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[54] **PROTECTION ARRANGEMENT AT CHAIN MOTOR SAWS**


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[51] **Int. Cl.** ..... **B27g 19/00**

[58] **Field of Search** ..... 30/286, 381, 382; 74/527; 192/56 L, 138, 150; 83/788, 814, DIG. 1



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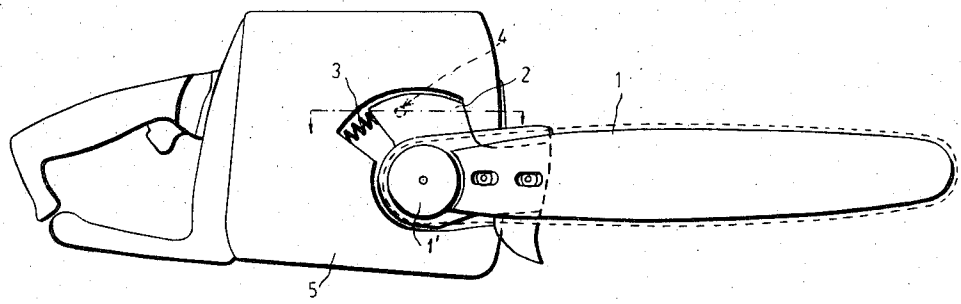
[57] **ABSTRACT**

A chain saw operated by an internal combustion engine in which the forces of a "kick-back" or throw resulting when the nose of the rotating chain engages a work piece, is minimized by means of a safety device which absorbs movement of the saw blade about the drive wheel axis and in which a spring-urged detent means acts normal to the plane of the blade to hold the blade in a normal, operative position; including means for shorting out the internal combustion engine by relative movement between a housing and saw blade support section; and including means for reorienting the saw blade to a normal work position after the "kick-back" force diminishes.


**3 Claims, 2 Drawing Figures**



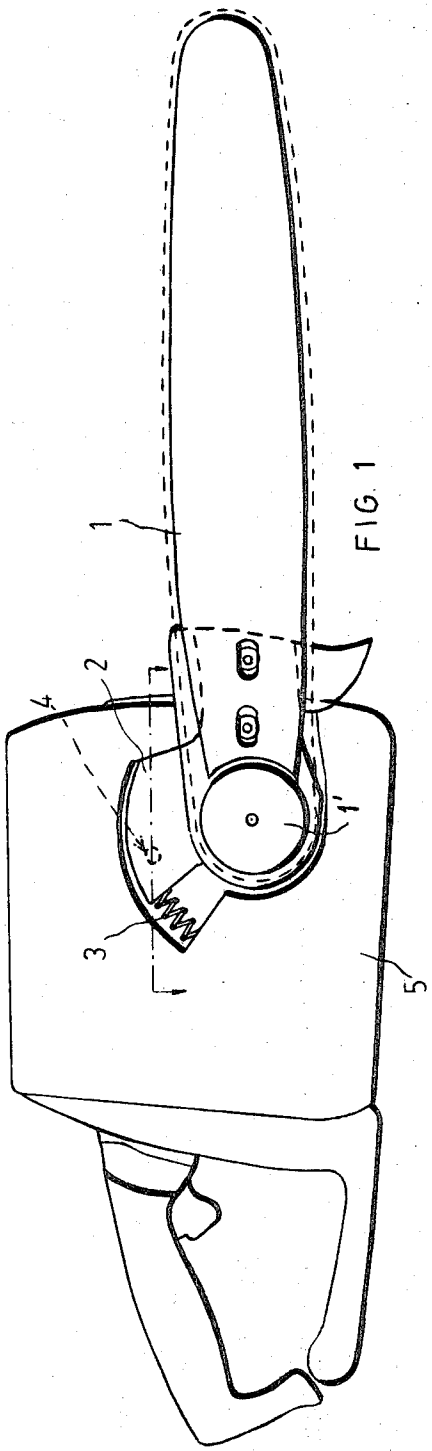



FIG. 1

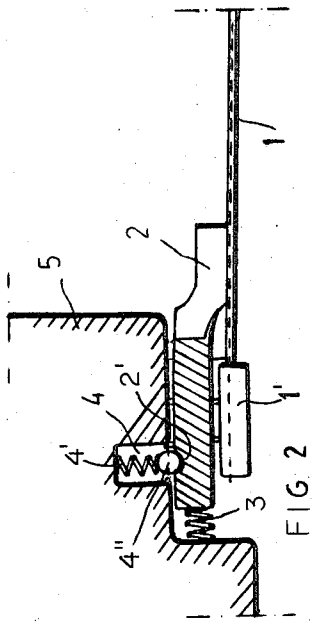



FIG. 2

# PROTECTION ARRANGEMENT AT CHAIN MOTOR SAWS

## FIELD OF THE INVENTION

The instant invention concerns a protective or safety device for power saws whereby the chance of accidents due to throw or "kick-back" is reduced.

## BACKGROUND OF THE PROBLEM

As soon as power chain-saws were utilized in the area of forestry for the removal of branches from trees, the number of accidents caused by throw or "kick-back" has increased to catastrophic proportions. Removal of branches from trees by means of power chain-saws is currently considered to be one of the most dangerous operations in forestry. In this regard, the accidents caused by throw or "kick-back" exceeds all other accidents in this connection.

## BACKGROUND EXPEDIENTS OF THE PRIOR ART

In order to reduce the accident-rate, various measures have been taken such as, for example:

1. So called protective means from throw or "kick-back" have been mounted on the saws which prevent the supporting hand from coming into contact with the handle around the frame-handle of the saw so that a "thrown" blade will not come into contact with the hand.

2. Personal protective equipment is recommended, such as, for example, safety-gloves and helmets in order to reduce the danger resulting from throw.

3. A few types of so called branch chain saws have been tested which reduce the depth of the cut at the nose-wheel so that the force generating a throw is reduced.

4. Brake-devices are mounted on the saw-chain; are coupled to a throw-controller mentioned above under 1. The force on the throw-controller functions as a brake-effect for stopping operation of the chain saw and shorts-out the ignition to the power source. It is difficult to justify the expense of these devices and to retain them in a dependable operative condition during field-operation.

The various measures each in themself contribute to reduce the danger of accidents, however, only a modification of the chain-saw (under 3 above) seems to provide for a reduction of the force or movement-energy of the saw during the generating of a throw. The other measures have no effect on the force generating the throw or on the speed and movement energy of the saw, after the generating of the throw. In addition, many prior art devices have the disadvantage in that they are uncomfortable or clumsy to handle, and in certain instances make it difficult to function efficiently, and at the same time do not provide the user with sufficient protection.

## SUMMARY OF THE INVENTION

The instant invention concerns reducing the movement-energy which the saw generates during a throw so that the time between the possible generation of a throw and an accident is substantially increased, so that the user of the power saw, if necessary, has the time to react and stop operation of the saw.



The instant invention is effective to reduce breakage of the cutting chains, by reducing the high stress on the chains which developes during a throw. This results not only in an increased use-life of the chain but also reduces the number of accidents due to broken chains.

The instant invention also serves to reduce noise and vibration which are normally transmitted between the blade or chain and the body of the saw which makes the user of the saw more comfortable and reduces wear and metal fatigue.

The power chain-saw of the instant invention comprises at least of two movably connected parts which are integrated to each other by means of a spring and-/or connecting mechanism with or without a locking device.

The part on which the blade-nose is mounted should be as light in weight as possible in relation to the remainder of the saw in order to obtain the best possible effect. If the blade nose of the saw-chain, for example, contacts a tree-branch, then the throw-force should provide that the blade-nose by which the saw-chain is guided be the contact-point between chain saw and branch, since the body of the saw is not moved to any great degree. This will provide the chain-saw with an impulse-momentum which represents only a fraction of the entire impulse-momentum of the saw during a throw and the period of generating a throw becomes much shorter. If later, the movement energy to which the nose of the saw-blade is subjected, is transmitted to the entire saw, the speed of the saw is then so low that the user of said saw encounters no difficulty in stopping the saw, if he needs to stop the movement at all.

A safety-device according to the instant invention which provides these advantages, should be constructed with the characteristics where the power saw comprises at least two movably connected parts, where one consists of a saw-blade inserted in the saw, and relative to the other part of the saw, is movably arranged in the plane of the saw-blade.

## BRIEF DESCRIPTION OF THE DRAWINGS

The following describes in more detail an embodiment of the safety-device of the instant invention by the attached drawings, whereof;

FIG. 1 shows a side-elevation of a power chain-saw, provided with the safety-device of the instant invention; and

FIG. 2 is a cross-sectional view substantially on the plane of the line 2—2 of FIG. 1.

A simple exemplary embodiment of the instant invention consists of a saw-blade 1 suitably secured to a blade-holder 2; said blade-holder being rotatably arranged in the plane of the blade, and being afixed at the center of a chain-gear drive wheel 1' defining the center of the tilting-movement.

The blade-holder is retained in a neutral or normal work position by means of a spring urged locking device 4, which consists of a ball 4'' which is urged by means of a spring 4' towards the plane of the saw-blade; the ball 4'' may be positioned, for example, in body 5 of the power chain-saw and enters partially into a recess 2' in the blade-holder 2 during the normal operating position of the blade-holder 2. When reaction force or thrust develops on the blade-holder, the blocking-ball 4'' is presssed inwards and the saw-blade and blade-holder are pulled, rotated, thrown or "kicked back" in relation to the body 5 of the saw. The energy

which urges the saw-blade and the blade-holder to rotate is received by an energy-receiving means 3 which comprises a return-spring; the force is received or absorbed by the body 5 of the saw. The movement through which the saw-blade may pivot in relation to the body 5 may be limited to about 10° about the axis of drive wheel 1'.

The above-mentioned energy-receiving damper means may consist of other expedients such as a braking-rod or a tensioned strand which releases when its stability is exceeded by the throw-force. The damper-means should react as fast as possible; i.e., to release the blade as fast as possible when the reaction-force exceeds a predetermined limit. This will prevent thrust-impulse on the body of the power chain-saw from being transmitted during the generation of a throw or "kick-back."

The above-mentioned damper and/or return-spring may be replaced by a pneuamtic damper or piston in another embodiment of the instant invention disposed on the pressure-side where reaction-pressure is transmitted by the combustion motor of the chain-saw during a throw, whereby the angular speed of the blade is retarded and the blade is later returned to the neutral position.

A still different embodiment of the instant invention can comprise a brake device (for example, a shoe brake or band-brake device) which stops the saw-chain motor during a throw. The brake device is actuated by the movement of the blade-holder in relation to the body of the saw. The reaction force of the holder of the blade brake device may thereby be used to reduce the acceleration of the saw-body, when the movement of the blade is reduced after a throw.

The apparatus may also be constructed in a manner wherein the neutral position of the saw-blade may be altered so that, for example, one may turn the blade during the removal of tree branches in relation to the hand grips of the saw in order to obtain a more comfortable working position.

Other possible alternative embodiments may consists in that the nose of the blade (for example, a nose-wheel) is displaceably attached by means of a spring or in a similar manner, in relation to the remaining part of the saw-blade; the major part of the saw-blade is fixedly united to the saw-frame.

It is also possible to mount the saw-blade, or a part thereof, for example in a universal-joint mechanism, which permits other relative movements of the saw-blade other than just tiltable movement. This should prevent the force-components generated during a "kick-back" from throwing the saw backwards, in the longitudinal direction of the blade, so that the force is not transmitted directly to the body of the saw. Some of these benefits would also be obtained if the blade-holder were tiltably suspended in the plane of the blade, however, with a tilting-center which, in a suitable manner, is eccentric in relation to the actuator or gear-drive wheel of the saw-chain.

The above describes an embodiment of the instant invention, however, as mentioned, the embodiments may vary. Certain embodiments whereby the saw-motor gears of the saw-chain stop as soon as the saw-blade is not in a neutral position, i.e., kicked out of position. The instant invention is defined in the following claims.

We claim:

**1.** In a power-operated chain saw including a body section and a blade holder section on which a chain saw blade is entrained, the improvement characterized in that one section has relative movement in the plane of the saw with respect to the other section; and means displaceably connected between said sections for permitting relative movement between the sections in the plane of the chain saw blade when reaction force due to "kick-back" occurs, said means comprising an energy-absorbing damper device interposed between the relatively displaceable sections whereby the reaction force of a "kick-back" of the blade is absorbed by the body section.

**2.** The apparatus as claimed in claim **1** in which said energy-absorbing damper device is constructed and arranged to absorb "kick-back" energy when contact between the saw blade and a work piece is interrupted.

**3.** The apparatus as claimed in claim **1** in which the energy-absorbing damper device is a return spring.

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