

May 30, 1933.

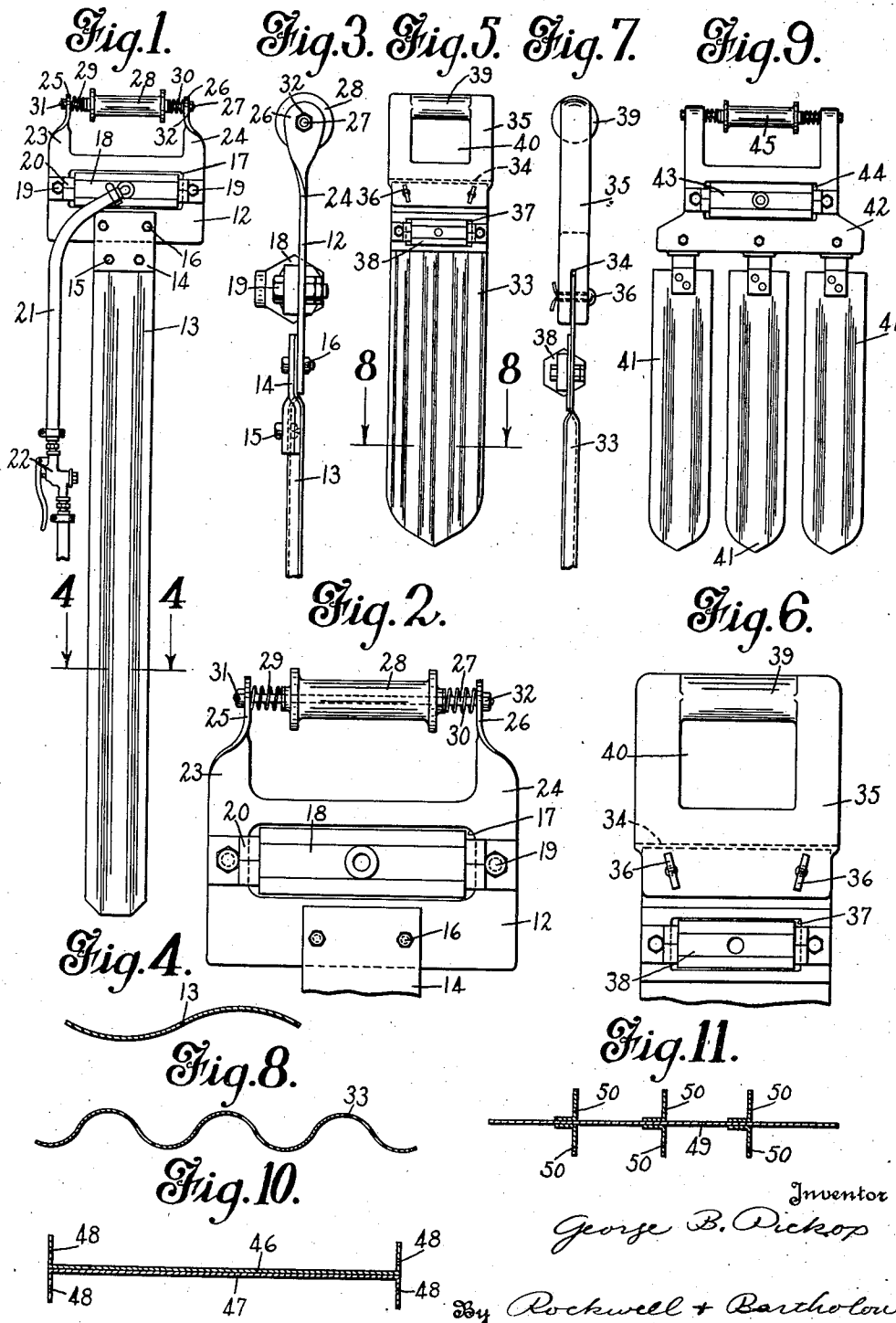
G. B. PICKOP

1,911,966

TOOL FOR USE IN MAKING CONCRETE

Filed July 24, 1930

2 Sheets-Sheet 1



Inventor
George B. Pickop

By Rockwell + Bartholomew

Attorneys

May 30, 1933.

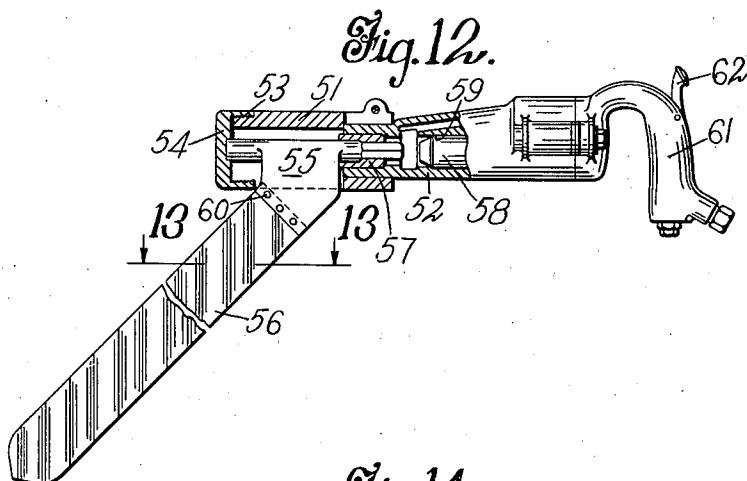
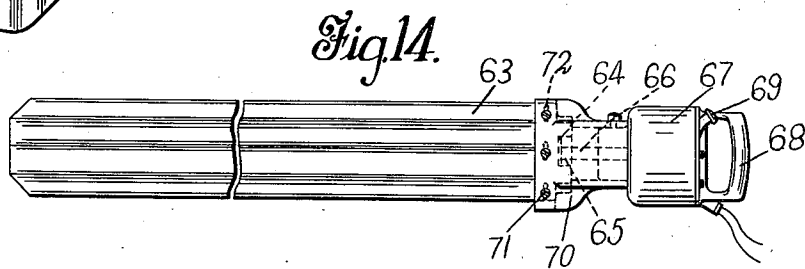
G. B. PICKOP

1,911,966

TOOL FOR USE IN MAKING CONCRETE

Filed July 24, 1930

2 Sheets-Sheet 2



Inventor

George B. Pickop

By Rockwell + Bartholow

Attorneys

UNITED STATES PATENT OFFICE

GEORGE B. PICKOP, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO MALLEABLE IRON
FITTINGS COMPANY, OF BRANFORD, CONNECTICUT

TOOL FOR USE IN MAKING CONCRETE

Application filed July 24, 1930. Serial No. 470,319.

My invention relates to a tool for use in making concrete and more especially to a tool for slicing, tamping or otherwise working concrete after it has been poured, in order to settle the same.

It is the usual practice in moulding concrete to settle the concrete by vibrating the mould into which the concrete is poured, or to tamp and slice the concrete by means of a crowbar-like tool having a flattened end.

It is, in general, an object of the present invention to bring about a form of tool by means of which the concrete may be more readily and effectively sliced and settled than by use of the usual vibrator or slicing bar, and by means of which the usual air pockets are broken up and any excess of water brought to the top, thus reducing the amount of time necessary for curing the concrete and producing a more uniform and desirable product.

In a more specific aspect, it is an object of the invention to bring about a form of slicing and tamping bar having a vibrator associated therewith by means of which the bar may be vibrated when inserted in the concrete.

Another object of the invention is to produce a form of slicing bar by means of which a mass of concrete may be effectively vibrated in order to settle the same.

A feature of the invention resides in a novel form of handle by means of which the tool may be supported and guided by a workman without communicating the vibratory movement thereof in any great degree to the hands of the workman.

Additional features of the invention will become apparent during the description thereof appearing hereinafter.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the drawings:

Fig. 1 is a front elevational view of a tool for use in making concrete in accordance with my invention;

Fig. 2 is a view similar to Fig. 1, showing

the upper end of the tool on an enlarged scale;

Fig. 3 is a side elevational view of the tool shown in Fig. 1;

Fig. 4 is a cross-sectional view along line 4—4 of Fig. 1;

Fig. 5 is a front elevational view of a modified form;

Fig. 6 is a view similar to Fig. 5, but showing the upper end of the tool on an enlarged scale;

Fig. 7 is a side elevational view of the tool shown in Fig. 5;

Fig. 8 is a cross-sectional view along line 8—8 of Fig. 5;

Fig. 9 is a front elevational view of still another modification;

Figs. 10 and 11 are cross-sectional views similar to Figs. 4 and 8, but showing different modifications of the invention;

Fig. 12 is a side elevational view partly in section of another form of the invention;

Fig. 13 is a cross-sectional view along line 13—13 of Fig. 12, and

Fig. 14 is a side elevational view of still another modification.

Referring to the drawings in which I have illustrated my invention by showing several preferred forms the invention may take, and with special reference at present to Figs. 1 to 4 inclusive, the reference numeral 12 indicates a frame which in the present instance takes the form of a generally flat piece of sheet material of relatively heavy gauge, having secured to the lower end thereof an elongated relatively thin bar or blade

13 of sinuous cross-section, as shown in Fig. 4. Adjacent the frame 12 the bar 13 is strengthened and stiffened by a plate 14 shaped at its lower end to fit the sinuous surface of the bar 13 and secured thereto by means of bolts 15, the plate 14 and bar 13 being relatively flat at their upper ends and being secured to frame 12 by means of bolts 16, which pass through the plate 14, bar 13 and frame 12, the end of the bar 13 being clamped between the plate 14 and frame 12.

Immediately above the end of bar 13, the frame 12 is provided with an elongated

transversely extending rectangular opening 17 in which is mounted a vibrator 18, which may take the form of that disclosed and claimed in my Patent No. 1,336,921 for a
 5 Vibrator, dated April 13, 1920, vibrator 18 being secured to frame 12 by means of bolts 19 which pass through the vibrator heads 20 and through the frame 12. Air or other fluid under pressure is supplied to vibrator
 10 18 by means of hose 21, the flow of air being controlled by the workman by means of hand operated valve 22, which may be grasped in one hand while the tool in general is supported in the other hand.

15 At its upper end, the frame 12 is provided with spaced arms 23 and 24 which at their upper ends 25 and 26 are twisted into planes at right angles to the general plane of the frame 12, arms 23 and 24 serving to support
 20 on their ends 25 and 26 a rod 27 on which is mounted a spool-like handle 28, the latter being movable on rod 27 in an axial direction, movement of the handle being opposed, however, by compression springs 29 and 30 mounted on rod 27 between the ends
 25 of handle 28 and the ends 25 and 26 of arms 23 and 24. Rod 27 is threaded at its ends for the reception of nuts 31 and 32, which engaging the arms 23 and 24 hold the rod
 30 rigidly against movement on the frame 12.

In operation, the handle 28 is grasped by the workman and the bar 13 inserted in the bed of cement at as many points as may be necessary, the bar 13 being ordinarily
 35 moved through the concrete in a direction coinciding with the general plane of the bar. Owing to the sinuous cross-sectional form of the bar 13 the vibratory movement of the latter is opposed by the concrete with the
 40 result that the concrete is effectively vibrated by the bar. The suspension of the handle 28 between the compression springs 29 and 30, insures that the tool may vibrate freely without the vibrations thereof being communicated in any great degree to the hand
 45 of the workman.

In that form of the invention shown in Figs. 5, 6, 7 and 8, a bar 33 is provided which is somewhat shorter than bar 13 but of
 50 greater width, the upper end of bar 33 being flattened and received in a slot 34 in the lower end of a frame 35, the bar 33 being secured somewhat loosely to frame 35 by means of cotter pins 36, which pass through
 55 relatively large openings in the frame 35 and bar 33. Immediately below the frame 35 the bar 33 is provided with a transversely extending elongated rectangular opening 37 in which is mounted a vibrator 38 in a manner similar to that shown in Figs. 1 to 4
 60 inclusive. At the upper end of frame 35 is a handle 39, the frame being apertured at 40 to permit the workman to grasp the handle.

65 The operation of this form of the inven-

tion is, in general, similar to that shown in Figs. 1 to 4 inclusive, the bar 33 being inserted into the concrete and vibrated by vibrator 38, the relatively loose connection between the frame 35 and the bar 33 permitting the latter to vibrate freely without transmitting the vibratory movements thereof in any great degree to the handle 39 and thus to the hand of the workman.

In that form of the invention shown in
 75 Fig. 9, a plurality of bars 41 are secured to the lower end of the frame 42 and vibrated by a vibrator 43 mounted in a transversely extending elongated opening 44 in frame 42, the tool being supported by a
 80 workman by means of handle 45 mounted on the frame 42 in a manner similar to that shown in Figs. 1 and 2.

In Fig. 10 of the drawings I have shown a cross-sectional view of a modified form
 85 of bar, in this instance comprising two channel-shaped members 46 and 47 welded or otherwise secured together and provided at their edges with longitudinally extending flanges 48 which, when the bar is inserted in
 90 the concrete, engage the latter to communicate the vibrations of the bar to the concrete.

In Fig. 11 of the drawings I have shown in cross-section another form of bar com-
 95 prising a generally flat plate 49 having mounted on the opposite faces thereof a plurality of longitudinally extending members 50, which may take the form of angle irons which engage the concrete to vibrate the
 100 same when the bar is inserted and vibrated in the concrete.

In Fig. 12 of the drawings I have shown another form that the invention may take, in which a sleeve 51 is mounted on the end
 105 of barrel 52 and threaded at 53 for the reception of the cap 54 bearing against and supporting one end of shank 55 of blade 56, while the opposite end of shank 55 is supported in a bushing 57 in the end of barrel
 110 52, shank 55 extending into barrel 52 to be engaged by a pneumatically operated piston or hammer 58 in bore 59, the movements of the piston 58 being controlled by a suitable valve mechanism of any usual type, not
 115 shown herein. The shank 55 extends outwardly through a slot in the lower end of sleeve 51 and is secured to blade 56 in any suitable manner, as for example by rivets 60. The blade 56 extends downwardly and
 120 forwardly with respect to the axis of sleeve 51 and barrel 52, and is sinuous in cross-section, as shown in Fig. 13. At the opposite end of barrel 52 from sleeve 51 is a handle 61 by means of which the blade 56
 125 may be guided, a lever 62 being mounted on handle 61 to control the supply of air to piston 58 in any usual or suitable manner.

In Fig. 14 I have shown another modification in which a blade 63 is slotted at 64 for
 130

the reception of eccentric 65 fixedly mounted on the end of shaft 66 of motor 67, the latter being provided with a handle 68 and controlling button 69, the latter being of any usual type and not being shown herein in detail. In the end of frame 70, mounted on motor 67, are a number of screws or bolts 71 which pass through elongated transversely extending slots 72 in the end of blade 63, screws 71 serving to hold the blade 63 on frame 70 while permitting transverse movement of the blade 63 on frame 70, as the eccentric 65 is rotated in slot 64.

The operation of the forms of invention shown in Figs. 12 and 14 is quite similar to those shown in Figs. 1 to 11 inclusive, the blades 56 and 63 being inserted in the concrete and vibrated by piston 58 and eccentric 65 respectively.

Heretofore it has been the common practice to use slicing bars or spaders in the making of concrete for causing the mass of wet concrete to be somewhat more closely mixed and more effectively settled than otherwise, but in the use of such tools or implements it has been necessary to give the implement an up and down motion like that of a crowbar and this has been very laborious. Yet in spite of the laboriousness of this operation and mixing and densifying of the concrete and the settling thereof and elimination of air bubbles has not, withal, been produced in a satisfactory manner or to a satisfactory degree. So also, in the mixing of concrete by vibration of the mould through the application of an exterior vibratory device to the mould, the results have not been notably satisfactory owing to the remoteness of the vibratory device from considerable portions of the concrete being settled. When mixed in this manner, the exterior portions adjacent the mould are relatively dense while the interior portions of the concrete or those remote from the walls of the mould are porous. With my implement, the laboriousness of the operation is greatly reduced because of the fact that the vibratory impulses imparted to the blade or shank of the implement permit it to be moved laterally through the mass of concrete, so that, in many cases, and with blades of certain profiles it is possible to move the blade laterally over substantially the entire area of concrete to be treated without the necessity of lifting or lowering the blade, at least to such an extent as has been necessary heretofore. It will be observed that in some forms the vibratory impulses directed in the plane of the blade are in a direction laterally of the blade, i. e., toward the side edges thereof and this assists in the lateral translatory movement of the blade through the mass while the blade is in vibration, and owing to the fact that the blade profile is such as to present lateral projections to take-

up against the concrete when the blade is subject to the lateral vibrating impulses, the action of the vibrator device is carried very directly into the interior of the mass of wet concrete so as to subject the mixture to a very direct vibratory action in all its parts through which the implement is traversed.

The thorough vibration of the mass of wet concrete is of great importance in securing the elimination of excessive water and improving the structure of the concrete. The vibration causes the water to rise in the mass and when it comes to the top it passes off or can be taken off and disposed of. Following the liquid are bubbles of air which rise to the top of the mass and escape. According to my invention provision is made for facilitating and assisting in the elimination of liquid and air bubbles, for it will be observed that for that purpose the direction of the impulses from the vibrating device and the shape of the shank or blade of the tool are properly coordinated. The blade has an irregular surface which facilitates the upward and outward passage of liquid and air from the concrete mass, and the direction of the vibratory impulses is in a general way transverse to the valleys or grooves in the tool blade which permit the outward passage of water and air bubbles, so that there is a maximum amount of vibration imparted to the mixture. The upward and outward passage of liquid and air is greatly facilitated by the flexibility of the blades provided, the vibratory movement of the blades being less adjacent their ends than adjacent the supporting elements therefor, thus bringing about generally wedge-shaped openings in the concrete of increased cross-sectional area from the ends of the blades towards the supporting elements through which the air and water may freely pass to the upper surface of the concrete.

Where my tool is used for working the concrete, the latter, when set, has infinitesimal air spaces therein, but these spaces are closed off from each other, for the most part, instead of being inter-communicating, and therefore the perviousness of the concrete is reduced to a minimum. In this respect concrete which is made according to the process herein described is markedly superior to that made by rapping or vibrating the mould.

It will be understood from the above description of the invention that the improved tool for working concrete may be readily inserted in the bed of concrete at as many points as may be necessary, the concrete being effectively sliced and settled, the air pockets being broken up and the time necessary for curing being greatly reduced.

While I have shown and described a preferred embodiment of my invention, it is to be understood that it is not to be limited to the details shown but is capable of modifi-

cation and variation within the spirit of the invention and the scope of the appended claims.

What I claim is:

- 5 1. In a tool for working concrete, a bar insertable in the concrete, and means for giving the bar a vibratory motion, said bar being of irregular cross-sectional shape in the direction of vibratory motion.
- 10 2. In a tool for working concrete, a bar adapted to be inserted in the concrete, said bar being of generally sinuous cross-sectional form, and means for giving the bar a vibratory motion.
- 15 3. In a tool for working concrete, a relatively elongated thin bar of generally sinuous cross-sectional form adapted to be inserted in the concrete, a handle associated with the bar, and means for giving the bar a vibratory motion with respect to the handle.
- 20 4. In a tool for working concrete, a frame, a vibrator mounted on said frame, a slicing bar rigidly connected to said frame at one end thereof, a handle mounted for movement on the opposite end of said frame, and means for limiting the movement of the handle to a direction transversely of the bar.
- 25 5. In a tool for working concrete, a frame, a vibrator mounted on said frame, a slicing bar rigidly connected to said frame at one end thereof, a pair of spaced substantially rigid arms on the opposite end of the frame, and a handle mounted between said arms for movement with respect to the frame.
- 30 6. In a tool for working concrete, a frame, a vibrator mounted on said frame, a slicing bar rigidly connected to said frame at one end thereof, a pair of spaced arms on the opposite end of the frame, a rod extending between said arms, and a handle mounted for movement on said rod between said arms.
- 35 7. In a tool for working concrete, a slicing element in the form of a blade, and means for imparting vibratory impulses to said blade in a generally transverse direction, the profile of said blade being such as to present a lateral projection thereon.
- 40 8. In a tool for working concrete, a slicing element in the form of a blade, and means for imparting vibratory impulses to said blade in a generally transverse direction, the profile of said blade being such as to present a lateral projection thereon, said vibratory impulses being imparted to the blade in a plane which is, generally, the plane of the blade.
- 45 9. In a tool for working mass concrete, the association with a slicing blade having a laterally projecting surface of a vibratory unit for said blade for moving said projecting surface against the mass in a generally transverse direction.
- 50 10. In a tool for working concrete the combination of a bar insertable in the con-
- 55

crete, a handle, means connecting said handle and bar for relative movement, said means restricting the movement to a direction transversely of the bar, and a vibrator associated with the bar and adapted to vibrate the same in said direction. 70

11. In a tool for working concrete the combination of a handle, a concrete working bar associated with the handle for relative movement in a direction axially on the handle, and means for giving the bar a vibratory motion in said direction. 75

12. In a tool for working concrete a generally U-shaped frame having a pair of arms, a handle mounted on said frame between said arms, a bar mounted on said frame opposite said handle and adapted to be inserted in the concrete, and means for giving the bar a vibratory motion with respect to the handle. 80 85

In witness whereof, I have hereunto set my hand this 22nd day of July, 1930.

GEORGE B. PICKOP.

90

95

100

105

110

115

120

125

130