United States Patent

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[54] **TAMPING MACHINE**
2 Claims, 2 Drawing Figs.

[52] **U.S. Cl.** **94/49**
[51] **Int. Cl.** **E01c 19/30**
[50] **Field of Search** 94/48, 49

[56] **References Cited**

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ABSTRACT: A tamping machine comprises a crank drive for operating a connecting rod, a pair of piston rods driven by the connecting rod and slidably received by the machine housing, a movable cylinder loosely mounted inside the machine housing, socket joint means for engaging the top end of the movable cylinder with the connecting rod, the forward or lower end of the piston rods being removably engaged with the lower end of the movable cylinder, and a percussion piston biased against the two ends of the cylinder and having a ramrod which has at the lower end thereof the tamping foot. The cylinder can be disassembled from the machine housing by disengaging it from the piston rods at the lower end of the former. The machine has further cushion springs for absorbing shock blows and a rod for supporting the machine and preventing turning of the tamping foot.

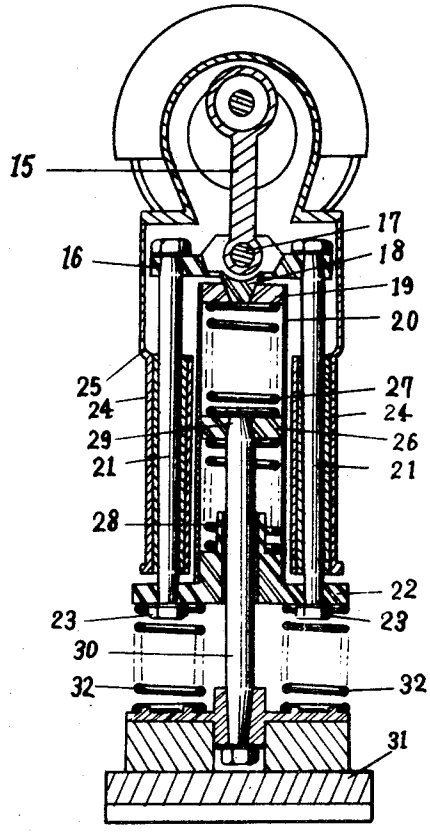


FIG. 1

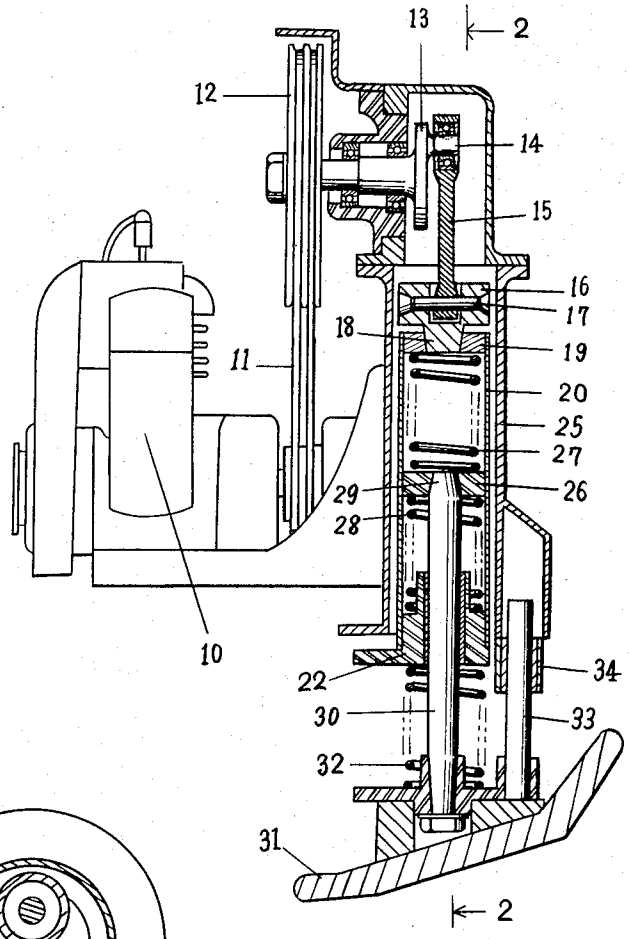
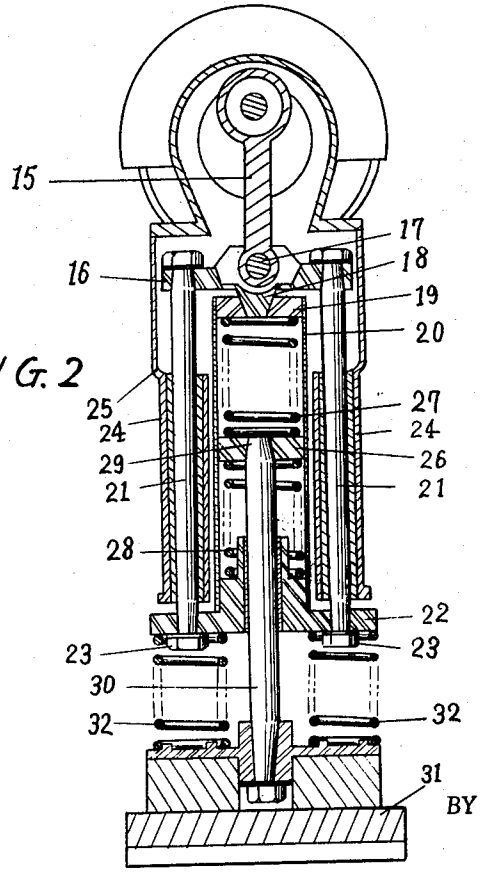

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FIG. 2


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TAMPING MACHINE

This invention relates to a tamping machine of the type manually guided for tamping grounds by vibrating means.

In one known embodiment of such a tamping machine the drive motor is connected to a crank drive for operating a connecting rod. The connecting rod engages a cylinder which is axially slidable in the housing of the device. In the interior of this slidable cylinder a piston is slidably mounted which is supported by means of springs against the two ends of the cylinder. The piston is slidably borne at the lower end portion thereof by the machine housing so that the piston supports the machine during the operation. The piston is connected with the working tool at the lower end of the device. During the reciprocating movement of the connecting rod and the cylinder, the springs disposed above and below the piston are alternately compressed and act to push the piston connected with the working tool up and down.

The device in accordance with the above system has the shortcoming that the shock blows are resisted solely by the spring disposed above the piston. Thus the spring is apt to be damaged or to fatigue rather quickly since it is subjected to repeated compression at a high frequency and heavy load.

Moreover, in the known embodiment, the connecting rod is linked to the upper end of the slidable cylinder by means of a pin to which a reciprocating movement is imparted in the housing of the machine, and the slidable cylinder is so constructed that it is covered by the machine housing. Thus, when a weakened or broken spring must be exchanged for a new one, it can only be done after disassembling the entire machine.

Furthermore, in the known device the cylinder is guided with the housing for the reciprocating movement of the former. The length of the guide for the cylinder is determined by the ratio of the lengths of the housing relative to the cylinder which may not go below certain limits. Moreover, as described above, the piston must support the machine. Thus there must be a sufficient length of axially supporting the machine housing at a position below the guide stroke of the slidable cylinder. If the movable parts of the reciprocating system must be protected against soiling, the lower end of the housing is sealed leaving a considerable clearance between the lower end of the housing and the tamping tool. Any such increase in the length of the housing relative to the cylinder, increase in the length of the piston for axially supporting the housing, and increase in the clearance below the lower end of the housing require a greater structural height as a result of which the center of gravity of the device is unfavorably shifted upwardly. This results in that the standing ability or stability of the device is adversely affected. Moreover, such a device is hard to guide and thus it causes increased physical strain on the operator.

It is therefore an object of the invention to overcome the above shortcomings in a unique fashion in that the connecting rod driven by a crank is connected by means of socket joint means without using a pin, with the top of a cylinder loosely mounted inside the machine housing. The housing is provided with guide sleeves each slidably receiving a rod therein. The upper end of the rod engages with the lower end portion of the connecting rod, while the lower end of the rod is removably fastened to the lower end portion of the cylinder. In the interior of the cylinder, a percussion piston is slidably mounted and is supported by springs against the two ends of the cylinder. The percussion piston carries a ramrod which extends downwardly through the lower end of the cylinder and is rigidly connected with the working tool at the lower end of the device.

In accordance with this arrangement the cylinder may be readily drawn out of the housing together with the piston, springs, and work tool by disengaging the lower end of the cylinder from the rod. Thus, should any part of the mechanism located within the tamping machine housing be in need of repair, such repairs can quickly and conveniently be made.

A further object and advantage of the apparatus in accordance with the invention is to provide for small structural height. Advantageously, this is accomplished in such a manner that the cylinder is guided for its reciprocating movement by a pair of piston rods which slide within the guide sleeves of the housing. The lower end of the cylinder is positioned below the housing. In this manner it is accomplished that the center of gravity of the device can be lowered.

Furthermore, the apparatus is advantageously so constructed that the reciprocating system and its drive means are protected against damaging shock blows by protective springs. Shock blows which are caused by such sudden movements of the device which run counter to the reciprocating system result in heavy loads on the drive means and the reciprocating system. Particularly, the percussion springs disposed above and below the piston in the cylinder are overloaded and deformed by the shock blows so that they fatigue and break. In order to prevent this a pair of compression springs is provided between the cylinder and the working tool. Thus, shock blows will be absorbed by the percussion spring and the two compression springs.

In this arrangement, hammering is prevented in the working tool of the invention. Further, the noise associated with the operation of the tamping machine may be minimized and the useful life of the machine may be increased.

In addition to the foregoing features, the apparatus of the invention is constructed in such a manner that the working tool is protected against twisting or turning. Twisting or turning would cause the operator problems in handling the machine. Turning of the working tool is prevented by connecting a second rod to the working tool. This rod extends upwardly parallel to the ramrod and is slidably received by the machine housing. The second rod also acts to support the machine housing. Thus, the standing ability of the device and the useful life of the machine are advantageously further increased by the provision of the second rod.

Further objects and advantageous features of the invention will become apparent from the following description, with reference to the accompanying drawings in which:

FIG. 1 is a sectional view of the device in accordance with the invention; and

FIG. 2 is a cross-sectional view taken along line 2—2 of FIG. 1.

As illustrated in the drawing, the tamping machine of the invention is provided with an internal combustion engine **10** which drives by way of belts **11** a pulley **12** for driving a crank **13** which has a stud **14** to which a connecting rod **15** is fastened. The connecting rod **15** is linked to a reciprocative piston member **16** by means of a pin **17**. The reciprocative member **16** has at the lower side thereof a conical extension **18** which is adapted to be received by a socket provided on the upper end **19** of a cylinder **20**. Secured to either side of the piston member **16**, with the conical extension **18** therebetween, and extending downwardly from the piston member **16** are rods **21** whose lower ends are fastened to the lower end **22** of the cylinder **20** by means of nuts **23**. The rods **21** extend parallel to the cylinder **20** and are received slidably by guide sleeves **24**, respectively, which form parts of the machine housing **25**. It should be noted that the cylinder **20** does not contact the machine housing **25**.

Mounted slidably in the cylinder **20** is a percussion piston **26** which is biased against the two ends **19** and **22** of the cylinder **20** by means of springs **27** and **28**. The percussion piston **26** is provided with a socket portion for receiving the upper end **29** of a ramrod **30** which extends axially downwardly within the cylinder **20** and projects from the lower end **22** of the cylinder **20**. The lower end of the ramrod **30** is fixedly secured to a tamping plate or foot **31**. Those skilled in the art will appreciate that the foot **31** is inclined relative to the ramrod **30** so that the tamping machine moves forward as the foot **31** vibrates.

Below the lower end **22** of the cylinder **20** there are located coiled springs **32** in alignment with the respective axes of the piston rods **21**. The upper end of the respective spring **32** bears against the lower end **22** of the cylinder **20** and the lower

end of the spring **32** rests against the foot **31**. These springs **32** serve as cushions for protecting the machine from shock blows.

The rod **31** has an upright rod **33** which extends parallel to the axis of the ramrod **30** and is slidably received by the machine housing part at **34**. The rod **33** protects the machine from undesirable turning or twisting. The rod **33** also functions to share the support and the load of the machine with the ramrod **30**.

Obviously the interconnection of the ramrod **30** and the percussion piston **26** is effected by gravity of the machine and the compression of the springs, thus the ramrod with the foot may be readily disconnected from the machine by merely drawing the rod out of the lower end **22** of the cylinder **20**. After disengaging the nuts **23** from the respective rods **21**, the machine housing may be readily taken off by hand or by suitable lifting tools for uncovering the cylinder **20**. The machine of the invention may be advantageously disassembled of its reciprocating system for releasing the springs from loads when the machine is not used. The disassembling and reassembling of the reciprocal cylinder and the pistons can be performed quickly and easily without any difficulty.

Although the presently preferred embodiment of the device has been described, it will be understood that within the purview of this invention various changes may be made in the form, details, proportion and arrangement of parts, the combination thereof and mode of operation, which generally stated consist in a device capable of carrying out the objects set forth, as disclosed and defined in the appended claims.

Having thus described my invention, I claim:

1. A tamping machine comprising a machine housing, a crank, drive means supported on said housing for driving said crank, a connecting rod connected to and driven by said crank, a member loosely supported in the machine housing and connected to said connecting rod for being driven in reciprocation thereby, said member including an extension on the underside thereof, a cylinder loosely mounted inside the machine housing and having at the top thereof a recess receiving said extension of said member, a pair of rods secured to and extending downwardly from said member and being slidably supported in the machine housing, guide sleeves in said housing for slidably supporting said rods, said cylinder including a lower flanged portion extending transversely of said guide sleeves externally of said housing, means for removably fastening the lower ends of said rods to the lower flanged portion of said cylinder at respective positions below the lower end of the machine housing, said fastening means constituting the sole means for holding said member integrally with said cylinder and rods so that said rods will prevent rotation of the cylinder relative to the housing, a percussion piston slidably mounted internally of said cylinder, springs mounted in said cylinder and acting on opposing faces of said percussion piston for supporting said percussion piston against the two ends of said cylinder, a ramrod carried by said percussion piston and extending axially through an opening in the lower end of said cylinder, and a working tool rigidly connected to the lower end of said ramrod.

2. A tamping machine as claimed in claim **1** wherein said extension on the underside of said member and said recess at the top of said cylinder are each generally conical.

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