

No. 607,569.

Patented July 19, 1898.

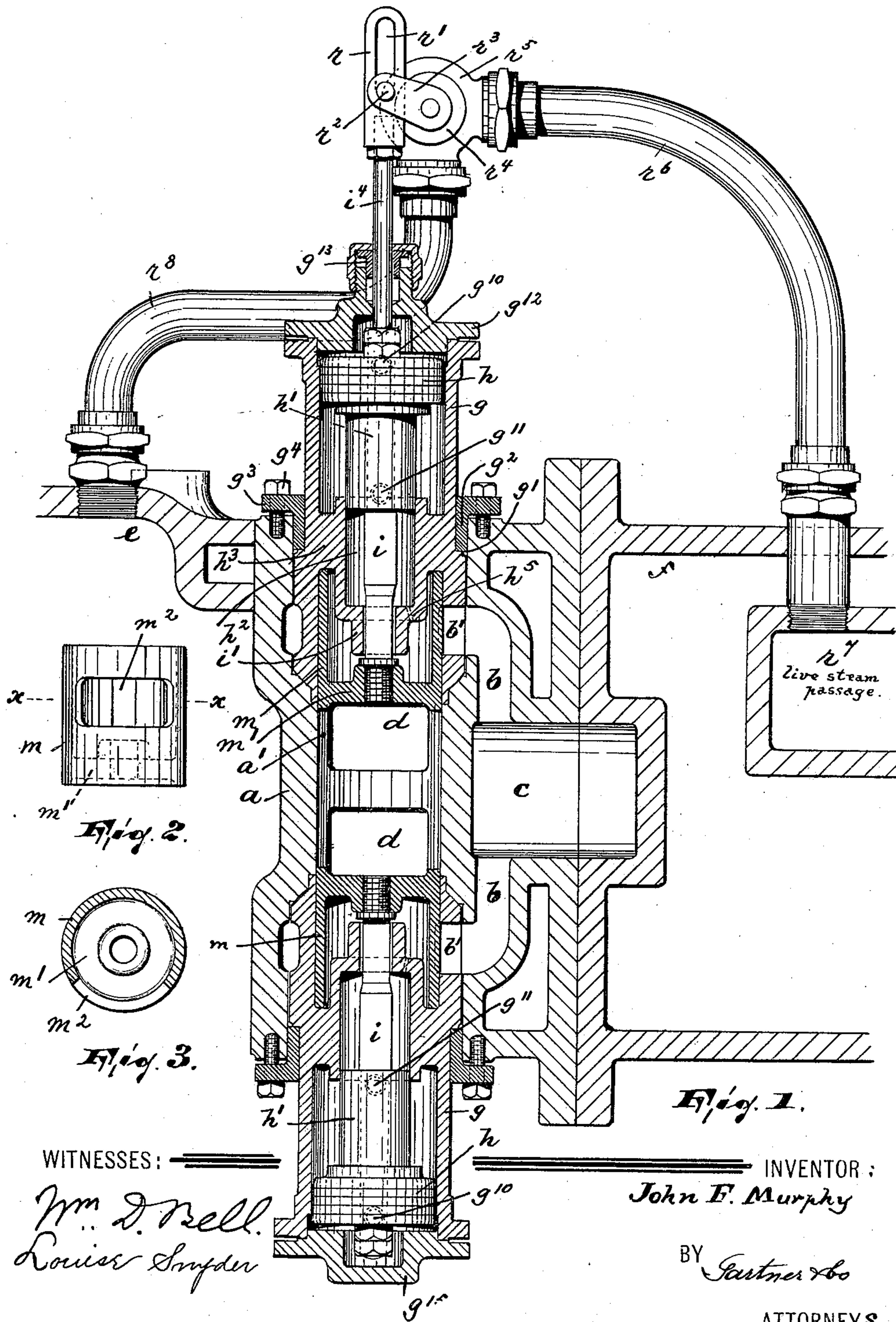
J. F. MURPHY.

INTERCEPTING VALVE FOR COMPOUND ENGINES.

(Application filed Dec. 27, 1897.)

(No Model.)

3 Sheets—Sheet 1.



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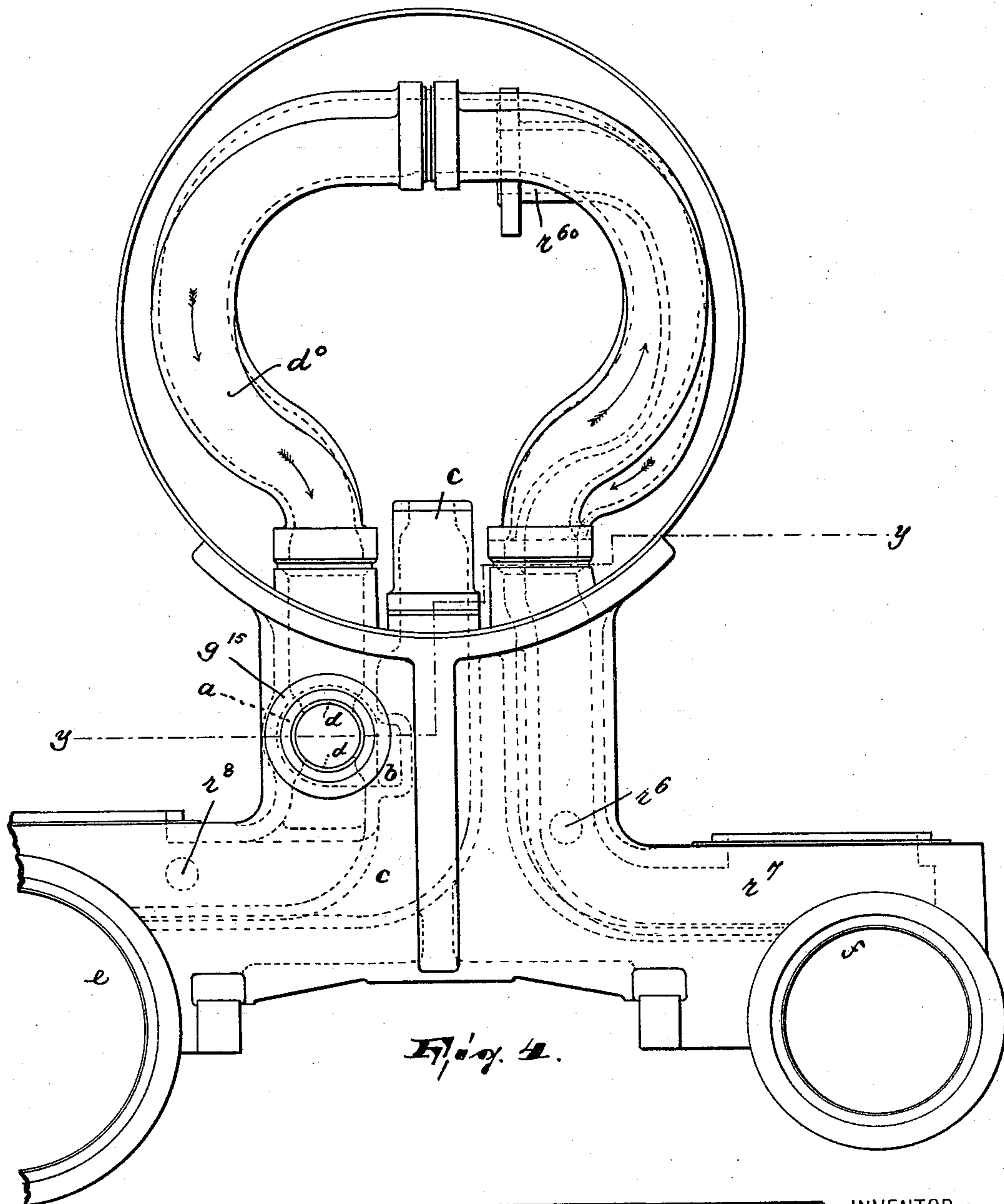


Fig. 4.

WITNESSES:

Wm. D. Bell.
Louise Snyder.

INVENTOR:

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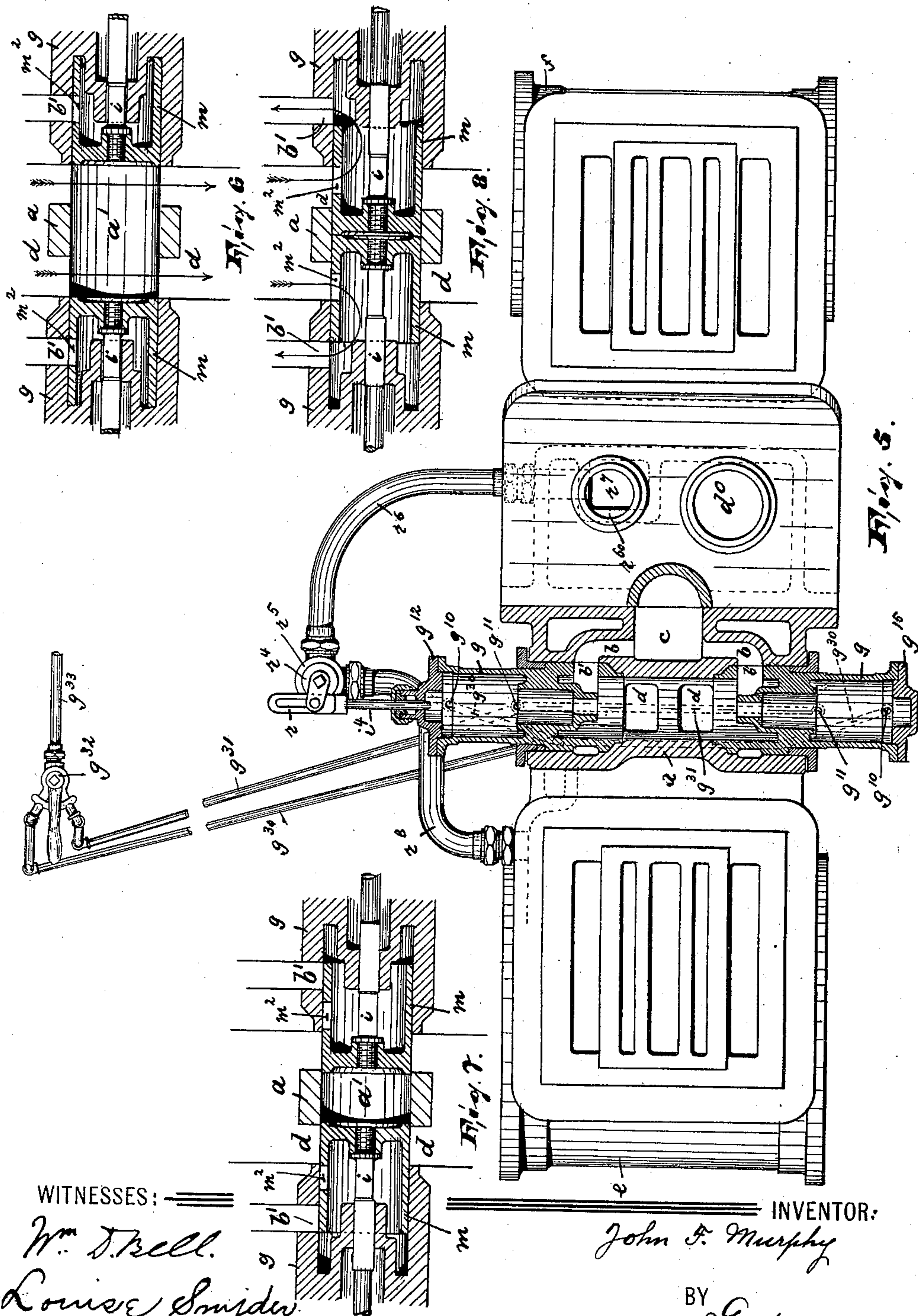
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3 Sheets—Sheet 3.



WITNESSES:

Wm. D. Bell.
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INVENTOR:

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UNITED STATES PATENT OFFICE.

JOHN F. MURPHY, OF PATERSON, NEW JERSEY, ASSIGNOR TO THE COOKE
LOCOMOTIVE AND MACHINE COMPANY, OF SAME PLACE.

INTERCEPTING-VALVE FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 607,569, dated July 19, 1898.

Application filed December 27, 1897. Serial No. 663,550. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. MURPHY, a citizen of the United States, residing in Paterson, county of Passaic, and State of New Jersey, have invented certain new and useful Improvements in Intercepting-Valves for Compound Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

My present invention relates to that class of compound engines in which intercepting-valves are used for the purpose of converting the engine from a compound to a simple engine, and vice versa. Its object is to provide an intercepting-valve of simple, strong, and durable construction, reliable and effective in operation, and which intercepting-valve permits the running of the engine simple for any desired length of time.

The invention consists in the improved intercepting-valve, in the admission-valve and its operating mechanism, and in the combination and arrangement of the various parts, substantially as will be hereinafter more fully described and finally embodied in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several views, Figure 1 is a longitudinal central sectional view of my improved intercepting-valve and also of the portions of the compound engine adjoining the same and connected therewith; Fig. 2, a detail elevation of one of the intercepting-valves detached; Fig. 3, a sectional view on the line $x x$ of Fig. 2; Fig. 4, a front elevation of a portion of an engine, illustrating the relative position of the cylinders, steam-passage, and intercepting-valve; Fig. 5, a sectional view on the line $y y$ of Fig. 4, certain portions being broken away and others removed, said figure in addition showing the three-way valve and its connection with the intercepting-valve; and Figs. 6, 7, and 8 detail sectional views illustrating

diagrammatically the positions of the intercepting-valves during certain stages of operation.

In said drawings, a represents the intercepting-cylinder, provided at one side with the auxiliary exhaust ports or channels $b-b$, leading into and communicating with the main exhaust c . The central portion of said cylinder is also provided with holes or openings $d d$, communicating with the receiver d^0 , leading from the high-pressure cylinder f to the low-pressure cylinder e , as shown in Fig. 4 of the drawings.

In each end of the cylinder a is removably arranged a valve-case g , provided with an annular flange g' , adapted to be engaged by the downwardly-extending flange g^2 of the annular ring g^3 , which latter is secured to the end of the cylinder a by means of a series of bolts g^4 .

Within the valve-case g is arranged a piston h , the reduced portion h' of which is adapted to slide in the central bore or dash-pot h^2 , arranged in the inwardly-extending partition or enlargement h^3 of the valve-case g .

The piston h and its reduced portion h' are secured on the rounded portion of the piston-rod i , the inner squared portion of which is suitably guided in the sleeve or extension i' , arranged on the inner end of the partition or enlargement h^3 . On the screw-threaded extreme end of said piston-rod i is removably secured the bottom m' of the cylindrical intercepting-valve m , which latter is slidably arranged within the inner portion of the valve-case g and within the central bore a' of the cylinder a , respectively. Said intercepting-valve m is so arranged within the valve-case g and the cylinder a that when in normal position, Fig. 6, it closes the port b' , penetrating the wall of the valve-case g and communicating with the respective auxiliary exhaust b , and when in working position covers the respective hole or opening d in the cylinder a , but communicates with said opening by means of the aperture m^2 , arranged in and penetrating the wall of the valve m and shown in Figs. 2, 3, and 8, and thus permits the high-pressure cylinder to exhaust through

said aperture m^2 , valve m , port b' , and auxiliary exhaust b into the main exhaust c in a manner hereinafter described.

The dash-pot h^2 is provided at its inner end with a port h^5 , permitting the air which during the inward movement of the piston h is being compressed, and thus acts as a cushion for the reduced portion h' of said piston, to escape or exhaust into the intercepting-valve m and through the port b' into the auxiliary exhaust b . The valve-case g is also provided with steam-ports g^{10} and g^{11} for the admission and exhaustion of the steam for operating the piston h , as will be manifest, and it may be stated that these steam-ports are connected in the usual manner through pipes g^{30} and g^{31} , respectively, with the "three-way valve" or "cab-valve" g^{32} , as shown in Fig. 5 of the drawings.

The back piston-rod i (in the drawings the upper one) is provided with a rearwardly-extending rod or projection i^4 , suitably guided in the valve-case head g^{12} and in the bushing g^{13} , respectively, and carries at its free end a link r , provided with an elongated slot r' . Said slot is in engagement with a pin r^2 , projecting from the free end of a crank r^3 , the other end of which is secured to and connected with the cock r^4 of the admission-valve r^5 . The admission-valve r^5 is connected by a pipe r^6 with the live-steam passage r^7 and through a pipe r^8 with the steam-passage of the low-pressure cylinder e .

The forward valve-case g is closed by the head g^{15} in the ordinary manner, and the remaining parts of the said valve-case g are of identical construction to those already described in connection with the intercepting-valve m , with the exception that the extension i^4 and the parts connected therewith and operated thereby are done away with.

The steam is admitted in the ordinary and well-known manner through the pipe r^{60} , Fig. 4, to the live-steam passage r^7 of the high-pressure cylinder and is controlled by the throttle-valve, operated by the throttle-lever, which latter parts have not been illustrated in the drawings, as the same have not been changed in construction or arrangement and do not form a part of my invention.

The parts constituting the intercepting-valve are illustrated in Figs. 1 and 6 of the drawings in normal position—that is to say, in a position permitting the engine to be run as a compound engine.

When the engine is to be started and is to be run first as a simple engine, the three-way valve g^{32} in the cab is operated and the throttle-lever opened, permitting steam to enter through the pipe g^{30} and steam-ports g^{10} into their respective valve-cases g and between the pistons h and valve-case heads g^{12} g^{15} . Said pistons are thus forced inward, their reduced portions h' being cushioned by the air contained in their respective dash-pots h^2 . The intercepting-valves m are pushed inward, covering the respective holes or open-

ings $d d$ in the cylinder a , as in Fig. 7, and upon reaching their innermost positions opening the ports $b' b'$, which latter communicate with the auxiliary exhausts $b b$, as shown in Fig. 8. Simultaneously the admission-valve r^5 is opened, the cock r^4 being operated by the elongated slot r' in the link r , permitting live steam from the live-steam passage r^7 to enter through pipe r^6 and pipe r^8 into the receiver d^0 of the low-pressure cylinder e . In this manner the low-pressure cylinder is converted into a high-pressure cylinder, and both cylinders are used for running the engine simple. The high-pressure cylinder exhausts through the port d , aperture m^2 in the valve m , port b' , auxiliary exhaust b into the main exhaust c , while the other cylinder exhausts through exhaust c in the usual manner. After the engine has been run simple the desired length of time the three-way valve in the cab is again operated, permitting steam to enter through steam-pipe g^{31} and ports g^{11} into their respective valve-cases, whereby the pistons h are moved outward—that is to say, are returned to their normal positions. The admission-valve r^5 is simultaneously closed the same as the ports b' and auxiliary exhausts b , while the communication between the high-pressure and low-pressure cylinders is opened through openings $d d$ and receiver d^0 , and the engine is running as a compound engine, as will be manifest.

I do not intend to limit myself to the precise construction shown and described, as various alterations can be made without changing the scope of my invention; but

What I claim as new, and desire to secure by Letters Patent, is—

1. In a compound engine, the combination with the high and low pressure cylinders, and the channels or passages connecting the same, and with the live-steam passage, of an intercepting-valve between said high-pressure and low-pressure cylinders and communicating with and adapted to control the channels or steam-passages connecting the same, a piston controlling said intercepting-valve, a dash-pot intermediately arranged between the intercepting-valve and the piston for cushioning the latter, an admission-valve, pipes connecting said admission-valve with the live-steam passage and with the steam-passage of the low-pressure cylinder respectively, and means connecting said piston and the admission-valve for opening the latter when the piston and the intercepting-valve are being operated to convert the compound engine into a simple engine, substantially as and for the purposes described.

2. In a compound engine, the combination with the high and low pressure cylinders and the channels or passages connecting the same, and with the live-steam passage, of an intercepting-valve between said high-pressure and low-pressure cylinders and communicating with and adapted to control the channels or steam-passages connecting the same, a piston

controlling said intercepting-valve, a dash-pot intermediately arranged between the intercepting-valve and the piston for cushioning the latter, an admission-valve, pipes connecting said admission-valve with the live-steam passage and with the steam-passage of the low-pressure cylinder respectively, a crank on said admission-valve for operating the same, a rod carried by the piston, and means for connecting said rod with said crank to operate the latter when the piston and intercepting-valve are being operated to convert the compound engine into a simple engine, substantially as and for the purposes described.

3. In a compound engine, the combination with the high and low pressure cylinders, and the channels or passages connecting the same, and with the live-steam passage, of an intercepting-valve between said high-pressure and low-pressure cylinders and communicating with and adapted to control the channels or steam-passages connecting the same, a piston controlling said intercepting-valve, a dash-pot intermediately arranged between the intercepting-valve and the piston for cushioning the latter, an admission-valve, pipes connecting said admission-valve with the live-steam passage and with the steam-passage of the low-pressure cylinder respectively, a crank controlling said admission-valve, a pin projecting from the free end of said crank, and a rod carried by the piston and provided with an elongated slot in engagement with said pin and adapted to operate the crank when the piston and intercepting-valve are being operated to convert the compound engine into a simple engine, substantially as and for the purposes described.

4. In a compound engine, the combination with the high and low pressure cylinders, the channels or steam-passages connecting the same, and with the main exhaust and the live-steam passage, of a pipe or pipes connecting the live-steam passage with the steam-passage of the low-pressure cylinder, an admission-valve intermediately arranged in said pipe or pipes, an intercepting-valve cylinder between the high and low pressure cylinders and communicating with the channels or steam-passages connecting the same, an auxiliary exhaust connecting said valve-cylinder with the main exhaust, an intercepting-valve in said valve-cylinder and normally closing said auxiliary exhaust and provided on one side with an aperture adapted to be brought in alignment with the respective channel or steam-passage in the valve-cylinder, when said valve-piston has been operated to convert the compound engine into a simple engine, a piston in alignment with the intercepting-valve and connected therewith, a dash-pot intermediately arranged between the intercepting-valve and the piston for cushioning the latter, and means for connecting said piston with the admission-valve to operate the same, when said

piston and intercepting-valve are being operated, substantially as and for the purposes described.

5. In a compound engine, the combination with the high and low pressure cylinders, the channels or steam-passages connecting the same, and with the main exhaust and the live-steam passage, of a pipe or pipes connecting the live-steam passage with the steam-passage of the low-pressure cylinder, an admission-valve intermediately arranged in said pipe or pipes, an intercepting-valve cylinder between the high and low pressure cylinders and communicating with the channels or steam-passages connecting the same, an auxiliary exhaust connecting said valve-cylinder with the main exhaust, a valve-case removably secured to the end of the valve-cylinder and extending into the latter, a piston in said valve-case, an intercepting-valve in said valve-case and valve-cylinder and normally closing the auxiliary exhaust and provided on one side with an aperture adapted to be brought in alignment with the respective channel or steam-passage in the valve-cylinder, when said piston and intercepting-valve are being operated to convert the compound engine into a simple engine, and means for connecting the piston with the admission-valve to operate the latter, substantially as and for the purposes described.

6. In a compound engine, the combination with the high and low pressure cylinders, the channels or steam-passages connecting the same, and with the main exhaust and the live-steam passage, of a pipe or pipes connecting the live-steam passage with the steam-passage of the low-pressure cylinder, an admission-valve intermediately arranged in said pipe or pipes, an intercepting-valve cylinder between the high and low pressure cylinders and communicating with the channels or steam-passages connecting the same, an auxiliary exhaust connecting said valve-cylinder with the main exhaust, a valve-case removably secured to the end of the valve-cylinder and extending into the latter and furnishing at its inner portion a dash-pot, a piston in said valve-case and having its reduced portion slidingly arranged and guided in said dash-pot, an intercepting-valve in the inner end of said valve-case and in the valve-cylinder respectively and normally closing the auxiliary exhaust in the latter and adapted to control the respective channel or steam-passage in said valve-cylinder, and means connecting the piston with the admission-valve for operating the latter, substantially as and for the purposes described.

In testimony that I claim the foregoing I have hereunto set my hand this 15th day of December, 1897.

JOHN F. MURPHY.

Witnesses:

ALFRED GARTNER,
WM. D. BELL.