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SET WORKS FOR SAWMILL CARRIAGES.

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SET-WORKS FOR SAWMILL-CARRIAGES.


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To all whom it may concern:

Be it known that I, WILLIAM H. TROUT, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Set-Works for Sawmill-Carriages; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to set-works employed on sawmill-carriages for advancing the knees or standards and moving the log or timber attached thereto toward the saw definite distances for sawing boards, planks, or lumber of the desired thickness or dimensions.

The main objects of my improvements are to relieve the setter of the labor of working the set-works by hand, particularly in sawing heavy logs or timber, and to expedite the operation of setting.

The improvements constituting my invention consist, essentially, of a cylinder and piston connected with and arranged to actuate an oscillating pawl-carrier or gripping device for turning the set-shaft and advancing the knees, of means for controlling the movement of said piston for sawing lumber of any desired thickness and of different thicknesses, of means of accurately limiting the movement of the knees by said piston, of a compressor mounted upon the carriage and having a driving connection with one of the carriage-trucks for supplying power to operate the set-works, and of certain novel details of construction and arrangement of component parts of the mechanism, as hereinafter particularly described and pointed out in the claims.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is an end elevation and vertical cross-section on the line 1 1, Fig. 2, of a sawmill-carriage and set-works to which my improvements are applied. Fig. 2 is a plan view of the set-works and a portion of the carriage, certain parts of the set-works being broken away and shown in horizontal section. Fig. 3 is an elevation of the fluid-pressure devices for actuating the set-works, the compressor and setter's platform being shown in vertical section on the line 3 3, Fig. 2; and Fig. 4 is an elevation as viewed from the right with reference to Fig. 3, showing the valve operating and controlling connections of the main and check cylinders and a modification of the connections between the main piston and set-shaft.

In Figs. 1 and 2 I have shown my improvements applied to set-works which have been in common use and to which I make no claim except as certain parts thereof are essential in connection with my improvements to the attainment of the objects hereinbefore mentioned. A designates the carriage-frame, B one of the head-blocks for supporting logs or timber thereon, C one of the knees or standards which are fitted to slide in ways on the head-blocks transversely to the carriage and are provided on the under side with racks, and D is the set-shaft supported in bearings on the frame A lengthwise thereof and provided with a ratchet-wheel d and with pinsions d', which mesh with the racks on the knees C in the usual way. E designates a rock-shaft commonly employed in hand set-works. It is supported in bearings on the carriage-frame over or near the back sill parallel with the set-shaft and is provided with a hand-lever e for manually operating the set-works and with a cross-head F, which is connected by links f with two oscillatory pawl-carriers G, loosely mounted on the set-shaft on opposite sides of the ratchet-wheel d and provided with pawls g, which are adapted to engage with the teeth of said ratchet-wheel and turn it in one direction for advancing the knees or standards C. H is the dial-wheel or scale, which is geared with the set-shaft and indicates at any time to the setter the distance of the knees or standards from the plane of the saw, enabling him to saw the log or timber on the carriage to the best advantage without actual measurement, calculation, or loss of time. I is the platform upon which the setter stands to operate the set-works. It is attached, as shown, to the rear sill of the carriage-frame adjacent to the set-lever e.

The parts hereinafter mentioned are such as are commonly employed in sawmill-carriages and set-works as heretofore constructed.
Referring now to Fig. 3 in connection with Figs. 1 and 2; J designates a cylinder mounted in a vertical position upon the setter's platform I and firmly secured thereto. It is formed or provided midway between its ends with a valve case or chamber, in which is fitted an oscillatory U-shaped valve K, controlling fluid supply and exhaust passages j j, leading therefrom to the ends of the cylinder. L is a fluid-check cylinder supported above and in the same axial line with the cylinder J by standards or bars M, which are formed with or rigidly attached to the upper head of cylinder J and the lower head of cylinder L. It is formed or provided midway between its ends with a valve case or chamber, in which is fitted an oscillatory valve N, controlling a by-pass l, leading therefrom to opposite ends of said cylinder.

O is a piston fitted to work in the main cylinder J, and a a piston-rod which passes through a stuffing-box in the upper head of said cylinder and through stuffing-boxes in both heads of the check-cylinder L. In the cylinder L a piston o' is fitted and attached to the rod o. The cylinder L and its by-pass l are filled with oil or other suitable liquid and control the movement of the piston o'. P is a rack attached to the piston-rod o between the two cylinders. It meshes with a pinion p, which in turn meshes with a segment-gear P', fixed on the lever or rock-shaft E of the set-works. The pinion p is journaled on a pin between two arms p', formed with or attached to the bars M and terminating at their opposite ends in sleeves or collars which encircle the shaft E on opposite sides of the gear P', thereby firmly holding said gears and the rack P in their proper relations to each other. To supply the power for operating the set-works, I prefer to provide upon the carriage an air-compressor Q, the piston of which is actuated by a crank shaft R, meshed in gear s on the axle S of one of the carriage-trucks. I have shown for this purpose a chain-belt connecting sprocket-wheels r and s on the shaft R and axle S, respectively. To stop and start the pump and render it inoperative andoperative according to the demands upon it, the sprocket-wheel r may be loosely mounted on the shaft R and formed or provided with one member of a clutch. The other member of the clutch r' is feathered on said shaft, so as to be movable lengthwise thereon and out of engagement with said sprocket-wheel. This clutch may be operated manually by means of a forked arm r' on a rock-shaft r, supported lengthwise of the carriage, and a connection r', (partially shown in Fig. 2,) leading to the setter's platform I or to a point on the carriage within convenient reach of the setter, or the pump may be rendered inoperative and operational automatically when the pressure produced thereby rises and falls to certain predetermined limits by any of the various well-known expedients for regulating air-compressors. T designates a compressed-air reservoir, which may be conveniently attached to the carriage alongside the rear sill under the setter's platform. It is connected by a pipe t with the delivery of compressor Q and by a pipe t' with the chamber of the main controlling-valve K. The purpose of this reservoir is to hold sufficient compressed air to operate the set-works when the carriage is at a standstill or whenever the direct supply from the compressor might be insufficient for the purpose. By means of the compressor on the carriage flexible jointed and telescoping connections for conveying steam or other fluid under pressure to the carriage from an outside source are dispensed with and the care and trouble of keeping them in working order are avoided.

The set-works is manually operated and controlled by the following means: To the projecting stem of the main valve K is fixed a lever k, as shown most clearly in Figs. 2, 3, and 4. One arm of this lever is connected by a rod k' with a corresponding arm n on the projecting stem of the valve N. To the other arm of lever k is pivoted between its ends what may be termed a "floating" lever U, the longer arm of which is connected by a rod u with an arm attached to and extending laterally from the upper end of the piston-rod o. The other shorter arm of lever k is connected by a link u' with the shorter arm of a bell-crank hand-lever V, through which alone the set-works is operated and controlled by the setter for sawing boards or lumber of any given thickness or dimension. The lever V is provided with a bolt or hutch operated by a hand-grip and adapted to engage with notches in a segment v, and thus determine and limit the throw of said lever, and consequently the extent of opening of the valve K. Although the travel of the main piston O and the resulting movement of the knees C through the medium of the setting mechanism are determined and controlled within narrow limits by the movement of the hand-lever V and the operation of the valves K and N and the check-piston o', a positive adjustable stop is provided in addition to limit with certainty and accuracy the travel of the main piston O in one direction. This stop consists of a forked block W, fitted to pass over the piston-rod o into engagement with any pair of opposite transverse grooves in the inner faces of the bars or standards M. For finer adjustments than can be made by placing the stop-block W in different grooves in the bars M inter-changeable stop-blocks of different thicknesses may be provided. By engagement with the hub of the rack P or any other suit-
able collar or projection on the piston-rod o the upward movement of the piston O is limited with certainty and accuracy at any desired point.

In Figs. 1 and 2 I have shown my improvements applied to a complete hand set-works of a common construction that may be used in the ordinary way at any time whenever it is necessary or desirable to do so, in case, for instance, the fluid-pressure-actuating connections are not in working order. The rock shaft E with the hand-setting lever and its other adjuncts may, however, be dispensed with and the rack F may be arranged to engage directly with a segment gear or rack formed or provided on the single oscillating pawl-carrier or gripping device G'. In this case the pinion p is omitted and the arms m' connect the cylinder J directly with the set-shaft D, as shown in Fig. 4. For the purpose of receding or withdrawing the knees on the head-blocks to position to receive another log the pawl-carriers are provided with cam-levers g' for throwing the paws g out of engagement with the teeth of ratchet-wheel d, and thus permitting the set-shaft to be turned backward by the usual or any suitable receding device.

My improved set-works operates as follows:

The stop-block W being adjusted by engagement with the proper grooves in the bars M to limit the travel of the piston O and the movement of the set-works at the required point for sawing boards or lumber of the desired thickness and the valve operating and controlling levers and connections being in the positions in which they are shown in the drawings, the setter pulls the hand-lever V back to a notch in the segment v corresponding in position with the stop-block W.

By this operation the lever U is turned downward at its outer or rear end, swinging on its pivot connection with the rod u as a fulcrum, and the outer or rear arm of the lever k is turned down, thereby shifting the main valve K, so as to admit compressed air or other fluid medium through the lower passage j into the lower end of cylinder J below the piston O and open the upper end of said cylinder to exhaust through the upper passage j and the cavity in said valve. Simultaneously with the opening of valve K the valve N is opened to a corresponding extent through the lever k, rod k', and arm n. The liquid in the check-cylinder L is thus allowed to flow from its upper end into its lower end. The compressed air or other actuating medium entering the lower end of the main cylinder J below the piston O forces the latter with its piston-rod o and the check-piston o' upward, at the same time turning the inner or front arm of the lever U upward by means of its connection with said piston-rod through the rod u, said lever now swinging on its pivot connection with the link u' as a fulcrum.

This movement of the lever U effects a movement of the valves K and N the reverse of that produced by the hand-lever V and closes said valves at a point in the upward movement of the pistons corresponding to the extent to which the lever V was moved in opening said valves and with the adjustment of the stop-block W. Upon the closing of said valves the movement of the check-piston o' is arrested by the confinement of the liquid in the cylinder L above it, and the main piston O is stopped thereby and by the block W at exactly the desired point. This upward movement of the pistons with the arrangement shown in Figs. 1 and 2 turns the rock-shaft E outward, or to the left, as shown in Fig. 1, thereby swinging one of the pawl-carriers G backward and the other forward and advancing the knees C one-half the required distance. The hand-lever V is now thrust forward by the setter to its starting-point or home position and the valve K is shifted so as to admit compressed air or other fluid medium into the upper end of the cylinder J and open the lower end of said cylinder to exhaust, the by-pass l of the check-cylinder L being simultaneously opened. The pistons now descend to their initial position and the valves are closed by a reverse movement of the floating lever U and its connections in the manner above described. The downward stroke of said pistons produces a like movement of the pawl-carriers, turning one forward and the other backward, thereby completing the advance movement of the knees C. The check-piston o' serves not only to check and stop the main piston O at the limits of its movement, but also to regulate and control the movement of said piston and of the set-works, so as to avoid shock thereto and overthrow of the set-works by its momentum. The farther the hand-lever V is drawn backward and the greater the extent to which the valves K and N are opened the greater will be the movement of the floating lever U and its connections to effect the closing of said valves, the point in the stroke of the pistons at which said valves are closed always corresponding with the extent to which said valves are previously opened by the lever V.

I do not wish to be understood as limiting myself to the particular kind of set-works shown in the drawings and hereinbefore stated to be old nor to the exact details of the fluid-pressure motor and its connections herein shown and described, as they may be variously modified within the spirit and intended scope of my invention. Although I prefer to employ in connection with a fluid-motor for actuating set-works a compressor on the carriage for supplying the power for said motor, said compressor and its adjuncts may be dispensed with and the motor may be supplied with steam or other fluid-pressure me-
dium from a source independent of the carriage by means of flexible, jointed, or telescoping connections. In place of the ratchet-wheel and the pawls any other form of gripping device may be used—such, for instance, as a friction-wheel in place of the ratchet-wheel and friction-blocks in place of the pawls.

The operation of the modified arrangement shown in Fig. 4 is like that hereinbefore explained, except that the forward movement of the single pawl-carrier G', produced by throwing the lever V backward, effects in one operation under ordinary conditions the advance of the knees the entire interval for sawing a board, plank, or piece of timber of any given thickness, while the backward movement of the pawl-carrier produced by returning said lever to home position brings it into position for the next advance movement of the knees.

I am aware that it is not broadly new to employ in different relations a check-cylinder containing a fluid and a piston movable in therein contained. I am further aware that motors have been provided with oscillatory valves having compound-lever mechanism and connections whereby the movement of the motor-piston is caused to actuate the piston-controlling valve or valves. I am not, however, aware that any one has hitherto proposed so to organize and construct the set-works and the knees subject to the controlling action of a fluid-check, whereby the action of the power apparatus is rendered gradual and uniform, preventing sudden and severe strains, overthrow, and like undesirable effects, nor am I aware that any one has heretofore combined with such fluid-check a valve mechanism capable of being manually set to determine simultaneously the throw or movement of the power-piston and the check-piston and the closing of the valve or valves controlling and determining such movement, nor am I aware that it has ever before been proposed to combine with such fluid-check an adjustable stop device designed and adapted to form a positive stop to limit the movement of the power-piston and connected parts and preclude the possibility of overmovement.

In machinery for sawing boards it is necessary in order to secure the requisite output and the necessary accuracy and uniformity in the thickness of boards sawed that the movements be produced with great rapidity and exactness. In sawing large and heavy logs it is essential to such rapid actuation that power be employed and that when employed it shall be so perfectly controlled as to preclude overmovement, sudden strains, or jerky action. It is extremely desirable also that after setting the controlling-valve the parts shall act automatically and without requiring the attention of the sawyer or attendant, or, in other words, that he be left free to look after and manipulate, if need be, other parts of the apparatus. While therefore various of the elements entering into the combination or into the complete organization of the apparatus herein set forth and claimed are old per se, their combination produces a structure essentially unlike anything previously existing and having capabilities not possessed by any other apparatus of which I have knowledge. While therefore I do not specifically and separately claim a fluid-check apparatus, nor, broadly, a floating valve-lever and connections for moving the controlling-valve through the movements or action of the power-piston, I believe myself to be the first to combine or to organize the several parts of the apparatus as herein set forth and as specified in the following claims.

Therefore I claim—

1. The combination with the knees and set-shaft of a sawmill-carriage of a fluid-cylinder mounted upon the carriage, and having a fluid-supply connection, a piston fitted to work in said cylinder and arranged to turn the set-shaft, a valve controlling the fluid-supply connection of said cylinder, and a floating lever connected with said valve and piston and arranged to close the valve at different points in the stroke of the piston according to the extent that the valve is opened, substantially as and for the purposes set forth.

2. The combination with the knees and set-shaft of a sawmill-carriage, of a main cylinder having a fluid-supply connection with its opposite ends, a piston fitted to work in said cylinder and having a connection for turning the set-shaft, a check-cylinder having a by-pass connecting its ends, a piston fitted to work in said cylinder and connected with the main piston, connected valves controlling the fluid-supply connection of the main cylinder and the by-pass of the check-cylinder, and a floating lever connected with one of said valves and pistons and arranged to close said valves at different points in the stroke of said pistons according to the extent of opening the valves, substantially as and for the purposes set forth.

3. The combination with the knees and set-shaft of a sawmill-carriage, of a cylinder having fluid supply and exhaust connections with opposite ends thereof, a piston fitted to work in said cylinder and having a connection for turning the set-shaft, an oscillatory valve controlling said supply and exhaust connections, a lever for opening said valve, and a floating lever pivoted between its ends to an arm on the valve-stem, and having one arm
connected with the opening-lever and the other with the piston-rod, substantially as and for the purposes set forth.

4. The combination with the knees and set-shaft of a sawmill-carriage, a wheel mounted on said shaft and an oscillatory gripping device for engaging and turning said wheel in one direction, of a cylinder mounted on the carriage and having fluid supply and exhaust connections, a piston fitted to work in said cylinder and connected with said oscillatory device, a valve controlling the fluid supply and exhaust connections of said cylinder, and a lever connection with said valve arranged to open and to automatically close the same according to the degree of opening, substantially as and for the purposes set forth.

5. The combination with the set-shaft of a sawmill-carriage, of a cylinder mounted upon said carriage and having fluid supply and exhaust connections, a valve controlling said connections, a piston fitted to work in said cylinder and to actuate said set-shaft, two bars arranged on opposite sides of and parallel with the piston-rod and formed with a series of transverse grooves, and a forked stop-block fitting opposite grooves in said bars, substantially as and for the purposes set forth.

6. In combination with the set-works of a sawmill-carriage comprising an oscillatory gripping device for turning the set-shaft and advancing the knees, a main cylinder and its piston connected with and arranged to oscillate said gripping device, and having fluid supply and exhaust connections, a check-cylinder arranged in line with the main cylinder and having a by-pass between its ends, a piston fitted in said check-cylinder and connected by its rod with the main piston, oscillatory valves controlling the fluid supply and exhaust connections of the main cylinder and the by-pass of the check-cylinder, a lever fixed between its ends to the main valve-stem and having one arm connected by a rod with a corresponding arm on the check-valve stem, a floating lever pivoted between its ends to the other arm of said valve-lever and having one arm connected by a rod with the piston-rod, and a hand-lever connected by a link with the other arm of the floating lever, substantially as and for the purposes set forth.

7. In combination with the knees and set-works of a sawmill-carriage, a fluid-cylinder mounted upon the carriage and having a fluid-supply connection; a piston fitted to work in said cylinder and arranged to turn the set-shaft; a valve controlling the fluid-supply connection of said cylinder; a lever connected with said valve and piston and arranged to close the valve at different points in the stroke of the piston according to the extent to which the valve is opened; and a lever for adjusting the opening of said valve, provided with means for locking it at any desired adjustment, substantially as set forth, whereby the controlling-lever may be set to any predetermined adjustment and the mechanism be thereafter caused to act automatically to move the piston to the predetermined extent and to close the valve when such movement is completed.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

WILLIAM H. TROUT.

Witnesses:
Wm. Walthiers,
Walter C. Trout.