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VIBRATOR FOR CONCRETE WORK

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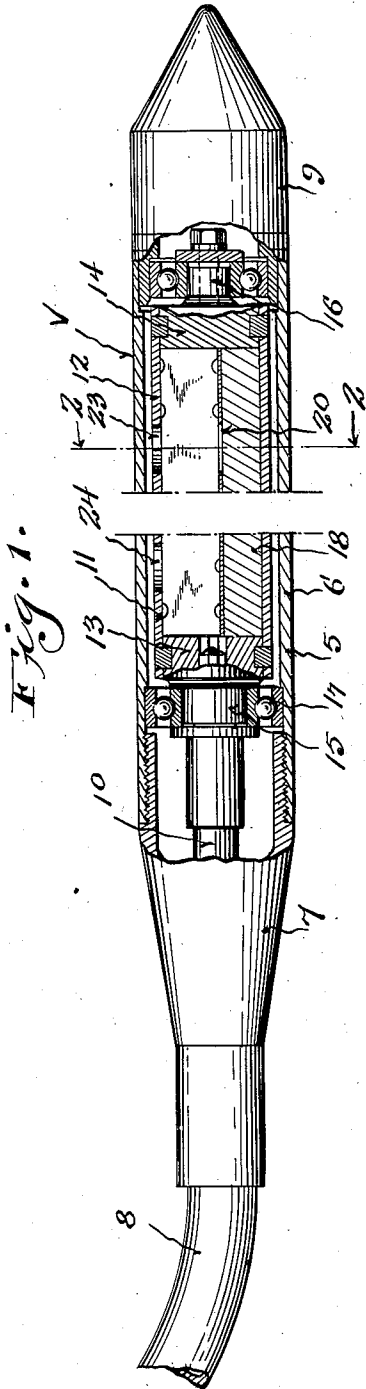
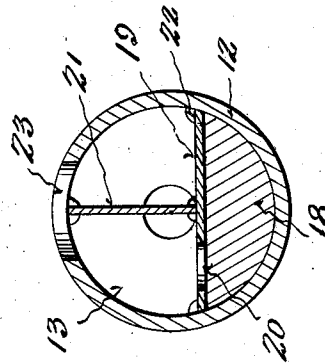


Fig. 2.



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VIBRATOR FOR CONCRETE WORK

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7 Claims. (Cl. 259—1)

This invention pertains to forming of concrete, and like plastic structures, and more particularly to a novel device for setting up vibrations in the concrete incident to the placing thereof in the forms for building walls, dams, and so forth.

It has been proposed to submerge, or partially submerge, a device having un-balanced weights therein for setting up vibrations in the plastic mass to facilitate the correct placing thereof in the form and in close contact with the walls thereof, and the reinforcing members (when utilized). In all of these devices, with which I am familiar, the weights are located at one end of the device, and thus the vibrations do not tend to radiate from the entire length of the tool, but only at the point of location of the weights, and the weights tend to shift the shaft out of line.

It is therefore one of the salient objects of my invention to provide a vibrator for concrete and like plastic masses, embodying an elongated cylindrical vibratory member, including a non-rotatable outer housing rotatably supporting an internal rotatable member extending longitudinally of the housing with an un-balanced weight carried by the member extending the full length thereof.

Another important object of my invention is the provision of the use of lead for the un-balanced or eccentric weight, it being found that lead will produce a most effective vibrator, permitting maximum kick for a minimum weight and diameter.

A further object of my invention is the provision of the use of an elongated mass of high specific gravity, as the vibratory element within the device, the construction being such the quantity of metal can be cut down, which would ordinarily counter-act the vibratory action of an off-balanced weight.

A further important object of my invention is the provision of novel means for placing the lead weight in position in the revolving element, and for anchoring the same in place, whereby the revolving part is prevented from bending and rubbing on the outer steel casing, which is placed in the concrete mass.

A further object of my invention is the provision of the use of a combination of lead with a steel reinforcing so as to obtain the most effective vibrator for a given length, diameter, and weight.

A further object of my invention is the provision of a removable wear-end for the tool, so that the same can be replaced as the same is

worn incident to the repeated use of the tool within the concrete masses.

A still further object of my invention is to provide a vibrator for concrete work, which will possess a minimum diameter, whereby the same can be readily inserted within the concrete between the reinforcing bars thereof having an off-balanced lead weight with a minimum of dead counter-acting weight action.

With these and other objects in view, the invention consists in the novel construction, arrangement, and formation of parts, as will be hereinafter more specifically described, claimed, and illustrated in the accompanying drawing, in which drawing:—

Figure 1 is a side elevation of my improved vibrator, with parts thereof broken away and in section to illustrate structural details.

Figure 2 is a detail transverse section through the rotor, taken on the line 2—2 of Figure 1, but on a larger scale.

Referring to the drawing in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter V generally indicates my improved vibrator, which comprises an elongated cylindrical housing 5, preferably formed from steel, or similar hard metal. This housing 5 includes an intermediate tubular or sleeve-like section 6, having threaded on the inner end thereof the head 7, which receives the flexible drive shaft 8. The outer end of the sleeve 6 detachably receives the penetrating point 9, which may or may not be provided with fins. This point can be threaded on the sleeve, or otherwise detachably secured in place, as may be preferred.

The penetrating point is also formed of hard material, and can be renewed as the same becomes worn, incident to the continued placing of the tool in the concrete masses. The casing of the flexible shaft can be readily secured to the head 7, and the rotating cork 10 thereof extends into the tool and is detachably connected with the rotor 11. The formation of the rotor 11 forms one of the salient features of my invention, and includes a cylindrical tube or sleeve 12 formed of hard metal, such as steel. This sleeve or tube 12 is of less diameter than the casing sleeve 6, and has firmly anchored in the ends thereof heads 13 and 14 provided with axially disposed stub shafts or spindles 15 and 16. These spindles are rotatably supported in anti-friction bearings, such as ball bearing races 17. The heads 13 and 14 of the cylindrical tube or sleeve 12 can be welded, soldered, or otherwise secured in place.

Extending longitudinally of the rotor is the lead weight 18, and it is to be noted that this weight is disposed entirely at one side of the axle center of the rotor. This lead weight 18 is placed within the rotor in a novel manner, and is firmly anchored in place in a novel manner, with the anchoring means forming a reinforcement for the rotor.

In accordance with my invention I provide a steel reinforcing rib or plate 19, which extends across the tube or sleeve 12 of the rotor, at one side of the longitudinal axis thereof. This steel plate, web, or rib can abut the end heads 13 and 14, and the same is provided with an orifice 20, the purpose of which will be later set forth.

A second longitudinally extending reinforcing plate or web 21 is provided. This web extends diametrically of the tube 12, and from one end of the same to the other, and the heads 13 and 14 are adapted to abut up against the ends thereof when the heads are placed in position. This reinforcing plate 21 engages the central portion of the plate 19, and the inner face of the tube 12. The reinforcing plates 19 and 21 are secured together, and to the inner face of the sleeve or tube 12, by welding, or by the use of solder 22.

Directly in line with the opening 20 the sleeve or tube 12 is provided with an opening 23, and the sleeve or tube can be provided with another opening 24 at a point spaced from the opening 20.

After the reinforcing plates 19 and 21 have been placed within the sleeve 12, and the end heads 13 and 14 have been anchored in place, the lead is introduced into the sleeve between the inner face thereof and the reinforcing plate 19, in a molten condition. A cone can be placed through the opening 23, and above the opening 20, so that the molten lead can be conveniently poured within the compartment defined by the reinforcing plate 19 and the inner face of the sleeve or tube 12. The opening 24 in the sleeve or tube constitutes a vent for hot vapors incident to the pouring of the metal in place. Obviously, the molten metal will fill up the entire space between the reinforcing plate 19 and the inner surface of the tube, and the same will closely adhere to the plate and to the tube. The reinforcing plate 19 constitutes an effective means for holding the lead 18 in place, and also constitutes a brace for the tube or sleeve 12. The provision of the web or plate 21 insures the rigidity of this structure.

By disposing the lead weight 18 longitudinally of the rotor, I am enabled to place the entire mass of the weight at one side of the axis of the rotor, and thus all dead or counter-balancing weight is eliminated. This insures a maximum amount of kick throughout the entire length of the vibrator. Not only am I enabled to obtain a maximum amount of kick throughout the length of the vibrator, but I am enabled to effectively decrease the diameter of the vibrator, and thus the vibrator can be effectively used in confined places.

By the use of the combination steel and lead rotor, the bending of the rotor is prevented, and thus all danger of the rotor contacting with the casing of the vibrator is prevented.

The vibrator can be effectively used with concrete, which would ordinarily be designated as dry concrete, and the tool is very effective for the treating of concrete in situ at points that are inaccessible for ordinary placing operation.

While I have stated that my improved tool is adapted to be submerged, or partially submerged, in the concrete mass, it is to be understood that

good results can be obtained from the use thereof by clamping the same to the sides of the concrete mass.

The flexible shaft 8 can be driven from any preferred type of a prime mover, such as an electric motor, internal combustion engine, and so forth.

Changes in details may be made without departing from the spirit or scope of my invention, but what I claim as new is:—

1. A vibrator for concrete work comprising an elongated cylindrical casing adapted to be totally immersed in the concrete work, an elongated rotor supported internally of said casing including a cylindrical hollow housing, an elongated weight in said housing extending the full length thereof and located entirely at one side of the axial center thereof, and a reinforcing plate extending across the housing and anchored thereto and fitted against said weight.

2. A vibrator for concrete work comprising an elongated casing, an elongated rotor mounted within said casing, said rotor including a hollow housing formed of hard metal, and a lead weight extending longitudinally of the housing disposed at one side of the longitudinal axis thereof, and means for anchoring the weight in the housing, said anchoring means including reinforcing plates.

3. A rotor for vibrators comprising an elongated hollow cylindrical housing of hard metal, a reinforcing plate arranged internally of the housing extending from one side thereof to the other and disposed on one side of the longitudinal axis of the housing defining in conjunction with the housing a compartment, said reinforcing plate having an opening therein, a second diametrically extending reinforcing plate secured to the housing and to the first plate, said housing having an opening in line with the first-mentioned opening, and lead received within said compartment, the lead being introduced through said opening in a molten condition in the compartment.

4. A rotor for concrete vibrators comprising an elongated sleeve of hard metal, a reinforcing plate extending across the sleeve and secured to the inner face thereof and disposed at one side of the longitudinal axis of the housing, said plate in conjunction with the sleeve defining a compartment, a second reinforcing plate secured to the inner face of the sleeve of the central portion of the first-mentioned plate, the sleeve and the first-mentioned plate being provided with openings, heads rigidly secured to the ends of the sleeve and abutting the ends of the plates, and a lead weight in said compartment, the lead being introduced in a molten condition through the openings.

5. In a vibrator for concrete work comprising a stator including an elongated casing, a sleeve, a removable penetrating point detachably carried by the outer end of the casing, a sleeve, a head detachably connected with the inner end of the sleeve, a flexible drive shaft including a casing and a drive core, the casing being connected with the head, a rotor mounted within the stator and operatively connected to the core, said rotor including a tubular housing of hard metal, and an elongated weight arranged within the casing at one side of the longitudinal axis thereof.

6. A vibrator for concrete work comprising an elongated cylindrical casing adapted to be totally submersed in the concrete work, said casing having a shell member internally threaded at both

ends, a flexible drive casing screw-threadedly secured to one end, a pointed penetrating member secured to the other end, a pair of bearings, a rotor in said shell mounted in said bearings, a
5 rotor having a tubular member, end closure members engaging said bearings and an offset lead weight therein, a plate mounted in said tubular member forming a confined space, said
10 lead weight in said space, said lead adapted to be poured into said space in a molten state and said plate and tubular member having aligned openings to permit introduction of said lead.

7. A vibrator for concrete work comprising an elongated cylindrical casing adapted to be totally
15 submersed in the concrete work, said casing having a shell member internally threaded at both

ends, a flexible drive casing screw-threadedly secured to one end, a pointed penetrating member secured to the other end, a pair of bearings, a rotor in said shell mounted in said bearings, said
5 rotor having a tubular member, end closure members engaging said bearings and an offset lead weight therein, a plate mounted in said tubular member forming a confined space, said
10 lead weight in said space, said lead adapted to be poured into said space in a molten state, said plate and tubular member having aligned openings to permit introduction of said lead, and said plate having a second opening to permit egress of hot vapors during the lead filling action.

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