

Nov. 18, 1952

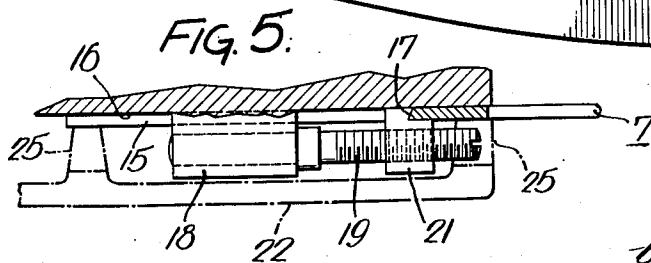
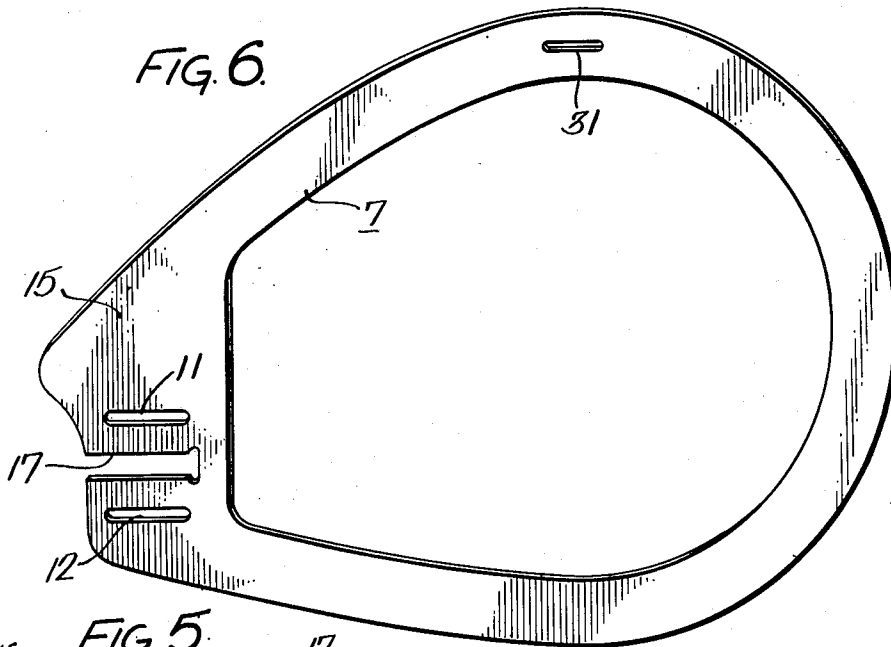
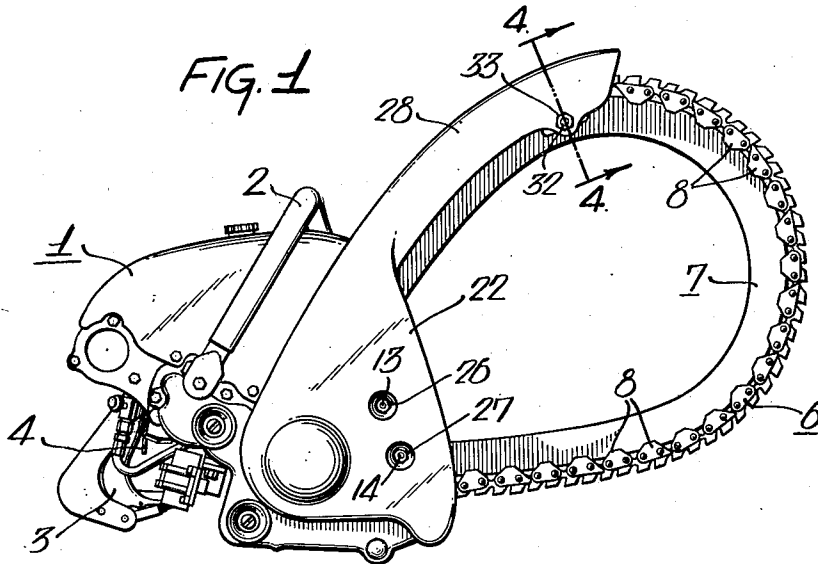
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2,618,298

BOW FRAME CHAIN SAW

Filed Dec. 27, 1949

2 SHEETS—SHEET 1



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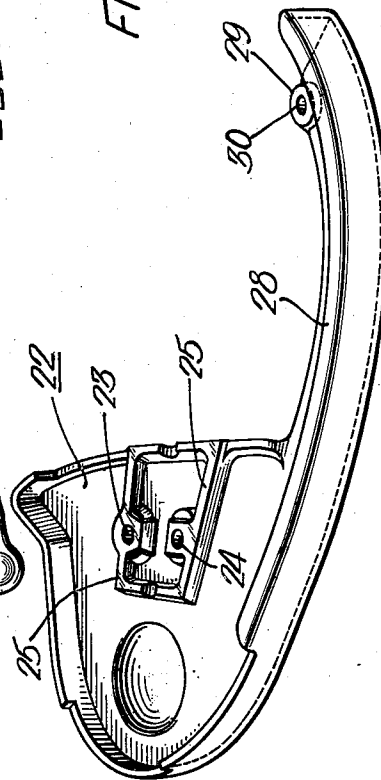
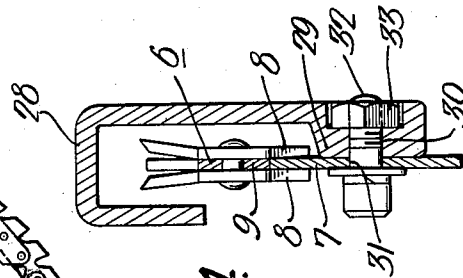
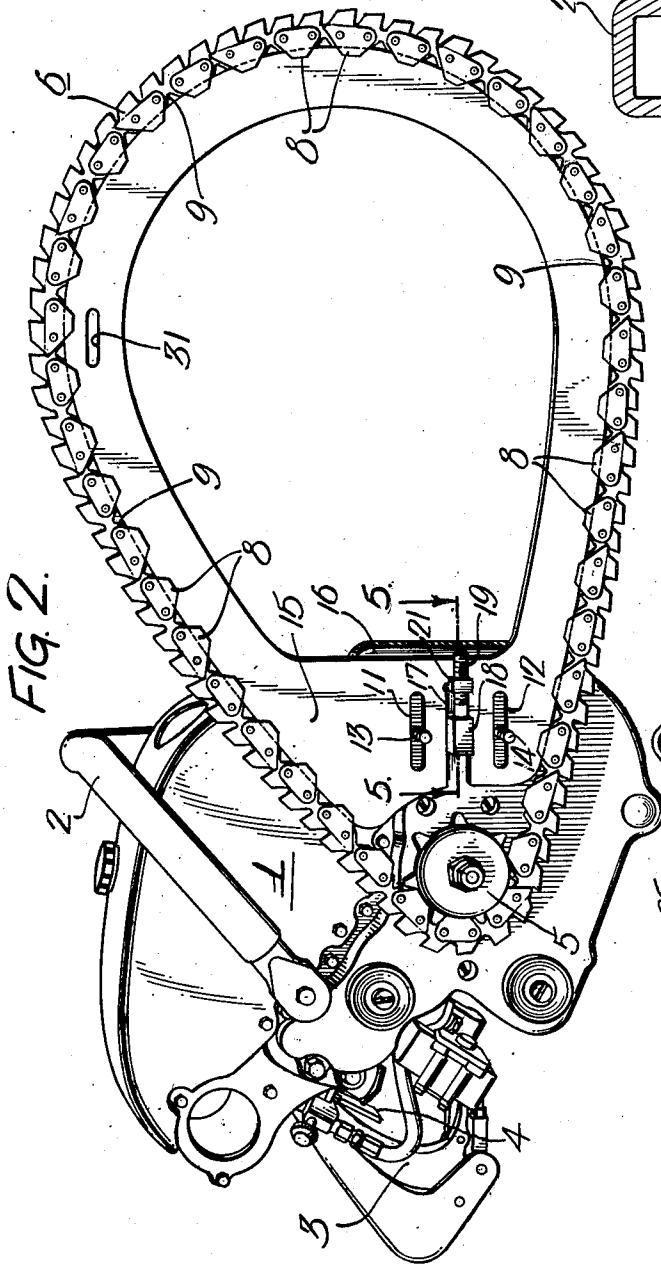
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BOW FRAME CHAIN SAW

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2 SHEETS--SHEET 2



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UNITED STATES PATENT OFFICE

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BOW FRAME CHAIN SAW

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2 Claims. (Cl. 143—32)

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This invention relates to chain saws and more particularly to an improved guide means for the cutting chain.

More specifically the invention relates to chain saws of the type wherein the chain is supported upon the guide means with the exception only of that part of the chain which engages the drive sprocket, and a primary object of the invention is to provide a chain guide for saws of this type having generally improved characteristics as hereinafter more particularly described.

Another object of the invention is to provide a guide rail of the stated type composed of one integral piece of metal thereby eliminating joints, interruptions, and variable curvatures in the rail, and maintaining a constant operating relationship between the rail and the chain.

Another object of the invention is to provide a guide rail and chain assembly of the bow type of which the rail element may be readily produced by stamping or other equally inexpensive operation, and wherein further the separate sections of the prior conventional guide rails are eliminated.

A further object of the invention is to provide a guide rail of the stated type composed of one integral piece of metal, the center of which is blanked or cut out, the remaining metal forming a rim which is of such a width and thickness that in backing up the cutting chain and following the chain into the cut, it cannot be bound or pinched by closure of the cut behind the cutting chain.

Still another object of the invention is to provide a guide rail that will produce maximum centrifugal action in the chain under operating conditions whereby the chain may be forced by the centrifugal force outwardly from the guide rail so as to reduce friction between the rail and the chain.

A further object of the invention is to provide a guide rail designed so that centrifugal force acting upon the moving chain will serve to properly tension the chain under operating conditions, the guide rail still maintaining its primary function of guiding the chain in its longitudinal travel over a predetermined path. In this phase the invention contemplates a dynamic self-tensioning of the chain as distinguished from the spring type tensioning means conventionally employed.

A still further object of the invention is to provide a guide rail of relatively light weight. Another object of the invention is to provide a guide rail having superior resistance to distortion or change of shape and dimension, and which shall be permanently free from obstructions of a char-

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acter tending to impede progress of the chain and to increase wear on both the chain and the rail.

Still another object of the invention is to provide a guide rail that will be entirely free from joints and crevices in which foreign matter such as pitch and oil might have a tendency to accumulate with resultant subsequent deterioration of the rail structure.

Still another object of the invention is to provide a guide rail so constructed and so mounted on the body of the saw that adjustments thereof for the purpose of compensating for chain elongation are obtained by adjustment of the whole guide rail, with respect to the engine frame, thereby maintaining a constant operating relationship between the rail and the chain.

Still another object of the invention is to provide a novel chain guard for the chain which will function also as a medium for conferring lateral stability upon the guide rail structure.

A still further object of the invention is to provide a chain saw constructed so as to facilitate installation and removal of the cutting chain.

The invention further contemplates a guide rail of simple form and relatively light weight, and in conjunction with said rail a guard structure which will function to confer stability and rigidity upon the rail structure.

The invention will be more readily understood by reference to the attached drawings, wherein: Fig. 1 is a side elevational view of a chain saw made in accordance with the invention;

Fig. 2 is an enlarged side elevational perspective view of the saw with the guard and cover plate removed to show the chain sprocket and the manner in which the guide rail is secured to the main frame;

Fig. 3 is a view in perspective of the combined guard and cover plate;

Fig. 4 is a sectional view on the line 4—4, Fig. 1;

Fig. 5 is a sectional view on the line 5—5, Fig. 2; and

Fig. 6 is an enlarged face view, in perspective, of the guide rail detached from the saw structure.

With reference to the drawings, the saw therein illustrated comprises an internal combustion engine indicated generally by the reference numeral 1, the motor frame being provided with two handles designated respectively by the reference numerals 2 and 3. Associated with the handle 3 is a throttle 4 by means of which the operation of the motor may be controlled.

Journaled in the frame and operatively connected with the motor 1 is a chain sprocket 5,

see Fig. 2, and this sprocket engages the cutting chain 6 which is supported and guided over the major portion of its length by a guide rail 7. In the present instance the chain links are provided with spaced ears 8, see Fig. 4, which straddle the edge of the rail 7, intermediate portions 9 of the chain engaging the edge surface of the rail, as illustrated, so that an adequate running connection is established between the chain and the rail.

The guide rail 7, as best shown in Fig. 6, is in the form of an open frame or bow with a well rounded outer end portion of ample radius. The inner end of the rail is provided with a pair of parallel slots 11 and 12 for reception of studs 13 and 14 through which the rail is secured to the motor frame. By means of these studs the base portion 15 of the rail is clamped solidly against a face 16 of the said frame as hereinafter more fully described. The guide rail 7 also comprises a slot 17 in the base portion thereof which extends parallel to and between the slotted openings 11 and 12, and in assembly this slot 17 receives a rectangular boss 18 which projects from the face 16 of the frame and which carries a screw 19, the inner end of the screw being rotatably supported in the boss. A block 21 is threaded on the screw 19 and, being prevented from rotation as shown in Fig. 5, may be adjusted along the axis of the screw by turning the latter. In assembly the block 21 engages the guide rail 7 at the inner end of the slot 17 and it will be apparent that by manipulation of the screw 19 and adjustment of the block 21 the rail 7 may be moved outwardly away from the sprocket 5 to thereby obtain a proper operative relation between the rail and the chain.

In the present instance the base part of the guide rail 7 is clamped between the face 16 of the frame and the inner face of a cover plate 22, see Fig. 3. This plate is provided with apertures 23 and 24 for passage therethrough of the rail-retaining studs 13 and 14, and has on its inner face projecting flanges 25 which bear against the confronting face of the rail so that when nuts 26 and 27 are tightened on the studs against the outer face of the plate 22 the butt end of the guide rail 7 will be clamped solidly to the motor frame.

The cover plate 22 not only houses the sprocket 5 and the inner ends of the chain and guide rail, but also, through the medium of an extension 28, functions as a guard for those portions of the chain which pass in proximity to the handle 2 and an outboard support for the guide rail 7. As shown in Fig. 4 the extension 28 is of channel form embracing the chain and is provided at its outer end with an inwardly projecting boss 29 the outer end of which is adapted for engagement with the proximate face of the guide rail 7. The boss 29 is apertured as indicated at 30 and this aperture in assembly registers with a slotted opening 31 in the guide rail 7. A bolt 32 passes through the registering hole and slot and with an associated nut 33 rigidly secures the outer end of the extension 28 to the guide rail. The plate 22 and its integral extension 28 are rigid, being formed, for example, from cast aluminum, so that the arm 28 functions not only as an efficient guard for the upper run of the chain but also confers a high degree of lateral stability on the guide rail structure. It will be noted that the extension 28 terminates at a point slightly beyond the longitudinal center of the guide rail so as to allow for cutting over and above the full

capacity of the depth of the rail and if circumstances require.

It will be noted that the outer end of the screw 19 extends beyond the cover plate 22 so that if adjustment of the guide rail 7 is required such adjustment may be effected by release of the screw 32 and the studs 13 and 14 and subsequent rotation of the screw 19. Removal of the cover member 22 may be accomplished by removal of the retaining screw 32 and of the nuts 26 and 27 of the studs 13 and 14. Following removal of the cover 22 chain 6 may be readily removed from the saw structure by backing the block 21 on the screw 19 to release the guide rail 7 and subsequently removing the chain from both the rail and the sprocket 5. It is obvious that the rail 7 may be removed by the same operation.

It is to be noted that the open bow guide rail 7 approximates a circle at its outer free end. As a result a considerable centrifugal effect is developed in the rapidly moving chain. This centrifugal force is utilized for two primary ends, first to reduce friction between the guide rail and the chain, in that the chain tends by centrifugal action to leave the edge of the rail, and secondly, to dynamically tension the chain for optimum operating efficiency. For these desirable ends, the guide rail is designed to produce maximum centrifugal action in the chain.

In assembling the saw the guide rail is adjusted so that under static conditions the chain is free on the rail. Under operating conditions the aforesaid centrifugal action takes effect to dynamically tension the chain, the said force tending to draw the chain away from the rail edge. Through this expedient necessity for the conventional spring tensioning means has been eliminated, as also has the necessity for maintaining substantial pressure between the guide rail and the chain. In the present instance the rail exerts no tensioning pressure upon the chain and functions merely to guide the chain in the desired path and to maintain the chain in proper operative connection with the sprocket 5. Since undue slack in the chain is taken up by adjustment of the guide rail as a whole with respect to the sprocket 5, it will be apparent that the operative relation between the guide rail and the chain remains constant. Also, by reason of the fact that the rail is composed of an integral piece of metal the chain finds a continuous and uninterrupted guide, free from joints and interruptions. Obviously, the integral construction and plain form of the guide rail materially simplify the manufacturing process with respect to this part of the saw assembly, and make possible production of the guide rail by simple stamping operation from an integral piece of metal of suitable gauge.

A one piece guide rail of the character described above has certain material advantages over rails composed of several parts spliced together. It affords, for example, a rail which is substantially lighter in weight than rails of the other type by reason of the absence of the additional elements required in rails of the spliced type for securing the parts together and for reinforcing the joints. A one piece rail of the character of the applicant's is also less subject to distortion than one made of an assembly of parts by reason of the fact that the integral rail contains no joints that might work loose. When the joints of a spliced rail loosen they frequently produce obstructions on which the chain may catch thereby tending to impede the progress of

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the chain and the rail. Also, in practice, foreign matter such as pitch, sap and oil tends to work into even minute spaces between the sections of a spliced rail where they are riveted, bolted, welded or otherwise secured together, the ultimate result being a tendency to produce looseness in the joints. Obviously, this also is avoided in a rail composed of one integral piece. As previously set forth the integral guide rail affords a substantial economy in that it can be stamped from flat metal, whereas a guide rail made of a number of pieces requires additional material for splicing the pieces together and also involves the labor necessary to putting the parts of the rail together.

I claim:

1. In a chain saw, a cutting chain, a substantially flat guide member providing at its edge a support for the chain and on which the chain over substantially its entire length is constrained to travel in a closed smoothly contoured path, and a chain-driving sprocket at the inner end of said guide member, the chain guiding edges of the member diverging from the sprocket and merging into the opposite sides of an approxi-

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mately circular arc at the outer end of the member, said arc embracing an angle materially in excess of 180 degrees and containing the major extent of the chain-guiding edge of the guide member.

2. A chain saw according to claim 1 wherein the said chain guiding edge extends into close proximity to the opposite sides of the sprocket.

HENRY C. PRATT.

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