United States Patent [19]

Byrne

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[54] **RAIL VIBRATING MACHINE**

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[52] **U.S. Cl.** **104/1,** 104/9, 104/12

[51] **Int. Cl.** **E01b 29/16**

[58] **Field of Search** 104/2, 3, 6, 9, 7, 104/1, 12

[56] **References Cited**

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[57] **ABSTRACT**

A machine to vibrate railroad rail includes a vehicle movable along the rail and supporting a spring-loaded vibratory shoe which engages the upper surface of the rail. The spring loading may be adjusted to control the intensity of the vibration imparted to the rail.

4 Claims, 3 Drawing Figures

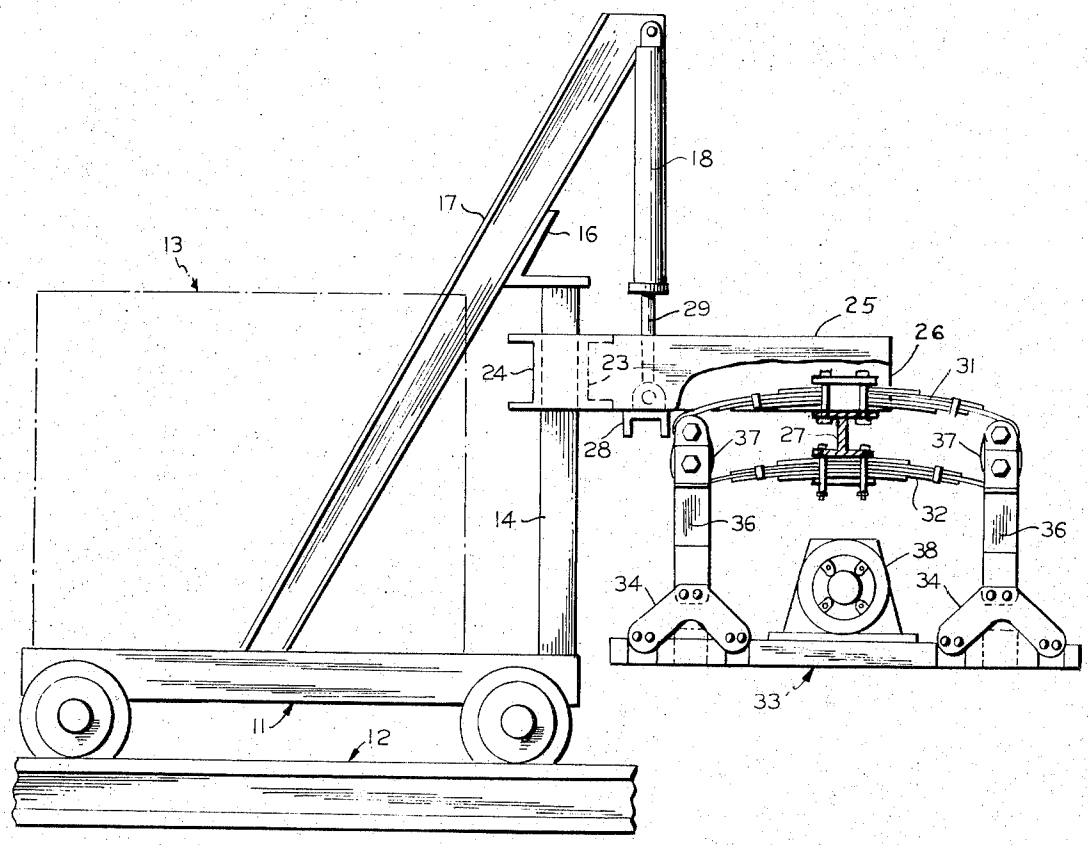
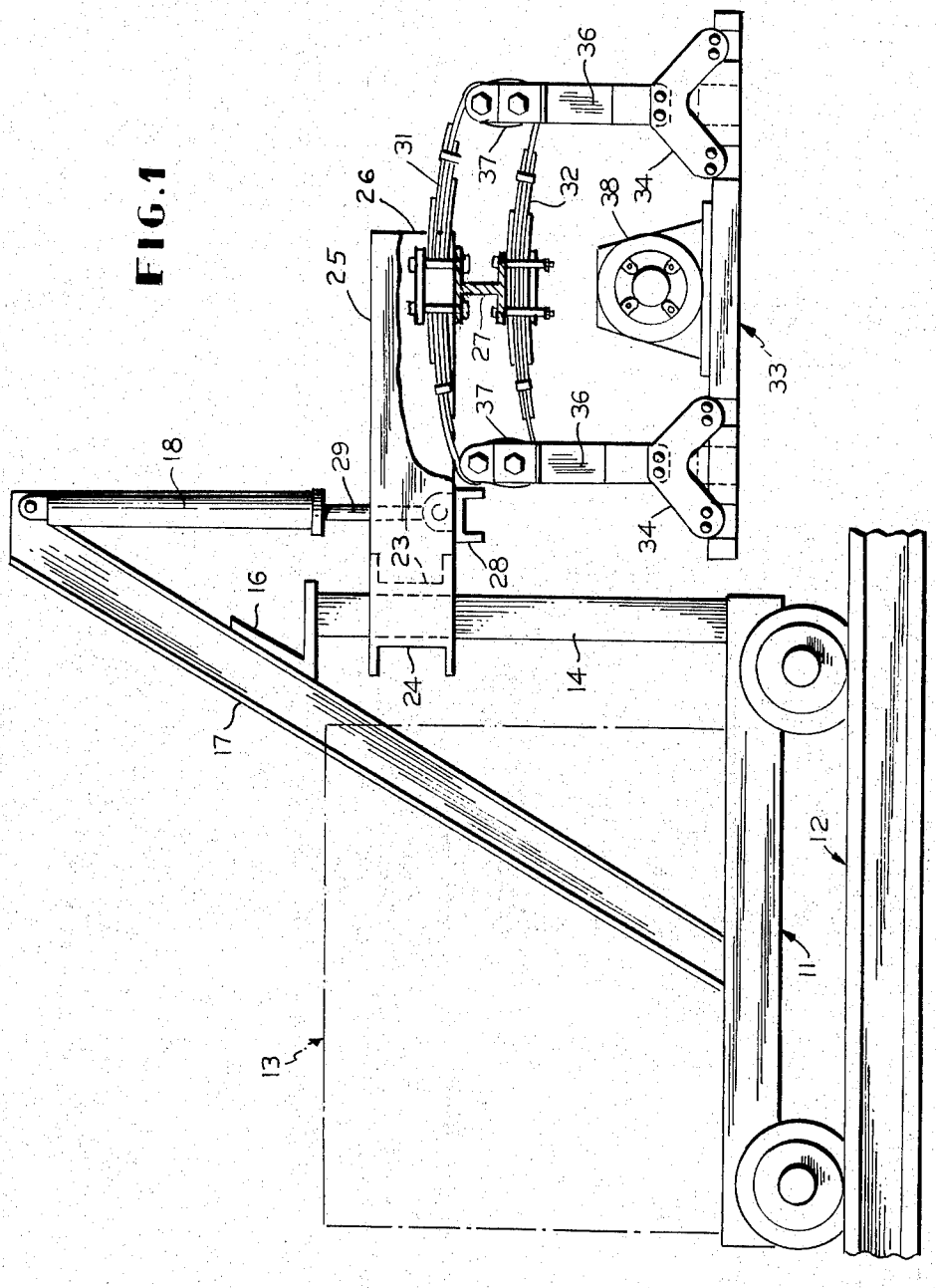


FIG. 1



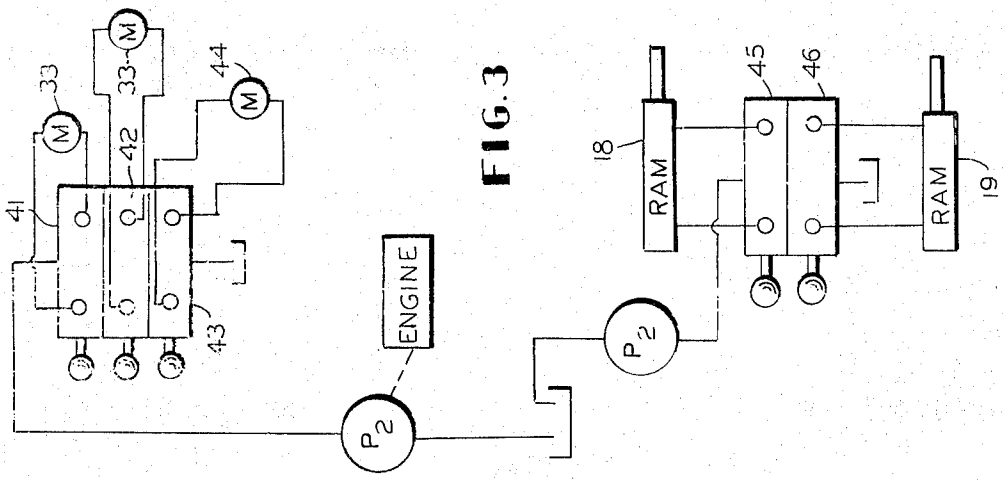

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FIG. 3

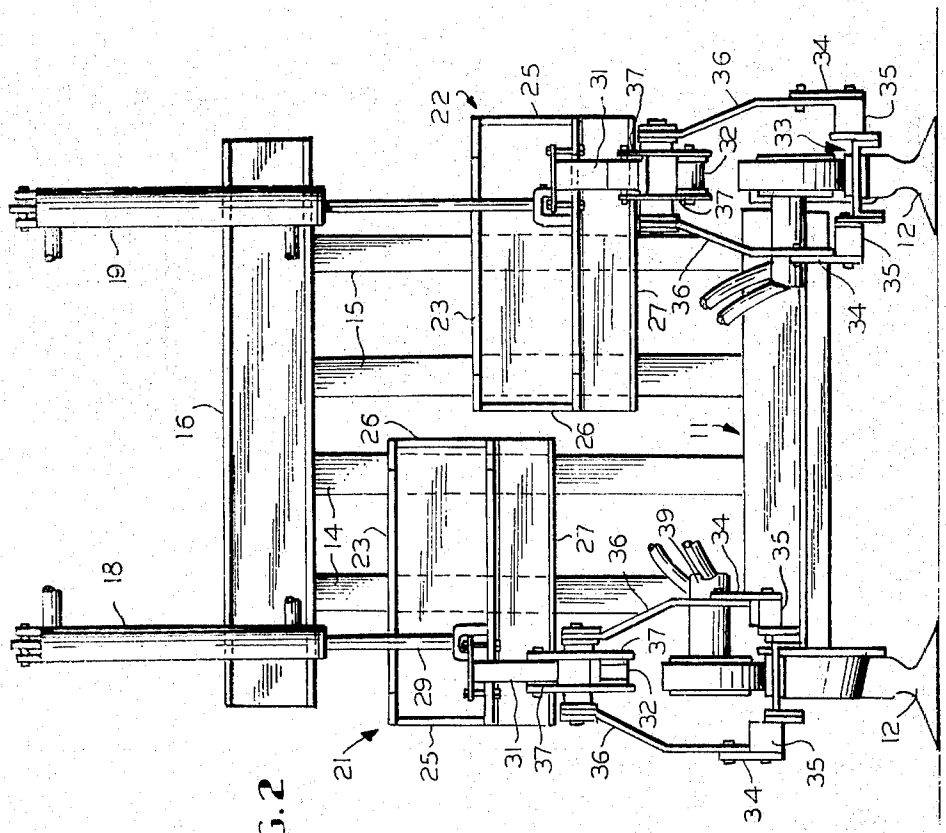

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FIG. 2

RAIL VIBRATING MACHINE

CROSS-REFERENCE TO COPENDING APPLICATION

This invention concerns a machine particularly intended for use in the practice of the method of laying railroad rail disclosed in pending application Ser. No. 181,105 filed Sept. 16, 1971 of which applicant is one of the co-inventors.

BACKGROUND OF THE INVENTION

Practice of the rail laying method disclosed in application Ser. No. 181,105 requires that the rail be vibrated while it is being laid. The vibration of the rail is for the purpose of freeing it from the frictional restraint imposed by the tie plates on which it rests prior to being spiked in place. According to the method disclosed in the prior application the rail is to be laid stress-free on the tie plates while at a predetermined temperature higher than the mean ambient temperature at the geographic location of the laying operation.

THE INVENTION

This invention concerns a machine devised to impart the desired vibration to the rail. This machine includes a vehicle movable along the rail to be vibrated. The vehicle carries an elongated shoe which can be placed in contact with the rail. The shoe is biased against the rail by spring means and the spring loading may be adjusted so as to hold the shoe against the rail with the desired force. The shoe carries a vibrator which reacts through the shoe onto the rail to cause it to vibrate.

The vehicle may include two rail engaging shoes, one to engage each rail of a railrod track. Ordinarily the shoes are independently used, though both may be operated simultaneously.

A preferred embodiment of the invention is shown in somewhat simplified form in the attached drawings in which

FIG. 1 is a side elevation of the machine.

FIG. 2 is a end view of the machine.

FIG. 3 is a schematic diagram showing a hydraulic circuit incorporated in the machine.

The machine includes a vehicle comprising a wheeled platform **11** movable along the rail **12.** Reference numeral **13** designates a space enclosed by dot-dash lines in FIG. 1 and in which are located an operator's station, a propulsion engine, pump means driven thereby and control valves. The pump means supplies fluid under pressure to a hydrostatic drive for the vehicle and also to a fluid motor operated vibrator and either or both of a pair hydraulic rams.

Two pairs of vertical guideways **14** and **15** extend upward from the front edge. The upper ends of these guideways **14** and **15** are connected by a transverse beam **16.** A pair of inclined beams **17** extend upward one from each side of the platform **11** and are secured to transverse beam **16.** A pair of fluid pressure actuated rams **18** and **19** are connected one to the upper end of each beam **17.**

Slides **21** and **22** are slidable along guideways **14** and **15** respectively. These slides **21** and **22** are mirror duplicates. Slide **21** comprises main transverse members **23** and **24** which pass respectively in front of and behind the pair of guideways **14.** It will be understood that appropriate guide bearings (not illustrated) are provided between the frame members **23** and **24** and each

guideway **14.** Longitudinal members **25** and **26** extend forward from the ends of members **23** and **24.** A front transverse member **27** is connected between the outer ends of members **25** and **26.** A transverse channel **28** (see FIG. 1) interconnects members **25** and **26** and the rod **29** of ram **18** is connected thereto.

Bow leaf springs **31** and **32** are connected at their midpoints above and below the transverse member **27.** Springs **31** and **32** are connected to a rail engaging shoe **33.** The connecting linkage includes side plates **34** the ends of which are connected to shoe **33** through rubber shock absorbing mounts **35.** Yoke members **36** extend upward from the side plates **34.** The upper end of yoke member **36** are connected to the centers of plates **37** which interconnect the outer ends of leaf springs **31** and **32.** Cylindrical rubber vibration dampening means are provided in the connections between the yoke **36** and plates **37** and between the plates **37** and the ends of springs **31** and **32.**

A vibrator unit **38** is mounted on the upper surface of shoe **33.** This unit **38** (see FIG. 2) includes hydraulic motor **39** and a housing **41** which encloses a weight mounted eccentrically on the shaft on the shaft of motor **39.**

FIG. **3** shows a hydraulic circuit which includes rams **18** and **19** and motors **39** of the vibrator units **38.** Pump means P_1 supplies fluid through valves **41, 42,** and **43** to motors **44** and **39.** The motors **39** are the motors of vibrator units **38** and each can be energized or idle depending upon the position of the energizing valve **41** or **42.** Motor **44** is the motor unit of a hydrostatic transmission device and may be driven in either direction or idle dpending upon the position of valve **43.** The motor **44** is connected to the drive wheels of the vehicle. A pump P_2 supplies fluid to rams **18** and **19** through valves **45** and **46.** The valves **45** have a neutral position in which the opposed working spaces of the ram are hydraulically locked and pump P_2 is unloaded. Each valve **45, 46** has raise and lower position to cause the desired ram movement.

Both pump P_1 and P_2 are driven by the propulsion engine. The engine pumps P_1 and P_2 and valves **41, 42, 43** and **45** and **46** are located in space **13** (see FIG. 1) convenient to the operators station.

OPERATION

Ordinarily the vehicle operates on only one rail of the track at a time though its utility is not so limited. In use in the laying operation one rail will be spiked in place and the other will be resting on the tie plates and will not have been spiked in place. The unspiked rail has one end connected to and aligned with an adjoining rail section which has been spiked in place. The vibrating machine is driven from the completed section onto the section to be laid. That shoe **18** or **19** which is above the unspiked rail is moved downward to engage the upper face of the rail. Assuming vehicle **11** is moving from left to right in FIG. **1,** and that the right hand rail **12** is unspiked, ram **18** will be pressurized. Pump P_2 generates a pressure which is variable. A pressure range of from 200 to 400 psi with a ram area of about five square inches has proven adequate in applicant's experience. The complete machine weighs about 4,000 pounds. As the vibrating machine moves further along the rail, a temperature adjusting unit is moved onto the same section of rail and the rail is either heated or cooled to create a desired rail temperature. The tem-

perature adjustment causes the length of the section to change. The vibration of the rail ahead of this section frees the remainder of the rail from restraint by the tie plates so that this change of length can occur. The rail is spiked in place after passage of the temperature adjusting unit.

The vibrating machine described herein produces vibrations which are easily detectable 400 feet in advance of the machine and are believed to travel the full length of the rail with sufficient intensity to permit the rail to move on the tie plates. The frequency of the vibration varies from about 33 cycles per second to about 40 cycles per second.

The machine can also be used to relieve stress in rail which has been in use. It is believed that track laying techniques used in the past resulted in the rail being laid with stress unevenly distributed therein. Thus such rail may be loosened by removing rail anchors and at least partially withdrawing the spikes. Vibration of the loosened section, its opposite ends being held in place by the adjoining rail sections and by unloosened spikes in the end regions, will permit the rail to move on its tie plates whereby the stress distribution will be rendered more uniform. Both rails of a track may be simultaneously adjusted during such stress adjustment, and it is partly for this reason that the present machine includes two vibrating assemblies. Two vibrating assemblies are also provided, because it is preferred to apply vibration to the rail between the vehicle and the free (unspiked) end thereof. It is possible to impart vibrations to the rail beneath the vehicle or behind it. These alternate arrangements are inferior because the vibrations will be severely damped by the weight of the vehicle.

I claim:

1. A machine for vibrating railroad rail comprising:

a. a rail-carried vehicle;

b. an elongated shoe adapted to engage the upper surface of the rail;

c. vibratory means mounted centrally of the shoe and acting to cause rail vibration in a vertical plane alined with the rail;

d. a vertical guidway on the vehicle;

e. a slide assembly movable along the guideway;

f. spring means in said vertical plane reacting between said assembly and the opposite ends of the shoes; and

g. means to position the assembly on the guideway so as to load the spring, whereby the shoe is held in engagement with the rail.

2. The machine defined in claim **1** in which said spring means comprises:

a. bow leaf spring means, extending in the direction of the rails and connected, at its midpoint, to said assebly and, at its ends, to the corresponding ends of said shoe.

3. The machine defined in claim **1**; and

a. a propulsion engine to drive the vehicle along the track while the vibratory means is in operation.

4. The machine defined in claim **3,** in which said vibratory means comprises:

a. a rotary hydraulic motor mounted on the shoe

b. a weight eccentrically mounted on a shaft driven by the motor, said weight moving in said vertical, plane; and

c. a pump carried by the vehicle, driven by said engine and hydraulically connected with said motor to form a hydrostatic transmission.

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