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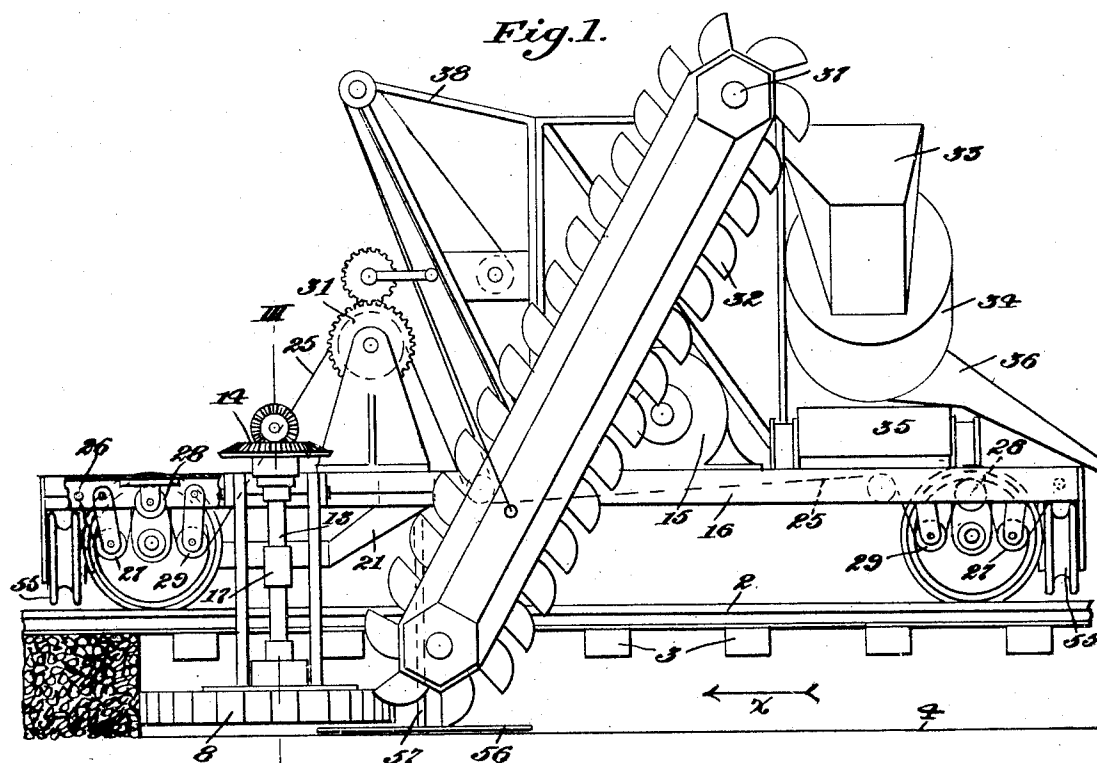
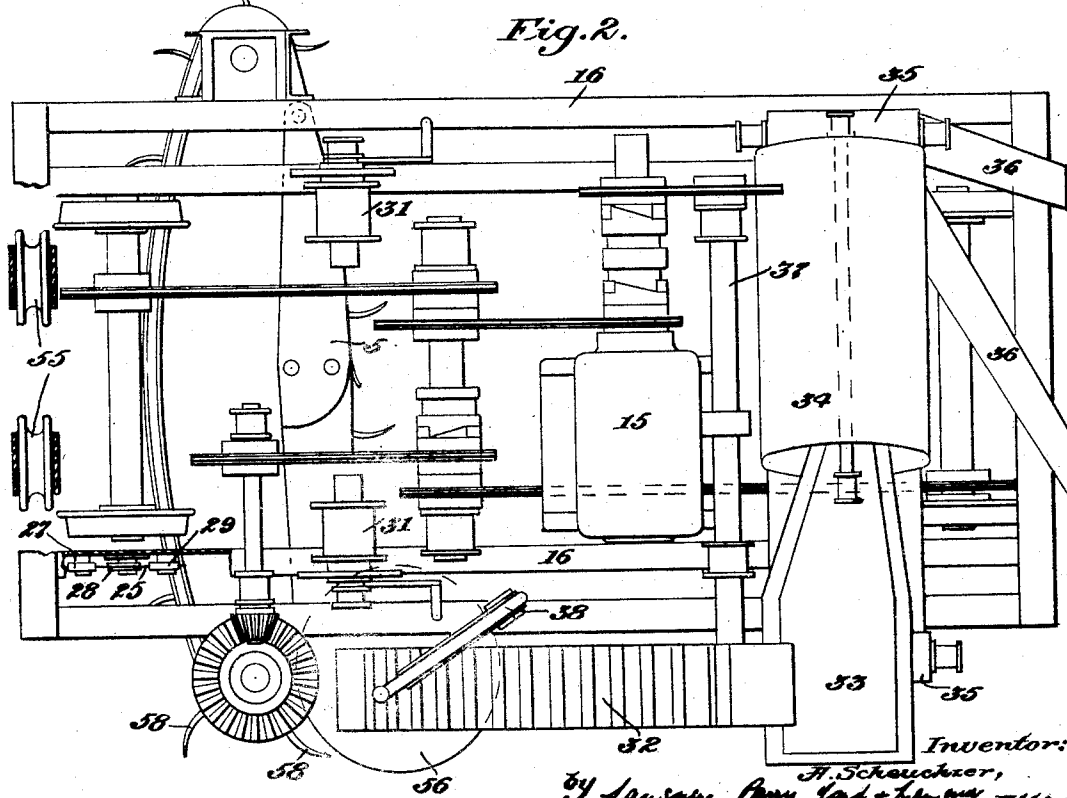
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RAILWAY TRACK BALLAST CLEANING MACHINE

Filed June 19, 1928

2 Sheets-Sheet 1



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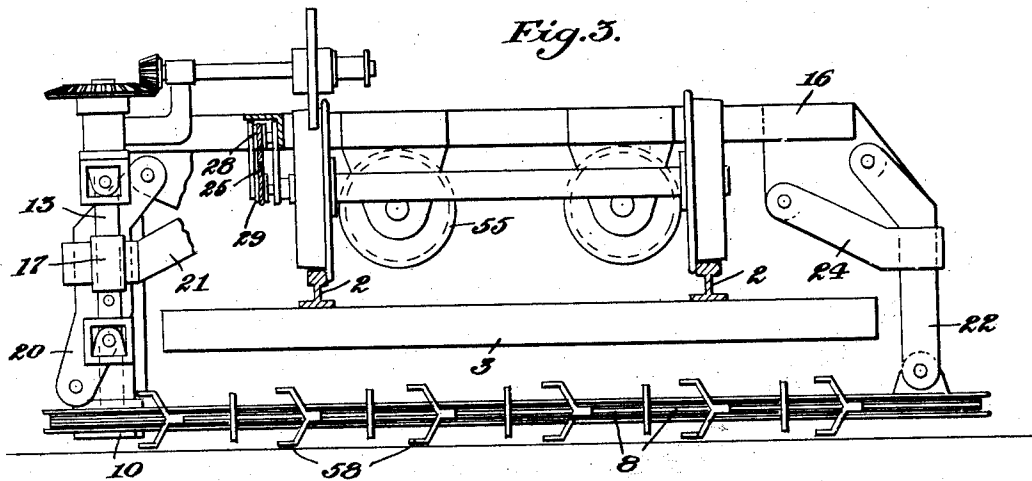
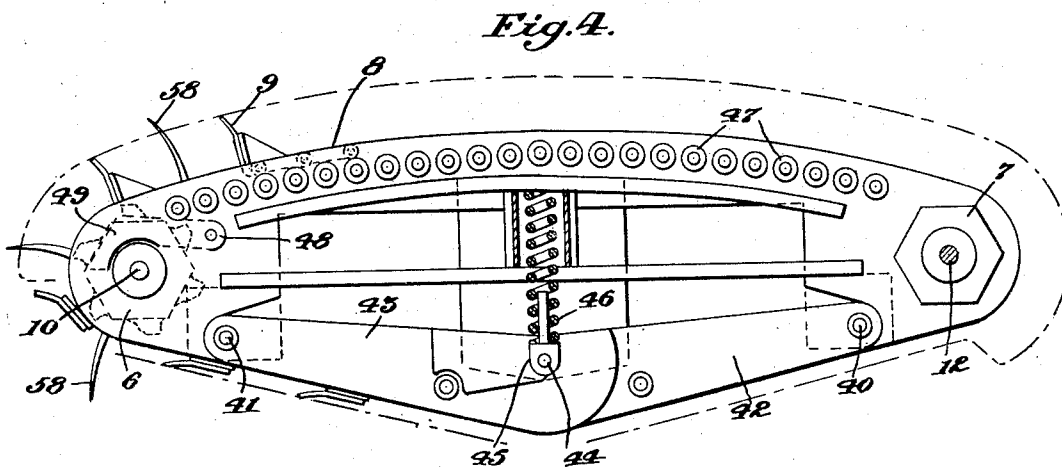
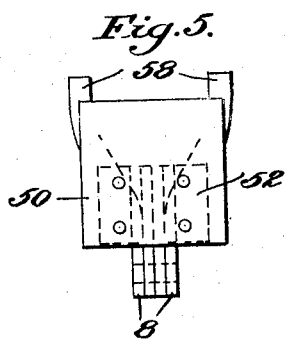
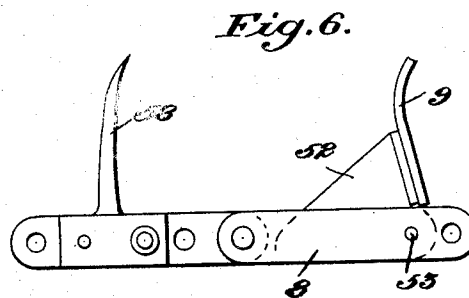
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RAILWAY TRACK BALLAST CLEANING MACHINE

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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RAILWAY-TRACK BALLAST-CLEANING MACHINE

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The invention relates to a machine for cleaning the whole ballast bed of a railway track and more particularly to a machine of the class adapted to travel on the track rails and to excavate the ballast to be cleaned, by means of endless tool chains operating longitudinally of the ties.

Proposals have already been made in machines of this type to do the excavating operation—which is the most difficult—by means of tool chains operating longitudinally of the ties. Constructions hitherto known have, however, been proven of little or no practical use. In one machine the operative surface of the tool chain is horizontal. A defect of such an arrangement consists in that the tools attached to the chain, since the space beneath the ties is limited, are relatively small and thus afford but little total efficiency in the machine. It is thus generally impossible to treat very solid track ballast with a tool chain thus arranged, since it is not supported between two sprocket wheels arranged at the ends of the ties, and when moved in the direction of the rails by the solid track ballast is subjected to very great strain, and in many cases is fractured. An actually efficient operation is possible only by combined longitudinal and transverse movement of the chain with respect to the track to be reballasted.

Other constructions provide two tool chains lying below the track obliquely with respect to the ties. Arranged in front of the two tool chains is a wedge-shaped blade or plowshare for moving the track ballast laterally to the two rearwardly diverging tool chains. A uniform advance of such machine is practically impossible except with the use of very great force, since the wedge-shaped blade must be driven into the solid track ballast. In addition, an elevator is provided on each side of the machine for each tool chain, so that the width of the machine no longer corresponds to that of the maximum loading gauge of the track, and in a two-track system it is impossible to maintain traffic on the adjacent track.

The defects of known machines for cleaning the ballast bed of a railroad track for

the whole of its width are completely eliminated by the machine of the present invention. According thereto the two sprocket wheels of the till chain rotate on two vertical shafts standing outwardly of the ties. It is thus possible to lay the whole chain horizontally below the track, with the tools facing the work. According to another feature of the invention the tools are rigidly supported during their operation. With a tool chain and tools arranged in this manner a uniform advance of the machine—even against a very solid bed of ballast—may be obtained without great expenditure of power and without risk of breaking the chain, since the resistance tends only to slow down the advance of the machine without affecting the shape of the tool chain.

According to the invention the rigid support for the operative section of the chain is removably secured to the car or wheeled body of the machine, whereby the chain may be left in operative position when it is necessary to release the track for the traffic.

The pitch or inclination of the tool chain is preferably adjustable, so as to operate also on track ballast in which the surface of the earth wall or dam carrying the track ballast is oblique or inclined. An inclination of this type is provided so that rain water will run off.

According to the invention, the tool chain is held elastically taut on its rigid support. This prevents the tools, the tool chain, or the parts directly or indirectly connected therewith from breakage or damage by reason of excessive strain when the tools come in contact with very hard points, or when a stone becomes lodged between the chain and sprocket wheels.

An exemplary embodiment of a machine, constructed in accordance with the invention, is shown on the drawings, in which:

Fig. 1 is a lateral elevation of the machine.

Fig. 2 is a plan view.

Fig. 3 is a section on enlarged scale through the machine along line III—III of Fig. 1.

Fig. 4 is a top view of the tool chain.

Fig. 5 is a view in end elevation of one

section of the tool chain and the tools thereon.

Fig. 6 is a side elevation of the link and tool structure shown in Fig. 5.

5 The tool chain 8 is passed over two sprocket wheels 6, 7 arranged at both sides of the ties 3 carrying the rails 2. The sprocket wheels are attached to vertical shafts 10, 12 and are driven by a motor 15
10 mounted on the vehicle. The shaft 10 is journaled in a bearing 11, integral with the frame 5 of the chain. The chain carries tools consisting of picks 58 and shovels 9. Each pick 58 is secured upon a respective
15 one of the links of the chain in such a manner that their points scrape horizontal furrows in the ballast bed. The front, that is, the operative section of the chain, is supported by the convex part of a rigid support or frame 5, in order that the picks 58 be
20 pushed against the ballast during their active travel. Journalled in this support are rollers 47, over which moves the operative section of the chain, and which at the same
25 time hold the shovels 9, pivoted at 53 to the chain links, in operative position by means of the heels 52 of the shovels.

The rear section of the chain 8 is passed over two arms 42, 43 (Fig. 4) which are
30 pivoted together at the center of the section by means of a pin 44. Between pin 44 and the rigid convex support there is a compression spring 46 which holds chain 8 constantly taut, so that actual adjustment of tension is not necessary. Moreover, this arrangement prevents the chain from breaking, even
35 in case a stone or the like should lodge between the chain and the sprocket wheel. The outer ends of the arms 42, 43 are pivoted with the necessary play to the chain
40 frame 5 at 40 and 41.

Pivoted to the chain frame 5 by means of a pin 48 is an arm 49, the cam-shaped end of which is supported on the hub of sprocket
45 wheel 6. This arm 49 serves to effect backward swinging of the shovels 9 pivoted to the chain links at one end of the working section of the chain. During movement along the idle section the shovels 9 lie flat
50 against the chain links (Fig. 4), and at the end of the idle section are automatically swung into operative position by the faces of the hexagonal hub of the sprocket wheel 7. The result thereof is that the shovels
55 deliver the ballast only to the end of the operative section and not again under the ties.

The chain 8 is driven by a universal shaft 13, which is connected through a bevel
60 gear drive 14 with the drive motor 15. The universal shaft consists of two parts which may be coupled together by a sleeve 17 and a pin 18.

The frame 5 of the tool chain 8 is rigidly
65 secured to the machine frame or body 16

before each operation by means of arms 20 and 22, pivoted at 19 and 23. Forks 21 and 24 (Figs. 1 and 3) are provided as supports or brackets for the arms 20 and 22. The arms 20 are secured at their free ends to the bearing 11 of the sprocket wheel 6, while the arms 22 are secured to the fixed shaft 12 of the sprocket wheel 7.

The body or supporting frame 16 is mounted on wheels, adapted to travel on the rails 2, through the intermediary of suitable raising and lowering mechanism in order to permit an adjustment of the depth as well as of the inclination of the chain under the ties 3.

In the drawings there are shown four chains 25 which serve for adjusting the height and inclination of the tool chain 8. Each of these chains is attached at one end to one end of the machine frame 16 at 26 (Fig. 1), and each is passed successively under a roller 27 journalled in the frame 16, over a roller 28 supported on the shaft bearing of the traveling vehicle, and under a roller 29 likewise journalled on the frame 16, and connected to and passed about a chain drum 31. One of the drums 31 is provided for each pair of chains 25. When the chains 25 are wound on the drums 31 the distance between the rollers 27 and 29 and the roller 28 is reduced, so that frame 16, and therewith tool chain 8, are raised. Reversely, when the chains 25 are unwound from drums 31, frame 16 and therewith the tool chain 8 are lowered.

If, now, a pair of chains is actuated on one side of the machine, or if one pair is wound or unwound to a greater degree than the other pair of chains, the machine frame 16 and therewith the tool chain 8 is inclined relative to the ties.

Arranged at one side of the machine, under the place to which the chain 8 brings the excavated material, is a horizontal disc 56, which is attached to a shaft 57 driven by the motor 15. Arranged above this disc 56 is an elevator 32 which collects and elevates the ballast dug out by the tool chain 8 under the ties and advanced by the disc 56, and throws it into an inclined chute 33, from which the ballast falls into a cylindrical screen 34. The large and still utilizable pieces pass into the screen 34 and therefrom to a distributor 36, which lays this cleaned ballast at both sides of the rails 2 behind the machine. The dust and dirt which pass the screen 34 is deposited on an endless conveyor belt 35 and is thrown thereby to one side of the track.

All the movable parts, such as the elevator 32, screen 34, conveyor 35, tool chains 8, etc., are driven simultaneously at suitable speed by motor 15. The latter serves at the same time for driving the vehicle, that is, for advancing tool chain 8 along the track.

The operation of the machine is as follows:

Initially sufficient amount of the ballast is

dug away to provide room for the chain 8. The tool chain 8 and its frame 5 which during transport is suspended to the side of the vehicle, is shoved under the ties, then both ends of the frame 5 are secured to the arms 20, 22 of the machine body 16.

The two parts of the universal shaft 13 are connected by means of the coupling sleeve 17 to realize the mechanical connection between the chain 8 and the motor 15. Upon starting the motor 15, the vehicle advances in the direction of the arrow α . At the same time the tool chain 8, and therewith disc 56, elevator 32, screen 34 and conveyor band 35, are set in operation. The picks 58 tear up the ballast and the shovels 9 carry the material loosened by the picks under the ties, and deposit the same on disc 56, which carries it to elevator 32. Behind the machine the ballast passing from distributor 36 is at once again deposited under the free-lying ties.

When the track involved is to be released for traffic, the chain 8 is left in its operative position and the rest of the machine is put out of the way. Means may be provided to push the materials transported by the disk 56 onto the elevator 32.

Having thus described my invention, what I claim as new is:

30 1. In a machine for cleaning railway track ballast adapted to travel on the rails above the ballast, an endless tool chain operating longitudinally of the ties and removably arranged on the machine body, said tool chain being mounted below the track and carried from one to the other end of the ties and having vertical operative surfaces, and means for inclining the tool chain with the machine body to the horizontal, so that the track ballast may be completely removed even from an oblique plane.

2. Machine according to claim 1, characterized in that the tool chain is suspended from the machine frame transversely to the track.

45 3. Machine according to claim 1, with a rigid support carrying the active section of the tool chain, characterized in that said rigid support is convex and that pivotally connected guide arms are provided for the idle section of tool chain at approximately the center of the section, whereby between the rigid support and the pivotally connected guide arms there is arranged a spring which maintains the tool chain taut.

55 4. In a railway track rebalasting apparatus of the class described, an endless chain, excavating means comprising picks which are mounted each upon a respective one of the links of the chain in such a manner that each one attacks the ballast bed, and shovels which work each behind a respective pick in order to remove to the side of the roadbed all the material excavated by the picks and which are guided around the frame of the chain in such a manner that they remain collapsed

along this frame during all their inactive travel.

5. In a railway track rebalasting apparatus of the class described, an endless chain of excavating means, a horizontally rotating disc disposed under the place to which the chain brings the excavated material, and a bucket elevator for collecting and elevating the material from the disc.

6. In a ballast cleaning machine of the class described, the combination of an endless chain of excavating means operating below the track, sprocket wheels over which the chain passes, and vertical shafts outwardly of the ties for the sprocket wheels.

7. Ballast cleaning machine according to claim 6, characterized in that the tool chain is guided between two sprocket wheels by a frame, which frame is removably secured by its two ends to the wheeled body of the machine in order to permit the tool chain with its frame to be left in operative position when the body must be removed from the track for traffic reasons.

8. In a ballast cleaning machine of the class described, the combination of an endless chain of excavating means operating below the track, sprocket wheels over which the chain passes, the tool chain being guided between the sprocket wheels by a frame which is removably secured by its two ends to the wheeled body of the machine, the frame of the tool chain having a front rigid part constituting a convex guide upon which the active section of the tool chain bears and a rear articulated part, constituted by two pivotally connected guide arms for the idle section of the tool chain, and a compression spring interposed between the front part constituting a rigid support for the tools and the pivotally connected guide arms in order to maintain the tool chain in taut condition.

9. Ballast cleaning machine according to claim 8, characterized in that the excavating means carried by the endless chain are pushed against the ballast bed by the convex part of the frame during the active travel and comprise picks which are secured each upon a respective one of the links of the chain in such a manner that the point of each one scrapes the ballast bed following a horizontally curved line, and shovels which work each behind a respective pick pivoted upon each link of the chain in order to remove to the side of the ballast bed all the material excavated and which shovels are guided around the frame of the chain in such a manner that they remain collapsed along the articulated part of this frame during all their inactive travel.

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