

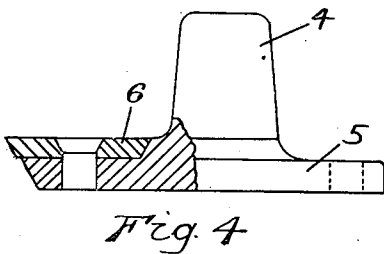
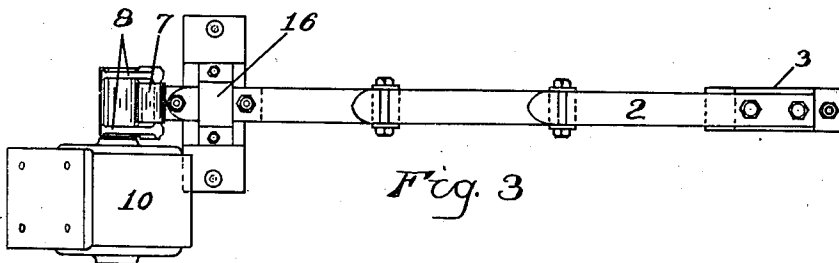
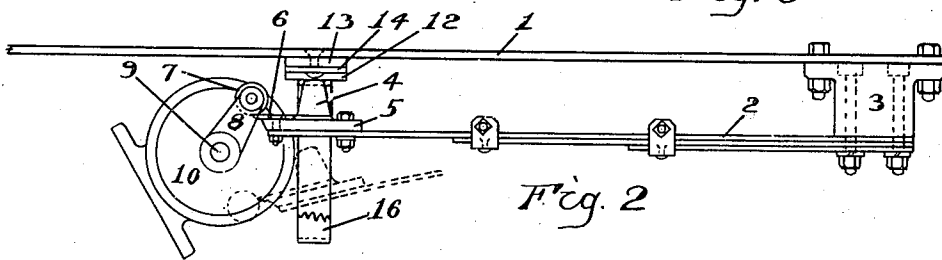
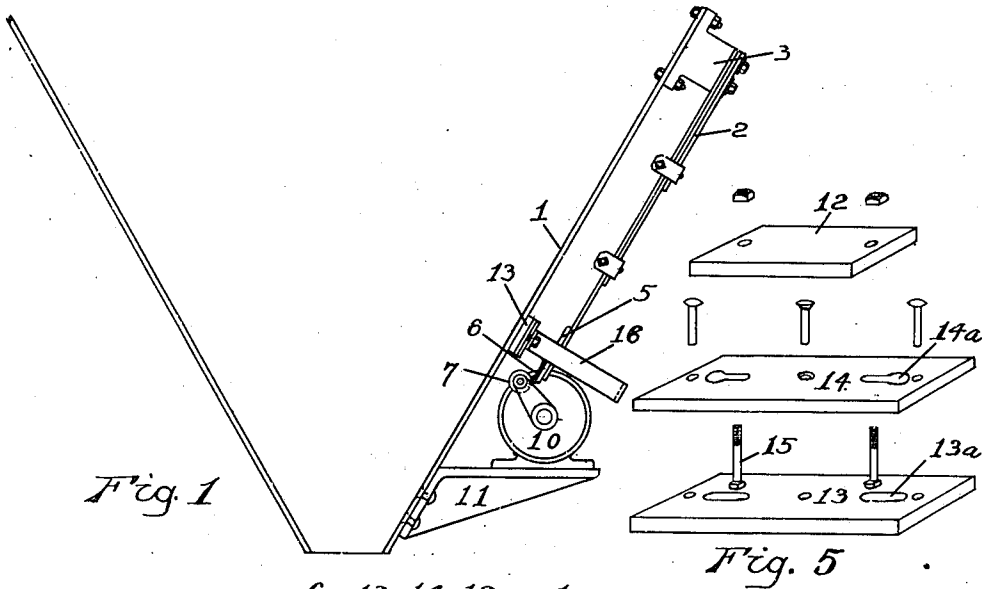
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1,644,175

WALL VIBRATING MACHINE

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UNITED STATES PATENT OFFICE.

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WALL-VIBRATING MACHINE.

Application filed January 11, 1924. Serial No. 635,657.

This invention relates to machines for vibrating the side walls of storage hoppers from which material such as sand or lime is to be fed out gradually. In a previous Patent, No. 1,460,573, I have illustrated such a hopper arranged to feed an automatic measuring device.

My present improvement relates to an improved construction and mode of operation of motor-actuated rapping device especially well adapted to service such as described in the patent above referred to.

The invention embodies a rapping machine of simple construction, not likely to get out of order under the conditions of hard usage to which machines of this type are usually subjected, including the presence in the air of quantities of dust and grit which have heretofore made the use of certain types of electrically actuated rapping devices impracticable.

With that object in view I employ a striking hammer mounted on the end of a leaf or whip spring, the fixed end of the spring being secured rigidly to a wall of the hopper, and I mount on the wall of the hopper underneath the hammer a removable anvil which receives the impacts of the hammer when the spring is flexed and released.

I also mount on the hopper wall a spring-actuating motor having a crank and wiping roller that raises and releases the hammer against the resistance of the spring. By this arrangement I eliminate all sensitive or delicate parts and mechanisms and provide a rapping device that not only delivers a series of quickly repeated forcible hammer blows against the side wall of the hopper, but also sets up additional vibrations in the hopper wall. By reason of the fact that the flexible spring is rigidly fixed at one end to the wall, the wall is thereby subjected to two kinds of jars or vibrations; one caused by the intermittent bending and releasing of the spring and the consequent bending and shaking action on the wall of the hopper at the fixed end of the spring. The other set of vibrations is caused by the impact of the hammer against the anvil. In addition, the side wall of the hopper is shaken by the jarring of the motor, since each revolution of the motor shaft causes a flexing of the spring followed by its sudden release and the consequent reaction or

shaking of the motor is transmitted from the motor to the wall of the hopper.

My invention further includes certain details of construction of the anvil and of the hammer whereby the working life of these parts is prolonged and renewals of the worn parts is facilitated.

With the foregoing and certain other objects in view which will appear later in the specification, my invention comprises the devices described and claimed and the equivalents thereof.

Fig. 1 is a side view of the device attached to the wall of a hopper.

Fig. 2 is a similar view with the hammer-guiding bracket broken away and the raised position of the rapping hammer indicated by dotted lines.

Fig. 3 is a plan view of the parts shown in Fig. 2.

Fig. 4 is a detail, partly broken away, of the hammer head.

Fig. 5 is a perspective view of the parts comprising the removable anvil member.

In the drawings, 1 is the hopper wall, usually inclined, as shown in Fig. 1.

The rapping machine is carried by the wall 1 and consists essentially in a multiple leaf spring 2 fixed at one end to an outwardly projecting boss or lug 3 secured to the wall 1.

The free end of spring 2 carries a hammer head 4 preferably of cast steel or other suitable material.

The head 4 has a base flange 5 adapted to be bolted to the spring 2, and a wearing plate 6 is secured to the other face of the flange and projects beyond the edge thereof, as shown in Fig. 4.

To raise the hammer against the resistance of the spring 2, I provide a wiper or roller 7, on the end of a revolvable crank 8. The crank is mounted on shaft 9 of a motor 10 which may be equipped with a speed reducing gear in the motor casing, as is common.

The motor is preferably mounted on a bracket 11 fixed to hopper wall 1.

An anvil is also fixed to the hopper wall between the motor support and the lug 3 to receive the impacts of the hammer head and effect the desired vibrations of the wall 1.

Preferably the anvil consists of the three assembled parts shown in Fig. 5, where 12 is the anvil face plate, 13 is a base plate

and 14 is a middle plate. The base plate is formed with elongated slots 13^a wide enough to receive the heads of bolts 15. Plate 14 has corresponding openings 14^a, also large enough at one end to permit the heads of the bolts to pass through, but with narrower communicating slots, as shown. When plates 13 and 14 are riveted together and to the hopper wall 1 they comprise a recessed base into which a bolt 15 can be removably secured by passing its head through opening 14^a and then moving the bolt sidewise into the narrower part of the slot. Plate 12 is then removably secured upon the projecting bolts 15. The plate 12 is preferably made of hardened tool steel, and can be removed when worn, and reversed or turned over to present a new wearing surface.

The hammer head 4 has a wearing plate 6, which is preferably made of tool steel and is formed with beveled edges, as shown in Fig. 4, so it can be turned around to present a new edge when the first edge becomes worn by roller 7.

The free end of spring 2 and the hammer head 4 are kept in line with anvil plate 12 by a U-shaped guide 16, secured by bolts 15.

In operation the roller 7 of crank 8, driven by motor 10, raises the hammer as shown by the dotted lines in Fig. 2. The bending of spring 2 causes a bending tendency in the plate 1 of the hopper wall, because of the bending stresses transmitted to the plate by lug 3 at one place on the hopper wall and by motor bracket 11 at a distant place on the same wall, as shown in Fig. 1.

Upon release of the spring when roller 7 runs off the edge of wearing plate 6, this stress in wall 1 is relieved, causing vibration of the wall. Immediately the hammer 4

strikes the anvil, violently rapping the hopper wall 1. The hammer head rebounds from the anvil and this blow is, therefore, a sudden and violent one that produces maximum vibration of the wall 1 with a minimum of force exerted.

By the means above described I have produced a rapping machine especially well adapted for agitating the walls of hoppers. All the parts are easily accessible for renewal and repair and the motor is an article that is readily obtainable in the market and does not require special knowledge on the part of the operator to keep it in repair.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a hopper having a vibratory plate comprising one of the walls of said hopper, a whip-spring, an anvil, and a motor for actuating said whip-spring, all independently mounted in fixed operative relation on said vibrating plate, whereby adjacent parts of the middle areas of said plate are slightly bent and buckled and vibrated with respect to each other by each co-operative reaction of said whip-spring, anvil and motor.

2. In a hopper having a vibratory plate, a whip-spring, an anvil, a motor bracket and a motor thereon, said motor having a spring-actuated crank, said spring, anvil and motor independently mounted on said vibratory plate in fixed operative relation to each other, whereby bending, buckling and shaking forces are exerted upon the different areas of the same plate by the co-operative reactions of said spring, anvil and motor.

In testimony whereof, I affix my signature.

EDGAR D. CHURCH.