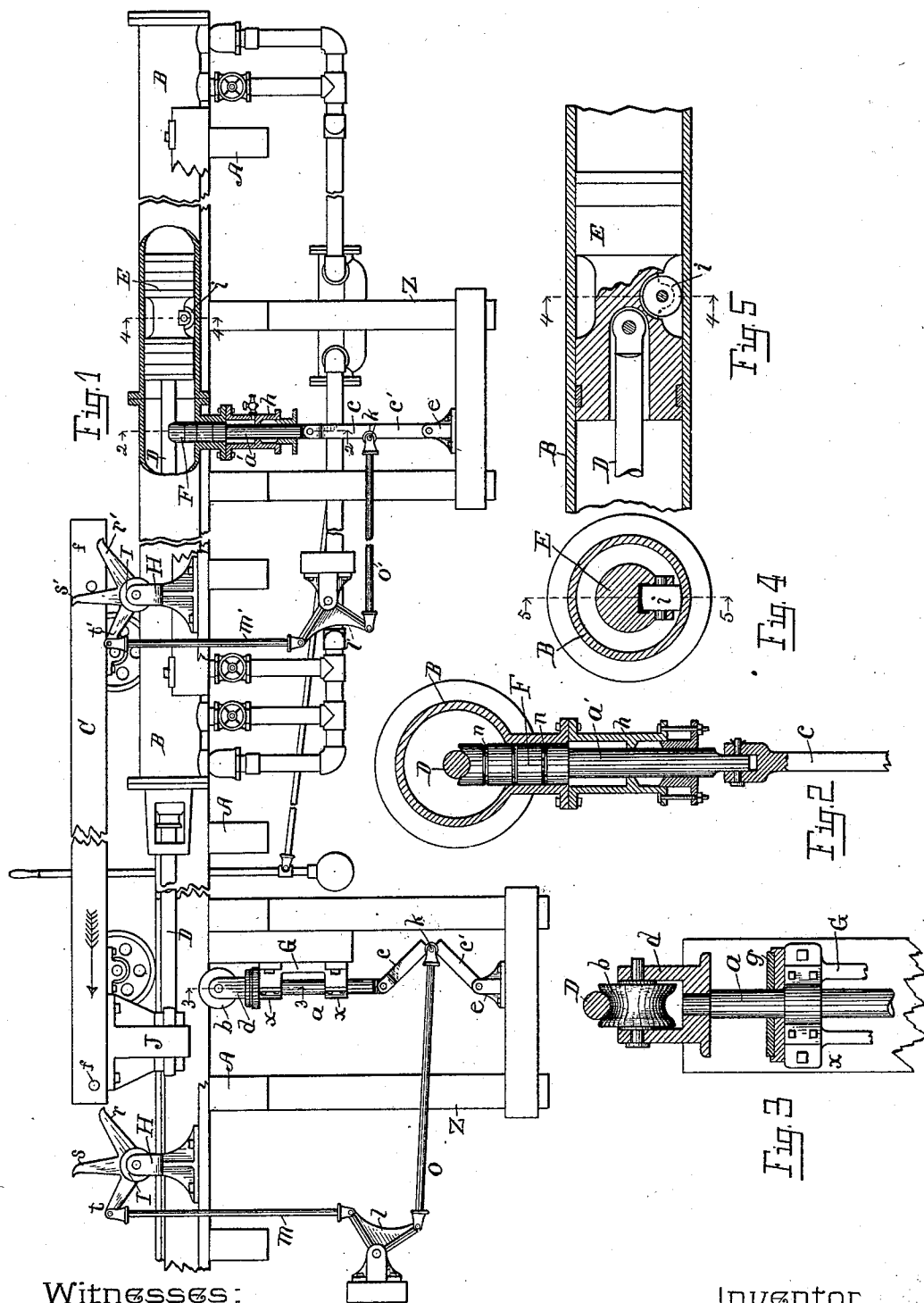


(No Model.)

W. E. HILL.
DIRECT ACTING STEAM ENGINE.

No. 513,107.

Patented Jan. 23, 1894.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM E. HILL, OF KALAMAZOO, MICHIGAN.

DIRECT-ACTING STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 513,107, dated January 23, 1894.

Application filed February 7, 1893. Serial No. 461,367. (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 certain new and useful Improvements in Direct-Acting Steam-Engines, of which the following is a specification.

My invention relates to improvements in direct acting steam engines, and more particularly to that class of direct acting steam engines, that are used for reciprocating saw mill carriages and for similar purposes, which have a very long cylinder and piston rod.

The objects of my invention are, first, to provide a suitable support for the piston rod both inside and outside the cylinder when needed; second, to provide a means for preventing the wear of the piston head on the bottom of the cylinder; third, to provide means for depressing the supports and prevent their interfering with the motion of the machine when not needed. I accomplish these objects by the mechanism shown in the accompanying drawings, in which—

Figure 1, shows a side view in sections of a steam-feed for saw-mills embodying my improvements, a portion of the steam cylinder being broken away. Fig. 2, is a section view on line 2—2 of Fig. 1 looking in the direction of the arrows. Fig. 3, is a view in detail partly in section on line 3—3 of Fig. 1, looking in the same direction. Fig. 4 is a view of a cross section of the cylinder and cylinder head on line 4—4 of Fig. 1, and Fig. 5. Fig. 5, is a view of a section on line 5—5 of Fig. 4. Similar letters of reference refer to similar parts throughout the several views.

The form of engine shown is the same as that described in an application for a patent for steam feed filed by me December 23, 1892, Serial No. 456,146.

A A are the sills of the floor of a saw-mill on which the cylinder B rests.

C, is the carriage which is attached to the piston rod of the steam cylinder by a bracket in the usual manner.

Below the floor of the mill is constructed frames Z, Z' which hold the guiding supports to their position.

In the support for the piston rod outside the cylinder, b is a roller guide to support the pis-

ton rod which is on the bearing d, which is on the top of the reciprocating rod a, which reciprocates through guides x on the bracket G. The toggle mechanism pivoted below is to reciprocate the bar a. It is composed of the links c, c' pivoted to each other and to the bearing e below and to the reciprocating rod a above. At the pivot k between the links c, c' is pivoted the horizontal connecting rod o which is connected to the bell crank l, which connects by the rod m to the trip I, which is operated from the carriage by a stop f. The support for the piston rod inside the cylinder is the same as the one for the outside except that the support F passes through the under side of the cylinder in such a manner as to prevent the escape of steam. The support F has small annular grooves turned into the surface that condense water and hold it and so prevent the escape of steam. The rod a' passes through a stuffing box below. The stuffing box and the sides of the opening into the cylinder combined serve as a guide and take the place of the guide shown on the support outside the cylinder.

As heretofore constructed the piston head E owing to its weight and the great weight of the long piston rod added thereto has worn into the bottom of the cylinder B soon making it necessary to replace portions of the cylinder. I remedy this defect by placing the antifriction roller i on the under side of the cylinder head to reduce the friction. Of course two or more rollers could be used if preferred. The piston rod is pivoted in the piston head as near as possible to the roller i so that the roller shall carry most of the weight. A similar device for relieving this friction is shown in my application for a patent filed February 25, 1893, Serial No. 463,759. The supports for the piston rod also relieve this weight.

In the drawings the carriage is represented as moving in the direction of the arrow. Steam being admitted to the rear of cylinder B, by suitable means will carry the piston forward which also carries the carriage. The stop f then comes in contact with the lever arm s which causes the arm t to be depressed which by its connection with the toggle causes the roller to be raised against the piston rod D. The pivot k, is carried a little by the cen-

ter and locks the support into position. When the carriage returns after passing the lever I, the stop *f* passes over the arm *s* and strikes the arm *r* which reverses the action of the forward movement and depresses the roller *b* so that the bracket J, on the carriage, passes over it without injury. A rubber cushion *g* is provided above the bracket G. The operation of the support on the inside of the cylinder is practically the same only it is depressed to allow the piston head E to pass instead of to allow the bracket J to pass and is fitted steam tight into the under side of the cylinder. No roller is shown on the top of this support, the piston rod being allowed to slide over it. It will be clear to those skilled in the construction of this kind of machinery that the stops *f*, *f'* need not be placed on the carriage but will have the same effect if put on any moving part of the machine and other forms of trips will readily suggest themselves. The cylinders in this class of engines being of such great length it would be possible for the operative to manipulate these supports independent of any stops on the carriage especially where the carriage is very heavily weighted and must move slowly; and consequently I do not wish to be limited to the means here shown for operating the supports as they might be operated by the sawyer or other persons operating the machine directly and in various ways.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a direct acting steam engine of the class described, a depressible support for the piston rod, in combination with a stop on a moving portion of the machine with suitable intervening mechanism to operate the same for the purpose specified.

2. In a direct acting steam engine a depressible support for the piston rod reciprocating through a stuffing box in the side of the steam cylinder operated by means of a

stop on the carriage in combination with a trip and suitable intervening mechanism for the purpose specified.

3. In a direct acting steam engine, the cylinder B with its piston head E and piston rod D, operated by suitable means, in combination with the support F adapted to reciprocate through a stuffing box in the side of the cylinder B and operated by the stop *f*, the forked lever I, the connecting rod *m'*, joined to the connecting rod *o'* by the bell crank *l'*, pivoted at *k* to the toggle composed of the links *c*, *c'* pivoted to each other and to the support F above and the frame X' below, substantially as described for the purpose specified.

4. In a steam engine an elongated piston head E pivoted to piston rod D, in combination with an antifriction roller *z*, at the central part of the piston to balance it and relieve the friction and wear substantially as described.

5. In a direct acting steam engine a cylinder with a piston head and piston rod in combination with a depressible support for the piston inside the cylinder and another outside in combination with toggles below operated by connecting rods and bell cranks connected with the levers operated by stops on the carriage for the purpose specified.

6. In a direct acting steam engine the combination with the piston rod of a depressible support for the purpose specified.

7. In a direct acting steam engine the combination with the piston rod of a depressible support inside the cylinder reciprocating through a stuffing box in the side of the cylinder for the purpose specified.

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

WILLIAM E. HILL. [L. S.]

Witnesses:

E. S. ROOS,

CORA E. WESTBROOK.