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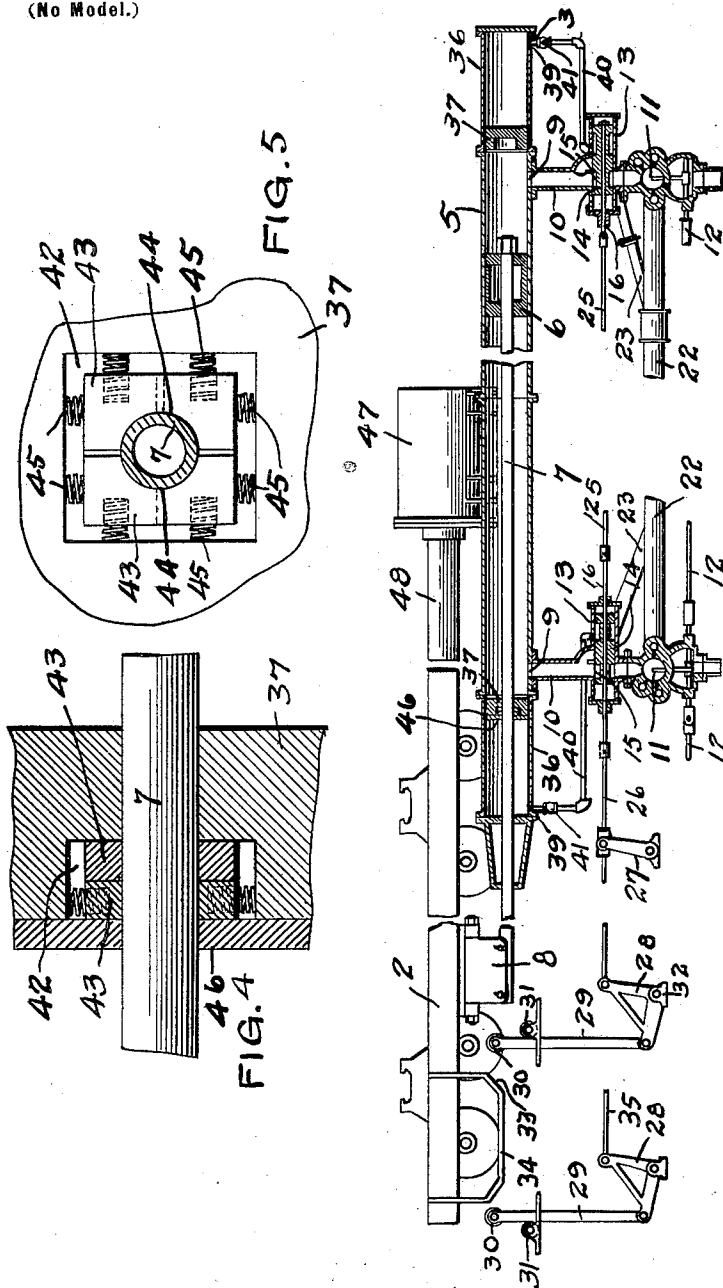
Patented Feb. 18, 1902.

E. E. THOMAS & J. E. LOCKWOOD.
MEANS FOR AUTOMATICALLY CONTROLLING SAWMILL CARRIAGES.

(Application filed Aug. 12, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES.

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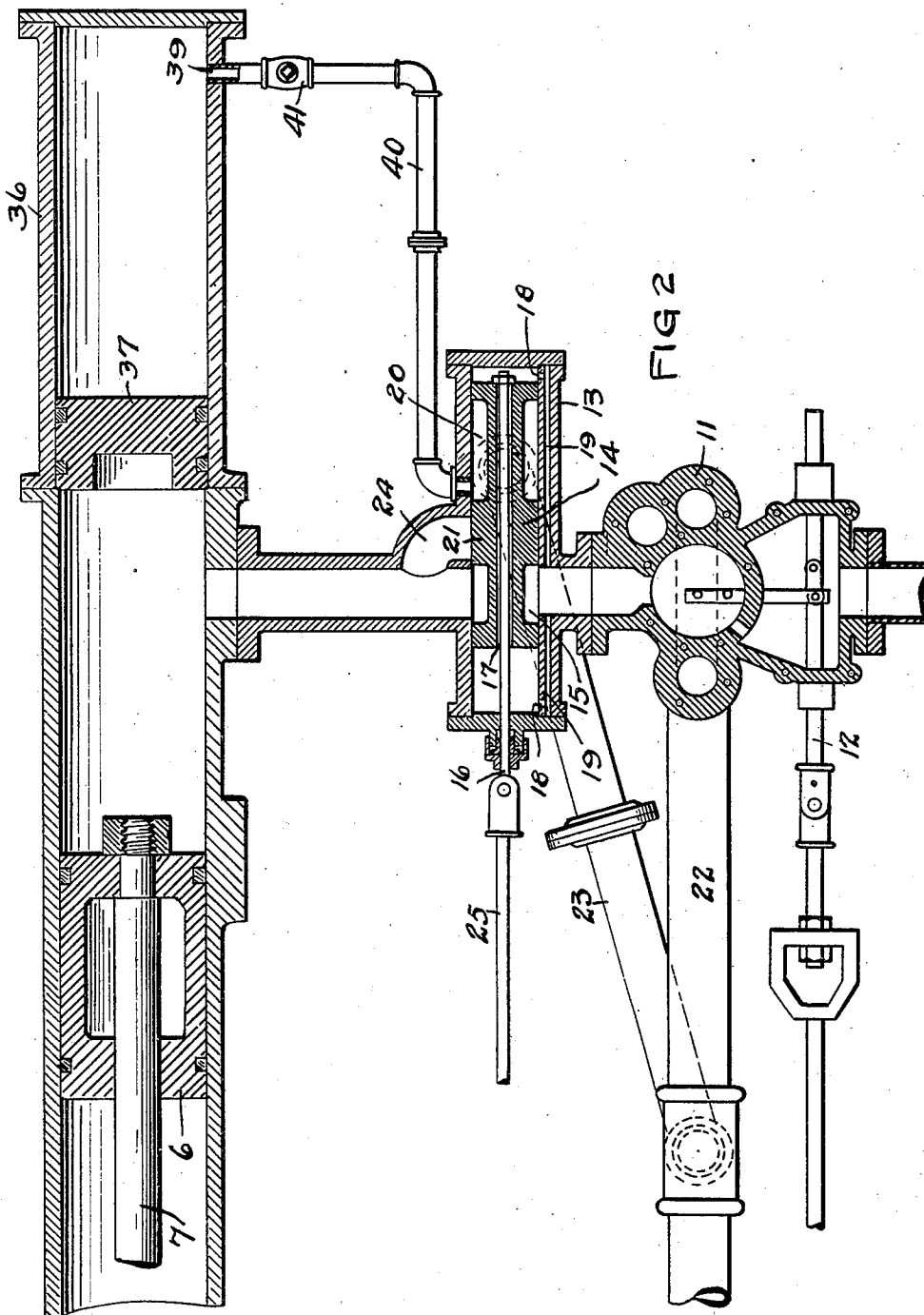
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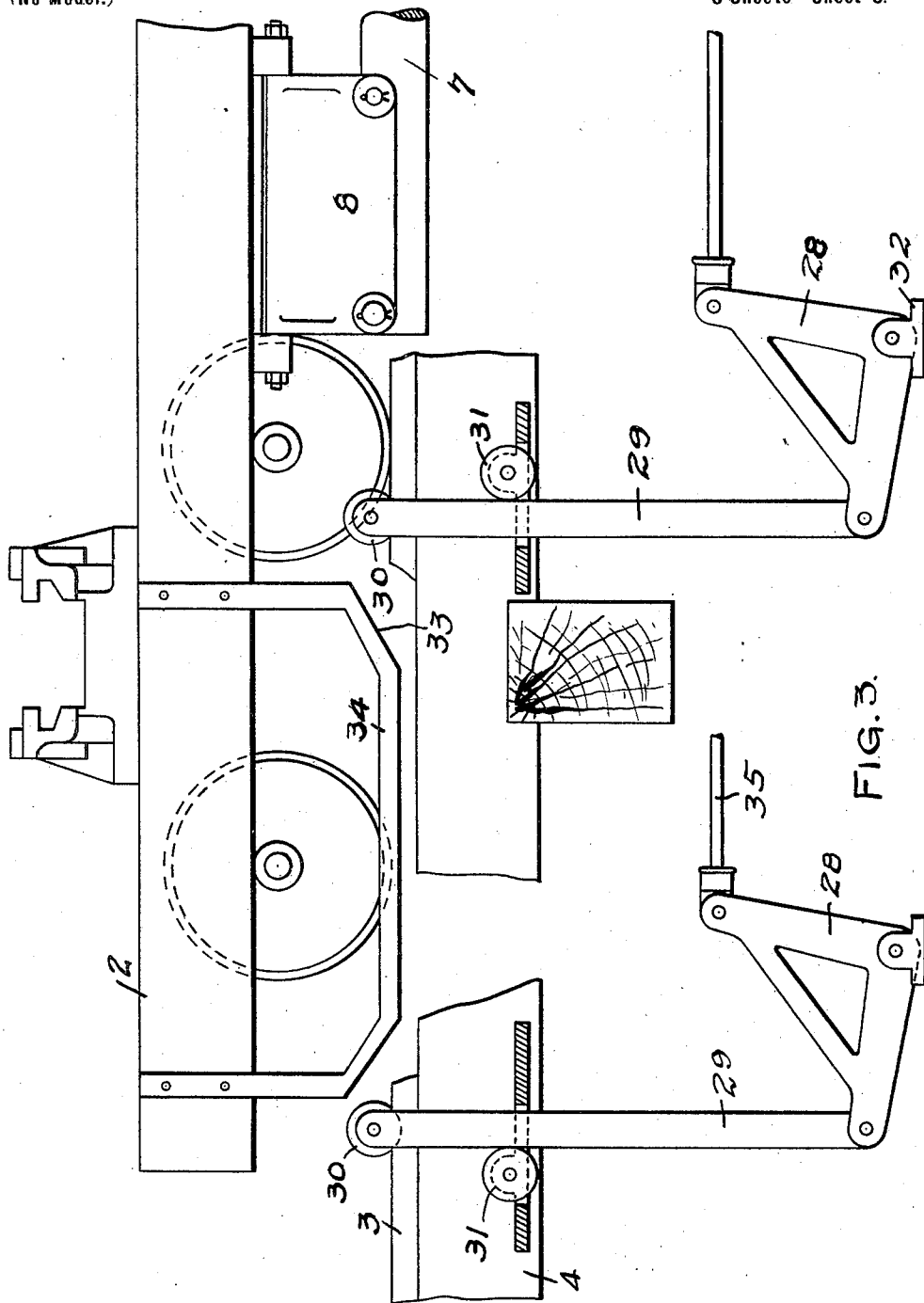
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

EDWIN E. THOMAS, OF ST. PAUL, AND JOHN E. LOCKWOOD, OF MINNEAPOLIS, MINNESOTA.

MEANS FOR AUTOMATICALLY CONTROLLING SAWMILL-CARRIAGES.

SPECIFICATION forming part of Letters Patent No. 693,629, dated February 18, 1902.

Application filed August 12, 1901. Serial No. 71,734. (No model.)

To all whom it may concern:

Be it known that we, EDWIN E. THOMAS, of St. Paul, Ramsey county, and JOHN E. LOCKWOOD, of Minneapolis, Hennepin county, Minnesota, have invented certain new and useful Improvements in Steam-Feed Cylinders for Sawmill-Carriages, of which the following is a specification.

Our invention relates to sawmill machinery, and particularly to devices used in connection with and for controlling the movement of the carriage. It sometimes happens in the operation of the sawmill-carriage that some of the connections for operating the valves that control the admission of steam to the cylinder become accidentally broken, causing the sawyer to lose control of the valves and of the carriage, or the sawyer may while having complete control over the valves and the carriage so lose his presence of mind as to throw his lever back and forth and allow the carriage to race from one end of the track to the other, endangering the lives of the men on the carriage and frequently damaging the carriage, mill-building, or the machinery. It also sometimes happens that the piston-rod will break while the mill is running, allowing the piston to be blown out through the cylinder-head, causing considerable damage thereto and a delay in the operation of the mill.

The objects, therefore, of our invention are to provide means for preventing injury to the men and damage to the machinery in case the sawyer loses control of the carriage or of himself and to prevent the piston from being blown out through the cylinder-head in case of breakage of the piston-rod.

A further object of the invention is to provide means for aiding the air-buffer or cushion-stop in arresting the movement of the carriage when near the limit of its stroke or travel. Other objects of the invention will appear from the following detailed description.

The invention consists generally in providing means for automatically balancing the piston and arresting the movement of the carriage if for any reason the sawyer loses control of the same.

Further, the invention consists in providing free or flying pistons in the cylinder.

Further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a side elevation of a sawmill-carriage and its connections, the cylinder and the operating mechanism connected thereto being shown in section. Fig. 2 is a sectional view, enlarged, of the right-hand end of Fig. 1. Fig. 3 is a side elevation, enlarged, of the mechanism shown at the left of Fig. 1. Figs. 4 and 5 are details of a packing for one of the pistons.

In the drawings, 2 represents a sawmill-carriage, 3 the track-rails, 4 the timbers whereon the rails are supported, 5 a cylinder, 6 the piston, and 7 the piston-rod, all of the ordinary or preferred construction. 8 is the connection by means of which the piston-rod is secured to the carriage. 9 represents ports provided in the wall of the cylinder over which steam-inlet pipes 10 are secured. These pipes 10 are provided at their outer ends with the sawyer-valves 11, of the usual construction, connected by the rod 12 and its attachments with the sawyer-lever, by means of which the valves are operated and the admission of steam to the cylinder is controlled. These parts are all of ordinary construction and need no further detailed description.

Between the sawyer-valves and the cylinder we provide valve-casings 13, each provided with a slide-valve 14, having an annular groove 15, through which the steam passes from the sawyer's valves to the pipes 10 and the cylinder. These valves are provided with piston-rods 16, extending through longitudinal holes in said valves that are of greater diameter than the diameter of said rods and form passages 17, through which the steam may pass from one end of the casing to the other to prevent undue pressure on either end of the valve. Each end of the valve-casings is provided with ports 18, communicating with ducts 19, that lead to the sawyer's valves and permit the water of condensation to escape to the exhaust. The slide-valves 14 are each provided with annular grooves forming steam-chambers 20 within the casing, and interposed between said grooves and the grooves

15 is a solid ring or bridge 21 for the purpose hereinafter described.

22 is the main inlet-pipe through which steam passes from the boiler to the sawyer's valves.

23 represent branch pipes leading from the pipe 22 and communicating with the interior of the valve-casings 13 and the chambers 20 to admit live steam therein.

24 represents enlargements of the pipes 10, forming by-passes, which when the bridges 21 stand across the passages from the sawyer's valves to the pipes 10 form communicating passages from the steam-chambers 20 to the pipes 10 and allow steam to rush into the cylinder upon each side of the piston without passing through the sawyer's valves.

The piston-rods 16 are connected by a rod 25, and the rod nearest the carriage is connected to an operating-rod 26, that is supported on a hinged arm 27 and pivotally connected to one arm of a bell-crank 28, the opposite arm being pivotally connected to a bar 29, provided at its outer end with an anti-friction-roller 30. A similar roller 31 bears upon the vertical edge of said bar and prevents oscillation of the same, but permits its free vertical movement. The bell-crank is pivoted on a suitable clip or casting 32. This bell-crank and the bar 29 are provided near one end of the carriage-track, and the roller 30 projects up into position to be struck by the cam or inclined face 33 of the depending bracket or hanger 34, that is secured on the carriage. Near the opposite end of the track we provide a similar bell-crank connected with the bell-crank 28 or the rod 26 by a rod 35 and provided with a similar vertically-moving bar carrying an anti-friction-roller that is in position to be engaged by an inclined or cam face provided on the bracket 34 opposite the face 33. The last-named bell-crank is supported in a manner corresponding to the one described. These vertically-moving bars are, as stated, near the limit of the stroke or travel of the carriage, and if from any cause such as breakage of the machinery or the sawyer losing his presence of mind the carriage should rush to the end of the track nearest the cylinder the cam-face 33 will engage the roller 30, oscillate the bell-crank, and move the slide-valves 14. As these valves are moved by the depression of the bar 29 the bridges 21 will be moved across the passages between the sawyer's valves and the pipes 10, and consequently shut off the flow of steam through these valves to the cylinder. At the same time the by-passes 24 will be uncovered and the steam rushing into the cylinder from the chambers or grooves 20 will produce an equal pressure upon each side of the piston and arrest further movement of the carriage. If the carriage should escape from the control of the sawyer when moving in the opposite direction or toward the other end of the track and move far enough to operate the other bar 29, then the valves will

be operated in a similar manner, the flow of steam through the sawyer's valves again cut off, and the live steam permitted to pass through the pipes 23 into the chambers 20, and from thence to the cylinder. A perfect automatic stop mechanism is thus provided, which in case of accidents to the machinery will absolutely stop movement of the carriage and prevent injury to the men or damage to the machinery. In case the sawyer should so far lose his presence of mind as to throw his lever back and forth and cause the carriage to rush from one end of the track to the other he will, as soon as the carriage engages either of the vertically-moving bars, be instantly deprived of further power to move the carriage, and steam cannot be again admitted through the sawyer's valves to the cylinder until the valves 14 have been pushed back to their normal position, where the grooves 15 will register with the passage from the sawyer's valves and the pipes 10 and allow the steam to flow again into the cylinder.

At each end of the cylinder we provide sections thereof 36, that are of greater diameter than the main portion and are provided with free or flying pistons 37, which have a limited sliding movement between the cylinder-heads and beveled shoulders or surfaces 38, provided on the inside of the cylinder near the points where the sections 36 are secured to the main portion of the cylinder. The sections 36, near the cylinder-heads, are provided with ports 39, which communicate through the valve-casings 13 with the steam-chambers 20 by means of pipes 40, and these pipes are provided with check-valves 41, which open toward the cylinder. As the chambers 20 have direct communications with the steam-supply pipe 22 through the pipes 23, it follows that the pressure in the sections 36 back of the sliding pistons will be substantially boiler-pressure, the ends of said pistons will be normally held in the position shown in the figures, the pressure on the other side of said pistons not being as great, owing to the loss by passage through the sawyer's valves and the less area of the pistons exposed. The piston shown at the right of the figure is easily accessible through the cylinder-head, but at the other end, on account of its position on the piston-rod, the flying piston cannot be readily gotten at for the purpose of packing the joints, and hence we prefer to provide an improved form of packing. (Shown in detail in Fig. 4.) This packing consists in providing a substantially square socket or recess 42 in the face of the piston and arranging therein a series of metal plates 43, having curved faces 44 to bear on the piston, and held in yielding contact therewith by springs 45. Spaces are provided between the edges of the plates to permit their automatic adjustment as they are worn away by the rubbing contact of the piston. As shown in the figure, we prefer to provide two sets of these

plates, arranged to break joints and as far as possible prevent the passage of steam from one side of the piston to the other. The plates are held in position in the socket by a suitable follower 46. This form of packing will render the free piston practically steam-tight and will obviate the necessity of frequent examination and repairs.

In a log-carriage-cylinder as usually constructed if the piston-rod breaks the piston will be blown out through the cylinder-head, but by providing the free or flying pistons in each end of the cylinder and having steam substantially at boiler-pressure behind them it will be impossible for the cylinder-piston to be blown out in case of breakage, as each of the flying pistons will act as a cushion to receive the shock of impact of the cylinder-piston when released and gradually arrest its movement. At one side of the cylinder is an air-cushion buffer 47, having a piston 48, projecting into the path of the log-carriage to be struck thereby when near the limit of its movement. This buffer is for the purpose of arresting the movement of the carriage in case of breakage of the machinery or should the sawyer lose control of the carriage and allow it to travel farther than is usual or necessary. The piston 48 when struck with the carriage will be driven into the air-cylinder, and about the same time the cylinder-piston will strike one of the flying pistons, which will aid the air-buffer in arresting the movement of the car and the mechanism connected therewith.

Various modifications will suggest themselves to any one skilled in the art, such as different means for operating the sliding valves by the movement of the carriage and other means for conducting the live steam from the supply-pipe past the sawyer's and sliding valves. All such modifications, however, we regard as obvious and within the scope of our invention.

We claim as our invention—

1. The combination, with a carriage of a fluid-pressure cylinder and its piston, valves within control of the operator for admitting fluid-pressure to each end of the cylinder, and means interposed between said cylinder and valves and actuated by the movement of the carriage for automatically shutting off the passage of fluid from said valves to the cylinder and depriving the operator of power to move the carriage.

2. The combination, with a carriage of a fluid-pressure cylinder and its piston, valves therefor within control of the operator, pipes connecting said valves with said cylinder, means provided in said pipes for shutting off the passage of fluid from said valves to said cylinder, and means provided at each end of the carriage-track to be actuated by the carriage for operating said shutting-off means, whereby the operator will be deprived of power to move the carriage, substantially as described.

3. The combination, with a carriage of a fluid-pressure cylinder and its piston, valves connected with said cylinder and within control of the operator, means interposed between said valves and cylinder for shutting off the passage of fluid thereto, means governed by the movement of the carriage for operating said shutting-off means, and passages normally closed by said shutting-off means and opened by the movement of the same for conducting the fluid around said valves to said cylinder, substantially as described.

4. The combination, with a carriage, of a steam-cylinder and its piston, valves within control of the operator through which steam is admitted to each end of said cylinder, pipes connecting said valves with said cylinder, slide-valves provided in said pipes, means connected with said valves and projecting into the path of the carriage when near the limit of its travel in either direction for operating said valves to shut off the steam from said cylinder-valves to the cylinder, and by-pipes leading around said cylinder-valves and normally closed by said slide-valves for admitting steam to the cylinder when said slide-valves are operated.

5. The combination, with a carriage of a cylinder and piston, valves connected with said cylinder, a steam-supply pipe, valve-casings provided between said cylinder-valves and said cylinder, slide-valves therein having annular grooves 15 and 20, said grooves normally registering with the steam-passages from said cylinder-valves to the cylinder, bridges 21 provided between said grooves 15 and 20, pipes 23 connecting said steam-supply pipe and said grooves 20, steam ducts or passages normally closed by said bridges 21 and opened by the movement of said slide-valves to allow the steam to flow from said grooves 20 into the cylinder, and means connected with said slide-valves and actuated by the movement of said carriage when near the limit of its stroke in either direction for operating said slide-valves.

6. The combination, with a carriage of a steam-cylinder and its piston, free or flying pistons provided in each end of said cylinder and having a limited sliding movement therein, valves connected with said cylinder, a steam-supply pipe, and pipes connecting said supply-pipe with said cylinder between its heads and said free pistons, substantially as described.

7. The combination, with a carriage of a steam-cylinder and its piston, free or flying pistons provided in each end of said cylinder, inclined or beveled shoulders between which and said heads said pistons are freely slidable, valves connected with said cylinder, a steam-supply pipe, and pipes connecting said supply-pipe with said cylinder between its heads and said pistons, substantially as described.

8. The combination, with a carriage of a cylinder and its piston, flying pistons pro-

vided in each end of said cylinder, cylinder-valves, pipes connecting said valves with said cylinder, a steam-supply pipe, valve-casings provided between said cylinder-valves
 5 and said cylinder, sliding valves in said casings provided with means for normally permitting the passage of steam from said cylinder-valves to said cylinder and shutting off the same when operated, steam-chambers
 10 provided in said valves, steam-passages communicating with said chambers and said cylinder when said valves are operated, pipes connecting said steam-chambers with said supply-pipe and with the cylinder between
 15 its heads and said flying pistons, and means connected with said sliding valves and actuated by the log-carriage when near the limit of its movement in either direction, substantially as described.

20 9. The combination, with a carriage of a steam-cylinder and its piston, steam-feed for said cylinder-valves, pipes connecting said valves with said cylinder, sliding valves interposed between said cylinder and cylinder-
 25 valves, and adapted to shut off the flow of steam to both sides of the piston simultaneously, vertically-movable bars provided respectively near the ends of the log-carriage track, means connecting said bars with said
 30 sliding valves, and means provided on the carriage for actuating said bars to operate said sliding valves.

10. The combination, with a carriage of a steam-cylinder and its piston, cylinder-valves,
 35 pipes connecting said valves with the cylinder, a steam-pipe, sliding valves interposed between said cylinder-valves and said cylinder, said sliding valves being provided with steam-chambers, by-pipes connecting said
 40 steam-supply pipe with said steam-chambers, steam-passages leading from said chambers to said cylinder and closed when said sliding valves are in their normal position, and
 45 means projecting into the path of the carriage to be actuated thereby for operating said sliding valves to shut off the flow of steam through said cylinder-valves, substantially as described.

11. The combination, with a cylinder and
 50 piston, of a steam-supply having pipe connections with said cylinder on each side of said piston, valves normally controlling the admission of steam to said cylinder from said supply, by-pass pipes, means normally per-
 55 mitting the passage of steam through said pipe connections to the cylinder and closing said by-pipes, and means for automatically operating said closing means to open said by-pipes and close the passage from said valves,
 60 substantially as described and for the purpose specified.

12. The combination, with a carriage, of a fluid-pressure cylinder and its piston, valves within control of the operator and connected
 65 with said cylinder upon each side of the piston and through which the fluid-pressure is normally admitted to said cylinder, cut-off

valves interposed between said cylinder-valves and said cylinder, and means connected with said cut-off valves and adapted
 70 to be actuated by said carriage at a certain predetermined point in its travel to operate said cut-off valves and shut off the passage of fluid through said cylinder-valves and allow it to enter said cylinder simultaneously
 75 upon each side of the piston, whereby the operator will be deprived of power to move the carriage.

13. The combination, with a carriage, of a steam-feed cylinder and its piston, valves connected with said cylinder upon each side of
 80 the piston and within control of the operator for normally admitting steam alternately to each end of the cylinder, and valves interposed between said cylinder-valves and the cylinder
 85 and adapted to be actuated by the carriage when passing a certain predetermined point in its travel to shut off the passage of steam through said cylinder-valves and allow it to enter both ends of the cylinder simultaneously.
 90

14. The combination, with a carriage, of a steam-feed cylinder and its piston, rotary cylinder-valves connected with the steam-supply and with said cylinder upon opposite sides
 95 of the piston, said valves being within control of the operator for normally admitting and exhausting steam from said cylinder, cut-off valves interposed between said rotary valves and said cylinder and having independent
 100 connections with said steam-supply and with said cylinder and adapted to close the passage from said rotary valves to said cylinder, and means connected with said cut-off valves and operated by the carriage when near the limit
 105 of its travel in each direction for actuating said cut-off valves to cut out said rotary valves and admit steam to said cylinder on both sides of the piston simultaneously.

15. The combination, with a carriage, of a
 110 steam-feed cylinder and its piston, free or flying pistons provided in each end of said cylinder and having a limited sliding movement therein, a steam-supply pipe, cylinder-feed valves within control of the operator and connected
 115 with said cylinder between said flying pistons, cut-off valves interposed between said cylinder-valves and said cylinder and having independent connections with the steam-supply and with said cylinder between
 120 its heads and said flying pistons, and means connected with said cut-off valves and adapted to be operated by said carriage at certain predetermined points of its travel for operating said cut-off valves to shut off the flow of steam
 125 from said cylinder-valves to the cylinder and allow it to pass through said independent connections thereto, substantially as described.

16. The combination, with a carriage, of a steam-feed cylinder and its piston, a steam-
 130 supply, cylinder-valves connected therewith, and with each end of the cylinder and within control of the operator for normally admitting steam to said cylinder, cut-off valves provided

between said cylinder-valves and the cylinder and connected with said steam-supply and with said cylinder and adapted when actuated to shut off the passage of steam from said cylinder-valves to the cylinder and open said independent connections to admit steam to both sides of the piston simultaneously, and means connected with said cut-off valves and adapted to be actuated by the carriage at certain predetermined points of its travel, whereby when the carriage passes either of said points

the operator will be automatically deprived of power to operate the carriage until said cut-off valves are returned to their normal position.

In witness whereof we have hereunto set our hands this 8th day of August, 1901.

EDWIN E. THOMAS.

JOHN E. LOCKWOOD.

In presence of—

RICHARD PAUL,

M. C. NOONAN.