

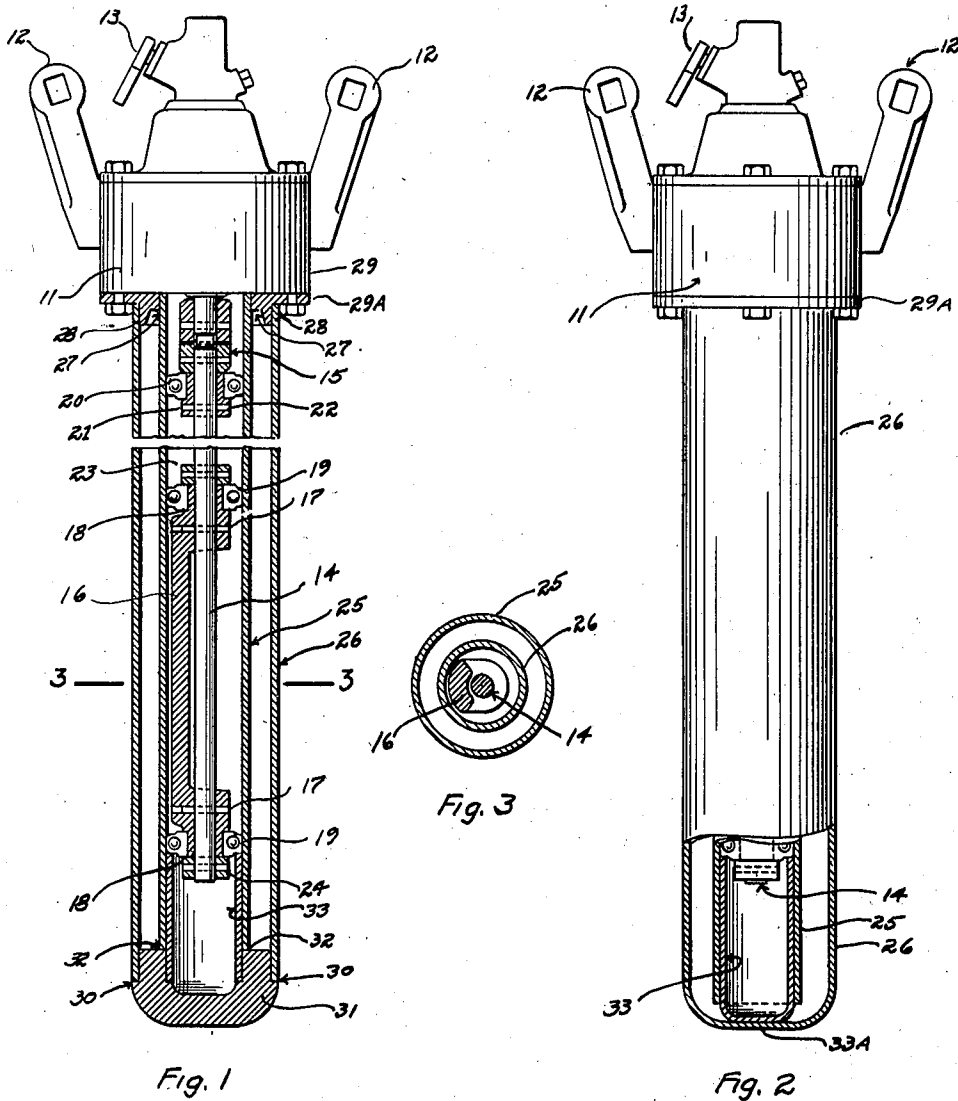
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CONCRETE VIBRATING MACHINE

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CONCRETE VIBRATING MACHINE

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My invention relates to machines for vibrating cementitious mixtures such as concrete, and more particularly to a vibratory mechanism having a special type of housing for improving the action of such machines.

It has become common practice in the placing and compacting of concrete mixtures in forms, or in large masses, such as in dam construction, to insert within the unset concrete a vibratory machine which transmits its vibratory energy to the concrete and causes it to "flow" into and fill the spaces within the form, or in the case of mass concrete construction to be levelled off and compacted onto the previously placed mass. It is an object of this invention to provide an improved vibrating machine which will place and compact a given mass of concrete in much less time. It is another object of my invention to provide a casing for the vibratory element which transmits the vibrational energy to the mass of concrete much more efficiently. It is a further object of my invention to provide a means for changing the vibration characteristics produced by the vibrating mechanism into other vibrations of different characteristics as delivered to the concrete mass. These and other objects will be apparent from the following description, and the drawing in which

Figure 1 is a view of a vibrator in elevation showing the housing in section.

Figure 2 is a view of a vibrator in elevation showing in section another form of the housing.

Figure 3 is a cross-sectional view of Fig. 1 taken on the line 3—3 of Figure 1.

An insertible vibrator for concrete must be so constructed that the moving parts are thoroughly protected from mechanical injury. In general, the machine comprises a rotary vibrating mechanism, means for rotating the vibrator, a housing for the motor means, and a housing for the vibrator mechanism adapted to be inserted in the unset concrete. In the drawing, 11 represents the motor means, 12 the handles by which the machine is controlled, and 13 the valve or switch means or controlling the operation of the motor means. The particular vibratory mechanism shown comprises an elongated shaft 14 connected to the motor shaft by the flexible coupling 15. Attached to the shaft 14 by pins 17 is an eccentric weight 16, whose ends 18 rotate in the bearings 19. This particular structure gives rigidity to the shaft and is believed to effect the periodicity of the vibrations generated. Other bearings 20 (the number of which is dependent upon the length of the shaft) between the eccentric weight and the

motor support the shaft 14, an adaptor sleeve 21 being attached by the pin 22 to the shaft. Collars 23 and 24 are fastened to the shaft to prevent its longitudinal movement.

The housing for the eccentrically weighted shaft system as above detailed comprises an inner casing or shell 25, which supports the bearings 19 and 20, and the outer shell or casing 26. The ends of the shells 25 and 26 are rigidly attached, as by welding at 27 and 28, to a collar 29A attached to the motor housing 29. The outer shell 26 is spaced from the inner shell 25, and is not attached intermediate its ends. In Fig. 1 the lower, or insertion end of the outer shell is joined at 30 to a nose-piece 31, and the inner shell 25 is likewise joined to the nose-piece at 32. A sleeve 33 fitting within the inner shell 25 serves to prevent longitudinal movement of the bearings 19 within the shell. The nosepiece 31 is made of hardened metal to withstand the mechanical strains and wear. An alternative arrangement is shown in Fig. 2, in which the outer shell 26 is a closed-end tube, welded or otherwise joined to the sleeve 33a, over which fits and is welded or attached the inner shell 25. Other equivalent arrangements may be employed.

The outer shell 26 is preferably made of hardened steel in order to withstand the strains and abrasions to which it is subjected in use, and also because of the stiffness and rigidity of hardened steel, which property permits it to be set in vibration. It is believed that the hardened steel transmits to the concrete mass the vibrational energy at a different frequency from that of its generation within the inner shell, of soft resilient steel.

The inner shell 25 is preferably made of tough, elastic steel, because its elasticity permits the transmitting of the vibrational energy set up by the rotating eccentric weight.

The method of using my machine is simple. The motor, and with it the shaft and eccentric weight, are rotated at high speeds from about 5,000 to 10,000 revolutions per minute. High frequency vibrations are set up by the eccentric weight. The end of the machine is thrust into the concrete mix, which takes up the vibrational energy transmitted to it by the double-walled housing, and this causes the damp mass to "flow" almost as a fluid, and to be compacted into a dense mass.

A vibrating machine constructed with the double-walled housing as above described, and when used as outlined, gives greatly increased efficiency over a similar machine having a single-

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walled housing. In repeated instances, a double-walled vibrator has been used to place and consolidate a mass of eight cubic yards of moist concrete mix in periods of time from 13 to 30 seconds, while another vibrating machine differing from the first only in having a single walled housing, has not been able to place and consolidate similar masses of concrete mix in less than 12 to 15 minutes of time. It is my belief that this increased efficiency is due to the peculiar vibrational characteristics of the double-walled housing, and may be due to the transmission of vibrational energy by the enclosed air between the walls, or it may be due to the different natural periods of vibration of the composite structure in comparison with a single walled housing.

While I have given this explanation of the action of my vibrator, and have shown the preferred embodiments, I do not limit myself to this theory of its operation, nor to the particular forms shown, but restrict my invention only insofar as is necessitated by the prior art and by the spirit of the appended claims.

I claim:

1. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising a double-walled metallic casing.

2. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising a double-walled metallic casing, the space between the two walls being hermetically sealed.

3. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising a double-walled metallic casing and a hermetically sealed chamber containing gas between the two walls of the casing.

4. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner metallic casing adapted to support the bearings for a vibrating mechanism, an outer metallic casing disposed away from said inner casing, and means for holding the inner and outer casings apart and for providing an airtight compartment between the two casings.

5. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner metallic casing adapted to support the bearings for a vibrating mechanism, an outer metallic casing disposed away from said inner casing, a collar adapted to hold the inner and outer casings apart and for attaching the housing to the motor unit, and a hardened nose-piece at the end of the housing opposite the motor unit adapted to hold apart the inner and outer casings and to protect the insertion end of the vibrator.

6. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner metallic casing adapted to support the bearings for a vibrating mechanism, an outer hardened resilient steel casing disposed away from said inner casing, and means for holding the inner and outer casings apart.

7. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner metallic casing adapted to support a vibrating mechanism, an outer metallic casing disposed away from said inner casing, and an end piece adapted to hold the inner and outer casings apart, the inner casing having a natural period of vibration different from that of the outer casing.

8. In an insertible vibrator for use in unset cementitious mixtures, a housing comprising a double-walled hermetically-sealed metallic casing, and means for transferring the vibrations from the inner portion to the outer portion of the housing.

9. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing a vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner elongated tubular casing adapted to be vibrated, an outer concentric elongated tube also adapted to be vibrated, and a hardened nosepiece attached to and spacing apart the inner and outer tubes.

10. In an insertible vibrator for use in unset cementitious mixtures, a housing for enclosing the vibrating mechanism and for transmitting the vibrational energy to the mixture, comprising an inner elongated tubular casing adapted to be vibrated, an outer concentric elongated tubular casing also adapted to be vibrated, the ends of the two tubular casings being hermetically sealed to form an annular space between them.

11. A machine for vibrating unset concrete and the like comprising a rotary means, a housing for said rotary means, an elongated shaft flexibly connected to the rotary means, an eccentric weight fastened to said shaft, bearings on either end of the eccentric weight, an inner metallic casing attached to said housing for rotary means and adapted to support the bearings and to be vibrated, an outer vibratable metallic casing attached to said housing for rotary means, and means for connecting together the free ends of the inner and outer casings, whereby the vibrations set up by the revolution of the eccentric weight within the inner casing are transmitted to the outer casing.

12. A vibratable housing for an insertible concrete vibrator, comprising a double-walled metallic casing having an hermetically sealed space between the two walls, the inner wall being of high tensile, high elasticity steel, and the outer wall of hardened, low elasticity steel.

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