Dec. 12, 1961 P. ALLEMANN 3,012,516

LIGHT TAMPING MACHINE

Filed June 11, 1956 2 Sheets-Sheet 1

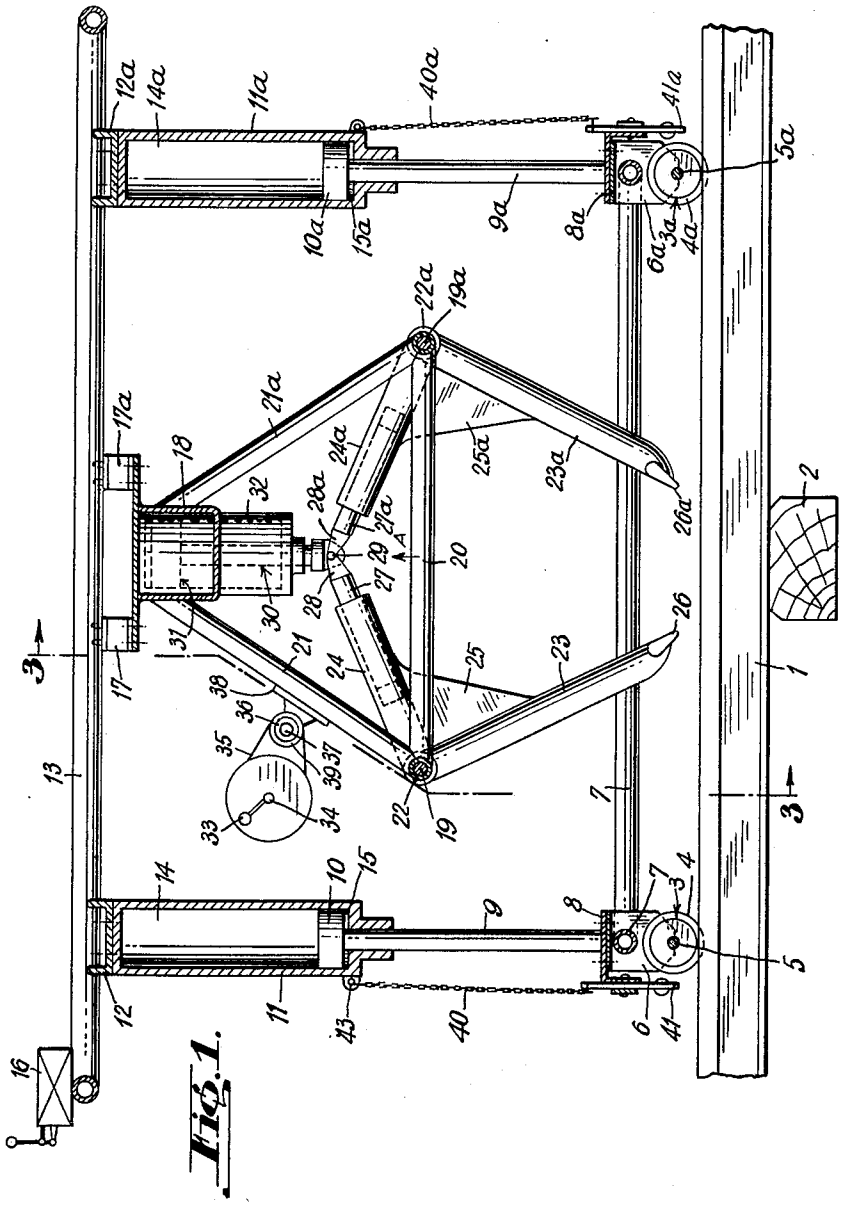


Fig. 1.

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Fig. 2.

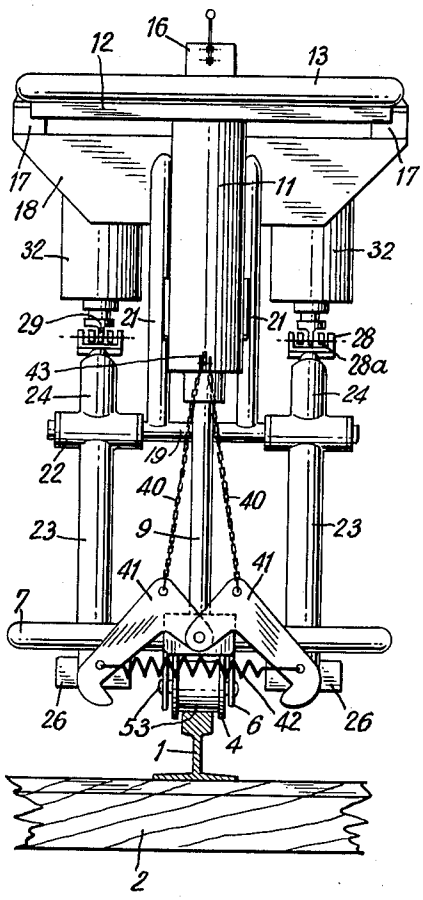


Fig. 3.

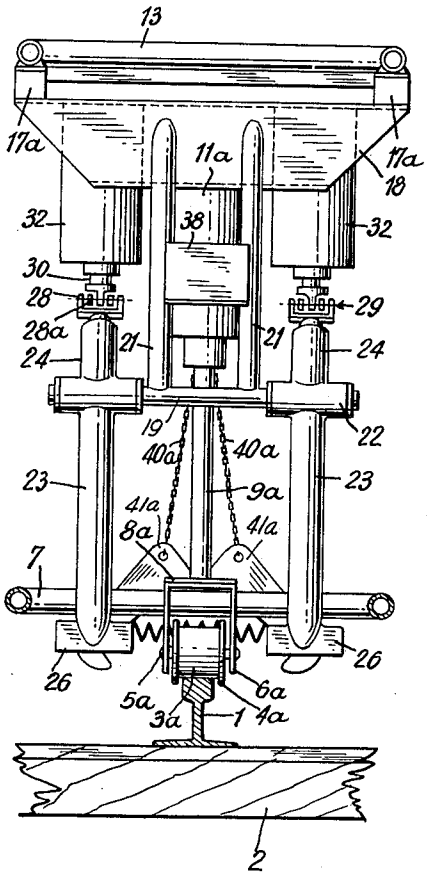
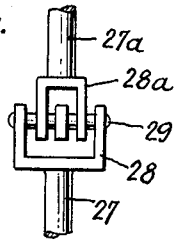


Fig. 4.



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LIGHT TAMPING MACHINE

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4 Claims. (Cl. 104—12)

There are actually two distinct types of tamping machines in general use. One type comprises the heavy tamping machines built like railway trucks, which, owing to this block the line and can only be used when the time intervals between succeeding trains are sufficiently protracted. The other type is represented by individual tamping tools, handled by the workman, sometimes utilized in groups and fed, either from a central source of power (compressors or generators) or by small independent motors, but which in any case allow the ballast to be tamped without blocking the railway line, and thus allow work to be effected even during the shortest intervals of time elapsing between succeeding trains. It has been possible to fit the large machines with mechanical or hydraulic devices by means of which high-frequency vibrations (for instance 1800 per minutes) of given constant amplitude may be imparted to the tools which compress the ballast, but the price of this is a very heavy construction which explains why these machines can weigh up to 10 or 15 tons. It has also been possible to fit the tamping tools with devices imparting to these tools rapid vibrations of variable amplitude, but without causing these tools to exert a mechanical compression on the ballast, the compression being imparted by the workman.

It is therefore an object of the present invention to provide devices which unite the advantages derived from the use of the large tamping machines together with the advantages derived from the use of a light working instrument or tamping tool. Accordingly, the subject of this invention is a light tamping machine for tamping railway line ballast, which is characterized by the fact that it comprises a monorail truck supporting a tool-carrying frame on which the tamping tools are mounted, hydraulic means controlling the symmetrical motion of these tools by which they are brought to move towards one another or to move apart, and a vibrator imparting to this frame vibrations which it transmits to the tools.

As will be seen below, such a monorail apparatus can be run by a single workman, and two persons are sufficient to enable it to be placed on the line. It is also possible to couple it, for instance in a manner allowing it to be easily disconnected, to a second similar monorail apparatus, the assembly thus constituted then making it easier to work simultaneously on the two rails of the railway line. The two apparatus could eventually be controlled by a single workman.

The accompanying drawing illustrates an embodiment of the monorail apparatus according to the present invention, given by way of an example.

FIGURE 1 is a vertical longitudinal section of the tamping machine taken along its plane of symmetry and shown in its raised position.

FIGURE 2 is a partial front view, as seen from the left in FIGURE 1.

FIGURE 3 is a transverse section taken along line 3—3 in FIGURE 1.

FIGURE 4 is a view of a pivot member as seen in the direction of arrow A in FIGURE 1.

Referring now to the drawings and more particularly to FIGURE 1, there is shown a tamping machine for tamping railway line ballast comprising a truck carrying a pair of wheels 3, 3*a* for engagement with a single rail

or track 1. It is to be noted that the tamping machine is symmetrically similar about a vertical center line, and elements on the right hand side of the drawing which are identical with elements on the left hand side of the drawing will be designated with the same reference numeral, but modified with the letter *a*.

The truck is generally supported by wheels 3, 3*a*, which are carried on axles 5, 5*a* journaled in the depending arms of support brackets 6, 6*a*. Wheels 3, 3*a* are provided with flange portions 4, 4*a* on both sides in a suitable manner to effect a positive engagement between the wheels and the single rail or track. Coupled to one of the depending arms of each of brackets 6, 6*a* is a tubular frame 7 which at its ends is bent through an angle of approximately 90° near the point of coupling; the tubular frame may be, for example, welded to brackets 6, 6*a* and forms a fixed horizontal rectangular chassis for the tamping machine.

Frame 13 which may also be designated as an intermediate chassis is coupled to frame 7 by means of hydraulic mechanisms. The hydraulic mechanisms or lifting jacks comprise a movable cylinder 11, 11*a* provided with a piston 10, 10*a* movable therewithin; it may also be considered that cylinders 11, 11*a* are movable relative to stationary pistons 10, 10*a*. Within cylinders 11, 11*a* there is provided a first space 14, 14*a* on one side of piston 10, 10*a* and on the other side thereof a second space 15, 15*a*. It is well known to provide mechanisms by means of which it is possible to supply fluid under pressure to the space on one side of the pistons 10, 10*a* and on the other side thereof whereby to cause cylinders 11, 11*a* to move relative to pistons 10, 10*a*. Beams 12, 12*a* are provided for coupling the movable cylinders 11, 11*a* to the frame 13, which may also be of the tubular type; the opposite ends of the cylinders being provided with an opening through which rods 9, 9*a* are coupled to pistons 10, 10*a* on the sides thereof facing the second space 15, 15*a* and move in a fluid-tight relationship therewith. The other end of rods 9, 9*a* are coupled to one arm of an L-shaped bracket 8, 8*a*, for example by means of a weld connection or other suitable fixed connection. The one arm of brackets 8, 8*a* are coupled to the base of brackets 6, 6*a*.

As seen in FIGS. 1 to 3, a tool carrying frame for carrying two pairs of tools 26, 26, 26*a*, 26*a* is also provided and is coupled to the tubular frame 13 by means of four elastic damping members 17, 17, 17*a*, 17*a*. Also coupled to the elastic damping members is a vibrating chassis or frame comprising transverse beam 18, a first pair of depending arms 21, a second pair of depending arms 21*a* and a pair of horizontal members 20. Arms 21, 21*a* and horizontal member 20 may be tubular in form and arranged in a triangular relationship; one end of member 20 is directly connected to one end of arm 21, the other end of member 20 being directly connected to one end of arm 21*a*, and the other ends of arms 21, 21*a* are directly connected to transverse beam 18. Both pairs of arms 21 are coupled to a transverse axial member 19, and arms 21*a* are coupled to another transverse axial member 19*a*, the member 20 having its opposite ends coupled to axial members 19, 19*a*. It is to be noted that arms 21, 21*a* and member 20 define two triangular frames which are symmetrical in all respects.

Tamping tools 26, 26*a* are carried by tubular members 23, 23*a*, the ends of which are coupled to ring members 22, 22*a*. Hollow tubular arms 24, 24*a* are also coupled to ring members 22, 22*a* within which axial members 19, 19*a* are journaled. It will be understood that while only one pair of tamping tools 26, 26*a* together with its associated members is shown in order to simplify the drawing, two pairs of the tamping tools together with their associated members are provided. Members 23, 23*a*

are positioned substantially 90° from their associated arms **24**, **24***a* and are fixedly coupled to each other separately from rings **22**, **22***a* by means of stiffening plates **25**, **25***a*, respectively.

The vibrating frame also includes a pair of cylinders **32** fixed respectively to the beam **18** and are each provided with a movable piston **31** movable or slidable within cylinder **32**. Coupled to piston **31** is a rod **30** with a free end thereof being provided with a central pivot member **29** coupled thereto for a purpose to be hereinafter explained. As will be noted in FIGS. 1 and 4, tubular arms **24**, **24***a* are adapted to receive for telescopic action therewithin telescope rods **27**, **27***a*. The end of rods **27**, **27***a* outside of tubular arms **24**, **24***a* are coupled to channel members **28**, **28***a* having a central opening provided in the legs thereof for engagement with pivot member **29**.

The hydraulic mechanisms or lifting jacks defined by pistons **10**, **10***a* and cylinders **11**, **11***a* and hydraulic mechanisms or closing jacks defined by pistons **31** and cylinders **32** are generally similar in operation; fluid under pressure may be applied to either side of the pistons in order to move them in a direction towards the low pressure volume. The operation of the lifting jacks may be effected by any well known expedients, and for the purposes of illustration a manually operable control member **16** is shown mounted on the intermediate chassis or frame **13**.

The downward motion of the piston **31** in the cylinder **32** simultaneously produces a motion of the two telescope rods **27** and **27***a* into their housing within arms **24**, **24***a* and a pivoting motion in opposite directions of the two tubular members or arms **23**, **23***a* and thus a moving apart or separation of the two facing tools **26**, **26***a*, i.e. a symmetrical motion, called the opening motion, of the tools. The reverse motion is obtained when the piston **31** moves in an upwardly direction in the cylinder **32**.

It is obvious that the mere fact of thrusting tools into the ballast and moving them closer is not sufficient to effect the tamping of the latter. In order to obtain this effect, the tamping machine is fitted with a generator of vibrations operating with a rotating unbalance—of any known type—schematically indicated in FIGURE 1 by a mass **33** which is eccentrically secured to a shaft **34** of a driving motor **35** the housing of which is locked, by means of a nut **36**, on a stud or axle **37** secured to a transverse support **38** which in turn is fixed at its ends (FIGURE 3) to the arms **21**. The mass **33** can rotate, for instance, at a speed of 3000 r.p.m. The vibrations are thus transmitted directly to the vibrating chassis (or frame **18**) and through the latter to the tools **26**, **26***a*, but not to the other chassis or frame **13** as a result of the intermediation of damping members **17**, **17***a* which only permit the existence in these chassis or frame **13** residual vibrations which have not notable effect on the operation of the tamping machine.

It is of interest to be able to impart vibrations of the tools in any desired direction. In the described tamping machine these vibrations are plane and approximately circular. To this end use is made of any device producing rectilinear vibrations the direction of which may preferably be varied at will. One of these well-known types is of the pendulum mounted kind and is schematically elastic so as to constantly urge the housing **35** towards a mean angular position in relation to the axis of stud or axle **37** of the housing of motor **35**. When the mass **33** rotates around the axis of shaft **34**, the housing oscillates about the axle **37** and it is only the component of the vibration which goes from the shaft **34** to the stud **37** which is transmitted to the vibrating chassis and therefore to the tools. The mean direction of this component is set by means of the nut **36**.

Referring to FIGURES 1, 2 and 3, there is shown two pairs of rail clamps comprising clamping members **41**, **41**, which are pivoted to the leg of L-shaped bracket **8**, **8***a*. The jaws of the clamping members **41**, **41** are adapted to close and grip the rail or track **1**, and there is provided chains or ropes **40**, **40***a* or any other suitable mechanisms for opening the jaws which are normally biased to close by means of spring **42** or other suitable mechanism. Spring **42** is coupled to the jaws of clamping members **41**, **41**.

It will be apparent that the mechanism as shown is in its raised position with the tools out of the tamping position. Fluid under pressure is supplied from space **14**, **14***a* in order to raise the mechanism, and when fluid under pressure is supplied to spaces **15**, **15***a* the mechanism is lowered in order to permit the tools **26**, **26***a* to be placed into the tamping position.

There is no need to carry on with the description in order to see that the jacks (cylinder **11**) enable the intermediate frame **13** to be lifted and lowered, and with it the tamping tools, whereas the jacks or hydraulic mechanisms (cylinder **32**) enable the latter to be swung round so that the tools **26**, **26***a* either move towards one another or move away from one another.

In FIG. 1 the intermediate frame **13** occupies its upper position and the tools the position in which they are closest together.

By acting on the jacks (cylinder **11**), it is possible to lift the tools above the sleeper (FIG. 1), in order to be able to run from one sleeper to the next, and by causing the piston **31** to move downwards, to bring the tools to the position in which they are farthest apart.

Starting from this position, the tools will be lowered into the ballast by means of the jacks (cylinder **11**), and at the same time the tools **26**, **26***a* will be brought closer together by means of the pistons **31**.

It should be noted that fluid under pressure can be supplied to both chambers **30**, both above and below pistons **31**, the pistons **31** and the cylinders **32** to move together as a unit for all positions of movement of cylinder **32**.

The described apparatus is very light and can easily be run along the rail by a single workman holding it by the frame **13**. It can also easily be placed on the rail by two workmen lifting it by means of frame **13**. In the position shown, the frame **13** is about 30 inches above the rail, which gives an idea of the size of the apparatus.

The pressure fluid required for the jacks and the power needed to drive the vibrator will be supplied, either by means of a motor mounted on an intermediate frame and driving the vibrator and the pump, the latter being also mounted on the intermediate frame, or by means of easily disconnected ducts from a power unit placed on the line, either on a particular vehicle or beside the latter or again on the coupling device, in the case of two tampers coupled together in the course of work effected simultaneously on the two rows of rails.

The frame **7** carries at each end a clamp **41** which seizes the head of the rail and grips it tightly under the influence of the powerful spring **42**. The automatic release of these clamps is obtained by means of the chains **40** connecting the clamp to a lug **43** of the cylinder **11** of the jack situated at the corresponding extremity. When the cylinders rise in order to lift the tools out of the ballast, they exert, by means of the chain, a traction on the corresponding clamp which causes the latter to open momentarily. These clamps do not, therefore, require special attention during the work. The clamp could also be controlled by means of a fluid.

By fitting appropriate connecting means to the apparatus described, the latter may be coupled in an easily removable manner to a second similar apparatus working simultaneously on the other rail; the two apparatus may then be run either each by one workman or both together by the same workman, in which case the two controls would be grouped in consequence.

The tamping machine shown in FIGS. 1–3 is of the

type in which the two tools **26**, **26***a* compress the ballast on the same side of the rail; it would also be possible to realize a construction in which the direction of the tools is such that the two tools compress the ballast in a diagonal direction in the angle formed by the rail and the sleeper.

Finally it may be remarked that the entirely tubular construction of the described apparatus gives it a maximum rigidity with a minimum in weight.

What I claim is:

1. A tamping machine for tamping railway line ballast, comprising a first frame including a pair of wheels for engagement with a single track, a second frame supported on said first frame movable therewith along said track and movable in a vertical direction with respect to said first frame, a tool carrying frame supported on said second frame, a pair of tamping tools on said tool carrying frame and pivoted thereto and pivotally movable towards and away from each other on opposite sides of a railroad tie in a direction perpendicular to said tie, vibrating means coupled to said tool carrying frame for imparting vibrations thereto and including a rotary motion device and a mass eccentrically coupled thereto, means on said tool carrying frame and coupled to said tools for moving the latter, elastic means coupling said second frame and said tool carrying frame together, and means on said first frame and coupled to said second frame for moving both said second frame and tool carrying frame in said vertical direction.

2. A machine according to claim 1 including adjustable means coupling said vibrating means to said vibrating frame, said adjustable means being effective for controlling the vibratory motion imparted to said vibrating frame and said tools.

3. A monorail railway track ballast tamping apparatus comprising a first frame, a pair of wheels on said frame for engagement with a single track, a second frame on said first frame movable in a vertical direction with respect to said first frame, a tool carrying frame supported on said second frame, a pair of tamping tools on said tool carrying frame and pivoted thereto and pivotably movable towards and away from each other on opposite sides of a railroad tie in a direction perpendicular to said tie, means coupled to said tool carrying frame and coupled to said tools for pivotally moving the latter in said perpendicular direction, said means comprising a hydraulic mechanism including a single cylinder and a piston movable therein coupled between said frame and tools, vibrating means coupled to said tool carrying frame for imparting vibrations thereto and including a motor and a mass eccentrically coupled thereto, elastic means coupling said second frame and said tool carrying frame together, and means on said first frame and coupled to said second frame for moving both said second frame and tool carrying frame in said vertical direction.

4. A machine according to claim 3 including adjustable means coupling said vibrating means to said tool carrying frame, said adjustable means being effective for controlling the vibratory motion imparted to said tool carrying frame and said tools.

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