

(No Model.)

2 Sheets—Sheet 1.

F. N. DU BOIS.

APPARATUS FOR TRANSMITTING POWER.

No. 386,116

Patented July 17, 1888.

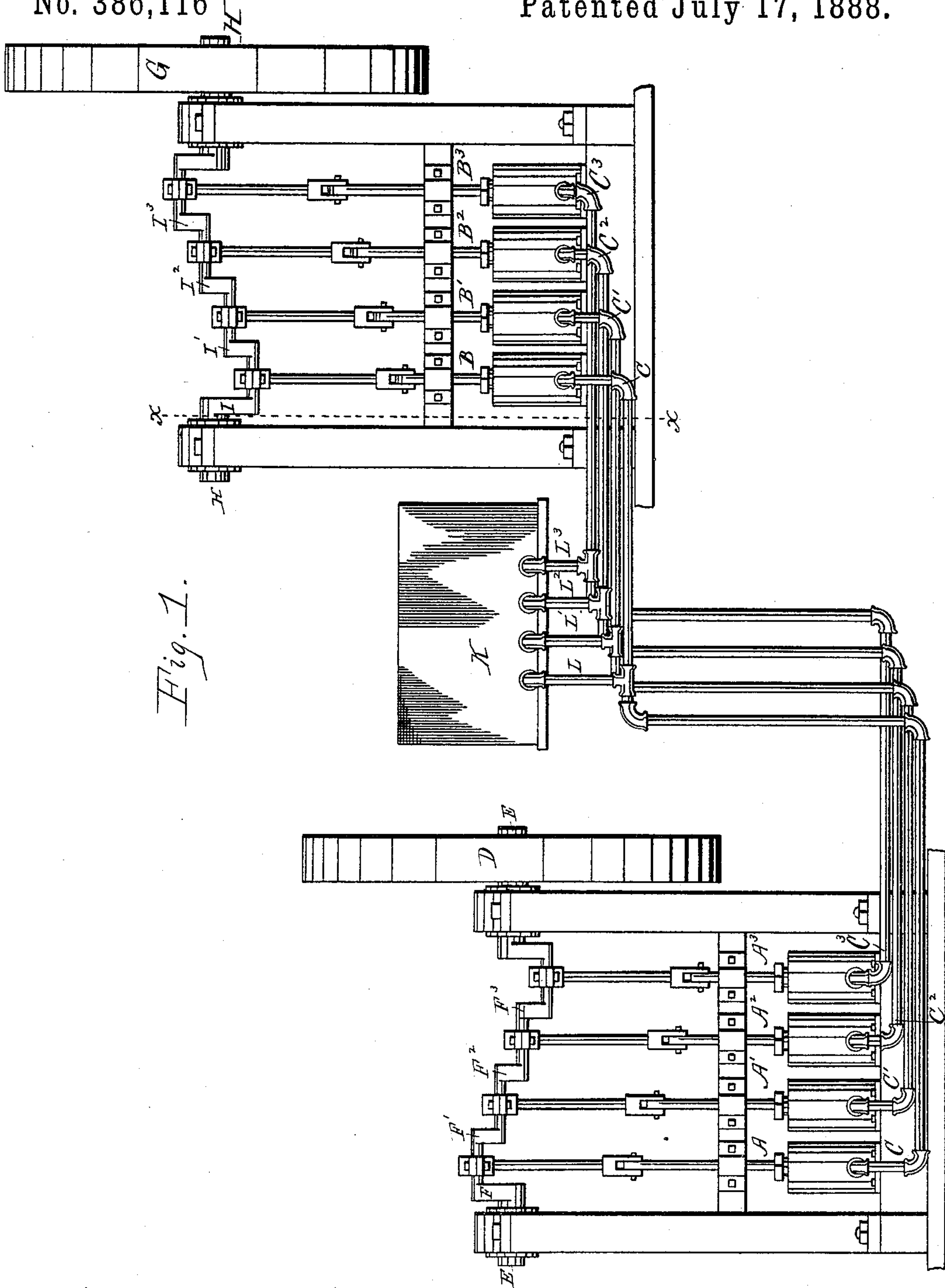


Fig. 1.

Witnesses.  
C. H. Russell,  
P. L. Dorland.

Inventor.  
F. N. Du Bois,  
by  
R. Mason,  
att'y.

(No Model.)

2 Sheets—Sheet 2.

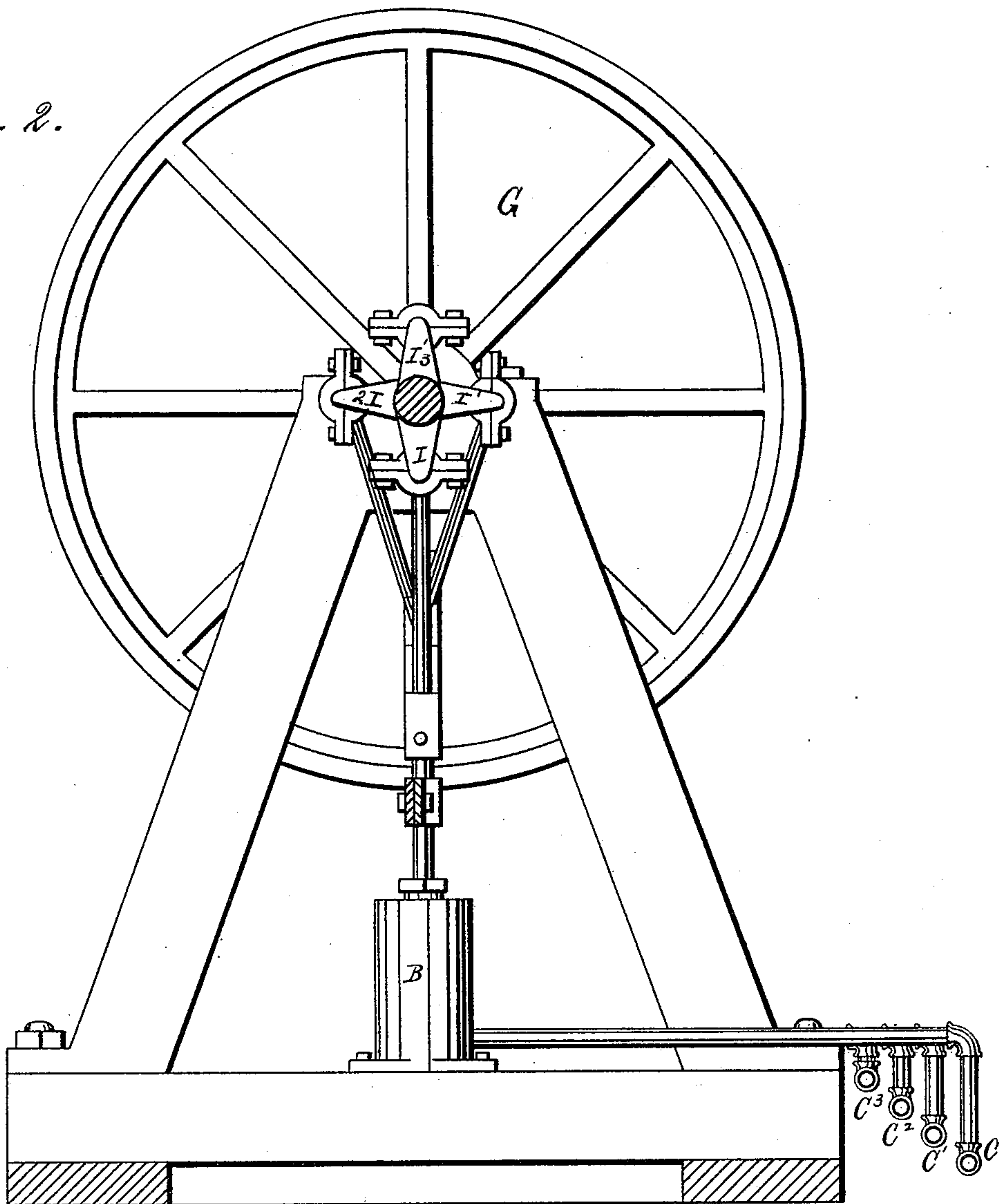
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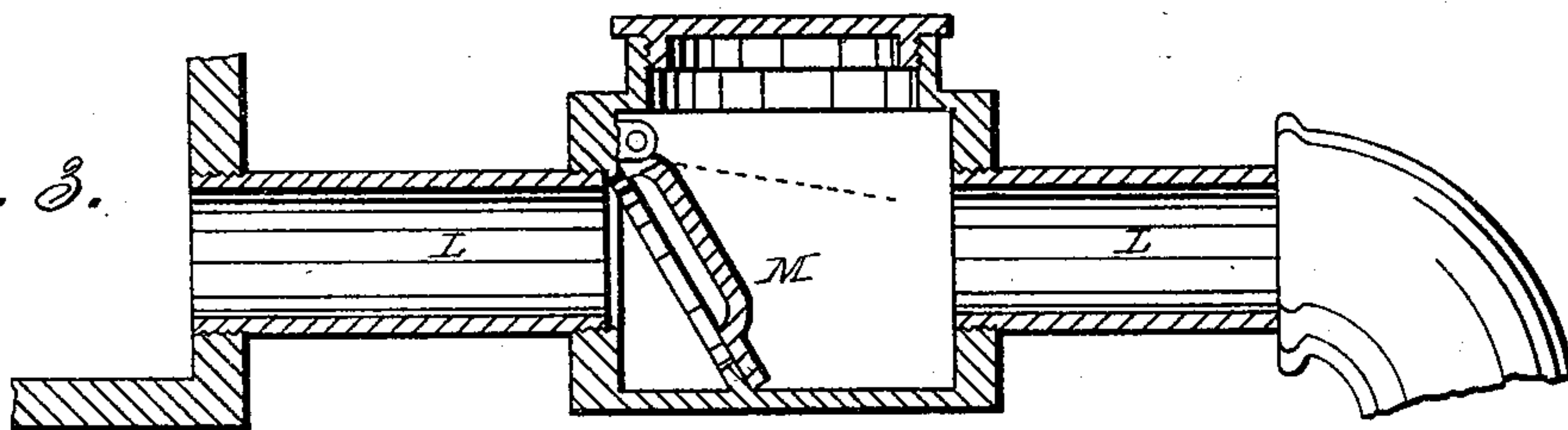
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*Fig. 2.*



*Fig. 3.*



*Witnesses.*

*C. W. Russell,  
P. L. Dorland.*

*Inventor.*

*F. N. Du Bois,  
by  
R. Mason  
att'y.*



# UNITED STATES PATENT OFFICE.

FREDERICK N. DU BOIS, OF NEW YORK, N. Y.

## APPARATUS FOR TRANSMITTING POWER.

SPECIFICATION forming part of Letters Patent No. 386,116, dated July 17, 1888.

Application filed March 29, 1886. Serial No. 197,079. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK N. DU BOIS, of the city, county, and State of New York, have invented a new and useful Improvement  
5 in Apparatus for Transmitting Power, of which the following is a specification.

My invention relates to that class of power-transmitters in which the pressure of water expelled from one cylinder and flowing through  
10 pipes connecting it with another is made to act on the piston of the other cylinder to drive it in the opposite direction.

My invention differs from others in this: that I employ a series of single-acting pumps,  
15 the pistons of which are driven by cranks or eccentrics so arranged on a common shaft that they shall pass their centers successively and at equal intervals, and a duplicate set of  
20 cylinders, the chambers of which two sets of cylinders are connected by single pipes, and a duplicate shaft of the same arrangement of cranks or eccentrics driven by the pistons of the said second set of cylinders, the object being to cause the two shafts to rotate at the  
25 same speed and with a continuous transmission and reception of impulse.

In the annexed drawings I have shown an apparatus made up of four cylinders in each set, in which—

30 Figure 1 is an elevation. Fig. 2 is a vertical section on the line X X of Fig. 1, and Fig. 3 is a vertical section showing the check-valve through which water may enter to supply loss from leakage.

35 The same letters are employed in all the figures in the indication of identical parts.

I have illustrated my improvement as applied to a shaft of four cranks with a corresponding number of cylinders in each set; but  
40 I do not wish to be limited to this number, as it is obvious that the same principle may be applied to a greater or less number, the opposite arrangement of the crank of the two shafts being preserved.

45 A A' A<sup>2</sup> A<sup>3</sup> are a series of single acting pumps arranged side by side in a strong frame, supporting also the necessary guides for the plungers.

50 B B' B<sup>2</sup> B<sup>3</sup> are a series of engines of like construction with the pumps arranged in a frame in the same manner, so that one is an exact

duplicate of the other. The chambers of these pump-engines, A B, &c., are connected by single pipes without valves, C C' C<sup>2</sup> C<sup>3</sup>, forming an unobstructed communication, so that  
55 water expelled from the cylinder of pump A shall flow through pipe C into the cylinder of engine B, and from B back to A; and so as to A' B' A<sup>2</sup> B<sup>2</sup> and A<sup>3</sup> B<sup>3</sup>.

D is a pulley on shaft E, on which are formed  
60 the cranks F, F', F<sup>2</sup>, and F<sup>3</sup>, said cranks being set at different angles so as to be in planes (in the case illustrated) at right angles to one another in succession.

G is a corresponding pulley on the shaft H,  
65 on which are formed in like manner cranks I, I', I<sup>2</sup>, and I<sup>3</sup>, corresponding in relative position to those on shaft E, but oppositely arranged, so that when the crank F is in any given position the crank I shall be in the opposite part  
70 of its orbit, and so as to the cranks F' I', F<sup>2</sup> I<sup>2</sup>, and F<sup>3</sup> I<sup>3</sup>, respectively.

The piston-rods of the respective pumps and engines are connected by connecting-rods to their proper cranks in the ordinary manner.  
75

It is necessary that the pump and engine chambers and their connecting-pipe shall be constantly full of water, and to compensate for any leakage which may take place a reservoir,  
80 K, is provided, containing water placed on a higher level than the highest point in the chambers or pipes connecting them. From this reservoir pipes L L' L<sup>2</sup> L<sup>3</sup> extend to the pipes C C' C<sup>2</sup> C<sup>3</sup> respectively. In these pipes  
85 L, &c., respectively, are placed check-valves M, which may be of any approved kind, and which will open to admit water when there is any deficiency, and will close by the pressure of the pumps on the water and remain closed  
90 as long as there is no vacuum of water in the chambers and pipes. This reservoir will supply the water necessary to fill the pumps and pipes upon starting.

The operation is as follows: Power being applied to, say, the pulley D, the pumps will be  
95 put in motion. The descending plunger or plungers will force the water out of the cylinder and drive it through the pipes connecting the chamber with the corresponding chamber of the other set of chambers or engine-cylinders and force up the plunger of the driven  
100 engines and give movement to shaft H and

pulley G. The descending plungers of the driven set will expel the water contained in their cylinders or chambers and drive it into the chambers of the corresponding cylinders  
5 or chambers of the other set, in which the pistons are being lifted. By this means I am enabled to drive two cranks at a considerable distance apart, and so give motion to machinery placed at a point to which it would not be  
10 convenient or economical to apply power directly. As one at least of the driving-pumps will always be in position to deliver its water and the connected cylinders or chambers will always be in position to put the second crank-  
15 shaft in motion, the driven machinery can always be started and kept in motion, since there are no dead-centers to the shafts E and H.

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

In combination, two crank shafts, E and H, 20 the cranks of each shaft being set at equal angles to one another, and those of one shaft oppositely arranged to those of the other, a set of pumps and a set of engines in series connected to the respective cranks, and a series 25 of a similar number of pipes, C, each connecting a pump-cylinder of one series with an engine-cylinder of the other series, for communicating a continuous rotary movement from the driving to the driven shaft, substantially 30 as set forth.

Witness my hand in the presence of two subscribing witnesses.

FREDERICK N. DU BOIS.

In presence of—

FRANK GARRETSON,  
F. W. BLAUVELT.