Nov. 8, 1955 R. L. HUBBARD 2,722,740

PRUNING TOOL

Filed March 18, 1955 2 Sheets-Sheet 1

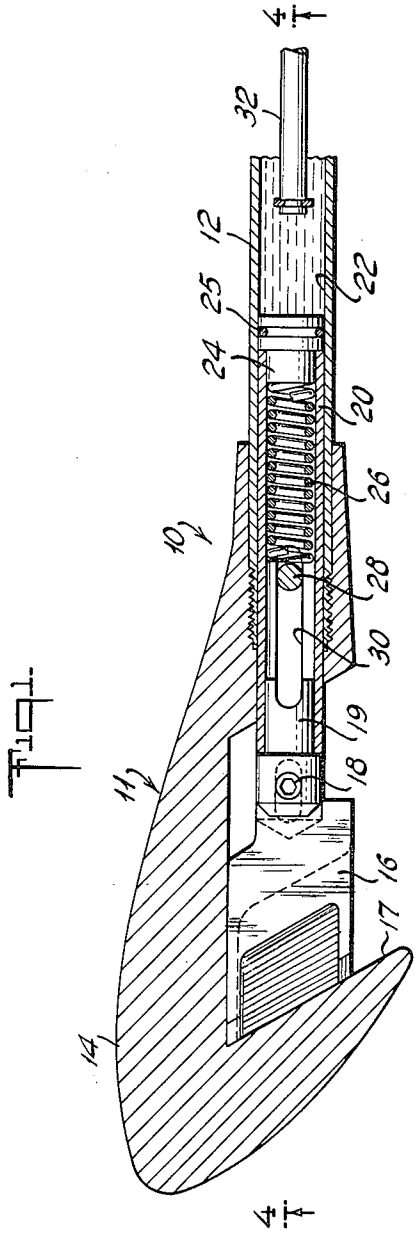


Fig. 1.

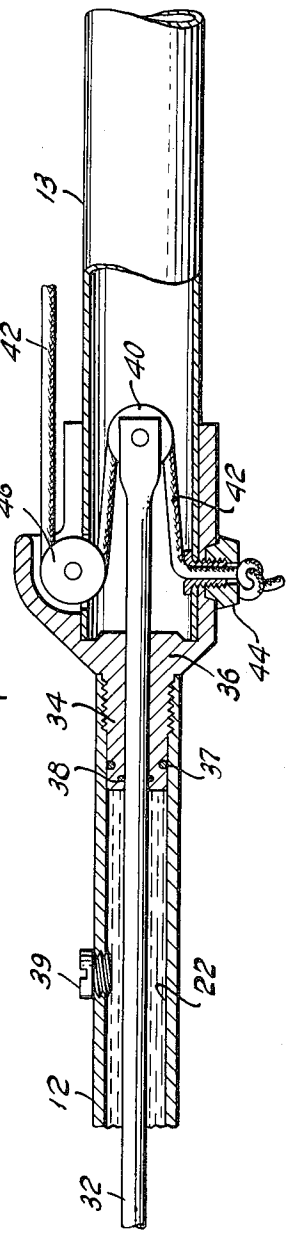


Fig. 2.

INVENTOR.
ROBERT L. HUBBARD
BY
Curtis, Morris & Safford.
ATTORNEYS

Nov. 8, 1955 R. L. HUBBARD 2,722,740

PRUNING TOOL

Filed March 18, 1955 2 Sheets-Sheet 2

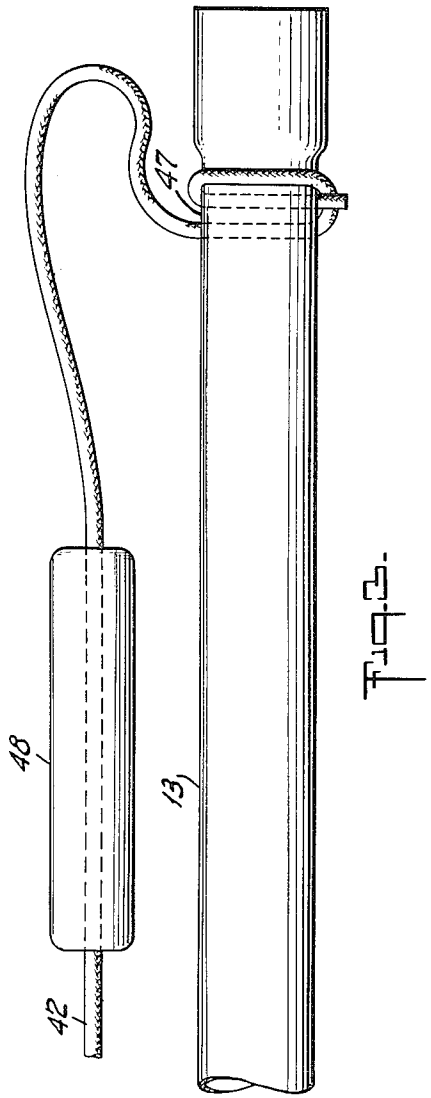


Fig. 3.

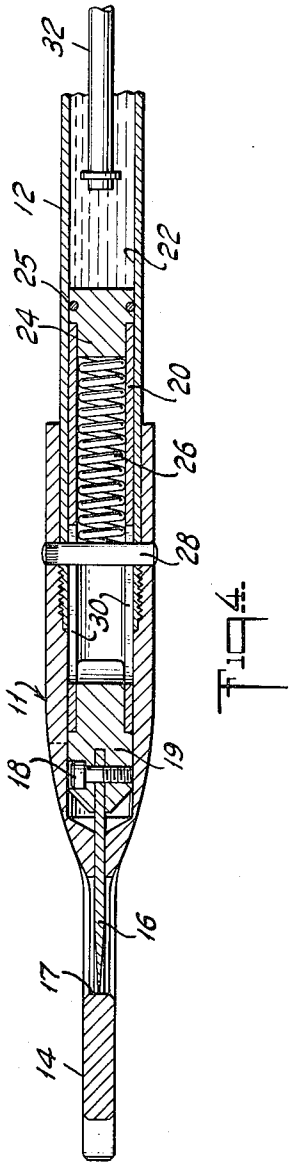


Fig. 4.

INVENTOR.
ROBERT L. HUBBARD

BY

Curtis, Morris & Safford.
ATTORNEYS

United States Patent Office

2,722,740

Patented Nov. 8, 1955

2,722,740

PRUNING TOOL

Robert L. Hubbard, Florham Park, N. J.

Application March 18, 1955, Serial No. 495,119

10 Claims. (Cl. 30—180)

This invention relates to devices for one-stroke cutting of small limbs and the like and for pruning trees and shrubbery, and in particular it relates to such devices that are hand operated.

An object of this invention is to provide an improved pruning tool which is lightweight and simple in construction and operation.

Another object is to provide such a tool which can with ease cut through relatively large and tough tree limbs.

In cutting tree limbs or shrubs which are high or difficult to reach it is desirable to have a quick acting, one-stroke cutting tool which is so compact and light-weight that it can be mounted on a long extension pole without becoming unwieldy. It thus may be brought within cutting distance of remote or lofty limbs by an operator standing on the ground. However, in the past, such cutting tools were of such low power that they were not much help or else they were complicated, bulky, and/or expensive. The present invention therefore seeks to provide a high power, lightweight and inexpensive pruning tool.

In accordance with the present invention, in one specific embodiment thereof, an improved hydraulic cylinder of long, thin configuration is built into the frame of a cutting tool and controlled by a relatively light hand pull to exert a tremendous pressure on a knife blade to move it against an anvil in the process of cutting a limb or the like. Because of the advantageous arrangement of the parts of this tool, a minimum number of parts is needed and these are simple and easily assembled. Accordingly the tool is lightweight and inexpensive.

A more complete appreciation of the many advantages of this invention together with a better understanding of its general nature will best be gained from a study of the following description given in connection with the accompanying drawings in which:

Figure 1 is a longitudinal sectional view of the top part of a cutting tool embodying features of the present invention, showing the knife blade and anvil together with the upper portion of the hydraulic cylinder;

Figure 2 is a longitudinal sectional view of the middle part of the tool, showing the lower part of the hydraulic cylinder and the hand operated mechanism for controlling the cylinder;

Figure 3 is a side elevational view of the bottom part of the tool; and

Figure 4 is a longitudinal sectional view of the top part of the tool taken on the lines 4—4 in Figure 1.

Figure 1 shows the head **11** of a cutting tool **10** having a long tubular frame **12** which extends the length of the tool. Head **11** consists of an anvil **14** screwed to the top end of the frame and a knife blade **16** adapted to move along the axis of the frame toward and away from the limb supporting surface **17** of the anvil. (Blade **16** is shown advanced into contact with surface **17**.) This blade is fixed by means of screw **18** and plug **19** (see Figure 4) to a hollow cylinder **20** which fits slidably within the end part of frame **12** and forms the piston for the hydraulic chamber **22**. Fluid within this chamber is prevented from leaking through or past cylinder **20** by a plug **24** which carries a sealing ring **25**. Plug **24** is force fitted into the lower end of the cylinder **20** and supports at its inner end a compression spring **26**. The other end of this spring pushes against pin **28** which passes through two slots **30** in cylinder **20** and through frame **12** and the lower part of anvil **14**, the pin being securely fixed to these last two members. Thus when the pressure in chamber **22** is released, spring **26** pushes cylinder **20** downward and retracts blade **16** from anvil **14**. Cylinder **20** and blade **16** are kept in alignment with anvil **14** by this pin **28** riding in slots **30**.

Fluid pressure within chamber **22** is raised by the advance upward of plunger **32**. This plunger is a solid rod having a diameter substantially less than the diameter of chamber **22** and a length great enough so that when moved into chamber **22**, blade **16** can advance from its back limit into contact with surface **17**.

As seen in Figure 2, the lower part of plunger **32** passes through the center of the neck portion **34** of a housing **36** which is tightly and firmly fitted within the end of frame **12**. Sealing rings **37** and **38** prevent leakage of fluid from chamber **22** through or around shoulder **34**. Housing **36** receives and tightly grips the end of tube **13** which serves as a continuation of frame **12**. A filler plug **39** screwed through the wall of frame **12** provides a simple means of filling chamber **22** with a suitable hydraulic fluid.

The bottom end of rod **32** is bifurcated and carries a pulley **40** around which rope **42** passes. One end of the portion of this rope passing around pulley **40** is attached by means of a bushing assembly **44**, having mating inner and outer sleeves and extending through housing **36** and tube **13**, to the frame of the tool. The other end of the rope passes around a second pulley **46** which is mounted on housing **36**. As seen in Figure 3, this end of the rope continues outside the tube **13** to an anchor point **47** near the bottom end of the tube to which, for convenience, it is affixed. A handle **48** which provides a grip for the operator's hand is attached to the rope at a suitable place above point **47**. The bottom end of tube **13** is flared to permit the insertion of a like diameter extension arm if desired.

By pulling down on rope **42**, rod **32** is pushed upward into chamber **22** and as it advances, because of the pressure exerted on plug **24**, cylinder **20** is forced upward. In this movement, for each 1" upward advance of rod **32**, rope **42**, because of the arrangement of pulleys **40** and **46**, must move downward 2", i. e. twice the distance rod **32** moves. The volume of chamber **22** remains substantially constant, however, and therefore a given pull on rope **42** is translated into a force twice (this factor of two resulting from the ratio of movement of rope **42** to rod **32**) the ratio of the cross-sectional area of plug **24** to the cross-sectional area of rod **32**. Thus, for the parts of tool **10** proportioned as shown, a 50 pound pull on rope **42** becomes approximately a half ton force pushing knife **16** against anvil **14**. When the pull on rope **42** is released, spring **26** acts to return knife **16** to its back position in which the tool is ready to make another cut.

In the above described embodiment frame **12** can, if desired, be made of one continuous length of tubing instead of being formed from two lengths as shown. In addition to this change other changes or modifications may occur to those skilled in the art and these changes and/or modifications can be made without departing from the spirit or scope of the invention as set forth.

I claim:

1. A pruning tool comprising an elongated tube a portion of whose inside volume forms the chamber of a hydraulic cylinder, a piston slidable within said hydraulic

cylinder and projecting through the upper end thereof, a knife blade carried by said piston, an anvil support opposing said knife blade and fixed to the upper end of said tube, and a rod slidable into the chamber of the cylinder from the outside thereof through the lower end thereof to create in said cylinder a pressure sufficient to move said piston and said knife blade toward said anvil support.

2. The combination of elements as in claim 1 in which said rod moves into the chamber in a direction substantially parallel to the axis of said tube and carries on its outer end a rope and pulley lift by which it can be advanced into the chamber.

3. A light, hand-operated pruning tool comprising a tube a portion of whose inside volume is adapted to be the liquid filled chamber of a hydraulic cylinder, a piston slidable inside the upper end of said tube and forming a movable part of the hydraulic cylinder, a knife blade adapted to be moved by said piston, a member opposite said knife blade for holding in conjunction with said blade an object for cutting, means including a spring for retracting said knife from said member, means including a constriction in said tube spaced a distance from the upper end thereof to make the cylinder liquid-tight, and means including a thin rod-like member slidable into the chamber of the cylinder from the outside thereof through said constriction to move said piston, the amount of liquid in said chamber remaining constant throughout this movement.

4. The combination of elements as in claim 3 in which said member opposite said knife blade is fixed to said tube, said means including a spring for retracting also includes a pin fixed to said tube, and one end of said spring pushes against this pin and the other pushes against said piston.

5. In a light hand-operated pruning tool having a long thin frame, a cutting head comprising: a hollow core piston slidable axially in the end of the frame and forming a movable part and the upper end seal of a hydraulic cylinder within the frame, a knife blade carried by said piston, an anvil fixed to the frame and having a supporting surface across the line of advance of said blade, a pin fixed to the frame and passing through an elongated slot in said piston, and a compression spring within the hollow core of said piston pushing against said pin and against said piston to move said blade away from said anvil supporting surface.

6. In a light hand-operated pruning tool having a cutting head, a tubular frame, a piston slidable in the upper end of said frame and forming a movable part and the upper end seal of a hydraulic cylinder extending along an inside portion of the length of said frame, a constriction spaced within said frame a distance below the upper end thereof and forming a portion of the bottom end seal of the hydraulic cylinder, a thin rod-like member movable

within said frame along the axis thereof through said constriction into and out of the hydraulic cylinder, hand-actuated means including a low friction member carried on the end of said rod-like member a low friction member carried by said frame and a flexible cord engaging said low friction members for moving said rod-like member into the hydraulic cylinder thereby to actuate the cutting head of said tool, the volume of the hydraulic cylinder remaining substantially constant.

7. The combination of elements as in claim 6 in which said low friction members are pulleys, and said flexible cord is fixed to said frame at one end, passes around said pulley carried by said rod-like member, then around said pulley carried by said frame, thence along the outside of said frame where it is adapted to be pulled by an operator of said tool.

8. The combination of elements as in claim 6 in which said constriction is an annular plug with a small central opening and is tightly fitted within said frame, and said rod-like member is slidable through the small central opening farther into or farther out of the hydraulic cylinder.

9. The combination of elements as in claim 8 in which said annular plug is an integral part of a housing fixed to said frame, and said frame is in two pieces joined together by said housing.

10. A pruning tool comprising a tubular frame, a hollow core piston slidable in the upper end of said frame and forming a movable part and the upper end seal of a hydraulic cylinder extending along an inside portion of the length of said frame, a housing having an integral neck portion fitted within the inside of the lower end of said frame said neck portion having a small opening parallel to the axis of said frame, a knife blade carried by said piston, an anvil fixed to the upper end of said frame and having a surface across the line of advance of said blade, a pin fixed to said frame and passing through a pair of elongated slots in said piston, a compression spring within the hollow core of said piston pushing against said pin and against said piston to move said blade away from said anvil surface, an extension member fitted within said housing along the axis of said frame and forming a continuation thereof, a thin rod slidable within said extension member through the opening in said neck portion farther into and farther out of the hydraulic cylinder, a first pulley carried on the end of said rod, a second pulley carried by said housing, and a rope attached to a fixed point at a place above said first pulley and passing down around said first pulley, up and around said second pulley and down the outside of said extension member.

No references cited.