

Jan. 21, 1947.

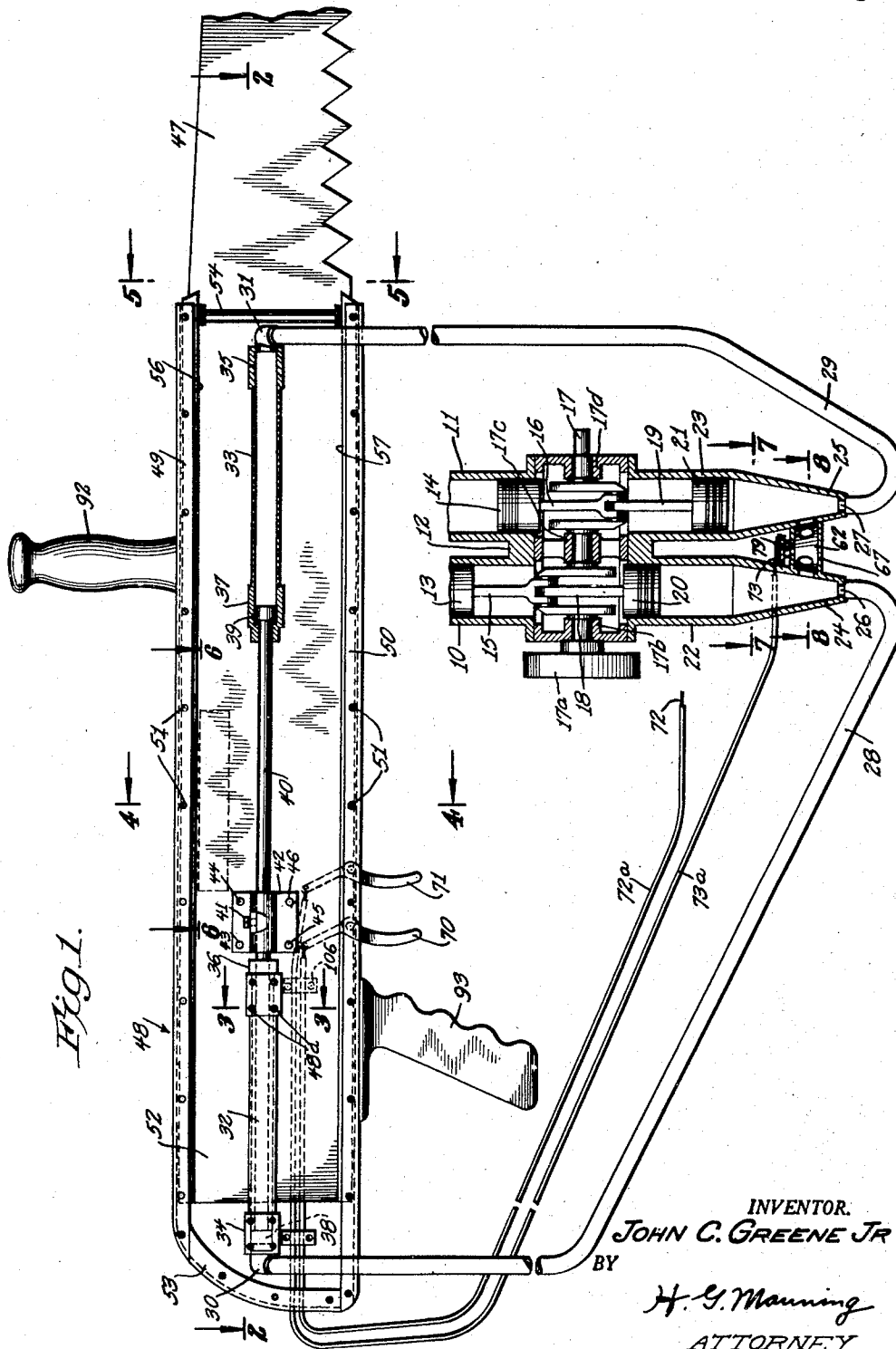
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2,414,519

HYDRAULIC DRAG SAW

Filed Dec. 27, 1943

3 Sheets-Sheet 1



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Fig. 2.

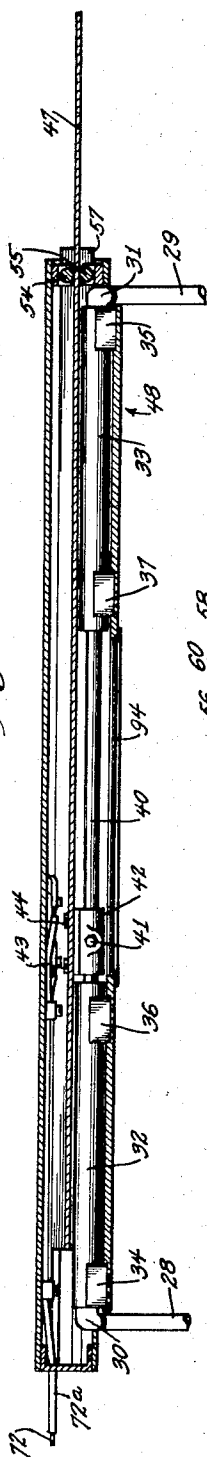


Fig. 5.

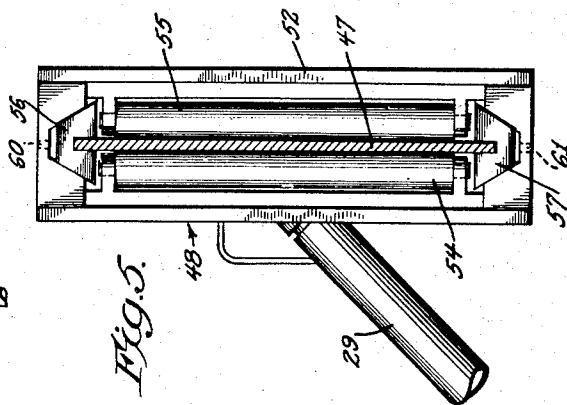


Fig. 4.

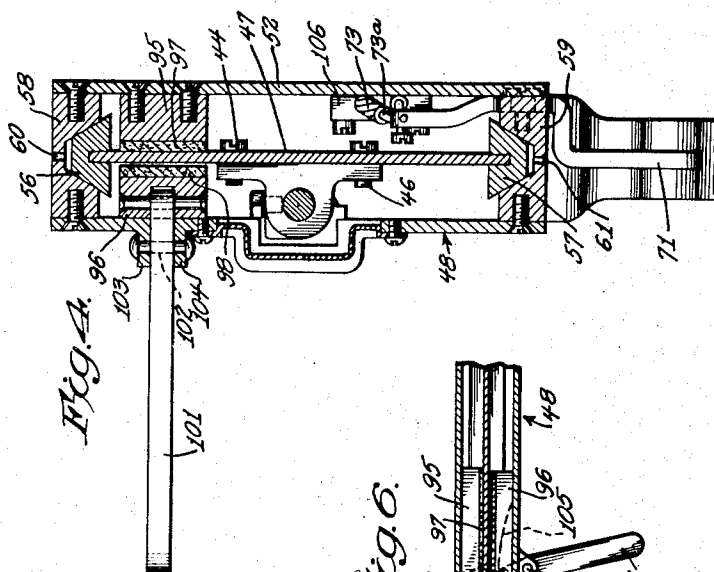


Fig. 3.

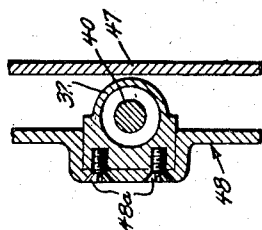
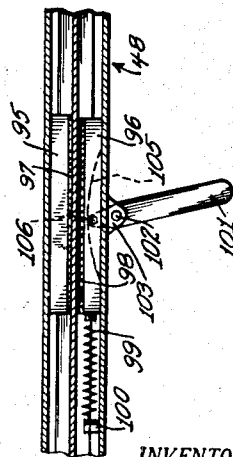


Fig. 6.



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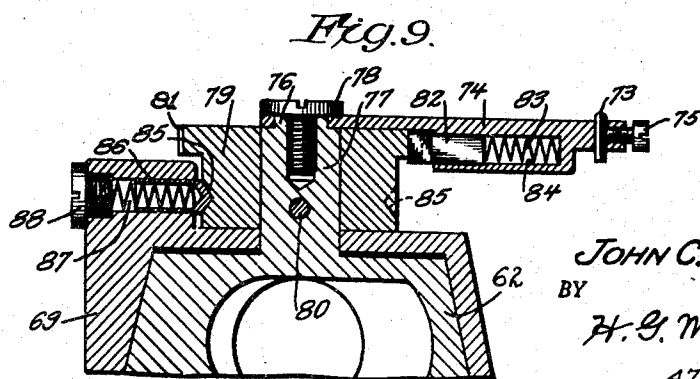
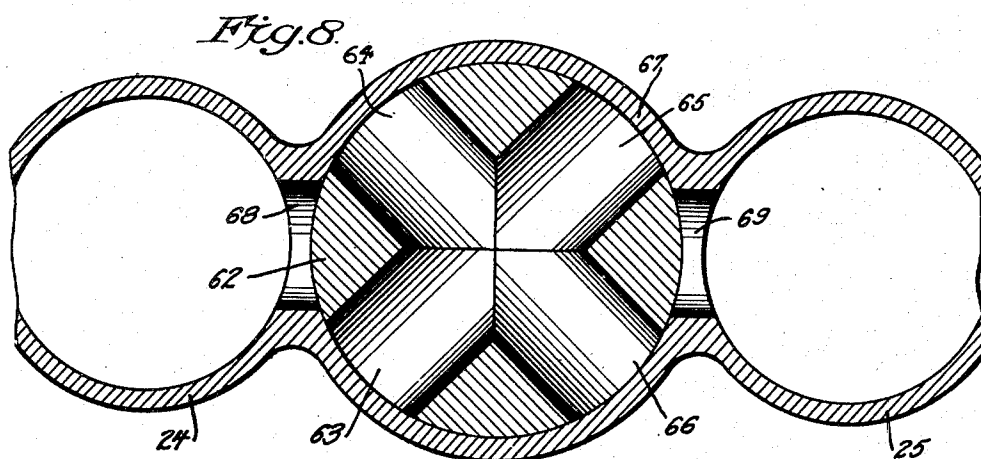
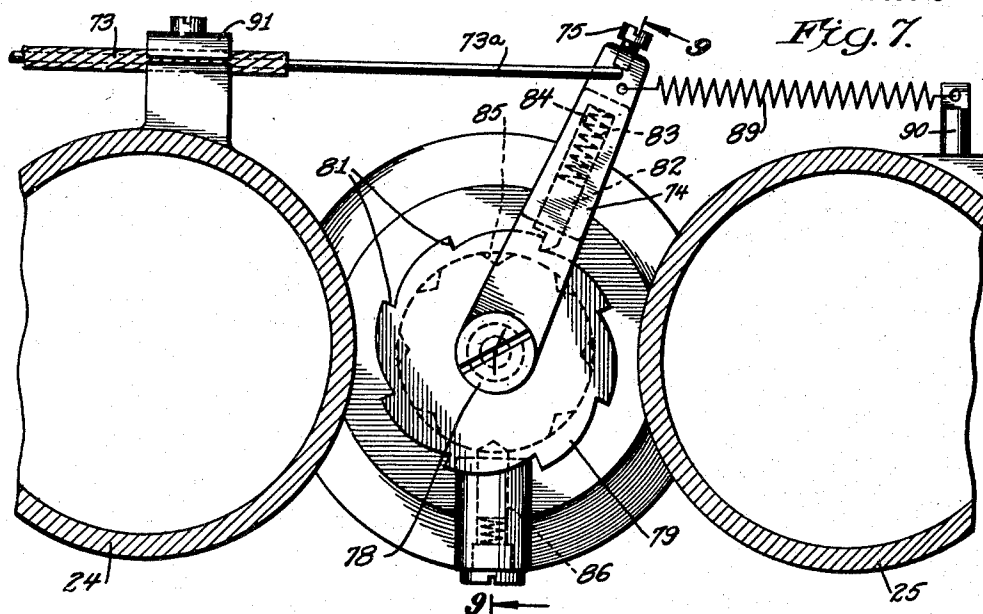
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HYDRAULIC DRAG SAW

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Application December 27, 1943, Serial No. 515,668

1 Claim. (Cl. 60—54.5)

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This invention relates to drag saws, and more particularly to a high speed drag saw operated hydraulically by an internal combustion engine.

One object of the invention is to provide a portable light weight drag saw of the above nature which may be conveniently used for felling, bucking, and limbing trees in the manufacture of cord wood, pulp wood, and similar forest products.

A further object is to provide a drag saw of the above nature in which a hydraulic liquid is alternately pumped by a pair of pistons connected to the engine crank shaft and located in a pair of auxiliary cylinders having conical lower ends, connected to a pair of smaller cylinders within which are a pair of saw-driving pistons joined together by a common connecting rod and rigidly attached to the reciprocating saw.

A further object is to provide a hydraulic drive for a drag saw having a conical valve located in the passage between the conical sections of the auxiliary cylinders, said valve having transverse passages for permitting the liquid to bypass between the hydraulic cylinders whenever the saw is stopped by means of the brakes, to be described later.

A further object is to provide a conical bypassing valve of the above nature in which the valve has a threaded spindle upon the top thereof, said spindle having a ratchet which is actuated step by step by a trigger-operated flexible cable, so that by successive manual actuations of the trigger, the control valve may be opened or closed as desired.

A further object is to provide a device of the above nature in which the valve ratchet is so coordinated with the trigger member that the bypass valve will be rotated successively by quarter turns for twisting said valve to "closed," "half-closed" or "open" positions.

A further object is to provide a drag saw of the above nature having a pair of upper and lower guiding handles adapted to be grasped during use by the hands of the operator.

A further object is to provide a drag saw of the above nature having a pair of triggers located adjacent the lower handle, one of said triggers being connected by a flexible cable to the engine carburetor and the other trigger being connected to a ratchet arm for operating a bypassing valve.

A further object is to provide guiding means for the saw comprising a pair of channels embracing the upper and lower edges of said saw, and a pair of elongated roller members located

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on each side of the saw at the forward portion of the saw housing.

A further object is to provide a manually controlled brake mechanism for stopping the saw whenever desired, without stalling the engine.

A further object is to provide an easily portable drag saw of the above nature in which the saw may be reciprocated more rapidly through the hydraulic apparatus than was possible in previous devices when the saw was operated mechanically either directly or indirectly from the crank shaft of an internal combustion engine.

A further object is to provide a drag saw of the above nature which will be simple in construction, inexpensive to manufacture, quick to set up, easy to manipulate by one man, compact, ornamental in appearance, and very efficient and durable in use.

With these and other objects in view there has been illustrated on the accompanying drawings, one form in which the invention may conveniently be embodied in practice.

In the drawings,

Fig. 1 represents a side view of the invention, shown partly in section.

Fig. 2 is a sectional view, taken along the line 2—2 of Fig. 1, showing the small saw-reciprocating pistons and cylinders.

Fig. 3 is a transverse sectional view, taken along the line 3—3 of Fig. 1, showing the saw and one of the small cylinders with its supporting bracket.

Fig. 4 is a transverse sectional view, taken along the line 4—4 of Fig. 1, showing how the saw blade is mounted for reciprocation in its housing.

Fig. 5 is a front end view of the saw housing, showing the appearance of the pair of guiding rollers which engage the opposite surfaces of the saw.

Fig. 6 is a longitudinal sectional view of the manually-operated brake for temporarily stopping the saw whenever desired.

Fig. 7 is a sectional view on a larger scale, taken along the line 7—7 of Fig. 1, showing the construction of the two hydraulic cylinders and the bypass valve located between the conical portions thereof.

Fig. 8 is a similar sectional view, taken along the line 8—8 of Fig. 1, showing the construction of the interior of the bypass valve.

Fig. 9 is a sectional view, taken along the broken line 9—9 of Fig. 7, and showing the construction of the trigger-operated ratchet mechanism for closing the bypass valve to start the

operation of the saw, and opening said valve to permit the liquid to bypass between the hydraulic cylinders when the saw is stopped by actuation of the brake.

Referring now to the drawings in which like reference numerals denote corresponding parts throughout the several views, the numerals 10, 11 indicate a pair of parallel main cylinders of an air-cooled four-cycle internal combustion engine, said cylinders being preferably cast integrally in a single block indicated by the numeral 12.

Located within the cylinders 10, 11 are a pair of pistons 13, 14, which are joined by connecting rods 15, 16 to a crank shaft 17, upon which is mounted a flywheel 17a, said crank shaft being journaled in bearings 17b, 17c, 17d, respectively.

Below the crank shaft 17, provision is made of a pair of connecting rods 18, 19, the lower ends of which are joined to a pair of pistons 20, 21 located in the upper cylindrical ends of a pair of hydraulic auxiliary cylinders 22, 23, having conical lower portions 24, 25 (as clearly shown in Fig. 1).

The hydraulic cylinders 22, 23 have outlet openings 26, 27 at their bottom ends, to which are connected a pair of flexible hydraulic conduits 28, 29—the other ends of said conduits being joined by elbows 30, 31 to a pair of aligned small saw-operating cylinders 32, 33 carried by the movable saw housing 48 to be described later.

The elbows 30, 31 are connected to a pair of enlarged sockets 34, 35, which are integrally joined to the outer ends of the small cylinders 32, 33. The inner ends of the small cylinders are joined to a pair of sockets 36, 37.

Mounted within the cylinders 32, 33, are a pair of small saw-driving pistons 38, 39 connected together by a common connecting rod 40 which reciprocates with the pistons located at the ends thereof. The connecting rod 40 is rigidly joined by a set screw 41 to a bracket 42, which in turn is secured by screws 43, 44, 45, 46 to a saw 47.

The saw is mounted to reciprocate within a housing 48 attached by screws 48a to the sockets 34, 35, 36, 37. The housing 48 is furnished with a pair of upper and lower guide channels 49, 50 which have screws 51 for connecting a removable side cover 52 (Figs. 4 and 5) to the saw housing 48. Provision is also made of a rear housing cover 53, which is also removable.

At the front of the saw housing 48, a pair of elongated parallel saw guide rollers 54, 55 (see Figs. 2 and 5) are supplied, said rollers being mounted in alignment with each other and adapted to engage opposite sides of the saw 47.

Provision is also made of a pair of slidable wedge blocks 56, 57 fastened to the upper and lower edges of the saw 47, said wedge blocks being embraced by a pair of V-shaped bearings 58, 59, as clearly shown in Fig. 5. The wedge blocks 56, 57 are adapted to be lubricated through a pair of small oil holes 60, 61, located at the opposite edges of the housing 48 in alignment with the wedge groove bearings 58, 59.

In order to bypass the hydraulic liquid between the auxiliary cylinders 22, 23, whenever the saw is temporarily stopped, provision is made of a vertical control valve 62 of conical shape (as most clearly shown in Figs. 1 and 8), said valve 62 having four radial passages 63, 64, 65, 66 arranged in the shape of a cross. The valve 62 rotates in a housing 67 having passages 68, 69, leading to the conical portions 24, 25 of the hydraulic cylinders 22, 23, previously described.

In order to control the operation of the drag

saw, provision is made of a pair of trigger levers 70, 71 projecting from the bottom of the housing 48, said trigger levers having flexible cables 72, 73 connected thereto (see Fig. 1). The cables 72, 73 are adapted to slide freely in housings 72a, 73a, respectively.

The cable 72 is clamped at its other end to the engine carburetor, not shown. The cable 73 is connected at its other end to a ratchet arm 74, by means of a set screw 75. The arm 74 is connected to a reduced end 76 of a shaft 77, integral with the bypass valve 62, by a headed lock screw 78. A horizontal ratchet wheel 79 is held rigidly upon the reduced end 76 of the shaft 77 by means of a key pin 80 (see Fig. 9).

The teeth on the ratchet wheel 79 are indicated by the numeral 81, and said teeth are adapted to be engaged by a radially arranged slidable pawl 82 which is pressed inwardly at all times by a coiled spring 83 located in a socket 84 formed in the ratchet arm 74.

Provision is also made of a series of eight equally spaced countersunk recesses 85 formed in the exterior of the shank of the ratchet wheel 79, which recesses are adapted to be selectively engaged by a hollow pointed radial plug 86, which is pressed inwardly at all times by a short coiled compression spring 87, the outer end of which engages an adjustable screw plug 88 mounted in the housing 69 of the bypass valve 62.

An elongated coiled tension spring 89 is also provided for connecting the outer end of the ratchet arm 74 with a post 90 projecting from the conical portion 25 of the hydraulic cylinder 23. The countersunk recesses 85 are mounted 45° apart, so as to hold the bypass valve 62 selectively in one of three positions—"closed," "half-closed," or "open," as desired.

For the purpose of holding the cable 73 in alignment with the end of the ratchet arm 74, an adjustable clamp 91 is provided, on the conical portion 24 (see Fig. 7).

The saw housing is adapted to be manually guided by means of upper and lower handles 92, 93 (see Fig. 1). The upper handle 92 is preferably vertical, while the bottom handle 93 is inclined rearwardly and has finger notches, as shown.

The numeral 94 indicates a removable center plate (as shown in Fig. 2), which when removed permits access to the interior of the housing 48.

Brake mechanism

The numeral 95 indicates a stationary brake block (see Fig. 6) which is rigidly secured to the rear of the housing 48, and the numeral 96 indicates a laterally movable brake block which is also slightly shiftable in a longitudinal direction with respect to the stationary brake block 95.

The blocks 95, 96, on their inner faces, have rigidly secured thereto, sheets 97, 98 of brake lining, which sheets are adapted to engage the opposite faces of the saw to exert friction pressure thereon. A tension spring 99 connects the movable brake member 96 to a fixed post 100 on the inside of the front wall of the saw housing 48.

In order to operate the brake to stop the saw, provision is made of a toggle handle lever 101, mounted on a pivot pin 102 carried by a pair of brackets 103, 104 (see Fig. 4).

The lever 101 extends inwardly into a curved recess 105 in the movable brake block 96 and has its inner end connected to a pin 106 embedded in said block.

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Operation

In use, to operate the saw, it is only necessary to first start the internal combustion engine, release the brake handle lever 101, and then turn the bypass valve to "closed" position.

The saw 47 will thus be caused to reciprocate within its wedge bearings 58, 59 and will be guided at its intermediate portion by the rollers 54, 55, said saw being preferably of the type which will cut when moving in both directions.

Whenever it is desired to stop the saw, the trigger 71 will be actuated to index the bypass valve 62 into "open" position. The toggle brake lever 101 will then be swung manually into braking position at right angles to the housing 48.

It will be understood that if desired, the internal combustion engine and attached hydraulic cylinders may be mounted on a pack board and carried on the back of the operator while the saw is being used.

While there has been disclosed in this specification one form in which the invention may be embodied, it is to be understood that this form is shown for the purpose of illustration only, and that the invention is not to be limited to the spe-

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cific disclosure, but may be modified and embodied in various other forms, without departing from its spirit. In short, the invention includes all the modifications and embodiments coming within the scope of the following claim:

Having thus fully described the invention what is claimed as new and for which it is desired to secure Letters Patent is:

In a portable drag saw, a hydraulic pump comprising a pair of parallel spaced cylinders, a bypass passage connecting the ends of said cylinders, a rotatable valve in said passage, a pair of power-driven pistons in said cylinders, a pair of flexible conduits connected to the ends of said cylinders, a saw-carrying frame adapted to be carried by the operator, a pair of aligned saw-driving cylinders located in said frame and connected at their ends to said conduits, a pair of saw-driving pistons in said saw-driving cylinders, said bypass valve having a ratchet wheel connected thereto, a pawl for engaging said ratchet wheel, and manually-operated trigger means associated with said saw-driving cylinders to successively operate said pawl to index said ratchet wheel and valve.

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