

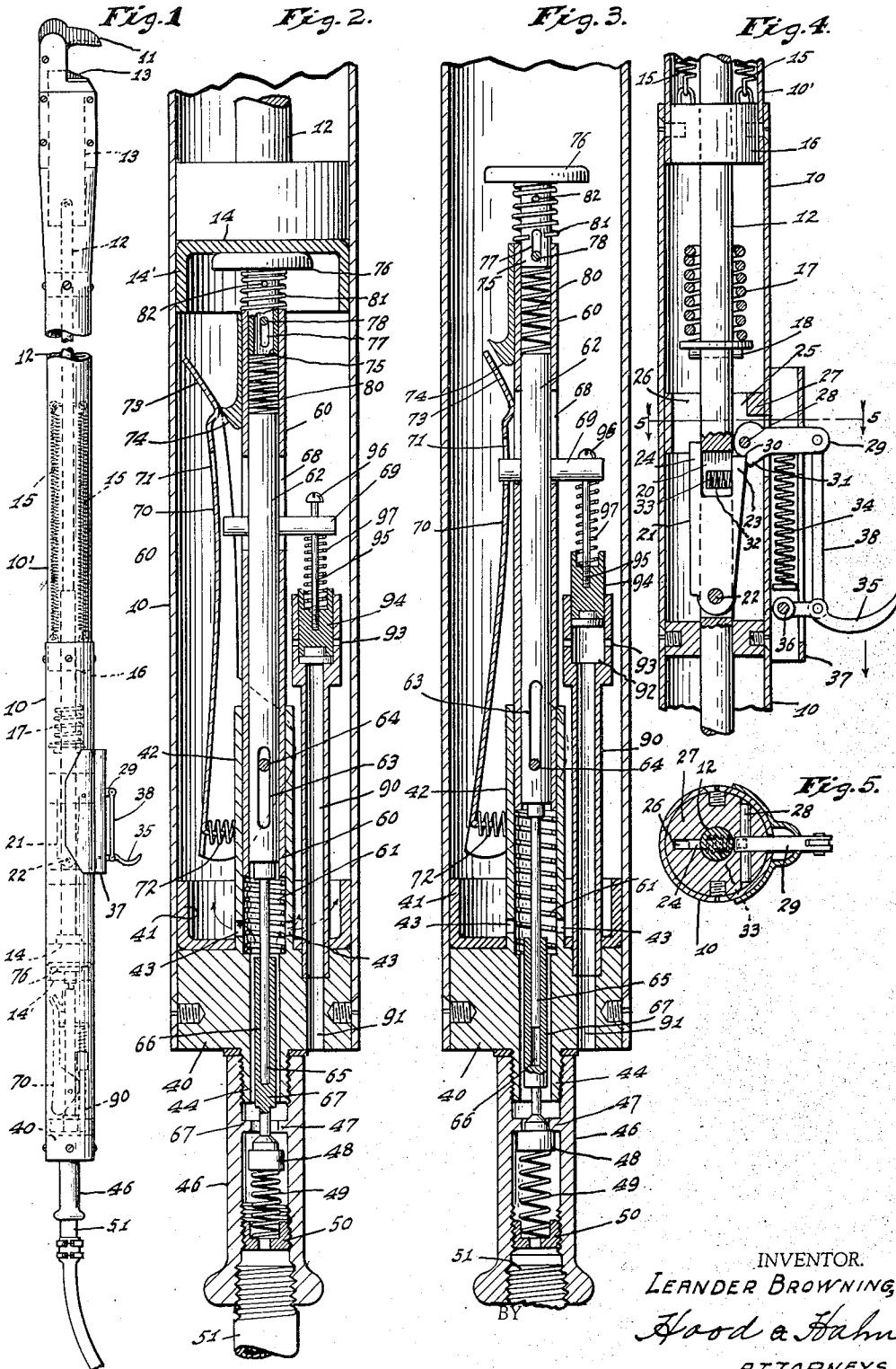
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PNEUMATIC PRUNING SHEAR

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PNEUMATIC PRUNING SHEARS

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2 Claims. (Cl. 121-21)

The object of my invention is to provide an automatically-reciprocating, pneumatically-actuated, single action tool.

The accompanying drawing illustrates my invention as embodied in a pruning tool.

Fig. 1 is a side elevation of the complete tool;

Fig. 2 is an axial section, on a larger scale, of the valve portion of the tool, with the parts in normal position;

Fig. 3 is a view similar to Fig. 2 with the parts in the positions immediately following forward movement of the cutting element;

Fig. 4 is an axial section, on a smaller scale, of the tripper mechanism and adjacent parts; and

Fig. 5 is a section on line 5-5 of Fig. 4.

In the drawing 10 indicates a main tubular barrel supplemented by the tubular extension 10' provided at its outer end with a cutter bill 11. Reciprocable within barrel 10-10' is a plunger rod 12 to the outer end of which is secured knife 13 adapted to coact with cutter bill 11. The inner end of plunger rod 12, within barrel 10, is provided with a piston head 14 and packing cup 14' which fit barrel 10, and rod 12 is biased to its innermost position by springs 15, 15 attached at one end to rod 12 and at the other end to a header or plug 16 at the junction between parts 10 and 10', as indicated by dotted lines in Fig. 1. Between piston 14 and plug 16, rod 12 is encircled by a buffer spring 17 engaging abutment 18 on rod 12 and engaging plug 16 at the end of the forward stroke of rod 12 after knife 13 has coacted with bill 11.

Rod 12, intermediate its length, is diametrically slotted at 20 (Fig. 4) to receive the latch 21 pivoted at 22. Latch 21 is medially slotted at its free end to form a latch finger 23 and a stop finger 24. The width of latch 21 exceeds the diameter of rod 12 so that it projects radially at opposite sides of rod 12 and extends into keyways 25, 26 formed in the guide ring 27 mounted within barrel 10. Pivoted at 28, in keyway 25, is the trigger 29 having an abutment shoulder 30 for reception of the tip of latch finger 23, and a finger 31 overlying said finger 23. Rod 12 within the area between fingers 23 and 24, is transversely bored to form a pocket 32 within which is seated a spring 33 engaging finger 23 and normally biasing the latch 21 to the position shown in Fig. 4.

Trigger 29 is biased to the position shown in Fig. 4 by spring 34 and, in order to ease operation of the trigger, I provide finger lever 35 pivoted at 36 on yoke 37 secured to barrel 10 and connected to the trigger by link 38.

Latch 21 sliding in the keyways 25 and 26 pre-

vents rotation of plunger rod 12 during its reciprocation, and when the parts are in normal, at rest, position (Fig. 4), the tip of finger 23 engages shoulder 30 substantially in line with pivot 28.

When finger lever 35 is pulled in the direction indicated by the arrow (Fig. 4) the free end of the latch 21 is swung to the left to clear the latch from obstruction by the trigger.

The lower end of barrel 10 is closed by the axially bored plug 40 provided with sealing cup 41 which provides an air tight association with barrel 10.

The specific construction of the trigger mechanism described above, forms the subject matter of my divisional application Serial No. 621,768, filed October 11, 1945.

Plug 40 is provided with an inwardly extending tubular portion 42, radially perforated at 43 just inside cup 41.

The outer end of plug 40 is provided with a threaded nipple 44 to which is secured the tubular valve casing 46 having an intermediate valve seat 47 the inlet side of which may be engaged by a valve 48 biased to seating position by spring 49 abutting ring 50 mounted within casing 46. Casing 46 is threaded at its outer end to receive a supply line 51 for compressed air.

Slidable within tube 42 is the lower end of a tube 60 normally urged inwardly by spring 61. Reciprocable within tube 60 is a rod 62 longitudinally slotted at 63. A pin 64 carried by tube 42 projects through slot 63 to limit the axial play of rod 62. The lower—or outer—end of rod 62 is enslaved at 65 to enter and seat in the axial bore 66 of actuator 67 resting at its outer end on valve 48. The parts are so proportioned that when tube 60 is in its lowermost position, actuator 67 presses valve 48 away from its seat and when tube 60 is in its uppermost position, valve 48 is seated to prevent ingress of compressed air between plug 40 and piston 14.

Tube 60 is longitudinally slotted at 68 and through this slot projects cross-arm 69 of rod 62. Tube 60 is also longitudinally slotted to register with slot 63 of rod 62 and pin 64 extends through both slots and forms the pivotal support of a latch 70 perforated at 71 for reception of one end of cross-arm 69. Latch 70 is biased to latching position by spring 72 and is provided at its free end with a cam 73 arranged to be engaged by a cam 74 carried by tube 60.

Reciprocably mounted in the inner end of tube 60 is the stem 75 of head 76 engageable by piston 14. Stem 75 is longitudinally slotted at 77 and its

axial movement relative to tube 60 is limited by pin 78 passing through said slot.

A compression spring 80 is interposed between stem 75 and rod 62 and a compression spring 81 is interposed between head 76 and tube 60. A pin 82, carried by stem 75, projects between the coils of spring 81 so that, by turning said spring one way or the other on stem 75 more or less of the coils of spring 81 may be caused to lie between pin 81 and tube 60 thereby adjusting the force of said spring between head 76 and tube 60.

An exhaust tube 90 perforates cup 41 and communicates with exhaust passage 91. At its inner end tube 90 is enlarged into a valve chamber 92 transversely ported at 93. The reciprocable exhaust valve 94 serves to open or close ports 93 and is provided with a stem 95 threaded into the valve, projected through a diametrical perforation in cross pin 69 and headed at 96. A spring 97 encircling stem 95 between valve 94 and cross pin 96 biases valve 94 toward port closing position, and head 96 in engagement with cross pin 69.

Normal positions of the parts are shown in Figs. 1, 2 and 4, inlet valve 48 being open, exhaust ports 93 closed, the space between cups 41 and 14' filled with compressed air and rod 12 and cutter 13 held in restricted position by latch 23 abutting trigger 29.

Pull upon finger lever 35 causes finger 31 to swing latch 21 to the left so that finger 23 will clear trigger 29, thus freeing piston 14, to yield to the compressed air behind it, whereupon the following movements take place in the order named: Head 76 moves forwardly to the extent of slot 77; spring 61 moves tube 60 forwardly to bring the lower end of slot 68 against cross pin 69 and then to bring cross pin 69 against head 96, at the same time retracting pin 66 from actuator 67 thus permitting spring 49 to close inlet valve 48, whereupon further movement of cross pin 69 lifts valve 94 to open exhaust ports 93. By this time, knife 13 has coacted with bill 11. Opening of ports 93 relieves the air pressure on piston 14 and thus permits springs 15 to return piston 14 to initial position.

The initial forward movement of tube 60 with-

draws cam 74 from cam 73 so that its perforation 71 may drop over crosspin 69 and thus retain exhaust valve 94 in open position until piston 14 has been returned to engagement with head 76 to first compress springs 81 and 80 and then move cam 74 to withdraw latch 70 from cross pin 69 whereupon spring 80 acts to withdraw cross pin 69 from head 96 and permit spring 97 to close exhaust valve 94 over ports 93.

When piston 14 is fully retracted, part 65 of rod 62 engages actuator 67 to open inlet valve 48, finger 23, in the meantime, having moved in behind trigger 29 to hold rod 12 and its piston 14 and cutter 13 against a second projection until trigger 29 is again actuated.

I claim as my invention:

1. A pneumatic implement comprising a main barrel, a piston therein, means biasing said piston to retracted position, trigger means releasably holding said piston against protraction, an inlet valve normally biased to closed position, a reciprocable rod arranged to act on said inlet valve against its bias, a latch arranged to engage said rod and releasably hold it in position permitting closure of said inlet valve by its biasing means, a cam movable relative to said latch to retract said latch from said rod, means associated with said cam for engagement by said piston to control cam movement, an exhaust valve controlling an exhaust port for said barrel, and a lost-play connection between said rod and exhaust valve.

2. A pneumatic implement comprising a main barrel, a piston reciprocable therein, means biasing said piston to retracted position, manually controlled means for blocking protractive movement of the piston, an inlet valve controlling flow of pressure air to the piston in protracting direction, means biasing said valve to closed position, a reciprocable tube aligned with the piston between piston and inlet valve, a spring biasing said tube in piston protracting direction, a reciprocable rod in said tube and contacting said valve in opening direction only, a spring in said tube biasing said valve in valve-opening direction, an exhaust valve and a connection between said exhaust valve and rod.

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