

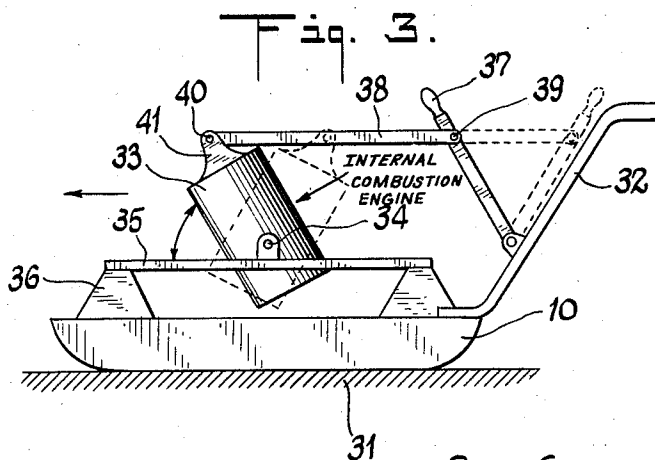
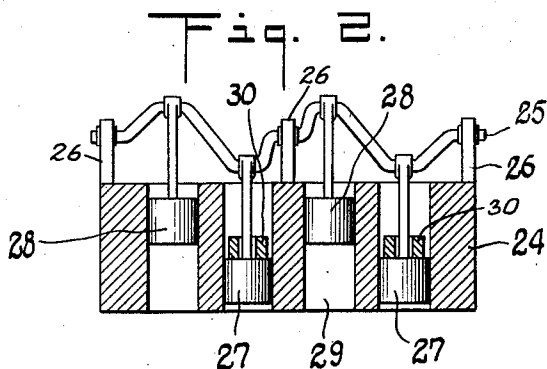
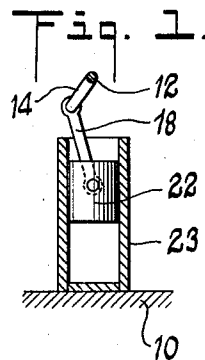
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S. GIERTZ-HEDSTRÖM

2,902,867

VIBRATION-PRODUCING DEVICE

Original Filed Sept. 21, 1950



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2,902,867

VIBRATION-PRODUCING DEVICE

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Original application September 21, 1950, Serial No. 185,984. Divided and this application May 13, 1953, Serial No. 354,810

2 Claims. (Cl. 74—61)

The present invention relates to mechanism by means of which vibrations may be produced and embodies, more specifically, an improved form of vibration-producing mechanism.

This application is a division of the copending United States application Serial No. 185,984 filed September 21, 1950, now abandoned.

Vibration-producing mechanisms are now commonly used in the building and other industries to accomplish certain well known operations such as the compressing of earth, the fluidizing of materials, and also, for example, the laying of concrete. Existing mechanisms of the character above mentioned have heretofore generally utilized rotatable shafts as a source of power, but in order to produce one-dimensional vibrations, these mechanisms have taken the form of a plurality of oppositely operating parallel shafts formed with eccentric weights and so related in phase of rotation that the plurality of shafts neutralize the out-of-balance weights in all directions save in the direction in which the vibrations are desired. Other mechanisms utilize weighted reciprocable members driven by cranks and require separate prime movers for their driving sources.

In order to simplify vibration-producing mechanism and to provide such mechanism in simple and effective form, the present invention has been designed, and among its numerous purposes is the object of providing a vibration-producing mechanism by means of which a single rotating member may be utilized as a source of power for mechanism for producing substantially unidirectional vibration.

Another object of the invention is to provide vibration-producing mechanism of the above character wherein an engine crank shaft is utilized as a vibration-producing power source, the vibration so produced being set up by one or more cylinders driven by the crank shaft through a connecting rod or rods.

Other and further objects of the invention will be apparent as it is described in greater detail in connection with the accompanying drawings, wherein—

Figure 1 is a schematic view showing one form of the invention;

Figure 2 is a fragmentary view in side elevation of an internal combustion engine, partly broken away and in section, showing a modified version of the invention, and wherein the internal combustion engine is utilized as a vibration-producing mechanism; and

Figure 3 is a view in side elevation showing a further modified form of the invention, and wherein there is provided mechanism for controlling the movement of the vibration-producing mechanism.

In accordance with the form of the invention illustrated in Figure 1, a foundation or base member 10 has mounted thereon a vibration-producing assembly including a crank shaft 12 and a crank 14 which drive a piston 22 through a connecting rod 18. The piston 22 reciprocates in a cylinder 23 that is carried by or mounted upon the base member 10, and vibrations are produced

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in accordance with the rectilinear movement of the piston. In this form of the invention the piston 22 and cylinder 23 form a part of an internal combustion engine, thus combining the elements of a prime mover with the elements of a vibration-producing mechanism.

With reference to the form of the invention illustrated in Figure 2, an internal combustion engine is illustrated as a vibration-producing mechanism, the engine being shown somewhat schematically as being provided with a cylinder block 24 and crank shaft 25 that may be suitably mounted upon the block 24 by means of pedestals 26. Pistons 27 and 28 reciprocate in the cylinders 29 formed in the block 24 and, in the form of the invention shown, adjacent pistons are 180° out of phase. In this fashion, pistons 28 are at the top of their stroke when pistons 27 are at the bottom, and one or more of one set of pistons are weighted in such fashion that vibrations are produced upon rotation of the crank shaft. For example, weights 30 are shown as being provided upon the pistons 27, thus to over-balance the pistons 28. Upon operation of the internal combustion engine of which the foregoing elements form a part, the weights 30 cause vibrations to be set up with a periodicity equal to the rate of rotation of the crank shaft 25.

In certain operations it is desirable to facilitate movement of the vibrating mechanism over the material that is subjected to its vibrations, and to this end the vibrating mechanism itself may be utilized to accomplish such movement. For example, in the form of the invention shown in Figure 3, the foundation or base member 10 is shown as subjecting material 31 to vibrations. In order that the vibrating mechanism may be moved over the material conveniently, the mechanism is provided with operating and guiding handles indicated generally at 32, the mechanism including an internal combustion engine 33 which may take the form of any of the examples illustrated in Figures 1 and 2, such mechanism being journaled at 34 upon spring members 35 that are mounted upon the base 10 through suitable pedestals 36. The axis of movement of the weighted members may be varied by means of a control handle 37 which is connected to the vibrating mechanism 33 through a link 38 that is pivoted at 39 to the handle 37 and at 40 to an extension 41 that is formed upon the vibrating mechanism 33. With the vibrating weights in the device 33 reciprocating in the plane illustrated by the solid line position of the mechanism 33 in Figure 3, the apparatus will move to the left as indicated by the solid arrow in Figure 3. Movement of the device in the opposite direction is accomplished by moving the handle and associated elements into the dotted line position illustrated in Figure 3.

The elements of these mechanisms are so designed as to cause the engine or other vibration-producing apparatus to be substantially vibrationless while causing strong desired vibrations to take place within the foundation or base member 10. The weights and springs are so designed that, when the vibration-producing mechanism is operating at the desired frequency, it will remain substantially vibrationless while the vibration forces will be transmitted to the base plate through the springs to cause the base plate to vibrate at substantial amplitude at the aforesaid frequency.

The nature of the material to be vibrated by the base member 10 and the frequency of vibration also are factors to be considered in determining the period of the springs 35. The same machine may of course be used to vibrate materials having different characteristics, e.g., elasticity or hardness, by merely varying the speed of the engine 33.

The vibration-producing mechanism may be designed in accordance with standard engine design inasmuch as the elements thereof will not be subjected to substantial

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stresses or strains in excess of those normally present during the operation thereof in a normal fashion. In such structures, the foundation or base member will be caused to vibrate substantially in resonance with the periodicity of the engine crank shaft while the relatively stationary engine components will remain substantially at rest.

Moreover, the use of an unbalanced internal combustion engine wherein the crank shaft is rotated by the strokes of the piston or pistons avoids the use of two individual units; i.e., a driving unit or prime mover and a vibration-producing unit coupled thereto.

While the invention has been described with specific reference to the accompanying drawings, it is not to be limited save as defined in the appended claims.

I claim:

1. Vibration-producing apparatus comprising a body member adapted to be urged against material requiring vibration, an internal combustion engine including a cylinder block formed with a plurality of cylinders, an engine crank shaft carried by the block and formed with adjacent cranks lying 180° apart, a plurality of pistons in the respective cylinders, connecting rods between the pistons and the cranks, at least one of the pistons being heavier than other of the pistons to cause vibration of the internal combustion engine during its operation, said

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heavier pistons being connected to the cranks disposed on the same side of the crank shaft, and resilient means connecting the cylinder block to the body member to cause vibration of the body member and minimize vibration of the engine.

2. Apparatus as defined in claim 1, wherein said resilient means includes spaced-apart pedestals on the body member, a flexible spring beam assembly between the pedestals, the periodicity of the resiliently mounted engine being such relative to the rotation of the engine crank shaft and to the elasticity of the material being vibrated that the engine cylinder block tends to stand still while the vibrational forces are transmitted to the body member for vibration thereof.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,902,867

September 8, 1959

Stig Giertz-Hedstrom

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the grant, lines 1, 2 and 3, for "Stig Giertz-Hedstrom, of Djursholm, Sweden," read -- Stig Giertz-Hedstrom, of Djursholm, Sweden, assignor to Vibro-Plus Corp., of Woodside, Long Island, New York, a corporation of Delaware, --; line 12, for "Stig Giertz-Hedstrom, his heirs" read -- Vibro-Plus Corp., its successors --; in the heading to the printed specification, line 3, for "Stig Giertz-Hedstrom, Djursholm, Sweden" read -- Stig Giertz-Hedstrom, Djursholm, Sweden, assignor to Vibro-Plus Corp., Woodside, Long Island, N. Y., a corporation of Delaware --.

Signed and sealed this 24th day of May 1960.

(SEAL)

Attest:

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Attesting Officer

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Commissioner of Patents