PATENT SPECIFICATION (11) 1 571 868

1 571 868

(21) Application No. 38066/77 (22) Filed 13 Sept. 1977

(31) Convention Application No. 9256/76 (32) Filed 14 Dec. 1976 in

(33) Austria (AT)

(44) Complete Specification published 23 July 1980

(51) INT. CL.[3] E01B 27/16

(52) Index at acceptance E1G 444 452 GC

(54) A TRACK TAMPING MACHINE, MORE ESPECIALLY FOR TAMPING BELOW TRACK SWITCHES

(71) We, FRANZ PLASSER BAHNBAUMASCHINEN-INDUSTRIEGESELLSCHAFT M.B.H., of Johannesgasse 3, Vienna 1, Austria, an Austrian Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described, in and by the following statement:—

This invention relates to a track tamping machine, more especially for tamping under track switches, crossings and the like, comprising at least one tamping tool unit which is mounted on the machine frame to be raised and lowered by a vertical adjustment drive and in which tamping tools disposed in the same transverse plane and intended to penetrate into the same sleeper crib on both sides of a rail are arranged on a tool holder which is pivotal about a transverse track axis longitudinally of the machine and which is connected to feed-adjustment and vibration drives.

Track tamping machines which are primarily intended for use along straight sections of track generally show only limited suitability for tamping the ballast bed in the vicinity of track branches because the work of the tamping tools is impeded or complicated by the presence of track components such as switch blades, frogs, guard plates and the like.

Althougth various structural solutions have been proposed with a view to mechanising the tamping process at switches and crossings, none of theses solutions has ever proved to be completely successful in practice. A considerable advance was made by the track tamping machine according to British Patent Specification 957268 of which the vibrated tamping tools feed-adjustable longitudinally of the track are laterally pivotal transversely of the longitudinal direction of the track at their lower ends where the tamping tines are mounted. This arrangement enables obstacles situated in the working range of the tamping tools to be overcome by lateral deflection of the particular tamping time without having to exclude the ballast below the sleeper in question from the tamping operation. A similar arrangement of a laterally pivotal tamping tool in the form of a double tool equipped with two tamping tines is known from British Patent Specification 1 037 520.

Further advances were made by the multiple-sleeper track tamping machine according to Austrian Patent No. 303,795, in which at least two groups of tamping tools are arranged one behind the other on a transversely adjustable frame member of the machine. In this arrangement, the tamping tools which are intended to penetrate into the same sleeper crib on the left and right of a rail are each mounted for lateral deflection on a holder which is arranged astride the rail and which is connected to vertical adjustment, feed-adjustment and vibration drives. With this machine, it is possible not only to overcome hindering track components by deflection of the particular tamping tools, it is also possible to tamp the ballast below sleepers situated in these zones by means of the tamping tools swung in laterally to engage laterally below the particular track component. Multiple-sleeper track tamping machines of this known construction have proved to be extremely effective in practice both in and around stations and along open sections of track.

In another track tamping machine (according to German Patent No. 2,013,991), tamping units vertically adjustable independently of one another are arranged on both sides of the same rail. Each tamping unit comprises a pair of tamping tools pivotal towards one another longitudinally of the track. The upper end of each tamping tool unit is pivotally mounted on the projecting roof part of the machine whilst its lower

end is guided for displacement transversely of the track. The pivotal mounting of the tamping units enables the tamping tools to be laterally deflected to overcome obstacles situated at least partly in their working range. However, since the tamping tools of a tamping unit can only ever be laterally deflected together, it is not possible to allow individually for all the track components interfering with the tamping process. In addition, the presence of numerous pivot bearings, partly in the form of universal joints, together with the relatively complicated guide systems gives rise to considerable maintenance and repair costs. In addition, the arrangement of the tamping units projecting beyond the vertical and lateral guide systems gives rise to unfavourable stressing of the guide components and to a fairly considerable degree of play of the tamping tools relative to the fixed part of the machine frame.

The object of the present invention is to construct a track tamping machine for normal track work with the least possible outlay in such a way that, when used at track switches, crossings of the like, it is able to tamp for greater areas of ballast than is possible with conventional track tamping machines. Hindering track components present in these zones are intended to be taken into consideration by the individual use of the tamping tools. In addition, the tamping units are intended to be provided with a simplified, weight-saving and space-saving and also low-maintenance construction in relation to track tamping machines of the type specially designed for use in and around track branches.

According to the present invention there is provided a railway track tamping machine, comprising at least one tamping tool unit which is mounted on the machine frame to be raised and lowered by a vertical adjustment drive and in which tamping tools disposed in the same transverse plane and intended to penetrate into the same sleeper crib on both sides of a rail are arranged on a common tool holder which is pivotal longitudinally of the machine about an axis transverse to the track, and which is connected to feed-adjustment and virbation drives, characterised in that at least one tamping tool or pair of tamping tools intended to penetrate into the ballast bed on one side of the rail is, in addition, designed to pivot laterally about an axis parallel to the longitudinal axis of the machine.

A track tamping machine constructed in this way enables the ballast bed to be continuously tamped both along open sections of track and also over considerable regions of track branches, the particular requirements of these different regions of track being fully taken into consideration. The quality of tamping is uniform over the entire length of the tamped sections of track and any manual tamping work in the region of track switches, crossings and the like is avoided or reduced to a minimum.

The construction according to the invention takes into account the fact that the track components which impede the tamping process are generally present on the same side of the rail associated with a tamping tool unit so that additional provision for the lateral pivotability of tamping tools need only be made on this side of the tamping tool unit. Since these tamping tools or pairs of tamping tools intended to penetrate into the ballast bed on the left or right of the rail are arranged on their tool holders to pivot laterally independently of one another, it is possible for the hindering track components to be laterally overcome to only the particular extent necessary, taking into account their configuration and their dimensions both longitudinally and also transversely of the track, by individually using the additionally laterally pivotal tamping tools. for example, it is possible in the presence of a guide rail for only one tamping tool of a pair of tamping tools already situated in the vicinity of the guide rail to be laterally deflected to the necessary extent whilst the other laterally pivotal tamping tool of this pair remains in its non-deflected normal position.

The invention provides for an even simpler and more compact construction of the tamping units in relation to known machines equipped solely with laterally pivotal tamping tools. Tamping tool units constructed in accordance with the invention are also eminently suitable for subsequent fitting to already existing track tamping machines without any need for significant structural modifications thereto.

In one preferred embodiment of the invention, the tamping tool or pair of tamping tools displaceable solely in the longitudinal direction of the machine is arranged on one side arm of a substantially fork-shaped or +-shaped tool holder which is intended to be centrally arranged in the plane of symmetry of the rails and which is preferably displaceable transversely of the longitudinal axis of the machine by means of a drive, whilst the additionally laterally pivotal tamping tool or pair of tamping tools is arranged on the other side arm of this tool holder which faces towards the middle of the track. The use of substantially fork-shaped or +-shaped tool holders is particularly favourable in the present case because holders of this type can readily be made rigid enough to be able also to withstand the asymmetrical stresses which can occur during the tamping of switches and crossings. In addition, the fact

that the tool holders are fork-shaped or ⊥-shaped provides the machine operator with a clear view of the tamping tools during their penetration into the ballast bed which is particularly important in the tamping of switches and crossings.

A particularly advantageous arrangement is one in which the additionally laterally pivotal tamping tool or pair of tamping tools, i.e. tamping tines, in releasably fixed to a holding shoe arranged on the transverse axis of the tool holder running parallel to the longitudinal axis of the machine, a hydraulic cylinder-and-piston assembly being pivotally connected to the holding shoe for its lateral pivoting function. By virtue of this arrangement, the tamping tines used for the additionally laterally pivotal tamping tools may be the same as, or identical with, those used for the tamping tools which are only displaceable longitudinally of the track, in addition to which the tamping tines may be releasably secured to the holding shoes by the same fixing technique as that used for securing the tamping tools solely displaceable longitudinally of the track to one of the side arms of the tool holder.

In cases where the track tamping machine is equipped with two tamping tool units associated with the two rails of the track and adjustable in particular transversely of the longitudinal axis of the track, further advantages are obtained in accordance with the invention by virtue of the fact that the two tamping tool units with additionally laterally pivotal tamping tools are pairs of tamping tools facing the middle of the track are constructed and arranged symmetrically to one another. With a machine constructed in this way, the ballast below tracks of a switch or crossing can be quickly tamped without the machine having to be turned, greater stability of the machine and a substsantially symmetrical stressing of the machine frame by the reaction forces of the ballast during the tamping process being obtained by the symmetrical arrangement of the tamping tool units and the resulting equalisation of weight.

In one particularly advantageous embodiment of the machine according to the invention, two tamping tines are releasably secured to the tamping tool holder for pentration into the ballast bed in the particular outer zone of the two rails, whilst only one laterally pivotal tamping tine or pair of tamping tines is releasably secured to the tool holder in the same transverse plane of the track in the particular inner zone of the two rails, i.e. between the rails. This construction takes particular account of the need for the ballast beneath the sleepers to be effectively tamped above all in the outer zone extending between the rail and the end of the sleeper, whereby the so-called "riding" of the sleepers on that region of the ballast bed situated between the rails is more effectively avoided. This construction of the sleeper bearing surfaces is as important along open sections of track as it is in the vicinity of track switches, crossings or the like and contributes towards increasing the maximum permitted speeds both along the open track itself and also in the vicinity of stations. In addition, greater stability of the track is obtained in the sections of track worked by the track tamping machine.

In another particularly advantageous embodiment of the invention, both the track tamping tools displaceable solely in the longitudinal direction of the track and also the additionally laterally pivotal tamping tools are designed to be arranged astride a sleeper below which the ballast is to be tamped and are connected to a common, preferably centrally arranged vibration drive for the tamping tool unit through a feed-adjustment drive pivotally connected to each of the fork-shaped or ⊥-shaped tool holders. This provides for uniform, high consolidation of the ballast at the sleeper eids over the entire section of track being worked on by means of the pairs of tamping tools which are displaceable solely in the longitudinal direction of the track and which penetrate like tongs into the ballast below the sleeper ends, and for the independent, individual tamping of the ballast below the sleepers in the zone situated within the rail by means of the laterally pivotal tamping tools which are also arranged in pairs and which are suitable for penetrating like tongs into the ballast below the sleeper and also for tamping the ballast on one side of the sleeper.

Embodiments of the invention are described by way of example in the following with reference to the accompanying drawings, wherein:

Figure 1 is a side elevation of a tamping tool unit of a track tamping machine according to the invention looking from the outside of the track,

Figure 2 is a front elevation of the tamping tool unit shown in Figure 1 looking in the longitudinal direction of the track, partly in section on the line II-II of Figure 1,

Figure 3 is a diagrammatic front elevation of another embodiment of a track tamping machine according to the invention,

Figure 4 is a plan view of part of a track switch diagrammatically illustrating the penetration process with a tamping tool unit of the type shown in Figures 1 and 2,

Figure 5 is a diagrammatic front elevation of the tamping tool unit in the zone V-V of the track switch shown in Figure 4,

Figure 6 is a diagrammatic front elevation of the tamping tool unit in the zone VI-VI of the track switch shown in Figure 4,

Figure 7 is a diagrammatic front elevation of another example of embodiment of a tamping tool unit of a track tamping machine according to the invention.

The track tamping machine shown in Figures 1 and 2, which is designed to travel along the rails 1 of a track, comprises a machine frame 2, of which only part is shown and which, for receiving one or more tamping tool units 3, is formed in this zone by two elevated frame members 5 which extend in the longitudinal direction 4 of the machine and of which only one is shown in the drawing. Two downwardly directed brackets 6 facing towards the outside of the track are secured, for example by welding, to each frame member 5. A horizontal guide column 7 extends between and is rigidly connected to the brackets 6 which are situated opposite one another in the transverse direction of the track. At least one tamping tool unit 3 is mounted on these two guide columns 7 for displacement transversely of the longitudinal direction 4 of the machine by means of two guide sleeves 8. An upwardly projecting jib 9 is connected to the guide columns 8. One end of a hydraulic piston-and-cylinder unit 10 is pivotally connected to this jib 9, its other end being pivotally connected to the machine frame by means not shown in the drawing. A vertical guide column 11 is arranged between and connected to the two guide sleeves 8. The tool carrier 12 of the tamping tool unit 3 is arranged for vertical adjustment on the vertical guide column 11 by means of a sleeve 13. On the inside of the tool carrier 12 facing towards the middle of the machine, a total of four guide rollers 14 are mounted for rotation about parallel axes extending transversely of the longitudinal direction 4 of the machine. The guide rollers 14 run along opposite surfaces of a vertical guide rail 15 which is connected to the guide sleeves 8. The tool carrier 12 is vertically adjusted by means of a hydraulic piston-and-cylinder unit 16 which is pivotally connected to a jib 17 of the tool carrier 12 at its lower end and to the jib 9 of the two guide sleeves 8 at its upper end.

The tool carrier 12 consists essentially of two spacer plates 19 which extend parallel to one another and to the vertical longitudinal plane 18 of the rail and on which two tool holders 20 arranged symmetrically relative to the vertical central plane 21 of the unit 3 are mounted to pivot about an axis 22 extending transversely of the longitudinal direction 4 of the machine.

Each tool holder 20 is in the form of a substantially fork-shaped pivotal lever with a pivot bearing 23, a forked drive arm 24 extending upwards therefrom and two side arms 25 and 26 extending below the pivot bearing 23 transversely of the longitudinal direction 4 of the machine to opposite sides of the vertical longitudinal plane 18 of the rails. Clamping tools which are solely displaceable longitudinally of the track and which are intended to penetrate into adjacent sleeper cribs 27, 28 outside the rail 1 are arranged on the outer side arms 25 of the two tool holders 20 and, together, form a pair 29 of tamping tools.

Additionally laterally pivotal tamping tools which are intended to penetrate into the sleeper cribs 27, 28 inside the rail 1 are arranged on the inner side arms 26 of the tool holders 20 and together form another pair 30 of tamping tools.

The tamping tools of the first pair 29 respectively consist of two tamping tines 31, 32 and 33, 34 which are arranged adjacent one another transversely of the machine, are releasably fixed directly to the outer side arm 25 of the tool holder 20 and carry a tamping plate 35 at their lower ends.

The other pair 30 of tamping tools is formed by two tamping tines 36 and 37 which are releasably secured to a holding shoe 39 pivotal about an axis 38 extending longitudinally of the track on the inner side arm 26 of the respective tool holder 20 and, at their lower ends, comprise a tamping plate 40 which has a greater width or surface area than the tamping plates 35 of the tamping tines 31, 32, 33 and 34.

A hydraulic piston-and-cylinder unit 41 is pivotally connected to the holding shoe 39, its other end being pivotally connected to a jib 42 connected to the drive arm 24 of the tool holder 20. By means of the piston-and-cylinder unit 41, the holding shoe 49 with the tamping tines 36 and 37 can be laterally pivoted transversely of the longitudinal direction of the track in addition to its displacement in that direction. Two different pivoted positions of the tamping tine 36 or 37 are shown in dash-dot lines in Figure 2. The tamping tines 36 or 37 may of course be provided with a pivoting range of any size in both directions by designing the pivoting drive accordingly.

A hydraulic piston-and-cylinder unit 43 is pivotally connected as feed-adjustment drive to the drive arm 24 of each tool holder 20, its other end being mounted on an eccentric shaft 44 of a common vibration drive 45, for example in the form of a hydraulic motor, arranged centrally on the tool carrier 12.

Figures 1 and 2 show the pair 29 of tamping tools formed by tamping tools 31 to 34 which are only displaceable in the longitudinal direction of the track, and the pair 30 of tamping tools consisting of additionally laterally pivotal tamping tools 36, 37 in the position astride a sleeper 46 below which the ballast is to be tamped. The tamping tool unit 3 with its tool holders 20 is situated in a position symmetrical to

the vertical longitudinal plane 18 of the track and is aligned longitudinally of the track with the centre of the sleeper 46 below which the ballast is to be tamped. When the tamping tool unit 3 is lowered by means of the piston-and-cylinder unit 16, the tamping tines 31 to 34 and 36, 37 of the tamping tool pairs 29 and 30, respectively which are vibrated by the vibration drive 45 penetrate into the ballast bed in the sleeper cribs 27, 28 situated adjacent the sleeper 46 on the outside and inside of the rail 1. The feed-adjustment drives 43 impart to the tamping tools of each tamping tool pair 29, 30 an in-feed movement directed towards the sleeper so that the ballast is pushed below the sleeper 46 from both sleeper cribs 27, 28 and is correspondingly consolidated. Since the pair of tamping tools 29 used on the outside of the track is formed by two adjacent tamping tines 31, 32 and 33, 34 with a relatively large useful surface of the two tamping plates 35, the ballast bed below the sleeper 46 is consolidated particularly effectively at the sleeper ends. The construction of the laterally pivotal tamping tool pair 30 used on the inside of the track with individual samping tines 36, 37, of which the tamping plates 40 have a smaller useful area than the two tamping plates 35 of the tamping tines 31, 32 and 33, 34 acting in the same sleeper cribs 28 and 27, takes into account the fact that the ballast situated below the sleeper 46 in the region between the two rails 1 has to be consolidated to a lesser extent to prevent so-called "riding" of the sleeper.

Figure 3 shows an embodiment of a track tamping machine 47 which has only been diagrammatically illustrated and which comprises two tamping tool units 48 and 49 each associated with one rail 1 of the track which are adjustable independently of one another along a horizontal guide 50 transversely of the longitudinal direction 4 of the machine, as indicated by the double arrow, by means of an adjustment drive 51. Each tamping tool unit 48, 49 is designed for separate vertical adjustment along a vertical guide 52. In these tamping tool units, the tool holders 53 which are vibrated by a vibration drive (not shown) are +-shaped. On the support arm 54 of each of the two tool holders 53 which extends transversely of the track, a tamping tine 55 which is displaceable solely in the longitudinal direction of the track is arranged on the outside of the track, whilst an additionally laterally displaceable tamping tine 56 is arranged with a corresponding pivoting drive (not shown) on the inside of the track. A track tamping machine 47 such as this with two symmetrically constructed and arranged tamping tool units 48 and 49 is suitable not only for normal, i.e. open, sections of track, but also and above all for rapidly tamping almost the entire ballast bed situated in the vicinity of both rails of switches, crossings and the like with individual use of the laterally pivotal tamping tines 56 or pairs of tamping tines in the vicinity of hindering track components.

Figure 4 illustrates part of a track 57, showing only one of the continuous rails, i.e. the outer rail 58, of the main track and the branching, curved outer rail 59 of the branch track. When the ballast below the sleepers 60 to 63 of the switch 57 is successively tamped by a tamping tool unit 64 which corresponds in its tamping tool arrangement and drives to the embodiment illustrated in Figures 1 and 2, but which is only diagrammatically illustrated in Figures 5 and 6, the following procedure is followed by the vibrated tamping tools 31 to 34 and 36, 37 arranged on the two tool holders 20. Whereas the pair of tamping tools 29 formed by the tamping tines 31 to 34 which are displaceable solely in the longitudinal direction of the track remains in the same lateral position relative to the rail 58 when tamping the ballast below the ends of all the sleepers 60 to 63, the rail 59 situated in the working range of the laterally pivotal pair 30 of tamping tools necessitates lateral deflection of the tamping tools 36, 37 towards the middle of the track in order to be able to lower them into the ballast bed on the inside of the rail 59 when the tamping tool unit 64 is lowered. The same operation is repeated when the ballast below the sleeper 61 is tamped, except that in this case the two tamping tines 36, 37 are laterally deflected through different angles corresponding to the curvature of the rail 59. In the vicinity of the sleeper 62, the distance between the two rails 58 and 59 is already so great that the tamping tines 36, 37 can be lowered slightly angled towards the outside of the track into the ballast bed between the two rails 58 and 59. By pivoting the tamping tines 36, 37 inwards below the nails 58 and 59, the ballast below the sleeper 62 can also be effectively tamped in this zone (*cf.* Figure 6). Tamping of the ballast below the sleeper 63 proceeds in the absence of any interference with the tamping tools, as in normal open-track application of the machine.

Figure 7 shows another embodiment of a tamping tool unit 65 according to the invention in which two tamping tines 67, 68 and 69, 70 are arranged adjacent one another on each of the two side arms of the substantially +-shaped tool holder 66. Whereas the tamping tines 67, 68 are releasably secured directly to the side arm 71 and hence can only be displaced in the longitudinal direction of the track, the tamping tines 69, 70 situated on the inside of the rail are arranged on a common holding shoe 73 which is mounted on the side arm 72 to pivot about

an axis 74 running parallel to the longitudinal direction of the track and can be laterally pivoted together with the tamping tines 69, 70 by means of an adjusting drive 75. Two such ⊥-shaped tool holders 66 are connected through separate feed-adjustment drives to a common vibration drive for the unit 65 in a manner not shown in the drawing.

Numerous other embodiments of the tamping tool unit differing from the embodiments illustrated are possible within the scope of the invention. The principle of differential consolidation of the ballast bed on the left and right of the rail to avoid "riding" of the sleepers may be applied with advantage both in the form of a different number and distribution of the tamping tools than in the embodiments illustrated by way of example and also, for the same number of tamping tools, by correspondingly adapting the widths or useful surfaces of the individual tamping tools which are intended to penetrate into the same sleeper crib on the left and right of the rail and of which some are only displaceable in the longitudinal direction of the track whilst others can additionally be laterally pivoted. The free choice of the most favourable number, configuration and useful surface ratios of the tamping tools to be provided on the left and right of the rail provides the designer with the possibility of largely adapting the tooling to meet the special requirements of the particular machine.

In our British Patent Specification No. 1,544,144 there is described and claimed a rail-borne machine for tamping ballast beneath the sleepers of a railway track and, more especially, for tamping ballast at switches, crossings and the like, including at least one tamping unit which is mounted on the machine frame for vertical adjustment by means of a hydraulic cylinder-and-piston drive and which comprises tamping tools mounted in pairs on a carrier for ballast-squeezing infeed adjustment relative to one another and for penetration into the ballast bed along the longitudinal sides of the sleepers, and also vibration and feed adjustment drives for these tamping tools, characterised in that the tamping unit comprises two forked tamping tools designed for arrangement astride the rail and pivotal relative to one another in substantially the vertical plane of the rail about transverse axes extending parallel to the plane of the track and perpendicularly of the longitudinal axis of the machine, and in that each of the tamping tool holders is a rigid unit which consists of a central pivotal upright first arm mounted on the carrier together with the vibration and infeed adjustment drives and of two side arms extending on both sides of the lower end of the first arm transversely of the longitudinal axis of the machine, the side arms being provided with holding shoes for the tamping tines, each holding shoe being arranged to pivot a longitudinal axis running parallel to the longitudinal axis of the machine to enable the tamping tines of each tamping tool adapted to penetrate into the ballast bed on both sides of the rail to be adjusted and swung out independenly of one another transversely of the track axis, the pivotal mounting of the said first arm enabling all the tines to be adjusted and swung together in the longitudinal direction of the track.

We make herein no claim to a machine as set forth in the preceding paragraph.

Subject to this disclaimer,

WHAT WE CLAIM IS:—

1. A railway track tamping machine, comprising at least one tamping tool unit which is mounted on the machine frame to be raised and lowered by a vertical adjustment drive and in which tamping tools disposed in the same transverse plane and intended to penetrate into the same sleeper crib on both sides of a rail are arranged on a common tool holder which is pivotal longitudinally of the machine about an axis transverse to the track, and which is connected to feed-adjustment and vibration drives, characterised in that at least one tamping tool or pair of tamping tools intended to pentrate into the ballast bed on one side of the rail is, in addition, designed to pivot laterally about an axis parallel to the longitudinal axis of the machine.

2. A machine as claimed in claim 1, characterised in that the tamping tool or pair of tamping tools displaceable solely in the longitudinal direction of the machine is arranged on one side arm of a substantially fork-shaped or ⊥-shaped tool holder which is intended to be centrally arranged in the plane of symmetry of the rail and which is preferably displaceable transversely of the longitudinal axis of the machine by means of a drive, whilst the additionally lateral pivotal tamping tool or pair of tamping tools is arranged on the other side arm, of the said tool holder which faces towards the middle of the track.

3. A machine as claimed in claim 2, characterised in that the additionally laterally pivotal tamping tool or pair of tamping tools is releasably fixed to a holding shoe arranged on the transverse axis of the tool holder running parallel to the longitudinal axis of the machine, a hydraulic cylinder-and-piston assembly being pivotally connected to the holding shoe for laterally pivoting the latter.

4. A machine as claimed in any of claims 1 to 3 equipped with two tamping tool units associated respectively with the two rails of the track and adjustable in particular transversely of the longitudinal axis of the track, characterised in that the two tamp-

ing tool units with additionally laterally pivotally two tamping tool or pairs of tamping tools facing the middle of the track are constructed and arranged symmetrically to one another.

5. A machine as claimed in any of claims 1 to 4, characterised in that two tamping tines are releasably secured to the tamping tool holder for penetration into the ballast bed in the particular outer zone of the two rails, whilst only one laterally pivotal tamping tine or pair of tamping tines is releasably secured to the tool holder in the same transverse plane of the track in the particular inner zone of the two rails, i.e. between the rails.

6. A machine as claimed in any of claims 1 to 5, characterised in that both the track tamping tools displaceable solely in the longitudinal direction of the track and also the additionally laterally pivotal tamping tools are designed to be arranged astride a sleeper below which the ballast is to be tamped and are connected to a common, preferably centrally arranged vibration drive for the tamping tool unit through a feed-adjustment drive pivotally connected to each of the fork-shaped or +-shaped tool holders.

7. A railway track tamping machine substantially as herein described with reference to the accompanying drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1980.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained

1571868 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

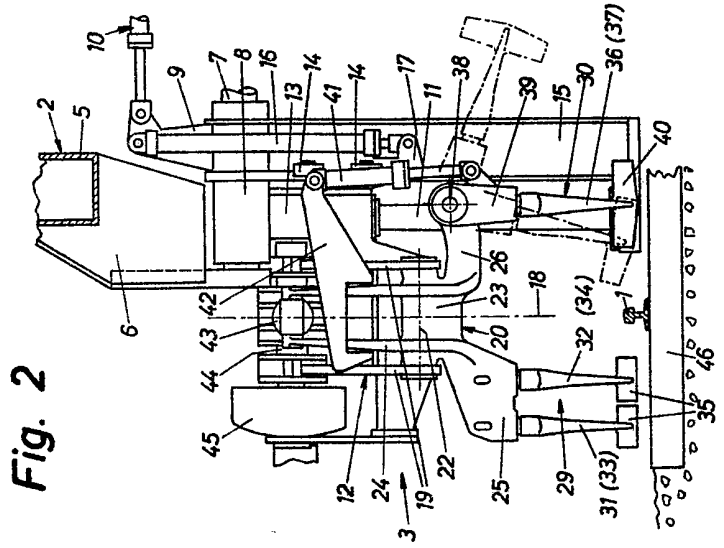

Fig. 2

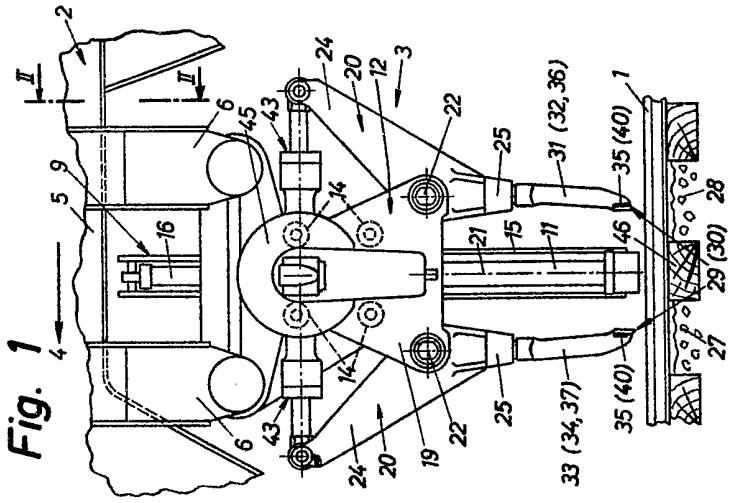

Fig. 1

Fig. 3

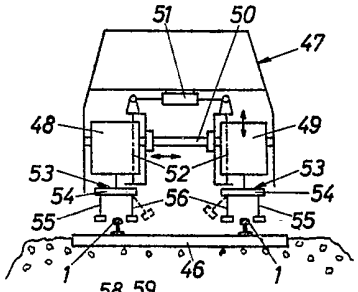

Fig. 4

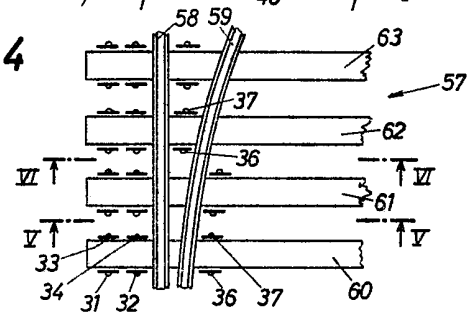

Fig. 5

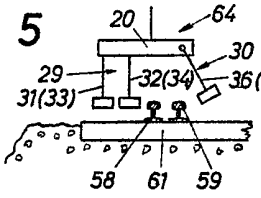

Fig. 6

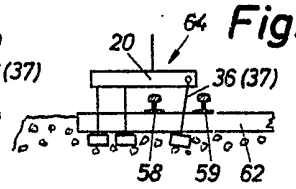

Fig. 7