March 5, 1968 P. M. THOMAS ET AL 3,371,459

MORTAR JOINT PLACEMENT DEVICE

Filed Nov. 26, 1963 3 Sheets-Sheet 1

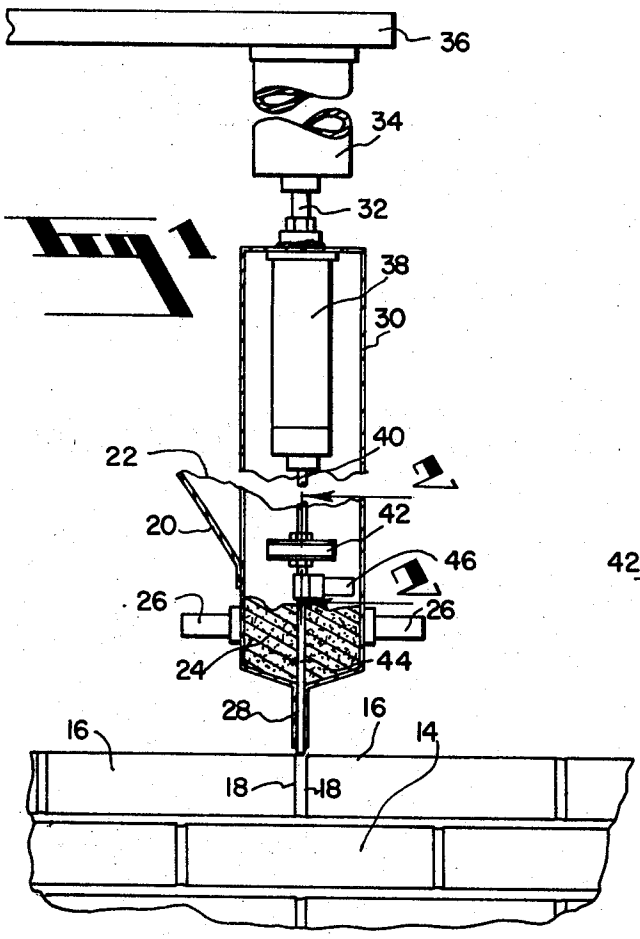


Fig. 1

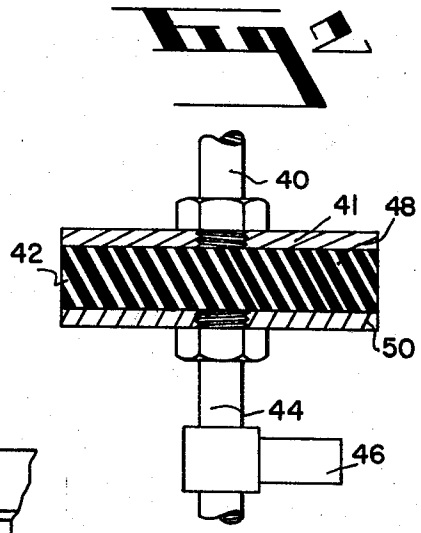


Fig. 2

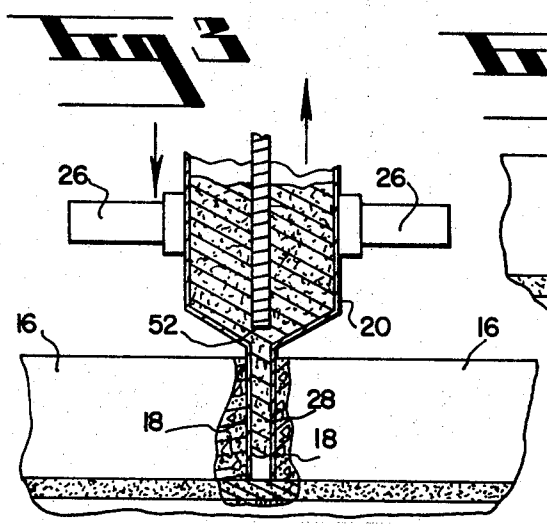


Fig. 3

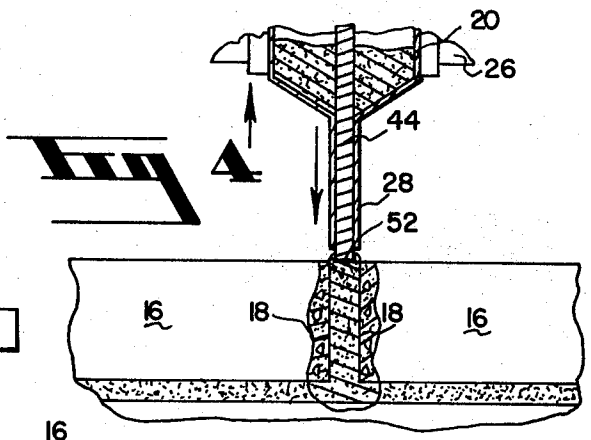


Fig. 4

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MORTAR JOINT PLACEMENT DEVICE

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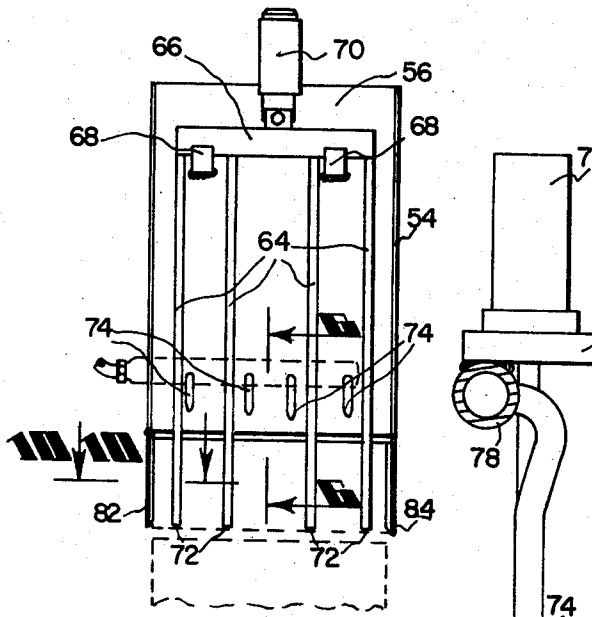


Fig 5

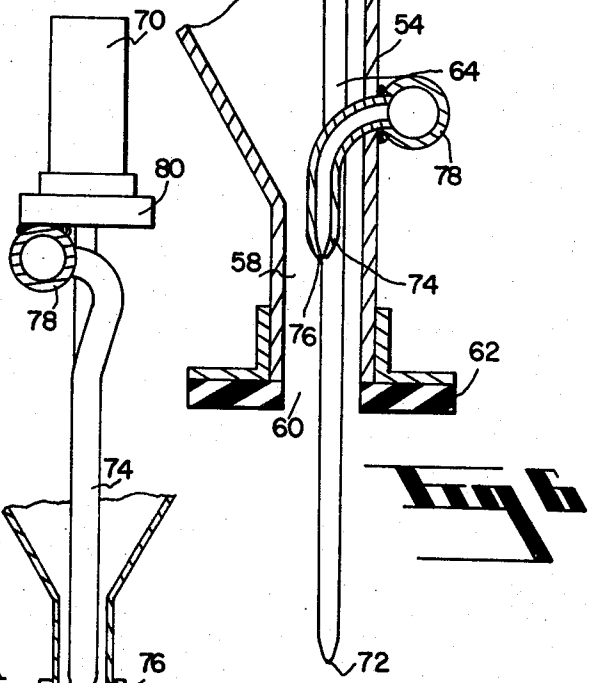


Fig 6

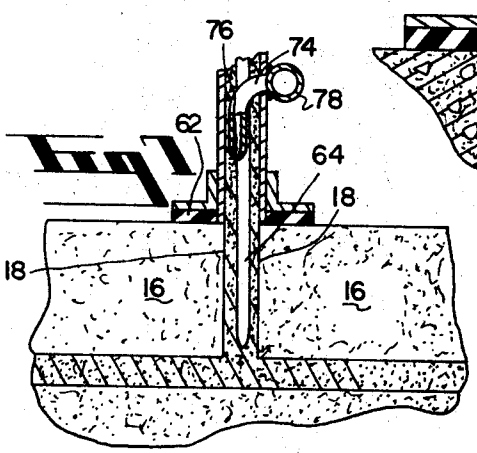


Fig 7

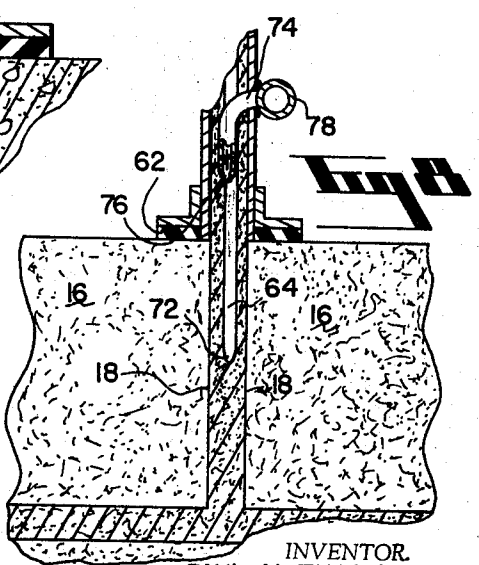


Fig 8

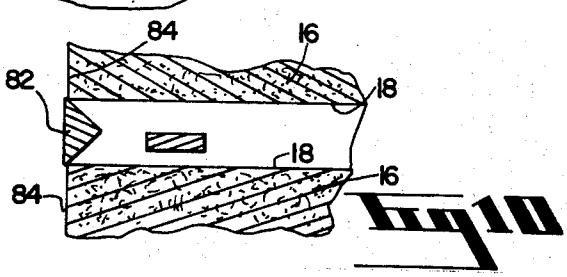


Fig 10

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MORTAR JOINT PLACEMENT DEVICE

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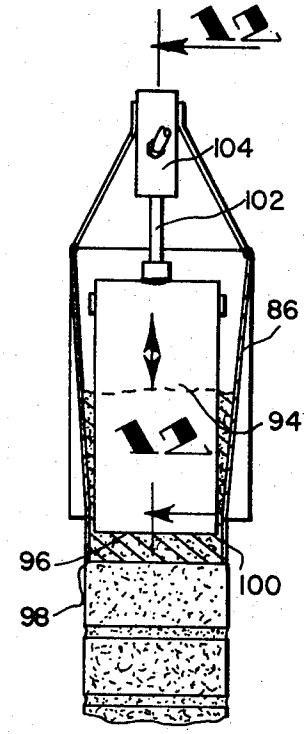


Fig 11

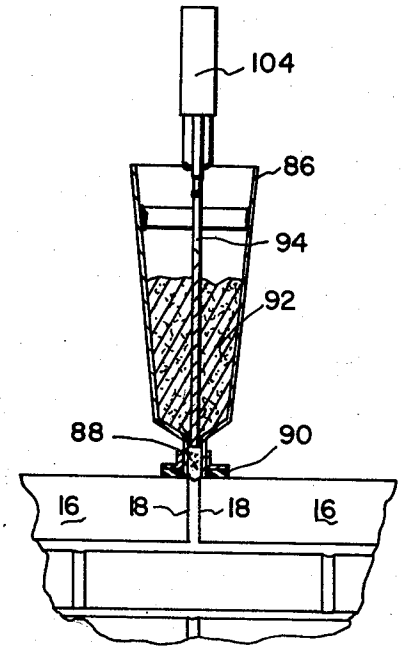


Fig 12

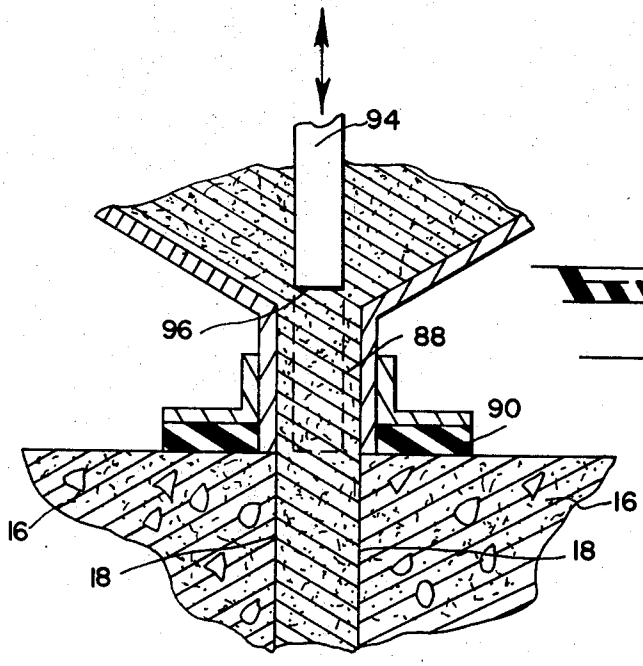


Fig 13

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3,371,459

MORTAR JOINT PLACEMENT DEVICE

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Filed Nov. 26, 1963, Ser. No. 326,293
10 Claims. (Cl. 52—749)

This invention relates to a mortar joint placement device and, more particularly, to a mortar joint placement device for placing mortar between adjacent spaced vertical surfaces of adjacent concrete blocks being formed into a wall or vertical panel.

In the forming of concrete block walls it has been conventional to employ labor for the placement of mortar between concrete blocks and various prior art attempts have been made to alleviate the high labor cost of mortaring concrete blocks together in walls or vertical panels.

Such prior art attempts have involved various machinery intended for use in laying and mortaring concrete blocks together in a wall structure, however, the problem of automatically placing mortar between vertical spaced adjacent surfaces of concrete blocks have been very difficult to solve, particularly in the placement of mortar between concrete blocks of substantial vertical elevation.

Accordingly, it is an object of the present invention to provide a mortar joint placement device which is particularly adapted for use in connection with concrete block laying machines and more particularly for use in placing mortar joints between spaced vertical surfaces of adjacent concrete blocks.

Another object of the invention is to provide a mortar joint placement device which may be used effectively in the placement of mortar between spaced vertical surfaces of adjacent concrete blocks having substantial elevation, as, for example, blocks having a vertical height of eight inches or more.

Another object of the invention is to provide a mortar joint placement device wherein a hopper feeds mortar downwardly into a tubular member which may be projected downwardly between spaced vertical surfaces of adjacent concrete blocks whereupon retraction of the tubular member is accompanied by projection of a plunger downwardly therein to eject the mortar in place between the vertical surfaces of adjacent blocks to thereby effectively fill the area between the spaced vertical surfaces of the adjacent concrete blocks.

Another object of the invention is to provide a novel mortar joint placement device which comprises a hopper having a downwardly directed outlet disposed to be placed over a space between adjacent vertical surfaces of concrete blocks which are spaced apart, whereby air jets located in the area of mortar in the lower outlet portion of the hopper may effectively project compressed air causing entrainment and impingement action of mortar into the space and in contiguous relationship with and between the vertical spaced surfaces of the concrete blocks disposed adjacent to each other.

Another object of the invention is to provide a mortar joint placement device disposed to place mortar in a space and in contiguous relationship with vertical surfaces of spaced adjacent concrete blocks; said device comprising a downwardly directed hopper having an outlet at its lower end adapted to be disposed over said space and wherein vibrating fingers extend through the mortar in the hopper and downwardly into said space, and, also, wherein compressed air jets are directed downwardly from the interior of the hopper and within the mortar therein so that the mortar is vibrated by said fingers

between said blocks and so that the mortar passing downwardly from the outlet of the hopper is pneumatically accelerated and caused to be blown and to impinge on the vertical surfaces of the blocks at opposite sides of the space, and to fill up said space, thereby providing a very dense mortar joint between said spaced vertical surfaces of said adjacent concrete blocks.

Another object of the invention is to provide a novel mortar joint placement device for placing mortar between spaced vertical surfaces of adjacent concrete blocks comprising a novel hopper having a downwardly directed outlet disposed to be located over said space, and wherein a vertically movable tamper plunger mechanism progressively moves up and down over said space and in and out of the outlet of said hopper wherein mortar is moved downwardly around said plunger tamper mechanism and is progressively tamped and projected into the space between the vertical spaced surfaces of the concrete blocks and compacted therein.

Another object of the invention is to provide a mortar joint placement device capable of forming a very intimate and strong mortar joint between adjacent spaced surfaces of adjacent concrete blocks.

Other objects and advantages of the present invention may be apparent from the following specification, appended claims and accompanying drawings in which:

FIGURE 1 is a side elevational view of a mortar joint placement device in accordance with the present invention and showing portions in section and fragmentarily together with a portion of a concrete block wall being mortared together by utilizing conventional concrete blocks and mortar;

FIGURE 2 is an enlarged fragmentary sectional view taken from the line 2—2 of FIGURE 1;

FIGURE 3 is an enlarged fragmentary sectional view taken on a plane similar to that of portions of the mechanism shown in FIGURE 1, but illustrating a varying position of the hopper of the device shown in FIGURE 1 wherein a tubular portion thereof is projected downwardly between adjacent vertical surfaces of concrete blocks during the placement of mortar therebetween;

FIGURE 4 is another view similar to FIGURE 3, but showing a vertical retraction of the tubular portion of the hopper upwardly leaving mortar between adjacent spaced vertical surfaces of concrete blocks;

FIGURE 5 is a side elevational view of a modification of the present invention showing mechanism taken in a disposition at 90 degrees to that as shown in FIGURE 1 with respect to the blocks being mortared together;

FIGURE 6 is an enlarged fragmentary sectional view taken from the line 6—6 of FIGURE 5;

FIGURE 7 is a view similar to FIGURE 6 showing the mechanism disclosed therein disposed in operating position wherein mortar is being placed between spaced adjacent vertical surfaces of concrete blocks;

FIGURE 8 is another view similar to FIGURE 7 but showing the same mechanism placing mortar between concrete blocks of substantially greater elevation than those shown in FIGURE 7;

FIGURE 9 is a view similar to that shown in FIGURE 7 but showing a modification of the invention wherein air jet devices are connected to vibrating fingers rather than supporting the air jet mechanisms on the hopper as shown in FIGURE 6 of the drawings;

FIGURE 10 is an enlarged fragmentary plan sectional view taken from the line 10—10 of FIGURE 5;

FIGURE 11 is a vertical sectional view of a modification of the invention shown substantially from the same direction as the structure shown in FIGURE 5 and illustrating the modification in position with respect to a concrete block wall being mortared together;

FIGURE 12 is a vertical sectional view of the mechanism shown in FIGURE 11 and taken from the line 12—12 thereof; and

FIGURE 13 is an enlarged fragmentary sectional view taken on the same plane as FIGURE 12, but showing in detail the vertical tamper action of the mechanism shown in FIGURES 11 and 12.

As shown in FIGURE 1 of the drawings, a concrete block wall 14 may be formed of a plurality of vertically superimposed courses of concrete blocks 16. Adjacent vertical surfaces 18 of these blocks 16 are spaced apart so that mortar may be placed therebetween.

Suitable clamping mechanism may be used to hold the blocks 16 in adjacent relationship to each other and spaced at their vertical surfaces 18 while mortar is being placed therebetween. This mechanism is not shown in the present application, and is no part of the present invention, however, this mechanism is necessary to prevent the spreading of the blocks 16 away from each other.

Such clamping and holding mechanism is disclosed in our co-pending patent application for block laying machine, Ser. No. 288,354, filed July 12, 1963, now Patent No. 3,215,001.

As shown in FIGURE 1, the hopper 20 is provided with a receiving chute 22 to receive mortar 24 which is vibrated into the lower portion of the hopper 20 by means of vibrators 26. These vibrators 26 are used during the feeding of the mortor downwardly into a tubular section 28 which forms an outlet for the hopper 20. The hopper 20 is supported by straps 30 carried by a plunger 32 of a vertical axis hydraulic cylinder or other actuator 34 stationarily mounted on a frame 36. Thus the plunger 32 is capable of moving the hopper 20 upwardly and downwardly a sufficient elevation to project the tubular portion 28 downwardly between the vertical spaced surfaces 18 of the adjacent concrete blocks 16.

Supported by the strap structure 30 and thus connected to the plunger 32 is another actuating cylinder 38 having a plunger 40 connected to a resilient coupling 42 which carries an ejector plunger 44 which generally fills the cross sectional area of the tubular outlet 28. This plunger 44 is retractable upwardly into the plunger 20 above the tubular outlet 28, as shown in FIGURE 3 of the drawings, and as will be hereinafter described. Such retraction is accomplished by retraction of the plunger 40 of the actuator 38.

Carried by the ejector plunger 44 is a vibrator 46 which is capable of vibrating the ejector plunger 44 as it is moved downwardly slightly after the tubular portion 28 of the hopper 20 has been moved upwardly, as will be hereinafter described.

In order for the vibrator 46 to be effective, the resilient coupling 42 freely permits vibration of the ejector plunger 44 relative to the plunger 40, all as shown best in FIGURE 2, wherein a flange plate 41 couples the plunger 40 to a layer of rubber or other resilient material designated 48. This rubber is also bonded to a flange plate 50 which is coupled to the ejector plunger 44. The ejector plunger 44 is provided with a lower end 52 which is substantially equal in cross section to the tubular outlet 28 of the hopper 20. This outlet is co-extensive laterally with the width of the blocks 16.

In operation the mortar 24 is held in the hopper 20 and the plunger 32 is first projected from the actuating cylinder 34, carrying or forcing the hopper 20 downwardly until its tubular outlet neck 28 is projected between the adjacent vertical surfaces 18 of the concrete blocks 16. Thus the neck outlet portion or tubular outlet portion 28 is disposed in the position as shown in FIGURE 3, and a lower end 52 of the ejector plunger 44 is disposed upwardly in the hopper so that vibration of the vibrators 26 may cause concrete or other mortar material to flow downwardly into and fill the tubular outlet portion 28 of the hopper which is co-extensive with the vertical surfaces 18 of the blocks 16. With the extension of the plunger 32 the plunger 40 is retracted so that when

vibration of the vibrators 26 starts the lower end 52 of the ejector plunger 44 will permit concrete material to flow downwardly into the tubular outlet 28 of the hopper 20.

When this tubular outlet 28 is filled by vibration of the vibrators 26, the hopper 20 may be retracted by retraction of the plunger 32 of the cylinder 34, while the plunger 40 is concurrently projected at the same rate, thus maintaining the lower end 52 of the ejector plunger 44 in substantially stationary position whereby the mortar carried in the tubular outlet 28 is ejected therefrom as the tubular outlet 28 passes upwardly around the ejector plunger 44.

After the hopper has been retracted upwardly, as shown in FIGURE 4 of the drawings, the tubular outlet 28 is above the upper surfaces of the concrete blocks 16, and the lower end 52 of the ejector plunger 44 is projected downwardly a slight distance while the vibrator 46 is energized to cause the mortar previously placed between the surfaces 18 to settle down into intimate engagement with these surfaces. Thus vibration of the ejector plunger 44 and concurrent downward movement thereof causes the mortar to fill in the space displaced by the thin walls of the tubular outlet 28 of the hopper 20. Thus the mortar joint is finished between the spaced vertically disposed surfaces of the adjacent concrete blocks 16.

The clamping means hereinbefore mentioned is then released so that the adjacent blocks 16 may remain mortared together, and such clamping means may be moved to the next adjacent vertically spaced surfaces 18 of the concrete blocks in the wall so that another vertical mortar joint may be made as hereinbefore described.

In the modification, as shown in FIGURES 5 and 6 of the drawings, a hopper 54 is open at its upper end 56 to receive mortar, and is provided with a downwardly directed outlet neck portion 58 having an opening 60 at its lower end surrounded by a gasket 62 disposed to rest on upper surfaces of adjacent concrete blocks being mortared together.

Extending downwardly through the outlet 58 are vibrating fingers 64, all coupled to a common horizontal bar 66 hung loosely on upwardly extending clips 68 so that a vibrator 70 connected to the bar 66 may cause the fingers 64 to vibrate freely.

These fingers 64 are provided with lower ends 72, which are disposed to be projected downwardly between adjacent vertical surfaces 18 of adjacent concrete blocks 16.

Disposed between these fingers 64 are compressed air jet nozzles 74 having open ends 76 directed downwardly and disposed to issue high pressure compressed air jets downwardly between the fingers 64 and into a space between the vertical surfaces 18 of the adjacent concrete blocks 16. These downwardly directed open ends 76 of the jet nozzles 74 are disposed internally of the outlet portion 58 of the hopper and substantially above the outlet opening 60 so that wet concrete mortar in the lower end of the hopper is aspirated or projected in the air stream so that it travels at high velocity and impinges into a space between the vertical surfaces 18 of the concrete blocks 16, it being noted that the concrete blocks 16 as shown in FIGURE 8 are of considerable elevation and may represent an eight inch high modulus block as compared to a four inch high modulus block, as illustrated in FIGURE 7.

The jet nozzles 74 are coupled to a high pressure compressed air supply manifold 78, which may be secured to a side of the hopper 54, if desired. An alternate mounting for the manifold 78 is shown in FIGURE 9 of the drawings, wherein the jet nozzles 74 project upwardly through the hopper and are coupled to the manifold 78 which is carried by a bar 80 equivalent to the bar 66 on which the vibrator 70 is mounted. Thus a flexible hose connection may supply air to the manifold 78, as shown

in FIGURE 9 of the drawings, and the vibrator 70 may vibrate the nozzles 74 as well as the fingers 64.

Projecting downwardly from the hopper 54 and outwardly of the fingers 64 are mortar retaining strike bars 82 and 84. These strike bars 82 and 84 are similar, and, as shown in FIGURE 10 of the drawings, the strike bar 82 is disposed to be projected downwardly at the outer vertical sides 84 of the adjacent concrete blocks 16 to seal the space between the vertical surfaces 18 so that when mortar is placed between the vertical surfaces 18 the members 82 and 84 will thus prevent the mortar from flowing outwardly from the space between the surfaces 18 and thus the jets 74 as well as the vibrating fingers 64 may place the concrete between the vertical surfaces 18 and it may fill up then to the upper surfaces of the blocks, all as shown in FIGURES 7 and 8 of the drawings.

In operation the modified structure as shown in FIGURES 5 to 10 is particularly effective since it comprises not only vibration of fingers within the mortar being placed, but it also includes high velocity pneumatic placement of the particles of the mortar as it moves downwardly through the outlet 58 of the hopper and around the jet nozzle openings 76, and in this manner the mortar is very effectively placed between deep blocks such as shown in FIGURE 8, wherein the mortar travels downwardly at high speed and impinges in place during which time the mortar fills up between the blocks and is then mechanically engaged by the fingers 64, which are vibrated by the vibrator 70. Thus a very effective and intimate mortar joint is made between the spaced vertical surfaces of adjacent concrete blocks.

In the modification, as shown in FIGURES 11, 12 and 13, a hopper 86 is provided with a downwardly directed outlet neck 88 having a gasket 90 similar to the gasket 62 hereinbefore described. This gasket 90 operates in a similar manner to the gasket 62.

Disposed in the hopper 86 and movable in mortar 92 therein is a tamper bar 94. This tamper bar 94 is provided with a lower edge 96 almost extensive in width to the width of the concrete blocks.

Connected to the lower end of the hopper 86, adjacent its outlet 88 and projecting downwardly therebeyond, are mortar retainers 98 and 100 similar to the mortar retainers 82 and 84 hereinbefore described.

The tamper plate 94 is connected by means of a rod 102 to a motor or fluid powered device 104 which is adapted vertically to reciprocate the rod 102 and the tamper plate 94. It will be noted that this power operated device 104 may be a conventional air cylinder having a reversing valve which causes constant reciprocation of the plunger 102, or this device 104 may be a solenoid operated device or a motor actuated device employing a gear train driven by an electric motor. Thus the power operated device 104 causes up and down vertical tamping action of the tamper plate 94 so that its lower edge 96 moves upwardly and downwardly in the concrete 92, thereby feeding and tamping concrete downwardly through the outlet 88 and into the space between the vertical spaced surfaces 18 of the concrete blocks 16. In this operation it is necessary to secure the blocks together by suitable clamping plates, as hereinbefore pointed out.

In the enlarged view as shown in FIGURE 13, it will be seen that the tamper plate 94 moves upwardly and downwardly, and that its lower edge forces the concrete downwardly through the outlet 88 and into the space between the vertical surfaces 18 of the blocks 16, and thus a mortar joint may be formed between these surfaces 18. During the forming of this mortar joint the mortar retainers 98 and 100 prevent the mortar from oozing or leaking out from opposite sides of the blocks and from the space between the vertical surfaces 18 thereof.

When the mortar joint is completed the operation of the motor 104 is terminated and the hopper 86 together with the mortar retainers 98 and 100 are moved upwardly so that these retainers 98 and 100 clear the upper surfaces of the blocks to leave the mortar neatly in place between the surfaces 18.

It will be obvious to those skilled in the art that various modifications of the present invention may be resorted to in a manner limited only by a just interpretation of the following claims.

We claim:

1. In a mortar joint placement device the combination of: means for holding mortar having an outlet disposed to direct mortar downwardly; a tubular structure at said outlet disposed to conduct mortar and hold mortar therein, said tubular structure of a dimension capable of being projected downwardly between spaced vertical surfaces of adjacent concrete blocks; means for moving said tubular structure upwardly and downwardly; and an ejector member disposed closely to fit the interior of said tubular structure and means causing said tubular structure when retracted upwardly from a space between vertical spaced surfaces of concrete blocks to move over said ejector plunger and to cause mortar to be dispensed between said adjacent vertical surfaces.

2. In a mortar joint placement device the combination of: means for holding mortar having an outlet disposed to direct mortar downwardly; a tubular structure at said outlet disposed to conduct mortar and hold mortar therein, said tubular structure of a dimension capable of being projected downwardly between spaced vertical surfaces of adjacent concrete blocks; means for moving said tubular structure upwardly and downwardly; and an ejector member disposed closely to fit the interior of said tubular structure and means causing said tubular structure when retracted upwardly from a space between vertical spaced surfaces of concrete blocks to move over said ejector plunger and to cause mortar to be dispensed between said adjacent vertical surfaces; means for vibrating said ejector member.

3. In a mortar joint placement device the combination of: means for holding mortar having an outlet disposed to direct mortar downwardly; a tubular structure at said outlet disposed to conduct mortar and hold mortar therein, said tubular structure of a dimension capable of being projected downwardly between spaced vertical surfaces of adjacent concrete blocks; means for moving said tubular structure upwardly and downwardly; and an ejector member disposed closely to fit the interior of said tubular structure and means causing said tubular structure when retracted upwardly from a space between vertical spaced surfaces of concrete blocks to move over said ejector plunger and to cause mortar to be dispensed between said adjacent vertical surfaces; means for vibrating said first means to feed mortar downwardly into said tubular portion.

4. In a mortar joint placement device the combination of: means for holding mortar having an outlet disposed to direct mortar downwardly; a tubular structure at said outlet disposed to conduct mortar and hold mortar therein, said tubular structure of a dimension capable of being projected downwardly between spaced vertical surfaces of adjacent concrete blocks; means for moving said tubular structure upwardly and downwardly; and an ejector member disposed closely to fit the interior of said tubular struc and means causing said tubular structure when retracted upwardly from a space between vertical spaced surfaces of concrete blocks to move over said ejector plunger and to cause mortor to be dispensed between said adjacent vertical surfaces; means for vibrating said first means to feed mortar downwardly into said tubular portion; means for relative retraction in movement of said first means and said ejector means.

5. In a mortar joint placement device the combination of: means for holding mortar having an outlet disposed to direct mortar downwardly; a tubular structure at said outlet disposed to conduct mortar and hold mortar therein, said tubular structure of a dimension capable of being

projected downwardly between spaced vertical surfaces of adjacent concrete blocks; means for moving said tubular structure upwardly and downwardly; and an ejector member disposed closely to fit the interior of said tubular structure and means causing said tubular structure when retracted upwardly from a space between vertical spaced surfaces of concrete blocks to move over said ejector plunger and to cause mortar to be dispensed between said adjacent vertical surfaces; means for vibrating said first means to feed mortar downwardly into said tubular portion; means for relative retraction in movement of said first means and said ejector means; means for vertically moving both said ejector means and said first means concurrently.

6. In a mortar joint placement device the combination of: means for holding mortar to be placed between adjacent vertical surfaces of spaced concrete blocks; an outlet for said first mentioned means; downwardly directed air jets in said outlet for projecting mortar downwardly from said outlet and into a space between spaced vertical surfaces of adjacent concrete blocks; means for retaining mortar at opposite sides of said space and coupled to said first mentioned means; downwardly directed fingers disposed to project below said outlet and in directions substantially normal to said outlet, said fingers also disposed to project below said jet means and between said concrete blocks; means for supporting said fingers relative to said first mentioned means and means for vibrating said fingers.

7. In a mortar joint placement device the combination of: means for holding mortar to be placed between adjacent vertical surfaces of spaced concrete blocks; an outlet for said first mentioned means; downwardly directed air jets in said outlet for projecting mortar downwardly from said outlet and into a space between spaced vertical surfaces of adjacent concrete blocks; means for retaining mortar at opposite side of said space and coupled to said first mentioned means; downwardly directed fingers disposed to project below said outlet and in directions substantially normal to said outlet, said fingers also disposed to project below said jet means and between said concrete blocks; means for supporting said fingers relative to said first mentioned means and means for vibrating said fingers; gasket means surrounding said outlet and disposed to provide a seal therearound and engageable with upper surfaces of concrete blocks at opposite sides of said space between said vertical surfaces of said spaced adjacent concrete blocks.

8. In a mortar joint placement device the combination of: a means for containing mortar; a mortar outlet for said means opened downwardly and disposed to be placed over a space between vertical surfaces of adjacent spaced concrete blocks; a vertical tamper plate disposed in said means and operable vertically adjacent to said outlet and thereabove; means for vertically reciprocating said tamper plate whereby reciprocation of said tamper plate in said first means tamps mortar downwardly through said outlet and into a space between vertical spaced surfaces of adjacent concrete blocks; gasket means surrounding said outlet and disposed to form a seal at opposite sides of said space between said vertical surfaces of said concrete blocks.

9. In a mortar joint placement device the combination of: a means for containing mortar; a mortar outlet for said means opened downwardly and disposed to be placed over a space between vertical surfaces of adjacent spaced concrete blocks; a vertical tamper plate disposed in said means and operable vertically adjacent to said outlet and thereabove; means for vertically reciprocating said tamper plate whereby reciprocation of said tamper plate in said first mentioned means tamps mortar downwardly through said outlet and into a space between vertical spaced surfaces of adjacent concrete blocks; means for relative retraction in movement of said tamper plate and said first means gasket means surrounding said outlet and disposed to form a seal at opposite sides of said space between said vertical surfaces of said concrete blocks; means connected to said first mentioned means and disposed to be located adjacent opposite sides of said concrete blocks and to seal the space between said spaced vertical surfaces of said adjacent concrete blocks to prevent excessive leakage of mortar outwardly from said space between said vertical surfaces when said tamper plate is tamping mortar into said space.

10. In a mortar joint placement device the combination of: a mortar container having a downwardly directed outlet; means disposed to propel mortar vertically and downwardly through said outlet and into a space between adjacent vertical surfaces of spaced concrete blocks; and means to induce vibration concurrently with the inducement of vertical force on mortar being placed in said space.

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