

(No Model.)

D. A. BARNES.
VALVE GEAR FOR COMPOUND ENGINES.

No. 501,986.

Patented July 25, 1893.

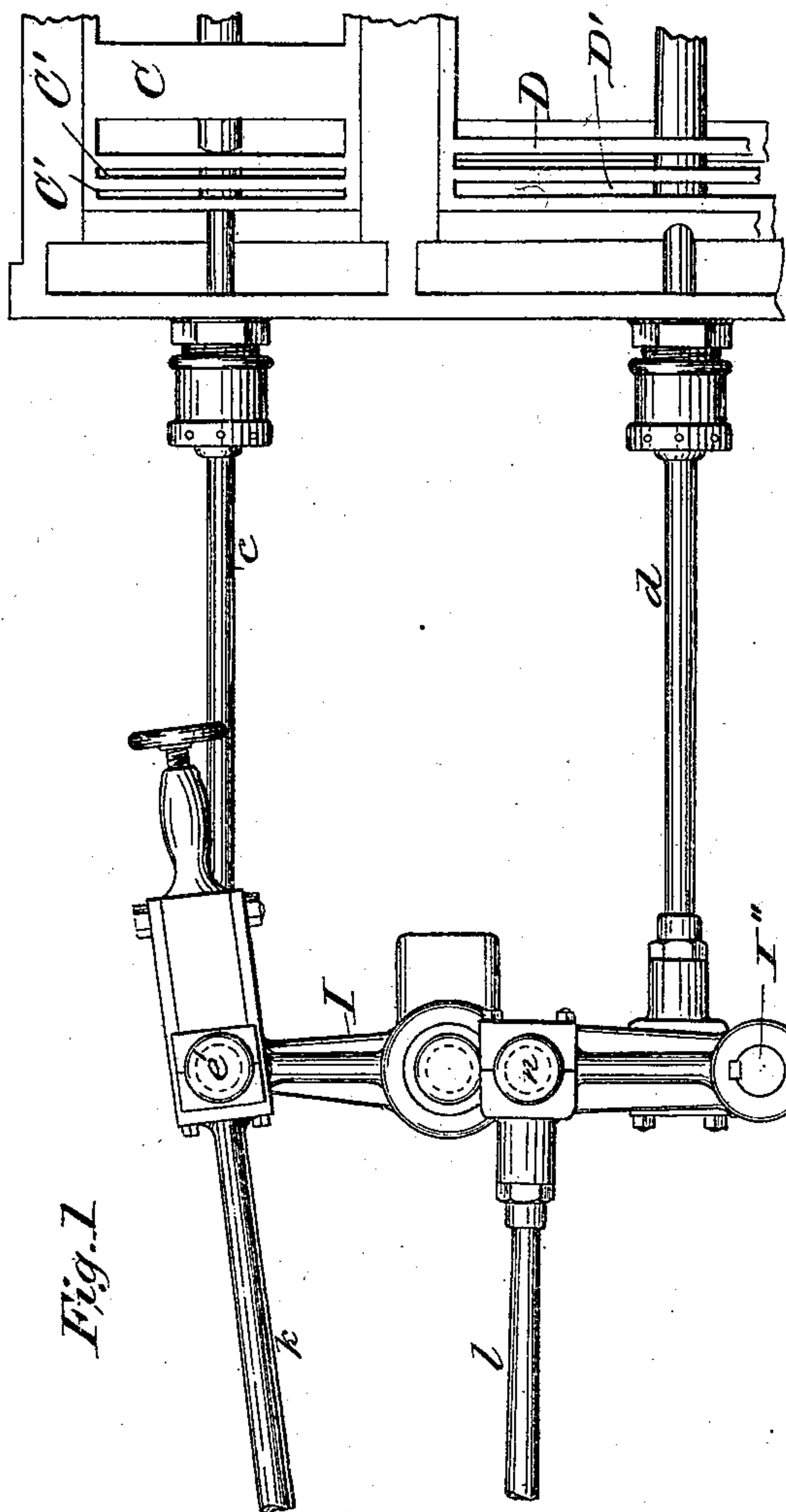


Fig. 1.

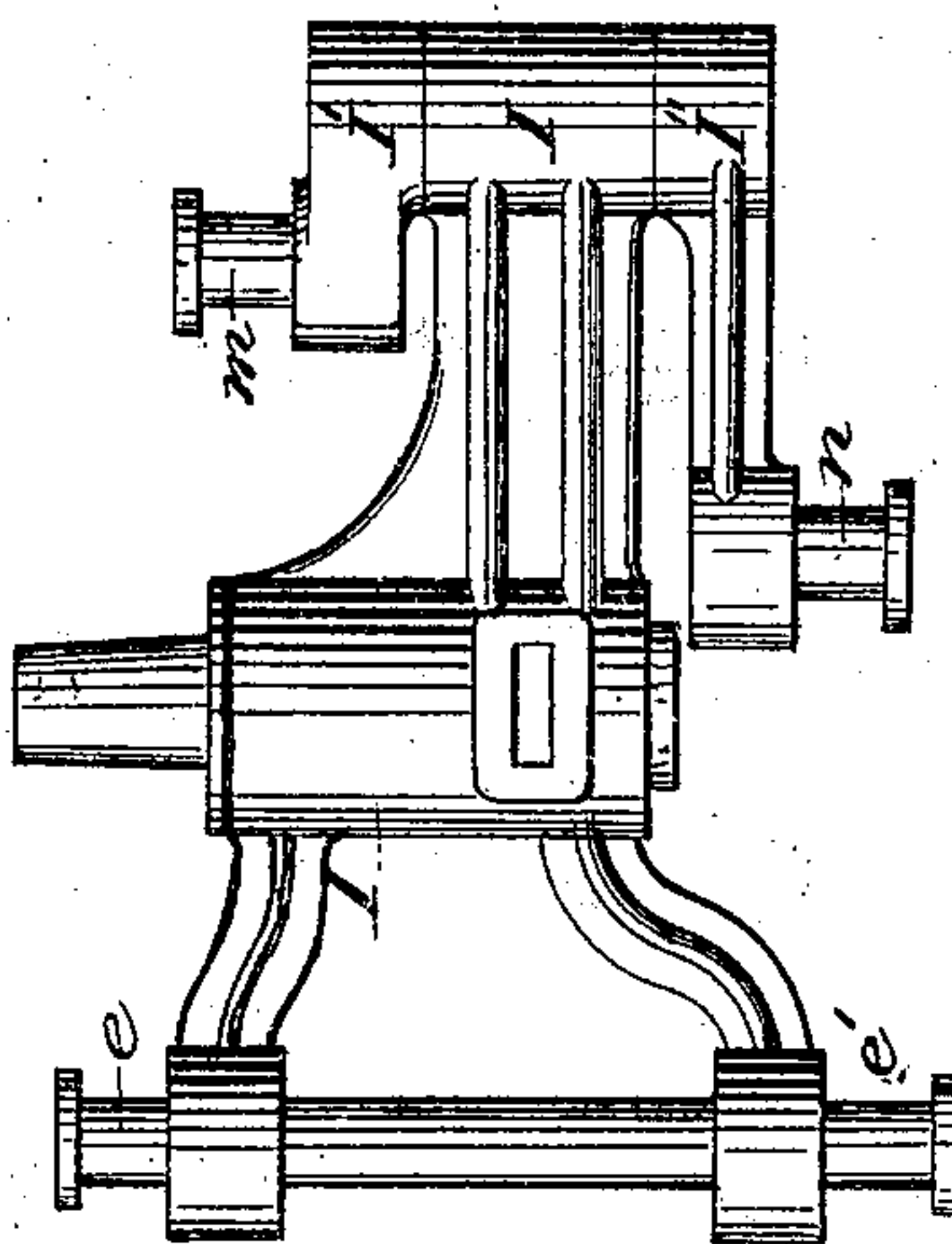


Fig. 3.

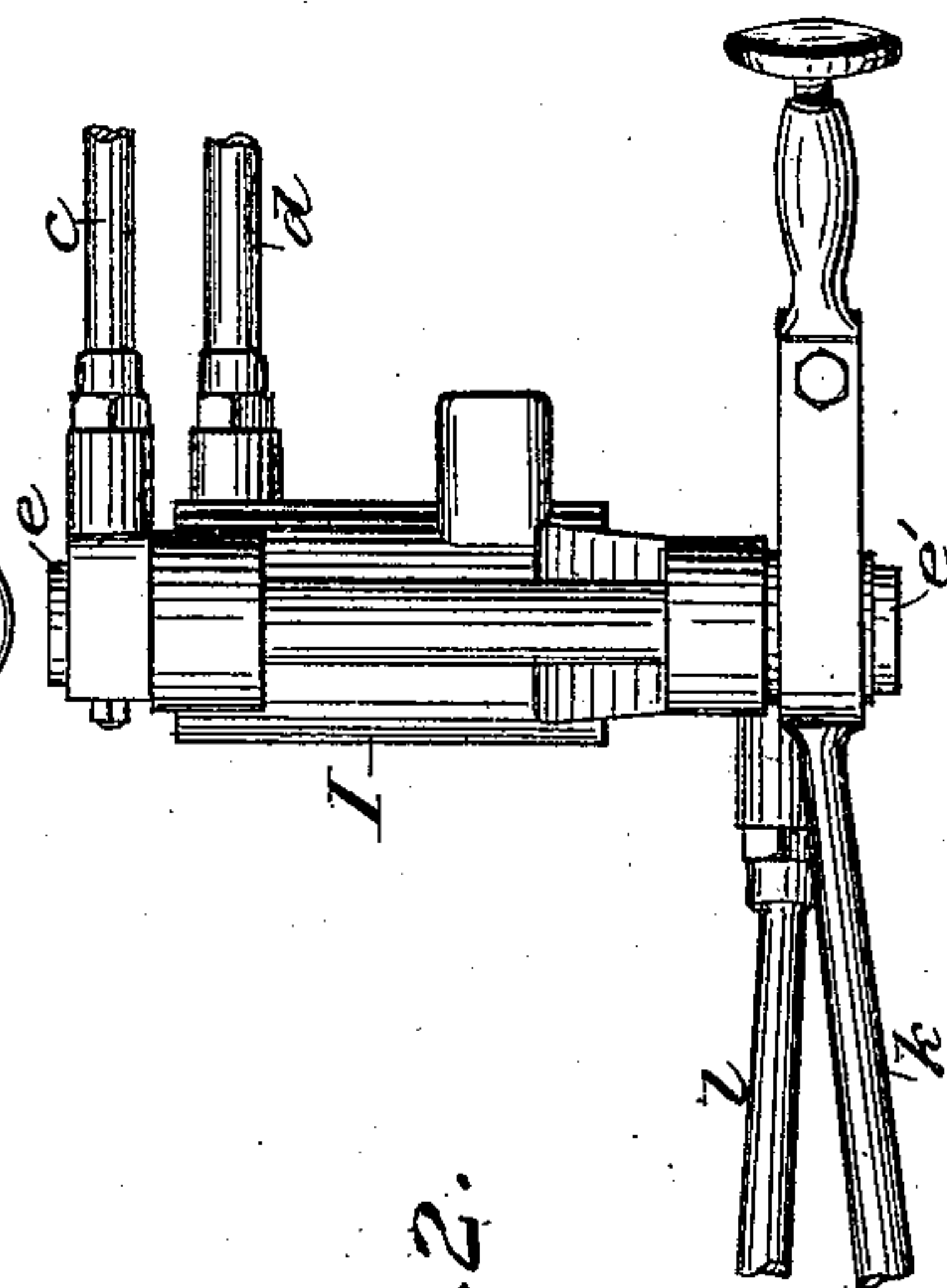
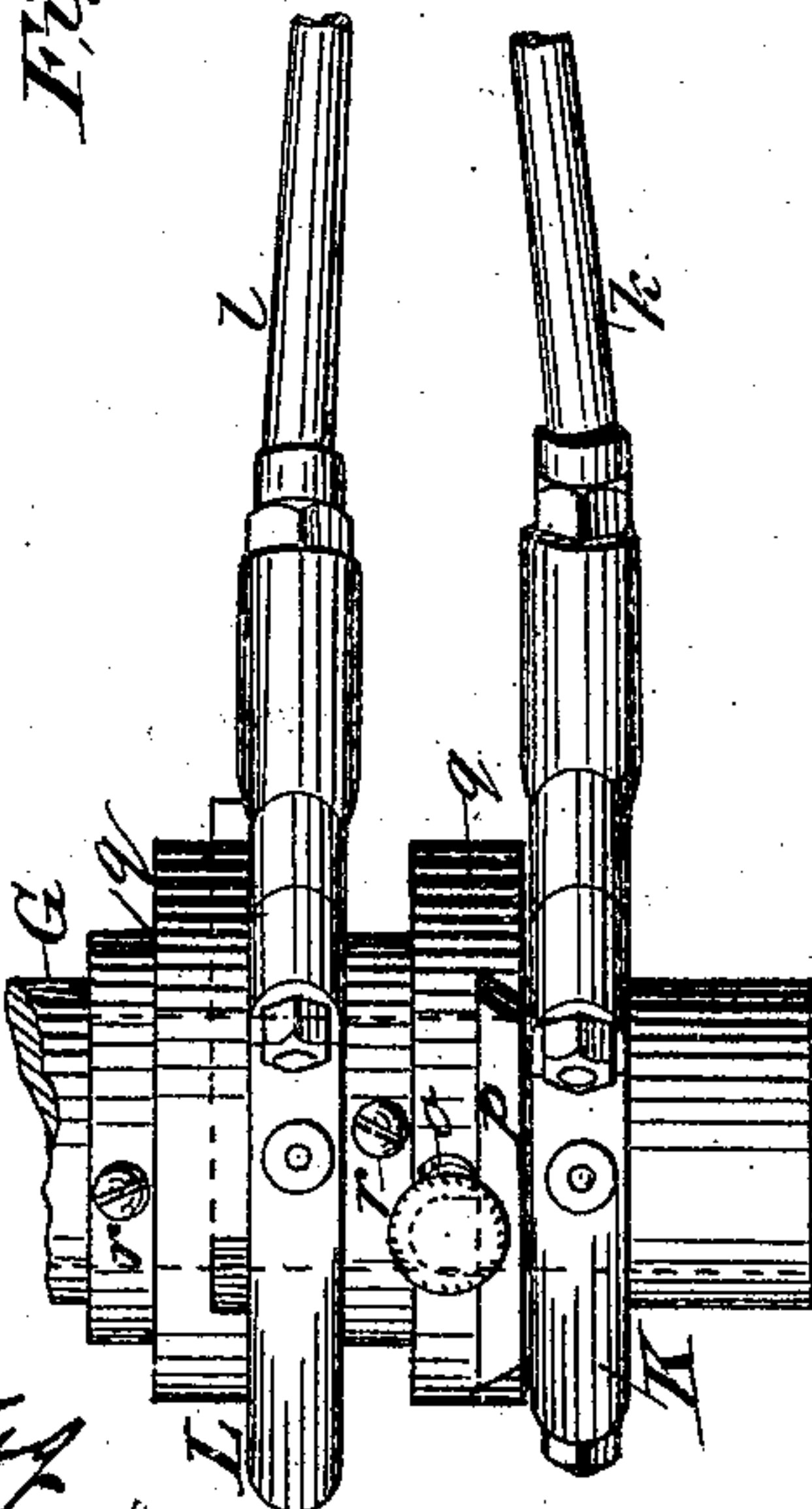


Fig. 2.



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UNITED STATES PATENT OFFICE.

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VALVE-GEAR FOR COMPOUND ENGINES.

SPECIFICATION forming part of Letters Patent No. 501,986, dated July 25, 1893.

Application filed June 9, 1892. Serial No. 436,106. (No model.)

To all whom it may concern:

Be it known that I, DANA A. BARNES, a citizen of the United States, residing at Schenectady, in the county of Schenectady, State of New York, have invented certain new and useful Improvements in Valve-Gear for Compound Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to improvements in valve-gear for compound multiple-cylinder engines; and the object of the invention is to produce a valve-gear for compound, triple, quadruple and multiple-cylinder engines, having a double rocker arm so arranged that the steam is cut off at a certain fraction of the stroke, in the high-pressure cylinder, exhausted into valve-chest of the low-pressure cylinder and there cut-off at a certain part of the stroke, and so to several cylinders, until finally exhausted into the condenser or atmosphere; furthermore to produce a positive adjustment, that can be arranged to be regulated automatically by the governor or by hand, so that the travel of the valves can be varied, as desired, and to suit certain loads.

The invention consists in certain details of construction and arrangement of parts, as will be more fully hereinafter described, and specifically pointed out in the claims, reference being had to the accompanying drawings and the letters of reference marked thereon.

Like letters indicate similar parts in the drawings, in which—

Figure 1, is a side elevation of my improved valve-gear, also on an enlarged scale. Fig. 2, is a top or plan view of the same. Fig. 3, is an end view of part of Fig. 2, showing the double rocker arm.

In the accompanying drawings, G and D are the valves which are respectively placed on the valve seats of the high and low pressure cylinders, and are provided with suitable inlet and outlet ports, C' D' respectively to correspond with the inlet and outlet ports in the valve-seats of said cylinders.

E is the frame, F the cross head and G the main shaft.

H is the crank rod.

The high pressure valve C, is operated by the valve-stem c passing through the ordinary

stuffing box, and connected to a pin e at the upper end of a rocker-arm I which is supported in suitable bearings on the frame, while the low pressure valve stem d passing similarly through a stuffing-box is attached to a pin m on an auxiliary arm I', at the lower end of the rocker arm I.

The eccentric rods k and l are connected relatively to the eccentrics K and L with one end, while their other ends are connected as follows: The rocker arm, has at the opposite end from the pin e, to which the valve-stem c of the high pressure cylinder is connected, a pin e' to which the eccentric rod k is attached. The eccentric-rod l of the low pressure cylinder is secured at one end to the eccentric L, and with its other end it is connected to a pin n on another auxiliary arm I'' on the opposite end of the shaft, to which said arms are attached. It will be readily seen by those skilled in the art, that by this arrangement of rock arms, eccentrics and rods, as well as the proper proportions thereof, the valves of the high pressure cylinder will, for instance, cut off the steam at three eighths of the stroke, and it will be then necessary that the valve of the low pressure cylinder cut off the steam of one half the stroke, and so on through all the different points of cut-off, and it is therefore a proportion cut-off between the two valves, so as to equalize the load.

The eccentrics are arranged so that the throw thereof can be varied, by connecting the screw o by suitable mechanism to the governor, by which a slide P, having beveled edges and fitting into a correspondingly shaped recess in a hub q can thus be moved nearer to or farther from the center of the shaft, thereby increasing or decreasing the throw of the eccentrics. The hubs q are secured to the shaft by the set-screws r, or by a key and seat. The slide P is provided with an oblong opening, so that it can move freely over the shaft, and will not come in contact therewith. It will be thus seen that the steam first expands its force as high pressure steam in the upper or high-pressure cylinder, and is then exhausted into the low-pressure-cylinder expanding therein and exerting its force, as low-pressure steam, on the piston of this cylinder, and then passes out through the ex-

haust passage of the low pressure cylinder into the condenser or atmosphere. This arrangement can of course be arranged to suit triple, quadruple, and more cylindered engines, so that the steam can be exhausted from one to the other until the entire force or pressure is obtained from the steam, and its entire power has been expanded so as to exhaust at last, at a very low temperature and pressure.

What I claim as new is—

1. As a means for controlling the cut-off and exhaust of combined high and low pressure cylinders, a double rocker arm or shaft pivoted between its ends and carrying at one end a secondary rocker arm or shaft and suitable connections extending to the valves and to the eccentrics, substantially as specified.

2. As a means for controlling the cut-off and exhaust of combined high and low pressure cylinders, a double rocker arm or shaft pivoted between its ends and carrying at one end a secondary rocker arm or shaft and suitable connections with the valves and with eccentrics one of which is adjustable in accordance with the load, substantially as specified.

3. As a means for controlling the cut-off and exhaust of combined high and low pressure cylinders, a double rocker arm or shaft pivoted between its ends and carrying at one end a secondary rocker arm or shaft and suitable connections with the valves and with eccentrics one of which is adjustable in accordance with the load and the other adjustably secured to the shaft with relation to the operation of the first-mentioned eccentric, substantially as specified.

4. A compound valve gear comprising a double rocker arm or shaft pivoted between its ends and connecting a variable eccentric with a high pressure cylinder valve and connecting a low pressure cylinder valve with a fixed eccentric by means of an intermediate secondary rocker arm or shaft, substantially as specified.

5. A rocker arm for valve gear provided with means for connection with the variable eccentric and high pressure valve, and carrying a secondary rocker shaft beyond the pivot of said means and provided with arms of varying lengths provided with means for con-

nection with an eccentric and a low pressure valve, substantially as specified.

6. In a compound engine, as a means for controlling the high and low pressure valves, a substantially centrally pivoted double rocker arm or shaft and eccentrics arranged to produce a proportionate cut-off between the valves to equalize the load, as herein specified.

7. In compound engines, eccentrics mounted on slides to vary their throw for different points of cut-off and connected with a substantially centrally-pivoted double rocker arm or shaft and the high and low pressure valves, substantially as and for the purpose specified.

8. In compound engines, a substantially centrally-pivoted double rocker arm or shaft consisting of a long arm connected to the low pressure valve and a short arm connected to the high pressure valve, said arms being arranged to equalize the pressure of both the high pressure steam and the exhaust as set forth.

9. High and low pressure cylinders arranged one above the other and exhausting from one to the other direct and a valve gear consisting of substantially centrally-pivoted double rocker arms or shafts having pins connected by valve stems to the valves of said cylinders and by rods to the eccentrics one of which is variable, as set forth.

10. In compound engines, a valve gear arranged to equalize the load and having valves operated by a substantially centrally-pivoted double rocker arm or shaft constructed as described, with eccentrics adjustable in the manner shown and set forth.

11. High and low pressure cylinders and pistons having rods connected to the same cross-head and the high and low pressure valves connected to a substantially centrally-pivoted double rocker arm or shaft and eccentrics substantially as herein shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

DANA A. BARNES.

Witnesses:

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JOHN CANTINE.