March 5, 1929. F. L. WEED 1,704,641

MOTORIZED HANDSAW

Filed Jan. 12, 1926 2 Sheets-Sheet 1

Fig. 1.

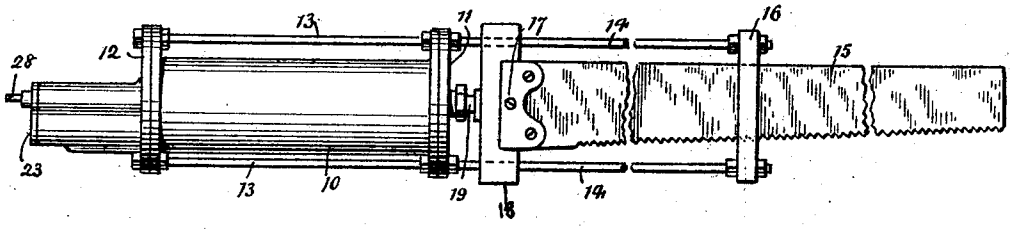


Fig. 2.

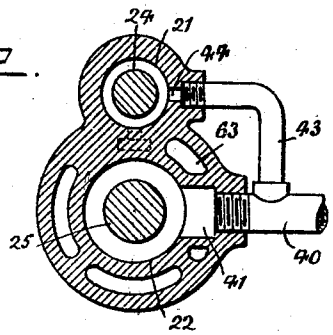


Fig. 3.

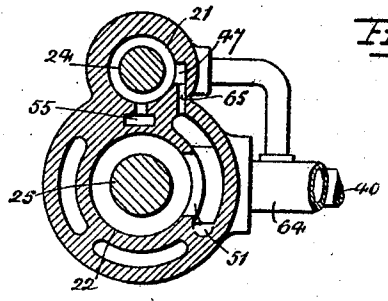
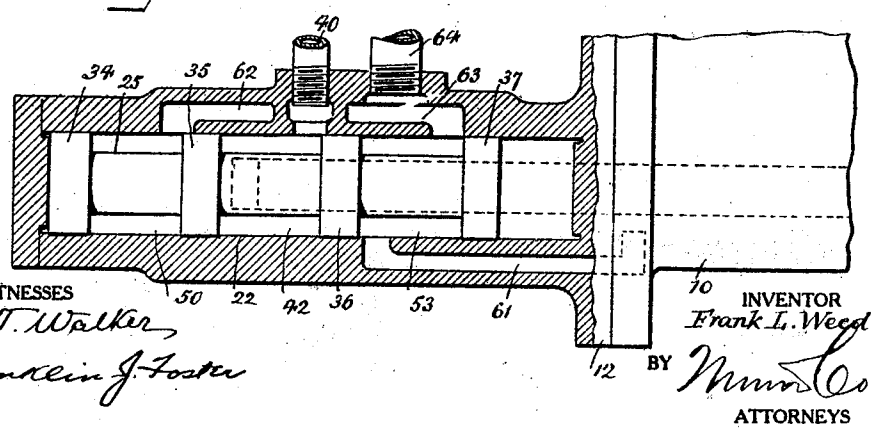


Fig. 4.



WITNESSES

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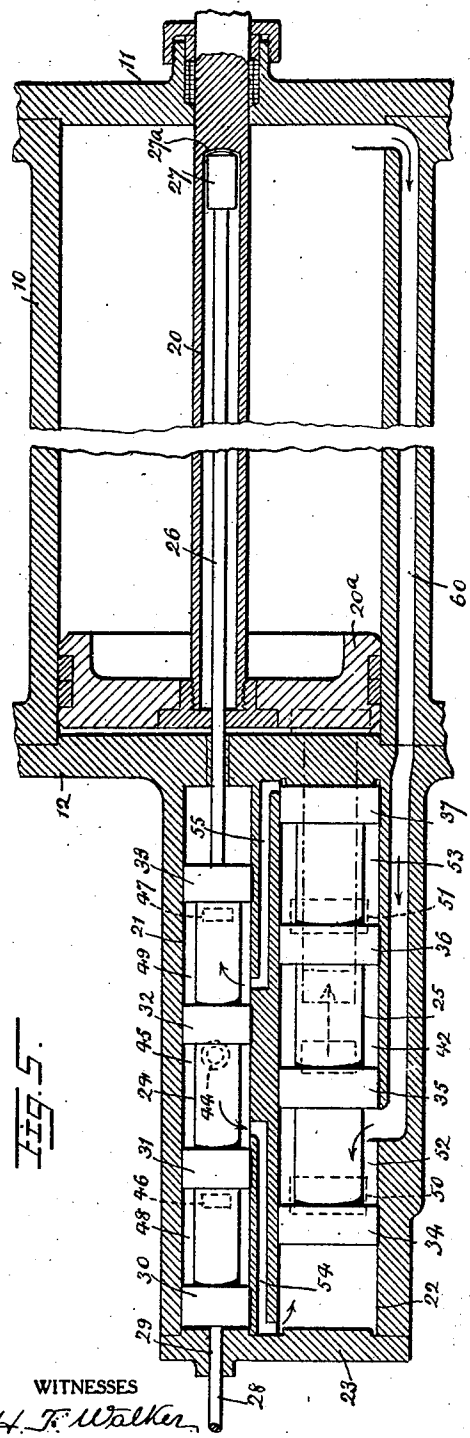


Fig. 5.

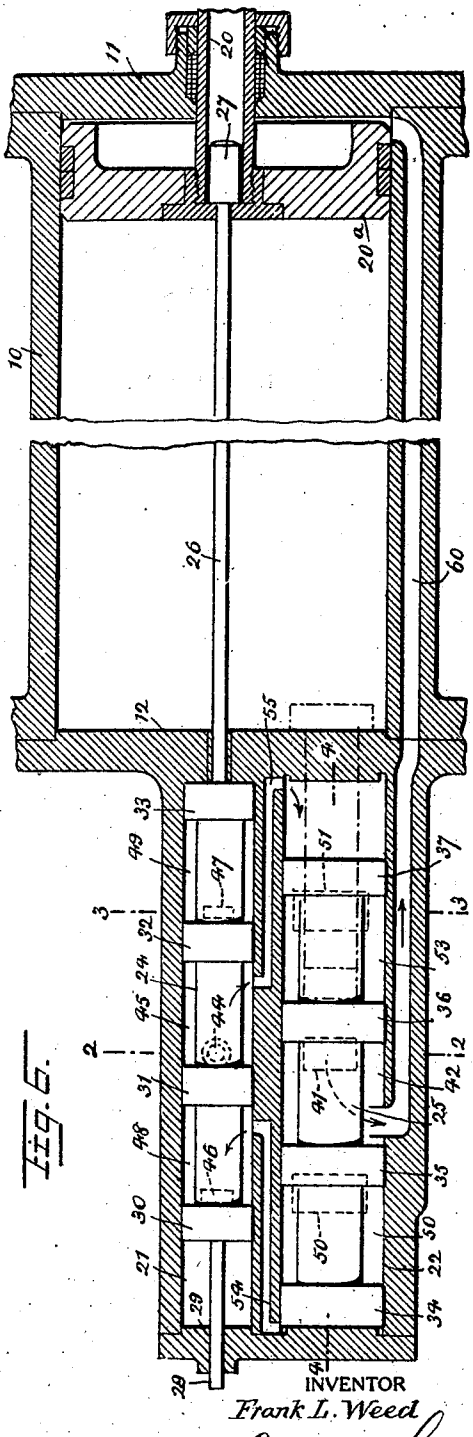


Fig. 6.

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UNITED STATES PATENT OFFICE.

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MOTORIZED HANDSAW.

Application filed January 12, 1926. Serial No. 80,767.

The present invention relates to improvements in power saws, and is particularly concerned with the provision of a relatively light weight motorized hand saw of convenient size for manual manipulation, and capable of being operated by steam, compressed air, or other motive fluid.

It is an object of the present invention to provide a saw of this general character which will be extremely simple and practical in construction, rugged, durable and efficient in use, and lending itself to the requirements of economical manufacture, assembly and operation.

With the above noted and other objects in view, the invention consists in certain novel features of construction and combinations and arrangements of parts, as will be more fully hereinafter set forth and pointed out in the claims. The invention may be more fully understood from the following description in connection with the accompanying drawings, wherein—

Fig. 1 is a broken view in side elevation showing a saw and motor unit embodying the present invention.

Fig. 2 is an enlarged transverse sectional view on the line 2—2 of Fig. 6.

Fig. 3 is a similar view on the line 3—3 of Fig. 6.

Fig. 4 is a longitudinal sectional view through the main valve chamber on the line 4—4 of Fig. 6.

Fig. 5 is a longitudinal broken sectional view taken in a vertical plane through the power cylinder and valve chambers or cylinders, and showing the power piston at one end of its stroke.

Fig. 6 is a view similar to Fig. 5, but showing the piston and the valves in their opposite extreme positions.

In the drawings I have used the reference character 10 to designate a power cylinder including removable flanged heads 11 and 12, coupled together by tie bars 13, the extensions 14 of which provide a frame which guides the movement of the saw 15. The extensions 14 of the tie bars are coupled together by block 16 which guides the movement of the saw blade, and the inner end of the saw is bolted or otherwise suitably secured at 17 to a cross head 18 sliding on the frames 14, and directly coupled to an extension 19 of the main hollow piston rod 20 for the main power piston 20^a.

The removable head 12 is preferably formed as an integral casting with a pair of cylindrical valve chambers or casings 21 and 22. The ends of these chambers are closed by a plate 23, and the chambers house a pilot valve 24, and a main valve 25 respectively. Each of these valves is in the nature of a sliding member actuated by the motive fluid for the piston 20^a in a manner to be more fully hereinafter described. The pilot valve 24 carries an operating extension 26 formed with a tappet 27 disposed within the hollow piston rod 20. This tappet is alternately engaged by the piston 20^a and by the end wall 27^a of the recess in the piston rod to effect positive shifting of the pilot valve. The pilot valve is also formed with an extension 28 at its opposite end guided in a suitable bearing 29 in the plate 23.

Before proceeding with the description of the details of the valve mechanism, and the means by which the pilot valve and main valve control the supply of motive fluid to the power piston, it may be noted that this valving is subject to a wide variety of structural variations, and that any suitable type of valve mechanism might be substituted for the particular mechanism herein illustrated. It is of course desirable that the valve mechanism be as simple and as light in weight as practicable, and I have found the illustrated mechanism well suited to the requirements of practical use.

Pilot valve 24 is formed with four enlargements or flanges 30, 31, 32, 33 which snugly fit the cylindrical chamber 21, and restrict the flow of motive fluid longitudinally of the pilot valve. The main valve 25 is preferably somewhat larger than the pilot valve, but is similarly constructed, including cylinder fitting flanges 34, 35, 36 and 37. The main valve 25 however, carries no guiding extensions at its end, but is freely movable in its cylinder 22 under the influence of the motive fluid, as will be more fully hereinafter set forth.

A steam supply pipe 40 communicates with a steam inlet port 41 in the wall of main valve cylinder 22. This port preferably enters the cylinder approximately at the center thereof, so that in either position of the main valve, the inlet port will deliver steam into the annular chamber 42 defined by the valve 25, the walls of the cylinder 22, and the two flanges 35, 36. Branching from the main steam pipe 40 is a steam inlet pipe 43 entering a port 44 in the pilot valve cylinder 21, port 44 being vertically aligned with the port

41. Steam entering the pilot valve cylinder through the port 41 always passes into the annular chamber 45 defined by valve 24, cylinder 21 and flanges 31, 32.

Steam exhaust ports 46, 47 are provided in the pilot valve cylinder on opposite sides of the inlet port 44. Exhaust port 46 is always in communication with the annular chamber 48 defined by the flanges 30, 31, and the exhaust port 47 is always in communication with the annular chamber 49 defined by the flanges 32, 33. In like manner the main valve cylinder is provided with exhaust ports 50, 51 vertically aligned with the exhaust ports 46, 47. Exhaust port 50, is always in communication with the annular chamber 52 defined by the valve flanges 34, 35, and the exhaust port 51 is always open to the annular chamber 53 defined by the flanges 36, 37.

One end of the cylinder 22 communicates with the cylinder 21 through a steam passage 54, and the opposite end of the cylinder 22 communicates with the cylinder 21 through a steam passage 55. Communication through one or the other of these steam passages is always cut off by the pilot valve 24. With the parts in the position of Fig. 5, it will be seen that there is free communication from inlet port 41 through chamber 45 and passage 54 to the rear end of cylinder 22. Flange 32 cuts off communication between the port 41 and the other passage 55. With the parts in the position of Fig. 6, the reverse is true, passage 55 providing free steam communication between the cylinders 21, 22, and passage 54 being cut off by the flange 31.

The crank end of the main power cylinder 10 communicates with the main valve cylinder 22 through a steam port 60 (Figs. 5 and 6), while the head end of the power cylinder communicates with the main valve cylinder 22 through a steam passage 61. It will be noted that one or the other of the steam passages 60, 61 will always be cut off from the steam supply port 41 of the main valve cylinder. With the parts in the position of Fig. 5, the flange 35 prevents the passage of steam from the port 41 through the passage 60, and with the parts in the position of Figs. 4 and 6, the flange 36 prevents the passage of steam through the passageway 61.

The steam exhaust ports 50, 51 of the main valve cylinder deliver exhaust steam through passageways 62, 63, to a common exhaust pipe 64. The exhaust ports 46, 47 from the pilot valve cylinder deliver steam through passages 65 to the passages 62, 63, thence to the main exhaust pipe 64.

The operation of the device is substantially as follows. With the parts in the position of Fig. 5, the tappet 27 has just been engaged by the shoulder 27^a to shift the pilot valve 24 to its extreme rearward position. As the pilot valve reaches this position, the passageway 54 is opened, and steam entering through the port 44 passes through chamber 45 and passageway 54 behind the rear end of the main valve 25. It will be recalled that steam is always entering the chamber 42 around the main valve, but since steam pressures on the flanges 35 and 36 are equal, the steam entering through the port 41 will have no tendency to shift the valve. The steam entering behind the rear end of valve 25 will shift the valve to the position of Fig. 5, it being borne in mind that passage 55 is cut off from the steam port 44, and serves as an exhaust passage through which the steam at the front end of the piston escapes to exhaust through the port 47. As the main valve reaches the position of Fig. 5, the flange 35 cuts off the passage 60 to the power piston, and the flange 36 uncovers the inlet end of the passage 61. Thus the steam will pass through the passage 61 into the head end of the power cylinder, and will shift the power piston from the position of Fig. 5 to the position of Fig. 6.

As the power piston reaches the position of Fig. 6, the tappet 27 is engaged by the piston, reversing the position of the pilot valve. At this time, the flange 31 opens passage 54 to the exhaust port 46 and opens passage 55 to the incoming steam from chamber 45. Thus the steam flowing through passage 55 into the front end of the main valve cylinder reverses the position of the main valve. As the position of the main valve is reversed, the flange 36 cuts off the passage of steam through passageway 61, and opens the passage 62 to the crank end of the power cylinder, whereby a reverse movement of the power piston is effected.

It will be noted that the passages 60 and 61, as well as the passages 54 and 55, serve alternately as supply and exhaust passages. In Fig. 5, the passage 60 is cut off from inlet port 41, and steam is exhausting from this passage through the chamber 52 and exhaust port 50. In Fig. 6, the reverse is true, inasmuch as the passage 60 is in direct communication with the steam inlet port 41.

I have referred throughout the specification to steam ports and steam passages, but it will be obvious that the device might be run equally well on compressed air. When steam is used as a motive fluid, some suitable handle means (not shown) is provided for manually grasping the tool and guiding the movement of the saw. When compressed air is used as a fluid medium, the tie bars 13 may conveniently serve as handles, or the casting which encloses the valve mechanism may be used as a handle. In any event it will be preferable to have the intake and exhaust pipes 40 and 64 connected through flexible hose leads to a suitable source of supply of steam or compressed air.

In the description of operation I have referred to the pilot valve as being positively operated by the lost motion connection be-

tween the extension 26 and the piston rod 20. It will be quite obvious that this positive operation need not be for the entire stroke of the pilot valve, and that it will only be necessary to initiate movement of the pilot valve and crack ports 54, 55 in order to effect fluid actuated shifting of the main valve 25.

It will be evident that various changes and alterations might be made in the general form and arrangement of parts described without departing from the invention. Hence I do not wish to limit myself to the details set forth, but shall consider myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of the appended claims.

I claim:

1. A motorized hand saw including a motor cylinder, flanged heads at the ends of the motor cylinder and tie bars connecting the heads and disposed at the exterior of the cylinder, said tie bars projecting well beyond one end of the cylinder to constitute guides, a cross head reciprocating on the projecting ends of the tie bars and a saw carried by the cross head, said saw being operatively connected to a motor within the cylinder.

2. A motorized hand saw including a motor cylinder, flanged heads at the ends of the motor cylinder and tie bars connecting the heads and disposed at the exterior of the cylinder, said tie bars projecting well beyond one end of the cylinder to constitute guides, a cross head reciprocating on the projecting ends of the tie bars and a saw carried by the cross head, said saw being operatively connected to a motor within the cylinder, and a block connecting the extremities of the projecting ends of the tie bars and cooperatively defining a guide slot for the saw.

3. A motorized hand saw including a motor cylinder, flanged heads at the ends of the motor cylinder and tie bars connecting the heads and disposed at the exterior of the cylinder, said tie bars projecting well beyond one end of the cylinder to constitute guides, a cross head reciprocating on the projecting ends of the tie bars and a saw carried by the cross head, said saw being operatively connected to a motor within the cylinder, a housing for motor valve mechanism secured to the end of the motor cylinder, said valve casing and one of the tie bars constituting the handle means of the saw.

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