(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 428 028 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **90121059.1**

(51) Int. Cl.[5]: **E04G 21/08**, //B28B1/08

(22) Date of filing: **02.11.90**

(30) Priority: **08.11.89 SE 8903740**

(43) Date of publication of application:
22.05.91 Bulletin 91/21

(84) Designated Contracting States:
DE DK ES FR GB IT NL SE

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(54) A poker vibrator for compacting concrete.

(57) The present invention relates to a method, and an apparatus for carrying out the method, in internal or 'poker' vibrators intended for compacting concrete, the vibration-generating movement being imparted to the vibrators by an electric motor housed in the poker and driving an excentric mass, and in which the power, transmission from a power source to the electric motor is effected via an electric cable enclosed in a casing. According to the method, the vibrations generated by the poker vibrator are insulated exclusively to the poker itself with the aid of a vibration-insulating element mounted between the poker and the casing. The method is carried intoeffect in that the poker (1) and the casing (2) are united with a helical spring (4), or alternatively with an element of polymer material, which, in its longitudinal direction, has a central portion (4a) with a spring rate which is higher than the spring rate of the surrounding free portions (4b, 4c).

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A POKER VIBRATOR FOR COMPACTING CONCRETE

TECHNICAL FIELD

The present invention relates to a method, and an apparatus for putting the method into effect, for insulating vibrations exclusively to the poker in poker vibrators intended for compacting concrete, partly for increasing the energy transmitted by the vibrator to the concrete and partly for eliminating harmful vibrations which, in hand-operated vibrators of the above type, may be transmitted to the operator.

BACKGROUND ART

Internal, or so-called 'poker' vibrators are employed for the inner vibration of, for example, concrete and consist of an excentric mass rotatably disposed in a cylindrical casing, the vibration-generating rotational movement being imparted to the excentric mass from, for example, an electric drive motor housed within the poker.

As a rule, poker vibrators of the type contemplated here are classed as hand tools in which the power transmission from the power source to the drive motor disposed within the cylindrical casing of the poker is effected via an electric cable. To be able to manoeuvre the poker in an expedient manner, those casings in which the cable is enclosed are relatively rigid, at least in those portions most proximal the poker where it is held by the operator, which entails that a considerable proportion of the vibrations generated in the poker is also propagated to these portions. It will be apparent to the skilled reader that but a fraction of the energy generated by the poker is utilised for vibrating the concrete, while the rest of the energy is transferred to the power supply means of the poker, i.e. the casing held by the operator. The vibrations transmitted to the casing are often of such magnitude that they may cause injury to the operator, in particular in lengthy exposure times.

OBJECT OF THE INVENTION

The object of the present invention is to insulate those vibrations which are generated in the poker to the poker itself and thereby eliminate the vibrations which are normally propagated to the power supply means of the poker, in accordance with the disclosures of the appended Claims.

SUMMARY OF THE INVENTION

In conventional poker vibrators in which the power supply means is enclosed in a casing which is relatively rigid from the handling point of view, the movement amplitude is always greatest at the lower end of the cylindrical casing which surrounds the electric motor and the rotating excentric mass, called the poker, and fades linearly towards the upper end of the poker and, at this residual amplitude, progressively fades along the length of the casing of the power supply means. It follows that a portion of the energy transmitted to the poker which is intended to vibrate concrete is consumed in vibrating the casing, with the result that the output energy in the concrete proper is not at optimum level.

According to the present invention, the amplitude pattern may be drastically modified so that the amplitude is practically equal at both the upper and lower ends of the poker, and so that the amplitude is negligeable at the casing of the power supply means. It further follows that the energy supplied to the poker will, to a greater extent than in conventional poker vibrators, be employed for compacting concrete. A further major advantage inherent in the present invention is that the harmful vibrations transmitted through the casing to the operator are eliminated.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The nature of the present invention and its aspects will be more readily understood from the following brief description of the accompanying Drawings, and discussion relating thereto.

In the accompanying Drawings:

Fig. 1 illustrates the distribution of amplitude in a conventional poker vibrator;

Fig. 2 illustrates the distribution of amplitude in the apparatus according to the present invention; and

Figs. 3 and 4 illustrate two alternative embodiments of the apparatus according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to the Drawings, Fig. 1 schematically illustrates the distribution of the vibration amplitude 3 about the poker 1 and the casing 2. It will be apparent to the skilled reader that the amplitude is greatest at the lower end of the poker and fades linearly towards the upper portion of the poker and

then further along the casing. Three-dimensionally, the amplitude along both poker and casing displays conical configuration. Fig. 2 schematically illustrates the distribution of the vibration amplitude 3 about the poker 1, at the vibration-insulating element 4 and about the casing 2. It will here be apparent that the amplitude but insignificantly fades along the poker because of the vibration-damping element, and that residual amplitude along the casing is of insignificant magnitude. Three-dimensionally, the amplitude along the poker displays a more cylindrical configuration.

Fig. 3 illustrates one embodiment of the present invention in which reference numeral 1 designates a vibrator poker, reference numeral 2 a flexible casing surrounding an electric cable 10, and reference numeral 4 a vibration-insulating element which, for example, consists of a helical spring secured at its one end to the upper end 6 of the poker 1 by means of a sleeve 5 surrounding the poker and the spring, and secured at its other end to the lower end 8 of the casing by means of a sleeve 7 surrounding the poker and the casing. The spring 4 is not tightly coiled but has a pitch throughout its entire free length which is at least that much larger than its wire diameter that the spring coils cannot touch one another on 900 bending of the spring. Furthermore, the spring rate of the spring is stepwise modified along its free length in that a central portion 4a of the spring is of larger pitch or alternatively smaller diameter, or alternatively larger pitch and smaller diameter, than the neighbourlng free portions 4b and 4c.

The vibration-insulating element may be of alternative design and construction, for instance be made of a polymer material such as, for example, rubber and be cylindrically designed, with one or more longitudinal conduits for leading an electric cable necessary for driving the poker, and in which a central portion of the rubber body displays larger material thickness than surrounding free portions.

Fig. 4 illustrates an alternative embodiment of the present invention in which the flexible casing has been replaced by a non-flexible telescopically adjustable handle portion 9 intended to be used in concrete pouring in which deeper insertions into the concrete are required, for example in pouring and casting of flooring slabs. In addition to the above description with reference to Fig. 3 - which also applies to Fig. 4 - this alternative embodiment displays a handle 11 of the easy-grip type for the operator and provided with an integral power switch 13, as well as an additional handle 12 which makes possible two-handed operation. A further advantage afforded with this alternative embodiment is that the handle may be electrically heated.

The present invention should not be considered as restricted to that described above and shown on the Drawings, many modifications being conceivable without departing from the spirit and scope of the appended Claims.

Claims

1. A method in poker vibrators for compacting concrete, the vibration-generating rotational movement being imparted to the poker vibrators by an electric motor housed in the poker (1) and driving an excentric mass, and in which the power transmission from a power source to the electric motor is effected via an electric cable (10) which is enclosed in a non-flexible handle portion (9) for manoeuvrlng the poker, said poker being united with the handle portion by means of a vibration-insulating element (4), **characterised in that** the vibration-insulating element displays, in the longitudinal direction of its non-tensioned part, different portions with different spring rates, so disposed that a central portion of the element has higher spring rate than that of both of the surrounding end portions.

2. An apparatus for carrying out the method as claimed in Claim 1, **characterised in that** the vibration-insulating element (4) consists of a helical spring whose one end is surrounded by a sleeve (5) which fixes the spring to the upper end (6) of the poker, and whose other end is surrounded by a sleeve (7) which fixes the spring to the lower end (8) of the non-flexible handle portion (9), said spring displaying a pitch per coil throughout its entire free length which is greater than its wire diameter; **and that** a central portion (4a) of the spring has a greater pitch than the surrounding free portions (4b, 4c) of said spring.

3. An apparatus for carrying out the method as claimed in Claim 1, **characterised in that** the vibration-insulating element (4) consists of a cylindrically shaped body of polymer material with one or more conduits running in the longitudinal direction of the body, whose one end is vulcanised to a metallic anchorage (5) which fixes the cylindrically shaped body to the upper end (6) of the poker, and whose other end is vulcanised to a metallic anchorage (7) which fixes the body to the lower end (8) of the non-flexible handle portion (9); **and that** a central portion of the body displays higher spring rate than the surrounding free portions of the body in that, in the cross-section of the central portion, a larger area is taken up by the polymer material than is the case in the cross-section of the surrounding free portions.

Fig. 1

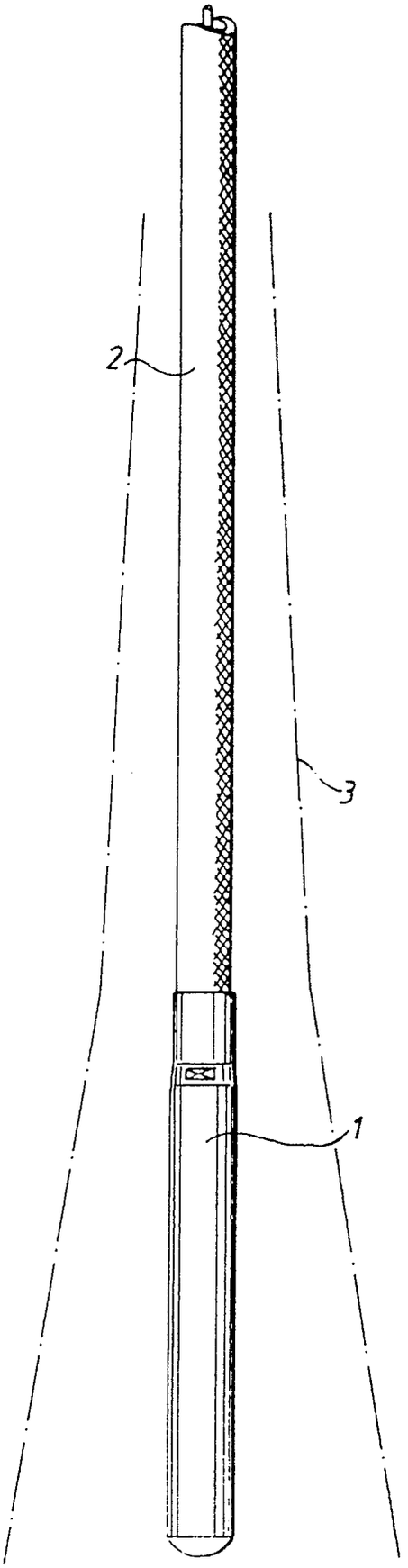


Fig. 2

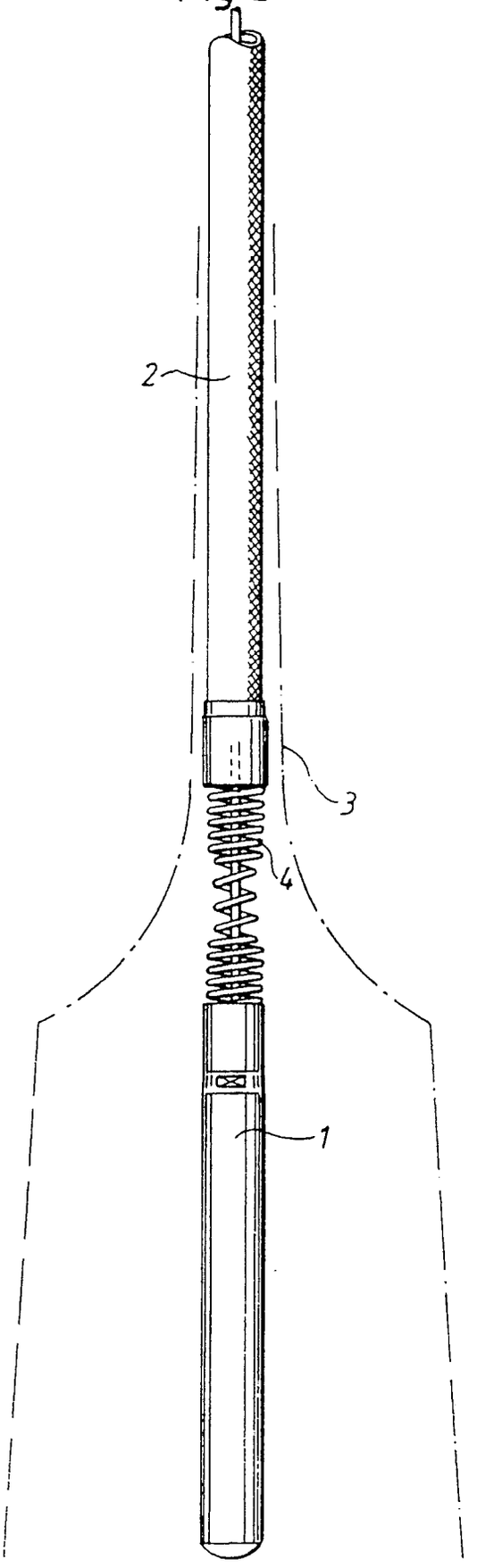


Fig. 3

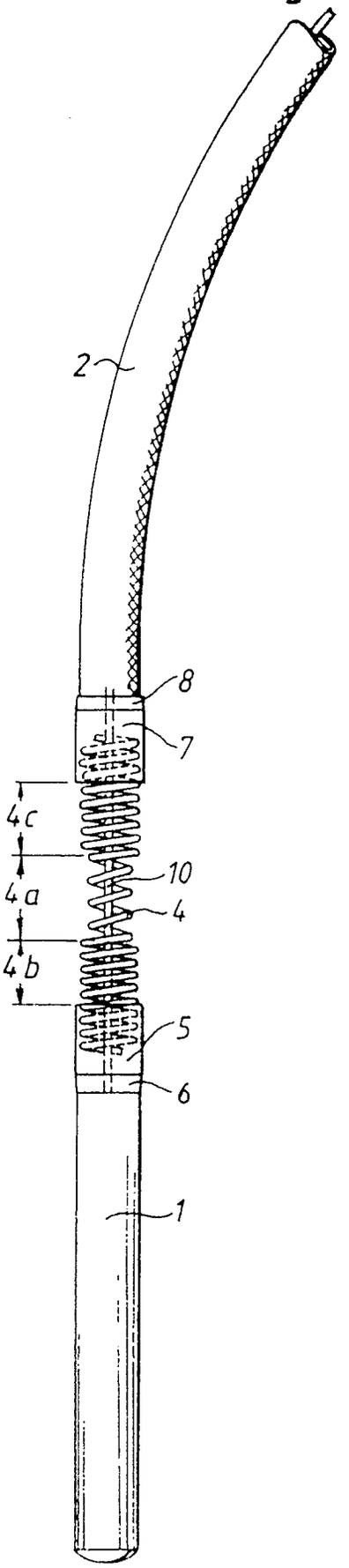
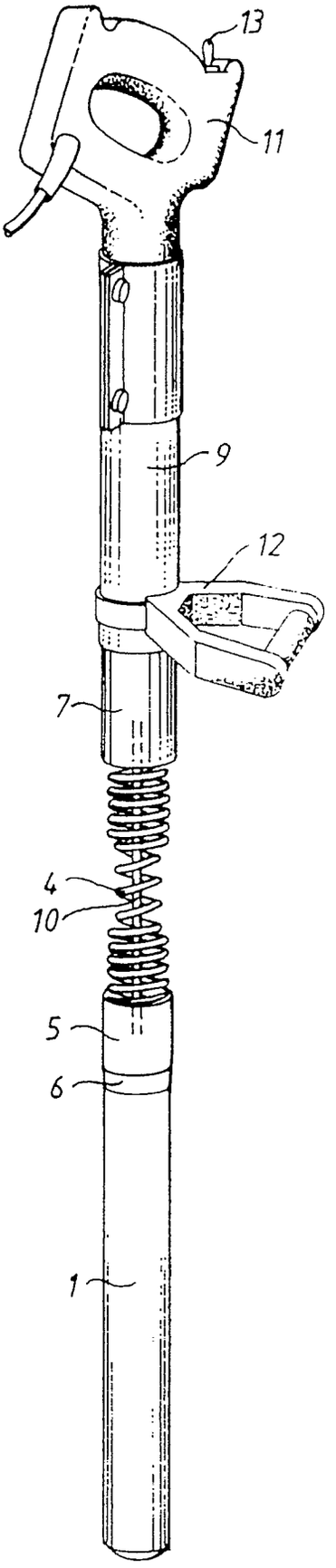


Fig. 4



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EUROPEAN SEARCH REPORT

Application number
EP 90121059.1

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl.)
X	US-A-4 086 970 (H. KATO) *column 1, line 8 - line 9 and lines 56-64; column 3, line 27 - line 68 and column 4, line 1 - line 32*	1,2	E 04 G 21/08 // B 28 B 1/08
X	US-A-4 135 826 (H. HOLM) *column 4, line 14 - line 39*	1,2	
X	US-A-1 947 941 (C. JACKSON) *page 1, line 46 - line 51 and lines 63-68*	1,3	
X	US-A-3 782 693 (G. STROHBECK) *column 3, line 1 - line 13*	1,3	
A	Derwent's abstract No. A79923/49, SU 899 356 (STAYTSEV N.A.), 27 January 1982	1-3	TECHNICAL FIELDS SEARCHED (Int Cl.) E 04 G B 28 B F 16 F B 25 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
STOCKHOLM	22-01-1991	BLOMBERG T.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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