

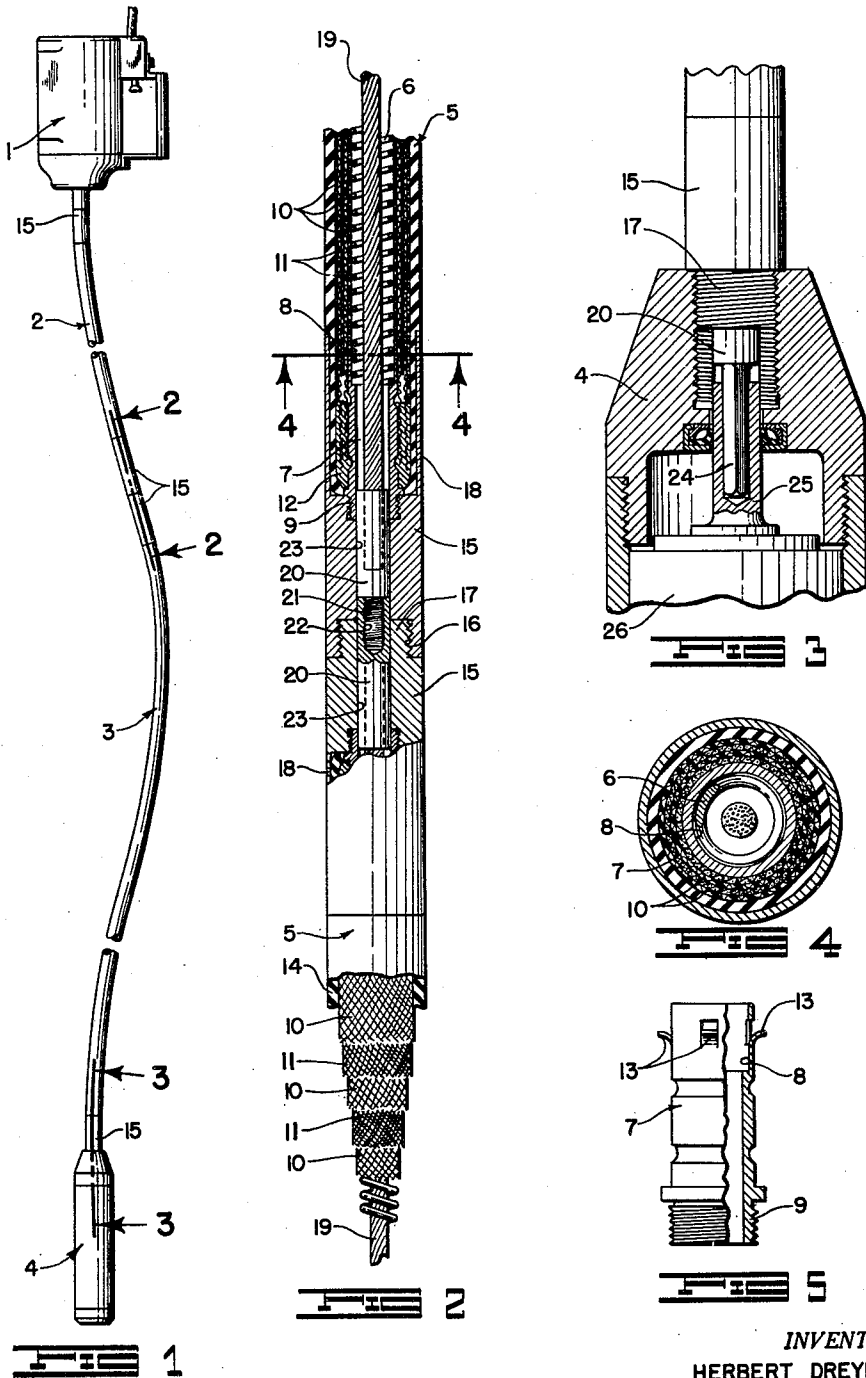
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FLEXIBLE DRIVE MEANS FOR CONCRETE VIBRATORS

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FLEXIBLE DRIVE MEANS FOR CONCRETE VIBRATORS

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6 Claims. (Cl. 64—4)

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My invention relates to flexible drive means for concrete vibrators. Concrete vibrators are devices which are lowered between the forms of a wall or other structure in the course of pouring concrete for the purpose of vibrating the fresh concrete thereby to consolidate and increase the density and strength of the concrete. Such devices are suspended from flexible drive cables which not only supply the rotary motion to eccentric devices or other vibrating mechanisms contained in the head of the vibrator, but also serve as the means for lowering, raising and manipulating the vibrator in and around reinforcing and other obstructions. As a consequence, such drive cables are subjected to extreme abuse.

Included in the objects of my invention are:

First, to provide a flexible drive for concrete vibrators which is particularly adapted to withstand the abuse inherent in the use of concrete vibrators.

Second, to provide a flexible drive for concrete vibrators which may be made in sections so that the length of the flexible drive means between the motor and the vibrator head may be varied to meet the conditions of use.

Third, to provide a flexible drive which employs a coupling structure so arranged that both the sheath or housing and the drive shaft have corresponding coupling elements which may be readily connected or disconnected; or, when desired, the drive shaft may be removed or inserted into the entire length of the coupled sections of sheathing without disconnecting the coupling elements of the sheathing or the drive shaft, thereby facilitating greasing and servicing of the flexible drive.

Fourth, to provide a sectional flexible drive means for concrete vibrators which eliminates the need of special bearing units interposed between adjacent sections, instead, the coupling provided at the ends of each flexible housing section forms a bearing in which is journaled the couplings which join the sections of flexible shaft.

With the above and other objects in view, reference is directed to the accompanying drawings in which:

Figure 1 is an elevational view of my flexible drive means shown in association with a motor drive unit and vibrator head.

Figure 2 is an enlarged fragmentary sectional view through 2—2 of Figure 1 with portions shown in elevation, and showing particularly the coupling means which join adjacent sections of the flexible shaft and shaft housing.

Figure 3 is a fragmentary sectional view

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through 3—3 of Figure 1 with the coupling member of the flexible drive in elevation.

Figure 4 is a further enlarged transverse sectional view through 4—4 of Figure 2.

Figure 5 is a fragmentary sectional view showing a modified form of end mandril which may be employed in my flexible drive means.

The complete concrete vibrator includes a motor 1, flexible drive units 2 and 3 which may be used individually or connected, or for special occasions additional flexible drive units may be provided. The lowermost drive unit is joined to a vibrator head 4.

In operation the motor unit is held by the operator or suspended from a suitable support and the vibrator head is forced into newly poured concrete and in and around reinforcing. This involves a considerable twisting and turning of the flexible drive units as the vibrator head is raised and lowered and moved from one place to another in the concrete.

Each flexible drive unit includes a flexible housing 5. The housing includes a steel coil 6, the ends of which are adapted to fit in a mandril 7 having a counterbore 8. The opposite or extended end of the mandril 7 is threaded, as indicated by 9. The steel coil is wrapped with servings of wire braiding 10 and rubber or synthetic rubber impregnated fabric 11, arranged alternately. All or some of the servings may extend the entire length of the steel coil. It is preferred, however, to provide gradually decreasing stiffness from the mandril toward the mid-portion of the flexible housing. Consequently, at least the outer servings of wire braiding 10 may terminate at different distances from the mandril 7. The servings are braised or soldered to the mandril, as indicated by 12. For this purpose, the mandril may be provided with one or more channels into which the bonding metal is flowed, and, in addition, the mandril may have outwardly pressed tongues 13 which press through the strands comprising the wire braiding. The servings are encased in an outer molded serving or cover of rubber, synthetic rubber, or other yieldable material. The rubber cover 14 is so molded as to expose the threaded end 9 of the mandril.

Each mandril is adapted to be screwthreaded into a tubular coupling 15. The extended ends of the couplings 15 may be provided with internally threaded sockets 16 or mating threaded pins 17 so that the couplings of adjacent sections of flexible housing may be joined together as shown in Figure 2, or joined to the casing of the motor drive unit or to the casing of the vibrator head.

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Each tubular coupling 15 is provided with an integral sleeve 18 of approximately the same length as the mandril 7. It is preferred to mold the covering 14 to a diameter equal to the outside diameter of the tubular coupling and then, prior to assembly, grind the surface of the molded covering 14 until the end will slide into the sleeve 18 and permit the mandril 7 to be threaded into the coupling 15. It is preferred that the threads which join the mandril 7 to the tubular coupling 15 and the threads provided in the sockets 16 and pins 17 be left handed threads, or at least be threaded in the same direction and in opposition to the torque which may be transmitted from the drive cable (to be described hereinafter) to the flexible housing.

Each flexible housing 5 receives a drive cable 19. Attached to each end of each drive cable 19 is a coupling member 20. The coupling members 20 are provided with pins 21 or sockets 22 threaded so that the coupling members may be joined end-to-end. The drive cables are of such length that their coupling members 20 fit within the bore defined by the corresponding mandril 7 and tubular coupling 15. These bores are accurately turned so that they may serve as bearings 23 capable of journalling the coupling members 20. The bores of the tubular couplings 15 alone are of sufficient length to constitute the bearings for the coupling members 20; therefore, if desired, the bores of the mandril 7 may be enlarged slightly and reduce the tolerance with which the mandrils need be fitted into the tubular couplings.

It is customary to provide a squared or keyed shank 24 on the lowermost coupling member 20, which shank is adapted to fit into a correspondingly formed socket within a stem 25 provided on the rotating element 26 contained within the vibrator head 4. With this arrangement, it is possible to withdraw or insert the drive cable without disconnecting the vibrator head from the adjacent flexible drive unit.

It will be observed that by employing the tubular couplings 15 as bearings for the coupling members 20, the need of any bearing mounted adaptor fitting between adjacent flexible drive units is eliminated. Consequently, it is possible when servicing or greasing any flexible drive means to withdraw the entire set of drive cables without separating the tubular couplings or coupling members and to reassemble the combined drive cables into the flexible housing after greasing or servicing. It is not necessary that the drive cables be entirely removed for high pressure lubricant may be forced between the cable and the housing, particularly if the cable is raised until the coupling members are within the steel coil 6. Under these conditions, the lubricant may be forced around and past the coupling members without difficulty.

When it is desired to shorten or lengthen the flexible drive means, it is merely necessary to unthread the adjacent couplings 15 exposing the coupling members 20 which are then unthreaded. The threads of the tubular coupling members may become damaged in service, although the flexible housing may be in good condition. Conversely, the housing may be damaged without damage to the tubular couplings. By reason of the fact that the tubular couplings are connected by threads to the mandrils 7, it is convenient to disconnect the tubular couplings from their flexible housing for replacement or repair of either member.

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Many other embodiments of the invention may be resorted to without departing from the spirit of the invention.

I claim:

1. A flexible drive means for connection between a motor drive unit and a concrete vibrator head, said drive means comprising: a flexible housing including metal reinforcing servings and molded servings forming a flexible tube; tubular end mandrils secured to the metal servings of said flexible housing, said mandrils having threaded extremities; tubular couplings threaded to receive said mandrils and including sleeves overlying the extremities of said flexible housing; and a flexible drive shaft axially displaceable and rotatably mounted within said flexible housing.

2. A flexible drive means for connection between a motor drive unit and a concrete vibrator head, said drive means comprising: a flexible housing including metal reinforcing servings and molded servings forming a flexible tube; tubular and mandrils secured to the metal servings of said flexible housing, said mandrils having threaded extremities; tubular couplings threaded to receive said mandrils and including sleeves overlying the extremities of said flexible housing; a flexible drive shaft in said flexible housing; and coupling members at the extremities of said flexible drive shaft, journalled in and by said tubular couplings and axially displaceable therein.

3. A flexible drive means for connection between a motor drive unit and a concrete vibrator head, said drive means comprising: a sectional flexible housing, each section including a flexible tube having metal and non-metal servings, tubular mandrils joined to the extremities of the metal servings of said flexible tube, tubular couplings joined by threaded connections to said mandrils and having sleeves overlying the extremities of said flexible tube, said tubular couplings having screwthread means for joining said housing sections end-to-end and to said motor unit and said vibrator head; a sectional flexible shaft, each section including coupling members for joining sections of said shaft together and to said motor unit and said vibrator head; said coupling members disposed within and journalled directly by said tubular couplings and axially displaceable therein.

4. A flexible drive means as set forth in claim 2 wherein clearance is provided between the sections of flexible shaft including said coupling members and the sections of flexible housing, thereby to permit passage of a lubricant from end-to-end of a multiple section drive means, upon axial displacement of the flexible shaft coupling members into the sections of flexible housing.

5. A flexible drive means as set forth in claim 3 wherein clearance is provided between the sections of flexible shaft including said coupling members and the sections of flexible housing, thereby to permit passage of a lubricant from end-to-end of a multiple section drive means, upon axial displacement of the flexible shaft coupling members into the sections of flexible housing.

6. In an apparatus of the class described: a flexible housing including metal reinforcing servings and molded servings forming a flexible tube; tubular end mandrils secured to the metal servings of said flexible housing, said mandrils having threaded extremities; and tubular cou-

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plings threaded to receive said mandrils and including sleeves overlying the extremities of said flexible housing.

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