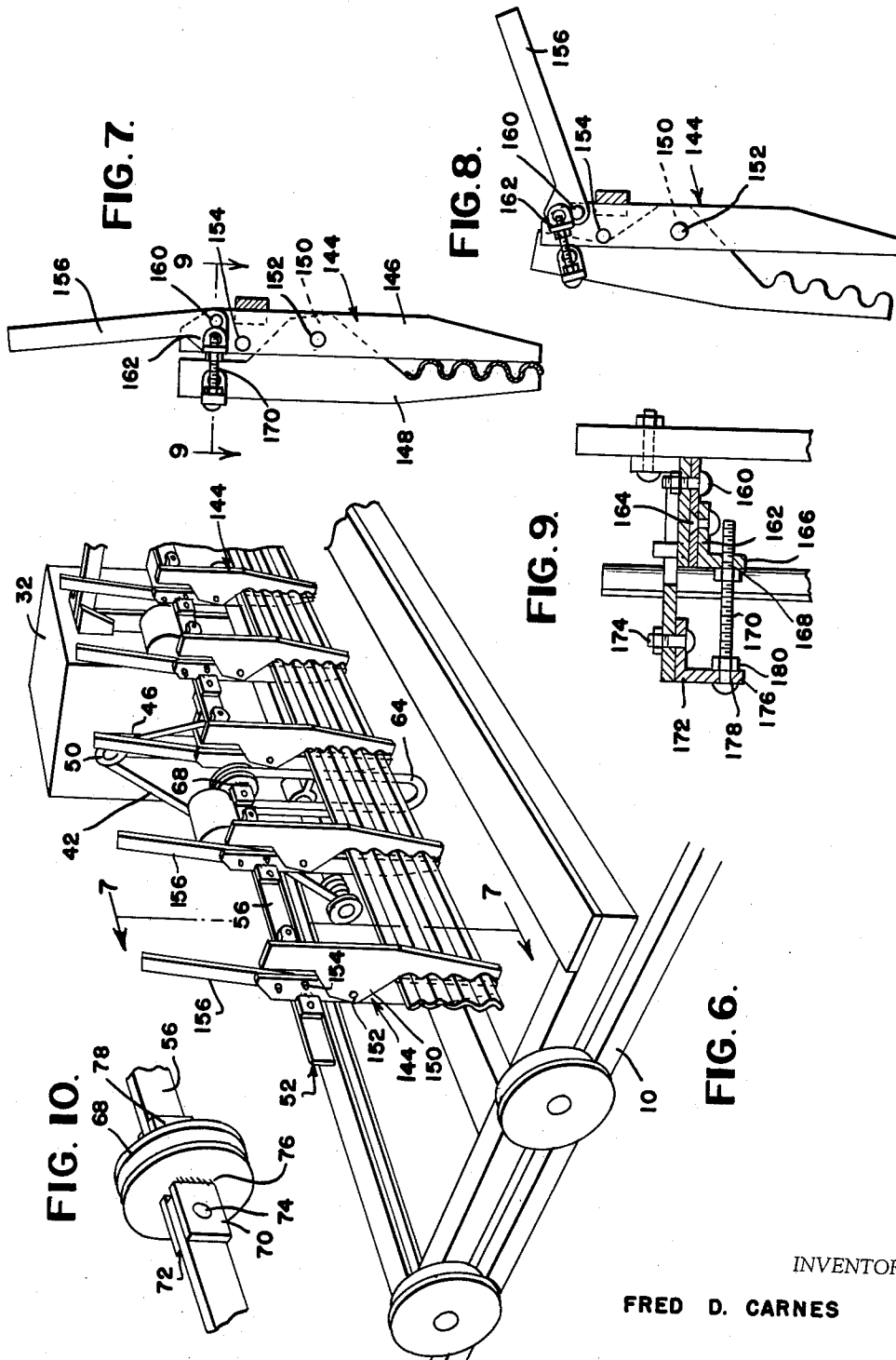
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APPARATUS FOR PLACING CORRUGATED JOINTS IN CONCRETE

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7 Claims. (Cl. 94—51)

The main object of this invention is to provide a machine for conveniently and accurately positioning a corrugated type joint vertically into freshly poured concrete, while the concrete is in a plastic state, in such a manner that the joint rests usually on the sub-grade and is completely encompassed by the concrete.

Another object of this invention is to provide a supporting frame for use on such a machine, the frame being mechanically raised and lowered in a guided straight line path of movement perpendicular to the concrete roadway and being subjected to vibrations while being lowered, the frame carrying depending plungers which releasably hold and insert the corrugated joint material into the concrete.

A further object of this invention is to provide plungers, which depend from the supporting frame, and which include a fixed finger and a movable finger, the latter being swingable toward and away from the fixed finger and being formed with a gripping surface complementary to the cross-sectional shape of the joint to prevent deformation of the joint during installation.

A further object of this invention is to provide hydraulic means for simultaneously swinging the movable fingers of the plungers relative to their associated fixed fingers and to also provide manually operable means for individually moving the movable fingers.

A further object of this invention is to produce extremely low-cost means and methods of producing a joint in concrete roads, which will transfer load from one slab to the other by the interlocking of the corrugations.

These and ancillary objects and structural features of merit are attained by this invention, the preferred embodiments of which are set forth in the following description and illustrated in the accompanying drawings, wherein:

Fig. 1 is a perspective view of a joint installing machine, constructed in accordance with the principles of this invention;

Fig. 2 is an exploded perspective view of the supporting frame and plungers carried by the frame;

Fig. 3 is a perspective view of electric vibrating motors, which are carried by the frame, and illustrating the means for mounting the motors on the frame;

Fig. 4 is a transverse sectional view taken on line 4—4 of Fig. 1 illustrating the corrugated joint in a mounted position for subsequent insertion into the roadway;

Fig. 5 is a view similar to Fig. 4, showing the corrugated joint inserted in the plastic concrete;

Fig. 6 is a fragmentary perspective view of the joint installing machine and supporting frame, with a manual mode of operation for the fingers of the plungers being illustrated;

Fig. 7 is a fragmentary sectional view taken on line 7—7 of Fig. 6 and illustrating the manually operated plungers in detail;

Fig. 8 is a view similar to Fig. 7, showing the fingers in an open position;

Fig. 9 is a cross-sectional view taken on line 9—9 of Fig. 7 and,

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Fig. 10 is a fragmentary perspective view of the mounting and guide means for the supporting frame.

Referring now more particularly to Figs. 1 through 5 of the accompanying drawings, the numerals 10 represent side forms for the poured concrete slab 12, the side forms also functioning as tracks for the carriage 14. The carriage 14 comprises a frame having parallel channel shaped side bars 16 and 18, the side bars being connected at their forward and rearward ends by a front bar 20 and a rear bar 22 and being connected intermediate their ends by a downwardly facing channel shaped cross-bar 24. A platform 26 for workmen is disposed transversely between the side bars at their forward end and is mounted on the front bar 20. Flanged wheels 28 are carried by stub axles 30, which project laterally from the side bars 16 and 18, the wheels being disposed on the tracks 10, so that the carriage is movably mounted above the concrete slab, the carriage being of such width as to span a full width roadway or to span a part width roadway.

A conventional internal combustion engine 32 is mounted on the carriage and is drivably connected to gear box 34 having a clutch (not shown) associated therewith and actuated by a clutch handle 36. Shafts 38 extend in opposite directions from the gear box and are journaled in bearings 40, which project rearwardly from the intermediate supporting bar 24 of the carriage 14. Cables 42 are fixed at one of their ends to the shafts and wound thereon adjacent the flanged ends 44 of the shafts. Upstanding bars 46 are suitably fastened at their lower flanged ends 48 on the supporting brackets for the bearings and sheaves 50 are rotatably carried by the upper ends thereof, the cables being entrained on the sheaves and connected to a supporting frame 52.

The supporting frame 52 is carried by the carriage and is arranged perpendicular to the roadway for guided vertical movement toward and away from the roadway. The frame includes a center bar 54 and end bars 56 and 58, which are aligned with the bar 54 and suitably fastened at their inner ends to the opposing ends of the intermediate bar 54. Pins 60 are mounted in brackets 62 which are fastened to the rearward faces of the end bars 56 and 58 of the frame, the pins anchoring the ends of the cables 42 to the frame.

Guide means is provided for preventing movement of the frame laterally of the carriage and guiding and limiting the frame in its vertical movement, effected by the winding and unwinding of the cables on the shafts 38. The guide means includes fixed track-ways 64 of oblong-elliptoid shape, which are held in vertical positions by supporting frameworks 66, which are vertically mounted on the intermediate bar 24 of the carriage 14. The track-ways are positioned forwardly of the intermediate bar and fixed sheaves 68, which constitute movable guides, are carried by the supporting frame. As seen in Fig. 10, the sheaves 68 are positioned on the bar 56 and on the bar 58 by means of center openings (not shown) formed in each sheave and extending transversely through the sheaves to receive the bars, the sheaves being rigidified and supported by blocks 70 and 72, arranged on opposite sides of the bar and secured together by bolts 74, the ends of the block adjoining the sheaves being welded, as at 76, thereto. Similarly, blocks 78 are arranged on the opposite side of the sheaves. The sheaves are disposed within the track-ways and slide up and down in the track-way, correspondent to the vertical movement of the frame, the closed ends of the track-ways limiting the vertical movement of the frame and the flanges on the sheaves preventing lateral movement of the frame.

Conventional electric vibrating motors 80 of the weighted eccentric type are provided and are mounted, as seen in Fig. 1, on the bars of the supporting frame. The base 82 of each of the motors is mounted on the flange

84 of the T-iron, the vertical flange 86 of the iron being fastened by bolts 88 to the bar.

Plungers 90 depend from the supporting frame, the plungers being in two groups and arranged on opposite sides of the longitudinal center line of the carriage. However, any number of groups of plungers can be provided or all the plungers can be arranged as a single group. The plungers, as seen in Fig. 2, include fixed jaws or fingers 92, which have straight inner faces or gripping surfaces 94 and which are arranged at right angles to the front face of the bars. The fingers are welded, as at 96, to blocks 98, which are fastened by bolts 100 to the face of the bars. An aperture 102 is formed in each of the fixed fingers and is registrable with an opening 104 formed in the offset portion 106 of the movable jaws or fingers 108, to receive a pivot pin 110, whereby the movable fingers are pivotally mounted on the fixed fingers. Stops 112 extend laterally from the fixed fingers and are arranged in the path of movement of upper ends of the movable fingers to limit the spreading movement of the fingers by engaging the forward edges thereof. The inner face or gripping surface 114 of the movable fingers is corrugated, the corrugations being defined by a series of semi-circular ribs 116, which are vertically spaced and evenly formed. The corrugated gripping surface 114 is formed complementary to the cross-sectional shape of a corrugated reinforcing sheet 118, as seen in Figs. 4 and 5, so that the sheet is securely gripped between the movable finger and fixed finger of each plunger, without deforming the sheet as it is held and inserted in the plastic concrete.

The movable fingers are connected at their upper ends by a transversely extending connecting bar 120, which spans the fingers and which is formed with a rearwardly extending apertured ear 122 for pivotally receiving the outer end of a piston rod 124. The piston rod 124, as seen in Fig. 4, is secured to a piston 126, which is workably disposed in a cylinder 128. The cylinder is pivoted by a pin 132 to the upper end of an upstanding supporting bar 130, which is mounted on the rear bar 22 of the carriage frame, the pin 132 being fastened to a projection 134 on the end of the cylinder.

The cylinder may be either of the pneumatic or hydraulic type and fluid lines 133 and 135 are connected to the cylinder adjacent the opposing ends thereof for supplying fluid or air pressure to the cylinder on opposite sides of the piston.

In operation, the carriage is disposed above the concrete roadway 12, into which the corrugated reinforcing sheets 118 are to be transversely disposed, the concrete being in a plastic state. The carriage is movably mounted by means of the wheels 28 on the opposing tracks 10 and is moved to a position, so that the frame 52 transversely overlies the roadway at a point where the corrugated joint is to be inserted, the joints being inserted at spaced progressive points along the roadway.

The movable fingers of each of the plungers are swung outwardly from the fixed fingers, the movable fingers 108 connected by the bar 120 being operated simultaneously by the cylinder 128 and the movable fingers 108 connected by the bar 121 being simultaneously operated by the cylinder 129. The pistons in the cylinders are simultaneously actuated by the admission of an operating fluid to the cylinders through a suitable valve means (not shown) so that the movable fingers 108 are simultaneously moved to a spread position, upon the retracting stroke of the piston rods in their respective cylinders 128 and 129, the movable fingers 108 pivoting about the pivots 110 on the fixed fingers 92 and being limited in their outward swinging movement by engagement with the stops 112. The corrugated reinforcing sheet or joint 118 is manually positioned between the spread fingers of each plunger, the sheet being of a length coextensive with the width of the roadway, and interposed between the fingers of each plunger and manually held in that position. The pistons in the cylinders 128 and 129 are then moved forwardly,

so that the movable fingers are simultaneously swung to a closed position and clamp the corrugated joint against the fixed fingers. It will be noted, in this respect, that the inner corrugated gripping surface or face 114 of the movable fingers is formed complementary to the corrugated sheet, so that the ribs 116 engage in the grooves in the sheet and prevent the reinforcing sheet from becoming deformed or flattened, as it is held between the fingers of the plungers.

The electric motors 80 are then energized, so that the frame is placed under vibration, the frame being vibrated as it is lowered toward the underlying concrete roadway, the lowering of the frame being effected by rotating the shafts 38 to play out the cables 42. The frames are lowered in a defined rectilinear path, endwise or lateral movement of the frames being obviated by the guide means, as the guide sheaves slide downwardly in the track-ways.

The plungers and the reinforcing sheet are forced downwardly into the plastic concrete, as seen in Fig. 5, until the lower end of the sheet abuts against the subgrade, at which point, the upper end of the sheet is disposed well below the upper surface or wear surface of the roadway. The piston rods 124 are then retracted into the cylinders 128 to simultaneously move the movable fingers 108 away from the joint and the cables 42 are wound on the shafts 38 to raise the frame. The gripping faces of the fixed fingers 92 are flat and the movable fingers 108 are swung away from the positioned joint, so that the plungers are retracted from the concrete without disturbing the vertical placement of the joint.

It will be noted that each of the fixed jaws is formed with a beveled outer edge 136 at their lower ends 138 so that the ends are somewhat faired for facile insertion into the cement, while, similarly, the edge 140 of each of the movable jaws is sloped downwardly and inwardly so that the lower end 142 of each movable jaw can be easily forced into the cement without too much resistance by the ends.

In Figures 6-9, inclusive, manually operable plungers 144 are illustrated, each of the plungers including a fixed jaw or finger 146 and a movable jaw or finger 148. The plungers are constructed in a manner identical to the construction of the plungers 90 and are carried in an identical manner by the frame 52.

However, the movable fingers 148 of the plungers 144 are not connected for simultaneous operation but are individually actuated by a manually operable means. Thus, as seen in Figures 7-9 inclusive, the offset portion 150 of the movable finger 148 is pivoted to the side of the fixed finger 146 by a pin 152 and a stop 154 extends laterally from the fixed finger above the pivot 152 and the offset portion 150 to limit the spreading movement of the fingers.

A hand lever 156 is pivotally fastened at its enlarged lower end 158 by a bolt 160, which is passed through the upper end of the fixed finger 146, and an angle bracket 162 is pivotally affixed by a rivet 164 to the end 158 of the lever. The flange 166 of the bracket extends outwardly from the lever and is formed with a threaded aperture 168 to receive one end of a tie bolt 170. An angle bracket 172 is pivotally mounted by a bolt 174 on the side of the movable finger 148 and the extending flange 176 is arranged in spaced confronting relation to the flange 166. The flange 176 is formed with an aperture 178 to receive the bolt 170, the head of the bolt abutting the flange and nuts 180 being disposed at the bolt at the flanges 166 and 176.

In use, the hand lever is grasped, with the fingers in the closed position of Figure 7, and is swung back from the plungers 144, the swinging movement of the lever pivoting about the pivot 160 causing the brackets 162 and 172 to pivot and, through the bolt 170, swing the movable finger about the pivot 152, until it encounters the stop 152. The bolt 160, which forms the pivot for the

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lever, is fastened securely to the fixed finger so that a tight pivot is obtained, which affords a lock, together with the weight of the handle, to hold the movable finger in the open position of Figure 8.

The corrugated joints interlock and provide predetermined points of expansion and contraction and combine to transfer the load.

While electric vibration has been disclosed in connection with the frame, it is to be understood that mechanical, hydraulic or other means can be utilized for vibrating the frame and that the joint can be spaced any desired distance from the grade, with the plunger frame being actuated by a direct hydraulic lift.

Accordingly, while the preferred embodiments of this invention have been disclosed, other forms can be used, so that limitation is sought only in accordance with the appended claims.

I claim:

1. An apparatus for installing a load joint transfer and joint member in plastic concrete, comprising a mobile carriage adapted to be positioned above the concrete and movable longitudinally thereover, a prime mover on said carriage, a supporting frame substantially perpendicular to the plane of said carriage and carried by said carriage transversely thereof and adapted to be arranged perpendicular to the concrete, fixed guides vertically mounted on the carriage, means carried by the frame and freely slidable within the fixed guides to guide the frame vertically and to locate the frame against movement transversely of the carriage, plungers depending from the frame and having means for releasably retaining the load transfer and joint member transversely of the carriage, means actuated by the prime mover for raising and lowering the frame relative to the concrete to force the plungers and joint member into the concrete and means for simultaneously actuating the releasable retaining means of the plungers for releasing the plungers from the joint member after insertion thereof into the concrete.

2. The combination of claim 1, wherein an idler pulley is vertically supported by the carriage and mounted above the frame and said means actuated by the prime mover includes a cable trained over the idler pulley and connected to the frame and actuated by means operated by the primer mover.

3. The combination of claim 1, wherein said means for simultaneously actuating the releasable retaining means of the plungers include a hydraulic cylinder, a piston working in the cylinder, a piston rod operated by the piston and connected to said releasable retaining means.

4. In an apparatus for installing a corrugated joint in plastic concrete in a vertical position, cooperating members adapted to grip the joint therebetween while the joint and members are being lowered into the plastic concrete, one of said members having a flat face adapted to contact the crests of the corrugations on one face of the joint, the other of said members being movably mounted relative to said flat faced member and having a gripping face conforming to the corrugations on the opposite face of said joint to hold said joint against said flat faced member, means for withdrawing said members from the plastic concrete after the movable member has been disengaged from the joint, and means for guiding said flat-faced member in a substantially vertical path during the withdrawing operation, whereby

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the flat-faced member maintains the joint in its installed vertical position.

5. In an apparatus for installing a non-flat surfaced joint in plastic concrete in a vertical position, cooperating members adapted to grip the joint therebetween while the joint and members are being lowered into the plastic concrete, one of said members having a flat face adapted to contact one face of the joint, the other of said members being movably mounted relative to said flat faced member and having a gripping face complementary in shape to the opposite face of the joint to hold said joint against said flat faced member, means for withdrawing said members from the plastic concrete after the movable member has been disengaged from the joint, and means for guiding the flat-faced member in a substantially vertical path during the withdrawing operation to permit the flat-faced member to be withdrawn from the plastic concrete without displacing the joint from its installed vertical position.

6. In an apparatus for installing an elongated corrugated joint in plastic concrete in a vertical position transversely of a road, a series of pairs of cooperating members adapted to grip different longitudinal areas of the joint therebetween while the joint and members are being lowered into the plastic concrete, one member of each pair of members having a flat face adapted to contact the crests of the corrugations on one face of the joint, the other member of each pair of members being movably mounted relative to said flat faced member and having a gripping face conforming to the corrugations on the opposite face of said joint to hold said joint against said flat faced member, means for withdrawing said members from the plastic concrete after the movable members have been disengaged from the joint, and means for guiding the flat-faced members in substantially vertical paths to maintain the flat-faced members in sliding engagement with the crests of the joint during the withdrawing operation to permit withdrawal of the members without disturbing the joint.

7. In an apparatus for installing a corrugated joint in plastic concrete in a vertical position, means adapted to be inserted into the concrete for holding the joint while it is being installed comprising a vertically disposed fixed jaw adapted to be arranged perpendicular to the concrete and having a flat gripping face adapted to engage the crests of the corrugations of the joint, a complementary movable jaw having a corrugated gripping face adapted to engage within the valleys in the joint and hold the joint tightly against the face of the fixed jaw, means for swinging said movable jaw from the fixed jaw and out of engagement with the joint, means for withdrawing the jaws from the plastic concrete, and means for guiding the fixed jaw in a substantially vertical path to maintain the flat face of the fixed jaw in sliding engagement with the crests of the joint during the withdrawing operation to permit withdrawal of the jaws without displacing the joint.

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