

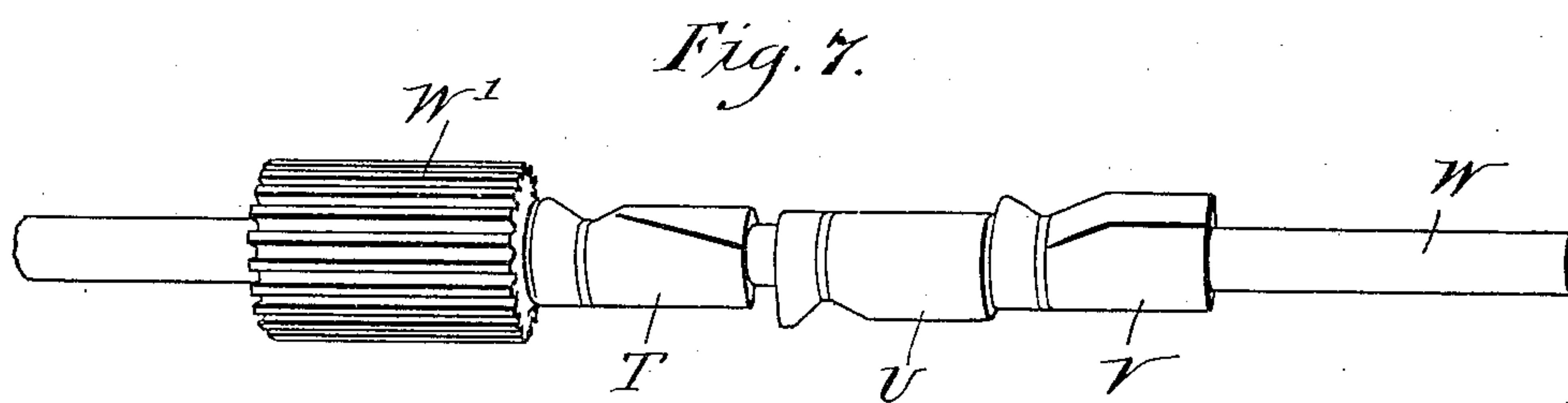
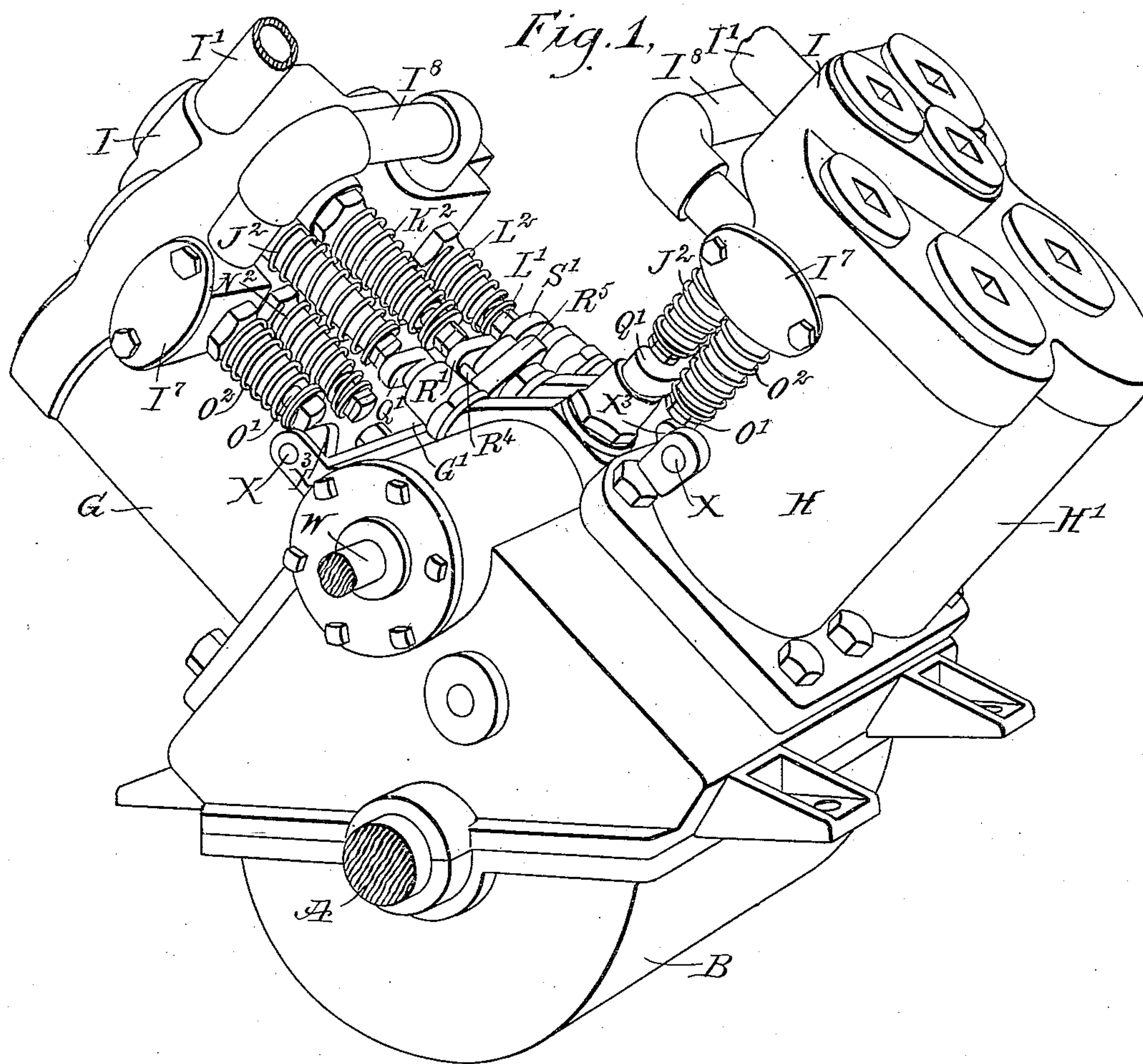
No. 875,453.

PATENTED DEC. 31, 1907.

D. PARRETT.
COMPOUND ENGINE.

APPLICATION FILED MAR. 7, 1907.

4 SHEETS—SHEET 1.



WITNESSES

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4 SHEETS—SHEET 2.

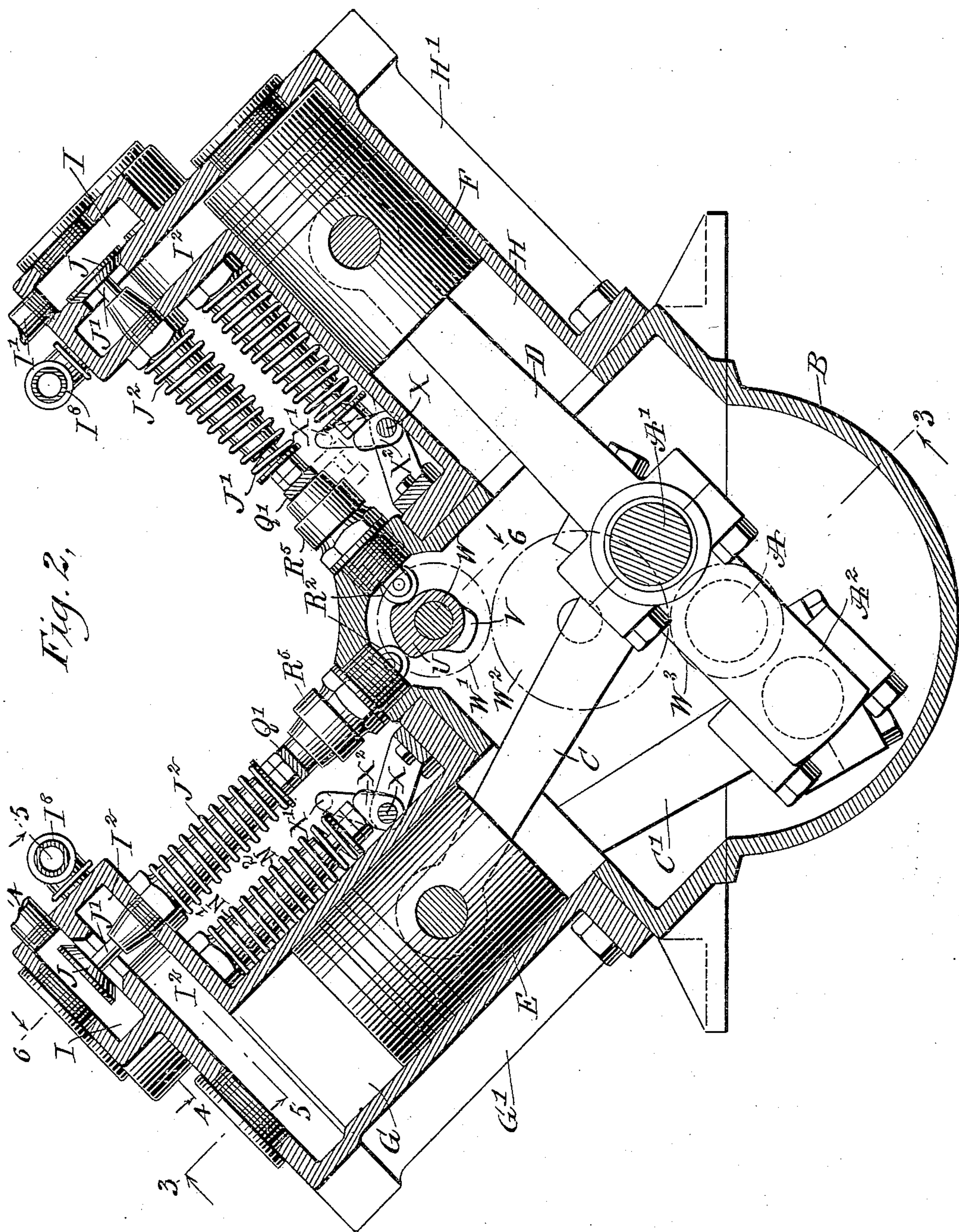


Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 3,

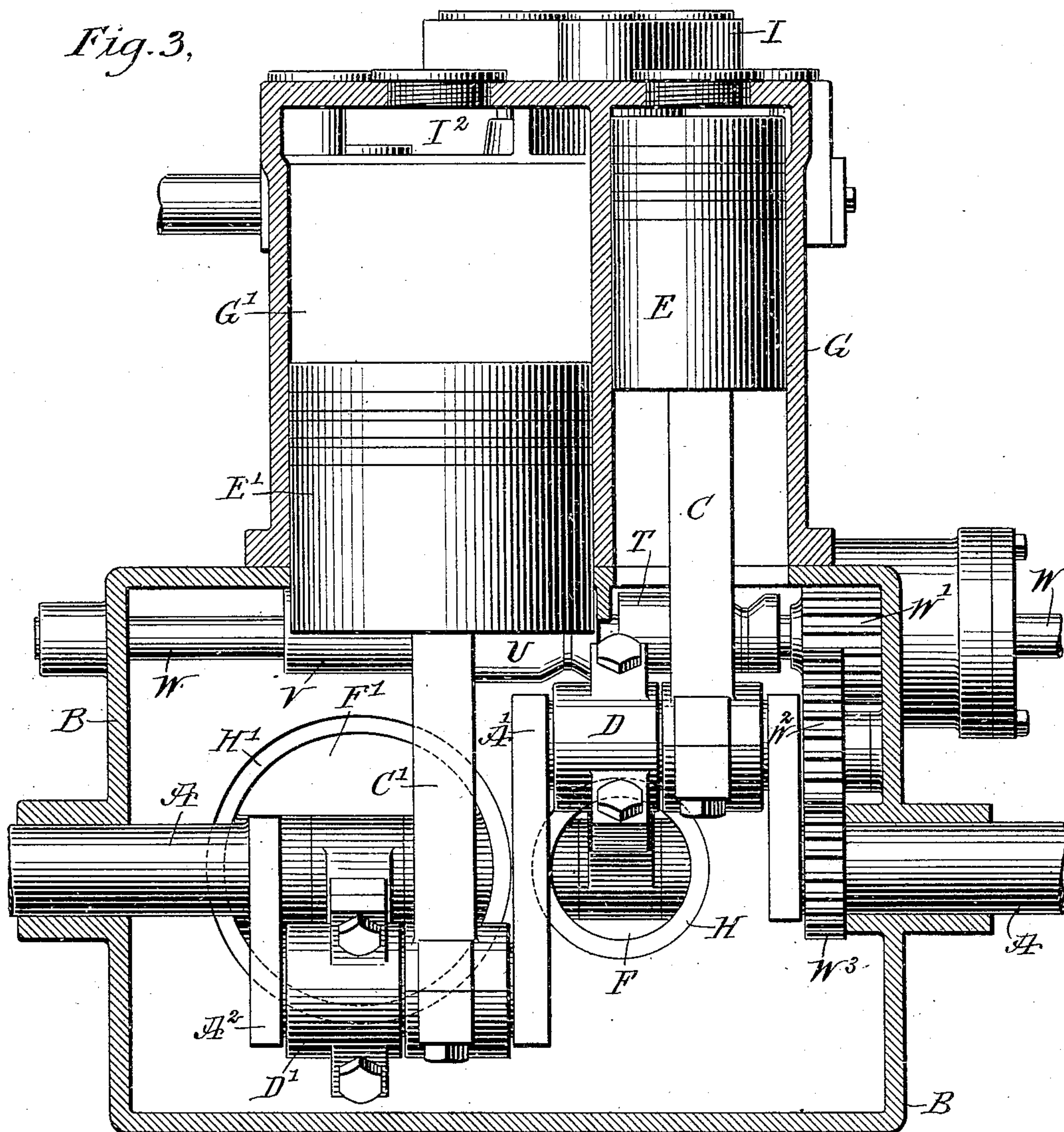
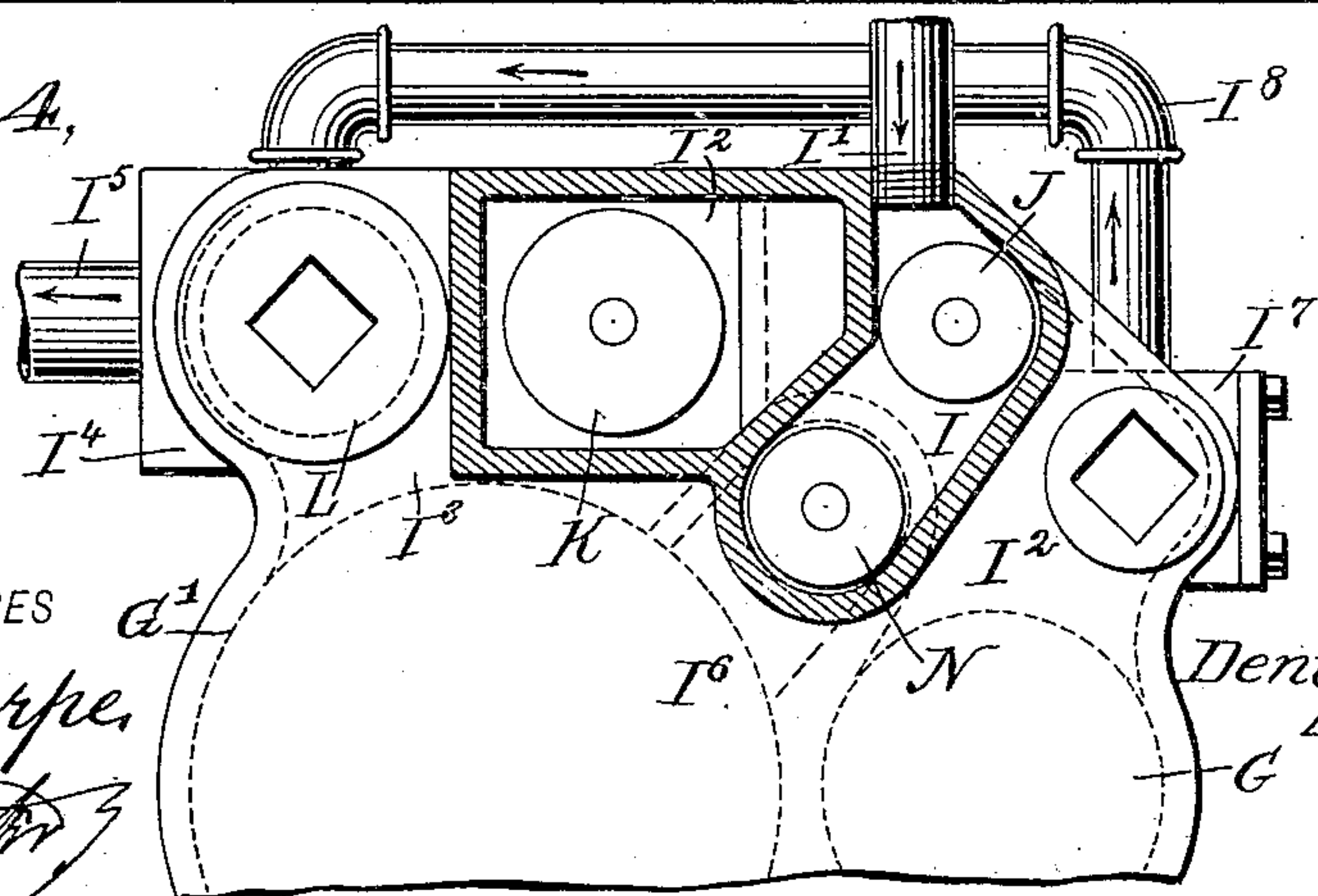


Fig. 4,



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Fig. 5,

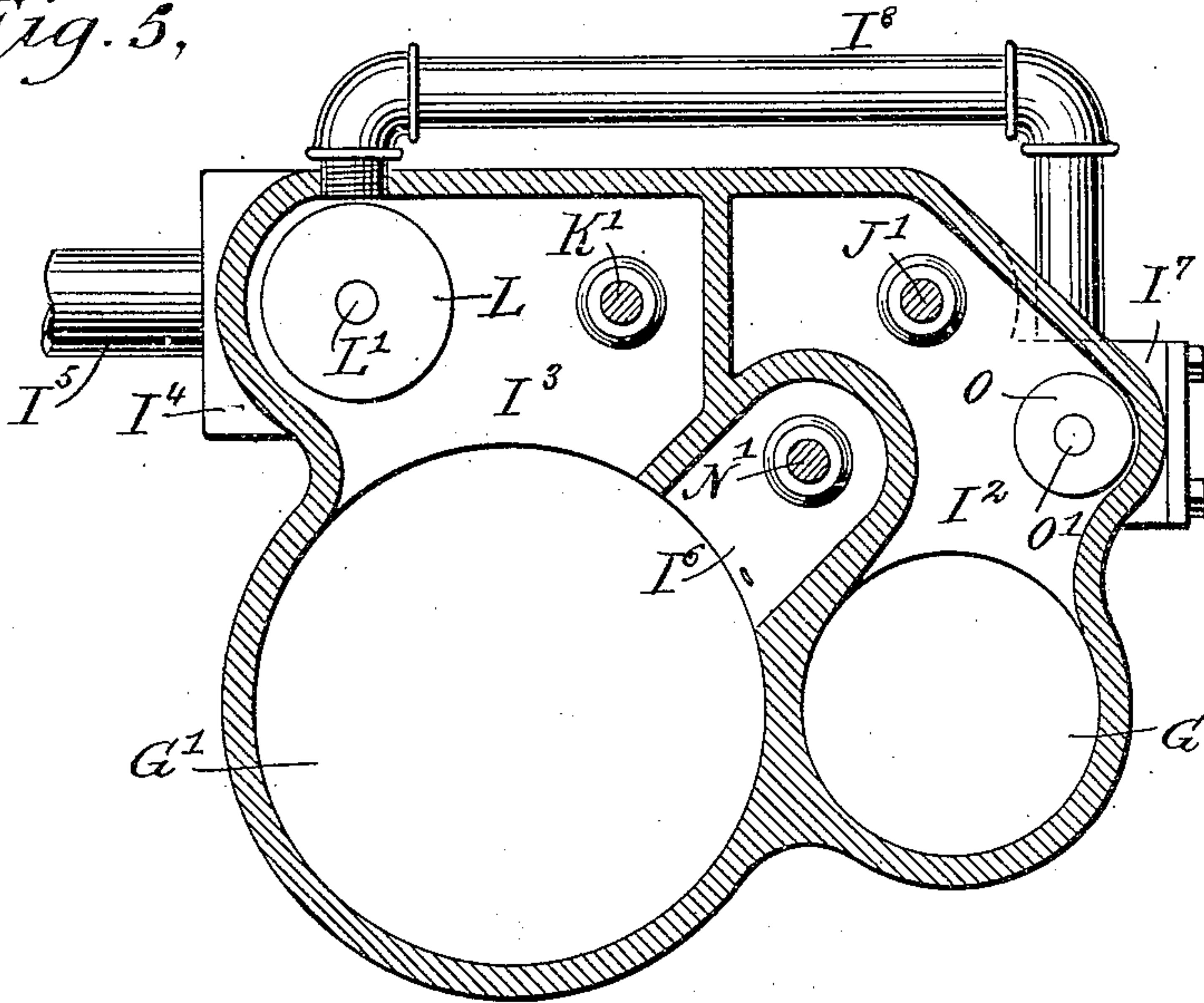
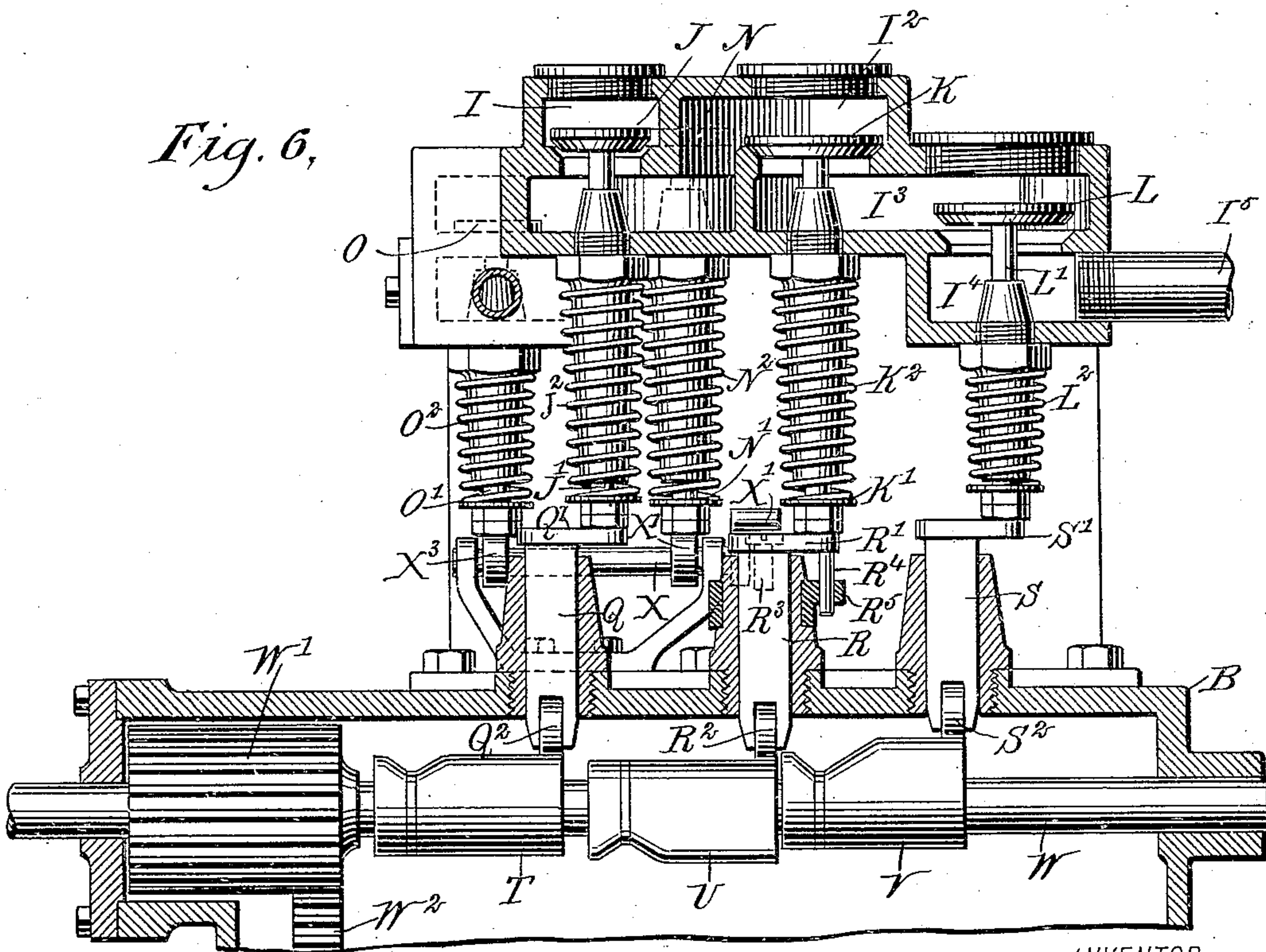


Fig. 6,



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UNITED STATES PATENT OFFICE.

DENT PARRETT, OF WENONA, ILLINOIS, ASSIGNOR OF ONE-HALF TO JAMES PARRETT, OF WENONA, ILLINOIS.

COMPOUND ENGINE.

No. 875,453.

Specification of Letters Patent.

Patented Dec. 31, 1907.

Application filed March 7, 1907. Serial No. 361,036.

To all whom it may concern:

Be it known that I, DENT PARRETT, a citizen of the United States, and a resident of Wenona, in the county of Marshall and State of Illinois, have invented a new and Improved Compound Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved compound engine, which is simple, durable and compact in construction, completely balanced and hence capable of running at a high speed without danger of undue wear or jar, arranged to start easily by using live motive agent in the low pressure cylinder, and especially serviceable for use on motor vehicles and the like.

The invention consists of novel features and parts and combinations of the same, which will be more fully described herein-after and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a perspective view of the improvement; Fig. 2 is a sectional side elevation of the same; Fig. 3 is a transverse section of the same on the line 3—3 of Fig. 2; Fig. 4 is a sectional plan view of the improvement on the line 4—4 of Fig. 2; Fig. 5 is a like view of the same on the line 5—5 of Fig. 2; Fig. 6 is a transverse section of the same on the line 6—6 of Fig. 2, and Fig. 7 is a perspective view of the cams for actuating the admission and exhaust ports.

The crank shaft A of the engine is journaled in the heads of a suitable casing B, and the said crank shaft A is provided within the casing B with the two crank arms A', A², arranged diametrically opposite each other, and of which the crank arm A' is connected by pitmen C, D with the pistons E, F, reciprocating in the high pressure cylinders G and H, respectively, and the said crank arm A² is connected by pitmen C', D' with the pistons E', F', reciprocating in the low pressure cylinders G', H'.

The high and low pressure cylinders G, G' are arranged one alongside the other and at right angles to the high and low pressure cylinders H, H', which latter are likewise arranged one alongside the other, as plainly indicated in Figs. 1, 2 and 3, the two sets of cylinders G, G' and H, H' being secured to

the casing B and opening with their inner ends into the said casing B. The valve gears for the admission and exhaust of the motive agent are alike for both sets of high and low pressure cylinders G, G' and H, H', so that it suffices to describe but one in detail.

The main steam chest I for each pair of cylinders G, G', H, H', is connected by a pipe I' with a boiler or other suitable source of motive agent supply, and the said main steam chest I is adapted to connect by a valve J with an auxiliary steam chest I² opening into the outer end of the corresponding high pressure cylinder G or H, so that when the valve J is open the motive agent can pass from the main steam chest I into the auxiliary steam chest I² and from the latter into the upper end of the high pressure cylinder G or H, to force the piston E or F in an inward direction, with a view to give an impulse to the main shaft A by the corresponding pitman C or D and the crank arm A'. The auxiliary steam chest I² is adapted to be connected by a connecting valve K with a low pressure steam chest I³ opening into the outer end of the low pressure cylinder G' or H', so as to allow the exhaust steam from the high pressure cylinder G or H to pass into the low pressure cylinder G' or H', to be used expansively therein.

The steam chest I³ is adapted to connect by the exhaust valve L with the exhaust chamber I⁴, from which leads the exhaust pipe I⁵ to the atmosphere, or to a muffler or other device. The main steam chest I is adapted to connect by a high pressure admission valve N with the high pressure steam chest I⁶ opening directly into the outer end of the low pressure cylinder G' or H', to allow, whenever desired, live steam to pass from the main steam chest I' into the steam chest I⁶ and into the low pressure cylinder G' or H', to thus convert the latter into a high pressure cylinder whenever it is desired to start the motor or for other purposes. The auxiliary steam chest I² is adapted to be connected by a valve O with the chamber I⁷ connected by a pipe I⁸ with the exhaust chamber I⁴, so as to permit a free exhaust of the steam from the corresponding high pressure cylinder G or H whenever the low pressure cylinder G' or H' is used as a high pressure cylinder, that is, when the valves N are opened.

The stems J', K', L', N' and O' of the sev-

eral valves J, K, L, N, and O are pressed on
 by springs J², K², L², N² and O², to hold the
 said valves normally to their seats, and the
 stems J', K' and L' are adapted to be en-
 5 gaged by the arms Q', R' and S' of slides Q,
 R and S, mounted to slide in suitable bear-
 ings arranged on the casing B, as plainly
 illustrated in Fig. 6. The slides Q, R and S
 are provided at their inner ends with friction
 10 rollers Q², R², S² in contact with the cams T,
 U, V secured on a shaft W journaled in suit-
 able bearings arranged on the ends of the
 casing B; and on the said shaft W is secured
 a pinion W' in mesh with an intermediate
 15 gear wheel W² meshing with a gear wheel W³
 attached to the crank shaft A. Thus when
 the engine is running and the crank shaft A
 is rotated then a rotary motion is given to
 the cam shaft W, which by its cams T, U
 20 and V imparts sliding motions to the slides
 Q, R and S, to lift the valves J, K and L off
 their seats at the proper time with a view to
 make the several connections as above de-
 scribed; that is, when the engine is running
 25 as a compound or expansion engine, then
 the valves J are open at the time the pistons
 E and F of the high pressure cylinders G
 and H are at the beginning of their down or
 inward stroke.
 30 The valves K are opened at the time the
 pistons E and F are at the beginning of their
 return stroke and the pistons E', F' are at the
 beginning of their down stroke, so that the
 exhaust steam in the high pressure cylinders
 35 G and H can pass by way of the valves K
 into the upper ends of the low pressure cylin-
 ders G', H', to force the pistons E', F' inward
 by the expansion of the steam in the said low
 pressure cylinders G', H'. When the pistons
 40 E' and F' reach the end of their inward
 strokes, the valves L are opened, so as to
 permit the exhaust steam in the low pressure
 cylinders G' and H', to pass by way of the
 open valves L into the chambers I⁴ and to
 45 the exhaust pipes I⁵. The other valves N
 and O during the time the engine is running
 as a compound engine are held in a closed
 position by their springs. When, however,
 it is desired to use extra power then both sets
 50 of cylinders G, G' and H, H' are used as high
 pressure cylinders, and for this purpose the
 following arrangement is made: The arms R'
 for lifting the valves K are mounted to turn
 on pivots R³ held on their slides R (see Fig.
 55 6) and from the arms R' depend pins R⁴ en-
 gaging sleeves R⁵ mounted to turn on the
 bearing for the slide R. When the engine is
 running compound the arms R' are in aline-
 ment with the stems K' of the valves K, but
 60 when the low pressure cylinders G', H' are
 to be used as high pressure cylinders then the
 operator turns the sleeves R⁵ so as to move
 the arms R' from under the stems K' and to
 move the said arms R' in engagement with
 65 crank arms X' held on rock shafts X jour-

naled in suitable bearings arranged on the
 casing B (see Figs. 2 and 6.) On the rock
 shaft X are secured arms X², X³ adapted to
 lift the valve stems N' and O' of the valves
 N and O, to open the same at the proper 70
 time, that is, to allow live motive agent from
 the steam chests I to pass by way of the
 valves N into the chambers I⁶ for the steam
 to pass into the upper ends of the high pres-
 sure cylinders G', H' at the time their pistons 75
 E', F' are at the beginning of their down
 strokes. When the pistons E', F' are at
 their return strokes then the valves L open
 to exhaust the motive agent from the cylin-
 ders G', H' now used as high pressure cylin- 80
 ders. The exhaust motive agent from the
 high pressure cylinders G, H passes by way
 of the valves O into the chambers I⁷ and by
 the pipes I⁸ into the exhaust chambers I⁴ and
 to the exhaust pipes I⁵ instead of passing by 85
 way of the now closed valves K into the low
 pressure cylinders G', H', as above described,
 and when the engine is running as a com-
 pound engine.

The cam shaft W is adapted to be shifted 90
 in an axial direction, and for this purpose
 the gear wheel W' is of sufficient width to
 remain in gear with the intermediate gear
 wheel W² when shifting the shaft W. By
 reference to Fig. 6, it will be seen that the 95
 cams T, U and V are shaped to give more or
 less rise to the slides Q, R and S, so as to lift
 the valves J, K and L longer or shorter
 periods, according to the amount of cut-off
 desired. By reference to Fig. 6, it will also 100
 be noted that the cams are so shaped as to
 permit of reversing the engine or shifting the
 cam shaft W to its extreme right hand posi-
 tion. It will also be noticed that the middle
 cam U does not give as much of a change to 105
 the valve K as the cam T gives to the admis-
 sion valve J, to prevent a too high compres-
 sion in the high pressure cylinder when
 running the engine on a short cut-off.

Suitable means may be employed for 110
 shifting the sleeve R⁵ and the cam W, and
 hence it is not deemed necessary to further
 illustrate the same.

Having thus described my invention, I
 claim as new and desire to secure by Letters 115
 Patent:

1. An engine having high and low pressure
 cylinders, means for controlling the ad-
 mission of steam to the high pressure cyl-
 nder, a connecting valve for conducting the 120
 exhaust steam from the high pressure cyl-
 nder to the low pressure cylinder, a high
 pressure admission valve for controlling the
 admission of live steam directly to the low
 pressure cylinder and means for operating 125
 either the said connecting valve or the said
 high pressure valve.

2. In a compound engine, a high pressure
 cylinder, a low pressure cylinder, a main
 steam chest, means for controlling the ad- 130

mission of steam from the main steam chest to the said high pressure cylinder, a connecting valve for conducting the exhaust steam from the high pressure cylinder to the low pressure cylinder, a high pressure admission valve for connecting the said main steam chest with the low pressure cylinder, and means for operating either the said connecting valve or the said high pressure admission valve.

3. An engine comprising a high pressure cylinder, a low pressure cylinder, a main steam chest, an auxiliary steam chest opening into the high pressure cylinder, a valve for controlling the admission of steam from the main steam chest to the auxiliary steam chest, a low pressure steam chest opening into the low pressure cylinder, a connecting valve connecting the auxiliary steam chest with the said low pressure steam chest to allow the exhaust steam from the high pressure cylinder to pass into the low pressure cylinder, an exhaust valve for the low pressure steam chest, a high pressure steam chest opening directly into the low pressure cylinder, a high pressure admission valve connecting the main steam chest with the said high pressure steam chest, and an exhaust valve for the auxiliary steam chest.

4. An engine comprising a high pressure cylinder, a low pressure cylinder, pistons reciprocating in opposite directions in the said cylinders, a crank shaft, pitmen connecting the crank shaft with the said pistons, a main steam chest connected with a steam supply, an admission valve for conducting the live steam from the said main steam chest to the said high pressure cylinder, a connecting valve for conducting the exhaust steam from the said high pressure cylinder to the said low pressure cylinder, an exhaust valve for the said low pressure cylinder, a high pressure admission valve for connecting the said main steam chest with the said low pressure cylinder, and means for operating either the said connecting valve or the said high pressure valve.

5. An engine comprising a high pressure cylinder, a low pressure cylinder, pistons reciprocating in opposite directions in the said cylinders, a crank shaft, pitmen connecting the crank shaft with the said pistons, a main steam chest connected with a steam supply, an admission valve for conducting the live steam from the said main steam chest to the said high pressure cylinder, a connecting valve for conducting the exhaust steam from the said high pressure cylinder to the said low pressure cylinder, an exhaust valve for the low pressure cylinder, a high pressure admission valve for connecting the main steam chest with the said low pressure cylinder, an exhaust valve for the said high pressure cylinder, and means for operating the said high pressure exhaust

valve when operating the said high pressure admission valve for the low pressure cylinder.

6. An engine comprising a high pressure cylinder, a low pressure cylinder, pistons reciprocating in opposite directions in the said cylinders, a crank shaft, pitmen connecting the crank shaft with the said pistons, a main steam chest connected with a steam supply, an admission valve for conducting the live steam from the said main steam chest to the said high pressure cylinder, a connecting valve for conducting the exhaust steam from the said high pressure cylinder to the said low pressure cylinder, an exhaust valve for the low pressure cylinder, a high pressure admission valve for connecting the said main steam chest with the said low pressure cylinder, an exhaust valve for the high pressure cylinder, slides having arms for operating the said admission valve for the high pressure cylinder, the said connecting valve and the said exhaust valve for the low pressure cylinder, cams driven from the main shaft for operating the said slides, a rock shaft having arms for operating the said exhaust valve for the high pressure cylinder and the said high pressure admission valve for the low pressure cylinder, and means for operating the said rock shaft from the arm for the slide controlling the said connecting valve.

7. An engine comprising a high pressure cylinder, a low pressure cylinder, pistons reciprocating in opposite directions in the said cylinders, a crank shaft, pitmen connecting the crank shaft with the said pistons, a main steam chest connected with the steam supply, an admission valve for conducting the live steam from the said main steam chest to the said high pressure cylinder, a connecting valve for conducting the exhaust steam from the said high pressure cylinder to the said low pressure cylinder, an exhaust valve for the low pressure cylinder, a high pressure admission valve for connecting the said main steam chest with the said low pressure cylinder, an exhaust valve for the high pressure cylinder, slides having arms for operating the said admission valve for the high pressure cylinder, the said connecting valve and the said exhaust valve for the low pressure cylinder, cams driven from the main shaft for operating the said slides, a rock shaft having arms for operating the said exhaust valve for the high pressure cylinder and the said high pressure admission valve for the low pressure cylinder, means for operating the said rock shaft from the arm for the slide controlling the said connecting valve, and means for shifting the said cams to regulate the cut off and the reversing of the engine.

8. An engine having high and low pressure cylinders, pistons reciprocating in said cylinders, a crank shaft connected with said pistons, a main steam chest, an admission valve

for conducting the live steam from the main steam chest to the high pressure cylinder, an exhaust valve for the high pressure cylinder, a high pressure admission valve for connecting the main steam chest with the low pressure cylinder an exhaust valve for the low pressure cylinder, a shaft driven from the crank shaft and provided with cams, and mechanism actuated by said cams for simultaneously operating the exhaust valve of the high pressure cylinder and the high pressure admission valve for the low pressure cylinder.

9. A compound engine, comprising two pairs of cylinders, each pair consisting of a high pressure cylinder and a low pressure cylinder, the pairs of cylinders being arranged at right angles to each other, pistons reciprocating in the said cylinders, a crank shaft connected by pitmen with the said pistons, a main steam chest for each pair of cylinders, admission valves for conducting live steam from said steam chests to the high pressure cylinders, connecting valves for conducting the exhaust steam from the said high pressure cylinders to the said low pressure

cylinders, exhaust valves for the low pressure cylinders, high pressure admission valves for connecting the main steam chests with the low pressure cylinders, exhaust valves for the high pressure cylinders, springs on the stems of said valves to hold the valves normally to their seats, slides provided with arms for operating the admission valves for the high pressure cylinders, the said connecting valves and the exhaust valves for the low pressure cylinders, a shaft driven from the crank shaft and provided with cams for operating said slides, and means for operating the exhaust valves for the high pressure cylinders and the high pressure admission valves for the low pressure cylinders, the said means being actuated from the arms of the slides controlling the said connecting valves.

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

DENT PARRETT.

Witnesses:

A. L. WEBBER,
CHAS. R. HOWE.