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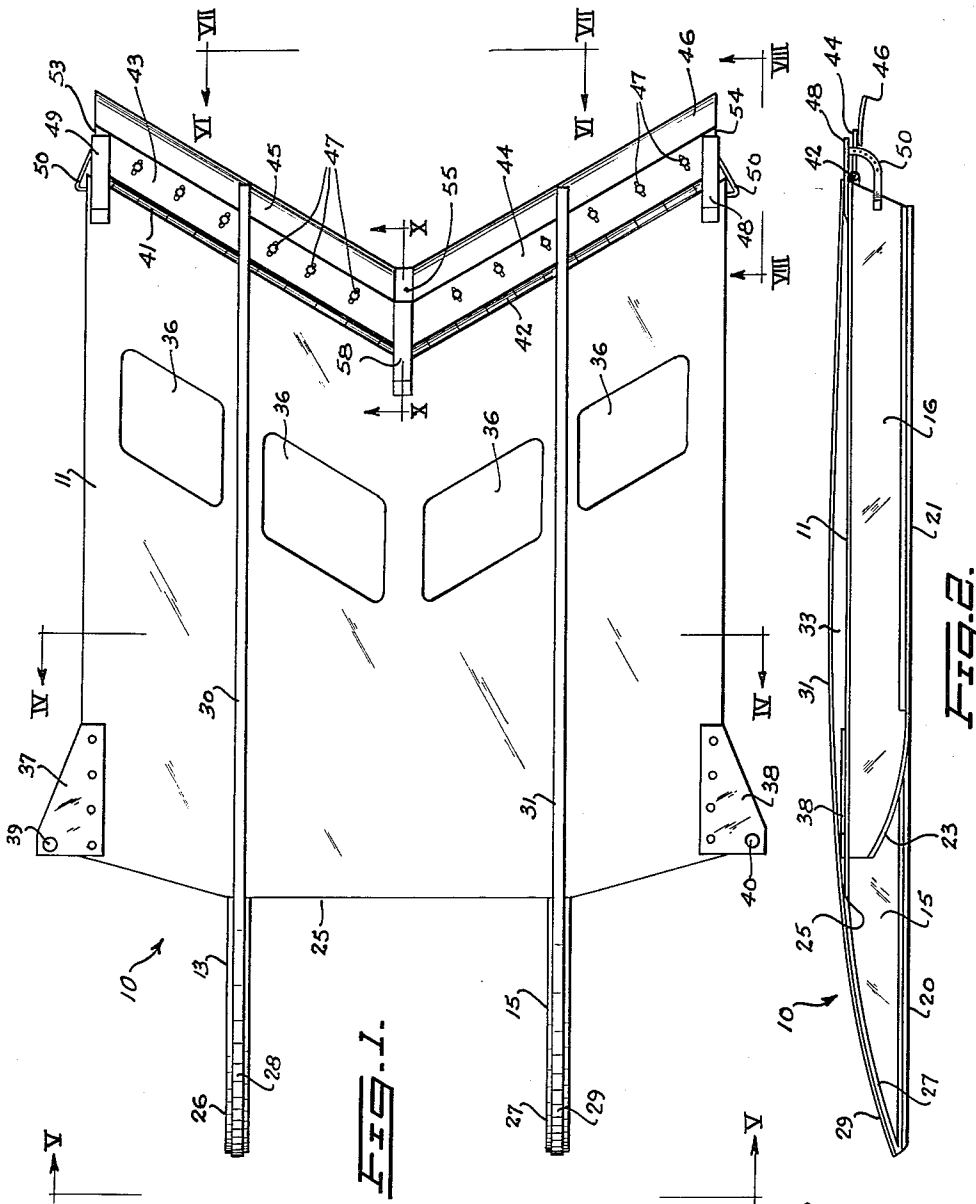
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3,091,187

BALLAST SLED FOR USE UNDER RAILROAD TRACKS

Filed March 21, 1957

3 Sheets-Sheet 1



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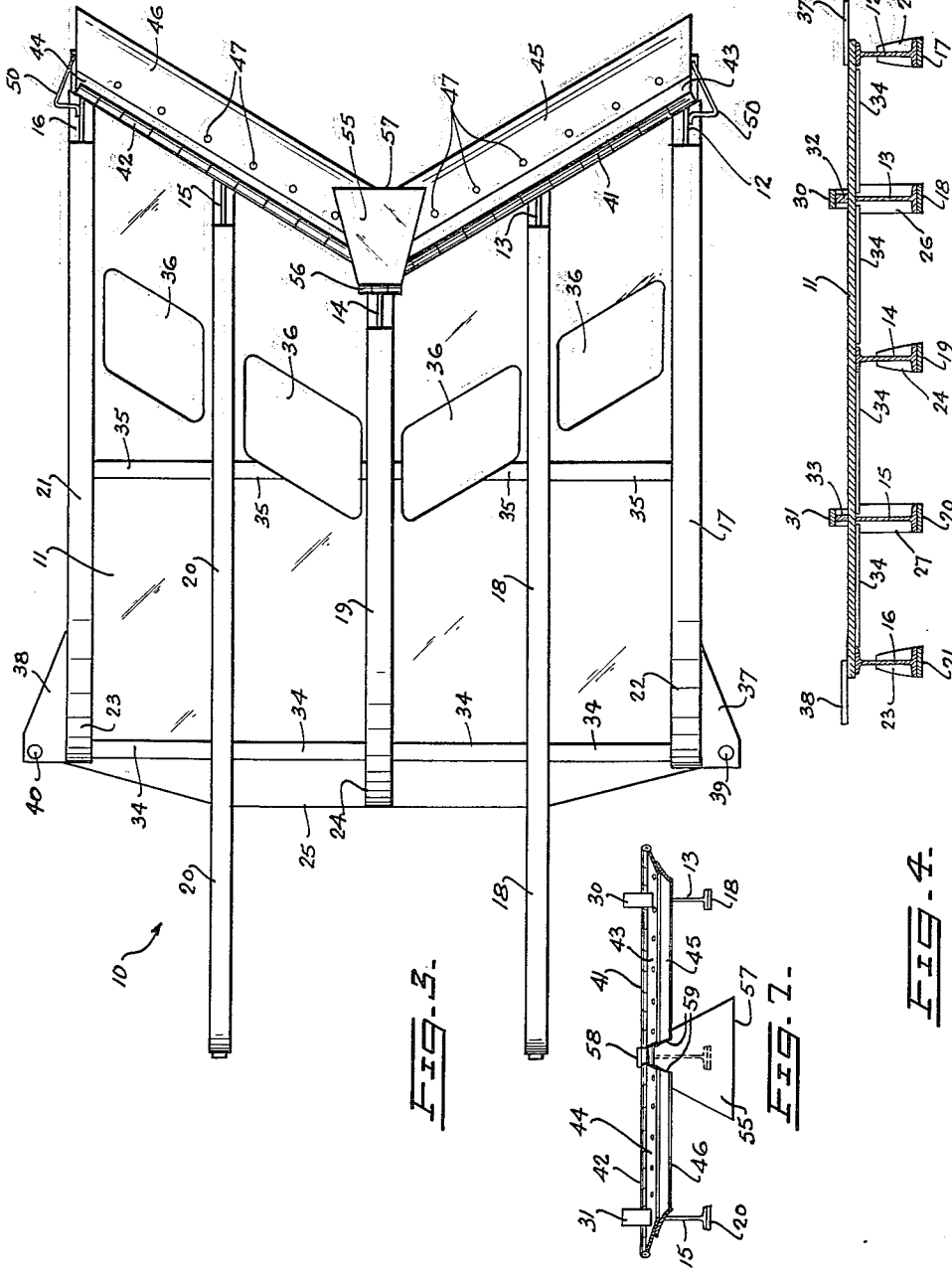
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3 Sheets-Sheet 2



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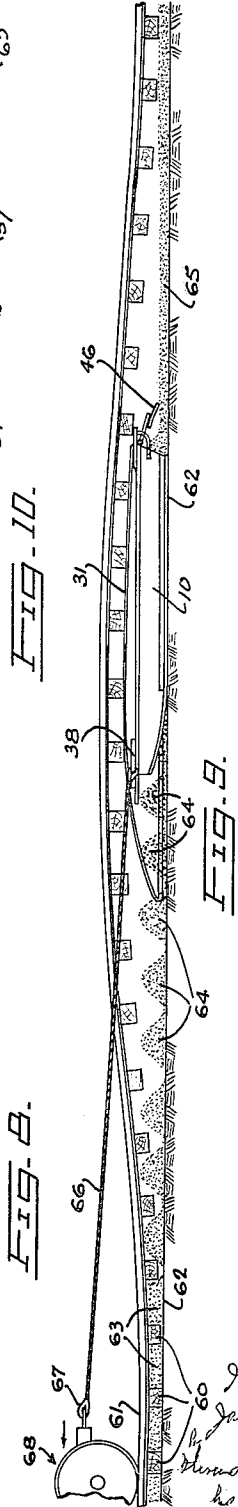
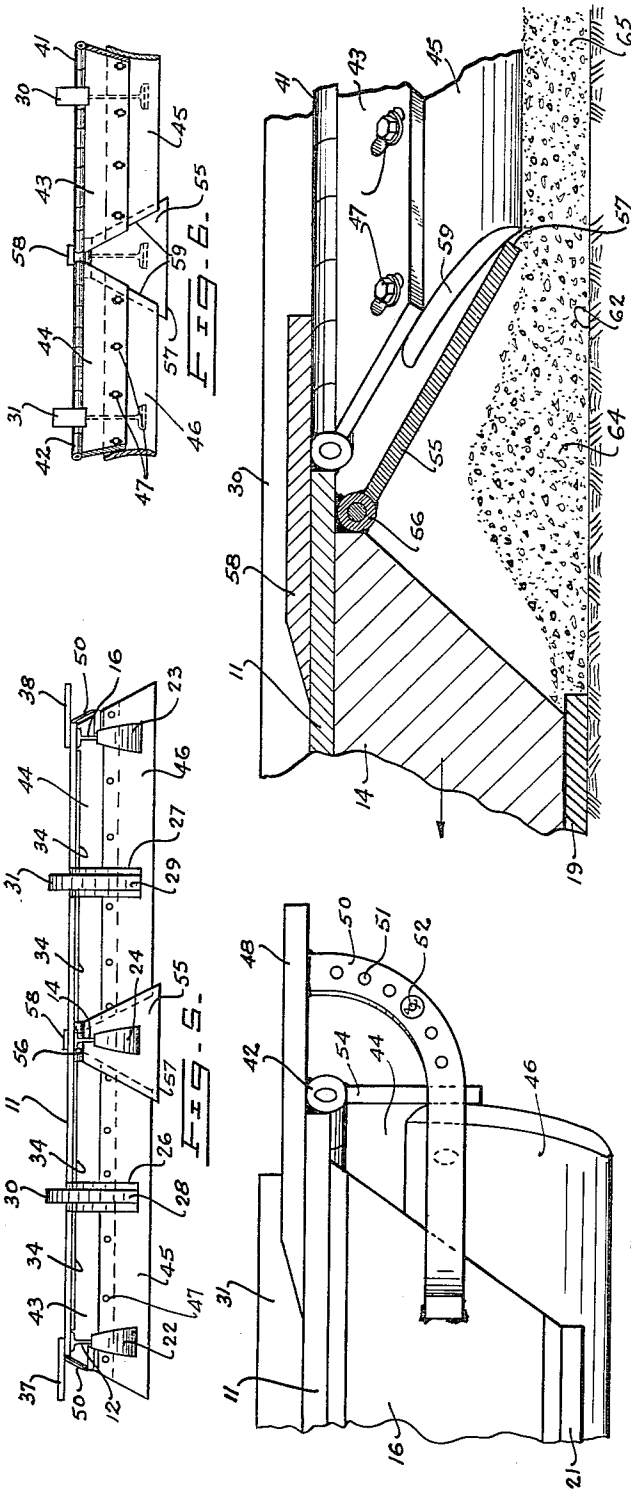
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BALLAST SLED FOR USE UNDER RAILROAD TRACKS

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3 Sheets-Sheet 3



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3,091,187

BALLAST SLED FOR USE UNDER  
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2 Claims. (Cl. 104-7)

This invention relates to a sled device for spreading ballast on a railroad roadbed. Devices of this type, sometimes known as "under-track sleds" or "ballast sleds" are inserted between the subgrade and the ties to which the rail tracks are secured, and are then towed along the track in this position by a locomotive.

Such sleds may be used in the laying down of new tracks, or in the rehabilitation of already laid tracks. In the latter case, prior to the use of the sled, the ballast previously existing on the roadbed will have been removed, conveniently by a ballast plow of a type described in L. B. Franco and J. C. Stein United States patent application No. 460,798, filed October 7, 1954 now Patent No. 2,921,390. After the plow has removed the fouled ballast, or, in the case of a newly laid track, after the track has been laid on the subgrade, fresh clean ballast is dumped onto the track to lie between and on top of the ties and rails. The function of the sled is to raise the track up to its desired level and to distribute the ballast evenly beneath the ties. Subsequently additional ballast can be dumped on the track between adjacent ties, this latter operation presenting no special difficulty as it does not require elevation of the track. Reference may be made to L. B. Franco United States Patent No. 2,769,172, issued October 30, 1956, for a description of a ballast sled of this character.

The object of the present invention is to provide improvements in such sleds, with particular reference to improving their operating characteristics, reducing the number of stoppages for manual clearance experienced in practice, and improving the evenness of ballast beds formed thereby.

The various features of the invention will become apparent from consideration of the ballast sled illustrated by way of example in the accompanying drawings and from the appended claims.

In these drawings:

FIGURE 1 shows a top plan view of a ballast sled with rear flaps in raised position;

FIGURE 2 shows a side view of the sled seen in FIGURE 1;

FIGURE 3 shows an underside plan view of the sled in FIGURES 1 and 2;

FIGURE 4 is a section taken on the line IV—IV in FIGURE 1;

FIGURE 5 is a front view of the sled taken on the line V—V in FIGURE 1, but showing the flaps in lowered position;

FIGURE 6 is a fragmentary rear view taken on the line VI—VI in FIGURE 1, also with the flaps in lowered position;

FIGURE 7 is a view similar to FIGURE 6 taken on the line VII—VII in FIGURE 1, but with the main flaps in raised position;

FIGURE 8 is an enlarged fragmentary side elevation taken on the line VIII—VIII of FIGURE 1, also showing the main flaps lowered;

FIGURE 9 is a diagrammatic side view of the sled in operation on a length of track; and

FIGURE 10 is a fragmentary section taken on the line X—X in FIGURE 1 during pulling of the sled in the

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manner shown in FIGURE 9, demonstrating the function of the main and central flaps.

The sled 10 consists of a framework structure of welded construction comprising a main plate 11 of steel, to the underside of which there are secured five parallel spaced beams 12, 13, 14, 15 and 16, each carrying on its lowermost web an under-runner 17, 18, 19, 20 and 21 respectively (see particularly FIGURE 4). The two beams 12 and 16 extending along the side edges of the sled and the central beam 14 together with their under-runners 17, 21 and 19 terminate level with the front edge 25 of the main plate 11, these under-runners having at their forward ends upwardly curved portions 22, 23 and 24 respectively (best seen in FIGURE 5). The intermediate beams 13 and 15, and with them the under-runners 18 and 20 that they carry, extend a considerable distance forwardly of the front edge 25 of the plate 11. These latter under-runners 18 and 20 are not upwardly curved, but their corresponding beams 13 and 15 are downwardly curved along their upper edges as at 26 and 27 (FIGURES 1 and 2) to support downwardly curved forward portions 28 and 29 of upper runners 30 and 31 that extend rearwardly from these extreme forward points of the sled structure to pass along the top of the main plate 11 supported a few inches thereabove by means of webs 32 and 33. The spacing of the runner members 30 and 31 corresponds to the spacing of the rails, so that, when the sled is in correct position, there is a runner under each rail.

Further structural strength is obtained from two sets of stiffening bars 34 and 35 (see FIGURE 3) extending transversely across the underside of the main sheet 11 between the beams 12, 13, 14, 15 and 16, the more rearward bars 35 being partially interrupted by reason of weep holes 36 that are cut in the main plate 11 to provide four vertical communicating passageways between the upper and lower sides of said plate.

Riveted to the forward side edges of the main plate 11 are towing ears 37 and 38 provided with holes 39 and 40, for receiving shackles on the ends of towing cables. The manner of towing is described below in connection with FIGURE 9.

At its rearward edge, the plate 11 is cut into forwardly projecting V-shape, the two rear edges of the plate thus formed carrying hinges 41 and 42 whereby a pair of main rear flaps 43 and 44 are pivotally mounted on the sled. Each of these flaps 43 and 44 has a levelling blade, designated respectively as 45 and 46, secured thereto by bolt and nut assemblies 47, the flaps 43 and 44 being slotted to permit adjustment of the blades.

On each rearward side edge of the main plate 11 and secured to the upper surface thereof are rearwardly projecting arms 48 and 49. Extending downwardly and forwardly from the underside of each of these arms 48 and 49 is a partly arcuate bar 50, the forward edge of which is secured to a respective main beam 16 or 12 (as best seen in FIGURE 8). Each of these bars 50 has formed in it a series of holes 51, in a selected one of which a pin 52 may be mounted to project into the path of swinging movement of the outside edge 53 or 54 of a respective main rear flap 43 or 44.

The sled is also provided with a central rear flap 55 secured to the undersurface of the main plate 11 and to the rear edge of the beam 14 by means of hinge 56. This central flap member has the shape of a trapezium widening from its connection at the hinge 56 to its rearward edge 57. An upper bar 58 extends rearwardly along the central portion of the main plate 11 above the beam 14 to overlie the hinge 56 and the central portion of the flap 55. The purpose of this central flap is to cover the

gap that would otherwise exist between the inner ends 59 of the main flaps 43 and 44 and the blades 45 and 46 secured thereto. In prior forms of sled not so provided with a central flap, there has been a tendency for a strip of unlevelled ballast to be left by the sled along the centre of the track.

These flap parts have been shown in different positions in the various figures. In FIGURES 1, 2 and 3, both the main flaps 43 and 44 and the central flap 55 have been shown in their uppermost positions. In a sense this is artificial, as the parts will not remain in this position without being supported, but this license is necessary for completeness of illustration. By way of contrast, in FIGURE 5 which is a front view and FIGURE 6 which is a fragmentary rear view, all the flaps have been shown in their lowered positions, that is to say projecting substantially vertically downwardly. FIGURE 8 is a further view showing this same lowered position. This is the true position of repose if the sled is assumed to be supported in its normal upright position without any object beneath it engaging the flaps which hang down below the level of the under-runners. It will be noted, particularly from FIGURE 6, that in this lowered position the inner ends 59 of the flaps 43 and 44 and their blades 45 and 46 are spread apart. This effect is the result of the mutual inclination of the axes of the two hinges 41 and 42. It will further be noted that the flap 55 extends across the space between these inner ends 59. FIGURE 7 on the other hand shows a view in which the main flaps 43 and 44 are in their raised position, the central flap 55 hanging loosely downwardly between them. Again this is an artificial condition and is provided for purposes of illustration.

A ballast sled such as the one herein described is employed to reballast track that has been "skeletonized," that is to say plowed clean of old ballast, or to ballast new track that has been laid directly on the subgrade without ballast. In the track shown in FIGURE 9, the ties 60 supporting the rails 61 in advance of the sled 10 are assumed to be resting directly on the upper surface of the subgrade 62. Prior to the sledding operation, fresh ballast 63 will have been dumped from a railroad car to lie between the ties, as shown in FIGURE 9, and also to lie to some extent on top of the ties approximately up to the upper level of the rails 61. The function of the sled device is to slide along with its under-runners on the subgrade 62, to raise the track away from the ballast leaving it in uneven piles 64 in advance of the sled, and then to level off these piles to produce a smooth surfaced ballast layer 65 behind the sled, the ties 60 sliding on the upper runners 30 and 31.

This levelling operation is carried out by the blades 45 and 46 and, along the central area of the sled, by the central flap 55 in the manner best seen in FIGURE 10 which shows an enlarged fragment of this part of the device in operation. All the flaps tend to hang downwardly by reason of their weight. When they encounter ballast they are forced upwardly until the ends 53 and 54 of the main flaps 43 and 44 come to bear against the respective pins 52 in bars 50, the latter having been placed in suitable holes having regard to the operating conditions, for example the volume of ballast (the thickness of ballast layer that is required to be applied), the form of ballast being used, the speed of towing, the weight of track, and any other factors found to influence the pulling conditions. Selection of the best setting for the flaps will be determined empirically on the site. The central flap 55 will likewise be forced upwards until it bears against the inner ends 59 of the blades 45 and 46 whereupon further pivoting will be prevented and the lower edges of blade 45, flap 55 and blade 46 will form in effect a continuous ballast levelling blade extending uninterruptedly across the sled from side to side. In this manner the continuously smooth ballast layer 65 is formed free from any

of the objectionable irregularities that have given rise to difficulties in the past.

Rearwardly of the sled 10 the track settles down onto the smooth layer 65 of ballast. The track raising part of the reballasting operation is then complete and subsequently additional ballast can be dumped between the ties directly from flat cars. Towing of the sled is carried out in a conventional manner, employing a pair of cables 66 extending forwardly from the towing cars 37 and 38 to suitable towing points 67 on a flat car 68 which will be drawn along by means of a locomotive (not shown), as indicated by the arrow.

The angle of V formed at the rear of the sled by the flaps 43 and 44 is greater than in sleds hitherto designed. By this increase of sweep-back angle (in the present sled the angle each hinge makes with the transverse direction of the sled is of the order 30°, whereas in sleds hitherto employed it has either been non-existent or very slight, usually no more than 10°), the desirable effect is obtained that the blades 45 and 46 can, under certain conditions, act to some extent as plow blades. Thus, if at some point along the track, the blades encounter a substantially excessive amount of ballast that cannot properly be levelled off by these blades, they will act to deflect this excess beyond their outer edges and thus outwardly of the area on which the ties will lie. A sweep angle of at least approximately 25° is necessary to provide this effect, and an angle of 30° is preferred. If the angle were too large, say over 45°, the structure of the sled would be of such great length that it would approach being impractical for placing the sled under and removing it from the track.

In this manner the sled can deal more adequately than prior sleds with a sudden excess of ballast, which is sometimes encountered in practice as a result of irregular dumping of ballast between the ties prior to the sledding operation. In the past it has often been necessary, when excess ballast has been encountered, to stop the sled and free the ballast manually; otherwise improper running of the sled would result.

It is already known to provide weep holes in the plate of a ballast sled, their purpose being to permit any ballast, which is lying on the upper surfaces of the ties as the track is raised and which falls or is knocked off manually onto the upper surface of the plate 11, to pass back down through the weep holes onto the main body of ballast passing beneath the sled. It has been found, however, with prior designs of ballast sleds that there has been a tendency, when a sudden excess of ballast is encountered, for this ballast to back up through the weep holes. It will be appreciated that often quite a substantial amount of ballast is forced along in advance of the levelling blades. This backing up is undesirable, because it causes ballast to flow along the top of the sled and down over the top surfaces of the ballast levelling flaps and blades. It may even interfere with proper passage of the ties along the top of the sled. In the present design of sled the rear edges of the weep holes 36 have been placed more forwardly than is usual to provide sufficient spacing between the rearmost weep hole edge and the ballast levelling blades that any tendency for the ballast to back up will be taken care of by the plowing function of the blades which becomes effective if excess ballast is encountered. In other words, any such excess ballast will be deflected to the sides before it will accumulate sufficiently to back up through the more forwardly positioned weep holes 36.

I claim:

1. A sled device for spreading ballast under railroad tracks and ties, comprising a generally flat framework adapted to be drawn along between the roadbed and the ties while supporting the weight of said ties and a span of track, said framework comprising a plate and supporting means to space the plate above the bottom of the device so that a substantial portion of the ballast passes

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under said plate, and ballast levelling means comprising a pair of main blades each pivotally mounted on said framework to be movable into a depending position in which its lower edge lies in a plane below the plane of said plate, the pivotal axis of each such blade extending transversely outwardly and rearwardly from a position adjacent the longitudinal centre line of the sled to an edge thereof, and a central blade pivotally mounted on said framework to be movable into a depending position in which its lower edge lies in a plane below the plane of said plate, said central blade extending transversely across the sled in the area between the inner ends of said main blades and overlapping said ends whereby to form a continuous levelling structure extending uninterruptedly across the full transverse extent of the device.

2. A sled device for spreading ballast under railroad tracks and ties, comprising a generally flat framework adapted to be drawn along between the roadbed and the ties while supporting the weight of said ties and a span of track, said framework comprising a plate and supporting means to space the plate above the bottom of the device so that a substantial portion of the ballast passes under said plate, and ballast levelling means comprising a pair of main blades each pivotally mounted on said framework to be movable into a depending position in which its lower edge lies in a plane below the plane of said plate, the pivotal axis of each such blade extending transversely

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outwardly and rearwardly from a position adjacent the longitudinal centre line of the sled to an edge thereof, each said blade being swept back at an angle to the transverse axis of the sled between approximately 25° and approximately 45°, and a central blade pivotally mounted on said framework to be movable into a depending position in which its lower edge lies in a plane below the plane of said plate, said central blade extending transversely across the sled in the area between the inner ends of said main blades and overlapping said ends whereby to form a continuous levelling structure extending uninterruptedly across the full transverse extent of the device, in any position of said main blades, said plate forming an uninterrupted baffle throughout a region extending forward of said blades far enough so that excess of ballast is confined while deflected to the side of the roadbed and cannot be pushed upwardly through the plane of the plate.

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