

No. 682,979.

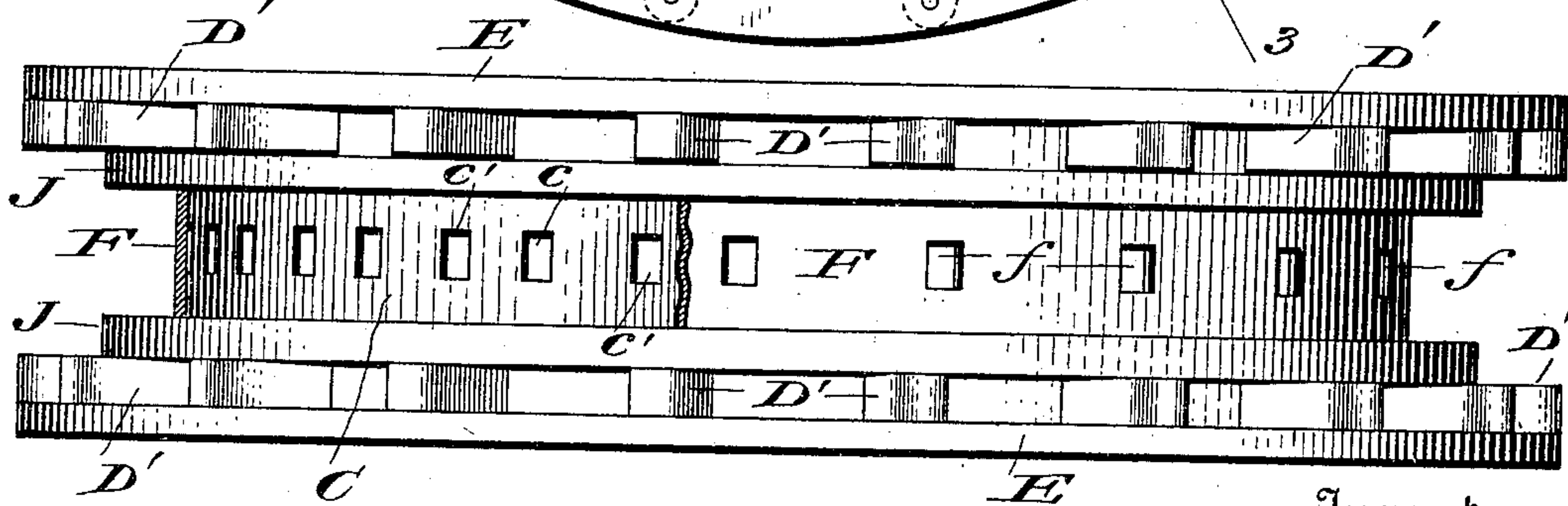
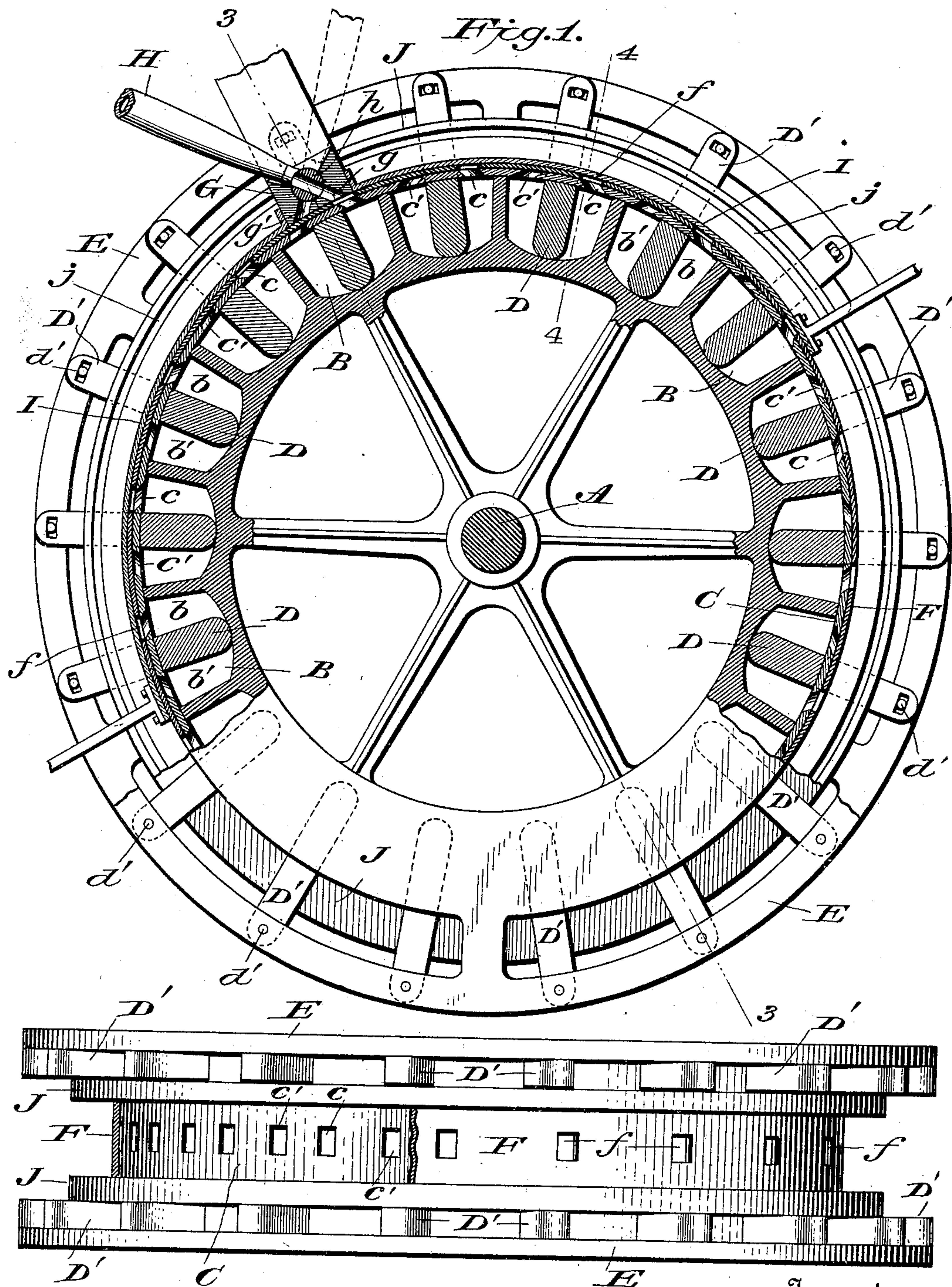
Patented Sept. 17, 1901.

C. F. DU BOIS.
PELTON WHEEL.

(Application filed Mar. 28, 1900. Renewed Feb. 18, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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James R. Mansfield.

Fig. 2. ^E Inventor
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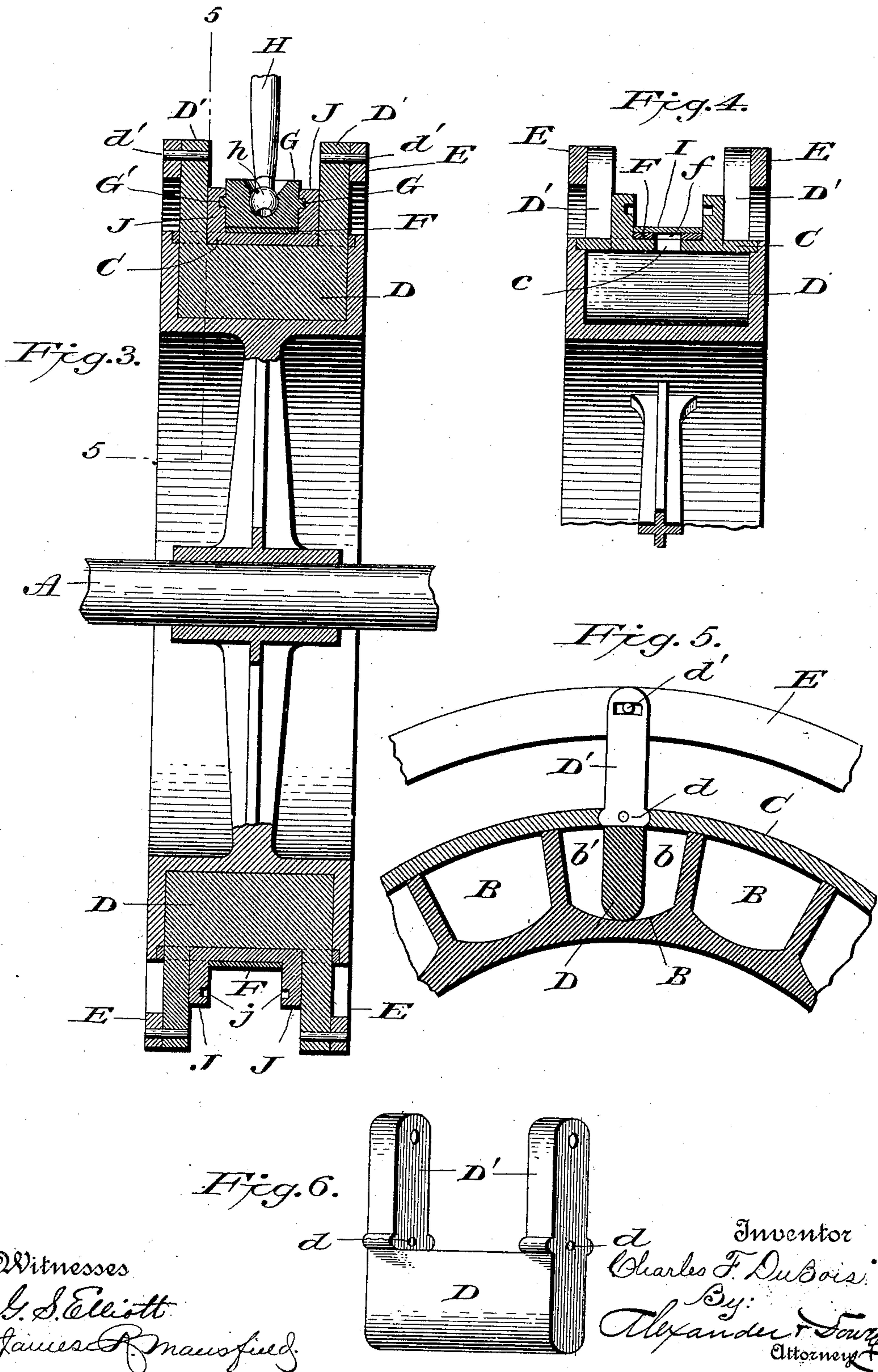
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UNITED STATES PATENT OFFICE.

CHARLES FRANKLIN DU BOIS, OF DENVER, COLORADO.

PELTON WHEEL.

SPECIFICATION forming part of Letters Patent No. 682,979, dated September 17, 1901.

Application filed March 28, 1900. Renewed February 18, 1901. Serial No. 47,852. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FRANKLIN DU BOIS, of Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Pelton Wheels; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is an improvement in Pelton wheels especially designed to be operated by expansive and compressible fluids, such as steam or air; and its object is to so construct the wheel that the most beneficial effect will be derived from the action of the propelling-fluid jets, the parts being so constructed that the propelling fluid after the first impact thereof will react or rebound against a yielding surface, which will neutralize the effect of such reactionary impact, and the movement of the yielding surface may even be utilized in assisting the forward propulsion of the wheel.

The invention also provides means whereby the direction of rotation of the wheel may be reversed in a very simple and effective manner.

The invention consists in the novel constructions and combinations of parts herein-after claimed, and the accompanying drawings illustrate a form of wheel embodying my invention, which I shall now proceed to describe in detail with reference to said drawings, in which—

Figure 1 represents an elevation of the wheel, partly in section, to show the construction thereof. Fig. 2 is an edge view, partly broken away. Fig. 3 is a sectional view on line 3 3, Fig. 1. Fig. 4 is a sectional view on line 4 4, Fig. 1. Fig. 5 is an enlarged sectional view on line 5 5, Fig. 3. Fig. 6 is a detail.

The wheel is mounted upon a shaft A and may be of any desired size and is provided near its periphery with an annular series of buckets or cells B, the outer ends of which are closed by a rim or cover C. Each cell is divided into two chambers $b\ b'$ by a transverse partition D, which is pivoted at the outer end of the cell, as shown at d . Each partition D is provided, as shown, with two

end arms D' , which project radially outward through suitable openings in rim C and have their extremities loosely connected by slots and pins d' to outwardly-projecting flanges E of the wheel. In short, the wheel might be described as having a deep annular groove in its periphery, the sides of which are formed by the flanges E, and in the bottom of said groove are formed the annular series of cells B. In the rim C over each cell are inlet-openings $c\ c'$, communicating, respectively, with the chambers $b\ b'$. Encircling the cells is a valve-band F, which is provided with openings f , which can be caused to register with and uncover the openings c while closing the openings c' , or vice versa, by properly shifting the valve-band. Located at a suitable point on the periphery of the wheel is the jet-pipe H, the end of which is connected by a ball-and-socket joint h to the block G, fixedly secured in position within the groove of the wheel directly over and fitted closely to the valve-band F. This block G has forwardly and rearwardly inclined ports or jet-openings g and g' , adapted to register with the openings $c\ c'$, respectively, when the valve-band F is properly adjusted to permit them to do so. The ball-and-socket joint will, however, act as a valve to automatically close the port g when port g' is opened, and vice versa, so that by adjusting the jet-pipe H through an angle of about ninety degrees the propelling fluid can be directed through the port g or g' , as may be desired. As shown, the pipe H is adjusted to eject the fluid through the port g , and the valve-band F is correspondingly adjusted so that the steam will only be admitted into the cells through the openings c , and consequently the wheel will be driven to the right. If desired, the cover band or rim C may be provided with upstanding flanges J, in which are annular grooves j , and the block G is provided with tongues G' to engage said grooves, and thus maintain close contact between the block G and the valve-band F at all times.

In operation when the wheel is driven to the right only the chambers b should be used, and when driven to the left only chambers b' should be used—that is, steam should not be admitted into the chambers $b\ b'$ in succession. For this reason the valve-band F

is employed, by which the inlets into one series of these chambers can be closed when the others are opened; but I do not wish to confine myself to the particular form of valve mechanism for closing the inlets to the chambers.

In order to prevent undue escape of steam or air except at the point desired, packing-segments I may be arranged over the valve-band F at opposite sides of the block G and extend a sufficient distance around the periphery of the wheel to prevent escape of the steam or air from the chambers *b b'* until the ends of such bands are reached. This arrangement will enable the exhaust steam or air to be easily collected and directed off from the apparatus.

In driving the wheel to the right, as indicated in Fig. 1, the inlet-pipe H (which is connected to a suitable supply of steam or compressed air or other fluid) is adjusted in the position shown in full lines, Fig. 1, so as to close port *g'* and open port *g*, and valve-band F is adjusted so as to uncover the series of openings *c* and close the series of openings *c'*. Then when the fluid is admitted into the cells it first impacts against the fixed right-hand wall of each cell and then rebounds and strikes against the movable partition D. As this partition is pivoted at *d*, the natural tendency of the blow would be to swing the inner end of the partition back, but at the same time the outer ends of the arms D, attached to the partition, will be swung forward until arrested by the pins *d'*, whereupon the impact of the blow upon the pins *d'* will tend to throw the wheel forward. By properly adjusting the pivots of the partitions D and properly proportioning the length of the arms D' it will be possible to almost, if not wholly, neutralize the reaction or rebound of the fluid from the solid wall of the cell against which it first strikes, and it might be possible by properly proportioning and adjusting the parts to even make this rebound of the fluid assist in the forward propulsion of the wheel. By providing a yielding partition for the rebound of the fluid the tendency of the rebound impact of the fluid to retard the movement of the wheel is lessened and the efficiency of the wheel is correspondingly increased.

When it is desired to reverse the movement of the wheel, the pipe H can be thrown over to the right, as indicated in dotted lines, Fig. 1, so as to close the port *g* and open the port *g'*. The valve-band F is then shifted so as to cover the series of ports *c* and uncover the series of ports *c'*, and then when fluid is admitted the wheel will be driven to the left, the operation being the same as that above described. Thus each cell and the movable partition therein can be utilized with equal advantage in either the forward or the backward rotation of the wheel.

Having thus described my invention, what I therefore claim as new, and desire to secure by Letters Patent thereon, is—

1. The combination of a wheel having a series of cells in its periphery, means for directing a jet of fluid into said cells and yielding surfaces or partitions within the cells to cushion the rebound of the jets therein substantially as and for the purpose described.

2. The combination of a wheel having a series of cells or buckets, and a series of yielding partitions in said buckets dividing each cell into two transverse chambers; with means for directing a jet of propelling fluid into each chamber, for the purpose and substantially as described.

3. The combination of a wheel having a series of cells or buckets, and a series of hinged or yielding partitions in said buckets dividing each cell into two transverse chambers and adapted to cushion the rebound of the jets therein; with means for directing a jet of propelling fluid into either chamber and means for closing the openings to the other chambers, for the purpose and substantially as described.

4. In a Pelton wheel, the combination of a wheel having a series of cells or buckets, and a movable or yielding partition in each cell to receive the rebound impact of the propelling fluid, for the purpose and substantially as described.

5. In a Pelton wheel, the combination of a wheel having a series of cells, a movable or yielding partition in each cell to receive the rebound impact of the propelling fluid, said partition having radial extensions or arms connected to the wheel at a point exterior to the cells, for the purpose and substantially as described.

6. The combination of the wheel having a series of cells, yielding partitions therein having radially-extending arms suitably connected to the wheel at a point beyond the cells, and an adjustable jet for directing the propelling fluid into the cells, substantially as described.

7. The combination of the wheel having a series of cells, a yielding partition pivoted in each cell having radially-extending arms projecting out of the cells connected to the wheel-rim at a point beyond the cells, and an adjustable pipe for admitting propelling fluid into the cells, substantially as described.

8. The combination of the wheel having a series of cells in its periphery, transverse partitions in said cells, partitions dividing the cells into opposite chambers, ports leading into said chambers, mechanism for closing the inlet-ports of either series of chambers, and means for directing propelling fluid into the open series of chambers, substantially as described.

9. The combination of the wheel having a series of buckets or cells in its periphery, pivoted transverse partitions in said cells having radially-extending arms projecting beyond the cells and loosely connected to the flanges on the wheel, said partitions dividing the cells into two transverse chambers, ports lead-

ing into said chambers, and means for directing fluid into the open series of chambers, substantially as described.

10. The combination of the wheel having a series of closed cells or buckets in its periphery, and a transverse partition in each cell dividing the same into front and rear chambers; with mechanism for closing the inlets of either series of chambers and means for admitting propelling fluid into the other series of chambers as the wheel rotates, substantially as described.

11. The combination of the wheel having a series of closed cells or buckets in its periphery and outwardly-projecting flanges at each side of the cells projecting beyond the same, a transverse partition in each cell dividing the same into front and rear chambers, said partitions having radially-projecting arms extending through the outer walls of the cells and loosely connected to the said flanges beyond the cells, and means for admitting propelling fluid into either series of compartments as the wheel is rotated, substantially as described.

12. The combination of the wheel having a series of closed cells or buckets in its periphery and a transverse partition in each cell dividing the same into front and rear chambers, with an annular valve-band encircling the series of cells having ports adapted to register with the inlets to either series of chambers in the cells while closing the inlets of the other series of chambers therein, for the purpose and substantially as described.

13. The combination of the wheel having a series of closed cells or buckets in its periphery, a transverse partition in each cell dividing the same into front and rear chambers, and an annular valve-band encircling the series of cells having ports adapted to register with the inlets to either series of chambers in the cells while closing the inlets of the other series of chambers therein; with a fixed block having oppositely-inclined ports, and an inlet-tube for the propelling fluid connected to said block and adapted to admit the fluid to either of said ports, for the purpose and substantially as described.

14. The combination of the wheel having a series of closed cells or buckets in its periphery and outwardly-projecting flanges at each side of the cells projecting beyond the same, a transverse partition in each cell di-

viding the same into front and rear chambers, said partitions having radially-projecting arms extending through the outer walls of the cells and loosely connected to the said flanges beyond the cells; with an annular valve-band encircling the series of cells having ports adapted to register with the inlets to either series of chambers in the cells while closing the inlets of the other series of chambers therein, and an inlet-tube for the propelling fluid, for the purpose and substantially as described.

15. The combination of the wheel having a series of closed cells or buckets in its periphery and a transverse partition in each cell dividing the same into front and rear chambers, and an annular valve-band encircling the series of cells having ports adapted to register with the inlets to either series of chambers in the cells while closing the inlets of the other series of chambers therein, an inlet-tube for the propelling fluid, and the segmental pieces on opposite sides of said inlet overlying the valve-band to prevent escape of fluid from the cells, for the purpose and substantially as described.

16. The combination of the wheel having a series of closed cells or buckets in its periphery and outwardly-projecting flanges at each side of the cells projecting beyond the same, a transverse partition in each cell dividing the same into front and rear chambers, said partitions having radially-projecting arms extending through the outer walls of the cells and loosely connected to the said flanges beyond the cells; with an annular valve-band encircling the series of cells having ports adapted to register with the inlets to either series of chambers in the cells while closing the inlets of the other series of chambers therein, a fixed block having forwardly and rearwardly inclined ports, and an inlet-tube for the propelling fluid connected to said block and adapted to admit the fluid to either of said ports, all substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

CHARLES FRANKLIN DU BOIS.

Witnesses:

FRED. ZEISWEISS,
GEO. E. STARN.