

[54] **CHAIN SAW SAFETY METHOD AND APPARATUS**

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[51] Int. Cl. **B27b 17/02**, B27g 19/06

[58] Field of Search 143/32 R, 17 C; 192/130; 188/82.3, 82.4, 82.7, 82.8

[56] **References Cited**

UNITED STATES PATENTS

3,664,390 5/1972 Mattsson 143/32 R

FOREIGN PATENTS OR APPLICATIONS

331,086 12/1930 Germany 188/82.8

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[57]

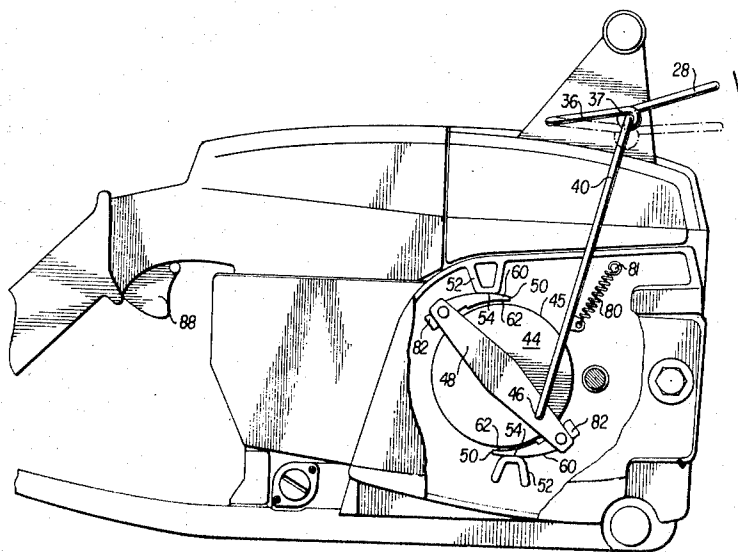
ABSTRACT

A method and apparatus for preventing injury to the hand of an operator working with a chain saw, of the type having a frame with a frame handle and a control handle, a guide rail or more conventionally termed a "guide bar," a cutting chain and power means mounted on the frame and operably connected to the cutting chain for driving the cutting chain on the guide rail.

The apparatus includes a bail handle actuation system which performs the dual function of blocking movement of the operator's hand toward the cutting chain and actuating a brake to immediately stop movement of the chain. The brake is self-locking and upon actuation jams to instantly stop movement of the chain and stall out the chain saw power means.

The method includes the steps of blocking movement of the operator's hand toward the cutting chain, actuating a self-locking brake and braking the cutting chain to an immediate stop.

3 Claims, 4 Drawing Figures



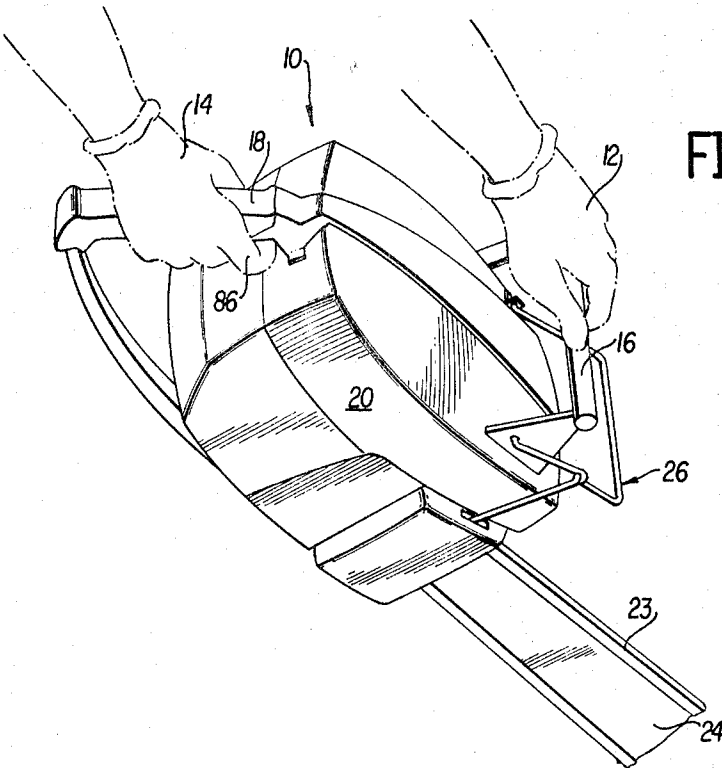


FIG. 1

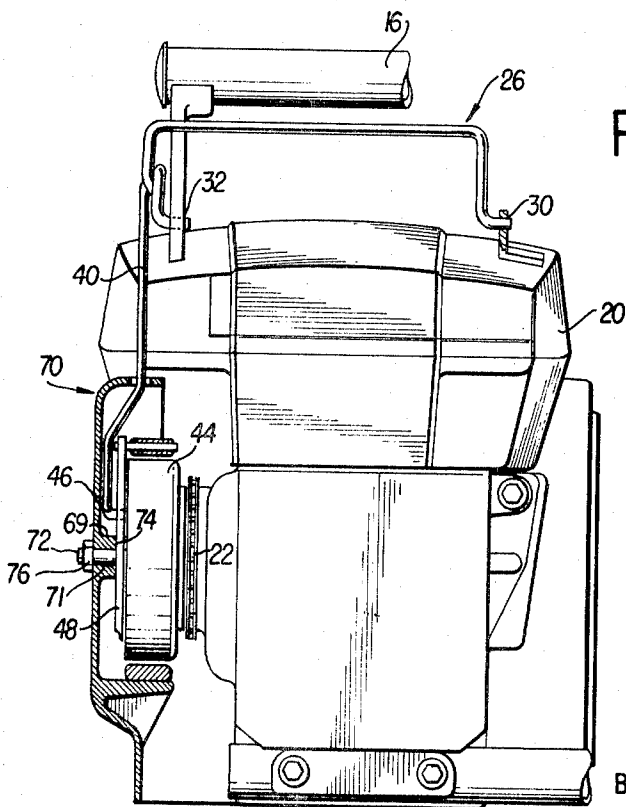


FIG. 4

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CHAIN SAW SAFETY METHOD AND APPARATUS

BACKGROUND OF THE INVENTION

This invention relates to chain saw safety method and apparatus. More particularly the invention relates to a method and apparatus for minimizing the possibility of an operator injuring his hand upon a chain saw cutting chain.

Typically a chain saw is designed to be utilized by an operator grasping the machine with both hands. An operator's left hand normally grips a frame handle while the right hand engages a control handle for actuating a trigger throttle mechanism suitable for ultimately controlling the speed of the cutting chain.

In some instances of cutting operation an operator may choose to apply downward and forward pressure on the frame handle to achieve a more rapid cutting rate. In these instances, there is the possibility of the operator's hand slipping from the frame handle toward and potentially into the rapidly moving cutting chain. Experience indicates that if an operator's hand accidentally slips into the rapidly moving cutting chain his hand and often his entire arm may be badly mangled or mutilated.

At least one previously known device which potentially may be useful for alleviating the above noted problem includes a lever arm mounted on the frame handle which, when held against the handle, operates a clutch mechanism in combination with a standard chain saw clutch, so that the chain will not be operably connected to the drive shaft unless the lever on the frame handle is kept in a depressed posture. Therefore, if the operator's hand should slip from the lever, the clutch would be disengaged and the chain would ultimately slow down and stop.

While a device, such as the above noted, may provide a degree of safety, it will readily be recognized that there is no provision for blocking movement of the operator's hand toward the chain. Further this known system merely serves to disengage a clutch so that momentum may carry the cutting chain forward momentarily thus continuing to present a potential source of injury to an operator. Still further such a device is an integral part of the normal drive system of the chain saw and thus is in continuous use presenting wear and replacement problems. Additionally it may be confining or awkward for an operator to continuously maintain the lever arm in a depressed posture.

Therefore, it would be highly desirable to provide a safety method and apparatus for blocking movement of an operator's hand toward the cutting chain of a chain saw in the event the operator's hand accidentally slips from the frame handle. Further it would be desirable to provide a safety method and apparatus to actuate and instantly brake the cutting chain to a halt so that movement of the chain would be stopped and thus minimize the possibility of cutting the operator's hand. Additionally, it would be highly desirable to provide an apparatus which would be normally out of engagement with the chain saw drive system and thus would be totally inoperative and maintenance free under normal operating conditions. Still further it would be desirable to provide a safety apparatus wherein the operator may freely handle the chain saw in a manner to which he is accustomed without feeling the constraint of maintaining a lever in a closed position at all times when the cutting chain is operating.

OBJECTS AND SUMMARY OF THE INVENTION

Objects of the Invention

It is therefore a general object of the invention to provide a method and apparatus to minimize problems of the type previously described.

It is a specific object of the invention to provide a method and apparatus to prevent injury to a chain saw operator's hand in the event the operator's hand accidentally slips from a chain saw handle toward a rapidly moving cutting chain.

It is another object of the invention to provide a safety method and apparatus for a chain saw wherein the chain saw operator does not feel constrained in his utilization of the saw.

It is still another object of the invention to provide a safety method and apparatus for a chain saw to prevent serious injury to an operator's hand which is suitable to function in a standby capacity and is thus not operative unless needed whereby coaction of the safety system with the normal drive is eliminated which minimizes maintenance and potential sources of failure.

It is yet another object of the invention to provide a chain saw safety method and apparatus operable to block movement of an operator's hand toward a rapidly moving cutting chain.

It is a further object of the invention to provide a chain saw safety method and apparatus which upon actuation serves to immediately stop rotation of the chain saw cutting chain and stall out the chain saw drive motor.

BRIEF SUMMARY

A preferred embodiment of the invention intended to accomplish at least some of the foregoing objects comprises a chain saw adapted to be held by an operator using both hands and having a frame with a frame handle and a control handle attached thereto. A guide rail is connected to the frame and serves to carry a cutting chain operably connected through a drive sprocket to a power source mounted on the frame. A brake system is connected adjacent the drive sprocket for stopping movement of the cutting chain. A brake actuation system serves the combined function of blocking downward travel of an operator's hand toward the cutting chain and actuating the brake system.

A significant method aspect of the invention comprises preventing injury to a chain saw operator's hand by actuating a self-locking brake and braking the chain saw cutting chain to an immediate stop to prevent the chain from seriously cutting the operator's hand.

THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings, wherein:

FIG. 1 is a pictorial view of a preferred embodiment of the invention disclosing an operator's hands holding a chain saw in a downwardly inclined posture which is typical when the saw is being utilized to sever a member lying in a generally horizontal position beneath an operator's waist;

FIG. 2 is a top view of the chain saw disclosing a safety bail handle operably positioned adjacent a frame handle;

FIG. 3 is a side elevational view of a chain saw disclosing in phantom the pivotally movable nature of the safety bail handle and in a partially broken away segment a self-locking brake system; and

FIG. 4 is an end view of a chain saw having a lower left hand corner thereof partially broken away to additionally illustrate the self-locking chain braking system.

DETAILED DESCRIPTION

Referring now to the drawing where like numerals designate like parts and more specifically to FIG. 1, there will be seen a chain saw 10 suitable to be held by an operator (not shown) in his left hand 12 and right hand 14. The operator's left hand 12 may grasp a frame handle 16 while the right hand is free to engage a control handle 18. The chain saw 10 is depicted in a downwardly inclined position as is typical when the operator is cutting a member lying in a horizontal posture approximately at the operator's feet. The operator's left hand may be typically used as a manipulation means to lift and apply downward cutting pressure to the saw while the right hand serves more in a control and fulcrum capacity.

The chain saw 10 is provided with a body frame 20 suitable to enhouse a power drive which typically is in the form of a small internal combustion engine having a carburetor and trigger operated throttle (not shown). The power drive within the interior of frame housing 20 may be operably connected to a chain sprocket 22 by a centrifugal clutch arrangement, such as shown, for example in the Moore et al. U.S. Pat. Nos. 2,947,399, Collins 3,385,411 or Hazzard 3,429,411. The chain sprocket 22 drives a cutting chain 23 which is supported for endless translation upon a guide rail or guide bar 24. The chain of course, serves to rip and tear a kerf through material to be severed in a well known manner of chain saw cutting operation.

The chain saw as shown in FIG. 1 also includes a chain saw safety system comprising a bail handle actuation system 26 which serves to actuate a brake system in a manner which will be described in detail hereinafter.

Referring now to FIG. 2 there will be seen a top view of the chain saw frame or casing 20 having connected generally longitudinally therewith the control handle 18 and generally transverse therewith the frame handle 16. Positioned forwardly of the frame handle 16 is the previously mentioned bail handle actuator system 26 including a safety bar 28. The safety bar 28 is positioned generally parallel with the frame handle and thus transverse to the frame 20 and cutting chain 23. The safety bar 28 is carried at its ends by connecting rods 34 and 36 which are pivotally mounted in suitable brackets on the chain saw frame 20 as at 30 and 32, respectively.

The connecting rod 36 may be provided at approximately its mid length with a loop configuration 37 which serves as a pivotal mount for one end of a push rod 40 as best illustrated in FIG. 3.

Coaxially mounted on the previously mentioned chain sprocket 22, note FIG. 4, is a generally cylindrical brake drum 44. In those instances when a centrifugal clutch is utilized such as disclosed in the previously mentioned Moore et al., Collins and Hazzard patents, the cup of the clutch may advantageously serve as the brake drum 44. As the chain saw power drive rotates the chain sprocket 22 to drive cutting chain 23, it will

also continuously rotate the drum 44. It will be noted, however, that brake drum 44 is, under normal operating conditions, free turning and does not interfere with or place limitations upon the cutting chain drive train.

As best illustrated in FIGS. 3 and 4, the push rod 40 terminates at its lower end 46 in pivotal engagement with a yoke 48. The yoke is pivotally carried by a brake casing 70, mounted upon the chain saw frame 20. In this connection, the brake casing 70 is fashioned with an interiorly extending mesa 69 having a flat surface 74. A recess 71 is fashioned through the mesa 69 coaxially with the brake drum 44. The yoke 48 is provided with a normally extending shaft 72 suitable to be rotatably received through the mesa recess 71. A suitable threaded fastener 76 engages the shaft 72 and serves to hold the yoke 48 into firm pivotal contact with the flat surface of the mesa 69.

The yoke 48 pivotally carries at its opposite ends a pair of arcuately wedge-shaped brake shoes 50. Adjacent to the brake shoes 50 are a corresponding pair of stationary frame lugs 52 having suitable arcuate surfaces 54 for abutting against the brake shoes 50.

The brake shoes themselves are fashioned with outer arcuate surfaces 60 for engagement with the stationary frame lugs 52 and inner arcuate surfaces 62 for engagement with the outer periphery 45 of brake drum 44. The brake shoes 50 may be fashioned from conventional brake lining material having a high coefficient of friction suitable for gripping engagement with the periphery of drum 44.

As best seen in FIG. 3, the brake shoes 50 are held in a normally disengaged posture from the brake drum 44 by biasing means such as for example a tension spring 80 which may be connected between the push rod 40 and a frame mount 81. The tension spring 80 serves to normally bias the yoke ends against frame stops 82. Further the brake shoes 50 may be normally pivotally biased away from engagement with the drum surface by leaf springs, not shown, connected between the ends of the yoke 48 and the brake shoes 50. Thus under normal operating conditions the yoke 48 serves to hold the brake shoes 50 adjacent to but spaced from the outer periphery of the brake drum 44 in a ready standby posture.

In operation, the saw is started typically by a conventional retractable cord system or a battery starter and the speed of the chain 23 is regulated by manipulation of a throttle 88 by an operator's index finger 86. The operator grasps the chain saw with two hands, the left hand 12 surrounding the frame handle 16 while the right hand 14 grips the control handle 18. Under normal operating conditions, the operator may move his left hand back and forth on the frame handle 16 or operate the saw solely with his right hand, as desired, but typically, the chain saw is manipulated by an operator by grasping it with two hands.

If for some unforeseen reason the operator's left hand 12 should slip accidentally from the frame handle 16 toward the rapidly moving cutting chain 23 it will first engage safety bar 28 of bail handle actuation system 26. Upon encountering bar 28 two things will happen. First, downward movement of the operator's hand toward the cutting chain will be blocked and, secondly, the safety bar 28 will move slightly downwardly pivoting about mounts 30 and 32. Correspondingly, push rod 40 will be forced downwardly against the bias of tension spring 80. Downward movement of push rod 40

in turn pivots the yoke 48 clockwise about the pivotal connection of shaft 72 with brake casing 70, thus rotating the brake shoes 50 in a clockwise direction into initial frictional engagement with the rapidly clockwise rotating brake drum 44.

The arcuately shaped inner and outer surfaces of the brake shoes 50 now come into play with the outer surface thereof 60 cammingly engaging the inner surface 54 of frame lugs 52 and inner surface 62 thereof engaging the outer periphery 45 of brake drum 44.

After initial frictional engagement of the inner surface 62 of the brake shoes with the rapidly rotating brake drum 44, the shoes will tend to be rapidly carried by the drum in a clockwise direction. This tendency, however, only serves to jam the arcuately wedge-shaped brake shoes 50 into tight frictional engagement between the frame lugs 52 and the outer periphery 45 of the brake drum 44. It will readily be realized therefore that the above described brake system is "self-locking" and will dictate an immediate halt to rotation 20 of the brake drum.

The brake drum 44, as previously mentioned, is coaxially connected to the cutting chain drive sprocket 22 and thus operably connected to the cutting chain 23. Therefore, when the brake drum is locked against rotation the cutting chain will also be locked against endless translation. It should be appreciated that the above described seizure of the brake will also tend to stall out the chain saw power drive and therefore minimize the possibility of any sudden or unexpected movement of the cutting chain if the brake should, for some reason, momentarily slip.

To reset the chain saw for subsequent operation a quick jerk of the safety bar handle 28 in the upward direction will disengage the brake shoes and the previously discussed bias systems will hold the shoes out of engagement with the drum so that the chain saw motor may be restarted and the cutting operation continued.

Thus it will be seen that if an operator's hand 12 should accidentally slip from normal operative engagement with the frame handle 16 toward the cutting chain 23, the bail handle actuation system 26 will first block downward movement of the operator's hand toward the cutting chain 23 and simultaneously actuate a self-locking brake system which will immediately stop movement of the chain 23. In this manner, accidental injury of an operator's hand on the cutting chain may be effectively minimized.

SUMMARY OF THE MAJOR ADVANTAGES 50

It will be appreciated by those skilled in the art that the above-described invention discloses a method and apparatus for minimizing disastrous accidents of the type which may occur when an operator's hand accidentally slips from a chain saw frame handle into the cutting chain.

The bail handle actuation system performs the dual function of blocking the downward movement of the operator's hand toward the cutting chain and simultaneously of actuating a brake system to immediately stop the motion of the chain saw cutting chain.

The brake may be of a self-locking character which upon initial actuation serves to further lock itself to immediately stop movement of the cutting chain and stall out the drive system.

Further, the subject invention permits an operator to utilize a chain saw in a typical operational manner.

Moreover, the safety system is not utilized during normal operational circumstances and does not continuously coact with the cutting chain drive train.

Although the invention is discussed with reference to a preferred embodiment, it will be appreciated by those skilled in the art that additions, deletions, modifications, substitutions and other changes not specifically described and illustrated in this embodiment may be made which will fall within the purview of the appended claims.

What is claimed is:

1. A chain saw adapted to be held by an operator using both hands comprising:

- a frame having,
- a frame handle and
- a control handle;

a guide rail connected to said frame;

a cutting chain operably carried by said guide rail; power means mounted on said frame and operably connected to said cutting chain for driving said cutting chain on said guide rail;

self-locking brake means operably connected to said cutting chain for stopping movement of said cutting chain on said guide rail, said brake means including,

a generally cylindrical brake drum operably connected to said cutting chain;

at least one arcuately wedge-shaped brake shoe operably carried adjacent the periphery of said drum and normally held away from engagement therewith; and

at least one stationary frame lug fixedly connected to said frame and positioned adjacent said at least one brake shoe; and

brake actuation means connected to said brake means and having a portion thereof operably positioned adjacent to said frame handle for actuating said brake means and stopping cutting movement of said cutter chain in the event an operator's hand accidentally slips from said frame handle toward said cutting chain.

2. A chain saw as defined in claim 1 wherein:

said at least one arcuately wedge-shaped brake shoe comprises: a pair of diametrically shaped brake shoes, pivotally supported upon a yoke connected therebetween; and

said at least one stationary frame comprises: a pair of frame lugs each one positioned on said frame adjacent a corresponding one of said pair of brake shoes.

3. A chain saw safety device, adapted to be attached to a chain saw of the type having a frame with a frame handle and a control handle, a guide rail, a cutting chain and power means mounted on the frame and operably connected to the cutting chain for driving the cutting chain on the guide rail, comprising:

a brake system including,

a generally cylindrical brake drum operably connected to the cutting chain,

at least one arcuately wedge-shaped brake shoe operably positioned adjacent to but normally spaced from the outer periphery of said drum, and

at least one stationary frame lug fixedly connected with the frame and positioned adjacent said at least one brake shoe to serve as an abutment when said shoe is actuated against said drum;

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a brake casing connected to the chain saw frame;
and
a yoke pivotally mounted within said brake casing
and lying adjacent to said brake drum, said yoke
being operable 5
to carry said at least one arcuately wedge-shaped
brake shoe; and
an actuation system including,
a bail handle pivotally mounted adjacent the frame
handle and having a safety bar portion disposed 10
generally parallel with the frame handle and posi-
tioned between the frame handle and the cutting

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chain; and
a push rod connected at one end to said bail hand
and connected at the other end to said yoke,
whereby actuation of said push rod pivots said
yoke within said brake casing for actuating said
at least one arcuately wedge-shaped brake shoe
between said at least one stationary frame lug
and the outer periphery of said generally cylin-
drical brake drum to immediately stop rotation
of said drum and movement of the cutting chain.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,739,475

Dated June 19, 1973

Inventor(s) Harold Edward Moore

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In column 3, line 31, after "al." omit "U.S. Pat. Nos."

In column 3, line 32, after "3,429,411" add --patents--.

In column 5, line 9, after "and" add --the--.

In column 7, delete lines 3 through 7, and insert

--a yoke pivotally mounted within said brake casing
and lying adjacent to said brake drum, said yoke
being operable to carry said at least one arcuately
wedge-shaped brake shoe; and--.

Signed and sealed this 19th day of February 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents