TOY CHAIN SAW INCLUDING SOUNDER

Fig. 1

Fig. 2

Fig. 3
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 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 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 an edge 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, 7a and 7b are enlarged details showing a novel method employed for fastening the two ends of the U-shaped tubular handle to the frame, FIG. 7a being a view on the line a--a of FIG. 7, while FIGS. 7 and 7b 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. A real 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 as well as the greatest safety 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 the 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 26, 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 outside 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 to the sprocket 22 by means of the cord reel 32, to wind 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 the speed of the motor 27 in a predetermined manner as at 40, to the frame 38 and has a two-toothed sound making pawl or crosshead 41 pivoted on this end, which, when the lever is not held against oscillating caused 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 some extent by the amplification due to enclosing the mounting of frame 38 by bolts 50 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 end 50 on 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 reel 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 crosshead 41 through reel 32 to ratchet wheel 29 as it is turned through ten or more turns per winding of the spring 28. In other words, the escapement lever 39 serves for releasably locking the ratchet wheel 29 to enable winding up the spring, and it also serves with the reel wheel 29 as the sound-maker when the trigger 13 is released. The ratchet wheel 29 in this operation turns 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 reel 30 while the shaft 31 is turned to turn the reel 32 and wind up the spring 28 therein, the clutch spring 48 slipping on the hub 49 in this clockwise operation of the reel 32 so that there is no tendency to turn 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 coaction 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 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 as are riveted together, as at 61 and 62, with the opposite ends together under a predetermined preload as shown, 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 becoming bound together temporarilysthere is accordingly 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 as a fair 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 10, 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, positioned lengthwise thereof, to receive 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 edge 69 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 7b 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. 7b, 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. 7b, by entering a tool in the bore 76 of boss 69 having a swaging project 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 mounted 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, and a pull-cord wound on said second reel to turn the shaft in a direction to wind said spring, said second reel rewrinding said cord in the turning of the shaft in the opposite direction by said spring.

2. 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 rewrinding said cord in the turning of the shaft in the opposite direction by said spring.

3. 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.

4. A toy chain saw structure as set forth in claim 1 wherein the endless belt is a nickel chain.

5. 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 including, 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, 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.
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.