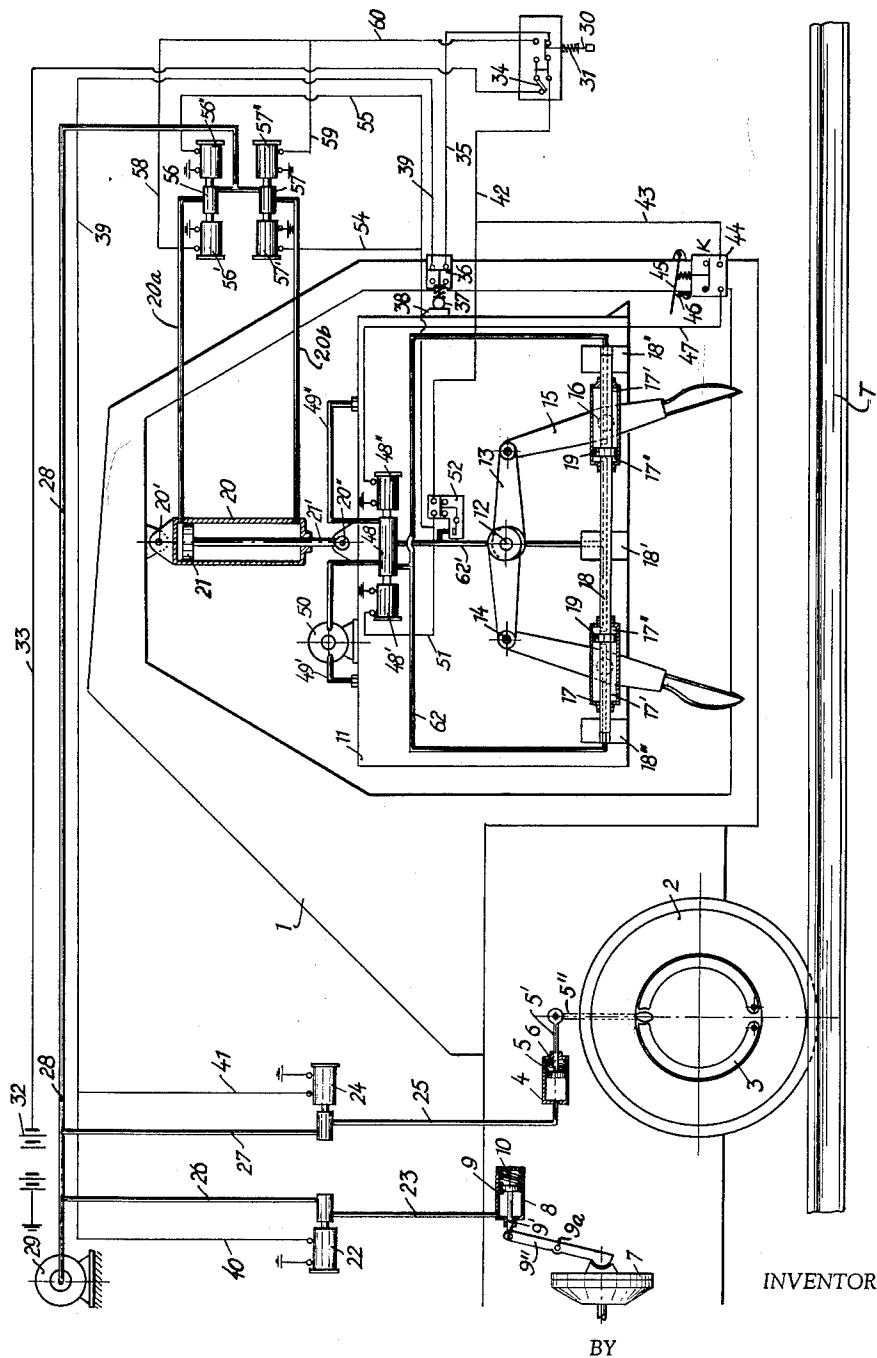


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MOBILE TRACK TAMPING MACHINE

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MOBILE TRACK TAMPING MACHINE

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The present invention relates to railway ballast tampers mounted on cars adapted to travel along a railroad track whose rails are arranged on spaced ties.

Highly efficient and automatic machines of this type have been developed in recent years to effect ballast tamping under and about the individual ties relatively quickly and dependably, the high quality of the tamping operation being independent of the skill of the operating crew. Such machines have been described, for instance, in our U.S. Patent No. 2,876,709, granted March 10, 1959, U.S. application Serial No. 741,984, filed June 11, 1958, now Patent No. 3,000,327, granted September 19, 1961, and U.S. application Serial No. 644,638, filed March 7, 1958, now Patent No. 2,915,018, granted December 1, 1959. However, while the present invention may be advantageously applied to these tampers, it is in no way limited thereto, the specific tamping mechanism forming no part of this invention. In fact, the invention may be used with any of the well known track tampers in which vertically adjustable tamping tool carriers are lowered to immerse the tamping tools in the ballast adjacent each tie and to effect tamping, the tamping tool carriers are raised after completion of the tamping operation, the car is moved to the next succeeding tie and the tamping tool carrier is then lowered again for the next tamping operation. Tamping is usually effected by moving pairs of vibratory tamping tools together to condense the ballast under each tie but surface tampers may also be used.

In application Serial No. 746,980, filed July 7, 1958, now Patent No. 2,976,816, granted March 28, 1961, there is disclosed a system including tie-probing means for automatically controlling the intermittent movement of the tamper from tie to tie. In this system, the tamper is stopped when the tie-probing means contacts a tie and means may also be provided for automatically controlling other steps in the tamping operation, such as the upward movement of the tamping tool carrier after completion of the tamping operation causing disengagement of the brakes and engagement of the clutch to produce forward movement of the tamper to the next tie.

Experience has shown that the tie-probing means, which controls the actuation of the brakes and/or clutch, does not always operate dependably. Sometimes, for instance, the tie-probing means contacted a high portion of the ballast and thus caused premature stoppage of the machine before the tamping tools were properly positioned above the tie to be tamped. Difficulties have also been encountered in connecting the tie-probing means with the coupling and brake actuating means so that the tamping units were not always accurately positioned above each tie when the machine was stopped. Such positioning, however, is essential for proper tamping with machines using pairs of approaching tamping jaws.

It is the primary object of the present invention further to increase the operating speed and efficiency of mobile track tamping machines and to achieve automation in tamping operations.

It is a more specific object of this invention to make some or all of the operating stages of a track tamper automatically dependent on the actuating of the tamper car stoppage means so that all tamping operations will be effected automatically when the car is stopped.

According to one embodiment of the invention, actua-

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tion of the car brakes automatically initiates the lowering of the tamping tool carrier to immerse the tamping tools in the ballast.

If the invention is applied to a track tamper with movable tamping tools, the tamping tool carrier may actuate the tamping movement of the tools when it has reached its lowermost or tamping position. In this embodiment, the movement of the tamping tools will preferably be automatically interrupted when the density of the ballast has reached a desired degree and/or when the tamping tool carrier is raised.

The system of the invention is particularly advantageous in tampers with pairs of tamping tools which are hydraulically moved together in the direction of the track. In such machines, a predetermined maximum pressure encountered by the closing tamping tools may automatically actuate the moving apart of the tools. Furthermore, this maximum pressure may also cause the raising of the tamping tool carrier.

Automation may be carried a step further by automatically actuating the disengagement of the tamper car stoppage means when the tamping tool carrier has reached its uppermost position, whereby the car is enabled to move on when the tamping tools are no longer immersed in the ballast. Preferably, the disengagement and engagement of the car brake is synchronously coordinated with the engagement and disengagement of the clutch so that the tamper car is in drive when the brake is disengaged, as is well known per se in automobiles, for instance.

The above and other objects, advantages and features of the invention will be more fully explained in the following detailed description of one specific embodiment thereof, taken in conjunction with the single figure of the accompanying drawing schematically illustrating a side view of the tamper and the circuit which automatically and sequentially controls the tamping operation.

As shown, the chassis of the mobile track tamping machine comprises frame 1 which is freely suspended above the track portion to be tamped in front of front wheels 2. Internal expanding brake 3 is pressure-operated, for instance by compressed air. The specific pressure-controlled brake actuating means illustrated includes a cylinder 4 guiding a piston rod 5' and a piston 5 fixedly attached thereto. Pressure medium feed line 25 is connected to one end of the cylinder to supply pressure medium to the adjacent cylinder chamber while a compression spring 6 is mounted in the other cylinder chamber to force the piston and piston rod into the rest position when no pressure is applied to the one cylinder chamber. An actuating rod 5'' is linked to the piston rod 5' and operates the brake in response to the reciprocating movement of the piston rod.

The drive clutch 7 is similarly controlled, the illustrated clutch actuating means including a cylinder 8 guiding piston rod 9' and piston 9, pressure medium feed line 23 being connected to one cylinder chamber while a compression spring 10 is mounted in the other cylinder chamber. A two-armed lever 9'' has one arm linked to the piston rod 9' while its other arm is universally coupled with the clutch. The two-armed lever pivots about fulcrum 9a in response to the reciprocating movement of piston rod 9'.

The illustrated tamping structure proper is generally similar to that of our Patent No. 2, 876,709 and only those conventional elements of the combination are shown in the drawing, which are required for a ready understanding of the essential features of the present invention. Thus, the tamping tool carrier 11 is vertically adjustably mounted in frame 1, for instance on vertical guide posts (not shown). It carries the conventional eccentric shaft 12 extending transversely of the track, the tamping tools

15 being linked to the ends of arms 13 which are vibrated by the eccentric shaft. The tamping tools are connected at pivots 16 to cylinders 17 which are reciprocable in the direction of the track T on fixed piston rod 18. The cylinders 17 are divided by fixed pistons 19 into outer cylinder chambers 17' and inner cylinder chambers 17''. The fixed piston rod 18 is securely mounted in outer bearings 18'' and central bearing 18'. All of this structure is more fully described in our patent No. 2,876,709 and it should be clearly understood that it is used herein for purposes of illustration only, the automation system of this invention being applicable to any track tamper with vertically adjustable tamping tool carriers.

Raising and lowering of the tamping tool carrier 11 is effected by pressure-controlled means, the specific pressure-controlled vertical adjusting means illustrated including a vertically extending cylinder 20 with vertically reciprocable piston 21 and piston rod 21' fixedly attached thereto. Pressure medium, such as compressed air, may be selectively supplied to one or the other cylinder chambers formed by piston 21 through feed lines 20a and 20b, respectively. Cylinder 20 is linked to frame 1 by lug 20' while piston rod 21' is linked to lug 20'' of the tamping tool carrier 11.

The similar brake and clutch actuating means are operated, respectively, by similar magnetic valves 24 and 22 which control the supply of pressure medium to cylinders 4 and 9, respectively. In the illustrated embodiment, a pressure medium supply conduit 28 receives compressed air from compressor 29, delivering the same to branch lines 26 and 27 which may be shut off from or connected to compressed air feed lines 23 and 25, respectively, by electromagnetically controlled valves 22 and 24.

Valves 22 and 24, which control the actuation of clutch 7 and brake 3, are controlled by operation of the tactile element 30 which is held in a rest position by compression spring 31 and receives current from storage battery 32 (or any other suitable source of power) as long as the main switch 34 in conductor 33 is closed. Current may be entirely shut off from brake control means 30 by opening the main switch.

Conductor 35 connects the tactile element 30 with switch 36 mounted on tamper frame 1 adjacent the vertically movable tamping tool carrier 11. The tamping tool carrier has a lug 38 adapted to engage the switch element 37 to operate switch 36.

The circuit includes further the conductor 39 connected with one end to switch 36 while its other end has branch conductors 40 and 41, respectively, to magnetic valves 22 and 24. Another branch conductor 42 connects the tactile element 30 with pressure-controlled switch 52 which is mounted in the pressure actuating circuit controlling the movement of the tamping tools. A conductor 43 leads from power line 42 to quick-action switch 44 also mounted on the frame 1 but operable by tamping tool carrier 11 in its lower position. Switch 44 comprises a switching lever 45 biased by spring 46 and so arranged that the switch may be actuated only by the descending tamping tool carrier.

Conductor 47 connects the quick-action switch 44 with electromagnet 48' which controls a slide valve 48 to regulate the supply of hydraulic fluid to cylinders 17 so as to move the tamping tools 15 in a manner known per se.

The hydraulic tamping tool moving means illustrated herein includes a pump 50 delivering fluid from a storage tank over conduit 49' to valve 48 whence it is distributed through conduits 62 and 62' either to cylinder chambers 17' or 17'', fluid returning from cylinders 17 flowing back into the storage tank through conduit 49''.

Valve control magnet 48' is connected to switch 52 by conductor 51, the latter switch being controlled by the pressure in hydraulic conduit 62' leading from valve 48 to the inner cylinder chambers 17''.

A conductor 53 connects the fluid pressure controlled

switch 52 by branch line 54 with electromagnet 57' and by branch line 55 with electromagnet 56'', which magnets control the movement of valves 57 and 56, respectively, in one direction. Electromagnets 56' and 57'', which control the movement of the latter valves in the other direction, are connected to the tactile element 30 by means of trunk line 60 with its respective branch lines 58 and 59. The magnetic valves 56 and 57 control the supply of compressed air from conduit 28 to cylinder 20 by respective lines 20a and 20b to adjust the vertical position of tamping tool carrier 11.

The illustrated system operates as follows:

Assuming the tamper to be in motion toward a tie to be tamped, it may be halted in a desired tamping position by actuating tactile element or switch 30 against the bias of spring 31 while main switch 34 is closed, as shown. This actuation of switch 30 will interrupt the current supply to switch 36 which receives current from voltage source 32 through conductors 33 and 35 in the illustrated rest position of switch 30. By disconnecting switch 36, conductor 39 with its branch lines 40 and 41 also loses its current supply so that the magnets of valves 22 and 24 become deactivated and the valves shut off compressed air supply to conduits 23 and 25. This enables springs 10 and 6 to reciprocate piston rods 9' and 5', respectively, since they encounter no more air pressure, and thus to disengage the clutch 7 and engage the brake 3 simultaneously. In this manner, operation of tactile element 30 immediately stops the tamper car.

While disconnecting the switch 36 from current supply, the switch 30 simultaneously closes the circuit of conductor 60 so that the electromagnets 56' and 57'' are activated, moving the slide valves 56 and 57 in opposite directions so as to supply compressed air from conduit 28 to line 20a while permitting air to escape through line 20b. The air pressure upon piston 21 in cylinder 20 will cause the tamping tool carrier 11 to be lowered.

The pressure on tactile element or button 30 need be maintained only until tamping tool carrier 11 has been lowered sufficiently to disengage lug or stop 38 from switch element 37 of switch 36. As soon as the tamping tool carrier has been lowered a little, switch 36 is opened and no current is supplied to trunk line 39 even if button 30 is released and returns to its rest position. Thus, magnetic valves 22 and 24 remain deactivated.

Under the pressure of the compressed air supplied to cylinder 20 through conduit 20a, the tamping tool carrier continues to descend until its lower edge trips switch element 45 to actuate quick-action switch 44. This sends an electric pulse over line 47 to electromagnet 48' to move slide valve 48 and thus permit hydraulic fluid to be supplied to inner chambers 17'' of cylinders 17. Under the hydraulic pressure thus applied, the cylinders 17 are reciprocated toward each other, taking along tamping tools 15 which are pivoted thereto. Under the pressure of the approaching tamping tools, the ballast between the immersed ends of the tools underneath a tie is condensed.

In a manner well known per se, the desired maximum pressure in the hydraulic supply conduit 62' and cylinder chambers 17'' may be regulated by a pre-set pressure relief valve, for instance, and when this maximum pressure is reached, switch 52 will be tripped and will thus activate electromagnet 48' by sending a pulse through line 51. This will move slide valve 48 in the opposite direction and direct the hydraulic fluid supply through conduits 62 into outer cylinder chambers 17', whereby the tamping tools are forced apart again. At the same time, the pressure-controlled switch 52 supplies current to trunk line 53 which sends a pulse to electromagnet 56'' over line 55 and to electromagnet 57' over line 54. This reverses the position of valves 56 and 57 so that compressed air is supplied to the lower chamber of cylinder 20 through conduit 20b while air escapes from the upper cylinder chamber through conduit 20a, the compressed air being fed by compressor 29 through conduit 28 and

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valve 57 into conduit 20b. The tamping tool carrier is thus moved upwardly until stop 38 trips switch element 37 and thus closes switch 35 to supply current again to line 39 and magnetic valves 22 and 24. This will again supply compressed air to the respective chambers of cylinders 4 and 9 to engage the clutch and disengage the brake, whereby the intermittent forward motion of the tamper car is resumed until button 30 is pressed again. Pressure on the tactile element 30 stops the machine, as hereinabove described, and automatically sets in motion all stages of the tamping operation in their proper sequence.

A system in accordance with the invention has several obvious advantages of great practical merit. An operator can concentrate on observing the exact positioning of the tamping units at the desired location and stop the machine instantly at this location by actuating tactile element 30, being relieved of control of any other tamping operation which is effected completely automatically. This not only saves considerable time and greatly speeds the track tamping but the operator's job is simplified to such a degree that he will hardly tire and will be able to be fully alert to the single requirement of stopping the tamper as accurately as possible to obtain highest quality tamping.

Since the tactile element 30 may obviously be operated from a distance, for instance by an electric cable or other suitable means, it is possible for the operator to leave the machine during the tamping operation and to walk next to it to be able better to observe the exact location of the tamping units in relation to the tie to be tamped, at which moment he actuates element 30. He thus halts the tamper instantly and automatically sets in motion the tamping operation which proceeds until completion and automatically moves the tamper forward after completion to the next tie, when the operator actuates element 30 again.

Thus, it will be appreciated that actuation of element 30 and stoppage of the tamper automatically triggers all stages of the tamping operation in proper sequence without further action by the operator.

It will be obvious to the skilled in the art that many variations and modifications of the illustrated embodiment are possible without departing from the spirit and scope of the invention as defined in the appended claims. More particularly, the specific tamping mechanism is of no importance to this invention which may be applied to tampers with vibrating or rotating tamping tools and/or to tamping tools which are moved together and apart by mechanical means, such as threaded spindles, as well as hydraulically. Equally, the tactile element 30 may be operated manually or controlled from a distance. If desired, it could also be set automatically. Furthermore, not all tamping operations need be automatically controlled and, if desired, automation could be limited to any one or any one sequence of tamping stages while the other stages are manually controlled.

What we claim is:

1. A ballast tamping machine mounted on a chassis with wheels for mobility on a railroad track which is mounted on spaced ties and comprising, in combination, a frame mounted on said chassis, a tamping tool carrier vertically adjustably supported in said frame, means mounted on said frame and connected with said carrier for lowering the carrier into a tamping position wherein the tamping tools are immersed in the ballast and for raising the carrier out of said tamping position, means mounted on said carrier for operating the tamping tools, brake means mounted for stopping the wheels, brake actuating means mounted for selective engagement with, and disengagement from, the brake means, an electric brake control circuit actuable to effect intermittent stoppage of the chassis by causing the brake actuating means to engage the brake means, said circuit compris-

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ing an electric power source, electric conductor means connected to said power source, an electromagnet connected to said electric conductor means, said electromagnet being connected for actuation of the brake actuating means, and a tactile element in said electric conductor means between the power source and said electromagnet, said tactile element being actuatable into respective positions activating and deactivating the electromagnet to disengage and engage the brake means, and means connected to said electric conductor means and actuating the means for lowering the tamping tool carrier in response to the tactile element position corresponding to the brake engagement.

2. The ballast tamping machine of claim 1, comprising further means connected to said electrical conductor means for operating the tamping tool operating means, the operation of said further means being responsive to the tamping position of the tamping tool carrier, means connected to the tamping means for stopping the tamping tool operation, and additional means connected to said electrical conductor means for operating the tamping tool carrier raising means in response to the stoppage of the tamping tool operation.

3. A ballast tamping machine mounted on a chassis with wheels for mobility on a railroad track which is mounted on spaced ties and comprising, in combination, a frame mounted on said chassis, a tamping tool carrier vertically adjustably supported in said frame, a pair of tamping tools mutually reciprocable in the direction of the track, the tamping tools being supported on the carrier, means mounted on said frame and connected with said carrier for lowering the carrier into a tamping position wherein the tamping tools are immersed in the ballast and for raising the carrier out of said tamping position, pressure fluid means mounted on said carrier for reciprocating the tamping tools, the pressure fluid means including a valve, an electric control circuit actuable to operate the tamping tool reciprocating means, said circuit comprising an electric power source, electric conductor means connected to said power source, electromagnetic means connected to said conductor means and said valve for selectively directing the pressure fluid into one and another direction thereby to move the tamping tools together and apart, a switch in said conductor means between the power source and said electro-magnetic means, switch actuating means on the tamping tool carrier for tripping said switch by said tamping tool carrier in said tamping position for activating the electromagnetic means and to move the tamping tools together, another switch, means responsive to a maximum pressure in the pressure fluid means for closing the other switch, an electric conductor connecting the other switch to the electromagnetic means, said electromagnetic means being activated by the closing of the other switch to move the valve and cause the pressure fluid to flow in the direction in which the tamping tools are moved apart, another electromagnet, and another electric conductor connecting the other switch with the other electromagnet, said other electromagnet actuating the means for raising the tamping tool carrier.

References Cited in the file of this patent

UNITED STATES PATENTS

2,712,287	Zermuhle	July 5, 1955
2,976,816	Plasser et al.	Mar. 28, 1961
3,096,724	Kershaw	July 9, 1963

FOREIGN PATENTS

193,921	Austria	Dec. 10, 1957
194,886	Austria	Jan. 25, 1958
1,014,140	Germany	Aug. 22, 1957
794,235	Great Britain	Apr. 30, 1958
802,795	Great Britain	Oct. 8, 1958