

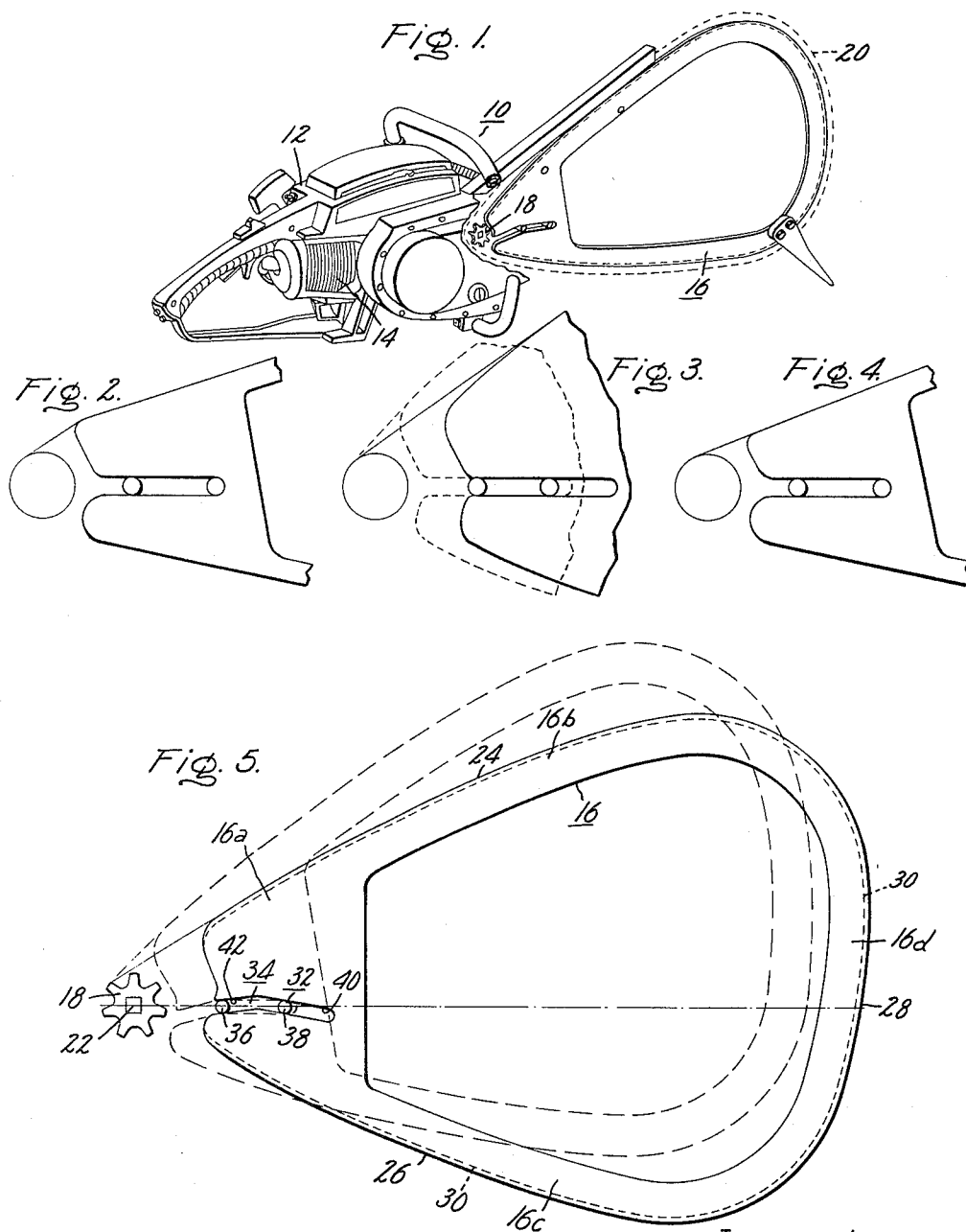
April 26, 1966

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3,247,873

CHAINSAW TENSIONING MEANS

Filed Nov. 8, 1963



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CHAIN SAW TENSIONING MEANS

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Filed Nov. 8, 1963, Ser. No. 322,286
6 Claims. (Cl. 143—32)

This invention relates in general to chain saws and more particularly to a novel means by which a guide bar is connected to the frame of a chain saw so that the chain saw chain can be quickly and effectively tightened.

The invention has particular utility in the design of a plunge bow type of chain saw although obviously the invention can be used on other types of chain saws. However, since the drawings show the preferred use of the invention, all subsequent remarks will refer to the invention in use with a plunge bow saw.

The primary object of this invention is to eliminate the problem of chain derailment of plunge bows of present design. This chain derailment occurs mainly when the plunge bow is adjusted forwardly in a direction away from the sprocket. Due to the wide top angle of the plunge bow as it is adjusted forwardly, the relating angle does not stay in a straight line with the top of the sprocket. On each plunge bow guide bar, a V shaped entry is provided for the chain to funnel into the groove which runs around the outer peripheral edge of the plunge bow or guide bar. A common complaint is that the saw chain does not meet this entry when the plunge bow or guide bar is adjusted forwardly.

One suggestion in the past was that material be added to the top of the plunge bow to provide better chain flow when the plunge bow is in the forward position. This idea is not practical because when the plunge bow is adjusted to the rearward position, the chain hammers the end of the guide due to too much height which increases the angle at the chain entry. This hammering at high speed causes excessive wear to both plunge bow and chain. See FIGURES 2 and 3 for examples of difficulties with conventional designs in the rearward and forward positions which the present invention is designed to cure. In FIGURE 2, at high speed, the chain tends to follow the sprocket until the top angle of the plunge bow causes the chain to leave the sprocket. When the angle is not in line with the sprocket, excessive hammering and chatter results since the shoulder of the end profile which was correct in neutral adjustment now projects upward and produces a hump that the chain must climb over. This causes severe hammering of the chain at this point on the plunge bow which pounds a flat on the guide bar and heavy burring which closes the slot width until the chain drive links are pinched and forced up out of the groove. Also, at high speed the chain as it strikes this high spot on the guide profile will leap up out of the groove causing chain whip and derailment.

By using the curved camming slot of the present invention, neither of the above undesirable conditions occur. The surface of the top rails of the plunge bow is always in a straight line which is tangent to the pitch diameter of the sprocket. This is the main advantage of the cam action which in any adjustment forward or rearward, keeps the chain properly feeding onto the guide bar from the sprocket by changing the angular position of the bow in reference to the saw.

FIGURE 3 shows the excessive clearance between the chain path and the top rails of the plunge bow when the plunge bow is adjusted or moved to its forward position. When adjusted forwardly, a gap occurs between the entry of the bow and chain. This is a condition which increases the possibility of saw chain being thrown since the chain

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is not entering the slot at the end of the bow. Any slight misalignment will allow a chain drive link to climb on top of a rail and throw the chain out of the groove since there is a gap between the chain and the end of the guide, as viewed from the side.

The ideal situation for smooth chain flow in conventional designs is shown in FIGURE 4 and consists of having the top angle of the plunge bow stay in a direct alignment with the sprocket. Obviously, when the chain wears and it becomes necessary to take up the chain slack, the plunge bow moves into the position shown in FIGURE 3 and the result is excessive vibration of the chain along with accompanying noise and wear, etc.

It was to overcome these deficiencies that a curved camming slot was designed which would raise the plunge bow at the rear as it was adjusted forward. Raising the rear of the plunge bow to stay in line with the sprocket results in smooth chain flow at both rearward and forward positions of adjustment.

It is another object of this invention to provide a simple and economical chain saw chain tensioning means which reduces chain hammering and chattering and also substantially reduces the possibility of chain derailment.

Further object and advantages will become apparent after reading the following specification in which:

FIGURE 1 shows a perspective view showing a plunge bow type of chain saw.

FIGURE 2 shows a conventional guide bar attaching means with a standard straight slot mounting in the rearward position.

FIGURE 3 shows a conventional guide bar attaching means with a standard straight slot mounting in the forward position (solid lines).

FIGURE 4 shows a conventional guide bar attaching means with a standard straight slot mounting in the best or ideal position.

FIGURE 5 shows a guide bar attaching means utilizing the present invention with the solid lines showing the forward position and the dotted lines showing the rearward position.

Referring to the drawings and especially to FIGURE 1, a power chain saw 10 is shown having a frame 12 to which is connected a gasoline engine or other power unit 14. A plunge bow guide bar 16 and sprocket 18 are connected to the front end of the frame 12 and a saw chain 20 mounted on the sprocket and guide bar to move thereabout in a clockwise direction, as seen in FIGURE 1.

Inasmuch as FIGURE 1 shows a general view of the invention in its proper environment and FIGURES 2-4 show various positions of a conventional chain saw wherein a straight slot mounting means is utilized, the invention is most clearly shown in FIGURE 5 and the following description will thus be best seen in this figure.

Operably connected to the power unit 14 is a shaft 22 on which sprocket 18 is secured to rotate with the shaft. Plunge bow guide bar 16 has a rear base portion 16a, from which an upper portion 16b and a lower portion 16c project in an outwardly diverging direction. A front, arcuate portion 16d connects the free ends of portions 16b and 16c, thus forming an integral enclosed bow member. The portions 16b, 16c, and 16d have peripheral edges 24, 26, and 28 respectively. A continuous groove 30 may or may not be cut in these edges to form a guide or rail means in which a segment of the saw chain rides around the guide bar. Since there are various conventional ways in which the saw chain can be guided on the guide bar, it is not believed necessary to further elaborate on this aspect of the chain saw.

The plunge bow 16 is adjustably mounted on the frame 12 by pin means 32 on the frame and slot means 34 on the plunge bow. Pin and slot means are conventional

ways of mounting a guide bar on a chain saw frame and generally comprise bolt means rigidly secured to the frame in one manner or another which extend through a straight slot means, such as shown in FIGURES 2-4.

Any conventional holding means such as a lock nut, etc., can be used to keep the guide bar rigidly positioned along the limits of the elongated slot.

In the present invention, bolts 36 and 38 can be welded or otherwise rigidly secured to the frame. The slot means 34, which is the most unique feature of the applicants' invention, comprises a forward longitudinal slot portion 40 which is in substantial alignment with the center line of the sprocket 18 at its rearward position (shown in dotted lines in FIGURE 5). Connecting with the forward slot portion 40 is a rearward slot portion 42 which is inclined downwardly, as seen in FIGURE 5. Although slot 34 is shown as two straight slot portions inclined to one another, it is apparent that the slot means could also be in the form of a continuously curved slot without departing from the intent of the invention.

As explained above, the curved slot 34 permits maintaining the proper angular relationship for the chain path to take between the sprocket and the top edge or rail of the guide bar. Thus, as mentioned above, the surface of the top rails or edges 24 are always in a straight line which is tangent to the pitch diameter of the sprocket regardless of whether the saw chain is new and in the rearward position or whether the saw chain is worn and guide bar is in the forward position.

It will be appreciated that the results mentioned in the previous paragraph are effected by the rear inclined slot portion 42 acting as a camming means which raises the rear end of the plunge bow 16 as it is adjusted forwardly.

What is claimed is:

1. In a chain saw having a body frame and a power unit, a sprocket operatively connected to said power unit to be driven thereby, a guide bar in substantially the same plane as the sprocket, a pin and slot means adjustably mounting the guide bar on the body frame to permit longitudinal shifting of the guide bar relative to the sprocket, a continuous saw chain positioned on said sprocket and on outer peripheral edges of the guide bar to move therearound upon actuation of said power unit, and cam slot means on said guide bar angularly positioned in relation to the slot means of said pin and slot means which cooperates with said adjustable mounting means to permit taking up of chain slack and at the same time change the angular relationship of the guide bar to the sprocket thus maintaining a proper angular relationship between the guide bar and sprocket throughout all adjustments of the guide bar.

2. In a chain saw having a body frame and a power unit, a sprocket operatively connected to said power unit to be driven thereby, a guide bar in substantially the same plane as the sprocket, means adjustably mounting the guide bar on the body frame to permit shifting of the guide bar relative to the sprocket, a continuous saw chain positioned on said sprocket and on outer peripheral edges of the guide bar to move therearound upon actuation of said power unit, and cam means on said guide bar which cooperates with said adjustable mounting means to permit taking up of chain slack and at the same time change the angular relationship of the guide bar to the sprocket thus maintaining a proper angular relationship between the guide bar and sprocket throughout all adjustments of the guide bar, said adjustable mounting means comprising pin means on said body frame shiftably positioned in a first longitudinal slot portion in said guide bar, and said cam means comprising a second longitudinal slot portion inclined with and connecting with said first slot portion so that said pin means can readily move from the first slot portion to the second inclined slot portion to cam the guide bar

and change the angular relationship between the guide bar and the sprocket when adjusting the guide bar to take up chain slack.

3. In a chain saw, the combination of a frame, a sprocket rotatably mounted on said frame, a guide bar mounted on said frame in substantially co-planar relationship with said sprocket, a new chain operatively positioned on said sprocket to be driven therewith and adapted to pass over and be guided on an outer peripheral edge of said guide bar, and means selectively operable to permit movement of the guide bar longitudinally relative to the sprocket so as to take up saw chain slack and at the same time to change the angular relationship of the guide bar to the sprocket thus maintaining a proper angular relationship for the saw chain in its movement from the sprocket to the guide bar throughout all adjustments of the guide bar, said means permitting movement of the guide bar and to change the angular relationship thereof comprising pin means on said frame, an elongated slot means extending inwardly from the end of the guide bar adjacent said sprocket, said slot having a rearward portion angularly inclined relative to a forward portion so that when said pin means are inserted within said slot means and the guide bar moved relative to the sprocket, the guide bar is cammed into a proper angular relationship with said sprocket.

4. In a chain saw having a frame on which a sprocket and guide bar are mounted and a saw chain whereby the saw chain is driven by the sprocket to move around the guide bar, the improvement comprising pin means on said frame and non-linear, longitudinally extending cam means on said guide bar operable to permit longitudinal movement of the guide bar relative to the sprocket and at the same time to change the angular relationship of the center lines of the guide bar and sprocket in order to provide necessary support of the saw chain on the guide bar.

5. In a chain saw having a frame, a power unit, a shaft connected to and driven by said power unit, a sprocket mounted on and rotated with said shaft, a plunge bow guide bar positioned in co-planar and spaced relationship with said sprocket, said guide bar comprising a rear base portion from which outwardly inclined upper and lower portions diverge, a curved forward portion connecting the free ends of said diverging portions thus forming an enclosed bow, guide means on the outer peripheral edges of said guide bar portions on which a continuous, flexible saw chain moves after the saw chain is first positioned around said sprocket, and a non-linear longitudinally-extending cam slot means in said guide bar base portion cooperating with pin means rigid with and projecting outwardly from said frame to permit simultaneous relative longitudinal and angular movement of said guide bar with said sprocket, thus maintaining in all positions of guide bar adjustment an ideal chain path relationship whereby the extension of the peripheral edge of the upper guide bar portion is always in a straight line which is substantially tangent to the pitch diameter of the sprocket.

6. In a chain saw as recited in claim 5 wherein said cam slot means comprises a front slot segment whose center line is in alignment with the center line of the pin means and the center line of the sprocket when the guide bar is in its most rearward position of adjustment, and a rear slot segment which connects with said forward slot segment and whose center line is inclined downwardly from the center line of the front slot segment.

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