United States Patent [19]

Stewart

[11] **3,808,976**

[45] **May 7, 1974**

[54] **MULTI-HEADED TAMPER STAGGERED OPERATION**

[75] Inventor: **John Kenneth Stewart,** Columbia, S.C.

[73] Assignee: **Canron, Inc.,** Phillipsburg, N.J.

[22] Filed: **Sept. 27, 1972**

[21] Appl. No.: **292,716**

[52] **U.S. Cl.** **104/12,** 104/8

[51] **Int. Cl.** **E01b 33/02,** E01b 27/17

[58] **Field of Search** ..... 104/12, 8, 7 B; 404/72

[56] **References Cited**

UNITED STATES PATENTS

3,687,081	8/1972	Plasser et al.	104/12
2,734,463	2/1956	Hursh et al.	104/12
3,380,395	4/1968	Plasser et al.	104/12
3,680,486	8/1972	Plasser et al.	104/12
R27,604	3/1973	Stewart et al.	104/12

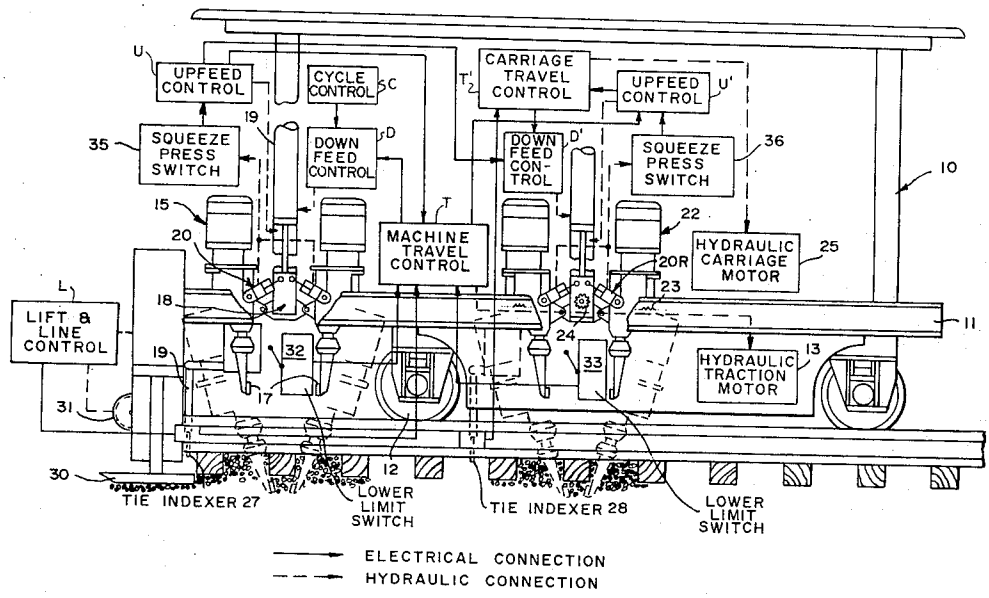
Primary Examiner—Robert G. Sheridan

Assistant Examiner—Richard A. Bertsch

[57] **ABSTRACT**

The invention relates to method and apparatus for tamping railway track ballast with a tamping machine having a fixed tamping head and a second tamping head movable along the machine chassis, the tamping heads being operated in a sequence such that whilst the first tamping head is conducting its tamping cycle the second tamping head is moving on the chassis and whilst the second tamping head is conducting its tamping cycle, the fixed tamping head is moving along the track, the tamping cycles of the heads overlapping each other with a substantially 180° phase difference.

6 Claims, 3 Drawing Figures



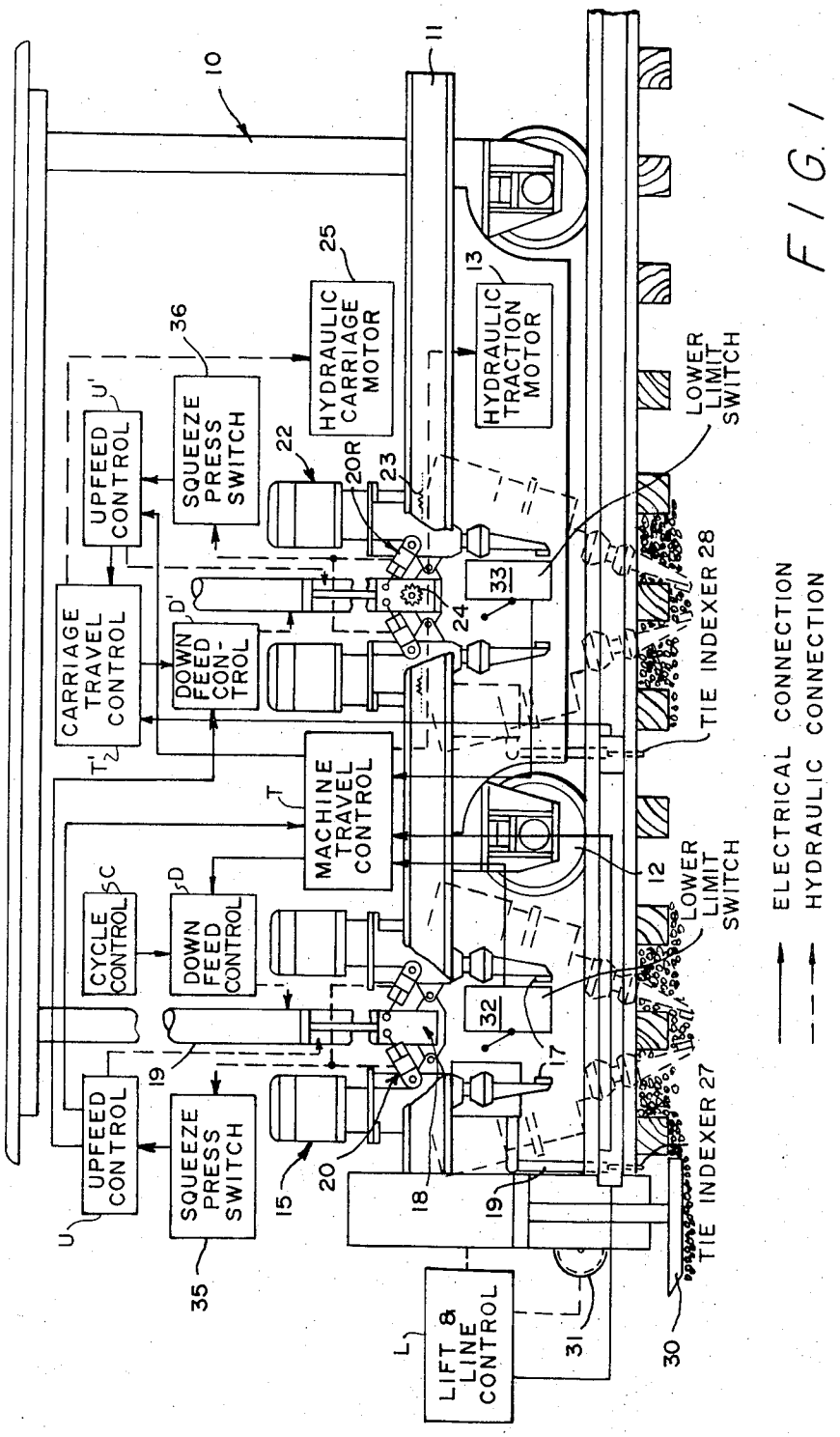
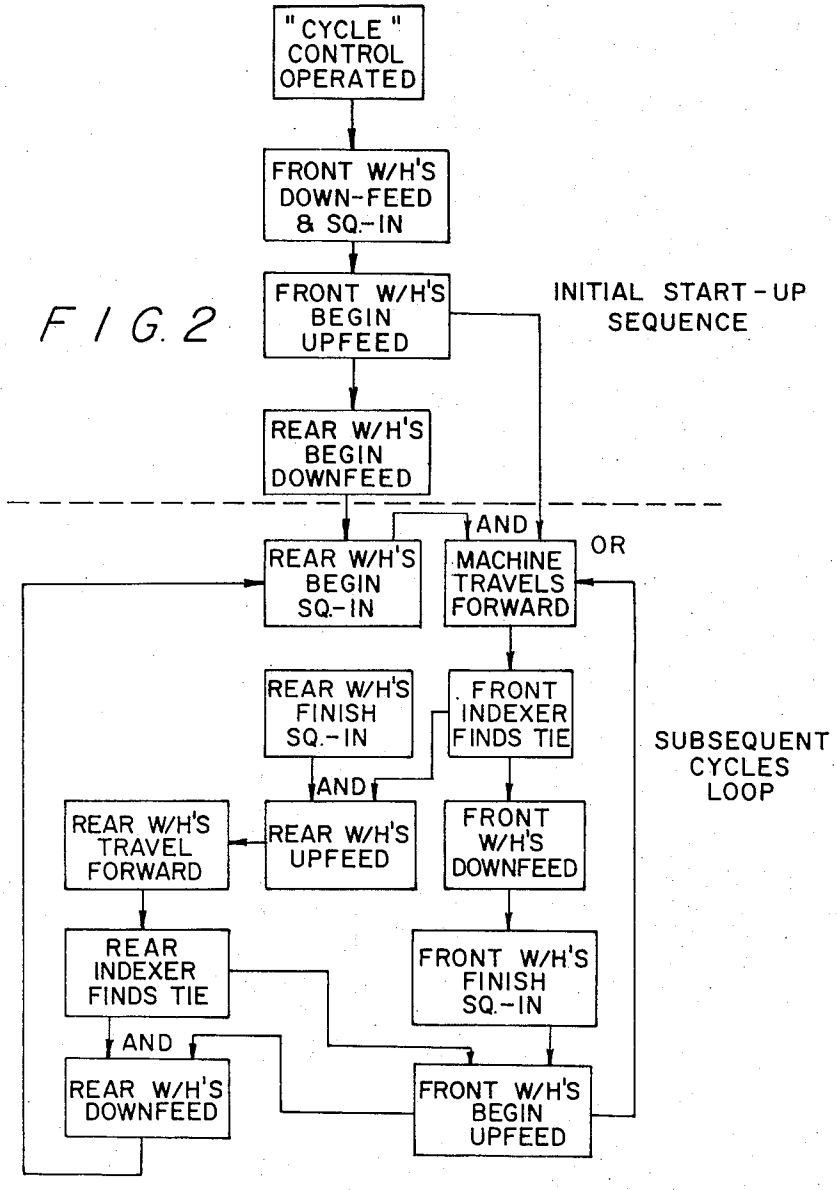

10
11
13
HYDRAULIC TRACTION MOTOR
25
HYDRAULIC CARRIAGE MOTOR
36
SQUEEZE PRESS SWITCH
U'
UPFEED CONTROL
22
20R
23
24
33
LOWER LIMIT SWITCH
TIE INDEXER 28
D'
DOWN FEED CONTROL
CARRIAGE TRAVEL CONTROL
T'
T
MACHINE TRAVEL CONTROL
12
LOWER LIMIT SWITCH
TIE INDEXER 27
C
CYCLE CONTROL
D
DOWN FEED CONTROL
32
17
19
U
UPFEED CONTROL
SQUEEZE PRESS SWITCH
35
15
20
18
19
L
LIFT & LINE CONTROL
31
30
ELECTRICAL CONNECTION
HYDRAULIC CONNECTION

FIG. 1

FIG. 2


"CYCLE" CONTROL OPERATED
FRONT W/H'S DOWN-FEED & SQ.-IN
FRONT W/H'S BEGIN UPFEED
INITIAL START-UP SEQUENCE
REAR W/H'S BEGIN DOWNFEED
AND
OR
REAR W/H'S BEGIN SQ.-IN
MACHINE TRAVELS FORWARD
REAR W/H'S FINISH SQ.-IN
FRONT INDEXER FINDS TIE
SUBSEQUENT CYCLES LOOP
AND
REAR W/H'S TRAVEL FORWARD
REAR W/H'S UPFEED
FRONT W/H'S DOWNFEED
REAR INDEXER FINDS TIE
FRONT W/H'S FINISH SQ.-IN
AND
REAR W/H'S DOWNFEED
FRONT W/H'S BEGIN UPFEED

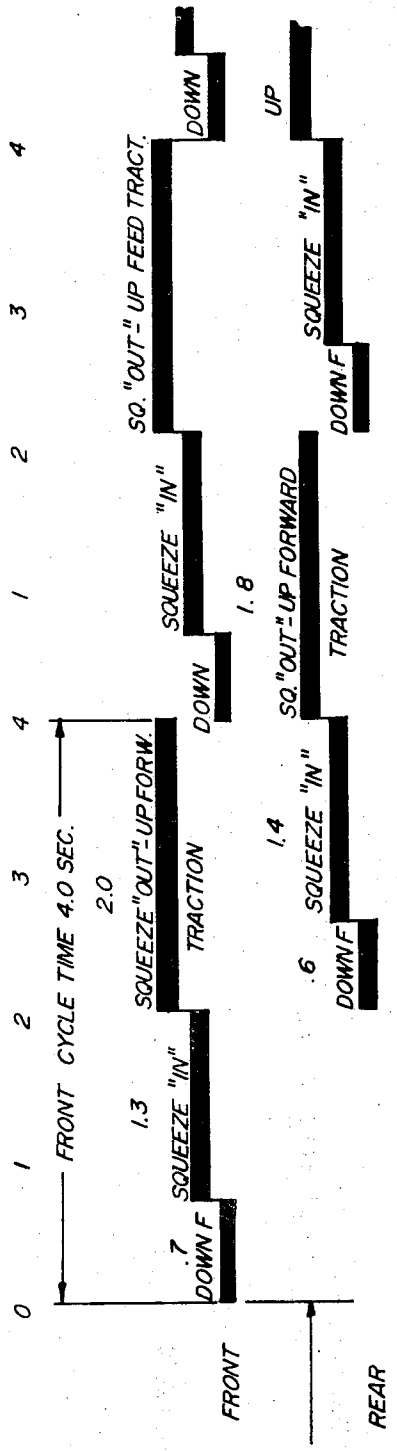

0
1
2
3
4
FRONT CYCLE TIME 4.0 SEC.
.7
DOWN F
1.3
SQUEEZE "IN"
2.0
SQUEEZE "OUT" UP FORW.
TRACTION
DOWN
1.8
SQUEEZE "IN"
SQ. "OUT" UP FEED TRACT.
DOWN
.6
DOWN F
1.4
SQUEEZE "IN"
SQ. "OUT" UP FORWARD
TRACTION
DOWN F
SQUEEZE "IN"
UP
FRONT
REAR

FIG. 3

MULTI-HEADED TAMPER STAGGERED OPERATION

BACKGROUND OF THE INVENTION

The present invention relates to a method and means of tamping railway track ballast with a multiple head tamping machine on which at least one of the tamping heads are movable on the machine chassis relative thereto and particularly, but not exclusively, to a method and means for tamping railroad track ballast with a machine having a fixed tamping head and a second tamping head movable on the machine chassis and relative thereto.

Machines have been suggested heretofore in which a plurality of heads were mounted on a chassis of a tamping machine, the heads being movable along the chassis and proposals have been made for permitting a movable tamping head to remain in the ballast to complete its tamping cycle whilst the machine moved forwardly along the track, the tamping head, on completion of its tamping cycle, being raised and rushed forward along the chassis to an appropriate stop so as to be positioned correctly for the next simultaneous down-feeding of all the tamping heads into the ballast. Such a proposal allowed for a slow, virtually continuous, forward motion of the machine chassis.

It has also been proposed (see copending U.S. Pat. application Ser. No. 79,773 filed Oct. 12, 1970) now U.S. Pat. No. 3,714,901, issued Feb. 6, 1973 to stagger the operation of two tamping heads such that the peak power requirement of each tamping head will not coincide.

There has been a further proposal to sequence the operation a second tamping head mounted for movement on a machine chassis in relation to a fixed front head mounted on the machine, so that if the front tamping head encounters the tie which it is to tamp before the rear movable tamping head encounters the tie which it is to tamp, the machine will stop with the fixed tamping head above the tie which it is to tamp whilst the second tamping head is moved along the chassis forwardly until it encounters the tie which it is to tamp. Alternatively if the rear tamping head encounters its tie before the front tamping head is correctly positioned, the rear tamping head is moved rearwardly on the chassis at the same speed as the forward motion of the machine chassis so that the movable tamping head keeps station above the tie which it is to tamp until such time as the fixed head is positioned over its tie.

The prior proposals suffered from the disadvantages that in every case, the speed of operation of the machine would have to be slowed to wait the positioning of the heads, or the completion of the operation thereof. This would have been particularly true in track which had less than exact tie spacing, the usual condition found in North America and elsewhere.

SUMMARY OF THE INVENTION

According to the present invention a method of railroad ballast tamping with a machine having a wheel mounted chassis carrying a first tamping head and a second tamping head mounted for movment relative thereto is improved by operating the heads in a sequence such that whilst the first head is conducting its tamping cycle the second head is moving on the chassis and whilst the second tamping head is conducting its tamping cycle, the first head is moving along the track; said tamping cycles overlapping each other with a substantially 180° phase difference.

Under these circumstances there is no stopping of the machine to wait for a head to be positioned, or substantial delay of the machine to permit a head to complete its tamping cycle. The result is that a machine having two tamping heads can tamp track at the speed of operation of two single headed machines, each tamping every second tie. It will be obvious that this is especially an advantage in tamping track which has an irregular tie spacing.

The present invention also provides a railroad ballast tamping machine comprising a wheel-mounted chassis; first and second tamping heads thereon; means for down-feeding and up-feeding the tamping heads into and out of the ballast; means for squeezing-in the tamping heads in the ballast to consolidate the ballast beneath ties being tamped; means for propelling the first head along the track; means for moving the second tamping head on the chassis relative thereto; control means operatively interconnecting the first tamping head with the second tamping head and operable to down-feed the second tamping head on substantial completion of the squeezing-in of the first tamping head and to down-feed the first tamping head on substantial completion of the squeezing-in of second tamping head; means responsive to the up-feeding of the first tamping head to operate the means to propel the first head along the track; and means responsive to the up-feeding of the second tamping head to operate the means for moving the second tamping head relative to said chassis: whereby the first tamping head is propelled along the track whilst the second tamping head is conducting its tamping cycle and the second tamping head is moved on the chassis whilst the first tamping head is conducting its tamping cycle; said tamping cycles being substantially 180° out of phase with one another.

In a preferred embodiment the first tamping head is fixed on the chassis and the means to propel it along the track is the machine prime mover.

BRIEF DESCRIPTION OF THE DRAWINGS

The following is a description by way of example of one embodiment according to the present invention reference being had to the accompanying drawings in which:

FIG. **1** is a diagrammatic representation of a machine having a fixed front head and a movable rear head;

FIG. **2** is a block flow-diagram showing the sequence of operations according to the method of the invention; and

FIG. **3** is a diagrammatic representation of the timing of the sequence of operations in accordance with the method of the invention.

DESCRIPTION OF SPECIFIC EMBODIMENT

Turning now to FIG. **1** a railroad ballast tamping machine **10** has an elongated chassis **11** mounted on rail engaging wheels **12** which are driven by prime mover such as a hydraulic traction motor **13.**

The machine has a front tamping head **15** attached to the frame near the front thereof. The head is of the standard vibrating squeeze type having tamping tools **17** which are vibrated by electric motors and mounted on a frame **18.** A hydraulic cylinder **19** is provided for

raising the frame **18** and the tamping tools **17** thereon out of the ballast (they are dropped into the ballast under their own weight) and squeeze cylinders **20** of standard configuration are provided to squeeze the tamping tools **17** together beneath a tie to be tamped in the fashion well known and shown in the dotted lines in the figure. Mounted intermediately of the wheels **12** of the machine is a second tamping head **22**, of a virtually identical configuration to the head **20**. The rear head **22** is mounted for longitudinal movement on the chassis on a rack **23** and is propelled therealong by means of a pinion gear **24** driven by a hydraulic carriage motor shown diagrammatically at **25**. Although only the tamping head over the rail visible in the drawings is shown, it is to be understood, that in standard fashion, the illustrated heads have companion heads in line with them over the other rail of the track. The forward motion of the vehicle under the action of the hydraulic traction motor **13** is terminated by means of a tie indexer **27** in standard fashion and forward movement of the head **22** and its frame on the rack **23** is terminated by a second standard tie indexer **28** mounted on the moving tamping head **22** and controlling the hydraulic carriage motor **25** in known manner.

At the front of the machine there is provided a standard track lifting jack diagrammatically shown at **30** and an aligning jack diagrammatically shown at **31**.

Limit switches **32** and **33** are provided on the chassis **11** and are tripped by movements of the heads **15** and **22** past them. Also the squeeze cylinders **20** and **20R** for the rear head are connected in conventional fashion to squeeze pressure switches **35** and **36**.

The operational method according to the invention will not be explained with reference to FIGS. **1, 2** and **3**.

Let it be assumed that the machine has just been started and is positioned such that both the front and rear tamping heads are located over the ties which they are to tamp. A "cycle control" switch C has been operated and the tie indexer **27** has encountered its reference tie and sent a signal to the machine travel control T to stop the hydraulic traction motor **13**. At the same time a signal is fed from the indexer **27** to the down-feed control D to drop the front heads **15** into the ballast. As the head **15** falls it trips a switch **32** which transmitts a signal to initiate the squeeze-in of the cylinders **20** in standard fashion. As the squeeze cylinders **20** reach a predetermined pressure the squeeze pressure switch **35** is operated and a signal is sent to the up-feed control U which operates cylinder **19** to prepare to lift the front head **15** out of the ballast while its squeeze cylinders **20** operate to squeeze out the tools **17**, away from each other. As the head **15** up-feeds out of the ballast it again trips the switch **32** which sends a signal to the machine travel control T to actuate the hydraulic traction motors **13** to move the machine and an additional signal is sent to the down-feed control D' of the rear work head. This causes the rear work head to drop into the ballast and to commence the squeezing of the heads by means of the squeeze cylinders **20R**. The rear head **22** works in the ballast to tamp its tie as the machine moves forward relatively to it. The hydraulic carriage motor **25** being deactivated and the weight of the rear heads **22** in the ballast permitting the rack **23** to move with the chassis **11** relative to the pinion **24**.

On completion of the squeeze-in of the rear head **22** the squeeze pressure switch **36** is operated and a signal is sent to the up-feed control U' for the rear head to prepare to lift the rear head **22** out of the ballast and squeeze-out the squeeze cylinders **20R**. Thus as soon as the front indexer reaches its tie, a signal is transmitted to up-feed the rear head **22**, stop the machine and down-feed the front head **15**. As the rear head **22** passes lower limit switch **33** it trips it and a signal is transmitted to the carriage travel control T', in conventional fashion, to operate the hydraulic carriage motor **25** to move the head **22** forwardly on the chassis **11** by driving the pinion **24** along the rack **23**. This continues until the tie indexer **28** encounters the tie which it is to tamp whereupon a signal is transmitted to terminate the action of the motor **25** and trigger the down-feed of the rear head **22** and the up-feed of head **15**.

It will thus be observed that the tamping heads are operating substantially 180° out of phase with each other.

Preferably the track lifting and track lining operation by means of the jacks **30** and lining cylinders **31** are controlled by the front tie indexer in known fashion through the lift and line controls L so that when the machine is stopped over the tie which the front head is to tamp, the track is lifted and lined during the sequence of the tamping operation of the front tamping head.

Although the invention has been described with reference to a machine having a fixed head and a movable head, it is to be understood that the invention is equally applicable to machines having no fixed head but a plurality of moving heads carried on a constantly moving frame.

What I claim as my invention is:

1. In a method of railroad ballast tamping with a machine having a wheel mounted chassis carrying a first tamping head and a second tamping head mounted behind said first tamping head for movement relative thereto, the improvement comprising operating said heads in a sequence such that whilst the first head is conducting its tamping cycle the second head is moving on the chassis towards the first head and whilst the second tamping head is conducting its tamping cycle, the first head is moving along the track away from the second head; said tamping cycles overlapping each other with a substantially 180° phase difference.

2. In a method of railroad ballast tamping with a machine having a wheel mounted chassis carrying a fixed tamping head and a tamping head mounted for movement relative thereto, the tamping cycles of each head comprising the steps of down-feeding into the ballast, squeezing-in to consolidate ballast beneath a tie being tamped, and squeezing-out and up-feeding from the ballast after consolidation; the improvement comprising operating said heads in sequence such that whilst the front head is conducting its tamping cycle, the movable head is moving on the chassis, and whilst the movable tamping head is conducting its tamping cycle, the chassis is moving along the track; the movable head down-feed step commencing substantially at the termination of the squeeze-in step of the fixed tamping head, and the down-feed step of the fixed tamping head commencing substantially at the termination of the squeeze-in step of the movable tamping head.

3. A railroad ballast tamping machine comprising a wheel mounted chassis; first and second tamping heads thereon; means for down-feeding and up-feeding the

tamping heads into and out of the ballast; means for squeezing in the tamping heads in the ballast to consolidate the ballast beneath ties being tamped; means for propelling the first head along the track; means for moving the second tamping head on the chassis relative thereto; control means operatively interconnecting the first tamping head with the second tamping head and operable to down-feed the second tamping head on substantial completion of the squeezing-in of the first tamping head and to down-feed the first tamping head on substantial completion of the squeezing-in of second tamping head; means responsive to the up-feeding of the first tamping head to operate the means to propel the first head along the track; and means responsive to the up-feeding of the second tamping head to operate the means for moving the second tamping head relative to said chassis; whereby the first tamping head is propelled along the track whilst the second tamping head is conducting its tamping cycle and the second tamping head is moved on the chassis whilst the first tamping head is conducting its tamping cycle; said tamping cycles being substantially 180° out of phase with one another.

4. Apparatus as claimed in claim **3** in which the first head is fixed on the chassis and the means to propel it along the track is the machine prime mover.

5. Apparatus as claimed in claim **4** in which the chassis is stopped with the first head over the tie which it is to tamp be means of a first tie indexer operatively connected to the prime mover; and the second head is located on the chassis above the tie which it is to tamp be means of a tie indexer operatively connected with the means for moving the second tamping head.

6. Apparatus as claimed in claim **5** further comprising means to lift and means to laterally shift the track; and control means operatively connecting the means to lift and the means to laterally shift the track to said first tie indexer and operable to lift and shift the track when said tamping head is operatively positioned.

* * * * *