Jan. 27, 1970 J. H. CARTER 3,491,479

TOY CHAIN SAW INCLUDING SOUNDER

Filed Jan. 20, 1967 2 Sheets-Sheet 1

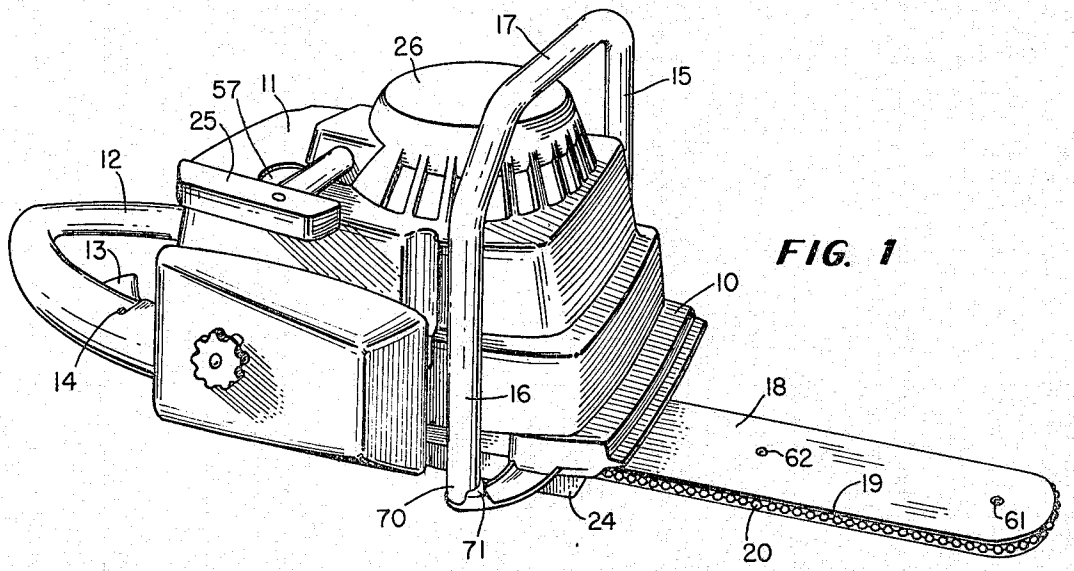


FIG. 1

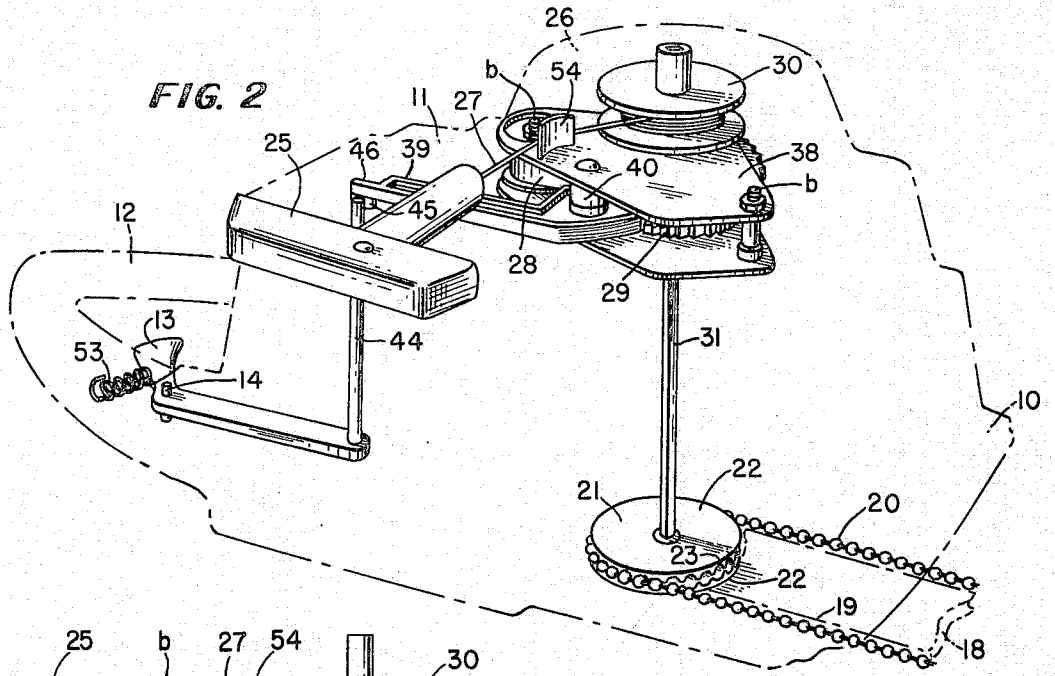


FIG. 2

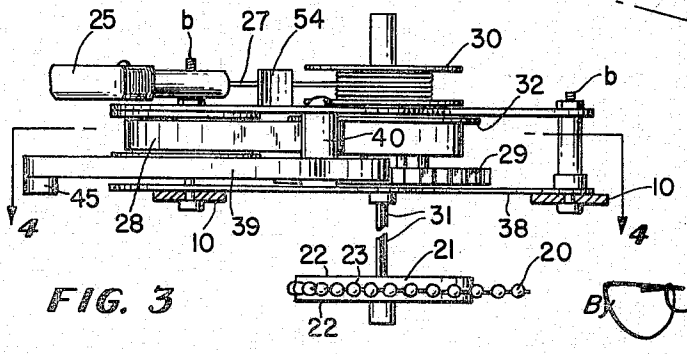


FIG. 3

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TOY CHAIN SAW INCLUDING SOUNDER

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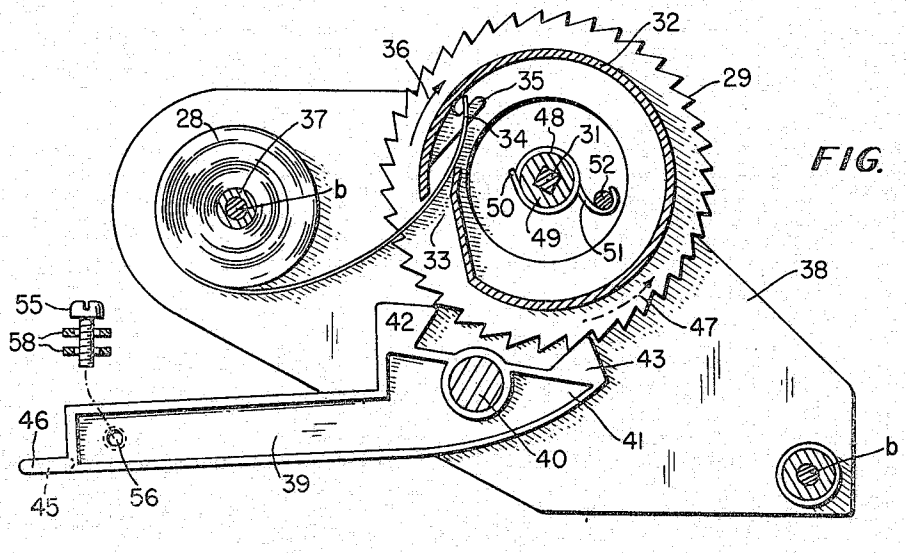


FIG. 4

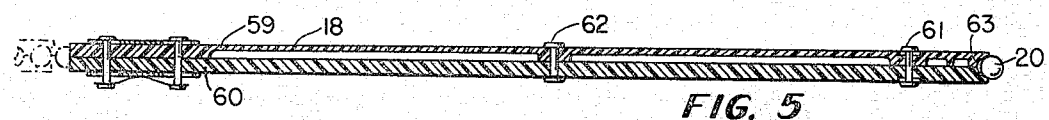


FIG. 5

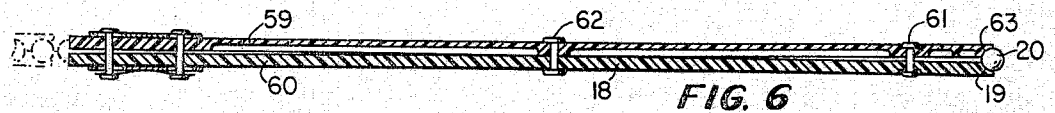


FIG. 6

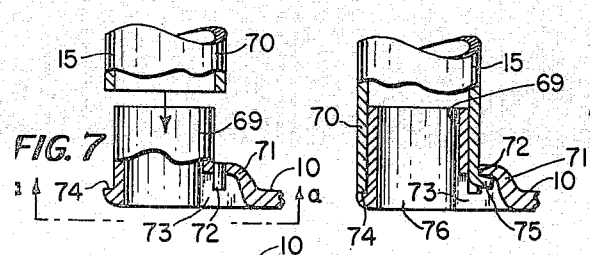


FIG. 7

FIG. 7b

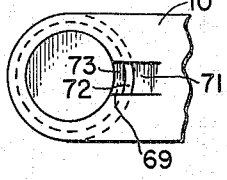


FIG. 7a

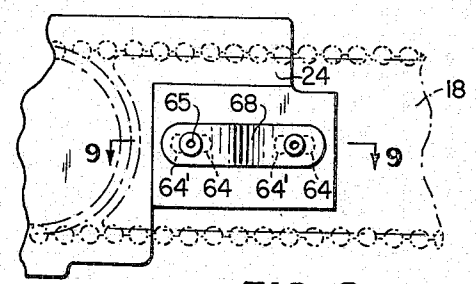


FIG. 8

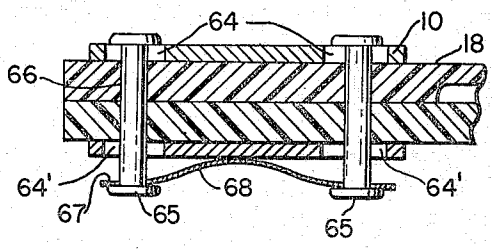


FIG. 9

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TOY CHAIN SAW INCLUDING SOUNDER

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Int. Cl. A63h 5/00, 31/00
U.S. Cl. 46—39 16 Claims

ABSTRACT OF THE DISCLOSURE

This miniature toy chain saw closely resembles the full-size chain saws operated by internal combustion engines or motors and incorporates a pull-cord, the pulling of which winds a spring having driving connections with a motor sound producing ratchet mechanism, through which the spring drives a harmless ball chain running on the periphery of an elongated blade similarly as the saw chain on a conventional chain saw. A trigger provided on the handle end releases an escapement element holding the ratchet wheel against turning, and spaced teeth on the escapement element in the rapid oscillation thereof relative to the teeth of the ratchet wheel gives a sound like a motor on a real chain saw. The sound can be controlled by suitably weighting the outer end of the escapement element to vary the freedom of oscillation thereof.

This invention relates to a toy chain saw.

The principal object of this invention is to provide a toy which, in miniature, bears close resemblance to the real thing that is operated by an internal combustion engine or motor and has pull-type starter mechanism and a trigger control for the motor at the handle end, the present toy with this objective in view, including:

(1) A pull cord provided for winding up a spring having driving connections with a motor sound producing ratchet wheel and a sprocket wheel for driving the "saw chain," which in the present toy is one made up of harmless balls but otherwise is adapted to run in a similar way as the saw chain on a conventional chain saw;

(2) A trigger provided on the handle end of the toy for releasing an escapement, which, up to the moment of depression of the trigger, holds the ratchet wheel against turning, the two spaced teeth on the escapement element in the rapid oscillation of said element when it is free to oscillate giving a sound closely resembling that of the motor of a real chain saw in operation;

(3) Two elongated plates forming the supporting frame and guide for the "chain" closely resemble in appearance the corresponding blade part on a real chain saw, these plates being grooved peripherally to define together a V-groove in which the ball chain is adapted to operate, and, to avoid any likelihood of the ball chain binding even momentarily and causing stoppage, these plates are made of flexible material and adapted to spread slightly at the groove to insure freedom of movement of the ball chain; and

(4) Means for regulating the speed of operation and, with it, the pitch of the sound maker, comprising a weight which can be applied to the outer end of the oscillatable arm of the escapement element near the extremity that is engaged by a projection on the trigger, this weighting of the escapement element reducing its freedom of oscillation so that the speed is governed accordingly, and the sound making is changed also, depending upon how much weight is applied.

Other objects and advantages will appear in the course of the following description, wherein reference is made to the accompanying drawings, in which:

FIG. 1 is a perspective view of the toy chain saw of my invention;

FIG. 2 is a slightly enlarged perspective phantom view of the handle end of the toy showing the ball chain drive and the sound maker mechanism, as well as the pull cord for winding the spring, and the trigger for controlling the operation of the toy;

FIG. 3 is a edgewise view of what appears in FIG. 2 with the exception of the trigger, a portion of the drive shaft being broken away to save space and to enable showing all of the parts on a larger scale;

FIG. 4 is a section on the line 4—4 of FIG. 3 on a further enlarged scale;

FIG. 5 is a longitudinal section through the two-piece chain guide frame or blade portion of the toy;

FIG. 6 is a similar section illustrating the flexing of the plates to provide a wider guideway for the ball chain so as to avoid the danger of a binding action;

FIGS. 7, 7*a* and 7*b* are enlarged details showing a novel method employed for fastening the two ends of the U-shaped tubular handle to the frame, FIG. 7*a* being a view on the line *a*—*a* of FIG. 7, while FIGS. 7 and 7*b* illustrate, respectively, how one end of the tube forming the handle is first slipped into place over a tubular projection on the frame and then a lug is cut and swedged outwardly from the wall of the tube at this end to lock the assembled parts together permanently; and

FIGS. 8 and 9 are two fragmentary views pertinent to the novel way the chain guide frame or blade is adjustably mounted on the main frame, FIG. 9 being a section on line 9—9 of FIG. 8.

The same reference numerals are applied to corresponding parts throughout the views.

Referring to the drawings, the reference numeral **10** designates a die-cast frame, to one side of which is suitably secured a housing **11** having a handle extension **12** rigid with the rear end thereof in which the control trigger **13** is pivoted, as indicated at **14**, to be operated by the index finger of the operator's right hand in the same way as the control trigger on a real chain saw. The handle **12** is held in the operator's right hand while the tubular generally U-shaped handle **15**, which is mounted on the frame **10** on the front end of the housing in transverse relationship to handle **12**, is held in the left hand either by its side portion **16** or its top portion **17**, similarly as in the operation of a real chain saw. The generally rectangular chain guide frame or blade **18**, which is suitably secured to the front end of the frame **10** and extends forwardly therefrom, provides a peripheral generally V-shaped groove **19** thereon in which a ball chain **20** operates similarly as the saw-teeth carrying chain on a real chain saw. The ball chain **20** is driven by a sprocket **21** that is formed by two circular disks **22** having registering V-shaped notches **23** provided in the periphery thereof, which together define half depth pockets to receive the balls on the chain **20** to transmit drive to the chain and thereby give the youngster a very close approximation of what he sees in a real chain saw, without, however, giving rise to any danger of injury to himself or damage to whatever he might bring the toy into contact with while it is in operation. A cover plate **24** that is fastened to the frame **10** with the inner end of the blade **18** conceals the sprocket **21** and therefore eliminates any likelihood of the youngster getting his fingers pinched between the ball chain **20** and the sprocket. A generally T-shaped handle **25** projects from one side of the generally circular shaped left hand side portion **26** of the housing **11**, where the handle for pull-starting of the gasoline engine in a real chain saw is located, thereby further adding to the close resemblance to the real chain saw in this toy, although here the handle **25** is used only

to pull a cord **27** used for winding a spring motor **28** to drive not only the sprocket **21**, previously mentioned, but also a motor sound making ratchet wheel **29**. A cord reel **30**, on which the cord **27** is wound has a square center hole the same as sprocket **22** and is mounted on a square drive shaft **31** with the sprocket **21** and a spring reel **32**, which likewise has a square center hole. The latter, as seen in FIGS. 3 and 4, has a slot **33** transversely of the periphery thereof through which the slotted end **34** of the spring **28** is extended and attached to a hook **35** on the inside of the reel so that when the cord reel **30** is turned in a clockwise direction by an outward pull on the cord **27** with handle **25**, this clockwise rotation is transmitted through shaft **31** to spring reel **32** to wind up the spring on the outside of the latter, as indicated by the full-line arrow **36** in FIG. 4. Spring **28** is rotatable freely on a spindle **37** provided in the frame **38**, and there is an escapement lever **39** which serves either to prevent unwinding of the spring from reel **32** or to control and regulate its unwinding. Lever **39** is pivoted at one end, as at **40**, to the frame **38** and has a two-toothed sound making pawl or crosshead **41** provided on this end, which, when the lever is not held against oscillating causes its oscillation as the two teeth **42** and **43**, which are triangular shaped but so inclined relative to one another, as seen in FIG. 4, to move alternately into and out of engagement with the teeth of the ratchet wheel **29**. This operation gives a good imitation of the sound given off by a motor on a real chain saw in operation. The trigger **13** is pulled to release or free the lever **39** for oscillation by shifting a stop pin **44** from its blocking relationship to a lug **45** provided on one side of the extremity **46** of the lever **39**. In the sound making, which is helped to some extent by the amplification due to enclosing the mounting of frame **38** by bolts *b* on portions of frame **10**, as indicated in FIG. 3, the spring **28** unwinds from reel **32**, turning ratchet **29** in a counter-clockwise direction as indicated by the dot-and-dash arrow **47** in FIG. 4. A one-way clutch for driving ratchet wheel **29** by reel **32** is provided by a coiled spring **48** which closely frictionally surrounds the hub **49** of the reel **32** and has its one end **50** free while the other end **51** which extends outwardly from the spring is hooked onto a pin projection **52**, provided on one side of the ratchet wheel **29**, whereby, in winding the spring, to allow the reel **32** to turn relative to the ratchet wheel, but later transmit drive from the reel **32** to the ratchet wheel **29** only when the reel turns in the counter-clockwise direction of arrow **47**, namely, when the trigger **13** is pulled to unblock the escapement lever **39** and accordingly allow free oscillation of the lever and its cross-head **41** with respect to the teeth of the ratchet wheel **29** as it is turned through ten or more turns per winding of the spring **28**. In other words, the escapment lever **39** serves for releasably locking the ratchet wheel **29** to enable winding up the spring, and it also serves with the ratchet wheel **29** as the sound-maker when the trigger **13** is released, the ratchet wheel **29** in this operation turning with the reel **32** through the action of the one-way clutch spring **48** so that the drive shaft **31** drives the sprocket **21** to drive the chain **20** throughout the recoiling of spring **28**.

In operation, the trigger **13** is held by means of a coiled compression spring **53** (FIG. 2) in a position holding its pin **44** in blocking relation to lug **45** on escapement lever **39**. Hence, when the handle **25** is pulled, the cord **27** sliding over the arcuate abutment **54** provided on one of the two plates forming the frame **38** unwinds the cord from the reel **30** while the shaft **31** is turned to turn the reel **32** and wind up the spring **28** thereon, the clutch spring **48** slipping on the hub **49** in this clockwise rotation of the reel **32** so that there is no tendency to turn the ratchet wheel **29** during this winding operation. The teeth **42** and **43** of the cross-head **41** hold the ratchet wheel **29** against turning in the counter-clockwise direction of arrow **47** until the trigger **13** is pulled to shift the pin **44** angularly relative to lug **45** and longitudinally relative to escapement lever **39** to unblock lug **45** on the escapement lever **39** and allow it to oscillate for the sound-making function in the turning of the ratchet wheel **29**, the latter turning with the reel **32** in the counter-clockwise direction of arrow **47** while the clutch spring **48** in this operation serves to transmit drive from the reel **32** to the ratchet wheel **29** under action of spring **28** in its recoiling on spindle **37**. The shaft **31** transmits drive from hub **49** of reel **32** to sprocket wheel **21** to drive the ball chain **20** at the same time that the sound-making is produced by the co-action of ratchet wheel **29** and escapement lever **39**, so that the operation is quite realistic and enjoyable to a youngster. On the other hand, if the sound-making proves to be too loud and irritating to adults in the household, the speed of operation can be reduced and the sound-making toned down considerably by adding weight to the outer end of the lever **39** as by threading a screw **55** in a hole **56** located near the outer end of the escapement lever **39**, the added weight serving to dampen the oscillation of the lever. A hole **57** may be provided in the housing **11** to afford access to the free end of the escapement lever **39** for addition or removal of the screw. One or more washers **58** may be added under the head of the screw **55** if additional damping of the oscillation of lever **39** is desired. In that way the sound-making can be controlled to suit the needs of the situation. Obviously, if the toy is used outdoors where the sound-making is usually not objectionable, the screw **55** and the one or more washers **58** can be removed to allow free oscillation of the escapement lever **39**.

As seen in FIGS. 5 and 6, the blade **18** is made up of two generally rectangular flexible resilient plates **59** and **60** that are normally bowed apart between their ends but are riveted together, as at **61** and **62**, to urge the opposite ends together under a predetermined preload spring pressure, the two spaced points being on the longitudinal center line of the blade **18**. The peripheral portions of the two plates each provides one half of a generally V-shaped groove or guideway **63** in which the balls of the chain **20** are arranged to slide freely in the operation of the toy. Freedom of movement of the chain **20** is assured by virtue of the flexibility of these plates **59** and **60** with respect to the fastening rivets **61** and **62**, as illustrated in FIG. 6, where the peripheral portions are shown as spread apart. In that way there is avoided any likelihood of the ball chain **20** binding even momentarily, and there accordingly is never any danger of the toy failing to operate properly due to lack of freedom of movement of the ball chain. On the other hand, the ball chain must, of course, be made short enough to insure its staying in the groove **63** so a fairly close fit is called for and makes it advisable to have the frame plates spreadable apart readily enough to eliminate the likelihood of any binding. The blade **18** is preferably adjustable lengthwise to a limited extent relative to the frame **10** and cover plate **24**, as shown in FIGS. 8 and 9, to permit setting the blade **18** for precisely the right freedom of operation of the ball chain **20**, regardless of differences in the overall lengths of the ball chains, which in quantity production are found to vary in length appreciably. Thus, there are registering slots **64** and **64'** provided in the frame **10** and cover plate **24**, respectively, spaced lengthwise thereof, through which the two spaced rivets **65** that fasten the blade to the frame **10** extend, allowing the blade **18** to be adjusted lengthwise relative to the frame to the small extent necessary. The two rivets pass through registering holes **66** in the frame **10** and registering holes **67** in the opposite ends of a bowed leaf spring **68** bearing against the outer side of the cover plate, thereby holding the blade **18** in a desired adjusted position while still enabling the blade **18** to be shifted one way or the other to get the ball chain **20** running nicely on the blade if at any time it tends to bind, or,

on the other hand, is too loose. The main purpose, however, is to facilitate quantity production of these toys by enabling setting the blades in the first instance at the time of assembling the toys so that the chains run properly regardless of anticipated variation in the overall lengths of the chains.

As seen in FIGS. 7 and 7*b* there are cylindrical tubular bosses **69** provided on the die-cast frame **10** over which the two ends **70** of the tubular generally U-shaped handle **15** can be secured in telescoping relationship to these bosses, and, in order to make for a simple and economical construction and yet one which will eliminate any likelihood of either end of the handle being pulled off its boss **69**, I have provided the die-cast frame part **10** with hollow semicircular bosses **71** in concentric relation to the base of the tubular bosses **69** and spaced therefrom by semicircular grooves **72** which open into the inside of the bosses **71** on to the limited extent indicated at **73** in FIG. 7*a*, this opening **73** being in the nature of a wise keyway. When the end **70** of the tube **15** is slipped over the boss **69** into abutment with the annular shoulder **74** around the base of the boss **69**, a lug **75** can be struck from the wall of the tube at the end thereof, as shown in FIG. 7*b*, by entering a tool in the bore **76** of boss **69** having a radial swedging projection to enter the keyway **73** and thereby cut and form the lug **75** from the end of the tube **15** for permanent fastening of the tubular handle to the frame **10**.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modifications and adaptations.

I claim:

1. In a toy chain saw, comprising a frame having front and rear portions, an elongated blade rigid with and extending from the front portion of said frame, and supporting and guiding handle means for said toy rigid with and extending from said frame, the improvement comprising an endless belt guided on the periphery of said blade, and combination drive means and sound making means on said frame for propelling said belt, comprising a drive shaft mounted on said frame, a reel non-rotatable on said shaft, a spool on said frame on which a spiral spring is carried in radially spaced relation to said reel, the spring having a free outer end attached to and windable on said reel, means for turning said shaft in one direction to wind said spring onto said reel, a drive transmitting member non-rotatably mounted on said shaft to transmit drive to the endless belt, a ratchet wheel rotatable in said frame relative to said shaft, one-way clutch means drivingly connecting said reel with said ratchet wheel permitting free turning of said reel relative to said ratchet wheel in the winding direction only, and a combination ratchet wheel speed control and sound-making pawl oscillatable relative to said frame and having two teeth in circumferentially spaced relation to and engageable alternately with the teeth of said ratchet wheel.

2. A toy chain saw structure as set forth in claim **1** including means whereby said elongated blade is adjustable endwise relative to said frame toward and away from said drive means on said frame to loosen or tighten said endless belt.

3. The structure as set forth in claim **2** wherein the frame has spaced slots provided therein for the adjustability of said blade relative to said frame on spaced supports extending through said slots, the structure including an elongated leaf spring mounted at opposite ends on said supports and having a bowed middle portion which exerts spring pressure on said blade between said supports yieldingly to hold said blade in a selected position of adjustment.

4. A toy chain saw structure as set forth in claim **1** including a trigger adjacent a handle of said handle means and operable by the same hand holding said handle for controlling the operation of said drive means.

5. A toy chain saw structure as set forth in claim **1** wherein the means for turning the shaft in one direction for winding the spring is operable by a pull-cord wound on a second reel which turns in the rewind direction with the drive means in the operation thereof, the pull-cord being operable by a handle on the outer end thereof in a manner similar to the starter rope of a conventional full size chain saw operable by a pull started internal combustion engine.

6. A toy chain saw structure as set forth in claim **1** including a lever oscillatable with said pawl, and manually operable means for preventing oscillation of said lever whereby to control operation of said toy.

7. A toy chain saw structure as set forth in claim **1** including a lever oscillatable with said pawl, and a trigger operated means blocking oscillation of said lever whereby to control operation of said toy, said trigger being disposed adjacent a handle of said handle means so as to be operable by the same hand holding said handle.

8. A toy chain saw structure as set forth in claim **1** including a lever oscillatable with said pawl, and weight means removably attachable to the free end portion of said lever to dampen its oscillations and accordingly moderate the sound-making and govern the speed of said ratchet wheel.

9. A toy chain saw structure as set forth in claim **1** including a lever oscillatable with said pawl, and weight means removably attachable to the free end portion of said lever to dampen its oscillations and accordingly moderate the sound-making and govern the speed of said ratchet wheel, this means including a screw threadable in a hole provided in said lever, and washer means mountable in different amounts on said screw to vary the weight.

10. The combination set forth in claim **1** wherein the means for turning the shaft in one direction to wind said spring comprises a second reel non-rotatably mounted on said shaft, and a pull-cord wound on said second reel to turn the shaft in a direction to wind said spring, said second reel rewinding said cord in the turning of the shaft in the opposite direction by said spring.

11. The combination set forth in claim **1** including a relatively large housing to which said frame is in sound transmitting relationship to amplify the sound.

12. A toy chain saw structure as set forth in claim **1** wherein the endless belt is a ball chain.

13. In a toy chain saw comprising a frame having front and rear portions, an elongated blade rigid with and extending from the front portion of said frame, and supporting and guiding handle means for said toy rigid with and extending from said frame, the improvement comprising means for making sounds simulating a chain saw, said means having, in combination, a drive shaft mounted on said frame, a reel non-rotatable on said shaft, a spool on said frame on which a spiral spring is carried in radially spaced relation to said reel, the spring having a free outer end attached to and windable on said reel, means for turning said shaft in one direction to wind said spring onto said reel, a ratchet wheel rotatable on said frame relative to said shaft, one-way clutch means drivingly connecting said reel with said ratchet wheel permitting free turning of said reel relative to said ratchet wheel in the winding direction only, a sound making pawl oscillatable relative to said frame and having two teeth in circumferentially spaced relation to and engageable alternately with the teeth of said ratchet wheel, the alternate engagement of said sound making pawl with the teeth of said ratchet wheel producing the sound simulating that of a chain saw, and means releasably preventing oscillation of said pawl.

14. A toy as set forth in claim **13** including an elongated lever oscillatable with said pawl to dampen the oscillation of said pawl, and means blocking the oscilla-

tion of said lever to maintain the wound condition of said spring until the sound-making means is to be set into operation.

15. A toy as set forth in claim **13** wherein the means for turning the shaft in one direction to wind said spring comprises a second reel non-rotatably mounted on said shaft, and a pull-cord wound on said second reel to turn the shaft in a direction to wind said spring, said second reel rewinding said cord in the turning of the shaft in the opposite direction by said spring.

16. A toy as set forth in claim **13** including a relatively large housing to which said frame is in sound transmitting relationship to amplify the sound.

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F. BARRY SHAY, Primary Examiner

U.S. Cl. X.R.

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