Nov. 10, 1953 R. E. ACKLEY 2,658,537

SAW CHAIN

Filed Feb. 23, 1949

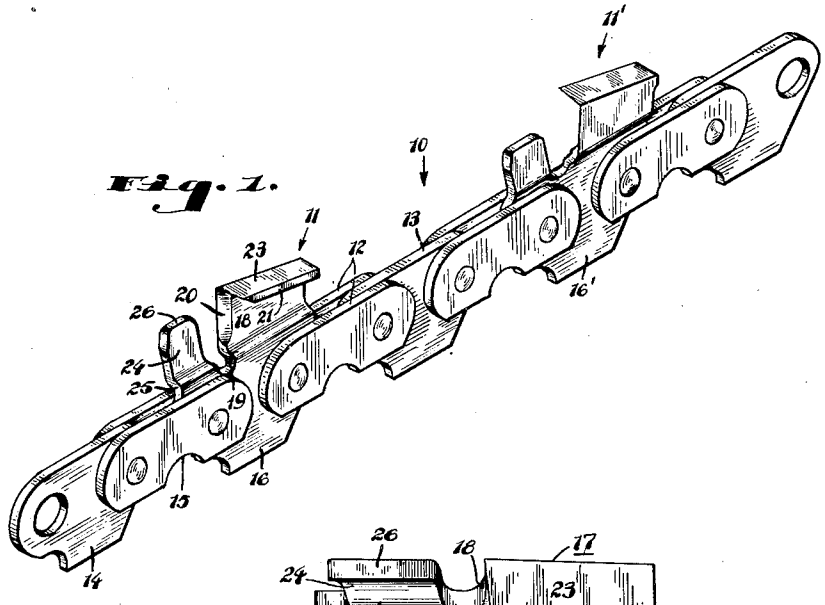

Fig. 1.

Fig. 3.

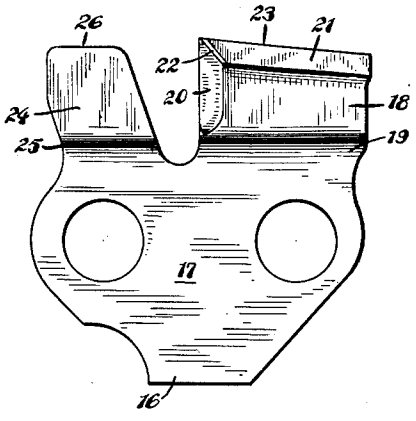

Fig. 2.

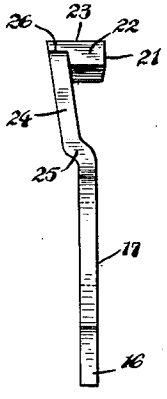

Fig. 4.

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Patented Nov. 10, 1953

2,658,537

UNITED STATES PATENT OFFICE

2,658,537

SAW CHAIN

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Application February 23, 1949, Serial No. 77,804

7 Claims. (Cl. 143—135)

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The present invention relates to chain saws, and the primary object thereof is to provide an improved saw chain and an improved cutter link therefor. The invention relates to chain saws of the general character of that disclosed in the patent to John E. Hassler No. 2,326,354 issued August 17, 1943, and is directed to the improvement of a detail of saw chains of the character there disclosed.

It has been found that saw chains provided with cutting teeth comprising a shank displaced from the median plane of the chain and terminating in a foot which projects toward said median plane, tend under some conditions to deviate, in operation, from the median plane as the teeth run in the kerf being cut. Such deviation is wasteful in that it unnecessarily widens and roughens the side walls of the kerf formed by the operation of the saw, but more importantly, it materially increases the power expenditure and, in some instances, actually results in breakage of the chain.

I have found that deviation of the cutters from the optimum path thereof can be inhibited and almost completely prevented by means of the very simple expedient which I have conceived, and which is disclosed herein. The simplicity of the solution, once conceived, is an important feature of my invention, inasmuch as it has resulted in the production of a chain which can be manufactured at no increase in cost over chains heretofore in use, and which were subject to the disadvantages resulting from tooth deviation.

To the accomplishment of the above and related objects, my invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

Fig. 1 is a perspective view of a section of chain comprising cutter links constructed in accordance with my invention;

Fig. 2 is a side elevational view on an enlarged scale of a cutter link embodying my invention;

Fig. 3 is a plan view of the link; and

Fig. 4 is a front end elevation of the link.

Referring more particularly to the drawings, the reference numeral 10 indicates generally a fragment of a chain made up of cutter links 11 and 11', connector links 12, and spacer links 13, assembled, by means of conventional pivot pins, into a continuous chain. In the present instance, each spacer link is formed with a tab 14

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adapted to ride in the slot of a guide bar provided in the machine with which the chain is designed to operate, and each cutter link 11 or 11' is provided with a similar tab 16 or 16'. In the particular embodiment of my invention herein illustrated, each pair of connector links 12 is provided with a notch 15 for engagement by the teeth of the driving and idler sprockets which are conventional in such machines.

Each cutter link 11 comprises a body plate 17 adapted to be disposed substantially in the median plane of the chain assembly, and formed for connection to other links in the assembly. A tooth shank 18 projects from said body, generally in the direction of extent of such median plane, merging with the body in a root 19 which is offset laterally from the plane of the body 17, so that the shank 18 is bodily offset from the median plane of the chain. In the illustrated preferred embodiment of the invention, the stem portion of the shank 18 is inclined away from said plane as the stem retreats from the root 19, as clearly illustrated in Fig. 4; but the stem portion of the shank may, in some instances, be parallel, or substantially parallel, with the plane of the body 17. Alternatively, the stem portion of the shank 18 may be bodily inclined away from the median plane of the chain, without the interposition of an offsetting root such as 19. It is essential only that the stem portion of the shank shall, in some fashion, depart laterally from the median plane of the chain so that the foot 21, carried at the free end of the shank, may project laterally toward said median plane. Preferably, said foot portion will intersect said median plane, projecting laterally therebeyond.

At least a portion of the leading edge of the shank 18 will preferably be sharpened; and that sharpening will be produced by beveling such leading edge rearwardly and toward the median plane, as is clearly indicated at 20 in the drawings, so that the cutting edge coincides with the outer face of the shank, i. e. the face which is relatively remote from the median plane of the body 17 of the link and of the chain.

The leading edge of the foot 21 will be beveled, as at 22, rearwardly and away from its outer or base surface which, as shown, will preferably be flat, as at 23, and disposed in a plane normal to the median plane of the chain. In the illustrated embodiment of the invention, the flat base surface 23 inclines slightly from its leading edge toward its trailing edge toward the body of the link 17. These details of the construction and arrangement of the foot portion 21 are not im-

portant, however, to the present invention, since the entire cutter may be L-shaped, as illustrated, or may be curved, whereby the cutting edge formed, in the illustrated embodiment of the invention, by the sharpened edge of the foot, may lie in a continuous curve which departs laterally from the median plane of the chain at its juncture with the body portion 17 of the cutter link, and returns to, or past, said median plane at the free end of the foot portion of the cutter.

Spaced forwardly, in the direction of chain travel, from the cutting edge of the tooth is a depth gauge 24, integral with the body 17. In the illustrated embodiment of the invention said depth gauge merges with the body 17 in an offset root portion 25, and is inclined laterally away from the median plane of the tooth as it retreats from said root portion. Its outer end 26 terminates short of the plane defined by the base surface 23 of the foot 21, so that said outer end 26 of the depth gauge will ride in the bottom of the kerf which has been formed in advance of the particular tooth with which said depth gauge is associated, limiting and controlling the depth to which the said tooth will penetrate the bottom of the kerf. As clearly illustrated in Fig. 4, the shank of the depth gauge is in all respects substantially congruent with the shank of the cutter, when viewed in the line of travel of the chain or in line of the length of the cutter link. Thus, the depth gauge shank will ride in close proximity to the proximate lateral wall of the kerf which is being formed, thus limiting the sharpened edge of the shank 18 toward said wall and restraining the same from unduly gouging the kerf wall.

The lateral surface of the kerf is worked, of course, by the extreme outer corner of the foot 21; and it will be seen from an inspection of Fig. 4 that, because the inclined depth gauge 24 terminates short of the extremity of the correspondingly-inclined cutter shank 18, the outer surface of the extremity of the depth gauge 24 lies slightly closer to the median plane of the chain than does said extreme outer corner of the foot 21. In practice, that difference may be a few thousandths, say 0.005 of an inch, which provides sufficient clearance so that the depth gauge does not continuously rub the kerf wall and yet locates the depth gauge so close to the kerf wall that any tendency of the cutter to deviate in the direction of that wall will throw the depth gauge immediately into contact with the wall to arrest such tendency before the occurrence of any such gouging as would be substantially deleterious to the kerf, the chain, or the power consumption of the saw.

As shown, the offset root 25 is substantially identical in conformation with the offset root 19 of the shank 18, and the inclination of the stem 24 of the depth gauge is substantially identical with the inclination of the stem portion of the cutter shank 18. Obviously, if the specific conformation of the cutter tooth is different from that illustrated, then the specific conformation of the depth gauge, as viewed in front elevation, as in Fig. 4, will be correspondingly different. The essential characteristic of the depth gauge 24 is that it shall in all respects be substantially congruent with its associated cutter shank, when viewed in front elevation, or in the direction of length of the cutter link.

The restraint of the individual cutter teeth against lateral deviation results in the formation of a kerf or cut which is straighter, narrower, and smoother than has been possible with cutting chains previously known to the art. At the same time, the cut requires the expenditure of less power, and the chain life is substantially increased by reduction in the breakage frequency. It has been found that, using a chain constructed in accordance with the present invention, the cut faces of the timber are smoother and truer than has been the case when cuts have been made in the past with chains not provided with means for thus restraining the individual teeth against lateral deviation.

The cutter link 11' differs from the cutter link 11 only in that its tooth and depth gauge shanks are oppositely displaced from the median plane of the chain. That is, the links 11 and 11' are allochirally related; and, in most instances, I prefer to alternate the two forms of links in the chain assembly, though two or more links 11 may, if desired, follow each other consecutively, thereafter being followed by a series of links 11' of corresponding number.

Although I have referred to the element 24 as a depth gauge, and have shown a construction in which it performs the function of a depth gauge, it will be clear that an element correspondingly located and performing the lateral-guidance function, without also limiting the depth-of-cut of the associated tooth, would fall within the purview of my invention.

I claim:

1. A saw chain comprising a plurality of cutter links and means for connecting said links into a chain assembly, each cutter link comprising a tooth shank offset to one side of the median plane of the chain and terminating at its outer end in a foot projecting toward said plane, said shank and foot being beveled at their leading edges to afford cutting edges coinciding with their respective outer faces, and a depth gauge spaced from the tooth shank longitudinally of the chain assembly and offset to the same side of the said median plane as the shank and to an extent such that the profile of the outer face of the gauge is in part substantially congruent with the profile of the beveled edge at the outer side of the shank when viewed longitudinally of the chain and on a line parallel to said plane, said gauge terminating at its outer end short of the outer end of the shank so as to afford an active cutting edge for the tooth extending continuously over the leading edges of the foot and of the immediately adjoining portion of the shank.

2. A saw chain according to claim 1 wherein the said congruency of the outer face profiles of the gauge and shank embraces the outer end portion of the gauge.

3. A saw chain according to claim 1 wherein the shank and foot are substantially flat so that the said cutting edges describe substantially straight lines meeting in an angular juncture.

4. A saw chain according to claim 3 wherein the shank diverges outwardly from and with respect to the said median plane and wherein the juncture of the shank and foot cutting edges extends laterally beyond the lateral extremity of the remainder of the chain.

5. As an article of manufacture, a cutter link for saw chains comprising a body adapted to be connected in a chain to extend longitudinally of the latter, a tooth shank projecting from and in the general direction of said body but offset laterally from the median longitudinal plane of the body, said shank terminating in a foot projecting toward said plane, said shank and foot being

beveled at their leading edges to afford cutting edges coinciding with their respective outer faces, and a depth gauge spaced from the tooth shank longitudinally of the body and offset to the same side of the said median plane as the shank and to an extent such that the profile of the outer face of the gauge is in part substantially congruent with the profile of the outer side of the shank when viewed from a longitudinal end of the body and on a line parallel to said plane, said gauge terminating at its outer end short of the outer end of the shank so as to afford an active cutting edge for the tooth extending continuously over the leading edges of the foot and of the immediately adjoining portion of the shank.

6. A cutter link according to claim 5 wherein the said congruency of the outer face profiles of the gauge and shank embraces the outer end portion of the gauge.

7. A cutter link according to claim 6 wherein the shank and foot are substantially flat, the shank diverging outwardly from and with respect to the said median plane and forming an angular juncture with the foot, the said angular juncture of the shank and foot cutting edges defining the maximum lateral extent of the chain.

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