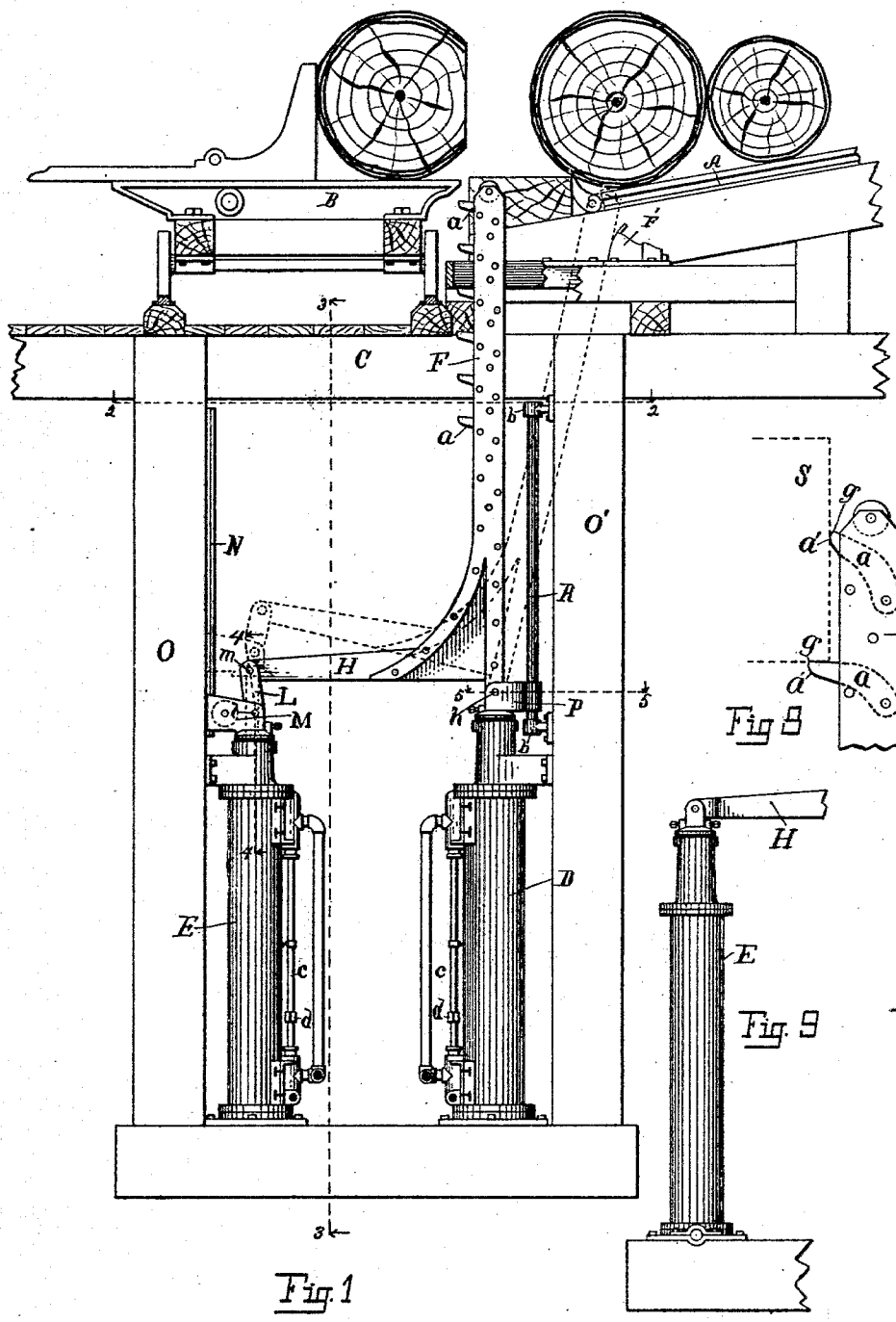
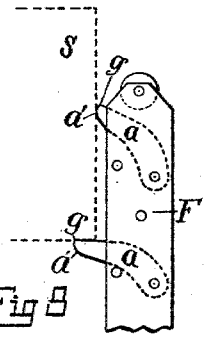
(No Model.) 2 Sheets—Sheet 1.

W. E. HILL.

LOG LOADER AND TURNER.

No. 514,550. Patented Feb. 13, 1894.





Witnesses:
Walter L. Wood.
Chas. E. Westbrook.

Inventor.
William E. Hill.
By Fred L. Chappell
Att'y.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. E. HILL.

LOG LOADER AND TURNER.

No. 514,550. Patented Feb. 13, 1894.

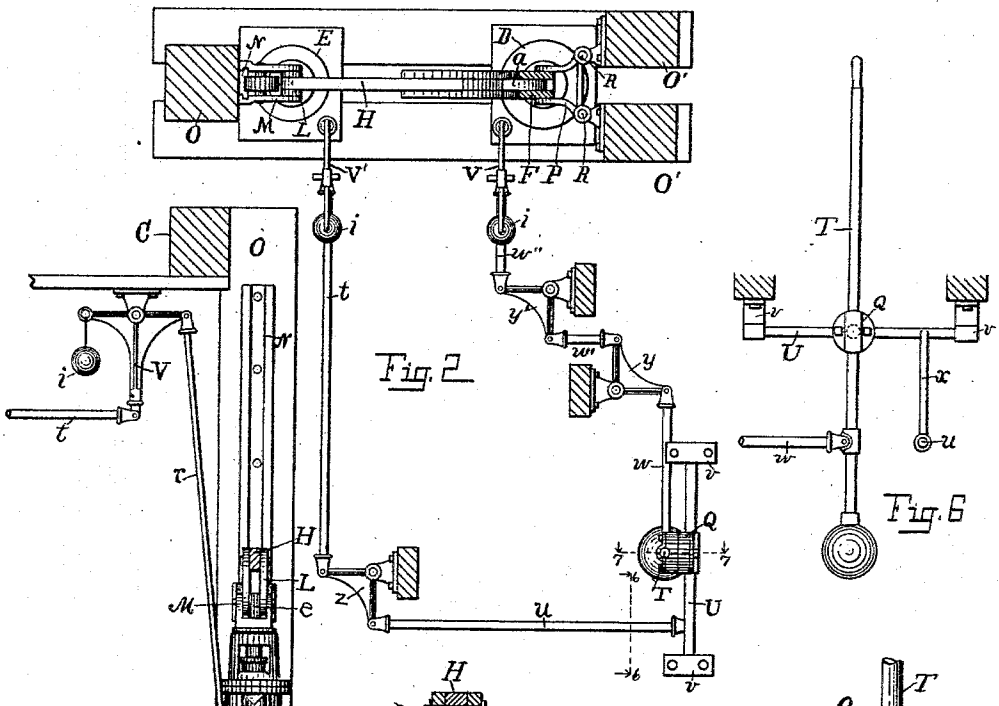


Fig. 2

Fig. 6

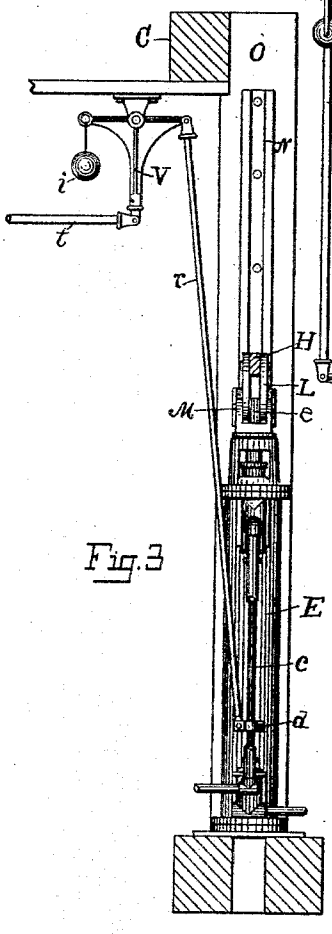


Fig. 3

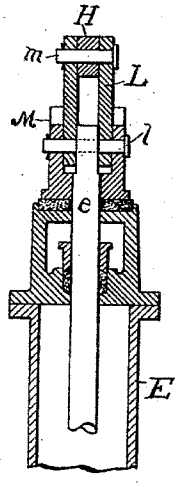


Fig. 4

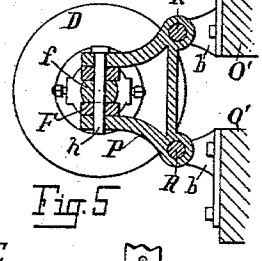


Fig. 5

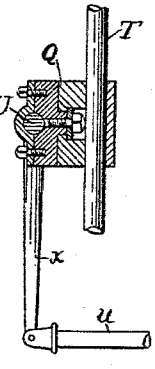


Fig. 7

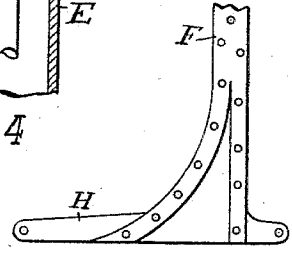


Fig. 10

Witnesses:
Walter Wood
Cora E. Westbrook

Inventor.
William E. Hill
By Fred L. Chappell
Att'y.

THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM E. HILL, OF KALAMAZOO, MICHIGAN.

LOG LOADER AND TURNER.

SPECIFICATION forming part of Letters Patent No. 514,550, dated February 13, 1894.

Application filed November 14, 1892. Serial No. 451,959. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM E. HILL, a citizen of the United States, residing at the city of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a certain new and useful Log Loader and Turner, of which the following is a specification.

My invention relates to improvements in log loading and turning machines in which an upwardly projecting toothed bar supported on a horizontal bar is operated by the direct action of pistons and piston rods of perpendicular or nearly perpendicular steam cylinders without the intervention of gearing or pulleys.

The objects of my improvements are first to provide a connection of the piston rods to the horizontal bar that will accommodate itself to the lateral motion of the end of the bar when it is tipped; second, to bring the perpendicular bar directly above one of the cylinders so that a more direct action is secured; third, to afford a simple means of connecting the operating lever with the valve stems of the cylinders; fourth, to provide by counterbalanced bell cranks against loss of motion between the connecting rods, bell cranks and rock-shafts of the operating mechanism and also by the same means take the weight of the connecting rods from the valve stems; fifth, to provide teeth in the toothed bar that will not mar or injure the sawed surface of a log but will roll a log by taking hold of the rough surface, or below the sawed surface. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the machine (without the operating mechanism) in position in a saw-mill. Fig. 2 is a view of the same with the operating mechanism attached looking down from line 2—2 of Fig. 1. Fig. 3 is a view to the right hand from line 3—3 of Fig. 1. Fig. 4 is a detail of cylinder E on the line 4—4, Fig. 1, looking to the right. Fig. 5 is a detail of cylinder D on line 5—5 Fig. 1, looking down. Fig. 6 is a detailed view of the operating lever T looking to the left on line 6—6 Fig. 2. Fig. 7 is another detail of the operating lever on line 7—7 Fig. 2. Fig. 8 is a detail of the upper end of the tooth bar F showing the shape of the pivoted receding teeth and the manner in which they act. Fig. 9 is a view of a cylinder on bearings at the bottom that can be used in place of cylinder E and its attachments. Fig. 10 is a detail of a modification of the bar F and H showing the perpendicular bar F at some distance from the end of the bar H.

Similar letters refer to similar parts throughout the several views.

C, O, O′, B and A are the floor and sill, posts, carriage and headblocks, and log skidway of a saw-mill in the ordinary form.

E and D are fixed upright steam cylinders containing pistons with piston rods projecting through stuffing boxes and guides, the piston rod of cylinder E, connecting by means of the link L, to the horizontal bar H, the piston rod of cylinder D connecting directly to the bar H, under the bar F. The bars F and H are bolted or riveted solid together and are practically one piece when finished. The piston rod of cylinder E is attached to a guide block M, which contains an antifriction roller and reciprocates on the guide N. The top of the piston rod of cylinder D is attached to a guiding cross head P, which reciprocates on the guide rods R R, Fig. 5, which are separated to allow the toothed bar F to pass between them when it is in operation. The teeth *a a*, Fig. 8 are shaped with a rounded part *a′ a′* projecting beyond the points *g g* so that when the teeth come in contact with the flat sawed surface of a log they will slide over without tearing, and the teeth below the sawed part will be the only ones to engage the log. The teeth shown are pivoted receding teeth but the same would be true of fixed teeth so formed.

The operating lever T with heavy weight at the bottom is pivoted on the side of the rock shaft U, so that it will oscillate in the direction of the length of the rock shaft but will when moved to either side cause the rock shaft to rock. To the lever T is pivoted the connecting rod *w*, which is pivoted to bell crank *y*, which is pivoted to connecting rod *w′*, which is pivoted to bell crank *y′*, which is pivoted to connecting rod *w″*, which is pivoted to counterbalanced bell crank V, which is pivoted to connecting rod *r*, which connects with the valve stem *c*, on cylinder D. To the

arm x, of the rock shaft U is pivoted the connecting rod u, which is pivoted to the bell crank z, which is pivoted to the counterbalanced bell crank V′, which is pivoted to the connecting rod which connects with the valve stem of cylinder E. These connecting rods and bell cranks might be attached to the lever at a point above the rock shaft and to an upwardly projecting arm, on the rock shaft should it be found more convenient. I prefer to attach them below.

The weights $i\,i$ attached to the arms of the bell-cranks V V′ prevent loss of motion in the joints between the bell-cranks and connecting rods of the operating mechanism and also take the weight of the connecting rods T from the valve stems c thus causing the valves to respond quickly and easily to the motions of the weighted operating lever T. I prefer to use bell cranks and connecting rods to rock shafts and connecting rods to connect the operating lever with the valves of the steam cylinder because the torsion of rock shafts prevents a perfect control of the valves.

My machine is operated by tipping the operating lever T. By examining Figs. 2, 3, 6 and 7 the action will be understood. Tipping the lever T in the direction of the line 7—7 Fig. 2 toward the right will rock the rock shaft U, and cause by its connection with the valve stem, steam to be admitted to the bottom of the cylinder E which will raise that end of the bar H, which will tilt the toothed bar away from the carriage B, as shown by the dotted lines in Fig. 1. Tipping the lever T in the opposite direction will admit steam to the top of cylinder E which will bring that end of the bar H down and move the toothed bar F in the opposite direction. By tipping the top of the lever T toward the cylinders in a line parallel with the line 6—6 Fig. 2, steam will be admitted to the bottom of cylinder D, which will raise that end of the horizontal bar H causing the toothed bar F to tilt toward the carriage B. When the bar has already been elevated if the lever T be tipped in the opposite direction from that above indicated steam will be admitted to the top of the cylinder D, and that end of the bar H will be lowered and the toothed bar F will be tilted away from the carriage B. The single lever thus operates each cylinder separately. By tipping the lever T in directions between those above indicated both cylinders can be operated at the same time. Steam can be admitted at the top of both cylinders or at the bottom of both cylinders in either equal or unequal amounts thus causing the toothed bar to raise or lower or to tilt and raise and lower at the same time. Or steam can be admitted to the top of either cylinder and to the bottom of the other at the same time and in varying amounts thus tilting the bar without changing its height. These will be the motions of the toothed bar when it is not operating on a log or timber. When the toothed bar is acting on a log or timber a little steam admitted to the top of cylinder E instead of moving the toothed bar holds the toothed bar against the timber with an elastic yielding pressure, and the larger cylinder D raises the whole bar and rolls the log or timber to its place. By these various operations the toothed bar will slide a log sidewise or roll or turn it or push it solid against the knees of the head blocks or turn it on the head blocks as desired.

A cylinder on trunnions at the bottom shown in Fig. 9 could be substituted for cylinder E in Fig. 1. The entire cylinder and piston oscillating and taking the place of the link L in Fig 1. The toothed bar F can be attached at any point on the horizontal bar H, or to an extension of the bar H beyond the point where the pistons are attached but it is preferred to have the bar F in this machine attached directly over the cylinder D.

I am aware that log loading and turning machines have been constructed having a toothed bar operated directly by pistons of steam cylinders, by a single operating lever prior to this invention so I do not claim that construction broadly, but

What I do claim, and desire to secure by Letters Patent, is—

1. In a log loader and turner, two upright stationary steam cylinders, the piston of one of which is attached by a vertical link to the end of a horizontal bar carrying an upwardly projecting tooth bar, at its opposite end and the piston rod of the other pivoted directly to said horizontal bar, under the vertical toothed bar, for the purpose set forth.

2. In a steam log loader and turner an upright bar for handling the logs, attached at the end of a horizontal bar, directly above the piston of one of the operating cylinders in combination with pistons of stationary steam cylinders connected to the horizontal bar to operate the same for the purpose specified.

3. In a steam log loader and turner, teeth in the toothed bar with rounded and smooth portions projecting beyond the points of the teeth so that the points of the teeth shall be between the line of the smooth portions and the bar, for the purpose specified.

4. In a steam log loader and turner, having two fixed cylinders, a vertical link connecting the piston rod of one of them to a horizontal bar carrying an upwardly projecting toothed bar at its opposite end the said toothed bar being directly over the other cylinder, for the purpose specified.

5. In a steam log loader and turner, having steam cylinders whose valves are controlled by operating levers, the combination of the hand operating lever, connecting rods, counterbalanced bell cranks and the valve stems substantially as described.

6. In a log loader and turner the combination of steam cylinders E, and D, and their pistons and piston rods, connected to the guide blocks P, and M, running on guides N,

and R, R, the vertical link L, the horizontal bar H, the toothed bar F, the receding teeth *a*, *a*, the weighted operating lever T, and the rock shaft U, with an arm near the lever both the arm and the lever being connected by means of bell cranks, connecting rods and counterbalanced bell cranks to the valve stems of the cylinders, all substantially as set forth for the purpose specified.

7. In a steam log loader and turner, the combination of two upright cylinders below, the piston rod of one pivoted directly to a horizontal bar carrying an upright toothed bar, the piston rod of the other attached to the horizontal bar by a short approximately vertical link adapted to oscillate to both sides of the center of the cylinder when the log turner is in operation, and suitable means of admitting steam to the steam cylinders, for the purpose specified.

8. In a log loader and turner, the combination of two vertical parallel guides, suitable cross heads on each of said guides, a horizontal bar with one end pivoted to one cross head, an approximately vertical link connecting the opposite end of said horizontal bar to the cross head on the opposite guide, and an upright toothed bar carried by said horizontal bar, the said cross heads being independently reciprocated by suitable means, for the purpose specified.

9. In a log loader and turner, a toothed bar in combination with hinged receding teeth, the outer ends of said teeth being rounded and projecting beyond the points, so that the points of the teeth shall be between the line of the rounded portions and the bar, for the purpose specified.

In testimony whereof I have hereunto set my hand and seal in the presence of two witnesses.

WILLIAM E. HILL. [L. S.]

Witnesses:
ELBERT S. ROOS,
CORA EVELYNE WESTBROOK.