

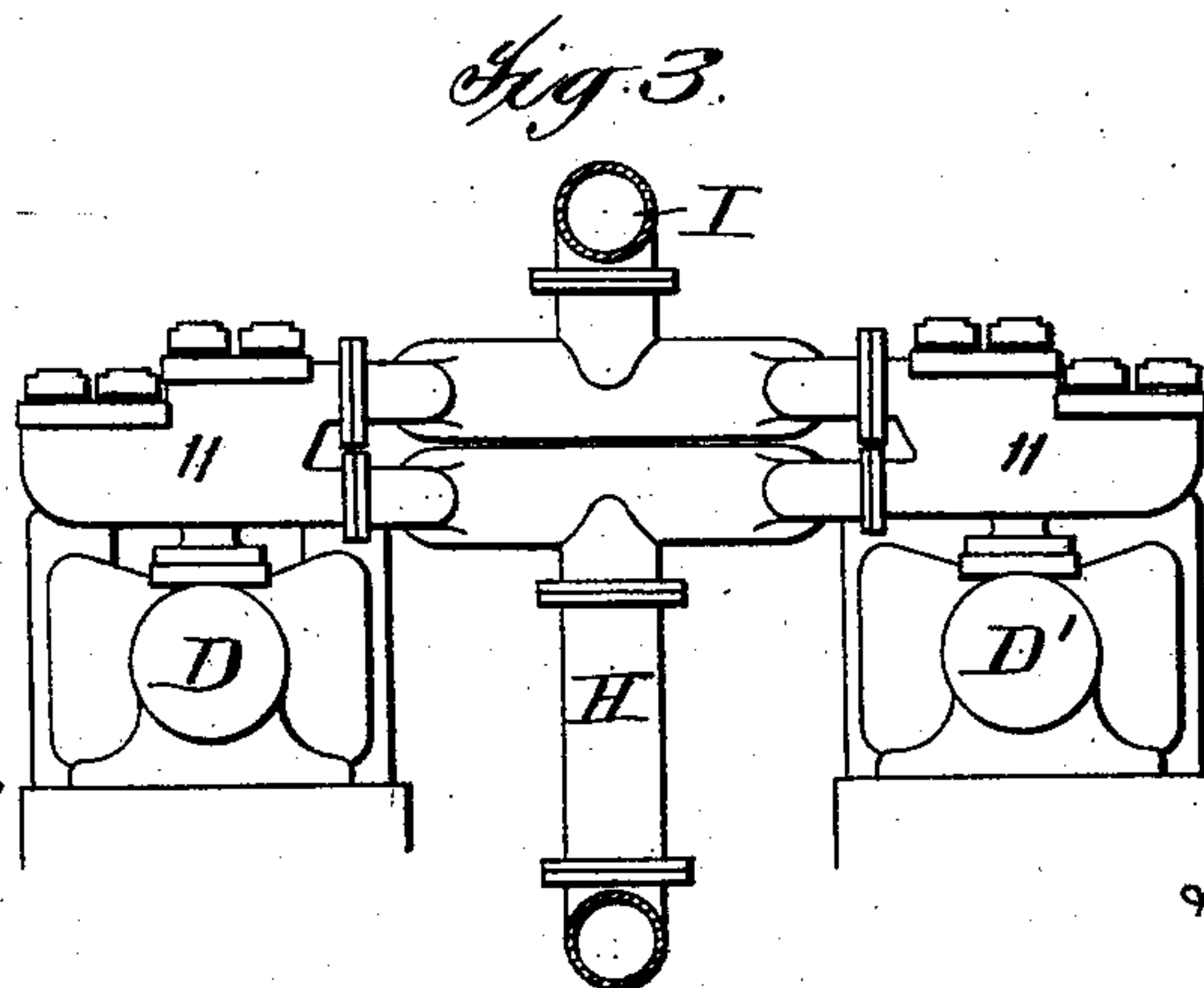
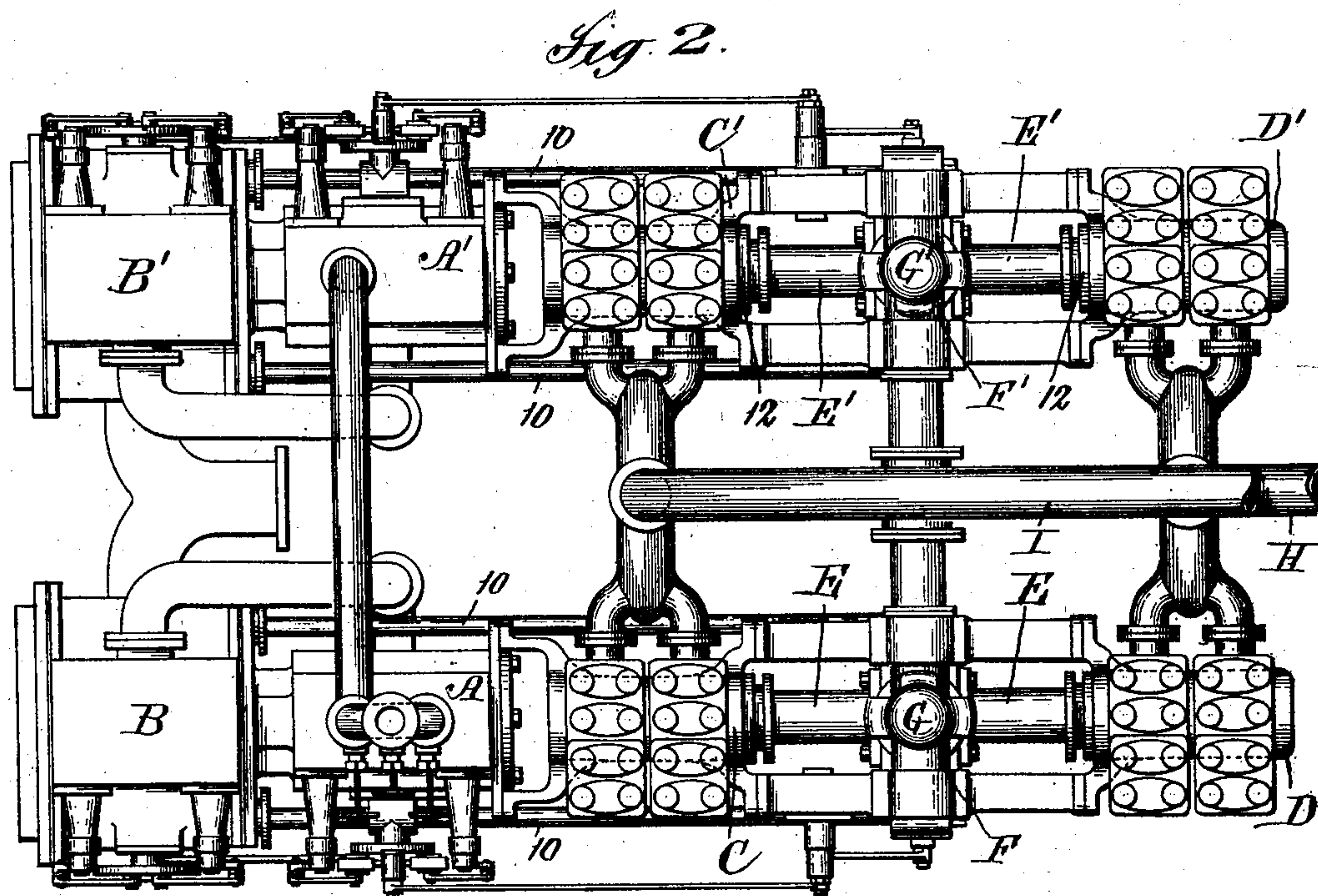
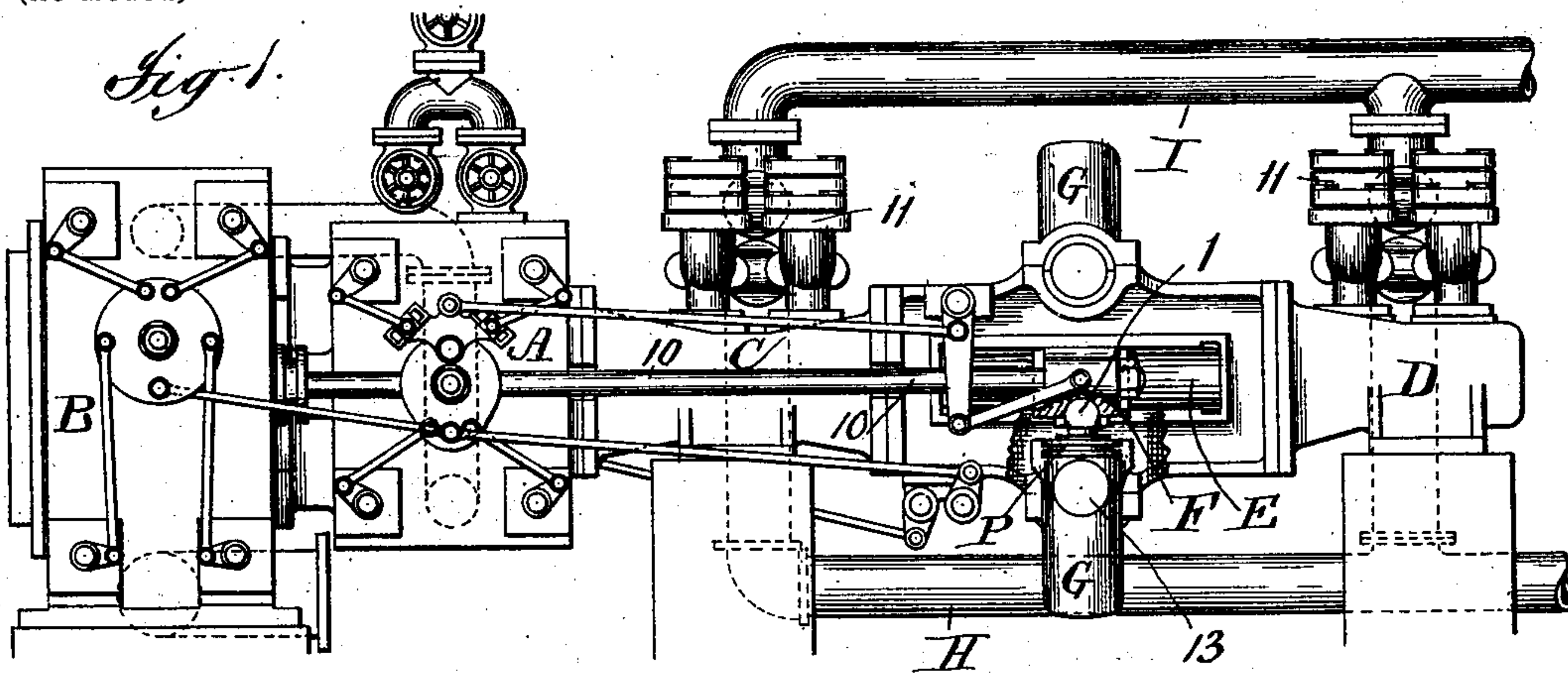
No. 710,030.

Patented Sept. 30, 1902.

C. C. WORTHINGTON.
PUMP.

(Application filed Aug. 23, 1900.)

(No Model.)



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UNITED STATES PATENT OFFICE.

CHARLES C. WORTHINGTON, OF DUNNFIELD, NEW JERSEY.

PUMP.

SPECIFICATION forming part of Letters Patent No. 710,030, dated September 30, 1902.

Application filed August 23, 1900. Serial No. 27,781. (No model.)

To all whom it may concern:

Be it known that I, CHARLES C. WORTHINGTON, a citizen of the United States, residing at Dunnfield, county of Warren, and State of New Jersey, have invented certain new and useful Improvements in Pumps, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to provide an improved pump construction especially adapted for that class of pumps used with high pressures and known generally in the trade as "pressure-pumps," the high pressure with which these pumps are used requiring special construction and packing. In an approved form of such pressure-pumps separate plungers are used for the opposite ends, and connection to one plunger is made directly from the cross-head between the pump and power ends, and connection to the other plunger is made beyond the end of the pump through side rods forming a connection between the main cross-head and a cross-head beyond the pump end. This permits the plungers to be packed outside the pump-chamber, at opposite ends of the latter, but increases the length of the pump and is objectionable because of the moving parts beyond the pump end and on account of the use of the heavy side rods for transmitting the power from one cross-head to the other. In duplex pumping-engines also, in which compensating cylinders are employed, the compensating cylinders, which may be applied to either of the cross-heads, act directly only upon one of the plungers.

Another form of outside-packed plunger-pump which has been used largely employs separate pump-chambers for the opposite ends of the pump, which are separated sufficiently to provide space for packing the plungers between them, the plungers for opposite ends being made usually in the form of a single continuous plunger, although two plungers suitably connected end to end may be used. In this construction it is obvious that the power is transmitted to the plungers from one end only of the plunger construction, the length of the pump structure is increased by the separation of the pump-chambers in addition to the space required for the

cross-head between the pump and power ends, and the compensating cylinders when employed act directly only on one end of the long-plunger construction.

The present invention provides a pump construction which enables the plungers to be readily packed as desirable in pressure-pumps, while at the same time it reduces the length of the apparatus and secures a very compact, strong, and durable construction, with the power applied directly to both plungers and without moving parts beyond the end of the pump and with the plungers connected directly together and directly to the single central cross-head required. In connection with the compensating cylinders, moreover, this construction applies the compensating load directly and equally on both plungers, securing a more efficient and uniform compensating action. I secure these results and other important advantages by using separate pump-chambers for the opposite ends of the pump, with the power attachment for the plungers between the chambers, so that the power is applied equally and directly to the plungers for the two chambers. In constructions employing compensating cylinders these compensating cylinders also are connected to the cross-head between the pump-chambers and act directly upon both plungers.

For a full understanding of the invention a detailed description of a construction embodying the same in its preferred form as applied in connection with a duplex steam pumping-engine of a well-known type will be given in connection with the accompanying drawings, forming a part of this specification, and the features forming the invention will then be specifically pointed out in the claims.

In the drawings, Figure 1 is a side elevation of the pumping-engine with a portion of the pump-cradle broken away to show the connection of the compensating pistons to the cross-head. Fig. 2 is a plan view of the same. Fig. 3 is an end elevation of the pump end.

Referring to said drawings, the steam end of the pumping-engine shown is of a well-known form manufactured by Henry R. Worthington and is shown as a compound cut-off engine having high and low pressure cylinders A B and A' B' on opposite sides, the valves of these steam-cylinders being actuated in

the usual manner for admission and exhaust by the pistons on the opposite side and for cut-off by their own pistons. The high-pressure pistons are connected to the low-pressure pistons through the cylinder-heads, and the low-pressure pistons are connected by side rods 10 to the pump cross-head, all as now common in such pumping-engines, except that the cross-head is between the pump-chambers, as presently to be described, instead of between the steam and pump ends.

Referring now to the pump end, this has on opposite sides the two separate pump-chambers C D and C' D', corresponding to the steam-cylinders A B and A' B', and in these pump-chambers work the plungers E E'. These plungers E E', whether each consisting of two separate plungers or of a single continuous plunger, are connected midway of their length to the cross-heads F F', to which the power is transmitted by side rods 10. To these same cross-heads F F' are directly connected the pistons P of compensating cylinders G G' on opposite sides of the engine, which compensating cylinders may be of any approved construction. The pistons P are shown as connected to the cross-heads by bowls 1, entering recesses in the cross-heads, so that as the cross-heads reciprocate the pistons P move in and out of the compensating cylinders G G' and the compensating cylinders swing on their journals 13, the pressure in the compensating cylinders applied through the pistons P thus alternately opposing and assisting the steam-pistons, as usual in such compensating-cylinder constructions. The plungers E E' are shown as packed between the pump-chambers by packing 12 of the usual form in outside-packed plunger-pumps. Above the pump-chambers C D C' D' are mounted the valve-pots 11, of suitable form, connecting with the suction-main H and force-main I in the usual manner, as shown, or through any othersuitable connections.

It will be seen that this connection of the power to the pump-plungers between the pump-chambers secures a very compact and strong pump construction, avoiding all moving parts beyond the pump end, while at the same time the power is directly and equally applied to both plungers, a single cross-head serving to transmit the power directly to both

plungers and to and from the compensating cylinders. It will be seen also that the power of the compensating cylinders is so applied that the compensating load is brought directly and equally upon both plungers, assuring a smooth, uniform, and efficient compensating action. The separation of the pump-chambers for the cross-head between them involves a lengthening of the pump end as compared with constructions in which the pump-chambers are separated only for plunger-packing; but this is more than compensated for by the omission of the cross-head space between the power and pump ends required in previous constructions, so that a material reduction in the total length of the apparatus is secured. Moreover, the increased space between the pump-chambers is desirable for convenience in packing.

It will be understood that the invention is not limited to the construction of pump shown, this being selected only as a pumping-engine well adapted for illustration of the invention; but the invention is applicable also generally in pump construction.

What I claim is—

1. A direct-acting steam-pump having separate chambers for the opposite ends of the pump, a cross-head between said chambers with the plungers for the opposite pump ends on opposite sides of the cross-head, connections from the steam piston or pistons to said cross-head, and compensating mechanism connected to said cross-head, substantially as described.

2. A duplex direct-acting steam pumping-engine having separate chambers for the opposite ends of the pump, a cross-head between said chambers on each side of the pump with the plungers for the opposite ends of the pump on opposite sides of the cross-heads, connections from the steam-pistons to said cross-heads, and compensating cylinders connected to said cross-heads, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES C. WORTHINGTON.

Witnesses:

C. J. SAWYER,
A. A. V. BOURKE.