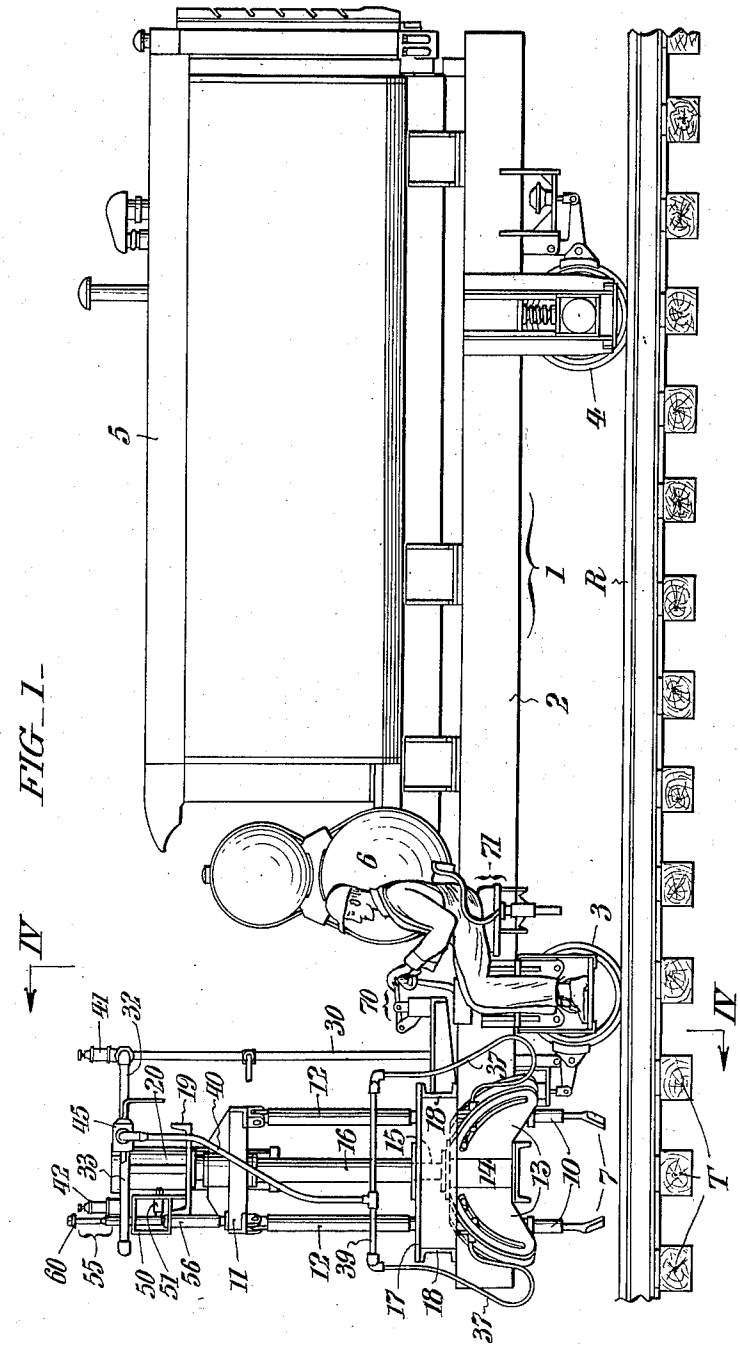
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 1



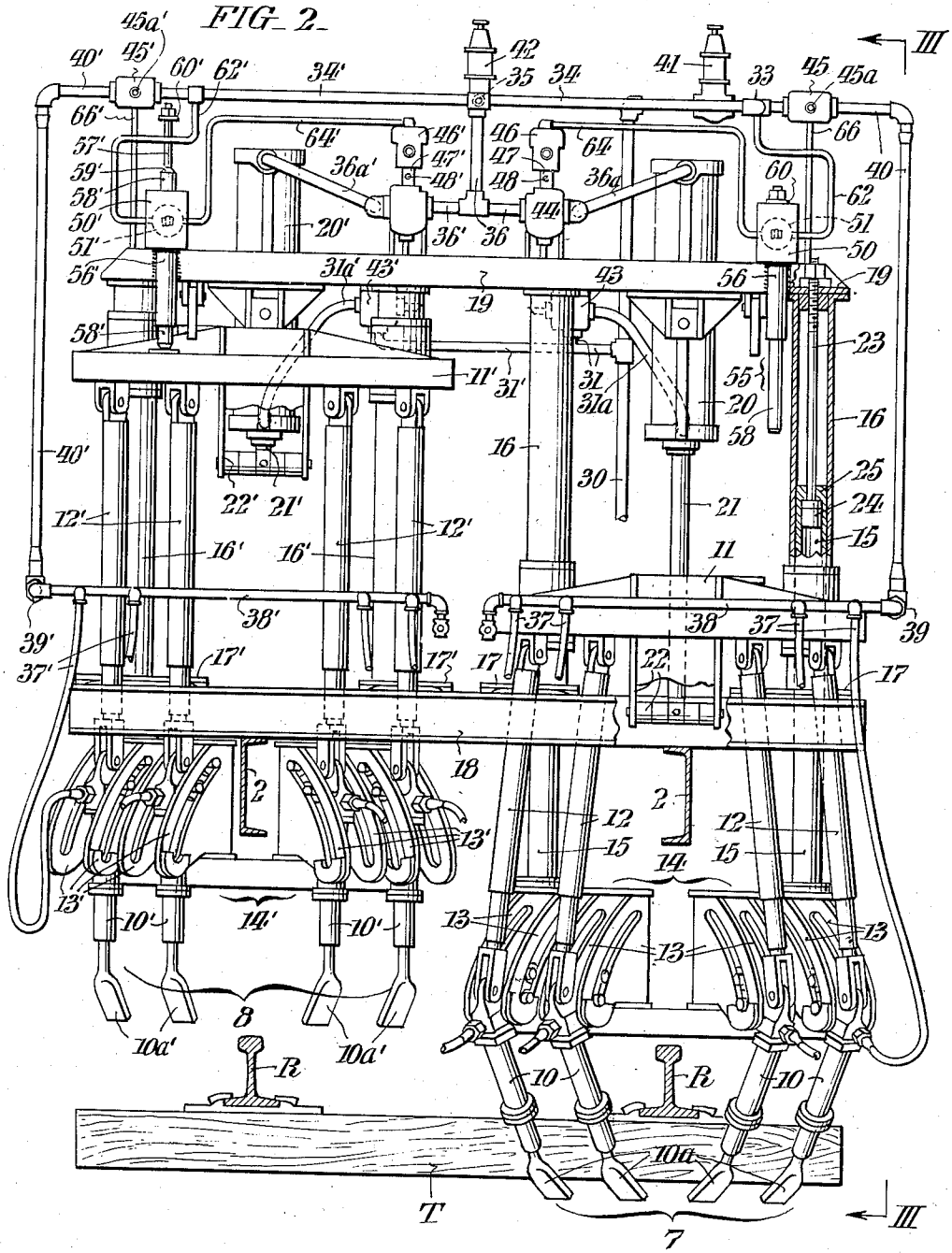
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 2



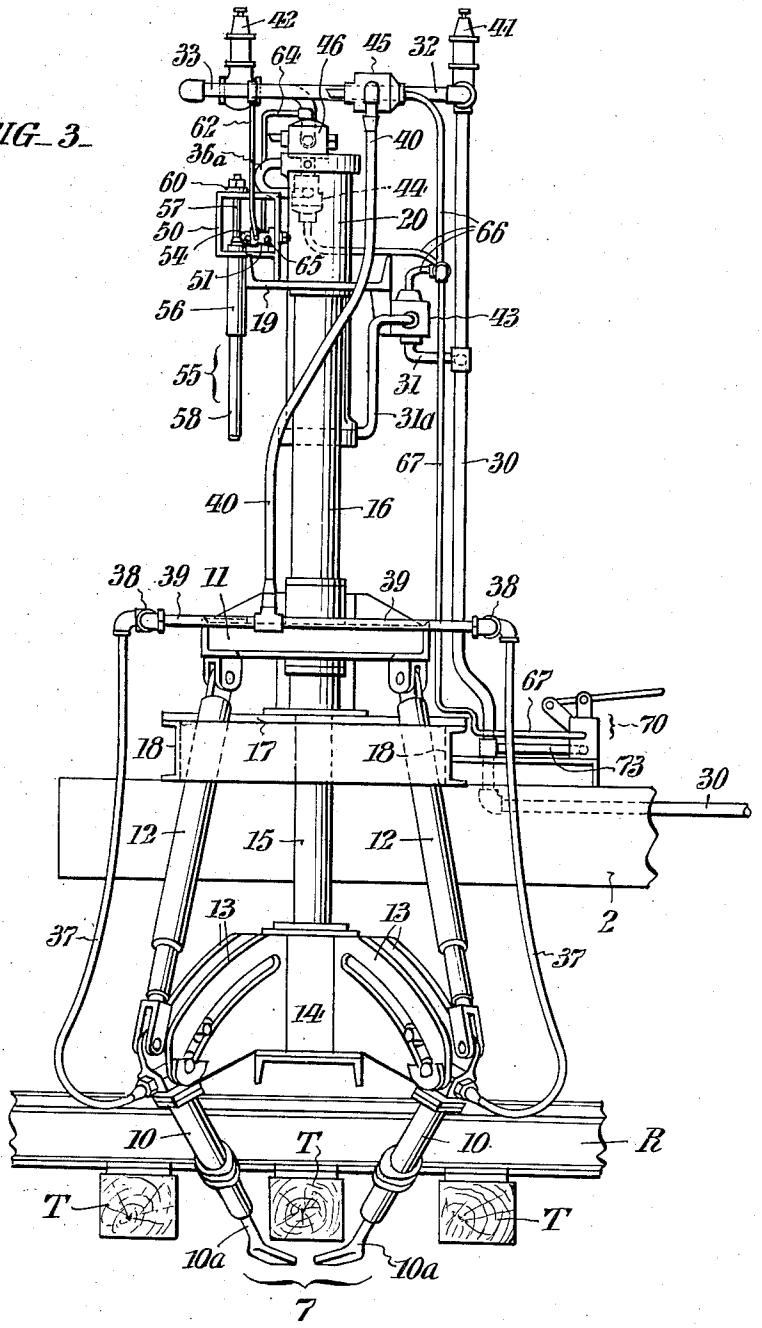
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 3



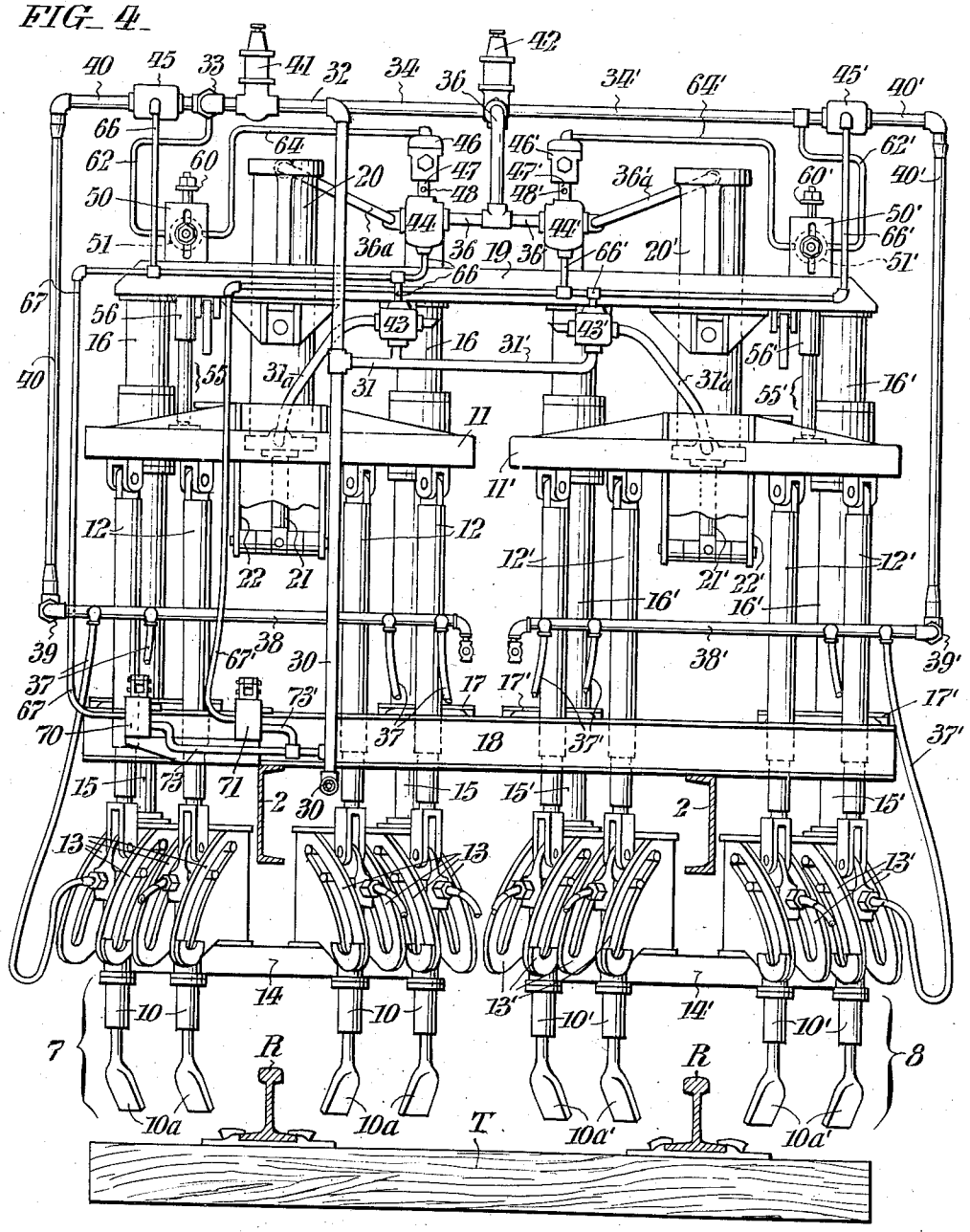
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 4



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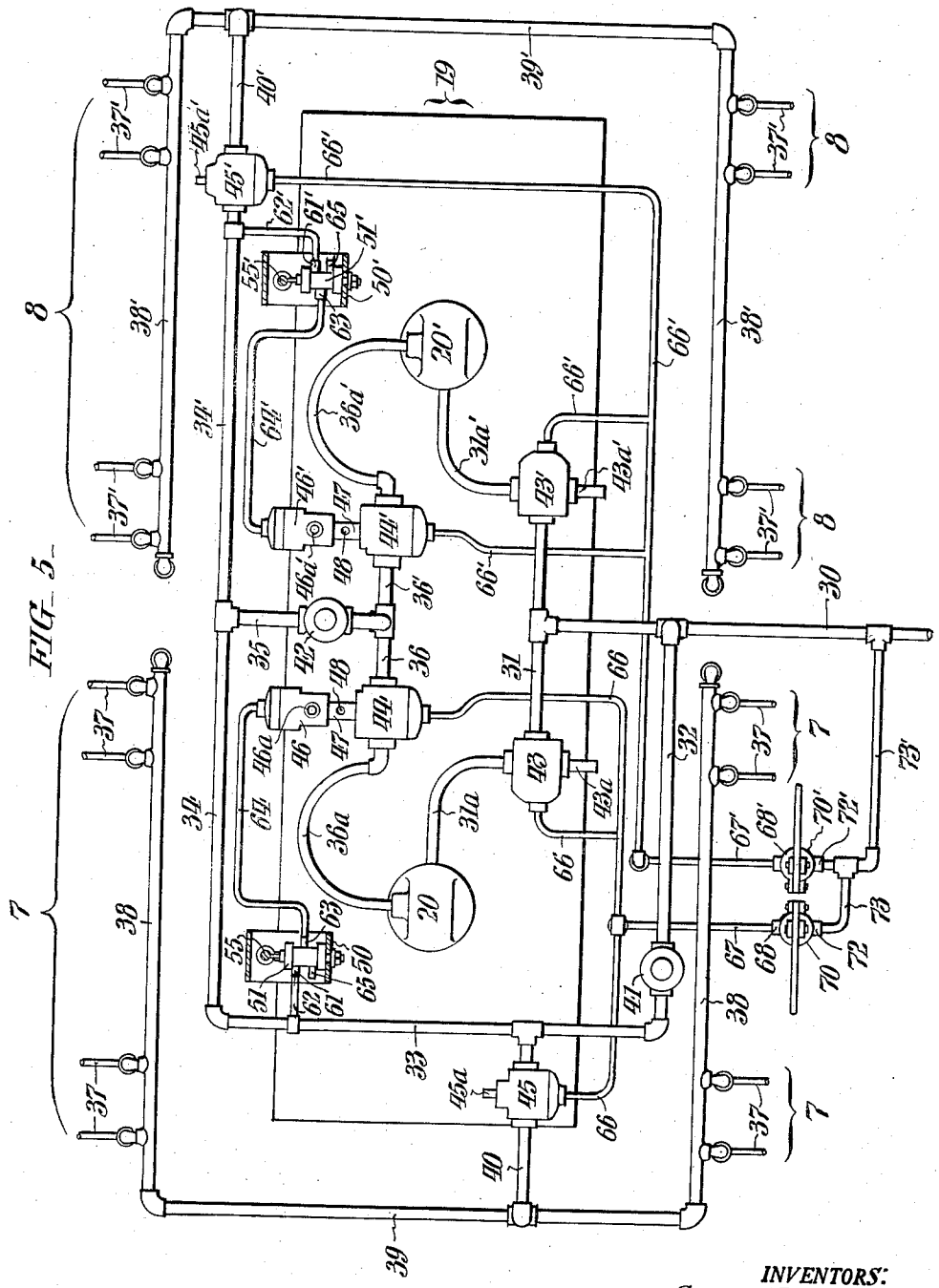
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 5



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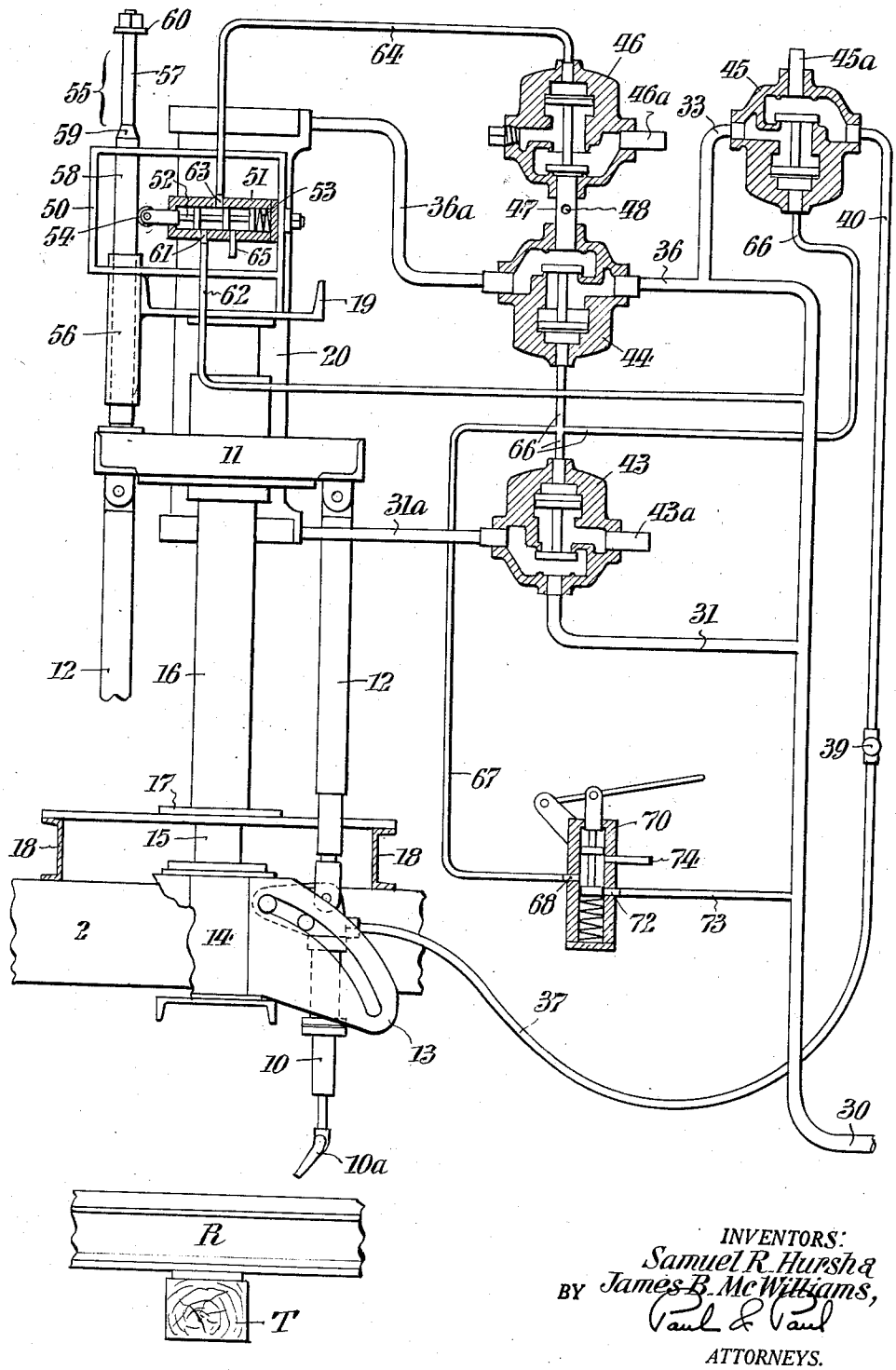
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 6



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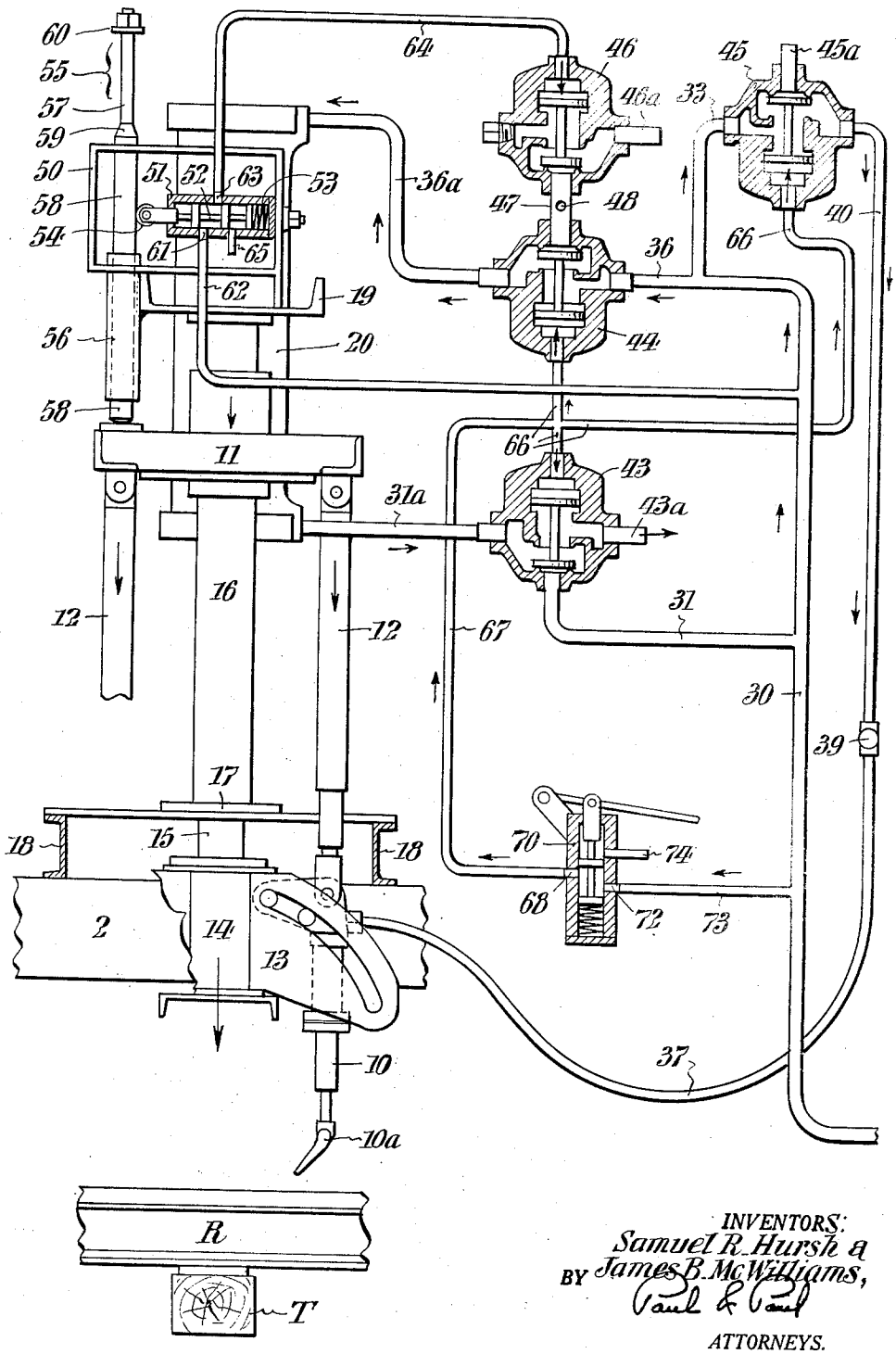
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 7



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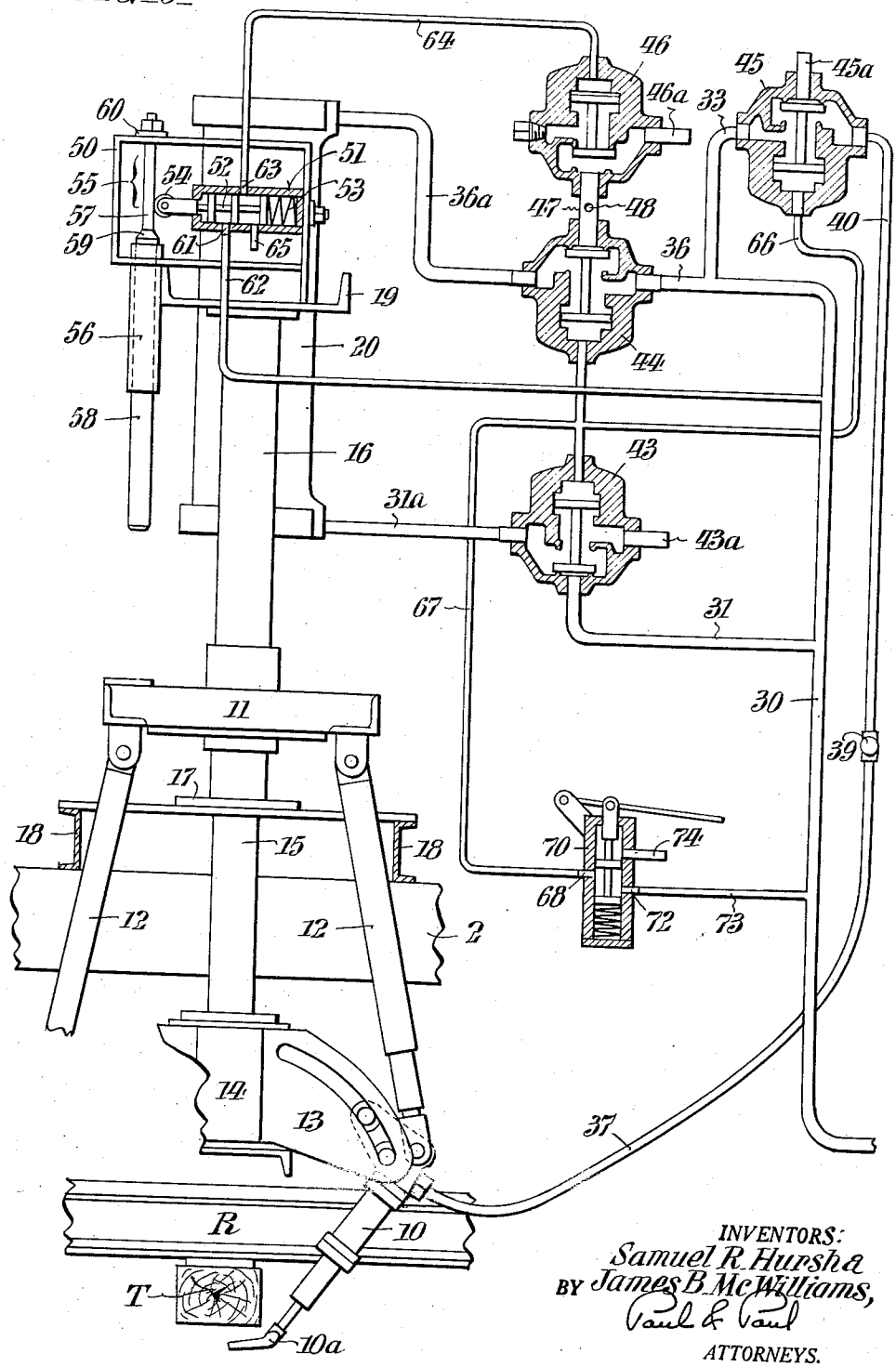
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FIG. 8



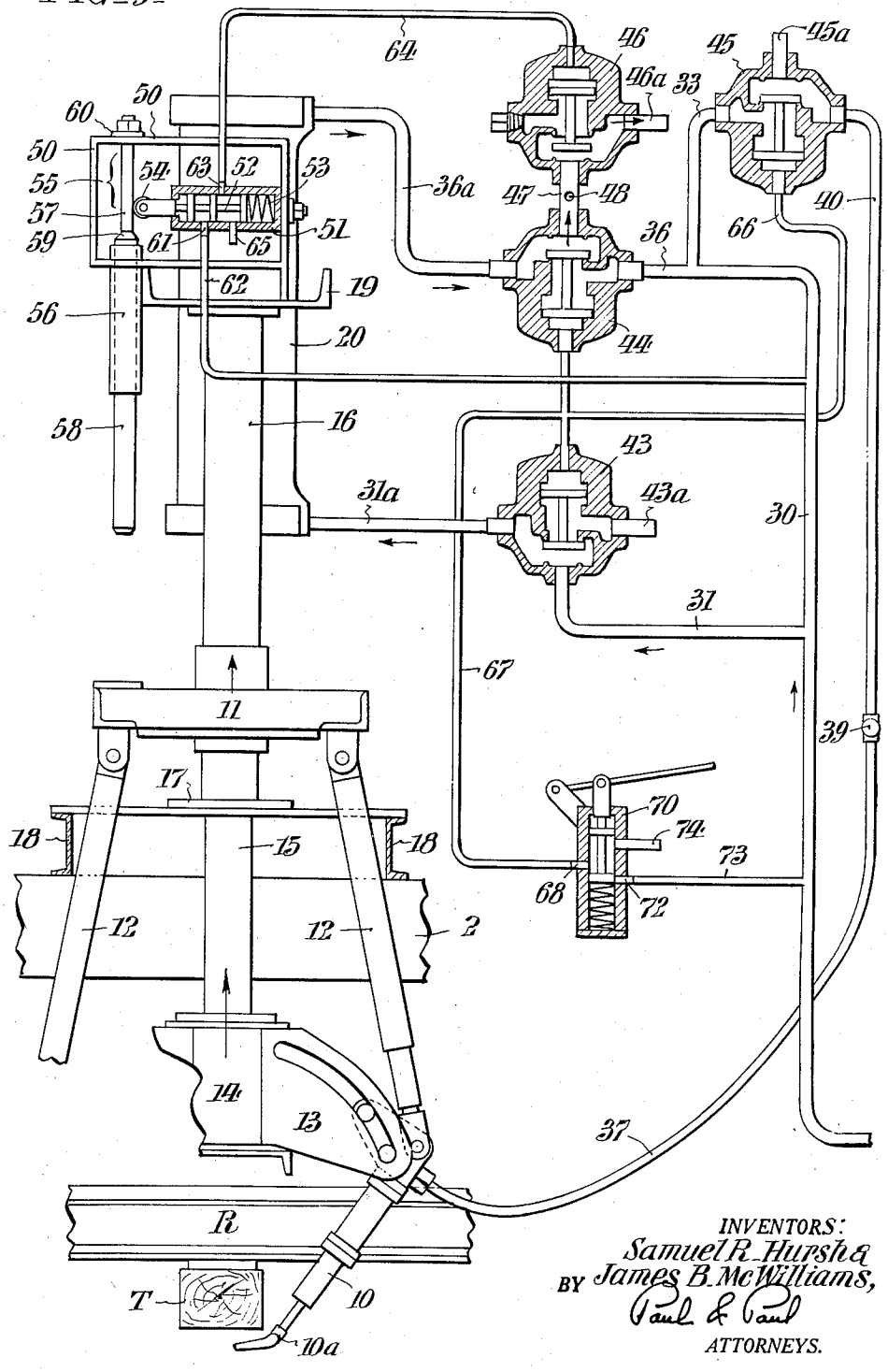
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 9.



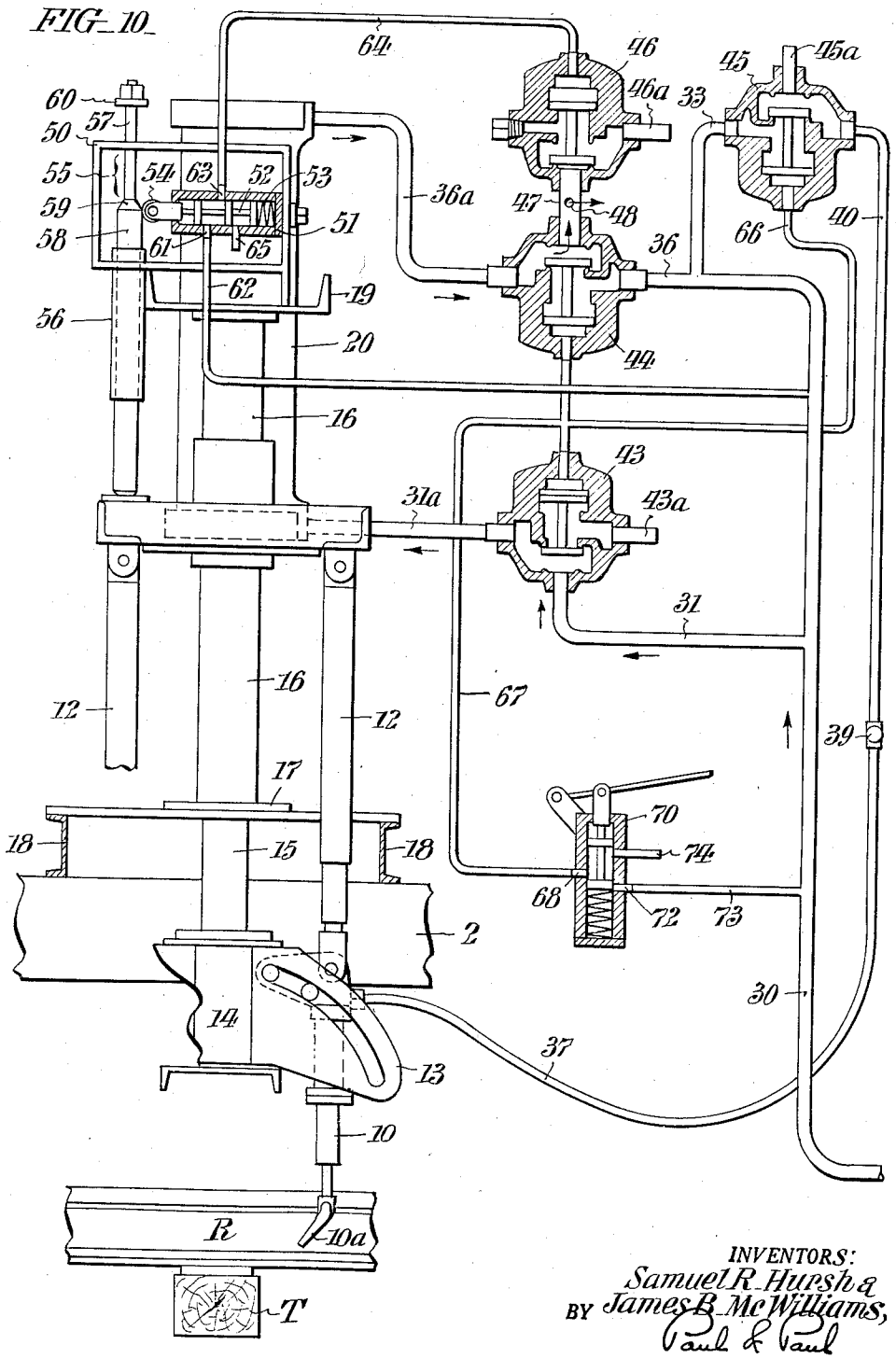
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RAILWAY TRACK BALLAST TAMPING APPARATUS

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FIG. 10.



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United States Patent Office

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Patented July 15, 1958

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RAILWAY TRACK BALLAST TAMPING APPARATUS

Samuel R. Hursh, Bala-Cynwyd, and James B. McWilliams, Pittsburgh, Pa.

Application December 16, 1955, Serial No. 553,521

8 Claims. (Cl. 104—12)

This invention relates to railway track ballast tamping apparatus. More specifically, it is concerned with railway track ballast tamping apparatus of the type disclosed in a copending patent application Serial No. 188,494 filed by us on October 5, 1950, now U. S. Patent No. 2,743,463 wherein groups of powered tampers for packing the ballast beneath the ties in the regions of rail support are sustained by a crosshead or crossheads, with capacity for being raised and lowered by pressure fluid-actuated cylinders on support or car capable of being shifted on the track rails. For travel of the car over crossings, the tampers must be raised to a level well above the rails to clear them. The height to which the tampers are thus ordinarily raised is considerably greater than that necessary during the actual tamping, and is attended by excessive waste of pressure fluid from the cylinders during the lift strokes of the tamper-carrying crosshead or crossheads, and therefore requires compressing equipment of a correspondingly large output.

The chief aim of our present invention is to overcome these drawbacks. This objective is realized in practice, as hereinafter more fully set forth, through provision of simple and reliable control means whereby, during actual tamping, the crosshead or crossheads are raised and lowered by the cylinders repeatedly through shorter strokes, the up strokes being such as to bring the ends of the tamper bars to a level just slightly above tie tops.

Other objects and attendant advantages will appear in the following detailed description of the attached drawing, wherein:

Fig. 1 is a view in side elevation of a railway ballast tamping apparatus conveniently embodying our present invention with the tampers in normal fully raised position.

Fig. 2 shows the front end elevation of the apparatus drawn to a larger scale, with one of the tamper groups in fully lowered position.

Fig. 3 is a fragmentary view in side elevation of a portion of the apparatus likewise drawn to a larger scale and looking as indicated by the angled arrows III—III in Fig. 2 but with the tampers in fully lowered position.

Fig. 4 is a cross sectional view taken as indicated by the angled arrows IV—IV in Fig. 1 with the tampers lowered part way.

Fig. 5 is diagrammatic view in top plan of the piping connections by which the actuating pressure fluid is supplied to the tamping mechanism.

Figs. 6, 7, 8, 9 and 10 are fragmentary diagrammatic views corresponding to Fig. 3 showing successive stages in the operation of the apparatus.

The railway ballast tamping apparatus herein illustrated is generally similar to that disclosed in Figs. 32–35 of the patent, hereinbefore referred to in that it comprises a carriage in the form of a car having a chassis frame 1 with side longitudinals 2, and with front and rear wheels 3 and 4 for mobility on the rails R of a railway track. Mounted on the car is a protective housing 5 for a motor driven air compressor unit (not shown) and a storage

reservoir 6 for the compressed air. Likewise, as in the patent supra, the means by which the tamping is accomplished is arranged at the front end of the car, said means comprising two groups 7 and 8 of tampers which are centered over the respective track rails R as shown in Figs. 2 and 3, and which are either independently or simultaneously operable. Since mechanisms for operating the two tamper groups are identical, the description which immediately follows of the group 7 will apply also to the group 8. Accordingly, in order to obviate the necessity for repetitive description, the characters used to identify the component parts of the operating mechanism for the group 7 will also be used for corresponding parts of the operating mechanism for the group 8 with addition however, in each instance in the latter case of a prime for the convenience of more ready distinction. The tampers 10 of the group 7 are suspended individually by means of thrust links 12, from an upper cross head 11 guided for up and down movement on the car. The tampers are arranged to operate from opposite sides of a track tie T and constrained to radial movement relative to the region of rail support by arcuately slotted cam wings 13 on a second or lower crosshead 14, said crosshead having upward plungers 15 which telescopically engage into fixed tubular guide columns 16 on the car. As shown, the columns 16 are supported upon a base plate 17 spanned between a pair of spaced beams 18 extending transversely between the frame longitudinals 2, and are connected at their tops by a transverse channel beam 19. The crosshead actuating cylinder 20 is suitably fixed on the beam 19 centrally between the columnar guides 16 and has its piston rod 21 pivotally connected to a bracket 22 affixed to the upper crosshead 11. The lower crosshead 14 is limited in its descent by means including rods 23, such as shown in Fig. 2, which extend axially downward from the beam 19 into the columns 16 and the plungers 15 and have stop enlargements 24 at their bottom ends to react with the closed tops 25 of said plungers.

Compressed air is conducted forwardly from the storage reservoir 6 through a conduit 30 (Figs. 3, 4 and 5) from which a branch pipe 31, 31*a* connects into the bottom end of the cylinder 20, and from which a branch pipe composed of sections 32, 33, 34, 35, 36 and 36*a* connects into the upper end of said cylinder. The tampers 10 are connected, by flexible tubes 37, to the parallel end sections 38 of a manifold pipe 39 which is connected, in turn, by a pipe section 40, to the pipe section 33. Interposed in the pipe sections 32 and 35 are manually operable pressure regulating valves 41 and 42; and interposed in the pipes 31 and 36 are pilot-actuated valves 43 and 44, of the piston type, the port 43*a* of the valve 43 being open to the atmosphere, a similar valve 45 being also interposed in the pipe section 40 with its port 45*a* open to the atmosphere. The auxiliary valve shown at 46 is likewise of the same type with its port 46*a* open to the atmosphere, and is connected to the exhaust outlet of the valve 44 by way of a short pipe section 47 having a bleed aperture 48 therein. Secured with capacity for vertical adjustment to an open bracket 50 fixed upon the beam 19 is a slide check valve 51, whereof the piston rod 52 is biased outwardly by spring 53 (Figs. 6–10) for maintenance of a roller 54 at the protruding end thereof yieldingly in lateral engagement with an actuating member in the form of a rod 55 constrained to endwise sliding movement in a vertical guide sleeve 56 on bracket 50, said rod having portions 57 and 58 of different diameters mergent through a cam slope 59. The rod 55 is actuated by contact of its lower end with the crosshead 11 as in Fig. 3, and is limited in its downward gravitational movement by engagement of a stop collar 60 at its upper end with the top of the bracket 50 as in Fig. 2. Referring again to Fig. 5, the

check valve 51 has an inlet port 61 connected by a tube 62 to the pipe section 33, an outlet port 63 connected, by a tube 64, to the piston chamber of the valve 46, and an exhaust port 65. The piston chambers of the valves 43, 44 and 45 are all connected to a tube 66 which, through a tube 67, is connected, in turn, to the outlet port 68 of a manual master control valve 70 which, see Fig. 1, is located within easy reach of an operator seated in a chair 71 at one side of the car. The inlet port 72 of the valve 70 is connected by a pipe section 73 to the pipe 30 and the port 74 of said valve is open to the atmosphere.

Operation

In Fig. 6, the mechanism for operating the tampers of group 7 is shown with the several valves all in normal position, with the crossheads 11 and 14 in fully elevated normal position and with the ballast packing bars 10*a* of the tampers 10 raised clear of the rail tops. As shown, the piston chambers of the valves 43, 44 and 45 are open to the atmosphere by way of the tubing 66, 67, and the exhaust port 74 of the master control valve 70 and the ports of said valves are closed. Under these conditions the lower end of the cylinder 20 is in communication, by way of the pipe sections 31, 31*a* and valve 43, with the air supply conduit 30, and the piston of said cylinder is held raised, the upper end of the cylinder being in communication with the atmosphere by way of the pipe section 36*a*, valve 44 and the bleed orifice 48 in the short pipe section 47, and the valve 45 preventing flow of compressed air to the tampers 10.

Upon depressing the handle of the master control valve 70 as in Fig. 7, compressed air is permitted to flow from the conduit 30, by way of the tube 67, to the piston chambers of the valves 43, 44 and 45. As a result, the valve 43 is set to permit exhaust of the bottom end of the cylinder 20; the valve 44 is set for admission of compressed air to the upper end of the cylinder from the conduit 30 by way of the pipe sections 36, 36*a*; and the valve 45 is set to permit compressed air flow to the tampers 10 by way of the pipes 33, 40, 39 and the flexible tubes 37. As a consequence, the crossheads 11 and 14 are lowered together rapidly for a time, and after the lower crosshead 14 is arrested in its descent by the stop means 23—25 (Fig. 2) the upper crosshead 11 continues further. During the independent downward movement of the upper crosshead 11, the tampers are swung angularly by action of the slotted cams 13 after the tamper bars 10*a* contact the ballast, to pack the ballast beneath the tie T in the region of rail support as in Figs. 2 and 8. During this action, the rod 55 follows down with the upper crosshead 11 until it is arrested by engagement of the stop 60 thereon with the top of the bracket 50 as is shown also in Fig. 8. As the small diameter 57 portion of the rod 55 passes the check valve 51, the piston of the latter is moved outward by the spring 53. The valve 51 is thereby positioned to permit exhausting of the piston chamber of the auxiliary valve 46 by way of the tube 64. Upon release of the handle of the master control valve 70, the piston chambers of the valves 43, 44 and 45 are permitted to exhaust by way of the tubes 66 and 67 with the result that said valves are reset as shown in Fig. 9. Under this condition, compressed air is admitted into the lower end of the cylinder 20 from the conduit 30 by way of the pipe section 31*a* and 31, while the upper end of the cylinder is allowed to exhaust by way of the pipe section 36*a*, the valve 44, the short pipe section 47, and the discharge port 46*a* of valve 46, the supply of compressed air to the tampers being instantly interrupted concurrently upon resetting of the valve 45 as shown. Due to admission of compressed air into the bottom of the cylinder 20 at this stage, the lower crosshead 14 is rapidly raised with attendant retraction of the tampers 10 by action of the slotted cams 13. Eventually said crosshead contacts the rod 55 and starts to lift the latter which, upon being lifted to the position of Fig. 10, causes the piston of the check valve 51 to be shifted inward and compressed air to be admitted, by way of the tube 64, into the piston chamber of the auxiliary valve 46 to reset the latter as shown. Further exhausting of the top end of the cylinder is thereby suddenly prevented except for a small amount through the orifice 48 in the short pipe section 47, and the crosshead 11 is substantially halted with the tamper bars 10*a* just slightly above the tie top as shown in Fig. 10. Now if the handle of the master control valve 70 is again depressed at this stage, the several pilot valves will be reset as in Fig. 7 and the tampers thereby again lowered and operated in the same manner as described in connection with the latter illustration. To insure thorough packing of the ballast beneath the tie, the tampers are usually lowered and raised several times in this way. Accordingly, due to shortening the stroke of the cylinder piston during the actual tamping, a great saving of compressed air is made possible and the efficiency of the apparatus as a whole correspondingly increased. If the handle of valve 70 is left in the position of Fig. 10 after the tampers have been operated, the trapped air in the upper end of the cylinder 20 will simply continue bleeding through the orifice 48 of the short pipe section 47 and the piston of the cylinder will thereafter rise very slowly as compressed air continues to enter the lower end of the latter, with attendant cushioning of the upward movement of the crosshead. Finally, of course, the mechanism will resume the condition in which it is illustrated in Fig. 6; in readiness, after the car has been shifted, for repetition of the tamping operation, to pack the ballast beneath another tie. It will be seen that, by adjusting the valve 51 up or down on the bracket 50, it is possible to predetermine the point in the rise of the crosshead 11 at which the exhausting of the top end of the cylinder is restricted.

The tampers of the group 8 are operated in exactly the same way as above described in connection with the group 7, under control of the manual valve 70'.

While in describing the preferred embodiment of the invention illustrated in the drawings, specific terminology has been resorted to for the sake of clarity, it is not the intention to be limited to the specific terms so selected, but to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose. The appended claims are to be construed, therefore, with the immediately foregoing in mind.

Having thus described our invention, we claim:

1. In railway track ballast tamping apparatus, a carriage shiftable along the track rails; a crosshead confined to a guide on the carriage for up and down movement thereon and supporting, in suspension, a group of tampers for packing ballast beneath the track ties; a cylinder fixed on the carriage and having a piston with the rod thereof connected to the crosshead, said piston having a stroke for moving the tampers from a level at which they clear the rail tops to the track bed level for engaging the ballast and vice versa; a pressure fluid conduit system on the carriage; a first valve means in said conduit system for controlling admission and exhaust of pressure fluid into and from the upper end of the cylinder; an oppositely functioning second valve means in said conduit system for controlling admission and exhaust of pressure fluid into and from the bottom end of the cylinder; manual master control means on the carriage connected to and for actuating said valve means for admission of pressure fluid alternately into the top and bottom ends of the cylinder to lower and raise the crosshead; and auxiliary exhaust control valve connected to the exhaust outlet of the aforesaid first valve means; check means connected to the auxiliary valve; and an actuating member on the carriage for actuating engagement respectively with the check means and extending into the path of the crosshead so as to be contacted by the crosshead upon elevation of the cross-

head and the tampers to a level slightly above the track ties to actuate the check means and thereby cause functioning of the auxiliary valve to restrict exhaust from the upper end of the cylinder to effect retardation of the crosshead and the tampers in their further rise.

2. Railway track ballast tamping apparatus according to claim 1, wherein the actuating member for the check means is adjustable to predetermine the point in the rise of the crosshead at which the check means is actuated and restriction of the exhaust from the top end of the cylinder is initiated.

3. Railway track ballast tamping apparatus according to claim 1, wherein compressed air is used as the actuating fluid for the cylinders.

4. Railway track ballast tamping apparatus according to claim 1, wherein compressed air is used as the actuating fluid for the cylinder, and wherein the tampers are of the pneumatically-actuated type; and further including valve means connected to and responsive to the manual master control means for supplying compressed air to the tampers upon initiation of downward movement of the crosshead and for cutting off the supply upon initiation of the rise of the crosshead.

5. In railway track ballast tamping apparatus, a carriage shiftable along the track rails; a pair of crossheads supported side by side transversely of the carriage and constrained to independent up and down movement in guides on the carriage and respectively supporting, in suspension, groups of tampers respectively for packing ballast beneath the track ties in the regions of rail support; separate crosshead actuating cylinders on the carriage respectively having pistons with the rods thereof connected to the respective crossheads, said pistons having a stroke for moving the tampers of the respective groups from a level at which they clear the rail tops to active level relative to the track bed level for engaging the ballast and vice versa; separate pressure fluid conduit systems on the carriage; first valve means in the respective conduit systems for controlling admission and exhaust of pressure fluid into and from the top ends of the respective cylinders; oppositely functioning second valve means in the respective conduit systems for controlling admission and exhaust of pressure fluid into and from the bottom ends of the respective cylinders; separate manual

master control means on the carriage connected to and for actuating the respective first and second valve means of the respective conduit systems for admission of pressure fluid alternately into the top and bottom ends of the respective cylinders to lower and raise the respective cross heads; auxiliary exhaust control valves respectively connected to the exhaust outlet of the aforesaid first valve means; separate check means respectively connnected to the auxiliary valves; separate actuating members on the carriage for actuating engagement respectively with said check means and extending into the paths of the respective crossheads so as to be contacted by the respective crossheads upon elevation of the corresponding crossheads and tamper groups, the latter to a level slightly above the track ties to actuate the respective check means and so cause functioning of the respective auxiliary valves to restrict exhaust from the upper ends of the respective cylinders to effect retardation of the respective crossheads and the tamper groups in their further rise.

6. Railway track ballast tamping apparatus according to claim 5, wherein the actuating members for the respective check means are independently adjustable to predetermine the point in the rise of the respective cross heads at which the respective check means are actuated and restricted exhausting from the top ends of the respective cylinders is initiated.

7. Railway track ballast tamping apparatus according to claim 5, wherein compressed air is used as the actuating fluid for the cylinders.

8. Railway track ballast tamping apparatus according to claim 5, wherein compressed air is used as the actuating fluid for the cylinders, wherein the tampers are of the pneumatically actuated type; and further including separate valve means connected to and responsive to the respective manual control means for supplying compressed air to the tampers of the respective groups upon initiation of the downward movement of the corresponding crossheads for cutting off the supply upon initiation of the rise of the crossheads.

References Cited in the file of this patent

UNITED STATES PATENTS

2,587,324	Hursh et al.	Feb. 26, 1952
2,734,463	Hursh et al.	Feb. 14, 1956