

G. F. WEISS.
 ROTARY ENGINE.
 APPLICATION FILED MAR. 27, 1911.

1,062,866.

Patented May 27, 1913.

4 SHEETS—SHEET 1.

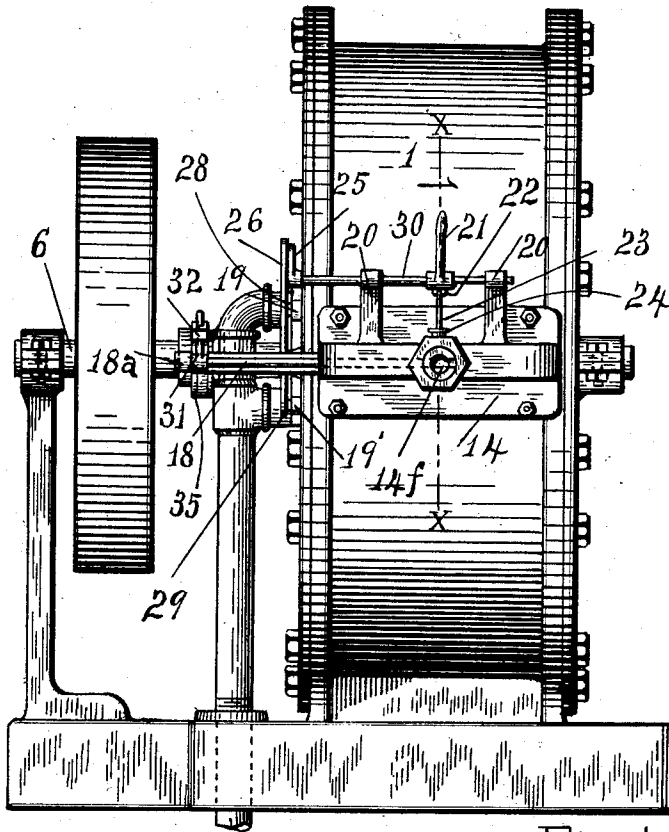


Fig. 1.

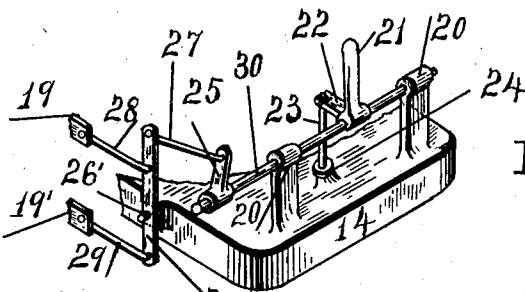


Fig. 5.

Witnesses.
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 Ray L. Howell.

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 By Atty N. DuBois.

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4 SHEETS—SHEET 2.

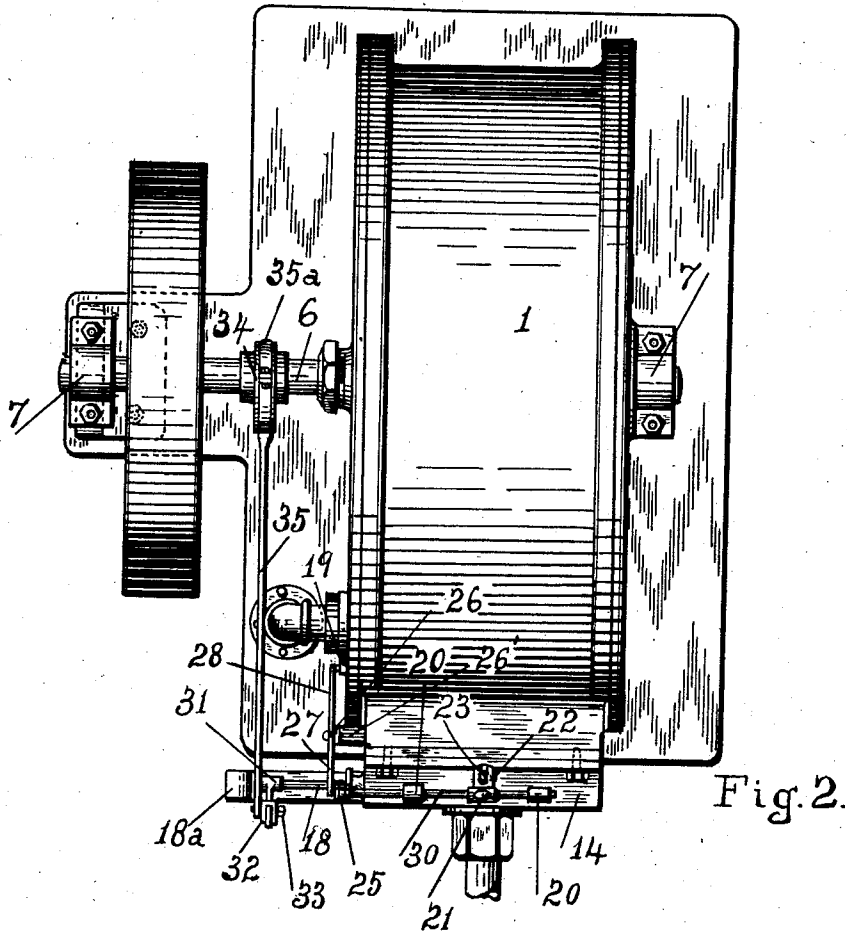


Fig. 2.

Witnesses.
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4 SHEETS—SHEET 3.

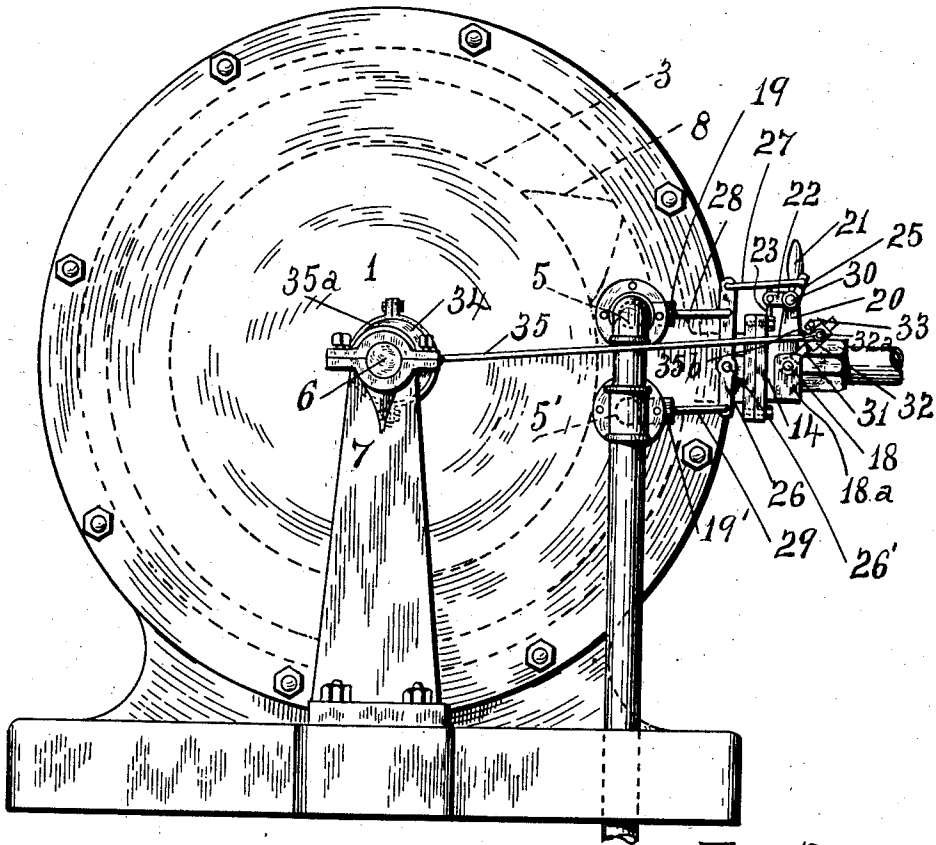


Fig. 3.

Witnesses.
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4 SHEETS—SHEET 4.

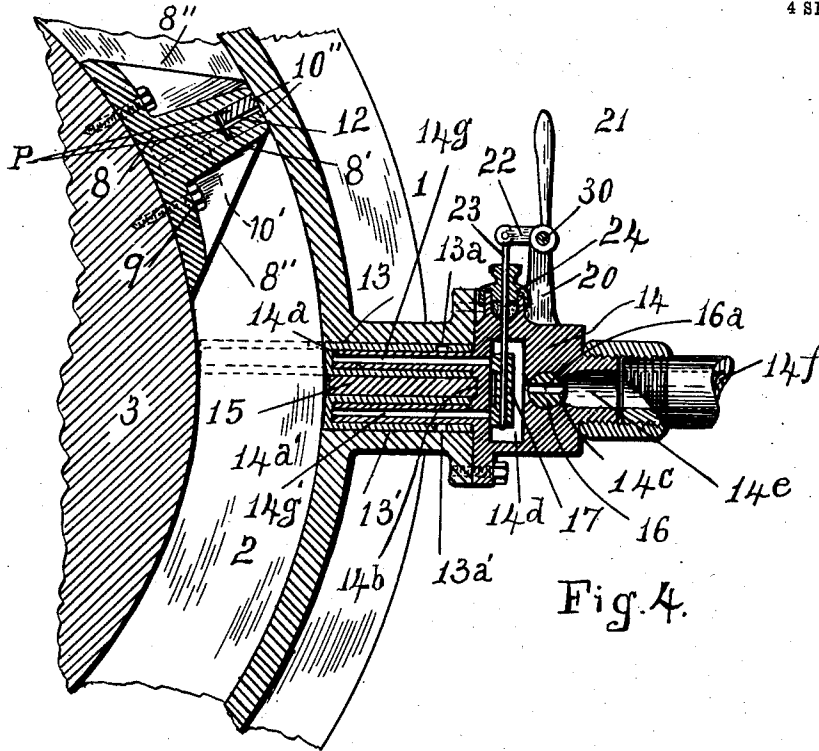


Fig. 4.

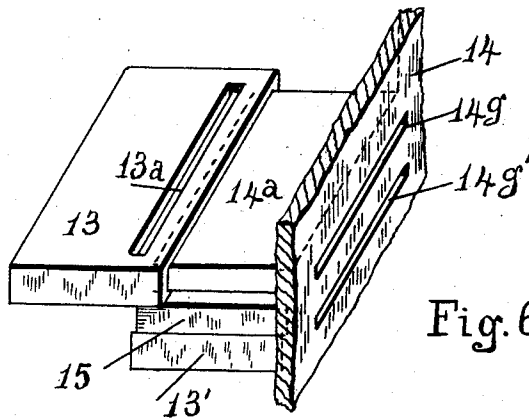


Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

GEORGE F. WEISS, OF SPRINGFIELD, ILLINOIS, ASSIGNOR OF ONE-HALF TO L. E. WHEELER, OF SPRINGFIELD, ILLINOIS.

ROTARY ENGINE.

1,062,866.

Specification of Letters Patent.

Patented May 27, 1913.

Application filed March 27, 1911. Serial No. 617,151.

To all whom it may concern:

Be it known that I, GEORGE F. WEISS, a citizen of the United States, residing at Springfield, in the county of Sangamon and State of Illinois, have invented a new and useful Rotary Engine, of which the following is a specification.

This invention relates to engines having a rotating piston actuated by the impact and expansive action of steam or explosive gases.

The purposes of the invention are:—to provide means effective to cause the piston to rotate either clockwise or counter-clockwise; to provide in connection with the piston a wing of improved construction; to provide in connection with the cylinder, two exhaust valves adapted for separate use, and means for operating the same so that upon opening one exhaust valve the other will be closed; to provide two steam actuated sliding valvular abutments adapted to be projected inwardly into the cylinder to contact with the periphery of the piston and so arranged that one valvular abutment will deliver steam on one side of the wing to cause clockwise rotation of the piston and the other valvular abutment will deliver steam on the other side of the wing to cause counter-clockwise rotation of the piston, the wing and the valvular abutments being so constructed and arranged that the rotation of the piston rotating in either direction will cause the wing to engage with and slide outward the inwardly projected valvular abutment contacting with the periphery of the piston during the rotation of the piston; to provide a controller valve adapted to supply steam to either sliding abutment; to provide a cut-off valve adapted to cut off the steam at any desired stage of rotation of the piston; to provide means connecting the controller valve and exhaust valves in such manner that when the controller valve is in position to admit steam to the upper sliding abutment the upper exhaust port will be closed and conversely when the controller valve is in position to admit steam to the lower sliding abutment the lower exhaust port will be closed; and to provide other new and useful features of construction herein-after set forth.

The invention is illustrated in the annexed drawings in which similar reference characters designate like parts in the several views.

Figures 1, 2 and 3 are respectively a front elevation, a top plan and a left hand side elevation of the engine. Fig. 4 is an enlarged vertical section on the line X. X. of Fig. 1. Fig. 5 is an enlarged isometric view of the system of levers connecting the controller valve and the exhaust valves; and Fig. 6 is an enlarged isometric view of the sliding abutments, the upper sliding abutment being shown in its extended position.

The main structure comprises a cylinder 1 having a circular bore 2 adapted to accommodate a rotating piston 3. In one cylinder head are exhaust ports 5 and 5'. The piston 3 is secured on a shaft 6 mounted to rotate in suitable supports 7 on the main frame. A wing 8 is secured on the piston 3 and extends radially from the piston and occupies space between the outer circumference of the piston and the inner circumference of the cylinder. Bolts 9 connect the abutment 8 with the piston 3. The wing 8 has a transverse channel 8' adapted to accommodate packing bars. The packing bars designated as a whole by the letter P, are L-shape substantially as shown and are of any suitable metal and each bar has a member 10' radial to the piston and a member 10'' transverse to the piston. The members 10' contact with the inner walls of the cylinder head and the members 10'' contact with the inner circular wall of the cylinder. The members 10'' lap as shown and are separated by a little space 12 containing steam which forms a cushion between the packing bars and also serves to keep the members 10' in cushioned or yielding contact with the inner wall of the cylinder, thus insuring close contact and obviating undue wear of the parts.

The side members of the wing 8 have inclined edges 8'' as shown, in order that when the piston is rotating in either direction the inclined edges 8'' will engage with either sliding abutment, which at the time is across the path of the wing within the cylinder.

The parts are so constructed and arranged that the wing on the rotating piston will move outward either of the sliding valvular abutments 13 or 13' and the steam within the valvular abutment which has been thus slid outward will act to propel the sliding abutment inward across the path of the wing as soon as the wing has passed the sliding abutment, and this will be repeated at each rotation of the piston in either di-

rection. When the piston is rotating clockwise the wing will engage with and move the upper sliding abutment; and when the piston is rotating counter-clockwise the wing will engage with and move the lower sliding abutment. The operation is entirely automatic; the wing engaging on either of the sliding abutments causes it to slide in one direction and the steam within the engaged sliding abutment acts to cause the engaged sliding abutment to slide in the opposite direction. There are two box-shape valvular sliding abutments 13 and 13' of suitable metal, preferably bronze. The width of each sliding abutment is equal to the length of the bore of the cylinder, and the length of each sliding abutment is approximately one-third greater than the radial distance between the circumference of the piston and the inner wall of the cylinder, so that when either sliding abutment is projected inward across the space between the piston and the inner wall of the cylinder, the sliding abutment will have a safe support as hereinafter described. There is a port 13^a, through the upper wall of the sliding abutment 13 which communicates with the interior of the cylinder when the abutment is pushed inward into such position that the inner end of the abutment contacts with the circumference of the piston. A similar port 13^{a'} through the lower wall of the sliding abutment 13' communicates with the interior of the cylinder when the abutment 13' is slid inward so that its inner end contacts with the circumference of the piston.

A valve body 14 is suitably secured on the cylinder and has integral inwardly extending members 14^a and 14^{a'} fitting loosely within the sliding abutments 13 and 13' respectively so that the abutments will slide on the extensions and the extensions will support and steady the abutments when they are projected into the cylinder and so that steam passing through the extensions will be delivered inside of the valvular sliding abutments and will act to slide the valvular abutments on the extensions. It also has a transverse notch 14^b accommodating one end of a block 15 interposed between the abutments 13 and 13'. The block 15 and the extensions 14^a and 14^{a'} afford a safe support and guide for the sliding abutments and assure even inward and outward sliding of the abutments and prevent undue strain on the abutments.

The valve body 14 has a rectangular chamber 14^d accommodating a vertically movable sliding valve 17; an intake opening 14^e communicating with the intake pipe 14^f; and a horizontal circular bore 14^e between the intake opening 14^e and the chamber 14^d and adapted to accommodate a plug valve 16. The members 14^a and 14^{a'} have lengthwise ways 14^g and 14^{g'} respectively commu-

nicating with the chamber 14^d and the interior of the valvular sliding abutments respectively. The plug 16 has a lengthwise slot 16^a registrable with the intake opening 14^e and the chamber 14^d, to permit steam to flow from the intake pipe 14^f through the slot 16^a to the chamber 14^d when the valve is in its open position as shown in Fig. 4. If the plug 16 be turned in the circular bore 14^e the slot 16^a will be partially or entirely closed according to the extent to which the plug is turned, and the plug may be turned to partially or entirely shut off the flow of steam to the chamber 14^d.

The slide valve 17 normally covers both of the ways 14^g and 14^{g'}. If the valve be moved downward the way 14^g will be uncovered and if the valve be moved upward the way 14^{g'} will be uncovered.

The plug 16 is preferably integral with the shaft 18 and the shaft is oscillated by means hereinafter described. The means for oscillating the shaft 18 is adjustable so that the steam may be partially or wholly cut off at any desired stage of rotation of the piston, that is to say; if the steam is to be used expansively during three-fourths of a revolution of the piston the valve 16 will cut off the steam at the end of the first quarter of a revolution of the piston, or if the steam is to be used expansively during two-thirds of the rotation of the piston, the valve 16 will cut off the steam at the end of the first third of a revolution of the piston, and so on according to the different degrees of expansion at which it is desired to utilize the steam. If a relatively small quantity of steam is to be used the valve 16 will be adjusted to admit the desired reduced quantity of steam.

If the piston is to rotate counter-clockwise the upper sliding abutment 13 will be in use and the lower sliding abutment 13' will be in disuse, and in that case the valve 17 will be depressed and steam from the chamber 14^d will pass through the way 14^g into the interior of the upper abutment 13 and will act to slide the abutment inward until its inner end contacts with the periphery of the piston, and when that occurs the port 13^a will be uncovered and in communication with the interior of the cylinder and steam passing through the sliding abutment will enter the cylinder behind the wing 8 and will act thereon to cause counter-clockwise rotation of the piston. When the piston has made the predetermined partial revolution the valve 16 will cut off the steam and thereafter the steam in the cylinder will act expansively on the wing to complete the revolution of the piston, and this will be repeated for each revolution of the piston. If the piston is to rotate clockwise the lower sliding abutment 13' will be in use, the valve 17 will be raised and

steam from the chamber 14^a will pass through the way 14^{s'} and the port 13^{a'} into the cylinder and will act upon the wing to cause partial clockwise revolution of the piston, and upon closing the valve 16 the steam will act expansively to complete the revolution of the piston, and so on for each revolution. When the valve 17 is depressed and the upper sliding abutment 13 is in use the upper exhaust port 5 must be closed; and when the valve 17 is raised and the lower sliding abutment 13' is in use the lower exhaust port 5' must be closed.

The means for effecting reverse rotation of the piston will now be described. Gate valves 19 and 19' of usual construction are arranged to control the opening and closing of the exhaust ports 5 and 5' respectively. A rock shaft 30 is mounted to oscillate on stationary brackets 20. A lever 21, a first arm 22, and a second arm 25, are mounted in proper relative position on the shaft 30. A stem 23 which slides in a gland 24, connects the arm 22 with the valve 17.

A lever 26 is mounted to oscillate on a stationary support 26'. A rod 27 connects the arm 25 with the lever 26; and rods 28 and 29 connect the lever 26 with the exhaust valves 19 and 19' respectively. The parts are so arranged and connected that when the lever 21 occupies a vertical position the valve 17 will extend across and close the ways 14^s and 14^{s'}. If the upper end of the lever 21 be moved to the left the movement of the lever will rock the shaft 30 to cause the valve 17 to descend and uncover the way 14^s, and the same movement of the lever 21 will cause the upper end of the lever 26 to move to the left and through the instrumentality of the rod 28 and the valve 19 close the upper exhaust port 5; and will cause the lower end of the lever 26 to move to the right and through the instrumentality of the rod 29 and the valve 19' open the lower exhaust port 5' so that steam from the chamber 14^a will pass above the valve 17 and into the upper sliding abutment 13 and cause it to slide into the cylinder and the steam passing from the abutment 13 through the port 13^a into the cylinder will act on the wing 8 to rotate the piston counter-clockwise as already described. The moving of the lever 21 to the right of its normal vertical position will actuate the rod 28 to slide the valve 19 outward to open the upper exhaust port 5, and will actuate the rod 29 to slide the valve 19' inward to close the lower exhaust port 5', and will cause the stem 23 to raise the valve 17 so that steam from the chamber 14^a will pass through the way 14^{s'} and the port 13^{a'} into the cylinder and under the hollow abutment 13' projected into the cylinder by the steam, and the steam passing through the lower sliding abutment into the cylinder will act

on the upper side of the wing 8 to cause clockwise rotation of the piston.

The means controlling the operation of the cut-off valve will now be described. The shaft 18 is mounted to oscillate in suitable bearings 18^a on the valve body 14. A radial arm 31 is mounted on the shaft 18. A block 32 provided with a wrist pin 32^a is adapted to slide lengthwise of the arm 31 and may be set in different positions on the arm by means of a set screw 33 or equivalent securing device. A disk 34 eccentric to the shaft 6 is suitably secured on the shaft. A rod 35 is connected with the disk 34 by a strap 35^a and one end of the rod is provided with a box 35^b in which the wrist pin 32^a fits. The rotating of the shaft 6 causes oscillation of the shaft 18, the extent of the oscillation of the shaft 18 being according to the setting of the block 32 on the arm 31. The means just described admit of adjusting the oscillation of the shaft 18 to cause the plug valve 16 to cut off the steam at any desired stage of rotation of the piston.

I do not restrict my claims to valves of the precise construction shown and described nor do I restrict them to the precise means shown and described for effecting coöperation of the valves since it is obvious that minor details of construction may be varied without departure from my invention.

The operation of the engine is disclosed in the foregoing description and need not be repeated.

Having fully described my invention what I claim as new and desire to secure by Letters Patent is:—

1. The combination of a cylinder having two valve-controlled exhaust ports, also having a bore adapted to accommodate a rotating piston; a piston mounted to rotate in the bore of the cylinder and having a fixed radial wing; two box-shaped sliding abutments adapted to slide transversely of the cylinder and between the exhaust ports and having ports communicating with the interior of the cylinder when the sliding abutments are projected into the cylinder; and a valve adapted to supply steam within either abutment to cause the sliding abutment to which steam is supplied to slide transversely of the cylinder.

2. The combination of a cylinder having a first exhaust port and a second exhaust port; a steam actuated first sliding abutment having in its upper wall a port admitting steam to the cylinder above said first sliding abutment; a steam actuated second sliding abutment having in its lower wall a port admitting steam to the cylinder below said second sliding abutment; a movable controller-valve controlling the admission of steam to both sliding abutments; a lever connected to operate the controller-valve; exhaust port valves respectively controlling

- the exhaust ports of the cylinder; and connecting devices connecting said exhaust-port valves with said lever to close the first exhaust port and open the second exhaust port when the controller-valve is moved in one direction and reversely to close the second exhaust port and open the first exhaust port when the controller-valve is moved in the opposite direction.
- 10 3. The combination of a cylinder having a first exhaust port and a second exhaust port; a steam actuated first sliding abutment having in its upper wall a port admitting steam to the cylinder above said first
15 sliding abutment; a second sliding abutment having in its lower wall a port admitting steam to the cylinder below said second sliding abutment; a movable controller-valve controlling the admission of
20 steam to both sliding abutments; a lever connected to operate the controller-valve; valves respectively controlling the exhaust ports of the cylinders; connecting devices connecting

the exhaust port valves with said lever; and a cut-off valve controlling the admission of steam to said controller-valve. 25

4. The combination of a cylinder; a valve body having extensions adapted to support the movable abutments respectively and having ways through said extensions; hollow abutments mounted to slide on said extensions and provided with ports positioned to communicate with the interior of the cylinder; and a valve controlling the supply of steam through said extensions to the interiors of said hollow abutments to slide said hollow abutments transversely of the cylinder. 35

In witness whereof I have hereunto signed my name at Springfield, Illinois this 20th day of March, 1911. 40

GEORGE F. WEISS.

Witnesses:

M. EVELYN THAIN,
C. D. JUSTICE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."