March 29, 1966 L. M. HELLSTROM 3,242,955

LOG SPLITTER

Filed July 30, 1964 2 Sheets-Sheet 1

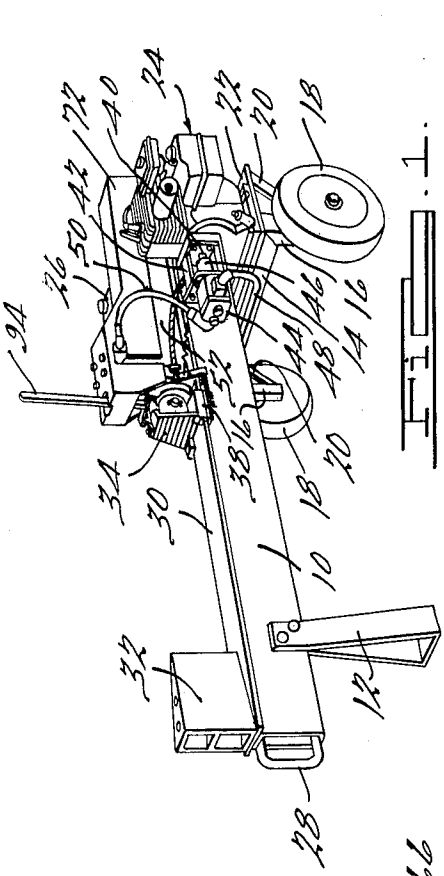


FIG. 1.

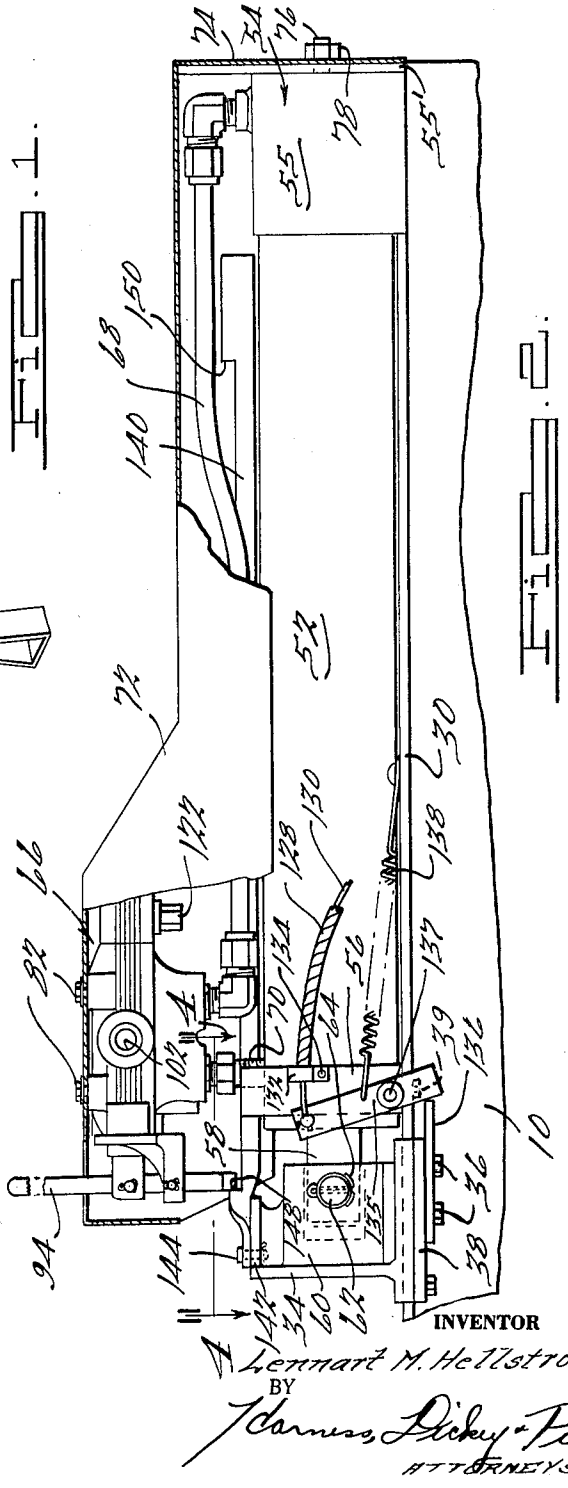


FIG. 2.

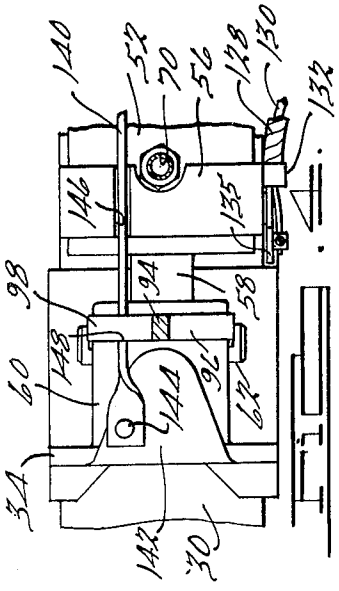


FIG. 4.

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LOG SPLITTER

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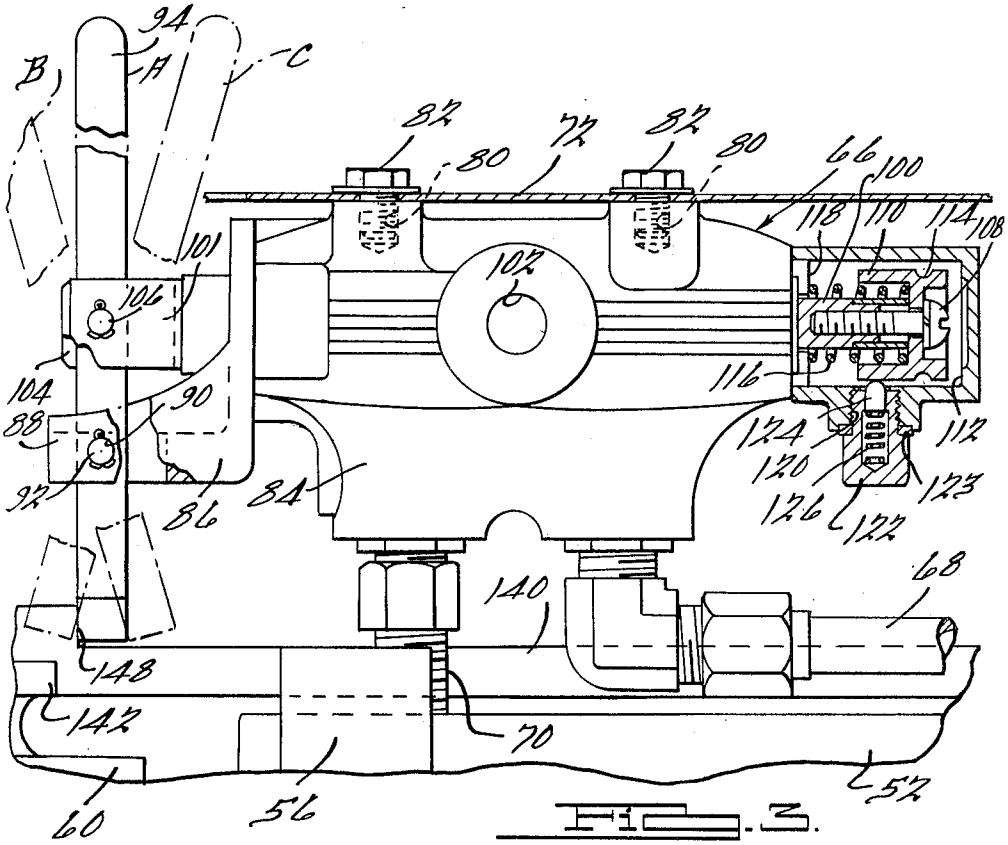


FIG. 3.

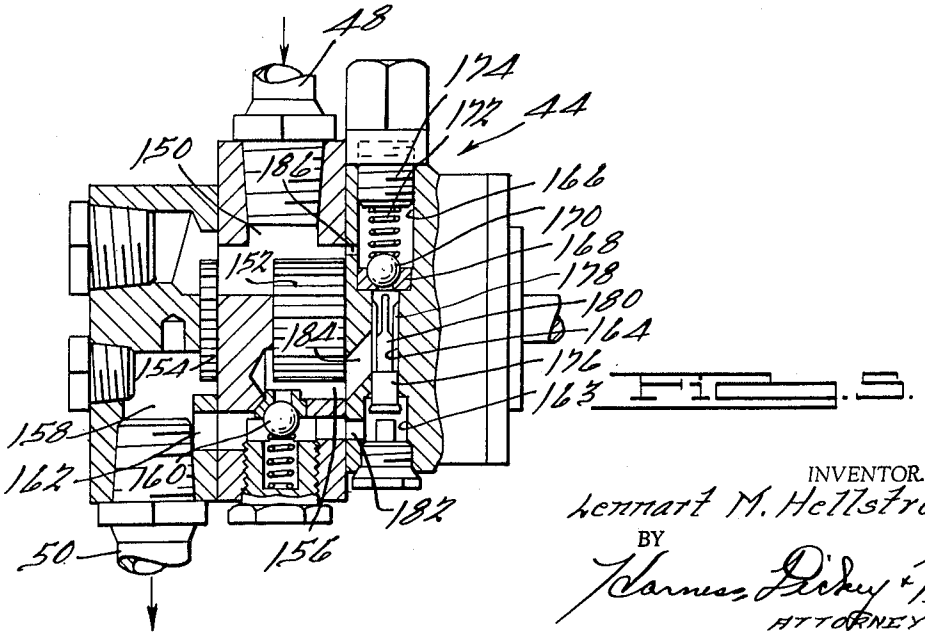


FIG. 5.

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LOG SPLITTER

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15 Claims. (Cl. 144—193)

This invention relates to power-driven log splitting apparatus. This application is a continuation-in-part of my copending application Serial No. 300,966, filed August 9, 1963, now abandoned.

It is a primary object of this invention to provide a compact, portable power-driven apparatus of relatively simple, inexpensive and sturdy design which is capable of quickly and easily splitting logs of varying sizes, shapes and species; and which during the splitting of a given log will automatically sense any increases in resistance of the log to split, such as might be caused by knots, an extra tough or stringy species of wood, or the like, and in response thereto will greatly increase the splitting forces exerted by the apparatus for a period sufficient to overcome the increased resistance.

Another object resides in the provision of a log splitting apparatus including a power-driven ram having a first relatively high speed mode of operation for advancing toward and returning from the log to be or actually split and for performing normal splitting jobs and a second relatively low speed mode of operation in which substantially greater forces may be exerted by the ram for extremely tough splitting jobs, and wherein both modes of operation consume substantially the same amount of power, whereby a lightweight, minimum horsepower prime mover may be used. A related object concerns the provision of such an apparatus, which will shift back and forth from one mode of operation to the other fully automatically in accordance with load requirements.

A further object resides in the provision of a log splitting apparatus which may be easily operated by one person, and in which all the controls are located in a compact and protected unit fully operable by a single readily accessible control lever. A related object concerns the provision of such an apparatus, wherein the controls provide complete flexibility of operation and wherein the power-driven ram at the end of its splitting stroke will automatically reverse its direction of movement and return to its normal at-rest position. Another related object concerns the provision of such an apparatus, wherein the prime mover is automatically throttled to a relatively low speed when the ram is at rest, thus increasing economy and reducing wear and noise, but wherein full operating speed is maintained during the retracting portion of the cycle, thus shortening overall cycle time.

These and other objects of the present invention will become apparent from consideration of the specification taken in connection with the accompanying drawings in which there is illustrated a single embodiment of the present invention, by way of example, and wherein:

FIGURE 1 is a perspective view of a log splitting apparatus embodying the principles of the present invention;

FIGURE 2 is an enlarged side elevational view, partly in section, of a portion thereof;

FIGURE 3 is a further enlarged side elevational view, partially in section, of a portion of the apparatus shown in FIGURE 2;

FIGURE 4 is a partial sectional view taken along lines 4—4 in FIGURE 2; and

FIGURE 5 is a sectional view of a fluid pump forming a part of the subject apparatus.

The overall arrangement of the disclosed embodiment of the present invention is best shown in FIGURE 1. The

apparatus comprises a longitudinally extending box frame member 10 having rigidly secured thereto adjacent the forward end thereof a depending stand or pedestal 12 and having rigidly attached at the opposite or rearward end a transversely extending frame member 14 from the opposite ends of which depend members 16 each having a ground-engaging wheel 18 rotatably mounted thereon. Rigidly secured to the top of transverse frame member 14, and reinforced by struts 20, is a mounting plate 22. Secured to mounting plate 22 on one side of longitudinal frame member 10 is a prime mover 24, shown in the form of a conventional internal combustion engine, although an electric motor would be equally suitable, and on the opposite side of frame member 10 there is secured to mounting plate 22 (or its counterpart on that side of the frame) a fluid reservoir 26 of conventional construction, only the top of which can be seen in FIGURE 1. At the forward end of frame member 10 there is also provided a handle 28 which may be used to manually move the apparatus around and also which is adapted to be engaged by a vehicle trailer hitch when it is desired to tow the apparatus behind a vehicle.

Secured to the upper surface of frame member 10 is a longitudinally extending plate 30 which is slightly wider than but of substantially the same length as frame member 10. At one end of plate 30 there is provided, either removably or permanently, a splitting element in the form of a rigid, hardened wedge 32 pointing in a longitudinal direction towards the rearward end of the apparatus. Facing wedge 32 is another splitting element in the form of ram 34 having a relatively flat face disposed substantially perpendicularly to the axis of frame 10. Ram 34 is mounted for reciprocal sliding movement along the top of plate 30 and for this purpose it is provided with relatively flat bottom surface portions. To prevent it from lifting off plate 30 and from sliding transversely thereon it is provided, as by means of bolts 36, with a pair of shoes 38 which wrap around and extend beneath the projecting edges of plate 30. Ram 34 is thus mounted for sliding movement towards and away from wedge 32 along plate 30. The portion of plate 30 disposed between the two splitting elements 32 and 34 therefore serves both as a track or guide means for the ram and as support means for the log to be split.

Secured to the housing of prime mover 24 and surrounding the drive shaft 40 thereof is one end of a box-like cage 42 having mounted at the other end thereof a pump 44, the latter being positioned so that its drive shaft is in axial alignment with and adjacent drive shaft 40 within cage 42. Connecting the two shafts is a conventional coupling 46. The inlet to pump 44 is placed in communication with reservoir 26 by means of a fluid conduit 48, and the outlet of the pump is placed in communication with the control circuit of the splitting apparatus by means of a fluid line 50.

Turning to the remaining figures, secured to the top of plate 30 at the rearward end thereof is a fluid motor 52 of the conventional piston and cylinder type. The rearward end of motor 52 is slidably received within a locating and mounting structure 54 including a pair of opposed side panels 55 permanently secured to plate 30 and frame member 10, and a vertically extending rigid end plate 55' also permanently affixed thereto and to side panels 55. The forward end of motor 52 is slidably received within a mounting block 56 tightly secured to plate 30, as by means of bolts 39 or the like. Slidably disposed within motor 52 is a conventional piston (not shown) to which is secured the usual piston rod 58, the free end of which is loosely secured within an annular boss 60 forming an integral part of ram 34 as by means of a transversely extending pin 62 held in place by suitable cotter pins 64. The inlet to fluid motor 52 operable

as such during the advancing movement thereof is placed in fluid communication with a control valve, indicated generally at 66, by means of a conventional fluid conduit 68. The other inlet to motor 52, operable as such during return movement, is placed in fluid communication with control valve 66 by means of a conventional fluid conduit 70, the latter serving as part of the support means for the control valve. The remaining support for the control valve is provided by an outer casing 72, formed of sheet metal or the like, surrounding the control valve and the upper portion of the fluid motor for the full length thereof. The rearward end wall of casing 72, indicated at 74, is provided with a suitable opening through which projects a threaded stud or projection 76 forming a part of motor 52. Stud 76 also projects through a suitable aperture in plate 55 and is provided with a nut or the like 78 which serves to hold both the fluid motor and end wall 74 of the casing tightly in position against plate 55. The top of casing 72 adjacent the forward end thereof is provided with a pair of suitable apertures positioned in alignment with two pairs of threaded holes 80 in the top of the housing of control valve 66, and suitable machine screws 82 are inserted through these apertures into threaded engagement with the control valve housing to tightly secure together and rigidify the entire assembly.

As best illustrated in FIGURE 3, the housing of control valve 66, indicated at 84, is provided at one end thereof with a bifurcated L-shaped mounting bracket 86 having a longitudinally extending slot 88 therein and a transversely extending aperture 90 therethrough. Pivotally secured within slot 88, by means of a transversely extending pin 92, is a generally vertically extending control lever 94 having a grippable portion at the upper end thereof and a generally T-shaped lower portion comprising transversely extending arms 96 and 98 (FIGURE 4). Control valve 66 is basically of conventional construction having a valve bore (not shown) in which is slidably positioned a valve spool, one end of which is shown at 100 and the other end of which is shown at 101. The inlet to the valve bore is indicated at 102 and is adapted to receive the oposite end of fluid conduit 50 extending from the outlet of pump 44, and on the opposite side of the valve there is provided a similar discharge opening which communicates through a conventional fluid conduit with the reservoir 26. Control valve 66 is a three-position valve and is so constructed that when the spool is in its rightmost position fluid from pump 44 is communicated through the valve to conduit 70 to return the ram; when the spool is in its centered position fluid from the pump is communicated directly to the reservoir and the ram is motionless; and when the spool is in its leftmost position fluid from the pump is communicated through the control valve to fluid conduit 68 to advance the ram. The control valve is also provided with the conventional relief valve which operates to dump fluid from the pump directly to the reservoir if the pump pressure exceeds a predetermined maximum safe value, regardless of spool position. Movement of the spool is effected by control lever 94 which extends through a vertical slot 104 in end 101 thereof, the two being secured together by a transversely extending pin 106. To prevent binding, the transverse aperture in control lever 94 may be somewhat elongated in cross section. Pins 106 and 92 may be maintained in position by suitable cotter pins or the like.

The opposite end of the valve spool, indicated at 100, is provided with spring detent means for maintaining the spool in its leftmost or "advance" position, and spring return means for urging the spool to its normal rightmost or "return" position, as will now be described. Tightly secured to the end 100 of the valve spool, by means of a machine screw 108 or the like, is a concentrically positioned annular member 110 having an I.D. substantially greater than the O.D. of spool end 100.

Annular member 110 is of an axial length such that when the valve spool is in its rightmost position it will abut the inside end wall of the valve housing, indicated at 112, and is provided about its periphery with a circumferential groove 114 of arcuate cross-section. Annular member 110, and hence the valve spool, are constantly urged to the rightmost position by means of a return spring 116 acting between the annular member and a portion 118 of the valve housing. The side wall of the valve housing is also provided with a threaded opening 120 into which is threadably secured a specially constructed fitting 122, a resilient washer 123 being positioned therebetween to prevent leaks. This fitting is provided with a bore in which is positioned a detent element or pin 124 and a spring 126 for urging the detent element against annular member 110. The inner end of detent element 124 is of a cross-sectional configuration corresponding with the cross-sectional configuration of groove 114 and is adapted to be urged thereinto by spring 126 when the valve spool is moved to its leftmost position, thereby preventing normal return movement of the valve spool. One of the advantages of this construction is that when groove 114 wears to the point where the spring detent will no longer hold the spool against normal return movement, the problem may be quickly eliminated by simply loosening screw 108, rotating annular member 110 slightly to present a new portion of groove 114 to the detent element, and then re-tightening machine screw 108.

The controls for the log splitting apparatus are extremely simple. For controlling the speed of prime mover 24 there is attached to the governor thereof (not shown) a throttle cable 128 guiding a control wire 130 therein. The control cable assembly is of the conventional Bowden type and at its opposite end the cable is clamped to the side surface of mounting block 56 by means of a conventional L-shaped bracket 132 held in place by screw 134, and the end of wire 130 is secured in a conventional manner to the upper end of an arm 135 pivotally mounted tob lock 56 by means of a suitable shouldered screw and washer assembly or the like 137, as best illustrated in FIGURES 2 and 4. The lower end of arm 135 is adapted to be engaged by abutment means on the ram, which in the disclosed embodiment comprises a stop member 136 secured to the bottom of one shoe 38 by means of bolts 36. When the ram is fully retracted the upper end of arm 135 is thus caused by member 136 to be moved to its leftmost position, and when the ram is not fully retracted it is moved to its rightmost position by means of a spring 138 extending between it and plate 30. The engine governor is set to maintain a constant operating r.p.m. when the upper end of arm 135 is moved to its rightmost position, and to maintain the engine at an idle r.p.m., to minimize fuel consumption, wear and noise, when the upper end of arm 135 is moved to its leftmost position, as seen in FIGURE 2.

For controlling the stroke of fluid motor 52, and hence ram 34, there is provided a stroke control rod 140 secured at one end to a flange 142 forming a part of ram 34, as by means of a suitable pin assembly 144, and guided for longitudinal movement within a longitudinally extending slot or groove 146 in the top of mounting block 56, as best illustrated in FIGURE 4. The opposite end of stroke control rod 140 is free, as can be seen in FIGURE 2. Actual stroke control is effected by a pair of abutting surfaces or stops 148 and 150 so positioned that they will abut opposite faces of transverse arm 98 of control lever 94, respectively, at the end of the full stroke of the arm in each direction. The relative positioning of these stops determines the end limits of movement of the ram in each direction.

The apparatus therefore operates as follows. When the engine is running and control lever 94 is in its vertical, "neutral" position (indicated at A in FIGURE 3) no fluid will be communicated to either end of the fluid motor and the engine governor will maintain its speed at

idle r.p.m. because the ram is fully retracted. When control lever **94** is urged to its "advance" position (indicated in phantom lines at B) it will move the control valve spool to its leftmost position in which fluid from the pump is communicated to the right-hand end of the fluid motor through fluid conduit **68**. In this position of the spool, detent element **124** will engage in groove **114** and maintain the spool, as well as the control lever, in the "advance" position, during which ram **34** will steadily advance towards wedge **32**. The initial advancing movement of the ram causes arm **135** to pivot clockwise to increase engine speed to operating r.p.m. Stop **150** on stroke control rod **140** is so positioned that when the ram reaches its fully advanced position this stop will engage transverse arm **98** of the control lever to move the latter sufficiently to cause detent element **124** to be urged out of groove **114** whereupon return spring **116** moves both the valve spool and control arm to their "return" position (indicated in phantom lines at C in FIGURE 3). In this position the control valve is caused to direct fluid from the pump to the left-hand end of fluid motor **52** to drive the ram steadily in a return direction. Stop **148** on control rod **140** is so positioned that when the ram reaches a fully returned position the stop will cause control lever **94** to move back to its neutral position (indicated at A in FIGURE 3). In this position no fluid will be communicated to either end of the fluid motor, and member **136** will have engaged arm **135** to cause the engine speed to decrease to idle. In the event it is not necessary to utilize the full stroke of the ram the control lever may be manually moved to either the "advance" or "return" positions at will at any point in the stroke and the fluid motor will respond instantly thereto, moving the ram in the same direction as the lever. If the ram is not "returned" manually using the control lever it will do so automatically at the end of its working stroke.

One of the unique features of the present invention is the type of pump utilized. Pump **44** is a commercially available gear pump but differs from the usual single action gear pump in that it is capable of operating at two different output displacements, in response to the pressure of the output thereof. Since the basic construction of the pump itself is conventional, only the portions thereof pertinent to this invention are shown in FIGURE 5. As can be seen, inlet fluid is communicated through conduit **48** into an inlet chamber **150** serving both a high displacement pair of conventional pumping gears, one of which is indicated at **152**, and a small displacement pair of conventional pumping gears, one of which is indicated at **154**. The outlet chamber of the high displacement pumping gears is indicated at **156** and the output chamber of the low displacement pumping gears is indicated at **158**. Chamber **156** communicates through a check valve **160** and a passageway **162** with chamber **158**. Check valve **160** is of the conventional ball and spring type in which the spring is merely for purposes of positioning and is therefore relatively weak. Also disposed within the pump housing is a pilot-operated valve comprising a first bore **163**, a second adjoining bore **164**, a third bore **166**, a valve seat **168** positioned between bores **164** and **166** and placing them in communication with one another, and a ball valve **170** urged into a seated position by means of a relatively stiff spring **172**, the amount of compression of which is regulated by a threaded element **174** threadably disposed within bore **166**. Slidably disposed within bore **164** is a piston having a solid head portion **176** exposed to bore **163** and a slotted and hollow tail portion **178** positioned within bore **164** adjacent valve seat **168**. Positioned within the hollow slotted end **178** is a plunger **180** adapted to engage ball **170** to urge it off its seat. Plunger **180** extends only a small distance beyond the end of slotted end portion **178** so that the ball cannot be displaced too far off its seat. Bore **163** communicates through a passageway **182** with passageway **162** and chamber **158**. Bore **164** communicates through a passageway **184** with chamber **156**, and bore **166** communicates through a passageway **186** with chamber **150**.

In normal operation both pairs of gears pump together in parallel. The output fluid from the high displacement gears causes check valve **160** to unseat so that this fluid may communicate through passageway **162** into chamber **153**, from which the combined output fluid of both sets of gears is pumped through fluid conduit **50** to control valve **66**. In this mode of operation ball valve **170** is maintained in a seated position by spring **172**.

For a given horsepower prime mover driving at fixed speed a piston displacement pump of fixed displacement, there is a certain maximum pump output pressure above which the prime mover will not have sufficient power to drive the pump. In the event that during a log-splitting operation the load on the fluid motor becomes so great that the prime mover would normally be of insufficient power to overcome the resistance, such as when a knot or the like is encountered, pump **44** automatically shifts and goes to a low displacement high pressure mode of operation. Thus occurs in the following manner. When the pressure in chamber **158** and passageway **162**, and hence passageway **182** and bore **163**, reaches the maximum value for the combined displacement of both sets of ears, its force upon the end of piston **176** causes both the piston and plunger to move upwardly, as shown in FIGURE 5, to unseat ball **170**, whereupon the output of the large displacement pair of gears is dumped back to inlet chamber **150** through passageway **184**, bore **164**, valve seat **168**, bore **166** and passageway **186**. In other words, the high displacement pair of gears ceases to pump, and check valve **160** automatically closes to prevent the output of the low displacement pair of gears from also dumping. Only the low displacement pair of gears are now pumping and therefore for a given input horsepower considerably higher fluid pressures may be generated, although the volume delivered will be smaller. The ram will therefore continue to operate, although at a slower speed, since the greatly increased fluid pressure available to the motor will enable it to overcome the load. When the increased load has been overcome and the output pressure falls below the maximum full displacement output pressure, spring **172** will cause ball **170** to reseat and the high displacement pair of gears will start pumping again. The pressure at which shifting occurs is determined by the compression of spring **172**, which may be regulated by turning element **174**.

The pairs of gears forming each of the two sections of the pump should be designed so that for the maximum operating horsepower of the prime mover and the size of the fluid motor to be used, sufficient force may be generated by the low displacement pair of gears to overcome the maximum loads which may be anticipated under usual service conditions. The high displacement pair of gears should then have a displacement which when combined with that of the low displacement pair of gears is small enough that sufficient pressures may be generated to handle most of the other loads encountered at the same maximum operating horsepower input, and at a reasonable ram speed. In actual practice, it has been found that most logs up to 24" long and 20" in diameter may be split with a 6" high wedge if the ram is capable of delivering 19,000 lbs. of force. This force may be generated by a 3-horsepower (rated) internal combustion engine driving a fluid motor having a piston diameter of approximately 3½" if the pump displacement (i.e., of the low displacement pair of pumping gears, in this case) is approximately 1½ gallons per minute and is driven at an operating speed of 3600 r.p.m., the pressure developed being approximately 1950 to 2000 p.s.i. as limited by the pump relief valve (not shown). Furthermore, it has been discovered that with the same fluid motor and the same prime mover, operating at the same output

horsepower, and with the high displacement pair of gears having an output of approximately 4½ gallons per minute (in which case total output would be approximately 6 g.p.m.) a pump output pressure of approximately 450 p.s.i. may be obtained, and that this is sufficient to drive the ram at a satisfactory speed during the remainder of its cycle. Accordingly, threaded element 174 should be adjusted so that in this case valve 170 will open to shift the pump mode of operation at approximately 450 p.s.i. Thus, it has been found that if the ratio of the total combined displacement to the displacement of the low displacement pair of gears is approximately 4 or 5 to 1, satisfactory results may be obtained, and the double action of the pump makes it possible to use a less expensive smaller horsepower prime mover to perform the splitting operation. In all modes of operation the effective working area of the fluid motor piston remains the same.

Log splitting is accomplished quite simply by one operator as follows. With the apparatus operating and the control lever in the neutral position, a log is placed upon support plate 30 between the ram and the wedge, preferably adjacent the latter. The control lever is then pulled in the direction of intended movement of the ram to cause the ram to start its steady advancing stroke to push the log into the wedge. The operator need not hold on to the lever because of the spring detent and the automatic return operation thereof and therefore is free to grab the next log to be placed upon plate 30 as soon as the previous log has been fully split and the ram returned. If the log should split clean in less than the full advance stroke, the operator need only tap the control lever to release or trip the spring detent and cause the ram to start its return movement. When a particularly tough log or a knot therein is encountered, requiring more force for splitting than is available during the full displacement mode of operation of the pump, the latter will automatically shift to its low displacement mode of operation to greatly increase the force of the ram to overcome the increased resistance, after which the the pump will automatically return to its full displacement mode of operation which is somewhat faster. Since shifting is under load there is no noticeable jerking or shock to the apparatus. In the event the log hangs on the wedge after the ram has made its full advance stroke, such as sometimes occurs with tough, stringy American elm logs, it is unnecessary to wrestle the log free since the next log placed on the apparatus for splitting will push it free. The supporting plate 30 and control lever 94 are placed at convenient heights so that the operator will not have to stoop or bend in operating the apparatus. When a particularly tough large log is to be split, it has been found that best results may be obtained by taking slab cuts around the periphery thereof, i.e., cuts along planes which do not pass through the center of the log but along cords thereof. After the log diameter has been reduced in this manner, it may then be split in the usual manner through the center. The frame of the apparatus, of course, can be of any length to handle logs of any size desired.

The use of the double acting piston unit disclosed provides several advantages over known prior art constructions. For example, the need for bulky piston return springs, such as required in single acting units, is completely eliminated. Furthermore, the single piston utilized is considerably simpler and less expensive in design than the multiple piston units which have been used in the past.

Thus, there is disclosed in the above description and in the drawings an exemplary embodiment of the invention which fully and effectively accomplishes the objects thereof. However, it will be apparent that variations in the details of construction may be indulged in without departing from the sphere of the invention herein described, or the scope of the appended claims.

What is claimed is:

1. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating said second element, a driven pump for supplying fluid under pressure to said fluid motor, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load.

2. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, a driven pump for supplying fluid under pressure to said fluid motor, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load, said regulating means being operable to automatically increase the effective displacement of said motor when said load falls below said predetermined level.

3. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, said motor comprising a cylinder having a single piston therein, a driven pump for supplying fluid under pressure to said fluid motor, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load.

4. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, a driven pump for supplying fluid under pressure to said fluid motor, said pump having separate high and low positive displacement pumping sections therein adapted to normally pump in parallel, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for dumping the output of said high displacement pumping section only to decrease the effective displacement of said pump when said load exceeds a predetermined level whereby addi-

tional pressure is available for overcoming said increased load.

5. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, a driven pump for supplying fluid under pressure to said fluid motor, said pump having separate high and low positive displacement pumping sections therein adapted to normally pump in parallel, the ratio of the combined displacement of said two sections to said low displacement section being approximately 4:1 to 5:1, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for dumping the output of said high displacement pumping section only to decrease the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load.

6. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, a driven pump for supplying fluid under pressure to said fluid motor, said pump having separate high and low positive displacement pumping sections therein adapted to normally pump in parallel, valve means for controlling the supply of fluid from said pump to said motor, and regulating means responsive to the load on said motor for dumping the output of said high displacement pumping section only to decrease the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load, said regulating means being operable to automatically increase the effective displacement of said motor by placing said high displacement pumping section back in parallel with said low displacement pumping section when said load falls below said predetermined level.

7. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating one of said elements, a driven pump for supplying fluid under pressure to said fluid motor, valve means for controlling the supply of fluid from said pump to said motor, regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load, and relief valve means for establishing the maximum value of said additional pressure, the two effective displacement conditions of said pump being such that substantially the same amount of horsepower is consumed by said pump when operating at said predetermined output level and at said maximum additional pressure value.

8. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a driven pump for supplying fluid under pressure to said fluid motor; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element and a neutral position in which no fluid is communicated to said motor; and control means secured to said second splitting element and adapted to move said control lever to its return position when said second splitting element is fully advanced and to move said control lever to its neutral position when said second splitting element is fully returned.

9. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a driven pump for supplying fluid under pressure to said fluid motor; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element, and a neutral position in which no fluid is communicated to said motor; control means secured to said second splitting element and adapted to move said control lever to its return position when said second splitting element is fully advanced and to move said control lever to its neutral position when said second splitting element is fully returned, said control lever and valve being normally spring biased to said return position; and spring detent means for releasably holding said control lever and valve in said advance position against said spring bias.

10. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a driven pump for supplying fluid under pressure to said fluid motor; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element, and a neutral position in which no fluid is communicated to said motor; control means secured to said second splitting element and adapted to move said control lever to its return position when said second splitting element is fully advanced and to move said control lever to its neutral position when said second splitting element is fully re-

turned; and regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load.

11. A log-splitting apparatus comprising a frame, support means thereon for supporting a log to be split, a first splitting element rigidly secured to said frame adjacent said support means, a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face, a fluid motor for reciprocating said second element, a pump for supplying fluid under pressure to said fluid motor, means for driving said pump, valve means for controlling the supply of fluid from said pump to said motor, regulating means responsive to the load on said motor for decreasing the effective displacement of said pump when said load exceeds a predetermined level whereby additional pressure is available for overcoming said increased load, and means responsive to the position of said second element for reducing the speed of said driving means when said second element is in a fully returned position.

12. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a pump for supplying fluid under pressure to said fluid motor; means for driving said pump; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element and a neutral position in which no fluid is communicated to said motor; control means secured to said second splitting element and adapted to move said control lever to its return position when said second splitting element is fully advanced and to move said control lever to its neutral position when said second splitting element is fully returned; and means responsive to the position of said second element for reducing the speed of said driving means when said second element is in a fully returned position.

13. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a pump for supplying fluid under pressure to said fluid motor; means for driving said pump; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element, and a neutral position in which no fluid is communicated to said motor; control means secured to said second splitting element and adapted to move said control lever to its return position when said second splitting element is fully advanced and to move said control lever to its neutral position when said second splitting element is fully returned, said control lever and valve being normally spring biased to said return position; spring detent means for releasably holding said control lever and valve in said advance position against said spring bias; and means responsive to the position of said second element for reducing the speed of said driving means when said second element is in a fully returned position.

14. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a pump for supplying fluid under pressure to said fluid motor; means for driving said pump; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element, and a neutral position in which no fluid is communicated to said motor; said control lever and valve being normally spring biased to said return position; spring detent means for releasably holding said control lever and valve in said advance position against said spring bias; and means responsive to the position of said second element for reducing the speed of said driving means when said second element is in a fully returned position.

15. A log-splitting apparatus comprising: a frame; support means thereon for supporting a log to be split; a first splitting element rigidly secured to said frame adjacent said support means; a second splitting element mounted on said frame for reciprocating movement across said support means toward and away from said first element, one of said elements having a wedge-shaped surface pointing towards said other element and the other element having a relatively flat log-abutting face; a fluid motor for reciprocating one of said elements; a driven pump for supplying fluid under pressure to said fluid motor; valve means for controlling the supply of fluid from said pump to said motor; a manually operable control lever for operating said valve means, said control lever having an advance position in which fluid is communicated to said motor to advance said second splitting element, a return position in which fluid is communicated to said motor to return said second splitting element, and a neutral position in which no fluid is communicated to said motor; said control lever and valve being normally spring biased to said return position; and spring detent means for releasably holding said control lever and valve in said advance position against said spring bias.

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