

No. 756,673.

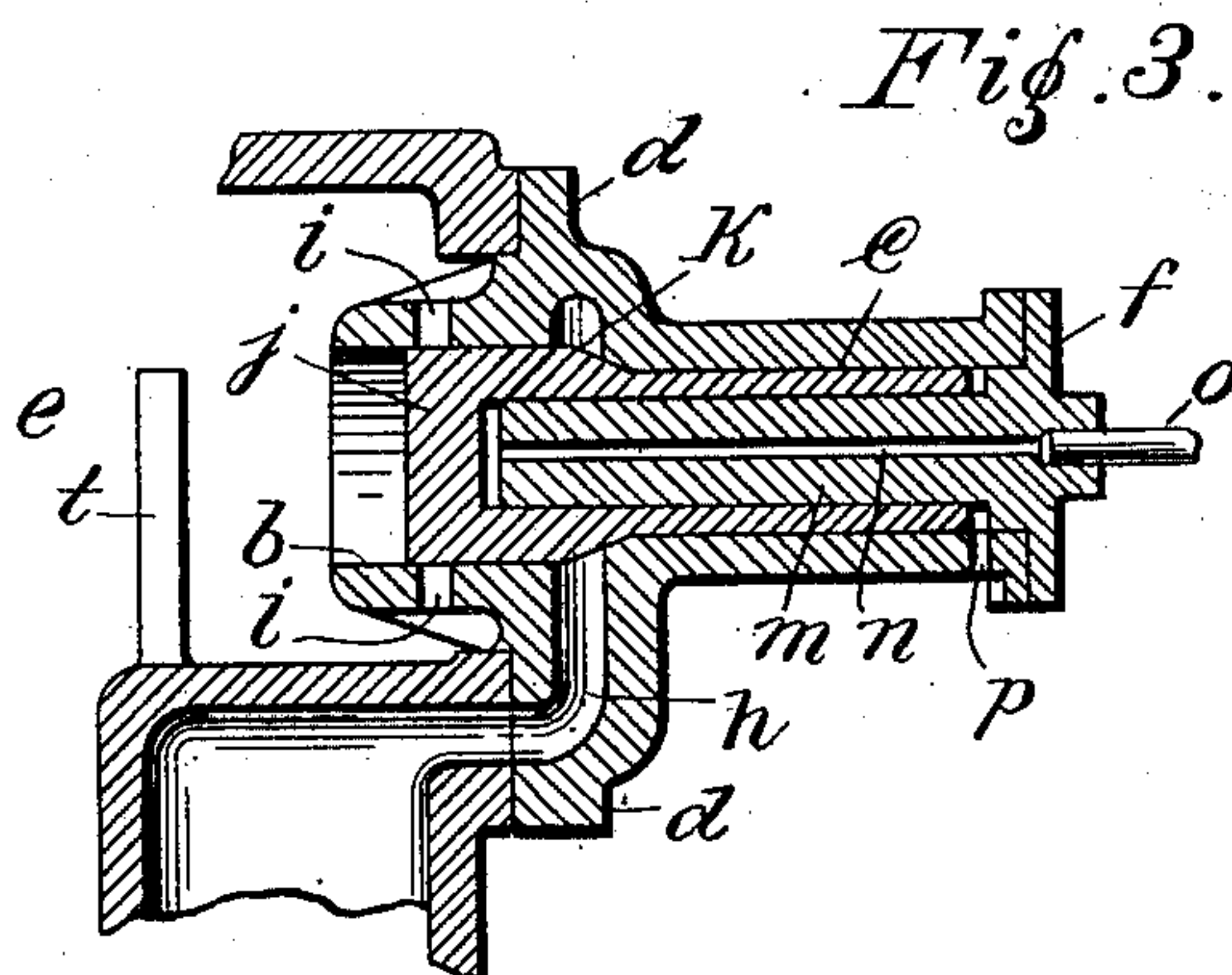
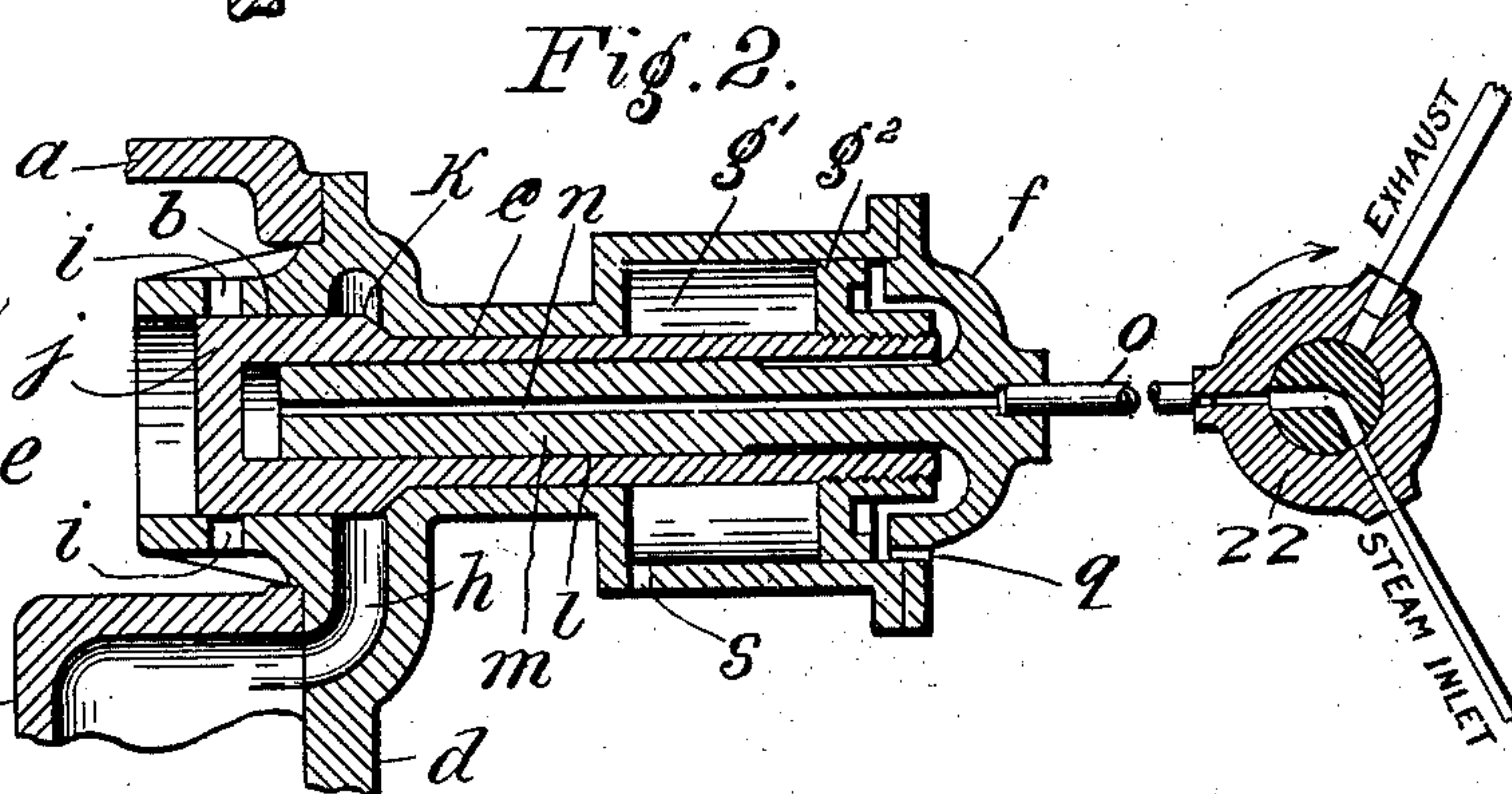
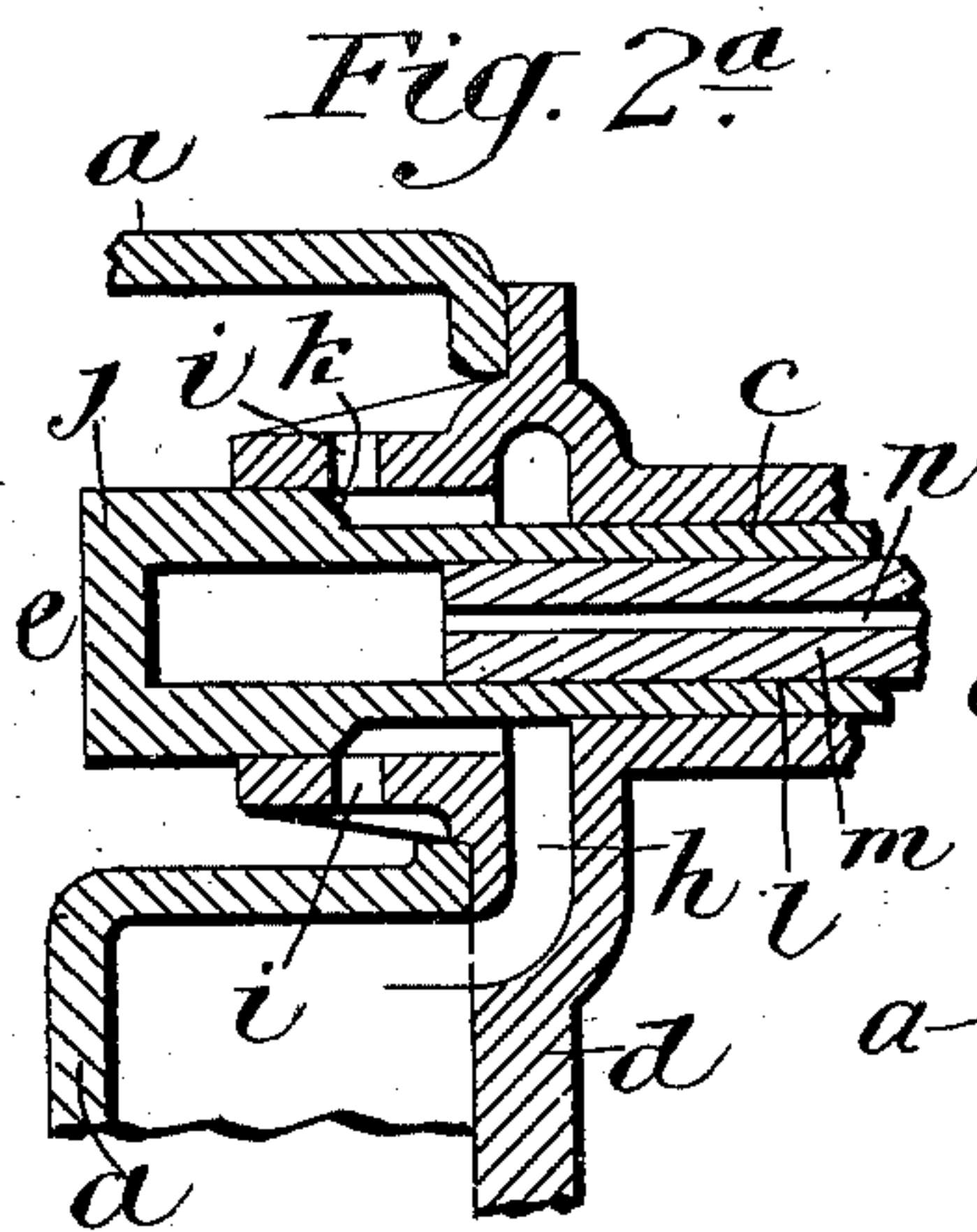
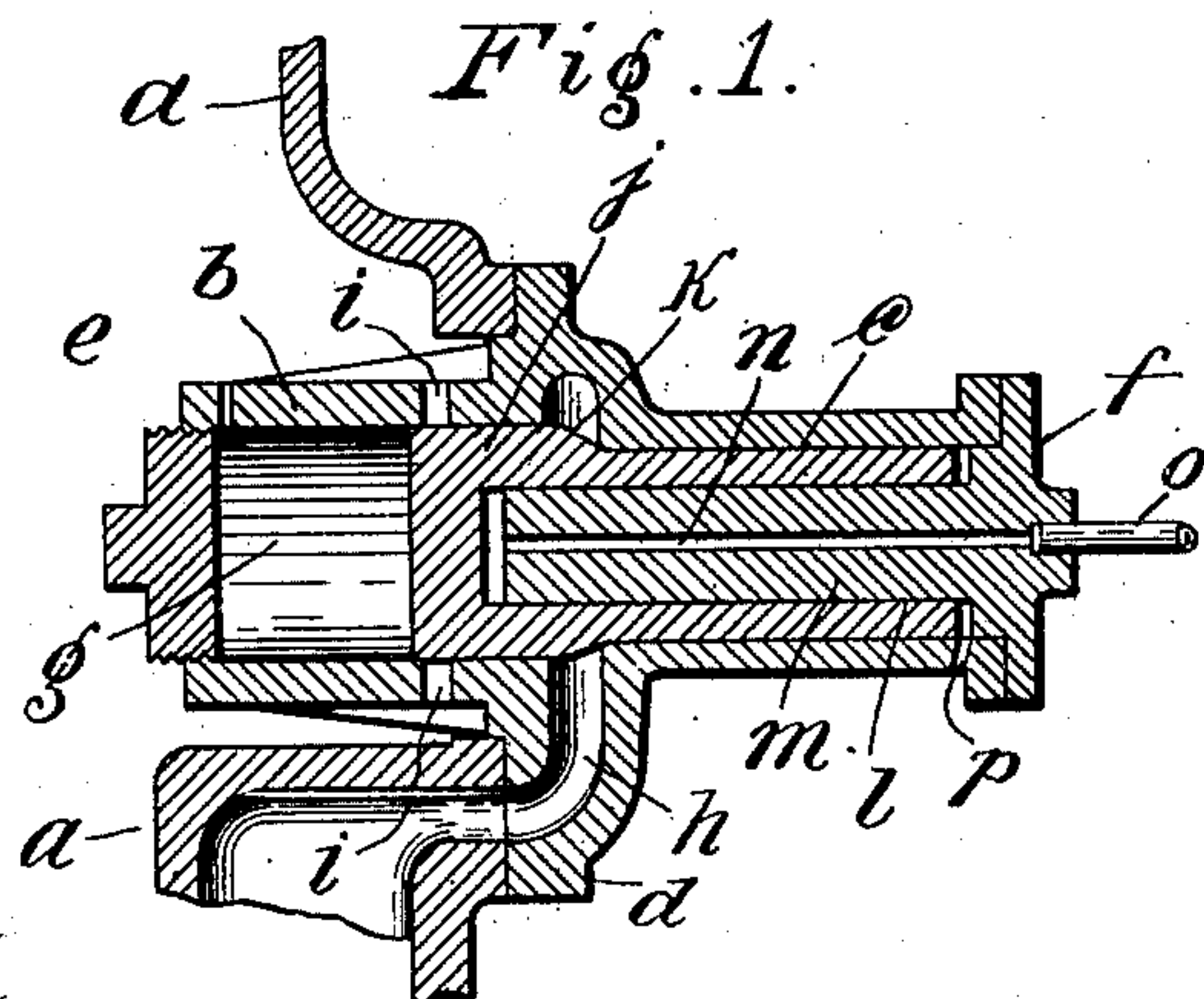
PATENTED APR. 5, 1904.

C. J. MELLIN.  
COMPOUND ENGINE.

APPLICATION FILED JUNE 14, 1902.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
C. Sedgwick  
J. M. Howard

Inventor  
C. J. Mellin  
By his Attorney  
A. Thayer.

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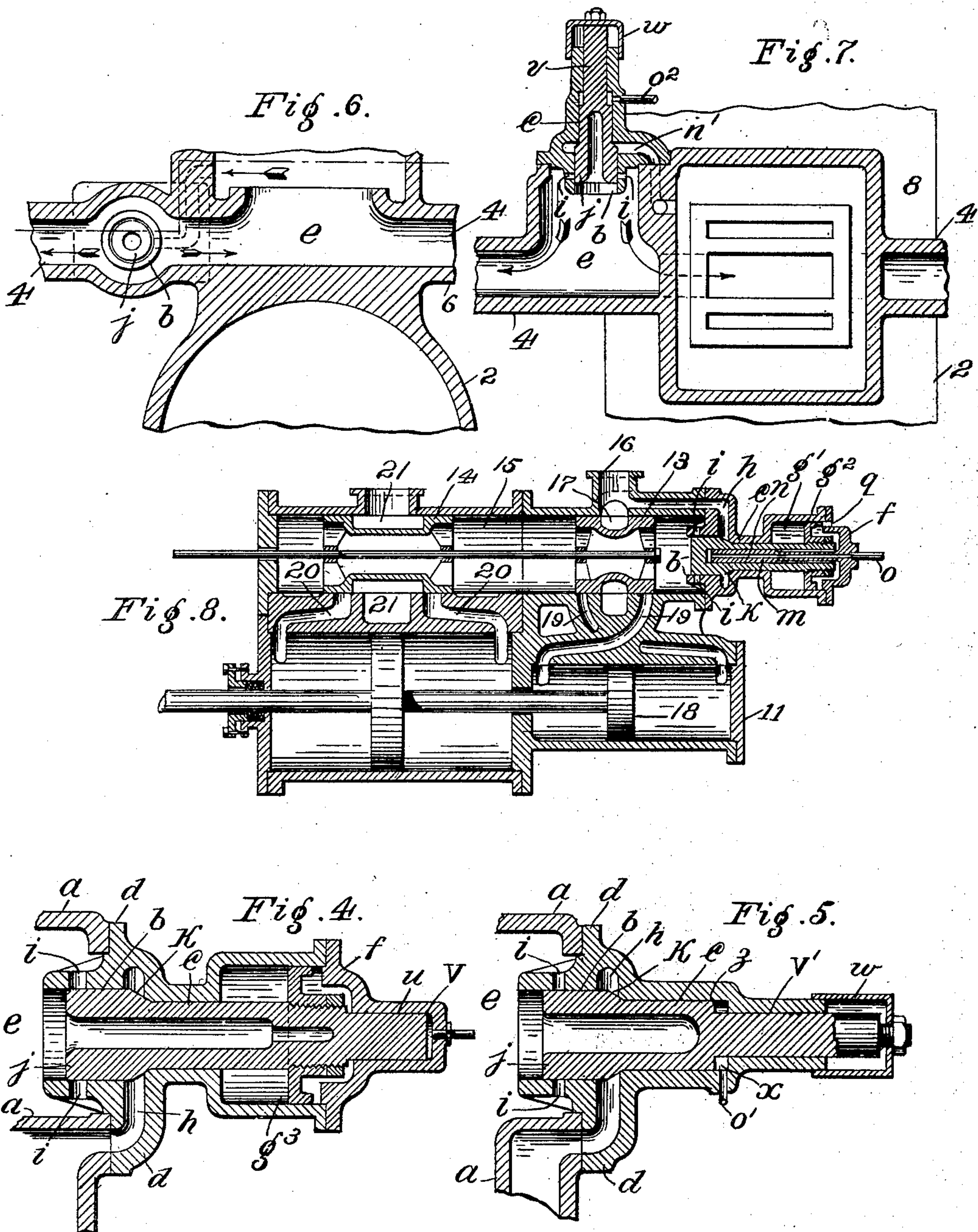
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# UNITED STATES PATENT OFFICE.

CARL J. MELLIN, OF RICHMOND, VIRGINIA.

## COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 756,673, dated April 5, 1904.

Application filed June 14, 1902. Serial No. 111,692. (No model.)

*To all whom it may concern:*

Be it known that I, CARL J. MELLIN, a citizen of the United States of America, and a resident of Richmond, county of Henrico, and State of Virginia, have invented certain new and useful Improvements in Compound Engines, of which the following is a specification.

My invention consists of an improved application of an admission and reducing valve to a compound or multiple-expansion engine for controlling the use of high-pressure steam in the low-pressure cylinder without regard to resistance of pressure in the high-pressure cylinder backing up against the piston.

15 The reducing-valve is adjusted to shut off live steam at a predetermined pressure slightly below the minimum receiver-pressure and keep it closed in working compound, but still give steam enough for ordinary starting when  
20 there is no receiver-pressure, and the construction is such that for harder work or in emergencies the balancing properties can be changed at will by letting pressure of live steam into or behind a part of the valve to increase the admission of live steam, whereby  
25 a considerably higher pressure on the low-pressure piston can be obtained competent for working without exhausting the high-pressure cylinder. As no intercepting-valve is  
30 used, of course the pressure backs up behind the high-pressure piston and reduces its power; but the larger low-pressure piston area gives more power than is lost on the high-pressure piston.

35 If desired, my improved reducing-valve can also be used with an intercepting-valve; but its purpose is mainly to provide a simple reducing-valve mechanism without the complication of the intercepting-valve.

40 In the accompanying drawings, forming part of the specification of my invention, Figure 1 is a central longitudinal section of my improved valve attached to the receiver between the high and low pressure cylinders, a part only of said receiver being shown. Fig.  
45 2 is a similar section with a slight modification and showing an auxiliary three-way valve for independent control of the reducing-valve. Fig. 2<sup>a</sup> is a similar section of part of the valve  
50 of Fig. 2, showing the reverse position of the

reducing-valve. Figs. 3, 4, and 5 represent similar sections showing some modifications. Fig. 6 is a detail in transverse section showing the application of the valve to a three-cylinder compound engine comprising one  
55 high-pressure and two low-pressure cylinders. Fig. 7 is a detail in horizontal section in further illustration of the application to a three-cylinder compound engine. Fig. 8 is a vertical longitudinal section showing the applica-  
60 tion of the valve to a tandem compound engine.

The broken shell *a* represents parts of the casing of the receiver *e* between the high and low pressure cylinders of a compound engine,  
65 which may be of any well-known construction and need not be more particularly described.

*b* and *c* represent the differentially-bored parts of the reducing-valve case connected to the receiver-casing *a* by the cover *d*.  
70

*f* is a cover to the outer end of the reducing-valve casing. *g* is a dash-pot extension of the inner end of said casing.

*h* is the live-steam inlet, normally open from the boiler to the reducing-valve.  
75

*i* is the inlet for live steam from the reducing-valve to the low-pressure cylinder, and *j* is the said reducing-valve. It opens admission-port *i* when the shoulder *k*, impelled by the pressure of the steam on it, reaches said  
80 inlet-port, the area of said shoulder being such that pressure in the receiver slightly below minimum will shut off live steam, such pressure being sufficient for starting ordinarily. For admitting higher live-steam pressure to  
85 the low-pressure cylinder in an emergency than can be admitted by the normal operation of the reducing-valve I provide auxiliary means of controlling the admission-valve independently of the normal action of the steam  
90 on said valve by live steam admitted to act on the reducing-valve from a three-way cock 22 in the cab, which may be done in various ways. In this example the valve is bored at  
95 *l* from the upper end and fitted with a stationary piston *m*, supported by the cover *f*, and said piston has a small steam-passage *n* bored through it, with a steam-pipe *o* from said three-way cock in the cab connected, by which steam may be turned on at the will of the en-  
100



gineer as an auxiliary means for further opening the admission-valve to increase the admission of live steam into the low-pressure cylinder for greater power in an emergency and may be exhausted from behind said stationary piston for restoring normal conditions. At  $p$  is a vent to the space behind the reducing-valve, said space being a dash-pot for cushioning the valve in that direction, or it may, by the application thereto of the pipe  $o$  from the three-way cock of the cab instead of its application to the piston, as shown, be the cylinder for application of live-steam pressure to the valve, and the vent may be through the bore of the piston  $m$ , with the chamber at the end of said piston for the dash-pot.

The construction of the reducing-valve of Fig. 2 is practically the same as in Fig. 1, except that instead of the dash-pot being arranged at the inner end of the valve the dash-pot chamber  $g'$  is provided at the outer end of the valve-case and a piston  $g^2$  is attached to the outer end of the valve for coaction with said chamber. This dash-pot may be vented at  $q$  and  $s$  or not, as desired.

The construction of Fig. 3 is the same as in Fig. 1 with the dash-pot  $g$  omitted and a stop  $t$  substituted to limit the opening movement of the valve, the dash-pot chamber at the rear end of the valve and at the piston being relied on to cushion the valve.

In Fig. 4 a dash-pot  $g^3$  is provided for the valve near its outer end with piston extension  $u$  of the valve into a bore  $v$  of the cover for application of live steam from the three-way cock for increasing pressure in the low-pressure cylinder.

In Fig. 5 the piston extension  $v'$  of the reducing-valve reaches through the end of the valve-casing and has cup attachments  $w$  on the end fitted to the exterior of the open end of the valve-case for a dash-pot, and live steam from the three-way cock is admitted through pipe  $o'$  to the space  $x$  between the shoulder  $z$  of the valve for application of live-steam pressure to increase the pressure in the low-pressure cylinder in emergency cases.

It will be seen that all these modifications are obvious variations of details of construction within the scope of my invention.

In the application of my invention to a three-cylinder compound engine—say one high-pressure cylinder 2 and two low-pressure cylinders—the reducing-valve may be connected to the exhaust of the high-pressure cylinder, having branches 4 connecting with the low-pressure cylinders, respectively, as indicated in Figs. 6 and 7 or in any approved way, such connection being represented in Fig. 7, in which the valve of Fig. 5 is so connected with

a live-steam passage  $n'$  from the steam-chest 8 for the live-steam admission through the reducing-valve.

In Fig. 8 I represent the application of my improved reducing-valve to a tandem compound engine, in which 11 represents the high-pressure cylinder and 12 the low-pressure cylinders, 13 the high-pressure piston-valve, and 14 the low-pressure valve, said valves being also in tandem order and in the receiver 15, which is also the valve-case. Live steam from the boiler is admitted at 16 to the exterior annular space 17, surrounding valve 14, from which it passes into the cylinder on opposite sides of the piston 18 alternately through the ports 19, said ports being arranged to cross each other for receiving the steam from between the ends of the valve and exhausting it at the ends thereof, while the ports 20 of the low-pressure valve are direct for admitting the steam from the ends of the valve and exhausting it at 21 between said ends, whereby, together with the hollow construction of both valves, the valve-case may be utilized for the receiver. Into one end of this receiver I connect the reducing-valve, as at the right-hand of Fig. 8, said valve being in this case constructed in the form of Fig. 2; but it may be constructed in any other equivalent form.

What I claim as my invention is—

1. In a compound or multiple-expansion engine, the combination with the high and low pressure cylinders, receiver between said cylinders, live-steam inlet to said receiver and a reducing-valve therein normally open to live steam and automatically controlling said inlet, of an auxiliary or reinforcing impelling part of said reducing-valve, and a subsidiary fluid-pressure inlet to said part subject to the control of the operator, to increase the opening of the reducing-valve and the admission to the receiver thereby, at the will of the operator.

2. In a compound or multiple-expansion engine, the combination with the high and low pressure cylinders, receiver between said cylinders, live-steam inlet to said receiver and a reducing-valve therein normally open to live steam and automatically controlling said inlet, of an auxiliary or reinforcing impelling part of said reducing-valve and a subsidiary fluid-pressure inlet to said part subject to the control of the operator by a three-way cock in the cab, to increase the opening of the reducing-valve and the admission to the receiver thereby, at the will of the operator.

Signed at New York this 26th day of May, 1902.

CARL J. MELLIN.

Witnesses:

C. SEDGWICK,  
J. M. HOWARD.

## DISCLAIMER.

756,673.—*Carl J. Mellin*, Richmond, Va. COMPOUND ENGINE. Patent dated April 5, 1904. Disclaimer filed March 18, 1905, by the patentee.

Enters his disclaimer—

“To that part of the specification which consists of the word ‘further,’ being the first word in the third line of page 2 of the amendment dated October 14, 1902.” (Line 1, page 2, of the printed specification.)

“Also to those parts of the claims consisting of the words ‘opening of the reducing-valve and the’ in the second and third lines from the bottoms of claims 1 and 2, as amended July 14, 1903.” (Lines 101–102 and 114–115, page 2, of the printed specification.)—[*Official Gazette*, March 28, 1905.]