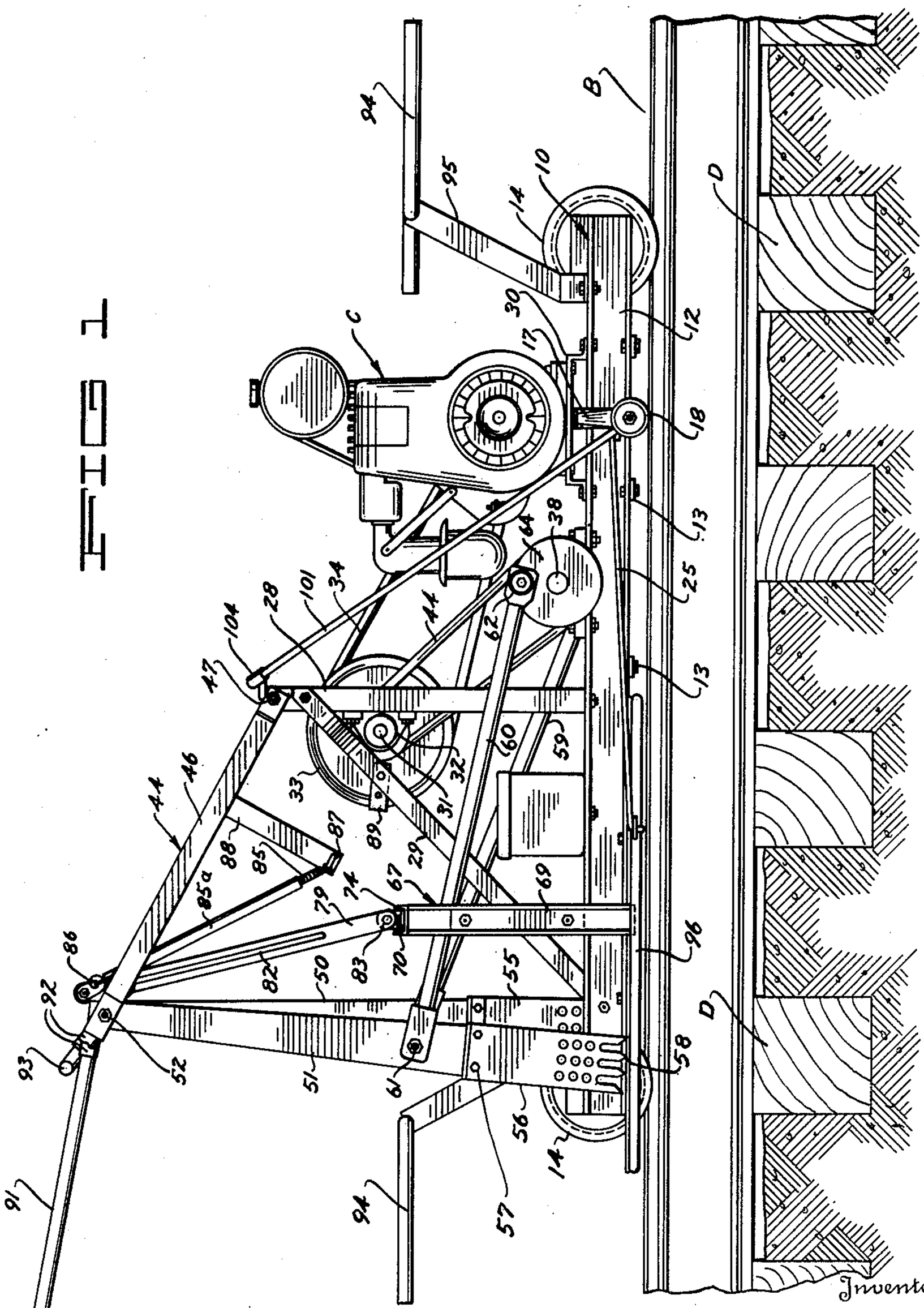
Oct. 31, 1950 H. E. WOOLERY 2,527,668

MACHINE FOR CUTTING AND SCORING RAILWAY TIES

Filed Sept. 14, 1946 5 Sheets-Sheet 1

FIG 1



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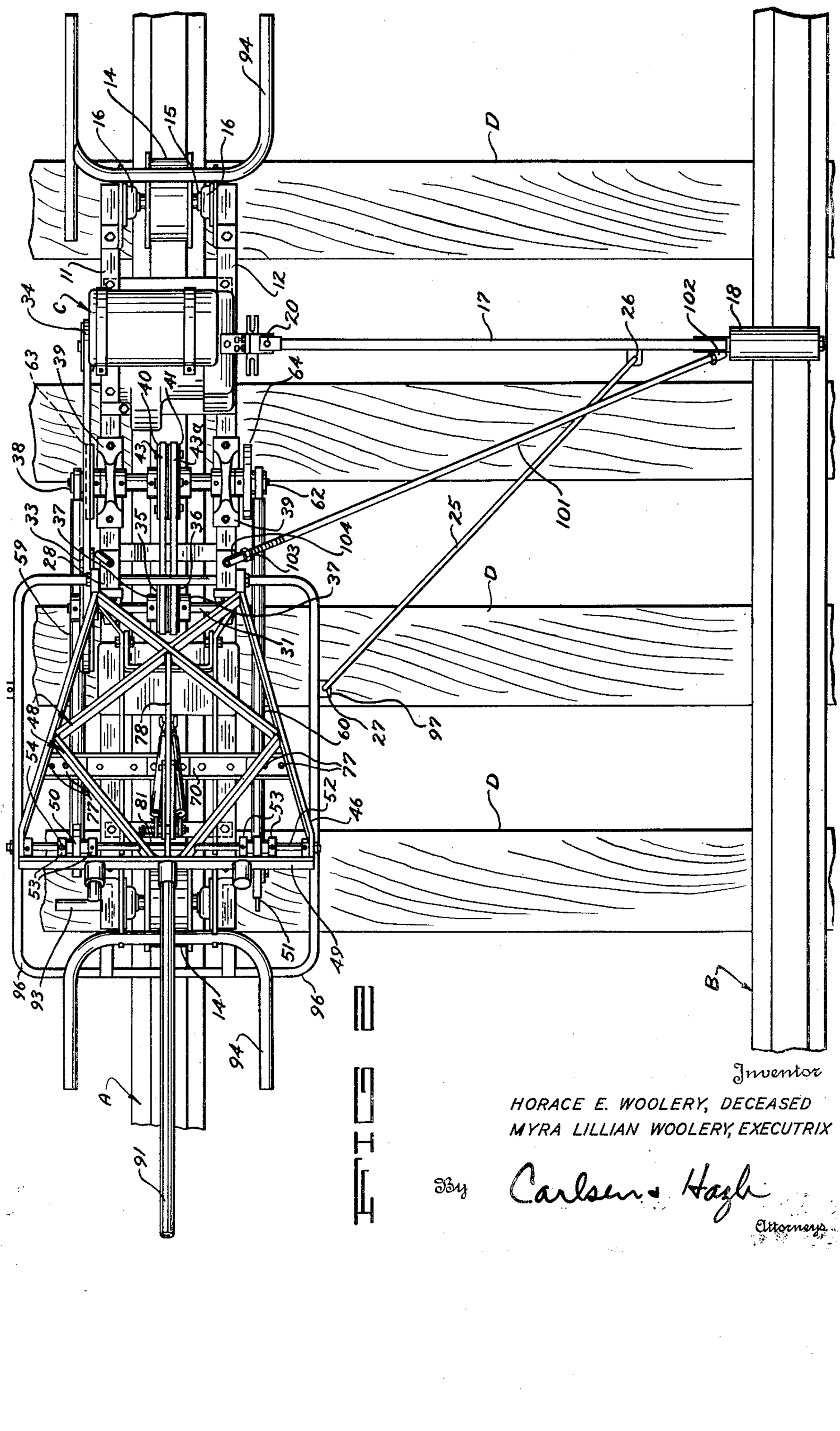
MACHINE FOR CUTTING AND SCORING RAILWAY TIES

Filed Sept. 14, 1946 5 Sheets-Sheet 2



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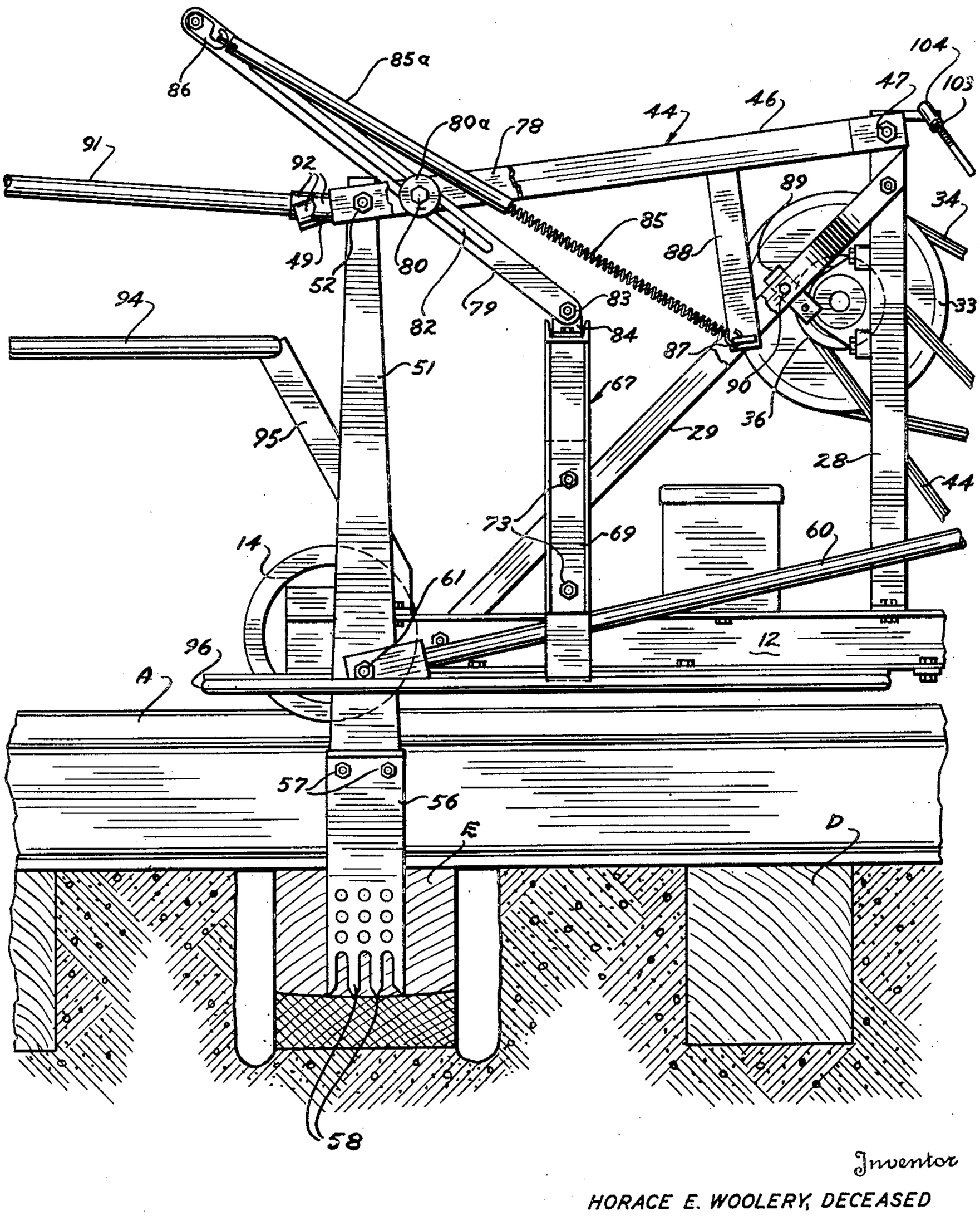
MACHINE FOR CUTTING AND SCORING RAILWAY TIES

Filed Sept. 14, 1946 5 Sheets-Sheet 3

FIG 3



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MACHINE FOR CUTTING AND SCORING RAILWAY TIES

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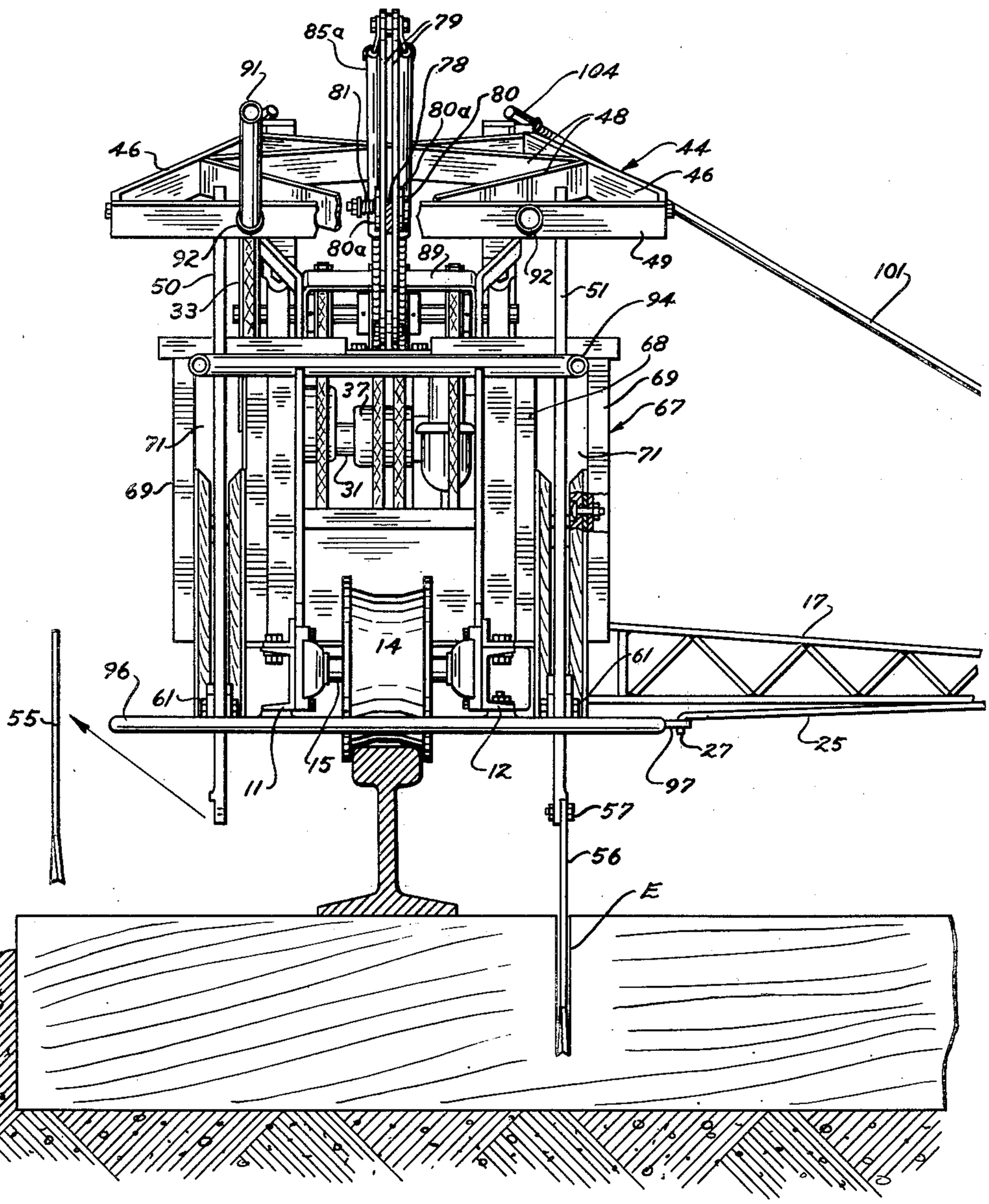
FIG 4



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MACHINE FOR CUTTING AND SCORING RAILWAY TIES

Filed Sept. 14, 1946 5 Sheets-Sheet 5

FIG 5

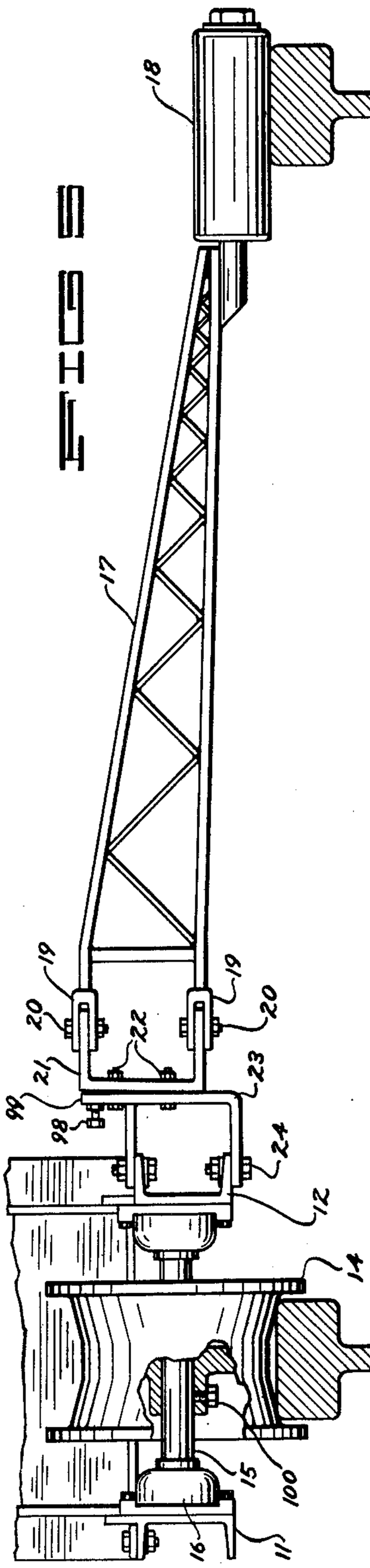

FIG 6

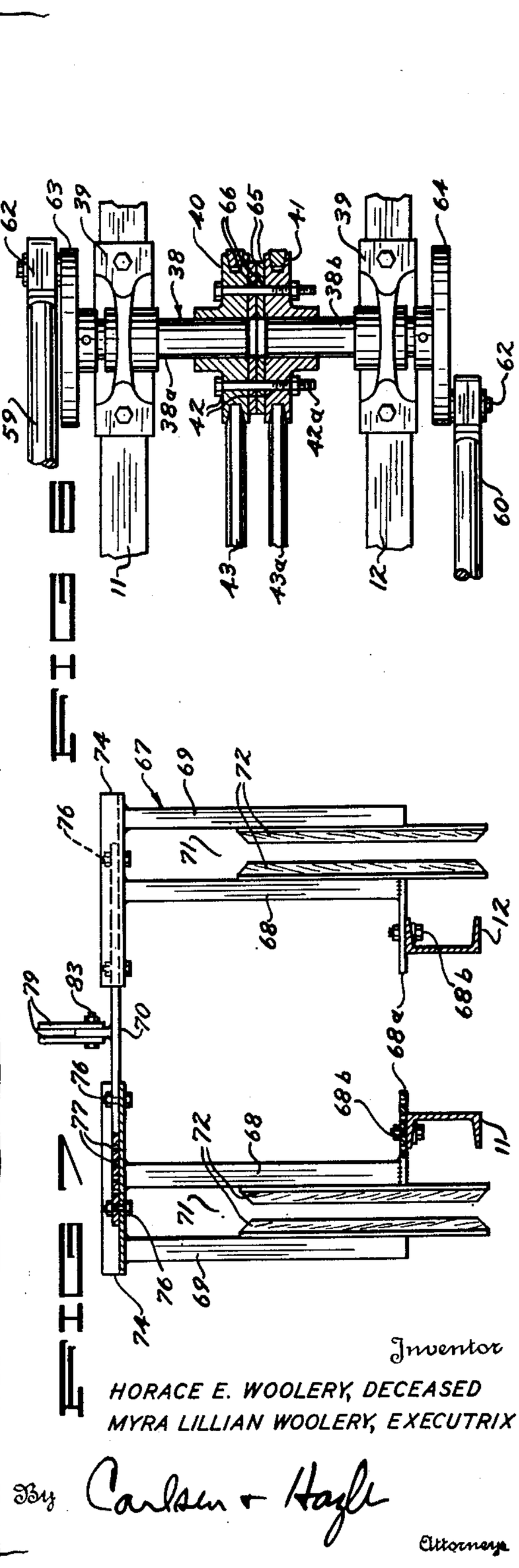

FIG 7

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Patented Oct. 31, 1950

2,527,668

UNITED STATES PATENT OFFICE

2,527,668

MACHINE FOR CUTTING AND SCORING RAILWAY TIES

Horace E. Woolery, deceased, late of St. Paul, Minn., by Myra Lillian Woolery, executrix, St. Paul, Minn., assignor to Woolery Machine Company, Minneapolis, Minn., a corporation of Minnesota

Application September 14, 1946, Serial No. 697,005

3 Claims. (Cl. 144—133)

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This invention relates to improvements in machines for cutting and scoring railway ties and provides a machine by which the ties may be cut into sections for removal and replacement with new ties and by which the ties may also be scored as necessary in the installation of rail plates where this work is necessary.

As is well known to those skilled in the art, it is frequently necessary to either remove a tie which is so badly worn as to be useless, or to install a rail plate beneath the rail where the tie, while otherwise in good shape, has become worn beneath the rail due to the pounding of passing traffic. The present practice in tie removal is to sever the tie entirely at the inside of each rail and then remove the tie in sections. By so doing, the ballast is but little disturbed about the tie and a new tie may be put into the trench formed by removal of the old with little added ballasting and tamping required. Where the tie is not badly worn but the rail has become embedded in its upper surface, it is customary to raise the rail and adze off a smooth surface therebeneath upon which may be laid a rail plate of a length or width substantially greater than that of the rail base to provide a firm bearing and footing for the rail when it is spiked down upon the rail plate. In carrying out the latter operation, it is desirable, even actually necessary, to score the tie or form shallow transverse cuts therein to delineate the ends of the surface to be adzed. The present invention provides a machine by which both of these operations may be carried out and which accordingly comprises two saws arranged in proper spacing for scoring the tie both inside and outside of the rail and with the saw at the outer side arranged for convenient removal so that the tie may be cut entirely through by the remaining saw.

An important object of the present invention is to provide a machine for these purposes which is light in weight and compact and which is therefore readily operated along the track for cutting and scoring the ties, and readily removable from the track when necessary. Still another object is to provide a machine for this purpose wherein the saws are readily adjustable to score the tie at any distance from the adjacent inner and outer sides of the rail to accommodate rail plates of all standard widths. Still another object is to provide a machine of this kind which is extremely convenient in operation and which may be readily operated by not more than two workmen.

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—

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Fig. 1 is a side view of the machine as positioned upon the rails of a railway and with the saws elevated to their transport positions.

Fig. 2 is a plan view of the machine as shown in Fig. 1.

Fig. 3 is an enlarged fragmentary side elevation showing one of the saws in the process of cutting through the tie for removal thereof.

Fig. 4 is an end view of the machine as shown in Fig. 3.

Fig. 5 is an enlarged fragmentary end view of the lower frame portion of the machine showing one of the wheels for carrying the frame upon the rail and showing the baling outrigger which runs upon the opposite rail.

Fig. 6 is a fragmentary detail view partially in section and showing the manner in which the drive for the saws is adjusted according to the spacing thereof.

Fig. 7 is a detail view of the saw guides.

The present invention is an improvement or an addition to the machine as disclosed in the prior Horace E. Woolery Patent #2,207,883 issued July 16, 1940, to which patent reference is invited for comparative purposes.

Referring now more particularly and by reference characters to the drawing the present machine comprises a main or base frame, designated generally at **10**, including a pair of parallel, closely spaced beams **11** and **12** rigidly joined and connected by suitable cross bars at appropriate points and designated throughout at **13**. Positioned between the side beams **11** and **12** at each end of the frame is a flanged wheel **14** having an axle **15** journaled in bearings **16** secured to the beams and these wheels are adapted to ride upon one rail A of a railroad track to support and carry the machine along the track. The machine is balanced transversely by an outrigger arm **17** which extends laterally from one end of the frame **10** and is provided with a small roller **18** adapted to roll along the opposite rail B. As best seen in Fig. 5, the outrigger arm **17** has vertically spaced forks **19** which are pivoted at **20** to a U-shaped clip **21**, said clip **21** is in turn fastened by bolts **22** to the upright portion of a bracket **23** which is secured at **24** alongside the adjacent side beam **12** of the main frame. The foregoing arrangement is such that the outrigger arm may fold about the vertical axis of the bolts **20** from its operative outwardly extending position to a collapsed position alongside the frame

10 to facilitate storage of the machine when not in use. A link rod 25 is provided and is hooked at its ends 26 and 27 to an outer end portion of the outrigger arm 17 and to a part of the frame 10, presently to appear, to hold the outrigger arm in its operative position as will be readily understood.

The main frame 10 is provided substantially midway between its ends with upright center posts 28 secured at their lower ends to the side beams 11 and 12 and suitably braced by angularly extending brace bars 29. On the end of the main frame 10 opposite that toward which the brace bars 29 extended there is mounted a conventional power plant C of the internal combustion type and which is supported upon a base 30 secured across and joining the side beams 11 and 12. A countershaft 31 is journaled transversely in bearings 32 secured to the center posts 28 and at one end this countershaft is provided with a belt pulley 33 over which operates the drive belt 34 from the power plant C. Midway between the center posts 28 the countershaft 31 is provided with two belt pulleys 35 and 36 having hubs 37 by means of which they may be fixed upon the countershaft and adjusted to any desired relative spacing therealong. Between the center post 28 and the power plant C there is located a drive shaft 38 journaled in bearings 39 secured atop the side beams 11 and 12. As best seen in Fig. 6 the drive shaft 38 is parted or split at its center and comprises separate sections 38*a* and 38*b*. These two sections are provided with belt pulleys 40 and 41 pinned or otherwise rigidly secured to the shaft sections and provided with registering apertures 42 through which bolts 42*a* may be passed to rigidly fasten the pulleys together. With the pulleys 40 and 41 thus secured together the shaft sections 38*a* and 38*b* will turn in unison as will be apparent. Separate belts 43 and 43*a* are trained over the respective pulleys 35—40 and 36—41, and the arrangement is thus such that the drive shaft 38 will be rotated by operation of the power plant C.

A swinging saw support or feed frame designated generally at 44 is provided and comprises a pair of side arms 46 which are pivoted at one end at 47 on upper ends of the center piece 28 so that the opposite end of this assembly may swing upwardly and downwardly about a transverse elevated axis. The side arms 46 diverge toward their swinging ends and are suitably rigidly braced by the diagonal brace structure indicated generally at 48. The wide spread ends of the arms are rigidly joined by a cross bar 49. This feed frame or saw support forms means for supporting the upper ends of two depending saw arms indicated at 50 and 51 and for this purpose the side arms 46 are joined near their wide spread ends with a rod 52 whereon the upper ends of the saw arms are pivotally mounted. On opposite sides of saw arms 50 and 51 there are provided collars 53 provided with set screws 54 by which the saw arms may be held against displacement endwise along the rod 52 and also held at any selected respective width adjustments. Saw blades 55 and 56, of exactly the form shown in the previous Woolery patent hereinbefore identified, are removably secured to the lower ends of the support arms 50 and 51 by means of bolts 57. The lower edges of the saw blades 55 and 56 have suitable cutting teeth 58 and the structure just described as such that with the saw support or feed frame 44 suitably supported in an elevated position the saw arms

and attached blades may operate in vertical planes at each side of the main frame 10 and parallel with the length of the rail upon which the machine is supported. Thus when the two lower edges 58 of the saw blades are brought down into engagement with the ties, indicated generally at D, the saw blades are so positioned that they will cut into the upper edge of the tie and down thereinto, forming transverse cuts as indicated at E, the depth of which will be determined by the vertical position of the feed frame 44.

The saw arms 50 and 51 are power operated by pitman or connecting rods 59 and 60 at one end at 61 to the respective saw arms and extending therefrom lengthwise of the machine to points adjacent the ends of the drive shaft 38. These ends of the arms are pivotally attached at 62 to eccentric disks 63 and 64 which are secured by their hubs at the ends of the shaft 38 outwardly of the bearings 39. The pivots 62 are eccentric to the axis of the shaft 38 so that rotation thereof will result in the translation of this rotary movement to a reciprocatory movement of the pitmans 59 and 60 such as to oscillate the saw arms 50 and 51. The amplitude of these operating motions of the saw arms is such that the travel of the two edges of the saw blades will cut the ties from edge to edge as will be apparent.

As thus far described it will be apparent that with the saw blades 55 and 56 in place the entire saw assembly may be power actuated and manually positioned vertically to bring the lower edges of the saw blades into contact with the ties D to form transverse scores or cuts in the ties inwardly and outwardly of the rails over which the machine runs. This scoring of the tie will be carried out only so far as to penetrate the tie to a depth such that the removal of the wood between the scores will properly accommodate the usual tie plate (not here shown) which is used to form a support for the rail when it has embedded itself in the tie. It will be equally obvious that by the removal of one of the saw blades 55 or 56, according to the direction in which the machine is run, that the remaining blade may, as seen in Fig. 4, be caused to cut further down into the tie and in fact clear to the bottom thereof when it is desired to cut the tie into sections for removal. The scoring operation will require the initial adjustment of the machine to form the scores or cuts in the tie at a distance apart suitable to accommodate the rail plates which are to be used. These rail plates vary in length (or width) although commonly a certain length of plate will be used for a considerable length of the track so that the spacing adjustments now to be described need not be continually made and once the machine is set up it will, in all cases, be used for a considerable length of time without further adjustment.

The saws may be readily adjusted toward or away from each other by loosening the set screws 54 and sliding the collars 53 for each saw arm inwardly or outwardly along the rod 52 as will be evident in Fig. 2. To maintain the pitman rods 59—60 in proper relation to the saw arms 50 and 51 as thereon adjusted the sections 38*a* and 38*b* of the drive shaft 38 may be adjusted endwise with respect to each other. It will be understood that with the pulleys 40 and 41 bolted directly together as shown in Fig. 2 the shaft sections 38*a* and 38*b* are drawn together to suit the closest necessary spacing for the saws. Then as the saw blades are adjusted further apart for scoring the ties for longer plates the pulleys

40 and 41 are separated and one or more circular shims or shim disks 65 are placed between the pulleys as seen in Fig. 6. These shims 65 will, of course, be provided with suitable apertures 66 to accommodate the bolts 43 and as the shims are inserted between the pulleys the shaft sections 38*a* and 38*b* may be spread apart in steps to bring the eccentric ends of the pitman rods 59 and 60 out into proper alignment with the saw arms. Compensating adjustments of the pulleys 35 and 36 to maintain the belts 43 and 44 in proper alignment will be made by adjusting the pulleys and securing them upon the counter shaft 31 by their hubs 37 in an apparent manner.

The saws are guided and held against "wobbling" movements as they operate by means of a saw guide assembly indicated generally at 67 and comprising inner and outer vertically depending guide bars 68 and 69 depended from an overhead cross bar 70 and forming upright guide ways 71 through which loosely pass the pitman rods 59 and 60 at points immediately adjacent the saws. The inner and outer guide bars 68 and 69 are provided on facing sides with wear straps 72 which are bolted in place as indicated at 73 for convenient removal and which are adapted to loosely engage the pitman rods 59 and 60 as they reciprocate and as they are moved upwardly and downwardly during operation of the saws. These wear strips 72 may well be made of oil impregnated wood and will obviously so guide the pitmans adjacent the saws as to prevent undue wobbling or misalignment of the saws during their cutting operation. The guide bars 68 and 69 for each pitman are rigidly joined at their upper ends by a carrier bar 74 of channel iron and which is supported upwardly against the laterally projecting ends of the aforesaid cross bar 70. The cross bar ties the upper ends of the guide bars together and the inner bars 68 have feet 68*a* which may be bolted at 68*b* (Fig. 7) to the side bars 11 and 12 of the frame to support the entire guide structure. Bolts 76 secure the bars 74 to the cross or tie bar 70 and by the provision of a plurality of spaced openings 77 for the respective bolts 68*b* and 76 it will be apparent that the guide bars may be bolted in place at certain predetermined spacings corresponding to adjustments of the saws for rail plates of standard sizes.

The saw support or feed frame 44 is frictionally retained in any adjusted vertical position by a mechanism now to be described. The bracing 48 for the side arms 46 includes a longitudinally extending bar 78 alongside which are positioned slide bars 79, one on each side. A bolt 80 passes crosswise through these bars and through washers 80*a* and at one end this bolt is provided with an expansion coil spring 81 in a well-known manner so as to draw the slide bars 79 tightly and frictionally against opposite sides of the bar 78. The slide bars 79 are each provided with an elongated longitudinally extending slot 82 through which the bolt 80 passes and the lower ends of the bars are pivotally attached at 83 to a bracket 84 secured to the center of the cross bar 70 supporting the saw guides. The slide bars 79 are thus permitted to swing in vertical and longitudinal planes so as to accommodate themselves to the swinging movement of the bolt 80 about the axis 47 of the saw support or feed frame as it is raised and lowered and the slots 82 permit this movement of the saw support without interference other than that of the friction upon the guide bars secured by the spring on the bolt 80 connecting the assembly. The

weight of the saw assembly is further counterbalanced by elongated retractile coil springs 85 which are connected at upper ends 86 to the upper extremities of the guide bars 79 and at lower ends are fastened at 87 to the end of a depending stop arm 88. The arm 88 is a part of the saw support or feed frame and the tension of the springs 85 is thus placed between the saw frame and the upper ends of the guide bars 79 which are carried by the frame, in such manner as to bias the feed frame and attached parts in an upward direction. In practice the tension of the springs 85 is such that, supplemented by the frictional grip obtained by the slide 79 upon the saw boom it will so counterbalance the weight of the saw assembly that it will hang in any adjusted position but may be moved upwardly or downwardly about its pivots 47 by hand and with little effort. The springs 85 are partially enclosed by tubular guards 85*a* so that danger to the operator, should a spring break, is removed.

The aforesaid stop arm 88 cooperates with a U-shaped yoke 89 which is adjustably mounted between the brace bars 29 by means of bolts 90. The yoke 89 may be adjusted to the position shown in Fig. 3 when ties are being cut, or swung upwardly out of the way of the stop arm 88, so that the saws may be forced downwardly far enough to cause the saw blades to completely penetrate the ties. On the other hand, when ties are being scored the stop yoke 89 may be adjusted to the position shown in Fig. 1 whereat it lies in the path of the stop arm 88 and will contact the same to limit downward movement of the saw support or feed frame to the point that the saw blades will enter the tie only a short distance sufficient for scoring. Thus when scoring ties proper and even scoring depth will be secured without any attention on the part of the operator.

The saw support or feed frame 44 is movably adjusted for feeding the saws to the work or lifting them to support positions by a long handle 91 which may be inserted in any one of three sockets 92 secured on the cross bar 49. The handle 91 consists of a length of pipe threaded at its end to screw into tapped bores in the sockets 92 and these sockets 92 are transversely spaced along the cross bar 49 so that the handle may be positioned for most convenient operation whether the ties are being scored or cut. Thus when scoring ties the handle 91 might best be located in the center socket 92 as it is shown in Fig. 2 so that the operator would be positioned to properly observe the operation of both saws and the feed pressure would be evenly distributed to the saws. On the other hand, when cutting the ties the handle 91 may be placed in either of the end sockets 92 over the saw then in use, for the same purpose. It will be noted in Figs. 1 and 3 particularly that the sockets 92 at the ends incline upwardly with respect to the center socket so that the handle 91, when placed in either end socket, will stand higher in order to allow the saws to be pushed down into the tie during the cutting operation without requiring the operator to stoop down. When the handle 91 is in the center socket for scoring it will then incline downwardly with respect to its position in either end socket, again for most convenient operation, and to compensate for the fact that the saws do not then move downwardly as far during the scoring operation. As shown in Figs. 1 and 2 an auxiliary handle or hand grip 93 may be screwed into one of the end sockets to provide

a purchase for the other hand of the operator enabling him to move the frame along the rails as may be required.

The machine is provided at each end with handle bars **94** supported at the upper ends of brackets **95** and having wide spread grip portions by which the operators may move the machine along the track, or lift it therefrom whenever required. Also forming part of the frame assembly of the machine are guard rods or rails indicated at **96** which extend outwardly from the side beams **11** and **12** and inclose the spaces wherein the saw blades operate. These guards or guard rails **96** are thus properly positioned to prevent the operator from stepping into a dangerous position with respect to the saws. The aforesaid tie or link rod **25** for the outrigger arm **17** is hooked at its end **27** in a bracket **97** which is secured to one of the guard rails. Inasmuch as the machine may be run in either direction along the track, and reversed end for end thereon, provision is made for fastening the outrigger arm **17** upon either side of the main frame **10** and for this purpose there will, of course, be provided brackets **23** and **97** upon both sides of the frame.

The outrigger arm **17** is arranged for up and down adjustments at its outer end with respect to the frame and in such manner that the main frame may be tilted by the resulting raising and lowering of the roller **18**. For this purpose the clip **21** is provided with adjustment bolts or set screws **98** which are threaded through the upwardly turned end **99** of the bracket **23** and are adapted to bear outwardly against the upper and inner surface of the clip. As best seen in Fig. 5 it will be apparent that the bolts **22** may be loosened and the set screws **98** adjusted to tilt the clip **21** and attached arm **17** as may be required to raise and lower the roller **18**. Such adjustment of the roller will, obviously, permit the entire machine to be transversely leveled whenever such action is required.

It is further contemplated that the flanged wheels **14** which support the machine upon the rail A may be adjusted crosswise upon theix axles **15** and located at any desired adjustment thereon by suitable means, such as a set screw **100** indicated in Fig. 5. It is thus possible to properly align the machine with respect to the rail and more important this adjustment of the wheels permits the entire machine to be adjusted crosswise with respect to the rail. The latter adjustment is of particular benefit when cutting ties since it allows the machine to be set up to cut the ties as closely as possible inside the rails so that the end sections of the ties may be removed with the maximum of convenience.

The outrigger arm **17** may be braced against upward displacement such as would permit the machine to tilt by means of a brace rod **101** attached at **102** to the outer end of the arm and adjustably fastened at **103** to the upper end of one of the center posts **28**. The adjustable fastening **103** includes an apertured anchor tube **104** which is attached to the center post and through which the nutted end of the brace rod **101** projects as clearly shown in Fig. 2. This fastening also permits the brace rod to be disconnected when the outrigger assembly is folded for storage of the machine.

From the foregoing it will be apparent that there is provided by this invention a machine which may be readily operated along the track to either score or cut the ties D and with this

selectivity of use possible merely by using one or two saw blades as required. Once the various adjustments herein are made the operation may be carried out by one man at the saw end of the machine, who raises and lowers the saw for each tie. It will be noted that the machine is not clamped either to the rail or to the tie to hold it in working position, as have been previous machines to this inventor's knowledge, and it is thus possible for the operator to have complete flexibility of control over the position of the machine at all times and to rock it back and forth along the rail as may be required to insure that the saws cut the full width of the ties but with a minimum of contact with the ballast which, of course, reduces the dulling and wearing on the saw teeth. It is contemplated that in the operation of the machine it will travel along the track and cut or score the ties as the case may be for considerable distances since it is possible, and it is the accepted practice, to score and cut the ties some time preliminary to either the installation of the rail plates or removal of the ties and replacement with new ones.

The length of the saw blades is such that when one is removed the other may cut entirely down through the tie, without the saw drive from which the blades is removed contacting the tie and stopping the downward feed movement of the saw assembly.

As shown in Fig. 3 the ballast may be removed at each side of the ties when they are to be cut, providing clearance for the saws.

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 the invention, what is claimed to be new and desired to protect by Letters Patent is:

1. In a tie cutting and scoring device of the character described, a frame adapted to be supported upon a railway track, a pair of cutting devices pivotally suspended from the frame for swinging movements at lower ends transversely with respect to a railway tie, a drive shaft journaled on the frame, power actuated means for rotating the drive shaft, eccentrics on the end of the drive shaft, pitman rods connected between the eccentrics and the said cutting devices, said cutting devices being adjustably supported to vary the distance therebetween, and the said drive shaft comprising two separable sections adjustably connected and adapted to be adjusted endwise with respect to each other to maintain the said eccentrics in alignment with the cutting devices as the latter are adjusted.

2. In a tie cutting and scoring device of the character described, a frame adapted to be supported upon a railway track, a pair of cutting devices pivotally suspended from the frame for swinging movements at lower ends transversely with respect to a railway tie, a drive shaft journaled on the frame, power actuated means for rotating the drive shaft, eccentrics on the end of the drive shaft, pitman rods connected between the eccentrics and the said cutting devices, said cutting devices being adjustably supported to vary the distance therebetween, the said drive shaft comprising two separate axially aligned sections, separate pulleys secured to adjacent ends of the shaft sections and having drive connections with the said power actuating means, means for securing the pulleys together whereby the shaft sections will operate as a unit, and

means adapted to be positioned between the said pulleys whereby to adjust the shaft sections endwise with respect to each other and thereby make compensating adjustments of the distance between the eccentrics as the cutting devices are adjusted.

3. In a tie cutting and scoring device of the character described, a frame adapted to be supported upon a railway track, a pair of cutting devices pivotally suspended from the frame for swinging movements at lower ends transversely with respect to a railway tie, a drive shaft journaled on the frame, power actuated means for rotating the drive shaft, eccentrics on the end of the drive shaft, pitman rods connected between the eccentrics and the said cutting devices, said cutting devices being adjustably supported to vary the distance therebetween, the said drive shaft comprising separate axially aligned sections, a pulley secured to the inner end of each section, drive belts operating over the pulleys, the said pulleys being releasably secured together to cause the drive shaft sections to operate in unison but being adjustable endwise with respect to each other to vary the effective length of the drive shaft and thereby maintain the eccentrics thereon in alignment with the cutting devices as they are adjusted, and drive means for the said belts supported for adjustment to maintain the belts

in alignment with the said pulleys as the spacing therebetween is adjusted.

MYRA LILLIAN WOOLERY,
Executrix of the last will and testament of Horace E. Woolery, Deceased.

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