

No. 638,260.

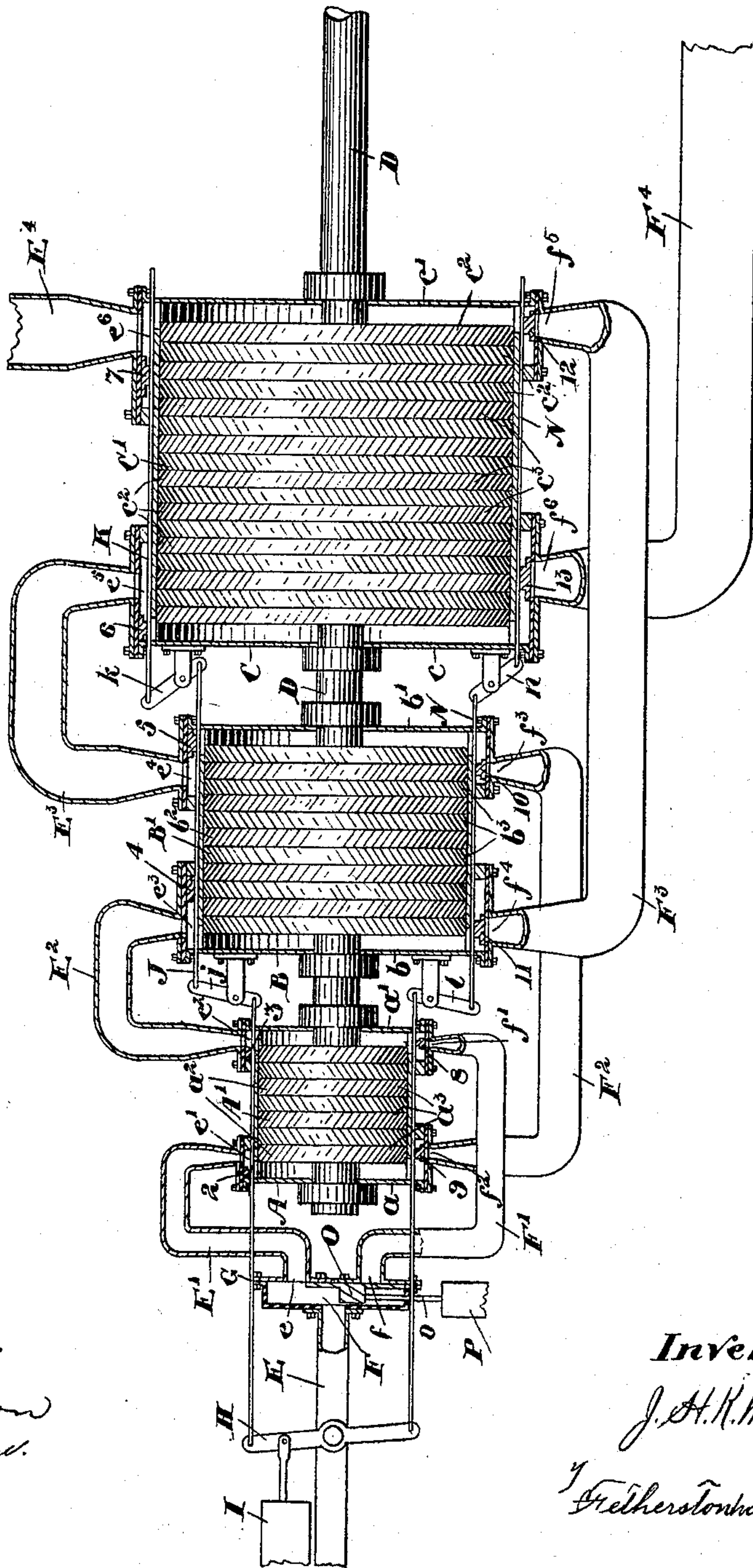
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J. H. K. McCOLLUM.

STEAM TURBINE.

(Application filed Sept. 17, 1898.)

(No Model.)



Witnesses.

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JAMES HARRY KEIGHLY MCCOLLUM, OF TORONTO, CANADA.

STEAM-TURBINE.

SPECIFICATION forming part of Letters Patent No. 638,260, dated December 5, 1899.

Application filed September 17, 1898. Serial No. 691,209. (No model.)

To all whom it may concern:

Be it known that I, JAMES HARRY KEIGHLY MCCOLLUM, electrician, of the city of Toronto, in the county of York, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Steam-Turbines, of which the following is a specification.

My invention relates to improvements in steam-turbines, and more particularly to those of the Parsons type; and the object of the invention is to design a simple and effectual arrangement for introducing the steam into the different cylinders whereby the engine may be effectively reversed at the same speed when required; and it consists, essentially, of separating the three cylinders and providing ends for the same, the steam-inlet pipes being arranged on one side, so as to introduce the steam into each cylinder at the front end and exhaust at the rear end and at the other side to introduce the steam into the rear end first and exhaust at the front end into the next succeeding cylinder and ending at the low-pressure one, the parts being constructed and arranged in detail as hereinafter more particularly explained.

The drawing represents a sectional plan, showing my improved engine.

A is the high-pressure cylinder, B is the intermediate cylinder, and C is the low-pressure cylinder, which, as will be noticed, are all of increasing diameters, starting at the high-pressure cylinder. The cylinders A, B, and C are provided with suitable heads a a' , b b' , and c c' .

D is the main shaft, which extends through the three cylinders and is provided with suitable packing and bearings. The shaft in the cylinders is provided with drums A' , B' , and C' , as indicated by dotted lines, and obliquely-set wings a^2 , b^2 , and c^2 , secured to such drums. To the inside of the cylinders are secured alternately with the wings the directing-vanes a^3 , b^3 , and c^3 , respectively. The vanes and wings are arranged identically to that of the Parsons engine.

E is the main inlet steam-pipe, and E' is a branch pipe leading from the port e of the valve-chest F to the port e' at the front end of the cylinder A.

E^2 is a pipe leading from the port e^2 at the

rear end of the cylinder A to a port e^3 at the front end of the cylinder B.

E^3 is a pipe leading from a port e^4 at the rear end of the cylinder B to a port e^5 at the front end of the cylinder C.

e^6 is a final exhaust-port, and E^4 is the pipe leading therefrom at the rear end of the cylinder C.

f is a port in the valve-chest F at the opposite side to that of the port e .

F' is a pipe leading from the port f to the port f' at the rear end of the cylinder A.

F^2 is a pipe leading from the port f^2 at the front end of the cylinder to the port f^3 at the rear end of the cylinder B.

F^3 is a pipe leading from the port f^4 at the front end of the cylinder B to the port f^5 at the rear end of the cylinder C.

f^6 is the final exhaust-port on this side, from which leads the exhaust-pipe F^4 .

It will be noticed that on each side of the cylinders, which are separated, as shown, the exhaust-pipe from one cylinder is the inlet-pipe to the next succeeding expansion-cylinder and that the ports are larger at the exit than at the entrance, as usual, but the exhaust-port at the exit end of the steam-pipe is equal to the inlet-port of the next succeeding cylinder. All the ports at each side are provided with slide-valves or any other suitable form of valve, those on one side being designed to be acted simultaneously, so as to throw open all the inlet-ports and the exhaust-ports. The same may be said of the other side.

The valve controlling the ports e' e^2 e^3 e^4 e^5 e^6 I designate 2 3 4 5 6 7. The valves controlling the ports f' f^2 f^3 f^4 f^5 f^6 on the opposite side I designate 8 9 10 11 12 13. The valves 2 and 3 I connect together by a valve-rod G, which is connected to a rocking bar H, suitably pivoted on the frame of the machine and operated either by hand or by a steam-piston I, as indicated. The valves 4 and 5 are connected by a rod J, which is connected to the rod G by a lever j , suitably pivoted. The valves 6 and 7 are connected by a rod K, which is connected to the rod J by the lever k .

On the opposite side the valves 8 and 9 are connected together by the rod L, which is connected to the rocking bar H at one end and at the other to the lever l . The valves 10

and 11 are connected together by the rod N, which is connected at one end to the lever *l* and at the other end to the lever *n*. The valves 12 and 13 are connected together by the rod N', which is connected at one end to the lever *n*.

O is the throttle-valve, which is connected by the rod *o* to the steam-cylinder P, by which the throttle-valve is controlled.

Although I have shown all the cylinders on the one shaft, it will of course be understood that they might be on different shafts, if desired.

The operation of my invention is as follows: In the drawing the throttle-valve O is arranged so as to leave the port *e* uncovered, and the rocking arm H is also placed in such a position that all the ports *e*¹, *e*², *e*³, *e*⁴, *e*⁵, and *e*⁶ are left uncovered by their respective slide-valves. It will therefore be quite clear that the course of the steam from the steam-pipe E through the pipes and various cylinders out through the exhaust-port will cause the drums in the various cylinders to be rotated in the direction indicated by arrow. To reverse, it is necessary to tilt the rocking bar on its pivot, so as to throw all the valves open on the opposite side to that hereinbefore mentioned and close those that were open on the other side. By manipulating the throttle-valve O so as to close the port *e* and open the port *f*, which has previously been closed, the course of the steam is directed through the pipes and cylinders on the opposite side, hereinbefore referred to, and as the steam first enters each cylinder at the rear instead of the front the rotation of the wings on the drum of each cylinder will of course be in the opposite direction to that indicated by arrow, and consequently impart a like rotary movement to the shaft.

In this specification, which describes simply my invention, it will of course be understood that the forms of the pipes, valves, and other details of construction may be varied without departing from the spirit of my invention.

What I claim as my invention is—

1. The combination with the high, intermediate and low pressure cylinders provided with stationary directing-vanes and the alternately-arranged rotating vanes or wings attached to the driving-shaft each cylinder be-

ing separated and provided with suitable heads, of suitable ports at the front and rear of each cylinder of increasing size from the smallest to the largest, suitable valves for such ports and suitable pipes at one side of increasing size from the smallest to the largest connecting the ports, such pipes being connected from the rear end of one cylinder to the front end of the next succeeding cylinder and having the final exhaust at the rear end of the last cylinder and suitable pipes at the opposite side of increasing size from the high-pressure to the low-pressure cylinder and having the inlet-pipe leading into the rear of the cylinder and the outlet or exhaust at the front of the cylinder or vice versa to the pipes at the opposite side and a suitable throttle-valve for admitting the steam into the high-pressure cylinder from either steam-pipe as and for the purpose specified.

2. The combination with the high, intermediate and low pressure cylinders provided with stationary directing-vanes and the alternately-arranged rotating vanes or wings attached to the driving-shaft each cylinder being separated and provided with suitable heads, of suitable ports at the front and rear of each cylinder of increasing size from the smallest to the largest, suitable valves for such ports and suitable pipes at one side of increasing size from the smallest to the largest connecting the ports, such pipes being connected from the rear end of one cylinder to the front end of the next succeeding cylinder and having the final exhaust at the rear end of the last cylinder and suitable pipes at the opposite side of increasing size from the high-pressure to the low-pressure cylinder and having the inlet-pipe leading into the rear of the cylinder and the outlet or exhaust at the front of the cylinder or vice versa to the pipes at the opposite side, a suitable throttle-valve for admitting the steam into the high-pressure cylinder from either steam-pipe and means whereby when the one set of valves is closed on one side the opposite set of valves on the other side of the cylinders is simultaneously opened as and for the purpose specified.

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