June 10, 1952 N. C. BYE 2,599,608

GUIDE BAR FOR CHAIN SAWS

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FIG. 1.

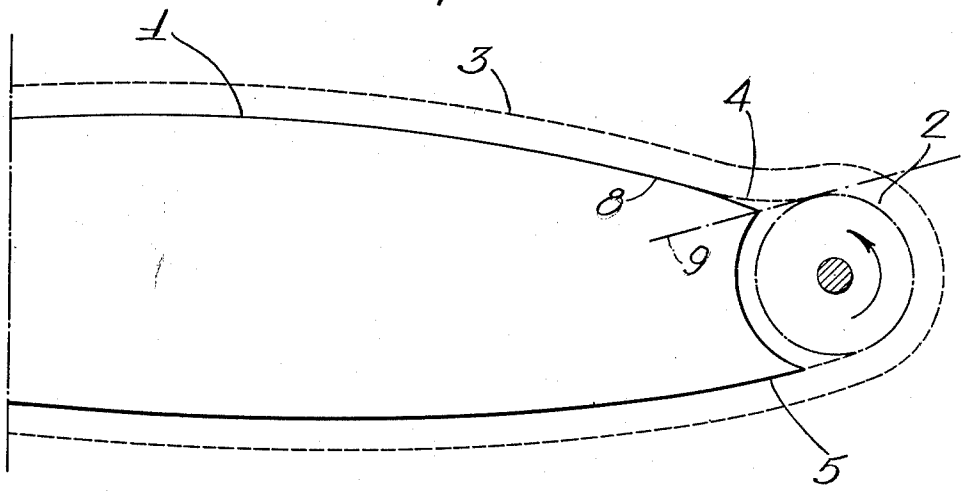


FIG. 2.

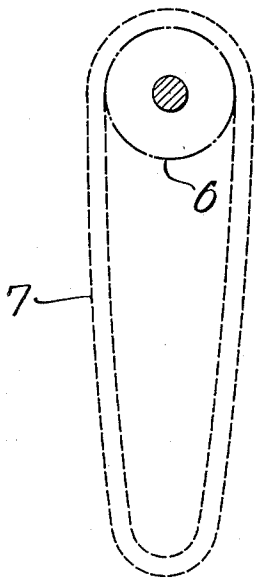
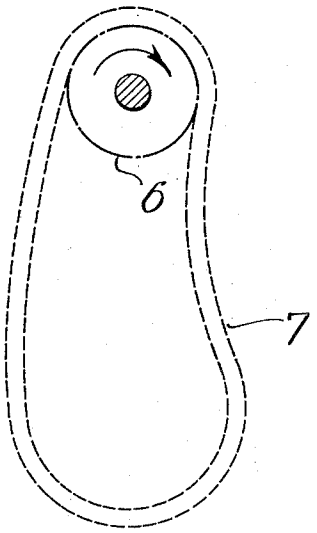


FIG. 3.



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GUIDE BAR FOR CHAIN SAWS

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2 Claims. (Cl. 143—32)

1

This invention relates to chain saws and more particularly to improvements in the guide rails which, in saws of conventional type, afford backing support for the cutting chain.

A primary object of the invention is to provide a guide rail which, by reason of an asymmetrical form hereinafter described, provides the proper supporting contact between the guide rail and the travelling chain, with uniform minimum pressure at all points, thereby materially improving the operating characteristics of the saw.

An object of this invention is to reduce vibration caused by periodic contact which occurs between a travelling chain and a symmetrical guide rail.

Another object is to reduce excessive wear at the localized pressure points which are built up between the travelling chain and a symmetrical guide rail.

A still further object is, through a more complete supporting of the chain, to lessen its tendency to chatter or bounce when cutting.

In the attached drawings:

Fig. 1 is a diagrammatic view showing a portion of a guide rail made in accordance with the invention and indicating also the chain and chain-driving sprocket in operative association with said rail; and

Figs. 2 and 3 are diagrammatic views illustrating the principle of the invention.

With reference to Fig. 1 of the drawings, reference numeral 1 indicates the fragmentary part of a guide rail with which the present invention is primarily concerned; reference numeral 2 indicates a chain-driving sprocket, said rail and sprocket being shown in the relative positions which they normally assume in conventional chain saw assembly. A cutting chain 3, indicated in broken lines, is trained about the sprocket 2 and is guided at the edges of the rail 1 as illustrated.

In accordance with the invention, the guide rail 1 departs from conventional symmetrical form to the extent that the portion of the rail which adjoins the sprocket 2 at one side is shaped so that the chain at that side of the sprocket may assume a concave contour, as indicated at 4, while the portion of the rail adjoining the opposite side of the sprocket exhibits a generally convex edge contour, as indicated at 5, merging smoothly into the sprocket periphery as illustrated. In operation, the sprocket will rotate in the direction indicated by the arrow, so that the provision for the concave contour of the chain is at the side on which the chain leaves the sprocket

2

while the convex portion 5 is at the side from which the chain approaches the sprocket. The chain supporting edge 8 of the rail to which the chain passes from the sprocket is smoothly contoured and in the present instance is of longitudinally convex form similar to the edge 5. Unlike the latter edge, however, the terminal end portion of the edge 8 which adjoins the sprocket follows a line which if extended beyond the end of the said edge would intersect the peripheral portion of the sprocket, the said terminal end portion of the edge 8 thus forming an inset angular recess with an imaginary line 9 intersecting the terminal end of said edge and lying tangent to the sprocket. It is this angular recess which permits the chain to assume the concave contour at 4 described above.

The functional characteristics of this construction are best illustrated by reference to Figs. 2 and 3. In each of these figures, the reference numeral 6 indicates a sprocket and the reference numeral 7 a chain trained about the sprocket. In Fig. 2 the sprocket is stationary and the chain in suspension assumes a substantially symmetrical contour with respect to a vertical line intersecting the rotary axis of the sprocket. In Fig. 3 the sprocket 6 is assumed to be rotating in the direction of the arrow and in this case, the chain 7 assumes an asymmetrical contour exhibiting a concavity on that side of the sprocket from which the chain passes; and a convexity of lesser order at the opposite side. This asymmetrical contour is a factor jointly of the rotation movement of the sprocket and the friction which, while small, is present in the pintle pins of the articulated chain. Departure of the chain from its normal symmetrical contour is characteristic but the extent thereof will vary with the speed of rotation of the sprocket.

Within a given limited speed range, it is possible to determine the mean path of travel of the chain.

It is evident that if a guide rail of the general character shown in Fig. 1 is shaped so that the chain-guiding edge thereof conforms to the symmetrical pattern of the chain shown in Fig. 2, then when the sprocket is in operation, the chain, by reason of its tendency to depart from the said symmetrical pattern in accordance with the principle illustrated in Fig. 3, will exert a positive pressure upon that part of the rail which immediately adjoins the one side of the sprocket, and will tend to leave the rail in that part which immediately adjoins the opposite side of the sprocket. This lack of conformity between the guide rail

and the normal asymmetrical path of travel of the chain, gives rise to a number of undesirable functional effects such as the development of areas of high pressure between the rail and the chain, with resultant undue wear in both elements, impact of the chain against the rail with resultant avoidable vibration, and lack of adequate support for the chain at 5 tending to cause chattering or bouncing of the chain during cutting operations.

All of these undesirable characteristics are avoided by practice of the present invention. In accordance with the latter, the guide rail is shaped, preferably to conform to the mean asymmetrical pattern of the chain within the relatively narrow speed limits of normal operation. The guide rail shown in Fig. 1 is so designed, and the manner in which it functions in the avoidance of the undesirable characteristics mentioned above will be obvious. Since the guide rail conforms approximately to the normal path of travel of the chain, the latter will tend to track smoothly on the rail without impact. Thus vibration is reduced to a minimum, high pressure areas are eliminated to give uniformly distributed wear, and full support is given to the chain at all points, resulting in smooth and easy cutting.

It will be understood that the principle of the invention may find useful application in chain saws employing guide rails of other overall shape than that illustrated in the drawings and that in this respect there is no implied limitation except as imposed by the terms of the following claims.

I claim:

1. In a chain saw, a cutting chain, a chain-driving sprocket, and a chain-supporting rail affording support for the chain at both sides of the sprocket, the chain supporting edges of the rail being generally of longitudinally convex contours and directing the chain tangentially to the sprocket on the one side and at the other side of the sprocket being smoothly contoured and extending into proximity to the periphery of the sprocket, the sprocket-adjoining end of said smoothly contoured edge being angularly disposed with respect to a line intersecting the terminal end of said edge and tangent to the sprocket and defining an inset angular recess between the said edge and the peripheral edge of the sprocket into which recess the chain may diverge in transition from the sprocket to the said rail edge.

2. In a chain saw, a cutting chain, a chain-driving sprocket, and a chain-supporting rail affording support for the chain on both sides of the sprocket, said rail directing the chain tangentially to the sprocket on the one side and at the other side of the sprocket being generally of longitudinally convex and smoothly contoured form and extending into proximity to the periphery of the sprocket, the sprocket-adjoining end of said smoothly contoured edge being angularly disposed with respect to a line intersecting the terminal end of said edge and tangent to the sprocket and defining an inset angular recess between the said edge and the peripheral edge of the sprocket into which recess the chain may diverge in transition from the sprocket to the said rail edge.

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

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274,348	Great Britain	July 21, 1927