June 14, 1960 R. MEYER 2,940,326

IMMERSION TYPE VIBRATOR FOR CONSOLIDATING CONCRETE

Filed July 8, 1957

Fig. 1.

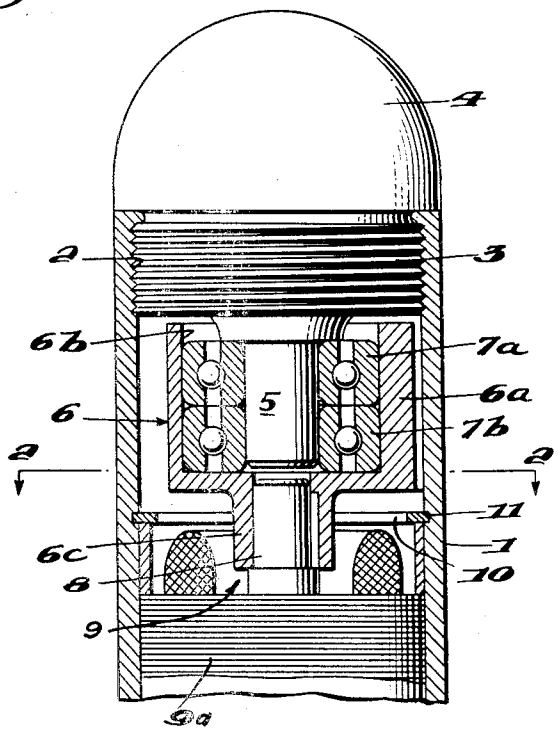
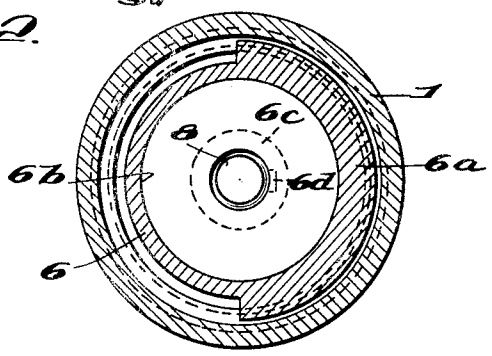


Fig. 2.



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IMMERSION TYPE VIBRATOR FOR CONSOLIDATING CONCRETE

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2 Claims. (Cl. 74—87)

This invention relates to electric motor-driven vibrators and more particularly to vibrators of the type adapted to be immersed in a freshly poured and still-fluid concrete mass for the purpose of consolidating the same.

The strength of concrete structures can, as is known, be increased considerably by shaking the still fluid concrete mass after the mold has been filled, because in this way any air spaces between the particles are driven out and rise to the surface as bubbles. One may either shake the mold or bring a vibrating body into contact with the fluid concrete mass itself. On the latter principle are based the immersion vibrators, i.e. metal bodies caused to vibrate and which are pulled through the concrete mass poured into the mold. The vibrator must be smooth and slender in order that it can pass through the meshes of a reinforcement for the concrete when used without getting caught. The vibrations are generated in a cavity of the vibrator casing by a swinging or rotating mass which is driven by a liquid or gaseous pressure medium or by a motor either from the outside by way of a flexible shaft or by an electric motor installed within the vibrator casing. Drive by a pressure medium is expensive and results in too heavy and too big a vibrator structure. For this reason, preference is given to drive by motor of a mass installed in the vibrator casing, and then again, to avoid the long flexible shaft, a vibrator with a coaxially installed electric motor having a high speed of rotation is preferred. The current supply cable for the motor passes through an end wall of the vibrator casing and is protected by a heavy rubber sleeve against tensile stress and damage. In a known design, the immersion vibrator casing consists of a hollow steel cylinder which is closed at one end by the lead-in sleeve for the cable, and at the other end by a rounded steel head. The high-speed electric motor is installed within the casing adjacent the cable lead-in while the cavity facing the head contains the eccentric mass, e.g. a half cylinder of steel with two centric trunnions. The motor and eccentric are each mounted in two ball or roller bearings and connected by a coupling. This known design results in a relatively long vibrator cylinder and is relatively heavy.

The purpose of the present invention is to provide a shorter and lighter design. This is achieved in that the eccentric member is hollow, attached directly on the shaft end of the motor, and mounted on a shaft located at the head of the vibrator.

In the drawing, an embodiment of the invention is represented, Fig. 1, showing a vertical longitudinal central section through the head end of a cylindrical vibrator, and Fig. 2, a transverse section through the eccentric mass contained therein on line 2—2 of Fig. 1.

With reference now to the drawing, the casing 1 of the vibrator is preferably made of steel and is seen to be of cylindrical configuration. One end of the casing 1 is provided with an internal screw thread 2 for receiving the male threaded end 3 of an externally rounded head 4 also

made of steel. Integral with the head 4 and extending axially into the casing 1 is a trunnion or stub shaft 5, and an eccentric member 6 surrounds the trunnion shaft 5, it being noted that the eccentric member 6 is provided with an eccentrically located mass portion 6*a* and an internal cylindrical sleeve portion 6*b* concentric with the axis of shaft 5, and that a double ball bearing 7*a*, 7*b* disposed between the shaft 5 and the surface of the cylindrical sleeve portion 6*a* is used to journal the eccentric member 6 for rotation about the axis of shaft 5. The eccentric member 6 is also provided with an axially extending sleeve portion 6*c* below the ball bearing 7*a*, 7*b* having a key slot 6*d* and which receives the adjacent keyed end of the shaft 8 of the rotating element of motor 9 which is used to drive the eccentric member 6 in rotation. As is evident from the drawing, the stationary stub shaft 5 is coaxial with the motor rotor shaft 8 and the lower end of shaft 5 terminates adjacent the upper end of shaft 8. The motor 9 is inserted axially within the vibrator casing 1 and its stator element 9*a* which surrounds the rotary armature element is pressed against one side of a snap ring 10 which is fitted into a transversely positioned groove 11 in the casing 1. The opposite end (not shown) of the rotating member of the motor is provided with suitable bearings and is suitably enclosed by the opposite end of the casing. It will thus be noted, that in accordance with the invention, the shaft 5 and double ball bearing 7*a*, 7*b* not only serves as a bearing support or journal for rotation of the eccentric member 6 but also serves as a bearing support and journal for the corresponding shaft end of the rotating member of the motor 9. Also, by making the eccentric member with a considerably large internal cylindrical space to receive the ball bearing element, the eccentric mass portion 6*a* is, in effect, shifted more laterally outward from the axis of rotation than has been possible with prior constructions and thus for a given speed of rotation and given shaking effect to be produced, the structure may be made lighter and shorter i.e. in an axial direction than has been heretofore possible. A further axial shortening and reduction in weight also results from the fact that no longer is it necessary to provide a separate bearing element for that end of the shaft of the rotating element of the motor which is adjacent the eccentric member and a coupling element between that end of the motor shaft and the shaft of the eccentric member, both of which required axial space to accommodate them. Besides the advantages already pointed to, the invention also results in a reduction in production cost and a savings in time required for assembly. Also, the construction according to the invention makes it possible to more easily disassemble the vibrator for inspection and servicing.

I claim:

1. In an immersion type motor-driven vibrator for consolidating freshly poured and still fluid concrete and like masses, the combination comprising a cylindrical casing, a head at one end of said casing and closing the same, said head being provided with an integral stub shaft extending axially into said casing, a bearing surrounding and mounted upon said stub shaft, an eccentric member including an internal centric cylindrical sleeve portion surrounding and in contact with said bearing, an electric motor disposed within said casing, said motor including a stator element secured rigidly to the interior wall of said casing and a rotating element within said stator element, said rotating element being axially aligned with said stub shaft, and means securing said eccentric member directly to the adjoining end of said rotating element, said bearing thereby serving simultaneously as the support for said eccentric member and as the support for

that end of said rotating element which is secured to said eccentric member.

2. A motor-driven vibrator as defined in claim 1 wherein said means securing said eccentric member to the adjoining end of said rotating element is an axially extending integral sleeve portion on said eccentric member into which said rotating element is fitted and keyed.

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