

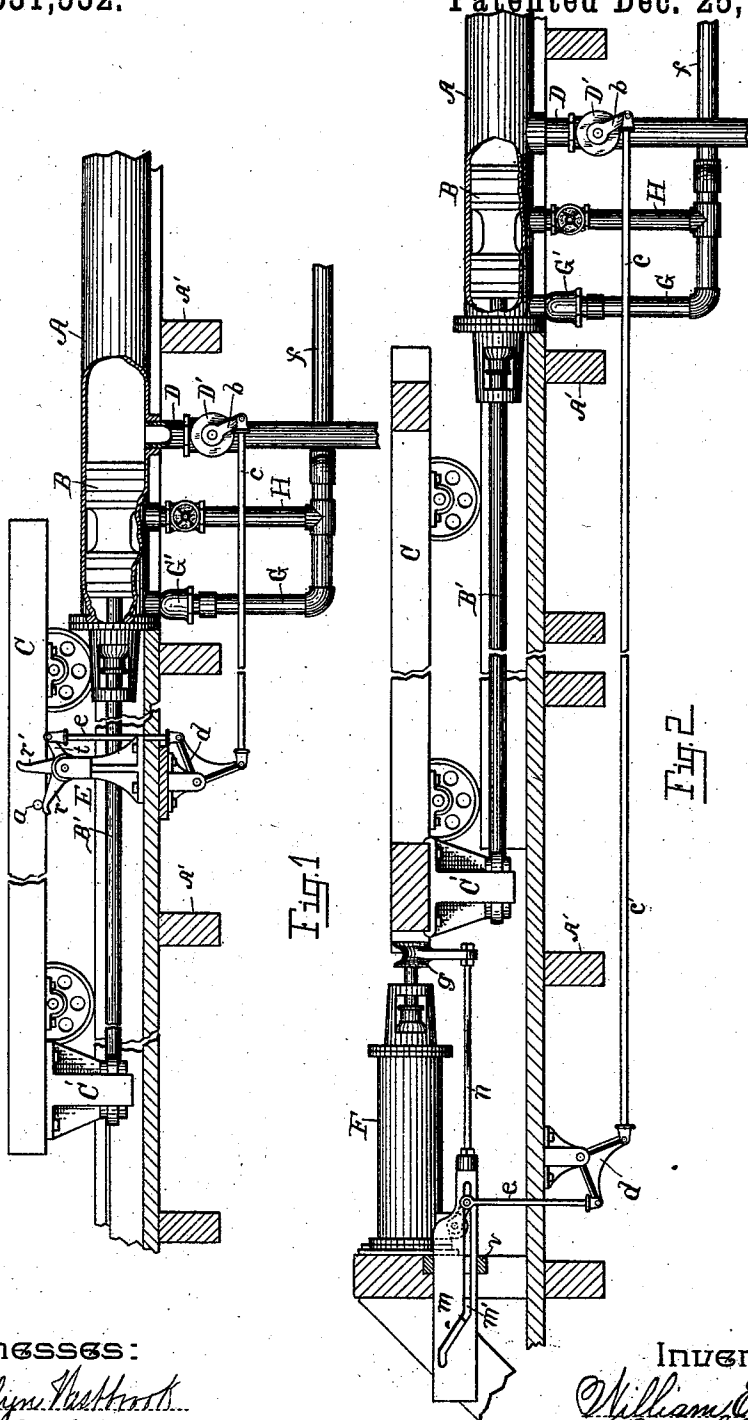
(No Model.)

W. E. HILL.

DIRECT ACTING STEAM ENGINE FOR RECIPROCATING SAWMILL  
CARRIAGES.

No. 531,532.

Patented Dec. 25, 1894.



Witnesses:

*James Earlman Thetford*  
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Inventor.

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

# UNITED STATES PATENT OFFICE.

WILLIAM E. HILL, OF KALAMAZOO, MICHIGAN.

DIRECT-ACTING STEAM-ENGINE FOR RECIPROCATING SAWMILL-CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 531,532, dated December 25, 1894.

Application filed February 25, 1893. Serial No. 463,758. (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 for Reciprocating Sawmill-Carriages, of which the following is a specification.

My invention relates to improvements in direct acting steam engines having very long steam cylinders such as are used for steam feed for saw-mills.

The object of my invention is to provide in addition to a steam cushion automatic means of relieving the pressure of steam back of the piston head and so leave only the momentum of the carriage and piston to be overcome by the steam cushion in the end of the engine cylinder and the buffer. I accomplish these results by the mechanism shown in the accompanying drawings, in which—

Figure 1, is a side view of my invention as applied to a steam feed for saw-mills where no buffer is used. Only the forward end of the engine is shown and that in sections. Fig. 2, shows a side view of my invention as I prefer to apply it where a buffer is used. Here also only the end of the engine is shown in sections.

Similar letters of reference refer to similar parts throughout both views.

A', A', are the floor and floor timbers of a saw-mill.

A, is the end of the steam cylinder of a steam feed for saw-mills, a portion being cut away from the side, showing the piston head B, with its piston rod B' passing through a stuffing box at the end. The piston rod B' connects by the bracket C' to the saw-mill carriage C, the engine operating to reciprocate the carriage.

The pipe G is the inlet pipe and H is the outlet pipe of the front end of the steam cylinder.

G' is a check valve that stops the escape of steam from the cylinder thus forcing the steam to exhaust through pipe H. A cushion of steam will thus be formed between the piston head B and the head of the cylinder A, when the piston head B passes the exhaust

port. This cushion overcomes the momentum of the carriage without a jar.

My invention provides a means whereby when the piston head B is cushioned against steam in the head of the cylinder the steam back of the piston head is allowed to exhaust thus relieving the pressure and leaving only the momentum of the carriage and its load and other moving parts to be overcome by the steam cushion in the end of the cylinder. I accomplish this by means of the exhaust pipe D which has the valve D'. I prefer to have this pipe open into a port toward the head end of the steam cylinder as it will only need to be used when the piston head B is compressing the steam cushion in the end of the cylinder. It will be operative at any point back of the piston head however.

The arm b of the valve D' is connected by the connecting rod c to the bell crank d which is connected by the connecting rod e to the arm t of the lever E.

The lever E is operated by the pin a striking against the arms r and r', the valve being opened by the pin a striking the arm r when the piston is near the end of its stroke and closed by its striking the arm r' as soon as it returns. It will thus be seen that when the engine becomes unmanageable or for any reason is operated with too great violence, the steam is allowed to escape from the cylinder through the pipe D and so relieve the pressure on the back of the piston head at once whether the engine is reversed or not. When the momentum of the parts is overcome the compressed steam in the end of the steam cylinder A will cause the carriage to return sufficiently far to close the valve D'.

In Fig. 2, I show the plan I prefer for operating the valve D when used in combination with my improved steam buffer, described in my application for a patent filed in the Patent Office February 13, 1893, Serial No. 462,167. The connecting rod e is there connected to the arm of the engine valve of the buffer and the valve D' is operated when the bumper comes into operation.

Another exhaust pipe and valve the same as D and D' could be operated when the piston head approached the rear of the cylinder. This extra precaution will not be required ex-

cept where a very large engine is used or the carriage is very heavily weighted.

I do not wish to be confined to the exact mechanism hereshown for operating the valve D' as many variations will readily suggest themselves to those skilled in the art of constructing engines, and the form of the valve D' may also be greatly varied. It is also clear that the exhaust port will have the effect if combined with the steam cushion in the end of the cylinder or with the buffer alone or with the steam cushion in the end of the cylinder and the buffer together. The exhaust pipe D and valve D' would be of great utility where neither the steam cushion in the end of the steam cylinder nor bumper were employed to prevent the jar. Of course any other vapor besides steam, or gas under pressure could be used to operate my engine.

I have an application in the Patent Office, filed February 25, 1893, Serial No. 463,759, for a device similar to the one here described, which is of slightly different construction. A safety exhaust pipe containing a check valve opens into the steam cylinder a little more than the length of the piston head from the end of the steam cylinder and is connected with the engine valve and in that way effects the same purpose which my invention shown in this application accomplishes.

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

1. In a direct acting engine of the class described the combination with a steam cylinder and piston of an exhaust pipe containing a valve, a stop on a moving part of the mechanism, a lever which is connected with the valve stem with which said stop coacts to ex-

haust the steam from behind the piston head and relieve the pressure for the purpose specified.

2. In a direct acting steam engine of the class described an exhaust pipe containing a valve with suitable mechanism for operating the same by a stop on a moving part of the engine adapted to be opened to relieve the pressure of steam back of the piston head when the head compresses steam confined in the end of the cylinder and adapted to close said valve when the piston head recoils, for the purpose specified.

3. In a direct acting steam engine an exhaust pipe containing a valve operated by suitable mechanism in connection with a stop on a moving portion of the engine, said exhaust pipe connecting with the steam cylinder so as to open back of the piston head when the piston head cushions on steam confined in the end of the cylinder for the purpose specified.

4. In a direct acting engine the combination of the steam cylinder A, the inlet pipe G, containing the check valve G', the exhaust pipe H and the exhaust pipe D containing the valve D' a stop on a moving part of said mechanism, a lever which is connected by connecting rods and bell cranks to the arm b of the valve D' and in position to be actuated by said stop, substantially as described 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 WESTBROOK.