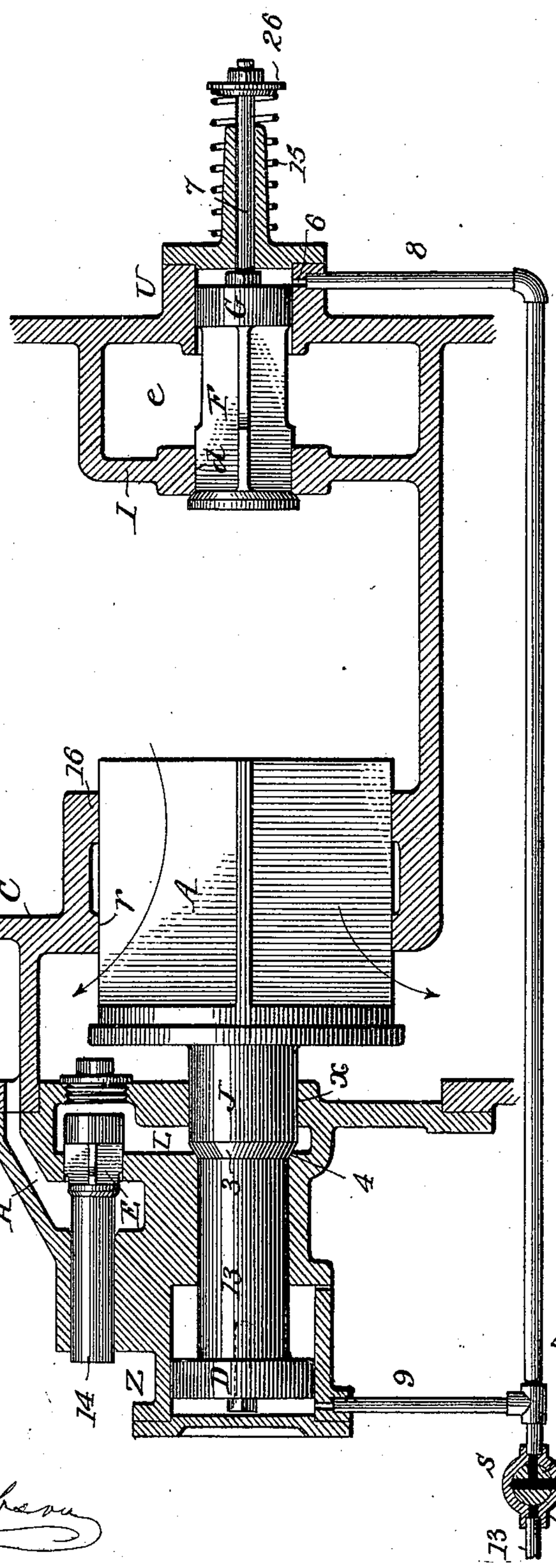
(No Model.) 2 Sheets—Sheet 1.

E. F. C. DAVIS.

VALVE OPERATING DEVICE.

No. 564,051. Patented July 14, 1896.

Fig. 1.



Witnesses
Jno. J. Hinkel
Arthur N. Dobson

E. F. C. Davis
Inventor
By Foster & Freeman
Attorneys

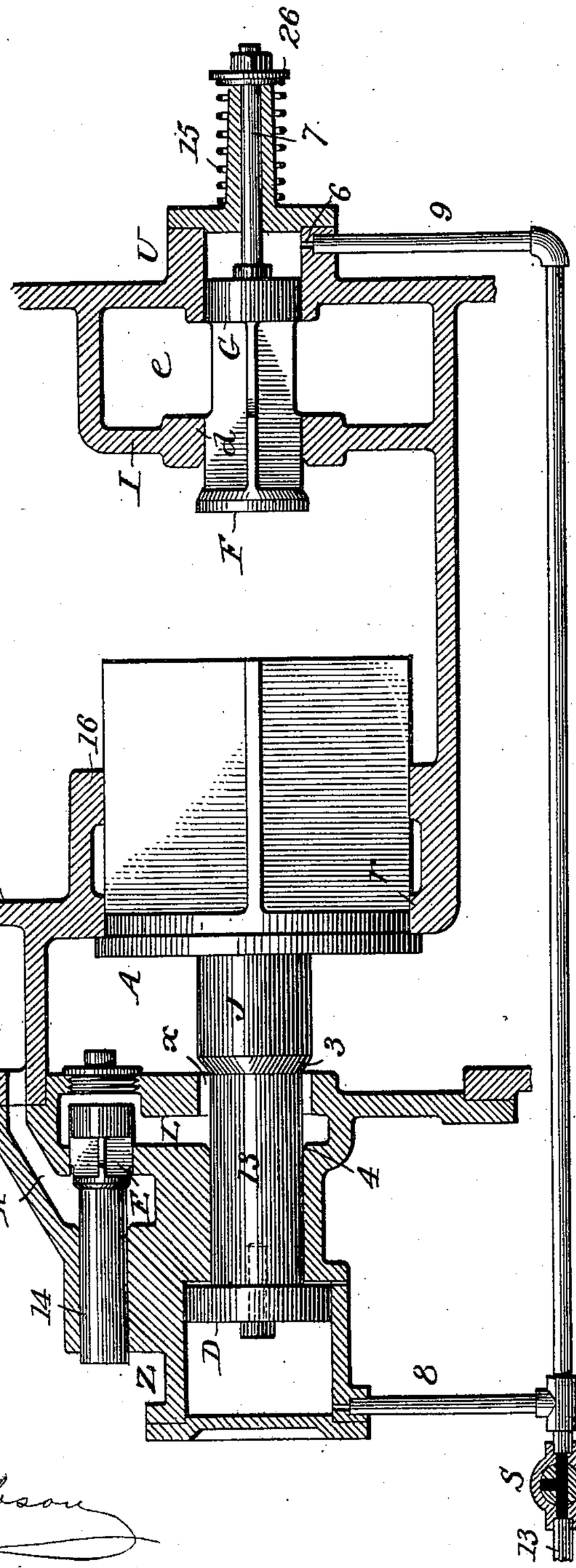
(No Model.) 2 Sheets—Sheet 2.

E. F. C. DAVIS.

VALVE OPERATING DEVICE.

No. 564,051. Patented July 14, 1896.

Fig. 2.



Witnesses
Jno. J. Hinkel
Allen N. Dobson

E. F. C. Davis
Inventor
By Foster & Freeman
Attorneys

UNITED STATES PATENT OFFICE.

EZEKIEL F. C. DAVIS, OF RICHMOND, VIRGINIA, ASSIGNOR TO THE RICHMOND LOCOMOTIVE AND MACHINE WORKS, OF SAME PLACE.

VALVE-OPERATING DEVICE.

SPECIFICATION forming part of Letters Patent No. 564,051, dated July 14, 1896.

Application filed April 4, 1894. Serial No. 506,338. (No model.)

To all whom it may concern:

Be it known that I, EZEKIEL F. C. DAVIS, 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-Operating Devices, of which the following is a specification.

My invention relates to that class of valve devices that are used for regulating the movements of compound engines; and my invention consists in constructing such valve devices so as to secure greater facility in operating the same, provide for the automatic regulation of the pressure in the low-pressure cylinder when operating as a single engine, secure the proper movements of the valves, and facilitate the manufacture of the device, all as fully set forth hereinafter and as illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of my improved valve device, illustrating the parts in the position occupied when running compound; Fig. 2, the same, illustrating the position of the parts when the engine is running single.

The casing X of the valve device is suitably constructed to support the parts hereinafter named, and is preferably a part of the saddle of the engines, and is formed to constitute a cylinder U, containing a piston G, connected with the wings of an emergency-valve F, that controls the port *d* in the wall I of the exhaust-chamber *e*, leading to the stack. The said casing also includes the cylinder Z, receiving a piston D, that is connected with the admission-valve J.

An intercepting-valve A closes the port *r* in the partition C that divides the receiver, this valve being suitably guided, as, for instance, by a flange 16, having bearings for the wings of the valve.

The admission-valve J is in the form of a piston or plunger which fits a circular port *x* of the casing, so arranged that the head of the admission-valve may extend through the port and connect with the intercepting-valve; and the head of the admission-valve is beveled, forming an annular face 3, which may be brought to bear against a narrower seat 4 in a channel or chamber L, to which live steam is admitted, whereby the said steam can bear upon the exposed portion of the face 3 to open the admission-valve, which is suitably guided by its reduced stem 13, having its bearing in the casing and extending to the cylinder Z, where it is connected to the piston D.

The chamber or channel L communicates with the live-steam channel H through a port, to which is fitted the head of a reducing-valve E, the contracted stem 14 of which extends through a bearing in the casing and has its end exposed to the atmosphere.

While the reducing-valve E may be arranged between the piston-valve J and the low-pressure cylinder, so as to control the flow of live steam from the valve J to the low-pressure section of the receiver, I prefer to arrange the reducing-valve as shown, so as to control the flow of live steam to the admission-valve, whereby it is rendered impossible to throw the full force of the steam upon the admission-valve. Whether the reduction-valve be placed in one position or the other it is independent, in connection and support, of both the admission-valve and the intercepting-valve and is therefore not affected in its movements by the movements of either of the other valves, and is therefore more sensitive and can be made lighter and more effective than if connected to or bearing upon either of the other valves. It will also be noted that the reduction-valve is arranged parallel to the axes of the other valve, so that the valve-seats can be bored out upon the same parallel lines, securing better fitting and saving labor.

A valve-casing S, communicating with the boiler or other source of motor fluid under pressure, is provided with a three-way cock 11 and communicates through pipes 8 9 with the cylinders U Z, whereby the motor fluid may be thrown simultaneously to both cylinders or may be discharged therefrom by turning the cock to put the cylinders in communication with an exhaust-port 12, leading to the atmosphere.

The stem 7 of the piston G extends through the head of the cylinder U and carries a collar 26, between which and said head is a spring 15. When live steam is admitted to the passage H, its pressure is controlled by

the reducing-valve E, accordingly as the valve is proportioned, so that the steam within the chamber L, that acts upon the admission-valve J, is at the desired reduced pressure, and under this pressure the said admission-valve is thrown to the right until the intercepting-valve A is closed and the admission-port *x* is opened, after which the steam is passed to the low-pressure cylinder.

When the pressure in the receiver, of the steam passing from the exhaust to the high-pressure engine, becomes sufficiently great, it acts upon the larger-area face of the valve A, throws the latter to the left, closes the admission-port, and the low-pressure engine will then work under the exhaust from the high-pressure engine.

When in any emergency greater power is required, the emergency-valve F is opened. While the valve F may be operated by various means, I prefer to make use of a motor and motor fluid, as before described, so that the introduction of a fluid under pressure through the pipe 8, throwing the valve F to the left, will open the direct passage or port *d*, between the receiver and the exhaust-chamber E, when the exhaust from the high-pressure engine will pass to the stack.

It will be seen that as the pressure is admitted to shift the piston G and is simultaneously admitted to shift the piston D, thereby positively opening the admission-valve, and also positively closing the intercepting valve as the emergency-valve is opened, the introduction of live steam to the chest of the low-pressure engine being thereby insured simultaneously with the opening of the exhaust-valve F and closing of the intercepting valve.

While I have shown the admission-valve as connected with the intercepting valve, I do not limit myself to this connection or arrangement.

The claims in this case are distinguished from those in my pending application Serial No. 506,997 by the dependent relation of the intercepting valve and the admission-valve, which are in this case connected together. The said claims are also distinguished from those in my pending case Serial No. 507,578, which are based on the differential faces of the reducing-valve, and the means for locking the reducing-valve in the closed position, and the said claims are distinguished from my pending case Serial No. 506,176, by being based on an independent reducing-valve.

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

1. The combination in a compound-engine valve device, of an intercepting valve, an admission-valve arranged to operate the intercepting valve and to close positively against the seat in a chamber communicating with the live-steam passage and an independent reducing-valve, adapted to direct live steam to the admission-valve to open the same and close the intercepting valve, substantially as set forth.

2. The combination of the admission-valve, intercepting valve and reducing-valve governing the flow of live steam to the low-pressure cylinder and having a stem extending to the exterior of the casing of the valve device, substantially as set forth.

3. The combination with the admission-valve and intercepting valve of a compound-engine valve device, of a reducing-valve arranged to control the flow of live steam from the live-steam passage to the admission-valve, substantially as set forth.

4. The combination in a valve device of a compound engine of a live-steam passage, an admission-valve, a reducing-valve controlling the flow of steam to the admission-valve, and an intercepting valve, said intercepting valve connected with the admission-valve, substantially as set forth.

5. In a valve device for compound engines, the combination of the admission-valve and intercepting valve, of a reducing-valve arranged to control the flow of live steam from the live-steam passage to the admission-valve a piston on the admission-valve, and means for directing a motor fluid thereto, substantially as described.

6. In a valve device for compound engines, the combination of the admission-valve and a piston and intercepting valve connected thereto, a live-steam passage, a reducing-valve arranged to control the flow of steam to the admission-valve and means for directing a motor fluid to the piston, substantially as described.

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

E. F. C. DAVIS.

Witnesses:
HENRY J. GROSS,
CHARLES E. GRAVES.