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Yamamoto

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[54] **EARTH TAMPER**

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[52] **U.S. Cl.** **404/133**

[51] **Int. Cl.²** **E01C 19/30**

[58] **Field of Search** 404/113, 133

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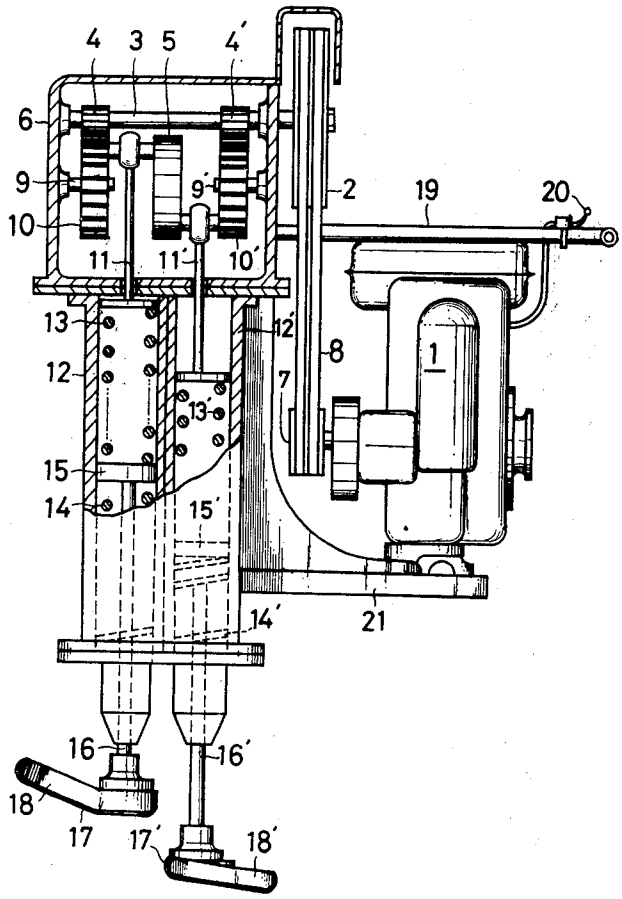
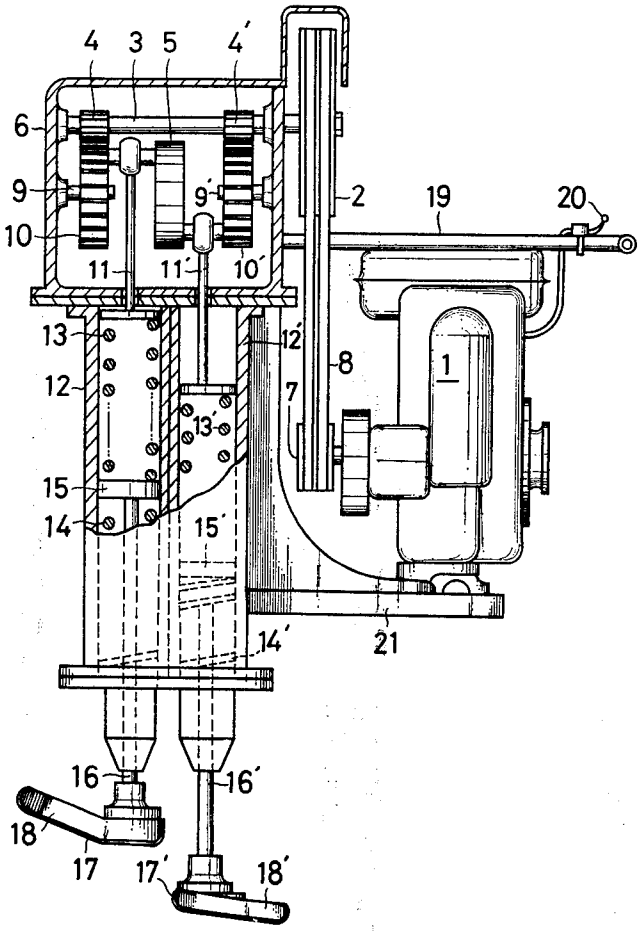
[57] **ABSTRACT**

Device for tamping the earth including two vibration systems each consisting of a pair of upper and lower driving rods and a spring mounted between the rods. Each of said upper driving rods is driven by the engine through a crank means so that they reciprocate alternately with each other. The movement of each of the upper driving rods is transmitted to the corresponding lower driving rod through said spring so that foot plates installed respectively at the lower end of each of the lower driving rods are alternately reciprocated to ensure efficient use of the engine rotation and the weight of the tamper per se while maintaining the tamper stable and lowering the noise level.

1 Claim, 1 Drawing Figure




4
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5
4'
6
9
9'
2
19
20
10
11
11'
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12'
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1
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16'
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EARTH TAMPER

This invention relates to an earth tamper, and more particularly an earth tamper of two-vibration system which is capable of continuously tamping the earth for compacting it.

An earth tamper comprising a simple vibration system is known, which has a single vertically reciprocating rod for compacting the earth by the vibration and reaction thereof. Such conventional earth tamper having a simple vibration system has a shortcoming in that the posture of the tamper relative to the earth is unstable, because it has only one foot connected to the single rod. Furthermore, with the conventional simple vibration tamper, the rotation of the crankshaft of the driving engine thereof may not be synchronized with that of the single tamping rod, so that the fatigue of the material constituting the engine crankshaft is accelerated. As a result, the driving engine is damaged or otherwise broken comparatively soon after the beginning of use of the simple vibration tamper.

Therefore, an object of the present invention is to obviate the aforesaid difficulties of the conventional earth tamping machine of the simple vibration system. According to the present invention, there is provided an earth tamper having two alternately actuatable tamping foot plates, characterized in that the tamper comprises a rotary shaft which is driven by an engine through a transmission and extends through a gear box, a pair of pinions secured to the shaft, a pair of driving gears rotatably mounted on supporting shafts secured to the gear box so as to mesh with the pinions, a crankshaft having two 180° offset arms which are rotatably carried by the driving gears, the crankshaft having an axis of rotation which is parallel to that of the rotary shaft, a pair of upper driving rods pivotally connected to the two arms of the crankshaft and extending into two guide cylinders, respectively, compression springs disposed within the guide cylinders so as to be compressed by the upper driving rods, piston plates slidably disposed within the cylinders and connected to the upper driving rods while engaging lower springs, a pair of lower driving rods secured to the piston plates, and a pair of foot plates secured to the lower ends of the lower driving rods. With the two tamping foot plates, the earth tamper of the present invention becomes very stable, as in the case of a man walking with two feet. The construction of the earth tamper of the present invention ensures efficient use of the engine rotation and the weight of the tamper per se. Accordingly, the overall efficiency of the earth tamping operation is improved, and it is also possible to lower the noise level.

The invention will now be described in detail by referring to a single accompanying drawing, which is a vertical sectional view of an earth tamper according to the present invention.

In the drawing, **1** is a driving engine, **2** is a driving pulley, **3** is a rotary shaft, **4, 4'** are pinions coaxially secured to the shaft **3** with a spacing therebetween, and **5** is a crankshaft. The aforesaid pinions and the shafts are housed in a gear box **6.** The driving pulley **2** is secured to the rotary shaft **3** at the outside of the gear box **6,** so that the pulley **2** can be driven by the engine **1** through a transmission consisting of an engine pulley **7** and a transmission belt **8.** The crankshaft **5** has two 180° offset arms which are rotatably carried by driving gears **10, 10'**, respectively. The driving gears **10, 10'** are rotatably carried by supporting shafts **9, 9'** secured to the inner wall of the gear box **6,** in such a manner that the driving gears mesh with the pinions **4, 4'**, respectively.

A pair of vertically reciprocating upper driving rods **11, 11'** are pivotally connected to the two 180° offset arms of the crankshaft **5.** The lower ends of the upper driving rods extend into a pair of guide cylinders **12,** 12', respectively. The guide cylinders are integrally connected to the lower end of the gear box **6.** A pair of compression springs **13, 13'** are placed in the guide cylinders **12** 12', so that the springs may be compressed by the upper driving rods **11, 11'.** Piston plates **15, 15'** are secured to the lower ends of the upper driving rods **11, 11'** so as to slidably reciprocate in the piston **12,** 12', and lower springs **14, 14'** are disposed between the piston plates and the lower ends of the cylinders. The piston plates **15, 15'** also cary lower driving rods **16,** 16', respectively. Tamping foot plates **17, 17'** are secured to the lower ends of the lower driving rods. In the embodiment of the FIGURE, **18, 18'** are wooden shoes of the foot plates **17, 17', 19** is a handle, **20** is an engine speed regulating lever, and **21** is an engine base.

In the operation of the earth tamper of the aforesaid construction, the engine rotation is transmitted to the rotary shaft **3** through the transmission consisting of the pulleys **2, 7** and the belt **8.** As the shaft **3** rotates, the pinions **4, 4'** drive the cooperating driving gears **10,** 10', so as to turn the crankshaft **5.** Whereby, the upper driving rods **11, 11'** are alternately reciprocated vertically. The movement of the upper driving rods **11, 11'** is directly transmitted to the tamping foot plates **17, 17'** through the pistons **15, 15'** and the lower driving rods **16, 16'.** The springs **13, 13'** and **14, 14'** act to strengthen the tamping action of the foot plates **17, 17'.**

As described in the foregoing, with the construction of the present invention, the uniform rotation of the engine **1** is converted into alternate vertical reciprocation by the two **180°** offset arms of the crankshaft **5,** so as to alternately drive the two tamping foot plates **17, 17'.** The extruding power of the crankshaft and the weight of the tamper per se are superposed, for effecting smooth and powerful tamping action while ensuring stable posture of the tamper. It is known to those skilled in the art that, with the suitable selection and disposition of the springs **13, 13', 14, 14',** the jumping action and the tamping action of the foot plates **17, 17'** can be enhanced thereby, so as to enable the maximum use of the kinetic energy of the engine and the potential energy of the tamper. Furthermore, if the tamper is forwardly inclined, the two foot plates will enable automatic forward movement of the earth tamper while carrying out the effective tamping of the earth.

What is claimed is:

1. A hand-guided earth tamper adapted to be moved in a forward direction and having two alternately actuatable tamping foot plates comprising a frame means, a crankshaft rotatably mounted on said frame means and having two 180° offset arms, a prime mover mounted on said frame means, a transmission operably disposed between said prime mover and said crankshaft and through which said prime mover drives said crankshaft, a pair of upper driving rods with respective upper ends pivotally connected to said two arms of the crankshaft, two guide cylinders disposed below said crankshaft, said upper driving rods extending into said two guide cylinders respectively, piston plates slidably dis-

posed within said cylinders, a pair of lower driving rods having upper ends secured to the piston plates so as to follow the movement of the latter, compression springs arranged between the lower ends of the upper driving rods and the piston plates, compression springs arranged between the piston plates and the lower ends of the cylinders, a leading foot plate and a trailing foot plate secured to the lower ends of each of the lower driving rods, whereby the two **180°** offset arms effect upward movement of one foot plate while the other foot plate is moving downwardly to thereby provide a stable posture to the tamper, both of said foot plates being disposed at an acute angle relative to the longitudinal axes of said guide cylinders to provide for automatic forward movement of the tamper, whereby the tamper is hand-guided in said forward direction in a forwardly inclined disposition with said leading foot plate and said trailing foot plate arranged in series relative to said forward direction such that the earth tamped by the leading foot plate is subsequently tamped by the trailing foot plate.

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