

April 10, 1951

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BALLAST REMOVAL APPARATUS

2,548,677

Filed Jan. 7, 1946

3 Sheets-Sheet 1

Fig. 1.

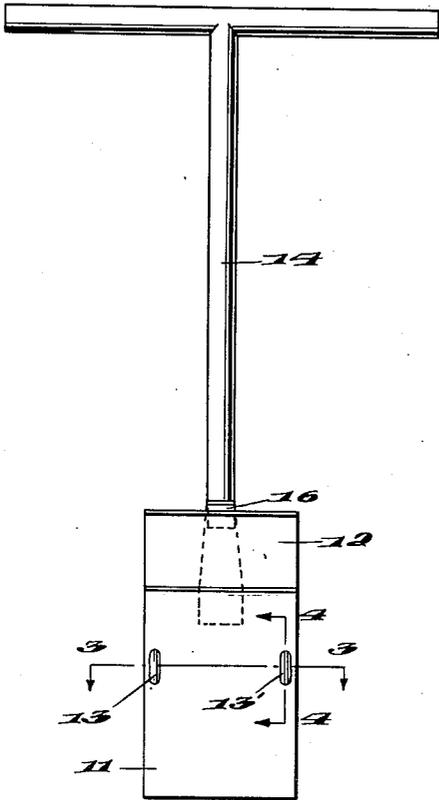


Fig. 2.

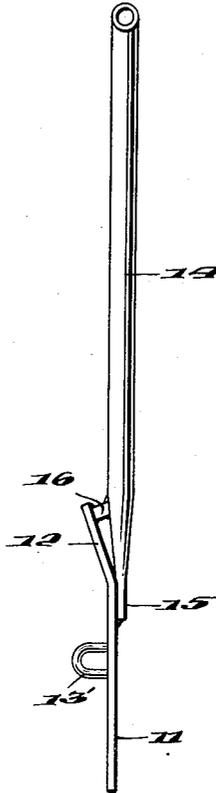


Fig. 4.

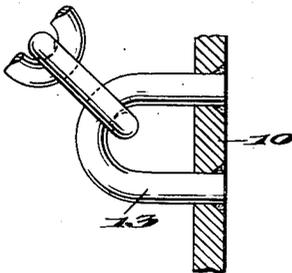
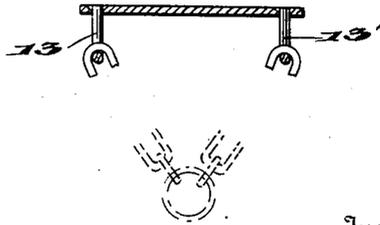


Fig. 3.



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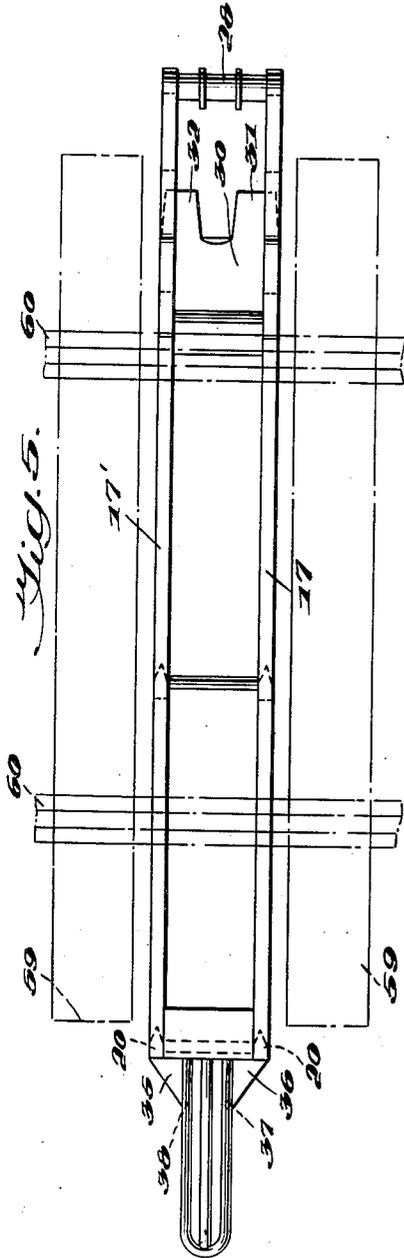


Fig. 5.

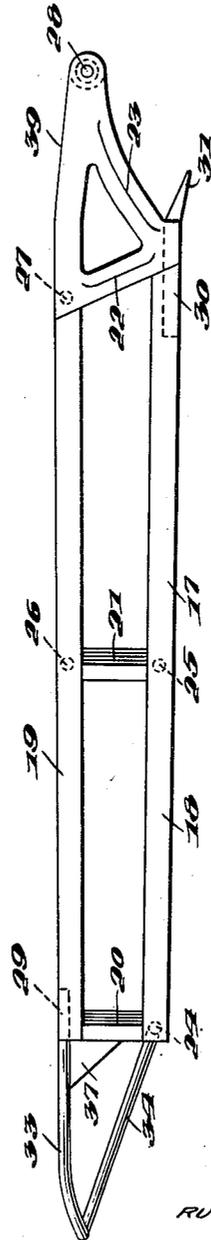


Fig. 6.

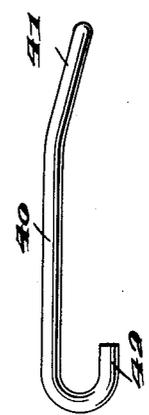


Fig. 7.

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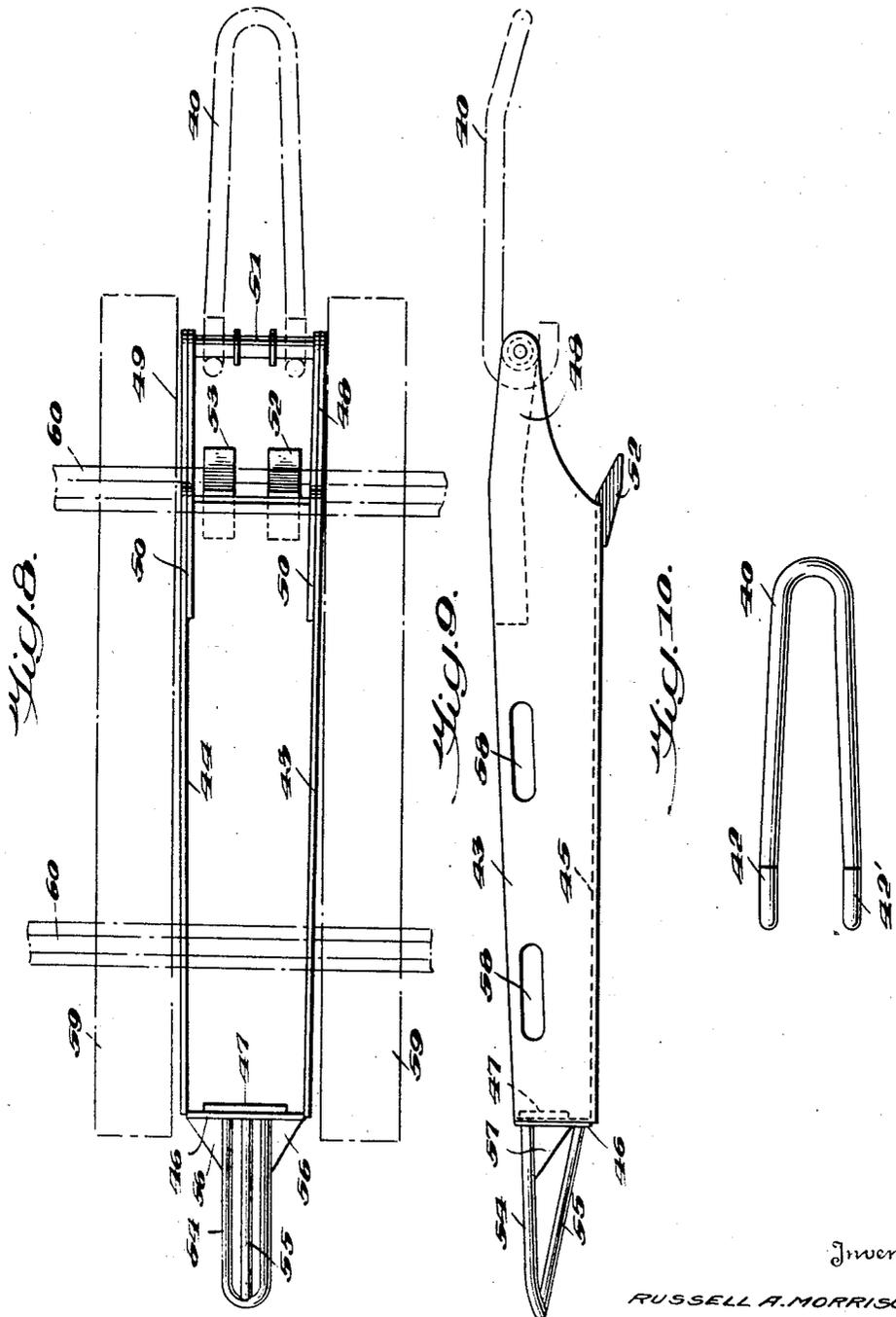
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# UNITED STATES PATENT OFFICE

2,548,677

## BALLAST REMOVAL APPARATUS

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5 Claims. (Cl. 37-104)

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This invention relates to the removal of ballast from between railroad ties and more particularly to instrumentalities for removing such ballast and a method for accomplishing the ballast removal.

It is necessary periodically to remove the ballast from between the ties and replace it with new ballast for several reasons such as to provide better drainage. Up to the present time ballast has been removed by hand by gangs of men using picks and shovels. This operation is extremely onerous, slow and costly. The present invention employs a number of specially designed instrumentalities which may be operated by a very small crew and the method of using these instrumentalities has been found to result in tremendous savings in the cost of removing ballast. Moreover, a stretch of track can be cleaned out or skeletonized in about one-fifth of the time required under the old method. Still further, the burdensome and back-breaking aspects of the old method are eliminated.

In addition to the use of a crawler tractor with a winch which is used as a prime mover, the invention employs three specially designed instrumentalities which comprise a drag shovel, a rooter, and a drag bucket.

The construction of these instrumentalities and the method in which they are used will become more apparent from the following specification and claims when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a front view of a drag shovel constructed in accordance with the invention;

Fig. 2 is a side view of the same;

Fig. 3 is an enlarged section taken on the line 3-3 of Fig. 1;

Fig. 4 is an enlarged section taken on the line 4-4 of Fig. 1;

Fig. 5 is a top plan view of a rooter constructed in accordance with the invention;

Fig. 6 is a side elevation of the same;

Fig. 7 is a side elevation of a hitch which is used in connection with the rooter;

Fig. 8 is a plan view of a drag bucket constructed in accordance with the invention;

Fig. 9 is a side elevation of the same; and

Fig. 10 is a bottom plan view of the hitch member shown in Fig. 7.

### The drag shovel

With reference now to Figs. 1, 2, 3, and 4, the drag shovel is comprised of a flat rectangular shovel portion 11 the upper end 12 of which is inclined forwardly at a slight angle. The shovel

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portion 11 is provided near each side edge with a metal loop 13, 13'. These loops are comprised of U-shaped members which are secured to the shovel member 11 in the manner clearly shown in Figs. 3 and 4. From Fig. 4 it should be apparent that the shovel member 11 is provided with two holes to receive the ends of the loop members 13, 13'. These holes are counter-sunk on the back side of the shovel and the space provided by the counter-sinking is burned and filled flush with flame and steel rod.

The shovel portions 11 and 12 are supported by a T-shaped handle member 14, preferably constructed of tubular metal and the lower end of which is flattened as at 15. The shovel portion 11 is secured to this flattened portion 15 by means of welding or the like. The shovel portion 12 is secured as by welding to the handle portion 14 through the medium of a spacer member 16.

### The rooter

Figs. 5, 6, and 7 illustrate a rooter constructed in accordance with the present invention.

Generally speaking this rooter is comprised of a substantially rectangular box-shaped frame. Specifically, the rooter is comprised of two side frame members 17, 17'. Each of these side frame members includes a base runner member 18 and an upper longitudinal member 19 which is supported above the base member by uprights 20, 21, 22, and 23.

The two side frame members 17, 17' are supported in spaced parallel relationship by cross rods such as 24, 25, 26, 27, an enlarged cross rod 28, called a crow bar, a cross plate 29, and a toothed digging plate 30. The digging toothed plate 30 is provided with two teeth 31 and 32 the points of which are inclined downwardly and extend below the plane of the lower edge of the base or runner members 18. At the rear of the rooter is a tail structure comprised of tubular material and including an upper substantially U-shaped member 33 and a lower inclined tubular member 34. This tail member is secured to the rooter proper and is reinforced by gussets 35, 36, 37, and 38 of triangular shape.

Attention is called to the fact that all the forward or leading edges of the uprights 20, 21, 22, and 23 are bevelled as clearly shown in the drawings.

Moreover, it will be noted that the rooter is tapered so that the front (right end in Figs. 5 and 6) is higher than the rear, although the extreme front portion slopes slightly in a downward direction as indicated at 39.

In use, a hitch member shown in Figs. 7 and 10 and indicated by the reference numeral 40 is hooked over the enlarged cross member or crow bar 28. The hitch member is comprised of a substantially U-shaped rod the closed end 41 of which is bent slightly downwardly and the rear open ends of which are formed into hooked portions 42, 42'. From Fig. 5 it will be noticed that the enlarged cross rod or crow bar 28 is provided with spaced annular flanges which assist in preventing the hitch member from moving laterally on the crow bar 28.

#### *The drag bucket*

The drag bucket is shown in Figs. 8 and 9 as comprised generally of a rectangular box-shaped member open at the front and at the top. This box-shaped member is comprised of side plates 43 and 44, a bottom plate 45, a rear end plate 46 reinforced by the plate 47. The front ends of the side plates 43 and 44 extend forwardly to comprise nose pieces 48 and 49 which may be reinforced by an extra thickness of material 50. The extreme front ends of the nose pieces 48 and 49 are joined by a cross rod or crow bar 51 similar to the crow bar 28 used in the rooter and adapted likewise to receive the hitch member 40.

On the forward edge of the bottom plate 45 are two digging teeth 52 and 53 which may be secured to the bottom piece 45 by welding or the like and which may be comprised of tough metal such as manganese steel alloy.

At the rear of the device there is a tail assembly which includes an upper U-shaped rod 54 and a downwardly hanging rod 55. This tail assembly is secured to the rear end of the drag bucket by welding or the like and may be reinforced by the triangular gussets 56 and 57.

Each of the side members 43, 44 of the drag bucket is provided with two elongated handle slots 58 to facilitate handling of the drag bucket.

It will be noted that the lower forward edges of the side plates are curved and advantageously these curved edges should be bevelled so as to form a forward cutting edge.

From Fig. 8 it will be observed that the side plates 43 and 44 are not disposed in parallel relationship but are closer together at the rear end of the device than at the forward end. Moreover, from Fig. 9 it will be observed that the upper edge of the plates 43 and 44 slopes gradually downwardly from a point directly above the teeth 52, 53 toward the rear end of the instrument. From a point directly above the teeth 52, 53 the upper edges of the plates 43 and 44 slope or are tapered downwardly in a forward direction.

In Figs. 5 and 8 the ties and rails have been diagrammatically shown, the ties being indicated by the reference numerals 59 and the rails by the reference numerals 60.

A method of using these three pieces of equipment, namely, the drag shovel, the rooter, and the drag bucket, will now be described.

It has been mentioned that all three of these instrumentalities are adapted to be drawn or pulled by means of a winch mounted on a tractor or the like which tractor runs parallel with the track.

The tractor, which also mounts a bull dozer blade (not shown) first runs parallel with the track and scrapes and/or removes the shoulder of the road bed down to the level of the bottom of the ties. The old ballast between the ties is preliminarily loosened with pneumatic cribbing hammers or the like, having fork-like tips. Next,

the ballast between the ties outside the rails on the side nearest the tractor is then removed by the drag shovel shown in Figs. 1 to 4, inclusive. The drag shovel is held in position by a man and is pulled by a cable attached to the tractor winch.

In the next operation the rooter illustrated in Figs. 5 and 6 is pulled between the ties from the side of the track opposite the tractor to the side of the track nearest the tractor by a cable attached to the tractor winch. Obviously, before this rooter can be pulled in this fashion, the cable first must be threaded under the rails and there is normally a two to three inch clearance in all trackage between the base of the rail and the top of the ballast so that it is an easy matter to thread the cable in this fashion. The purpose of the rooter is to further loosen the ballast and it also removes about twenty-five percent of the ballast.

The drag bucket illustrated in Figs. 8 and 9 is next pulled in the same fashion and in the same direction as the rooter. The drag bucket removes practically all of the remaining ballast in one pass.

The small amount of ballast remaining after the rooter and the drag bucket have been pulled through can easily and quickly be removed by hand.

It is important to note that the rooter is tapered so that the front is higher than the rear, whereas the drag bucket is tapered so that it is higher and wider in front than at the rear. These tapers are vital because they relieve the wedge effect of the ballast which overflows when these pieces of equipment are in motion, and these pieces of equipment will wedge and be unworkable unless these tapers exist.

Moreover, the tail construction on both the rooter and the bucket are also of considerable importance because these tail constructions prevent the rooter and the drag bucket from kicking up and wedging and/or gouging out the track due to the digging resistance of the front end. It must be remembered that the ballast in track becomes extremely hard packed and digging conditions are extremely severe.

Still further, the importance of the hitch member 40 cannot be underestimated because this hitch acts as a crow bar lever in guiding both the rooter and the bucket under the rail so that the tops of both will slide easily under the rails and not hit with an impact and bind against it, which action would be severe enough to pull the track out of alignment. The hitch 40 is common to both the rooter and the drag bucket.

It will be noticed that on the top front of both the rooter and the bucket a curve or taper from the highest point which is directly above the teeth down to the crow bars (28 for the rooter and 51 for the drag bucket) to which the hitch attaches. This curve and/or taper is likewise important because it is in proportion to the thickness of the hitch, which permits the hitch to have its fullest crow bar effect, and, therefore, allows the rooter and the bucket to slide easily under the rails.

The bucket, as previously mentioned, has hand holes 58 on its sides, which are important since they facilitate handling of the drag bucket. Moreover, the tail assemblies of both the bucket and the rooter likewise can be used as handles.

It is obvious that changes in the construction and arrangement of the parts may be made without departing from the invention which is not

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to be limited by this disclosure except in accordance with the following claims.

I claim:

1. A roter for loosening and removing ballast from between railroad track ties, comprising an elongated generally rectangular box-like open frame, said frame having vertical open generally rectangular side members disposed in spaced parallel relation, cross members rigidly connecting said side members, the bases of said side members comprising flat runners, the forward ends of said side members terminating in nose portions, a heavy cross rod connecting the forward ends of said nose portions, digging teeth secured to the frame between the forward end of said runners and extending forwardly and downwardly below the plane of said runners, the top edges of said side members being inclined downwardly from points substantially above said teeth to the rear of the frame, and inclined downwardly from said points toward the front end of said nose portions.

2. A roter for loosening and removing ballast from between railroad track ties, comprising an elongated generally rectangular box-like open frame, said frame having vertical open generally rectangular side members disposed in spaced parallel relation, cross members rigidly connecting said side members, the bases of said side members comprising flat runners, the forward ends of said side members terminating in nose portions, a heavy cross rod connecting the forward ends of said nose portions, digging teeth secured to the frame between the forward end of said runners and extending forwardly and downwardly below the plane of said runners, the top edges of said side members being inclined downwardly from points substantially above said teeth to the rear of the frame, and inclined downwardly from said points toward the front end of said nose portions, and a tail construction extending rearwardly from the rear end of said frame, said tail construction comprising a substantially U-shaped tubular member secured at its open end to the upper rear end of said frame and a tubular member joining the closed end of said U-shaped member and the lower rear end of said frame.

3. A roter for loosening and removing ballast from between railroad track ties, comprising, an elongated generally rectangular box-like open frame, the sides of said frame at the front terminating in forwardly extending nose portions, digging teeth secured on the base of the frame to the rear of said nose portions, said digging teeth being inclined downwardly in a forward direction with their forward edges disposed below the plane of the base of the frame, the upper side edges of said frame sloping rearwardly from points substantially above said teeth, the upper edges of said nose portions sloping downwardly in a forward direction from said points, the lower edges of said nose portions being arcuate, a cross rod rigidly connecting the nose portions at their front ends, and a hitch member having hook portions for engaging said cross rod.

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4. A roter for loosening and removing ballast from between railroad track ties, comprising, an elongated generally rectangular box-like open frame, the sides of said frame at the front terminating in forwardly extending nose portions, digging teeth secured on the base of the frame to the rear of said nose portions, said digging teeth being inclined downwardly in a forward direction with their forward edges disposed below the plane of the base of the frame, the upper side edges of said frame sloping rearwardly from points substantially above said teeth, the upper edges of said nose portions sloping downwardly in a forward direction from said points, the lower edges of said nose portions being arcuate, a cross rod rigidly connecting the nose portions at their front ends, and a hitch member having hook portions for engaging said cross rod, and a tail construction extending rearwardly from the rear end of said frame, said tail construction comprising a substantially U-shaped tubular member secured at its open end to the upper rear end of said frame, and a tubular member joining the closed end of said U-shaped member and the lower rear end of said frame.

5. A roter for loosening and removing ballast from between railroad track ties, comprising, an elongated generally rectangular box-like open frame, the sides of said frame at the front terminating in forwardly extending nose portions, digging teeth secured on the base of the frame to the rear of said nose portions, said digging teeth being inclined downwardly in a forward direction with their forward edges disposed below the plane of the base of the frame, the upper side edges of said frame sloping rearwardly from points substantially above said teeth, the upper edges of said nose portions sloping downwardly in a forward direction from said points, the lower edges of said nose portions being arcuate, a cross rod rigidly connecting the nose portions at their front ends, and a hitch member having hook portions for engaging said cross rod, and a tail construction extending rearwardly from the rear end of said frame, said tail construction comprising a substantially U-shaped tubular member secured at its open end to the upper rear end of said frame, and a tubular member joining the closed end of said U-shaped member and the lower rear end of said frame, the leading edges of all parts of the frame being pointed.

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