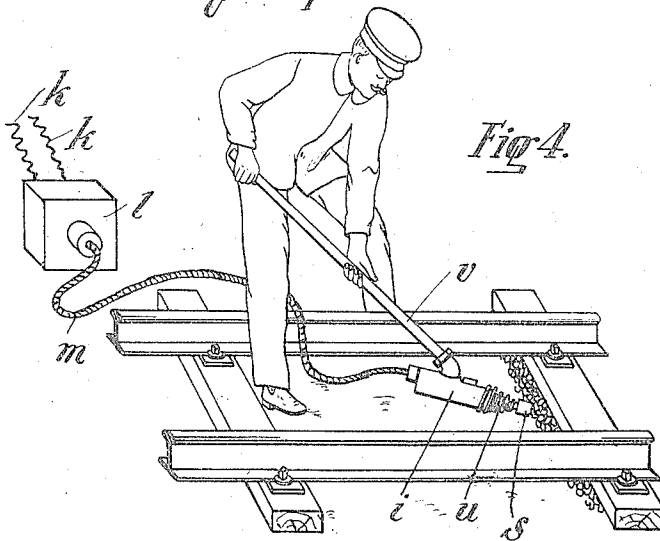
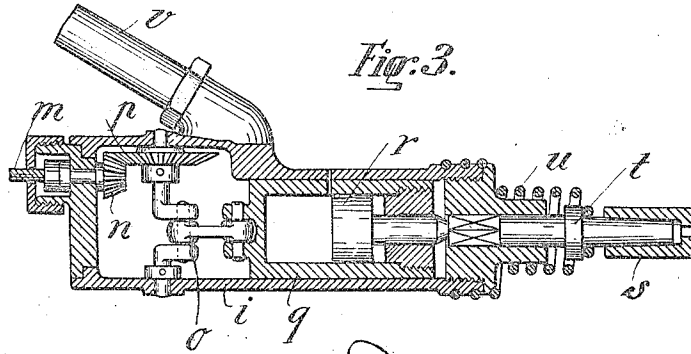
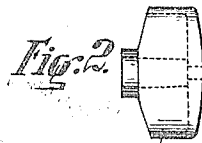
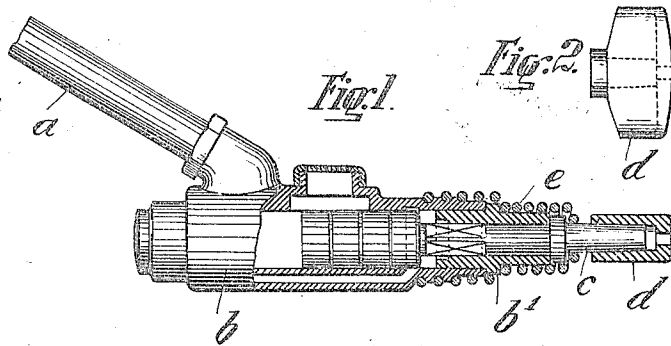


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TIE TAMPER.
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UNITED STATES PATENT OFFICE.

HEINRICH CHRISTIANSEN, OF ALTONA-OTTENSEN, GERMANY.

TIE-TAMPER.

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To all whom it may concern:

Be it known that I, HEINRICH CHRISTIANSEN, manufacturer, a citizen of the German Empire, residing at Altona-Ottensen, in the Kingdom of Prussia, Germany, have invented Improvements in Tie-Tampers, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to power driven tie tampers adapted to be held by hand in the most effective position.

The usual method of tamping the ballast such as broken stone, gravel, etc., beneath the ties by hand with the aid of blunt headed picks, calls for a gang of skilled laborers and requires considerable time in addition to being costly and tiring. The quality of the work depends upon the bodily strength, industriousness and skill of the various workmen. Hence the uniformity of the quality of the work done must suffer. Attempts have been made to replace hand labor by machine work by using power means such as compressed air, power driven hammers, the cylinders of which could be moved on guides attached to the rails. The piston rods, the ends of which were suitably formed in the shape of tampers, were moved to and fro by pressure parallel to the guides of the cylinders and were struck against the ballast. Attempts have been made to use tamping machines in which the tamping tool consisted of a rod reciprocating in a long tube which rod was raised by a power driven eccentric and retracted by a spring. On account of their length and cumbersomeness it was also found impracticable to hold these machines by hand and it was necessary to support them by guides fixed to the rails or to a carriage traversing the rails. Satisfactory results could not be achieved with these machines. On busy lines or in cases where the intervals between trains are short, as for instance on city railways, they could not be used at all, as it would not be possible to remove them from the line quickly enough. But it is just on lines of this kind that the substitution of manual labor by machine work is particularly desirable and a rapid tool would be particularly useful. But also on lines where the traffic is slack it is inconvenient and to a certain extent dangerous to use tamping devices the loosening and removing of which requires considerable work

and time. Another evil is that the adjustment of the tool takes so much time that no economy results. A further disadvantage of these automatic machines is that they are not capable of replacing the most important operations of the tamping workmen automatically or at any rate easily and quickly enough. These operations consist in applying and directing the tool in the manner required by the condition of the ballast itself. A skilled workman tamping with a pick will notice whether he strikes the ballast with his pick and the amount of resistance that the material offers to his blows. He will alter the strength and direction of his blows accordingly and continually shifts with his pick in accordance with the progress of the work *i. e.* "he follows up the ballast." But with the tamping machines employed hitherto, the workman controlling the machine could not ascertain, without performing some special act, whether and in what manner the ballast was being struck by the tamping tool, because the rigid guide absorbed a part of the shocks resulting from the blows. The result of this was that these machines were only capable of following up the material much too slowly and in too cumbersome a manner and that the blows delivered to the material were sometimes too hard and at other times they were directed to the ties or in the air. One of the principal evils of the known tamping machines was the following: The blows of the tool were not delivered as in the case of a hand pick in an approximately horizontal direction *i. e.* not approximately parallel to the bottom surface of the tie, but in an oblique direction from above to below. But when the blows are delivered in such a direction it is not possible to reach the material beneath the middle of the tie and to tamp it firmly, so that an inferior job results.

The object of the present invention consists in improvements in devices for tamping railroad ties or sleepers by which the disadvantages of tamping by hand and also the disadvantages coupled with the use of the known machines are avoided and which results in a comparatively unskilled workman being enabled to execute an amount of work which formerly required numerous skilled hand laborers, in the quality of the work performed being no longer dependent on the force applied by the workman, in rendering it possible for even an unskilled

workman to immediately carry out the work of tamping, because he no longer needs to have the sure aim that is necessary in tamping by hand, in an improved quality of strength of the blows is considerably greater and more uniform, the life of the rails being lengthened hereby, and because on the other hand it is, on account of the greater strength of the blows, only necessary to

tamp on one side. By being able to tamp through beneath the tie from the one side to the other, it is possible to ascertain whether the tie is really lying throughout its width upon a firm bed. If the sleepers or ties are tamped from both sides, which is the only possible way when tamping by hand or with a power driven tamping tool that moves in an oblique direction, it is impossible to tell whether or not, through the careless work of one or another of the workmen, the beds of some of the sleepers have been left hollow in the middle. Since by the aid of the new device one man takes the place of a large number of workmen the working costs are very considerably lower than when using hand labor. An extremely important point is that the work of tamping can also be carried out much faster, so that it is possible to utilize the briefest intervals between trains (on city railways, large shunting yards, etc.) for the reconstruction of lines and repairs, which results in an additional shortening of the total time required for carrying out the work.

As compared with the known tamping machines the new device has the following advantages: When stopping work no unfastening of parts is necessary: the versatility is the same as when working by hand. Contrary to the machines used hitherto it is possible to follow up the material just as well as when tamping by hand. The blows can, just as in tamping by hand, be directed in an approximately horizontal direction. It is therefore possible to utilize the greater strength of the blows to the best advantage and to firmly tamp the whole surface beneath the sleepers from their one side, which was not possible with the known machines striking obliquely from above to below.

The improvement consists in an instrument which is similar to an ordinary tamping pick and which consists of a long handle similar to the handle of a tamping pick and of an iron tamping tool corresponding to the blunt head of a tamping pick fixed at an angle to the lower end of the handle, being held against the ballast that is to be tamped, the tamping tool being arranged in the manner of a power driven hammer, *e. g.* compressed air hammer or electropneumatic hammer. The tamping tool of the motor driven hammer is shaped at the front like the front part of an ordinary hand tamping

pick. When the device is in operation the workman holds this tamping tool against the ballast and lets the hammer operate which results in the ballast being firmly packed. The workman feels whether and how much resistance the ballast offers to the tamping tool and can "follow up the ballast." When a train passes the workmen simply step off the line just as they do when using ordinary tamping picks.

The invention is shown in the accompanying drawing in which,

Figure 1 is a side view of a pneumatic tamping machine used for carrying out the new method, partly in section, Fig. 2 is a plan view of the tamping tool, Fig. 3 is a sectional view of an electropneumatic or mechanopneumatic tamping machine, which is used for carrying out the new method. Fig. 4 illustrates the manner in which the tamping tool shown in Fig. 3 is employed.

The pneumatic tamping machine shown in Figs. 1 and 2 consists of a handle *a* and a compressed air hammer *b*. The latter is fixed at an angle to the lower end of the handle, which arrangement enables the machine to be held in a convenient manner and on the other hand renders possible a completely horizontal position of the actual tool. The handle *a* is formed in the shape of a tube and serves as a conductor for compressed air. It may be connected to an air compressor (not shown) standing beside the rail track by a flexible pipe (not shown). The compressed air hammer (*b*) is of the usual kind. In the front cylinder cap (*b'*) is inserted a rod *c*. This rod carries at its front end the tamping tool *d* the front view of which is about the same as the front end of an ordinary tamping pick. The valve gear of the compressed air hammer is not shown. The front cylinder cap *b'* is not screwed fast to the cylinder, but is pressed against the front end of the cylinder by a strong spring *e*. The flexible connection of the front cylinder cap *b'* is necessary in order that, when a blow does not strike any object, the cap may be able to move forward a certain distance when the air is compressed in the space between the cylinder cap and the piston, whereby the living force of the striking piston is absorbed. By this means violent knocks that would result from blows that do not strike any object are taken by a spring cushion and the tearing off or destruction of the front cylinder cap is prevented.

When using the machine the workman holding the handle of same, presses the compressed air hammer *b* with moderate pressure against the ballast and lets the hammer operate. On the ballast being pressed in, the workman follows up with the hammer.

With the electro-pneumatic tamping ma-

chine shown in Figs. 3 and 4 the electric current may be taken from existing supply mains or through wires *k* from a portable dynamo (not shown) placed near the rails and connected to a small electromotor *l*.

The rotation of the motor shaft *l* is transmitted by a flexible shaft *m* to a bevel driving wheel *n* in the tamping machine *i*, the bevel wheel engaging another bevel wheel *p* fixed to a crank shaft *o*. The crank shaft *o* imparts a reciprocating motion to a cylinder *q* which contains a movable piston *r*. On the reciprocation of the cylinder *q* the piston is forced by the air at both its sides to participate in the reciprocating motion. The air in the two cylinder spaces acts as an elastic cushion. In the front cap of the cylinder *q* is slidably fixed a rod *t*, which carries the tamping tool *s* similarly as shown in the construction represented in Fig. 1. The rod *t* is however not rotatable and is held in its rearward position by a spring *u*.

A long handle *v* is fixed at an angle to the tamping machine *i*. By this handle *v* the workman holds the tamping machine *i* and presses it with moderate force against the ballast, following the ballast up as it recedes on being pressed in.

Instead of the electromotor *l* the flexible shaft *m* may be driven by any other kind of power machine such as an oil engine, etc.

I claim:

1. A device for tamping sleepers comprising a chamber adapted to be connected with a source of power, a hammer in said chamber formed in the shape of a piston, a tamping tool adapted to be struck by the hammer, and a handle for freely holding the device fixed to the chamber at an angle to the direction of movement of the hammer, said handle being of sufficient length to afford ample leverage for readily guiding the hammer.

2. A device for tamping sleepers comprising a chamber adapted to be connected with a source of power, a hammer in said chamber formed in the shape of a piston, a tamping tool adapted to be struck by the hammer and slidably but not rotatably held in said chamber, and a handle for freely holding the device fixed to the chamber at an

angle to the direction of movement of the hammer, said handle being of sufficient length to afford ample leverage for readily guiding the hammer.

3. A device for tamping sleepers comprising a chamber adapted to be connected with a source of power, a hammer in said chamber formed in the shape of a piston, a tamping tool formed in the shape of the blunt end of an ordinary hand hammer and adapted to be struck by said hammer, and a handle for freely holding the device fixed to the chamber at an angle to the direction of movement of the hammer, said handle being of sufficient length to afford ample leverage for readily guiding the hammer.

4. A device for tamping ties, comprising a cylinder, a piston within the cylinder, said piston having a chamber therein, a hammer within said chamber, air spaces on two sides of the hammer, a crank shaft adapted to reciprocate the piston, means for driving the crank shaft, a tamping tool carried by the cylinder and acted upon by the hammer, and a handle for freely holding the device fixed to the cylinder at an angle to the axis of the latter to position the cylinder in a substantially horizontal plane, said handle being of sufficient length to afford ample leverage for guiding the cylinder.

5. A device for tamping ties, comprising a cylinder, a piston within the cylinder, said piston having a chamber therein, a hammer within said chamber, air spaces on two sides of the hammer, a crank shaft adapted to reciprocate the piston, a flexible shaft coupled to said crank shaft, means for driving said flexible shaft, and a handle for freely holding the device fixed to the cylinder at an angle to the axis of the latter to position the cylinder in a substantially horizontal plane, said handle being of sufficient length to afford ample leverage for guiding the cylinder.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HEINRICH CHRISTIANSEN.

Witnesses:

ERNEST H. L. MUMMENHOFF,
IDA CHRIST. HAFERMANN.