

July 15, 1952

W. F. WOOLERY

2,603,255

RAILWAY TIE CUTTING MACHINE

Filed July 1, 1948

4 Sheets-Sheet 1

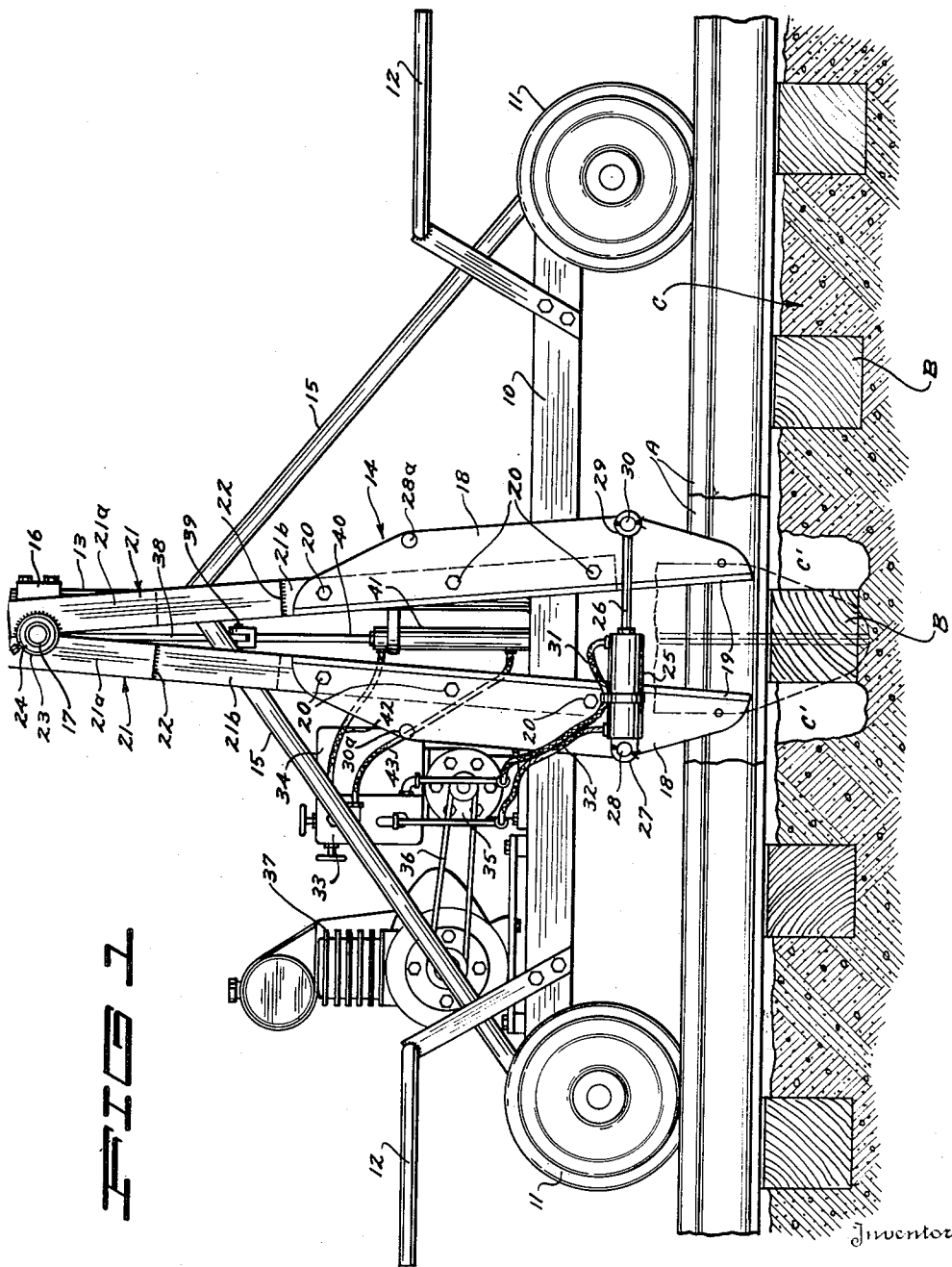


FIG 1

Inventor

WILBER F. WOOLERY

334

Carlson & Hayler

Attorney

July 15, 1952

W. F. WOOLERY

2,603,255

RAILWAY TIE CUTTING MACHINE

Filed July 1, 1948

4 Sheets-Sheet 2

FIG 2

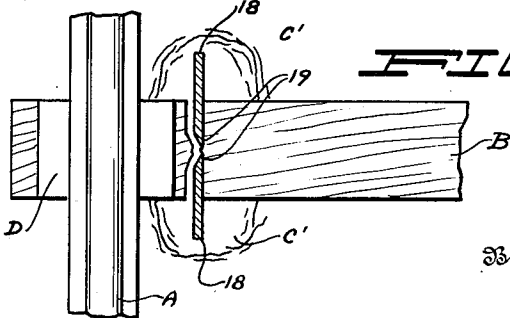
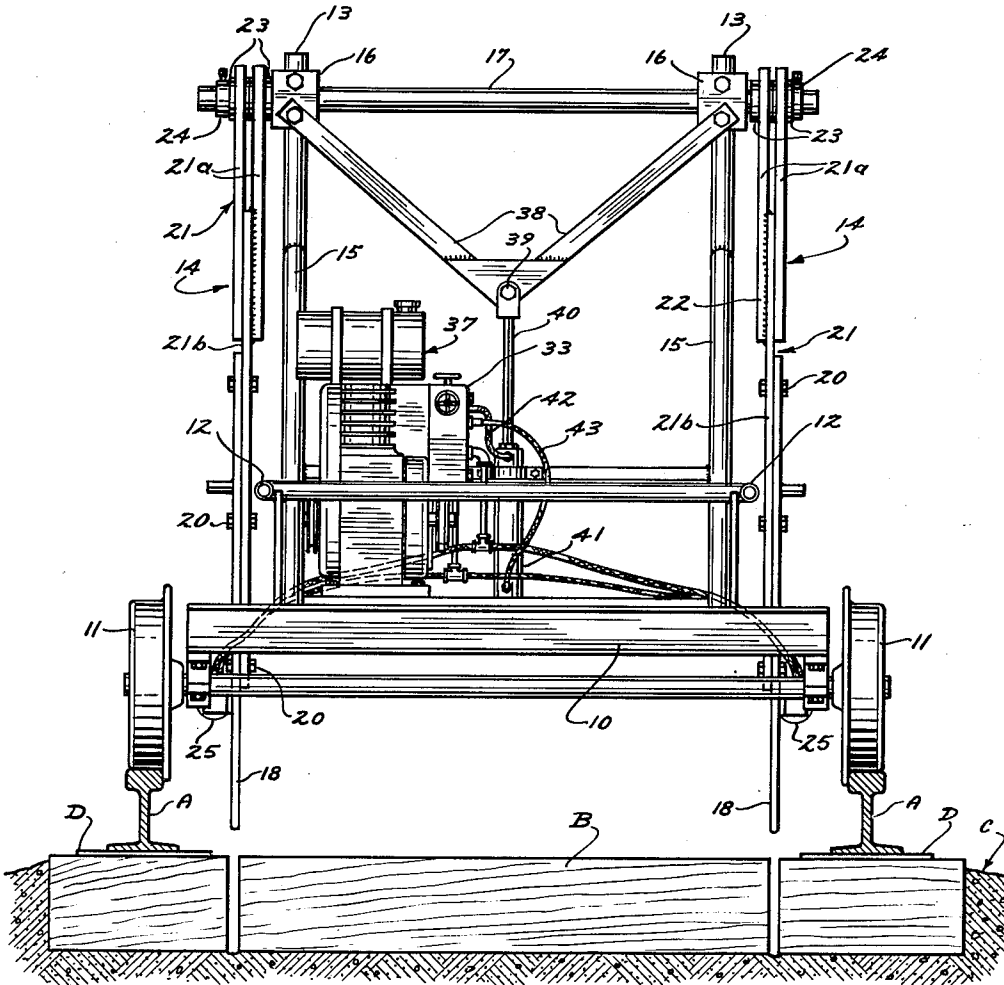


FIG 3

Inventor

WILBER F. WOOLERY

By

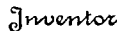
Carlsen + Hazle

W. F. WOOLERY

RAILWAY TIE CUTTING MACHINE

Filed July 1, 1948

4 Sheets-Sheet 3



WILBER F. WOOLERY

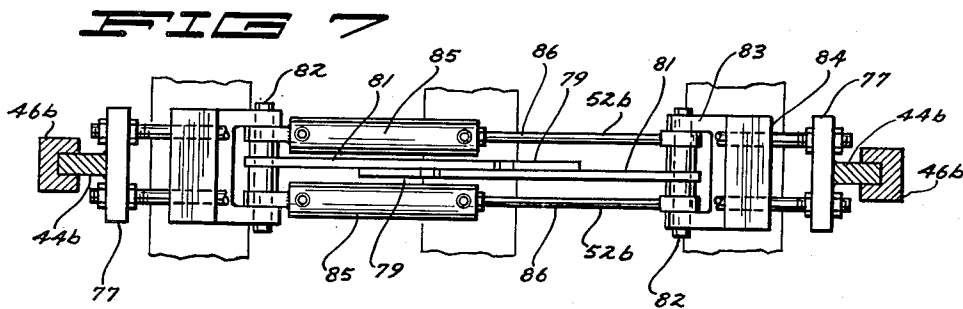
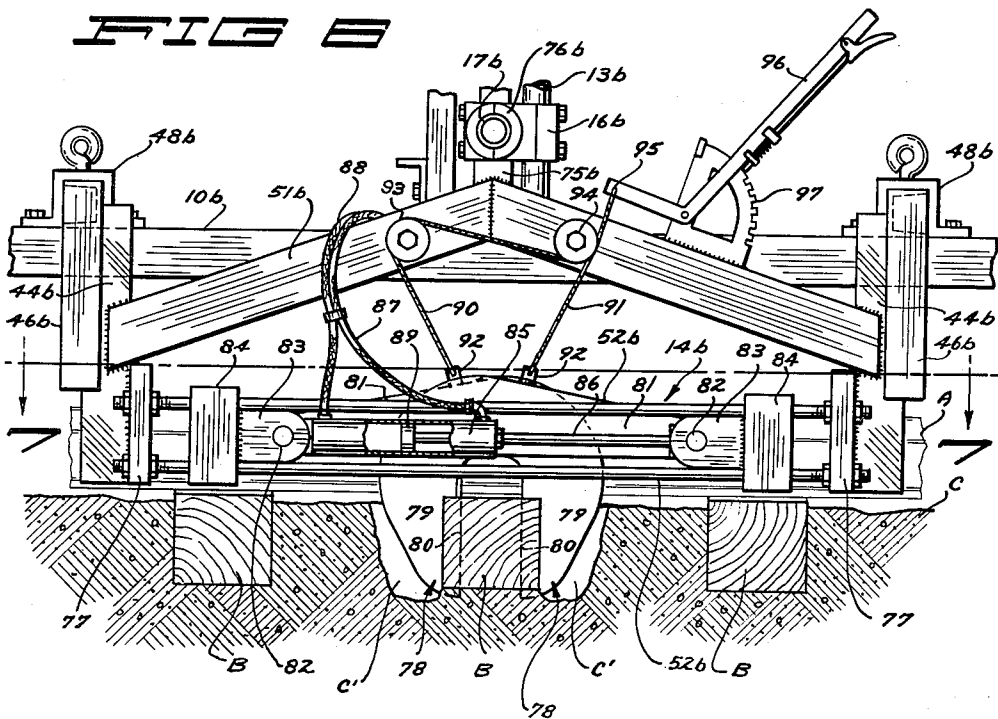
डे

Carlson & Hazle

Filed July 1, 1948

RAILWAY TIE CUTTING MACHINE

4 Sheets-Sheet 4



WILBER F. WOOLERY

විෂය

Carlson & Hazle

UNITED STATES PATENT OFFICE

2,603,255

RAILWAY TIE CUTTING MACHINE

Wilber F. Woolery, St. Paul, Minn., assignor
to Woolery Machine Company, Minneapolis,
Minn., a corporation of Minnesota

Application July 1, 1948, Serial No. 36,383

12 Claims. (Cl. 144-133)

1

This invention relates to improvements in railway tie cutting machines for use in cutting old ties just inside the rails so that the resulting end and center sections may be removed with the maximum of ease and minimum disturbance of the ballast or roadbed.

To this extent the present machine is identical in purpose to the machine disclosed in the Horace E. Woolery Patent No. 2,207,883 issued July 16, 1940. In the patented machine and all others to my present knowledge, however, the ties are cut by saws and it is found in practice that the saws became very rapidly dulled and worn by unavoidable contact with the ballast material so that they require all too frequent sharpening and replacement. Then, too, such machines are fairly slow in operation and are quite complicated and expensive in construction.

It is accordingly the primary object of my invention to provide a machine which uses, in lieu of the saws for cutting the ties, movably mounted cutting blades which are dropped down alongside the tie into suitable pockets dug in the ballast and then powerfully forced together to shear through the tie in a single and practically instantaneous operation. Thus the tie may be cut through rapidly and with but little occasion for abrasive contact between the ballast and the cutters or blades so as to very materially reduce the time lost for sharpening and the expense thereof.

Another object is to provide a machine of this character wherein the cutters or blades are operatively arranged to sever the tie ends with a final snap such that the ends are forced outwardly enough to loosen them in their beds and facilitate their ultimate removal.

Still a further object is to provide a machine which is comparatively simple, light and inexpensive to manufacture.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which:

Fig. 1 is a side elevation of a machine according to my invention in use, with the near railway rail broken away and showing the cutters or blades ready for lowering into the ballast pockets for cutting a tie.

Fig. 2 is an end view of the machine of Fig. 1.

Fig. 3 is a horizontal sectional view through the lower ends of the blades, illustrating their action upon a tie of which, along with the adjacent rail, only parts of which are shown.

Fig. 4 is a side view of a modified form of ma-

2

chine only a part of the supporting car of which appears.

Fig. 5 is a plan view of the machine shown in Fig. 4.

Fig. 6 is a view similar to Fig. 4 but showing still another modification.

Fig. 7 is a plan view of the structure shown in Fig. 6.

Referring now more particularly and by reference characters to the drawing, I have shown my improved tie cutting machine in Figs. 1-3 as including a wheeled car for travel along the railway rails A and over the ties B, said car having a rectangular frame 10 with wheels 11 near its ends and handles 12 by which it may be maneuvered and lifted from the track when required. As usual the ties B are laid in a ballast road bed designated generally at C.

As here shown the machine is operatively to cut off both ends of the ties just inside the rails, or inside the usual tie plates which are indicated at D and the machine comprises upright support frames 13 at each side from which are supported duplicate cutting assemblies designated generally at 14. Since these are duplicates they will not be separately described in detail nor separately identified by reference numerals. The support frames 13 are actually standards or posts erected atop triangular side frames 15 secured to the car frame 10 and bearings 16 are slidably mounted on the supports to carry a transverse hanger shaft 17. It is upon the ends of this hanger shaft that the cutting assemblies 14 are actually hung.

Each cutting assembly comprises blades or cutters 18 having elongated straight cutting edges 19 and secured, as by bolts 20, to the lower end portions of hanger bars 21. These bars 21 are each made of two lapped sections 21a and 21b, oppositely offset and welded together as indicated at 22, and thus the blades 18 secured on the outer sides of the lower sections will hang in the same vertical plane, parallel to and inside of the adjacent rail A. See Fig. 2 particularly. The blades 18 taper toward both upper and lower ends and it will be noted (Fig. 1) that they each have four openings for the selective accommodation of the bolts 20 so that they may be reversed on the hanger bars 21. Since it is only the lower depending ends of the blades, hanging below the bars 21, that do the cutting it will thus be seen that this reversal of the blades allows both ends to be used and when both are finally dulled the blades may then be readily removed for re-sharpening.

The upper ends of the hanger bars 21 have col-

3

lars 23 which are pivotally mounted on the hanger shaft 17 and are held thereon against axial displacement by set screw equipped collars 24. The blades 18 are thus supported for swinging movements, toward and away from each other, and to so operate them I provide for each cutting assembly a hydraulic or fluid actuated jack or ram having a cylinder 25 and plunger 26. The cylinder 25 has an eye 27 at one end which is removably, pivotally mounted on a pin 28 adjacent the lower end of one blade 18 while the plunger has a similar eye 29 pivotally attached to a similar pin 30 on the other blade. The ram is thus disposed in a horizontal plane so that extension and retraction of the plunger will move the blades apart and draw them together, respectively. It will be noted that the blades have auxiliary pins 28a and 30a upon which the ram may be mounted when the blades are reversed as previously described.

Fluid under pressure is selectively admitted to opposite ends of the respective cylinders 25 through flexible conduits 31 and 32 leading to a valve assembly 33 through which fluid flows from an accumulator tank 34. The fluid is placed under pressure in the tank by a pump 35 operated by belt 36 from a conventional internal combustion power plant 37, all these elements being conveniently grouped and mounted on one end of the car frame 10 as shown in Fig. 1.

The upper ends of a wide V-shaped lift frame 38 are secured to the bearings 16 which carry the hanger shaft 17 and the lower center of this frame is attached at 39 to the end of a plunger 40 operating vertically in the cylinder 41 of a hydraulic adjusting jack. The cylinder 41 is supported on the car frame 10 and suitably braced to hold an erect position, and fluid from the pump 35 is admitted selectively, also under control of the valve assembly 33, to the opposite ends of the cylinder through conduits 42 and 43.

In operation the machine is moved along the track until the cutting assemblies are located above the tie to be removed and then with the blades 18 spread apart, the adjusting jack is operated by proper admission of fluid to the cylinder 41 to lower the frame 38 and so slide the bearings 16 down the support frames 13 or to lower the hanger shaft 17 and correspondingly lower the blades down at opposite sides of the tie. The ballast C is previously removed forming pockets C' alongside the tie to accommodate the blades. Obviously the blades will be so adjusted that they will project at their lower ends slightly below the bottom of the tie, just inside the rails and tie plates. Fluid is now admitted through the valve from the accumulator 34 to the actuating ram cylinders 25 so as to pull in the plungers 26 and this force being sufficiently powerful the cutting edges 19 of the blades will cleave through the tie until these edges meet and the tie ends are completely sheared off from the center leaving the tie in three sections. The blades are then forced apart by reversal of the fluid flow to the cylinders 25, the cutting assemblies are again raised by reversing the fluid to the cylinder 41 and the machine moved on to the next tie. Obviously the operation is a very rapid one and equally obviously the blades 18 will be subject to so little abrasion from the ballast, as compared to the saws of earlier machines, that sharpening and replacement costs are materially reduced.

Referring to Fig. 3 I show the cutting edges 19 of the blades 18 as bevelled on their outer sides, or toward the rails. In operation as the blades

4

approach the center of the tie it will be found that the end is snapped off and this bevel of the cutting edges tends to force the severed ends of the tie outward, endwise, as they snap. The tie ends are thus broken loose from their ballast bed to facilitate their removal.

The modification of the machine as shown in Figs. 4 and 5 of the drawing employs the same basic principles and is likewise mounted on a traveling car, only a center portion of the frame 10a of which is shown. In this case there is mounted at each side of the frame an erect post or standard 13a whereon bearings 16a are vertically slidably mounted to adjustably support a hanger shaft 17a from which are supported cutting assemblies, designated generally at 14a, inside the rails. Only one cutting assembly is here shown.

Turning now to differing details of this modified construction, each said cutting assembly comprises an inverted U-shaped carrier frame having upright slide bars 44 which slide in the channels 45 of guide bars 45. The upper ends of these guide bars 46 are affixed to and depend from outrigger channels 47 which are slidably mounted inwardly through brackets 48 secured to the sides of the car frame 10a. Eyed pins 49 are removably mounted down through the brackets 48 and may be placed in any one of a series of openings 50 in the channels 47 thus permitting the carrier frame to be moved inwardly or outwardly as may be required to properly locate the cutting assemblies with respect to the ties and rails. The carrier frame slide bars 44 are joined at their upper ends by a cross or tie bar 51 and secured in vertically spaced relation to the lower portions of the slide bars are guide rods or shafts 52 running parallel to the rails. Blade carriers 53 are provided and have properly bored upper and lower end bearings 54 which accommodate and slide upon the rods 52 so that these carriers may move in straight lines toward and away from each other. Normally they are urged toward each other by expansion coil springs 55 braced between the carriers and brackets 56 secured to the slide bars 44 between the rods 52. The cutting blades are designated at 57 and they are removably bolted at 58 to the carriers 53 and have tapering cutting ends depending below the carriers. The inner or facing edges 59 of the blades are sharpened as previously described.

The blades 57 of each cutting assembly are moved toward and away from each other by a hydraulic actuating ram located between the upper and lower end bearings 54 of the carriers and comprises a cylinder 60 attached at 61 to one carrier and a plunger 62 attached at 63 to the other carrier. Fluid is supplied to the cylinder through flexible conduits 64 and 65 exactly as previously described and from a power plant-pump assembly such as shown in Fig. 1.

A rock shaft 66 is journaled crosswise above the car frame alongside channels 67 secured in upright position to the car sides and at one end this shaft is journaled through a lever quadrant 68 secured to one channel, and at the other end through a bracket 69 secured to the other channel. An adjusting lever 70, having the usual pawl 71 cooperating with the quadrant, is secured to one end of the rock shaft 66 and has an end 72 extending over one of the bearings 16a and attached thereto by a link 73. At the opposite end of the rock shaft there is secured

5

an arm 74 (Fig. 5) likewise linked to the other bearing 16a.

The foregoing arrangement is such that the lever 70 may be operated to slide the bearings 16a up and down the standards 13a, and since the cutting assemblies are hung from the hanger shaft 17a carried in these bearings, the cutting blades 57 may be raised and lowered as required. The cross bars 51 of the carrier frames have center arms 75 attached to set screw equipped collars 76 on the shaft 17a to transmit these up and down movements and the collar allows compensating adjustments along the hanger shaft as the carrier frame is moved in and out through the brackets 48 as previously described.

The blades 57 will operate to cut off the tie also as previously set out, but in this case with a sliding straight line movement instead of an arcuate swinging motion.

In Figs. 6 and 7 I show a third modification of my invention, again employing the same cutting principle, and again mounted upon a wheeled car only a midportion and one side of the frame 10b of which is shown. The supporting and vertical adjusting mechanism and arrangement duplicates that of Figs. 4 and 5 in that there are upright standards, one shown at 13b, on which the hanger shaft 17b is carried by bearings 16b. The same lever mechanism may be used although not here shown. Each cutting assembly 14b has a carrier frame made up of slide bars 44b slidable in guide bars 46b carried in brackets 48b and the slide bars are joined by a cross bar 51b and slide rods 52b with a center hanger arm 75b on the cross bar hung by a collar 76b on the hanger shaft. In this case there are inner and outer pairs of the slide rods 52b mounted at their ends by brackets 77 on the slide bars 44b.

In this case the cutting blades are designated at 78 and they have depending cutting portions 79, the adjacent upright edges 80 of which are sharpened, and oppositely extending arm portions 81 the opposite ends of which are pivoted on pins 82. These pins extend through and between apertured ears 83 on the facing sides of carrier blocks 84 which are apertured at their corners to slide upon the four slide rods 52b. It will be noted that the blades overlap in such manner that their cutting edges will be pulled together by forcing the carrier blocks 84 apart on the slide rods. For this purpose I provide hydraulic actuating rams each having a cylinder 85 attached at one end to one of the pins 82 and a plunger 86 attached at its end to the other pin; the rams being placed on opposite sides, or inwardly and outwardly of the cutting blades. Fluid is selectively supplied to the opposite ends of the cylinders 85 by fluid conduits 87 and 88 exactly as previously described.

The operation of the cutting blades will be readily evident but this particular arrangement has the advantage that on the cutting stroke the pistons 89 (Fig. 6) on the plungers 86 have their full area exposed to the fluid pressure so that for a given thrust smaller cylinders may be used as will be readily understood.

I also here show cables 90 and 91 attached at 92 to the upper edges of the blades 78 and passing over pulleys 93 and 94 on the cross bar 51b and fastened at 95 to a hand lever 96 pivoted on and cooperating with a quadrant 97 also mounted on the cross bar. By manipulating this hand lever the center or overlapping ends of the blades may be raised and lowered as an auxiliary adjustment to the bodily raising and lowering of

6

the carrier frames, or in lieu thereof as will also be understood.

While I have described my invention as for the simultaneous cutting of both ends of the ties it will be understood that it may be equally well built in single units for cutting off one end at a time. In this case the machine may be either reversed on the track for cutting off the opposite ends of the ties, or the cutting unit may be arranged to slide transversely on the car for the same purpose.

It is understood that suitable modifications may be made in the structure as disclosed, provided such modifications come within the spirit and scope of the appended claims. Having now therefore fully illustrated and described my invention, what I claim to be new and desire to protect by Letters Patent is:

1. In a railway tie cutting machine, a frame supported over a tie to be cut, a vertically movable support on the frame, cutting blades carried by the support and movable toward and away from each other, fluid actuated means for moving the blades and separate fluid actuated means for raising and lowering the said support and thereby moving the blades into operative relation to the tie.

2. In a tie cutting machine of the character described, a frame, an upwardly and downwardly adjustable support on the frame, hanger bars swingably mounted on the frame for movement toward and away from each other at their lower ends, blades mounted on the hanger bars and depending therefrom at their lower ends, means for swinging the blades toward and away from each other, the said blades depending at their lower ends below the hanger bars and the blades having their facing edges sharpened, and the blades being reversible end for end on the hanger bars.

3. A machine for cutting off the end of a railway tie to facilitate its removal from its ballast bed, said machine having movably supported blades adapted to be positioned at opposite sides of the tie, means for forcing the blades together to cut off the tie end, and the said blades both having cutting edges bevelled off on the side facing the end of the tie in such manner as to force the tie end in an endwise direction as it is severed and thereby loosen the severed end in its ballast bed.

4. A railway tie cutting machine of the character described for severing the end portions of ties to facilitate their removal from the roadbed, comprising a frame having a support above the tie to be cut, a pair of blades pivotally connected at their upper ends to the support for movement toward and away from each other and positionable at their lower ends at opposite sides of the tie, a fluid operated ram for swinging the blades toward and away from each other at their lower ends, and said ram being horizontally positioned adjacent the lower ends of the blades and having a cylinder connected to one blade and a plunger connected to the other blade.

5. In a railway tie cutting machine of the character described for severing the ends of ties in the ballast, a main frame, a support on the frame above the tie, a pair of upright cutting blades movably mounted on said support for movements toward and away from each other and having ends depending at opposite sides of the tie to be cut, the blades having inner cutting edges, and a hydraulic ram arranged in a horizontal position alongside the blades and

including a cylinder connected to one blade and a reciprocable plunger connected to the other blade.

6. In a railway tie cutting machine of the character described for severing the ends of ties in the ballast, a main frame, a support on the frame above the tie, a pair of upright cutting blades movably mounted on said support for movements toward and away from each other and having ends depending at opposite sides of the tie to be cut, the blades having inner cutting edges, means in the main frame adjustably supporting the said support for up and down movements with respect to the frame to raise and lower the blades, and an upright hydraulic ram connected to the frame and to the support for raising and lowering the support and blades.

7. In a railway tie cutting machine of the character described for severing the ends of ties in the ballast, a main frame, a support on the frame above the tie, a pair of upright cutting blades movably mounted on said support for movements toward and away from each other and having ends depending at opposite sides of the tie to be cut, the blades having inner cutting edges, a lift frame on the main frame carrying said support, and an upright hydraulic ram connected between the main and lift frames for raising and lowering the lift frame and support and blades with respect to the main frame and the ties.

8. In a railway tie cutting machine of the character described for severing the ends of ties in the ballast, a main frame, a support on the frame above the tie, a pair of upright cutting blades movably mounted on said support for movements toward and away from each other and having ends depending at opposite sides of the tie to be cut, the blades having inner cutting edges, the said blades being arranged in a common virtual plane and the inner cutting edges thereof being beveled off on the same side for cutting through the tie as the blades are forced together and the cutting edges meet.

9. In a railway tie cutting machine, a frame supported over a tie to be cut, an upwardly and downwardly movable support on the frame, slide rods supported crosswise of the tie on said support, carriers slidably mounted on the rods for movement toward and away from each other in planes crosswise of the tie, cutting blades on said carriers and depending at their lower ends therefrom, means for sliding the carriers on the rods, and means for raising and lowering the support and thereby moving the blades into operative relation to the tie.

10. In a railway tie cutting machine, a frame supported over a tie to be cut, an upwardly and downwardly movable support on the frame, slide rods supported crosswise of the tie on said support, carriers slidably mounted on the rods for movement toward and away from each other

in planes crosswise of the tie, cutting blades on said carriers and depending at their lower ends therefrom, a fluid actuated ram having a cylinder connected to one carrier and a plunger connected to the other carrier to slide the carriers on the rods, and a separate fluid actuated means for moving the support and lowering the blades into operative relation to the tie.

11. In a railway tie cutting machine, a frame supported over a tie to be cut, an upwardly and downwardly movable support on the frame, slide rods supported crosswise of the tie on said support, carriers slidably mounted on the rods for movement toward and away from each other in planes crosswise of the tie, cutting blades pivotally connected at their oppositely extending ends to the carriers and extending inwardly therefrom in overlapping relation, the inner ends of the blades having depending cutting portions with their facing edges sharpened, at least one hydraulic ram connected between the carriers to force the blades in opposite directions and bring their sharpened edges together, and means for raising and lowering the support to bring the blades into operative relation to the tie to be cut.

12. In a railway tie cutting machine, a frame supported over a tie to be cut, an upwardly and downwardly movable support on the frame, slide rods supported crosswise of the tie on said support, carriers slidably mounted on the rods for movement toward and away from each other in planes crosswise of the tie, cutting blades pivotally connected at their oppositely extending ends to the carriers and extending inwardly therefrom in overlapping relation, the inner ends of the blades having depending cutting portions with their facing edges sharpened, at least one hydraulic ram connected between the carriers to force the blades in opposite directions and bring their sharpened edges together, means for raising and lowering the support to bring the blades into operative relation to the tie to be cut, and means also for swinging the blades up and down about their pivot connections to the carriers.

WILBER F. WOOLERY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
846,839	Fannon	Mar. 12, 1907
944,555	Holden	Dec. 28, 1909
2,207,883	Woolery	July 16, 1940
2,214,334	Knight	Sept. 10, 1940
2,446,011	Johnson et al.	July 27, 1948

FOREIGN PATENTS

Number	Country	Date
119,846	Germany	May 18, 1901
18,934	Sweden	Aug. 4, 1904