

(No Model.)

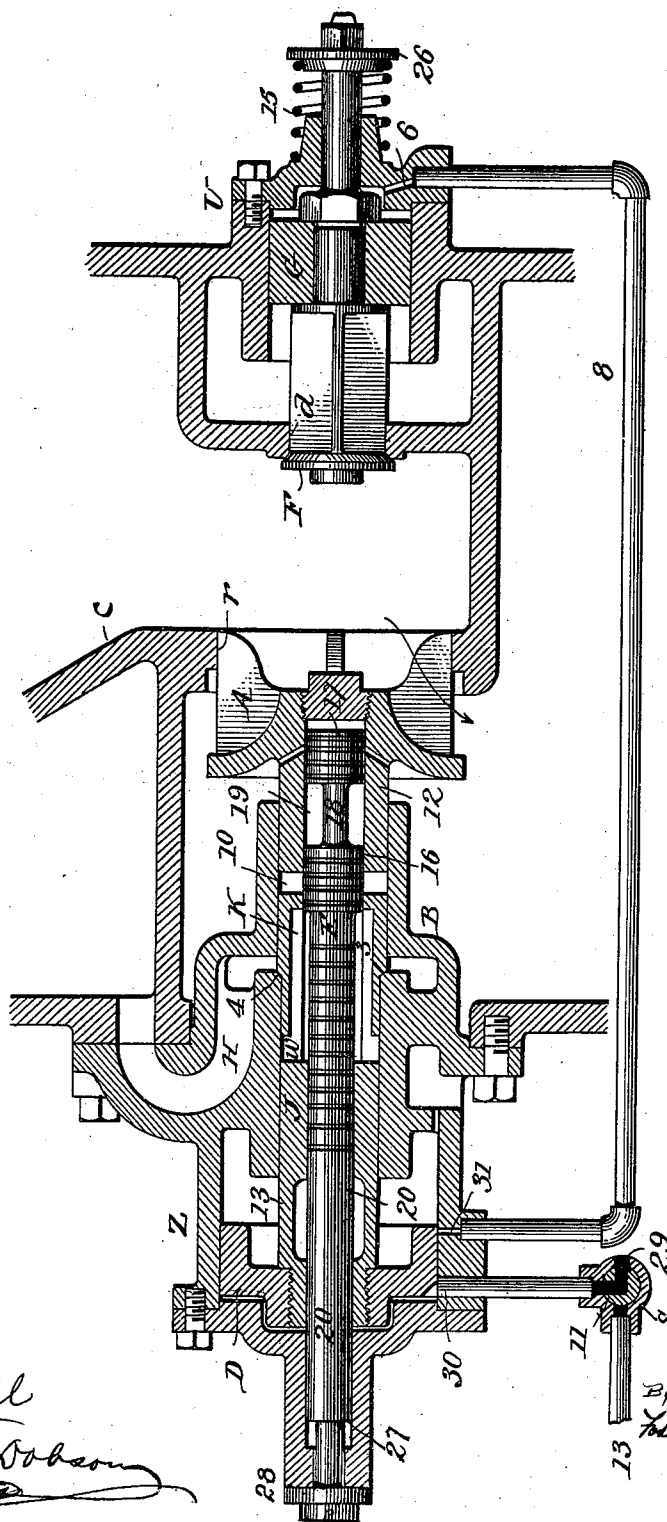
3 Sheets—Sheet 1.

C. W. RUSSELL.
VALVE DEVICE FOR COMPOUND ENGINES.

No. 548,140.

Patented Oct. 15, 1895.

Fig. 1.



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(No Model.)

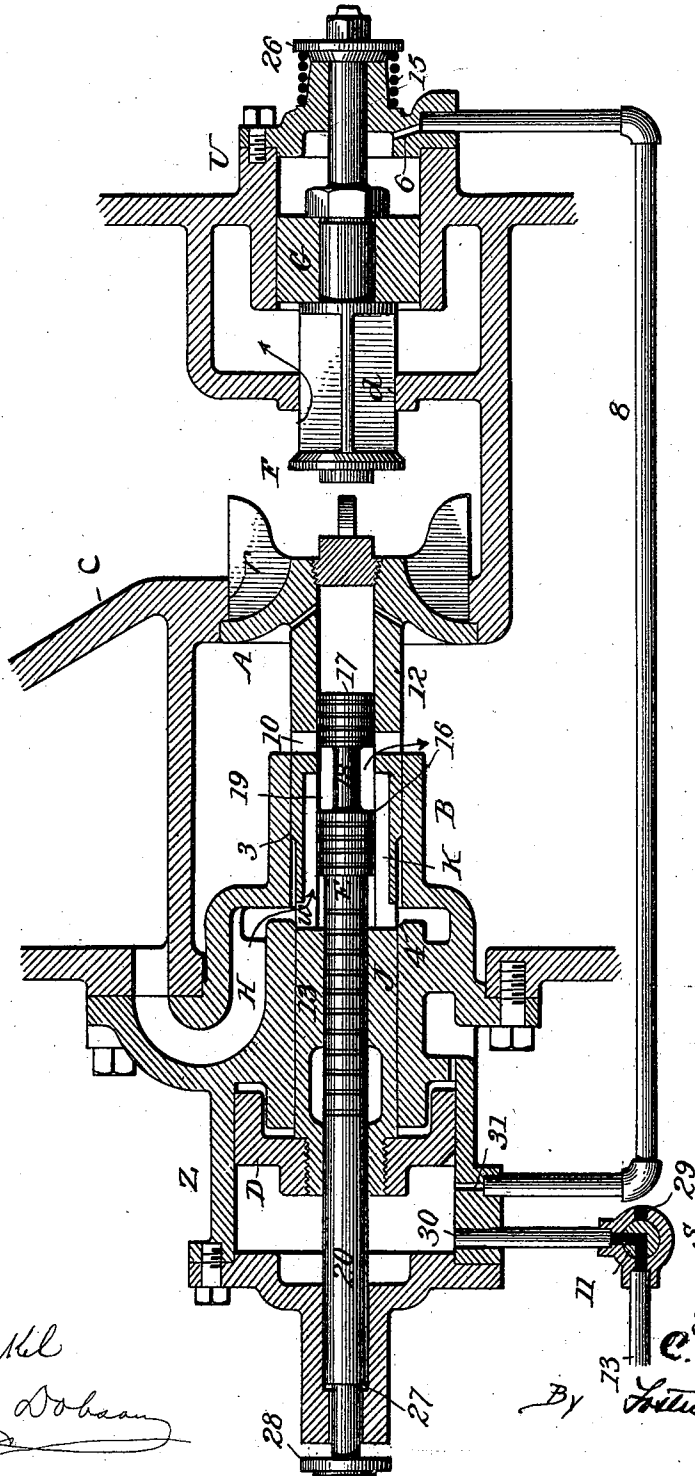
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Patented Oct. 15, 1895.

Fig. 2.



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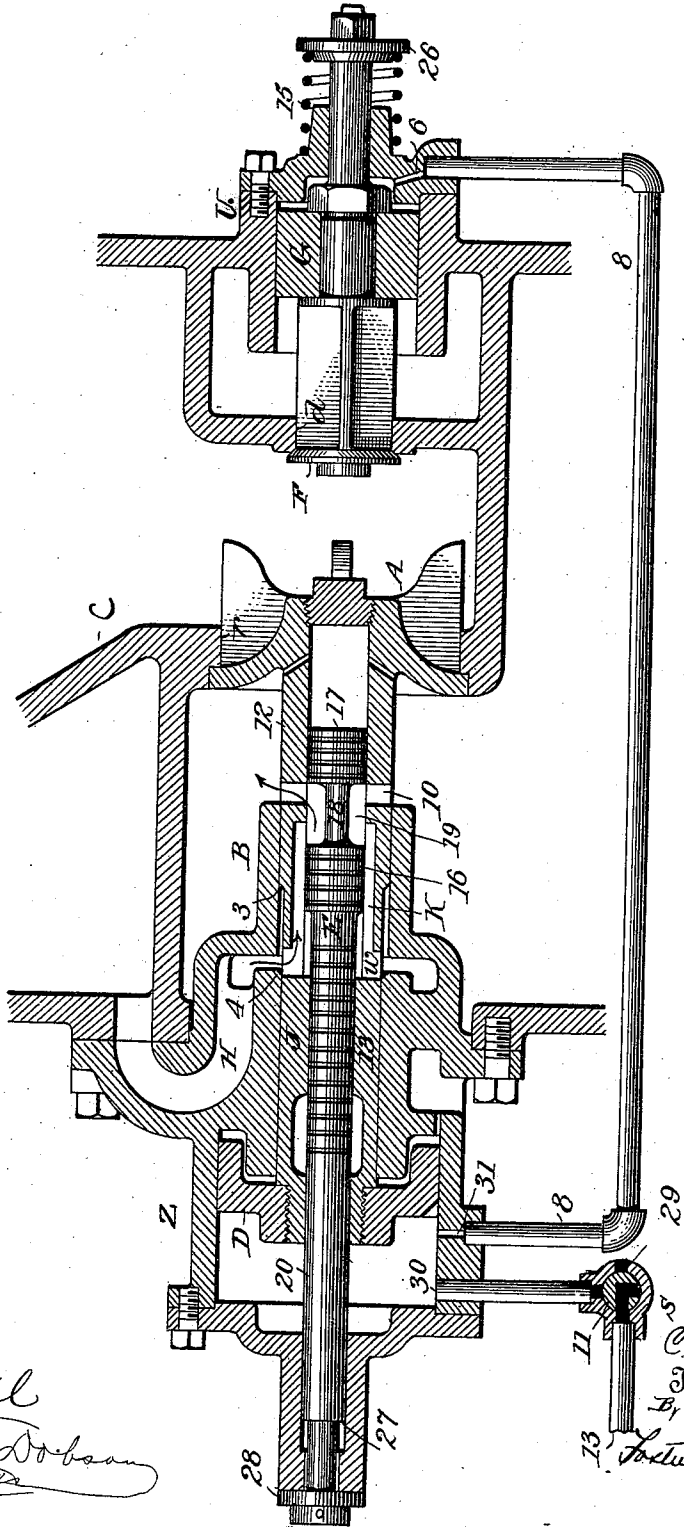
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Fig. 3.



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UNITED STATES PATENT OFFICE.

CLINTON W. RUSSELL, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE RICHMOND LOCOMOTIVE AND MACHINE WORKS, OF SAME PLACE.

VALVE DEVICE FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 548,140, dated October 15, 1895.

Application filed April 7, 1894. Serial No. 506,781. (No model.)

To all whom it may concern:

Be it known that I, CLINTON W. RUSSELL, a citizen of the United States, residing at Richmond, in the county of Henrico and State of Virginia, have invented certain new and useful Improvements in Valve Devices for Compound Engines, of which the following is a specification.

My invention relates to that class of compound engines in which an intercepting-valve serves to control the receiver-chamber to convert the engine from a compound to a simple engine; and my invention consists in a certain arrangement of valves and motors fully set forth hereinafter, whereby to permit the change from compound to simple to be effected without the loss of power heretofore resulting, as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a compound-engine valve device embodying my invention and showing the position of the parts when the engine is working compound; Fig. 2, the same illustrating the position of the parts when the engine is working simple; Fig. 3, the same illustrating the position of the parts as the admission-valve is opened to start the engine.

The casing of the valve device is suitably constructed, and when the device is used with a locomotive-engine the said casing may form part of the saddle of the cylinders. A part of the said casing is a partition C, containing the port *r*, that divides the receiver constituting the port of the intercepting-valve A. Forming part of the casing are three cylinders B U Z, to which are fitted pistons J, G, and D. The piston J is connected with the hollow stem or sleeve 12, attached to the intercepting-valve A, and in the construction shown constitutes also the admission-valve with an annular beveled face 3, closing against a narrower beveled face 4 of the casing to close the live-steam passage H, and the reduced stem 13 of the piston valve J extends into the cylinder Z and is connected to the piston D. Within the hollow stem or sleeve 12 fits a reduction-valve E, consisting of two pistons 16 17, connected by a stem 18, forming an annular port 19, the reduced stem

20 of the reduction-valve passing through the piston D and through the head of the cylinder Z, and being provided with a shoulder 27 and a collar 28, constituting stops limiting the sliding movement of the reduction-valve.

An exhaust or emergency valve F closes a port *d* in the wall of the chamber which communicates with the stack, so that when the emergency-valve is opened there is a direct communication between the receiver and the exhaust.

A valve-casing S contains a two-way valve 11 and communicates through a pipe 13 with the boiler or with any other supply of steam or air or any other fluid under pressure, and also communicates with a port 30 of the cylinder Z and has an air-outlet 29. The cylinder Z has another port 31, which is so arranged as to be uncovered by the piston D as the intercepting-valve A begins to close the port *r*, and with the port 31 communicates a pipe 8, extending to a port 6, communicating with the outer end of the cylinder U. A stem extends from the piston G through the head of the cylinder U and carries a collar 26, between which and the head of the cylinder is arranged a spring 15.

When steam is admitted to the passage H, it acts upon the exposed face 3 of the valve J and throws the latter to the right, closing the intercepting-valve A and thereby bringing a port *w* in the sleeve 12 into communication with the passage H, admitting steam to a chamber K around the piston reduction-valve E, and the steam acting upon the face of the latter having its greatest area shifts the valve to the right and brings the port 18 into communication with a port 10 in the sleeve 12, whereby live steam is admitted to that section of the receiver communicating with the low-pressure engine. When the pressure in the other section of the receiver becomes sufficiently great, it acts upon the intercepting-valve A, throws the latter to the left, bringing the face 3 against the seat 4, cuts off the flow of live steam to the low-pressure engine, and admits the exhaust-steam from the high-pressure engine to operate the low-pressure engine.

In case of an emergency, where it is de-

sired to operate the engines non-compound or simple the emergency-valve F should be shifted to open the exhaust-port *d* and permit the exhaust-steam from the high-pressure engine to pass to the stack. It has been found that if the said emergency-valve opens the port so as to permit the pressure in the low-pressure cylinder to become reduced there is a loss of power just at the moment when it is most desirable to secure an increase in the power of the engine, and I therefore provide means whereby the valves A F may be successively operated by the pistons D G, so that the exhaust-valve or emergency-valve is carried from its seat immediately after the intercepting-valve closes the port *r*, thereby preventing any great decrease of pressure in the low-pressure cylinder and also opening communication between said cylinder and the live-steam passage as the intercepting-valve reaches its seat, and also affording an escape from the exhaust without back-pressure upon the high-pressure piston immediately after the port *r* is closed. These successive operations of the parts are effected automatically by the construction shown. Thus, assuming the emergency-valve F and the admission-valve J to be closed and the intercepting-valve to be opened and the engine working compound, if it is desired to increase the power by working both the engines as simple engines the cock of the valve device S is turned to admit steam to the port 30 of the cylinder Z, when the piston D will be thrown to the right, the intercepting-valve will be closed, and the live steam will pass to the chamber of the reducing-valve and thence to the section of the receiver in communication with the low-pressure engine. As the intercepting-valve reaches its seat and the live-steam passage is opened, the port 31 is uncovered by the piston D and steam then flows through the pipe 8 and port 6 to the cylinder U and shifts the latter and the emergency-valve, so as to open the exhaust-port *d* and prevent any accumulation of back-pressure against the high-pressure piston after the closing of the port *r*. By turning the valve 11 to open the air-port 10 both pistons G D will be carried to the outer ends of their cylinders, owing to the pressure of the steam within the casing against the piston G and the greater face of the valve A.

While I have illustrated a particular arrangement of parts with a motor-piston for the emergency-valve and a separate motor-piston for the intercepting motor-valve with ports and passages arranged so as to put the said motor successively in operation, it will be evident to those skilled in the art that different motor devices may be used to secure this successive operation. While I have shown the admission-valve as connected directly

with this intercepting-valve, it will be evident that other arrangements may be employed without departing from the main features as regards the successive operations of the intercepting and emergency valves.

I do not claim, broadly, as my invention the combination of motors with the intercepting and emergency valves, with means for directing a motor-fluid to these motors; nor do I here claim the arrangement of the emergency-valve to open a direct passage between the receiver and the exhaust, nor the arrangement of the intercepting-valve, valve-piston J, and reduction-valve within the stem of the intercepting-valve, as these features constitute the subject-matter of a separate application for Letters Patent, Serial No. 504,989.

It is to be understood that piston D does not entirely cut off communication through pipe 30 when in the normal position.

Without limiting myself to the precise construction and arrangement of parts shown and described, I claim—

1. The combination in a valve device for a compound engine of an emergency valve, an intercepting valve, motors connected to operate said valves, and means for automatically putting the said motors into operation successively, substantially as set forth.

2. The combination with the intercepting valve and emergency valve of a compound engine, of independent motors for operating said valves, and means for directing a motor fluid first to the intercepting valve motor and then to the motor of the emergency valve, substantially as described.

3. The combination in a compound engine valve device, of an emergency valve and motor therefor having a piston and cylinder, an intercepting valve and motor therefor having a piston and cylinder, means for directing a motor fluid to the cylinder of the motor actuating the intercepting valve and an exhaust port of the intercepting valve cylinder communicating with the admission port of the emergency valve cylinder, substantially as set forth.

4. The combination with an intercepting valve, of a piston and cylinder, a valve device communicating with said cylinder and with a supply of motor fluid under pressure, an emergency valve, and motor therefor having a piston and a pipe connecting the admission port of the emergency valve motor and an exhaust port of the intercepting valve motor, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLINTON W. RUSSELL.

Witnesses:

CHARLES E. FOSTER,
G. P. KRAMER.