

CHARLES L. STEVENS.

Improvement in Hydropneumatic Motor.

No. 120,545.

Patented Oct. 31, 1871.

Fig. 1.

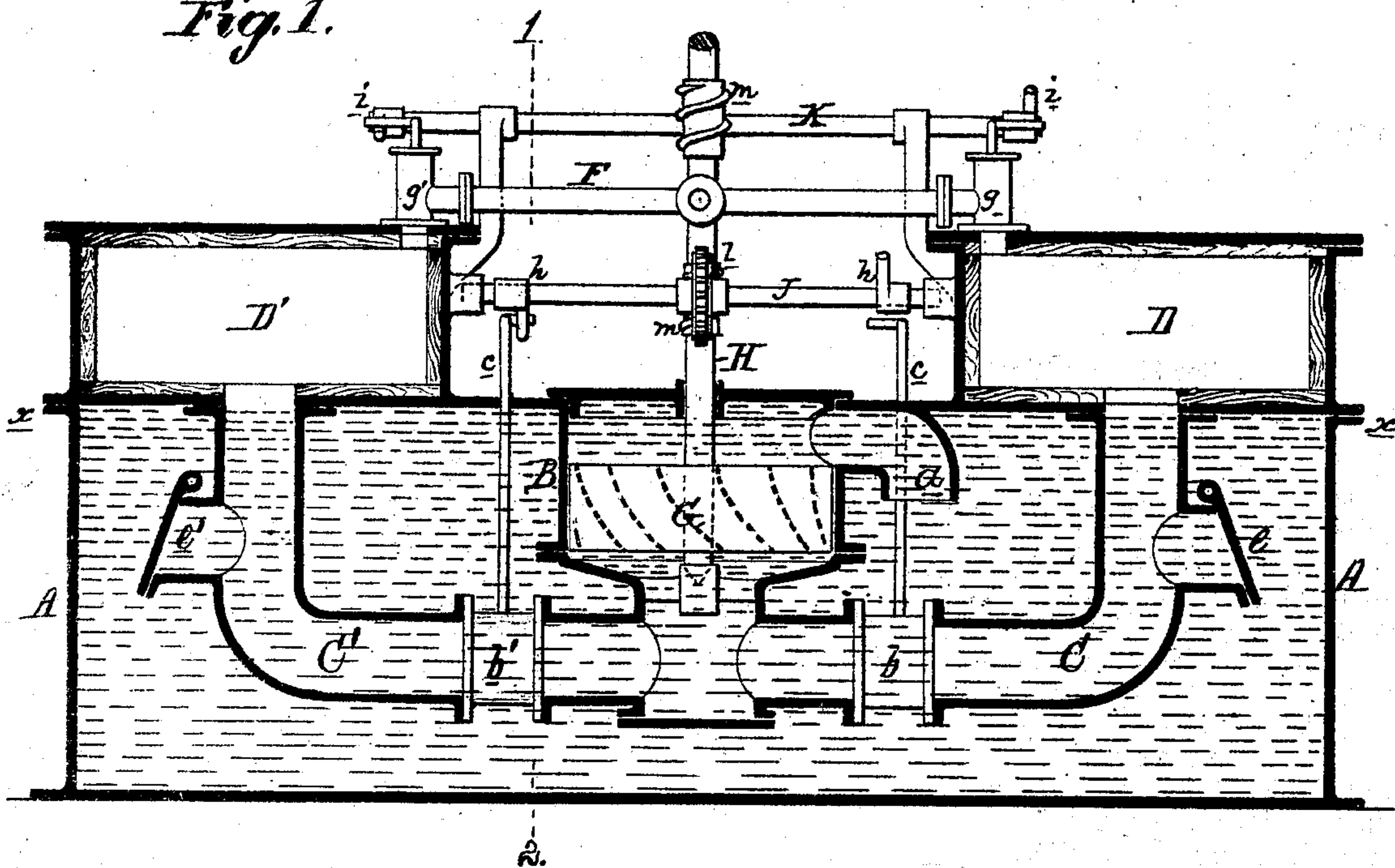


Fig. 2.

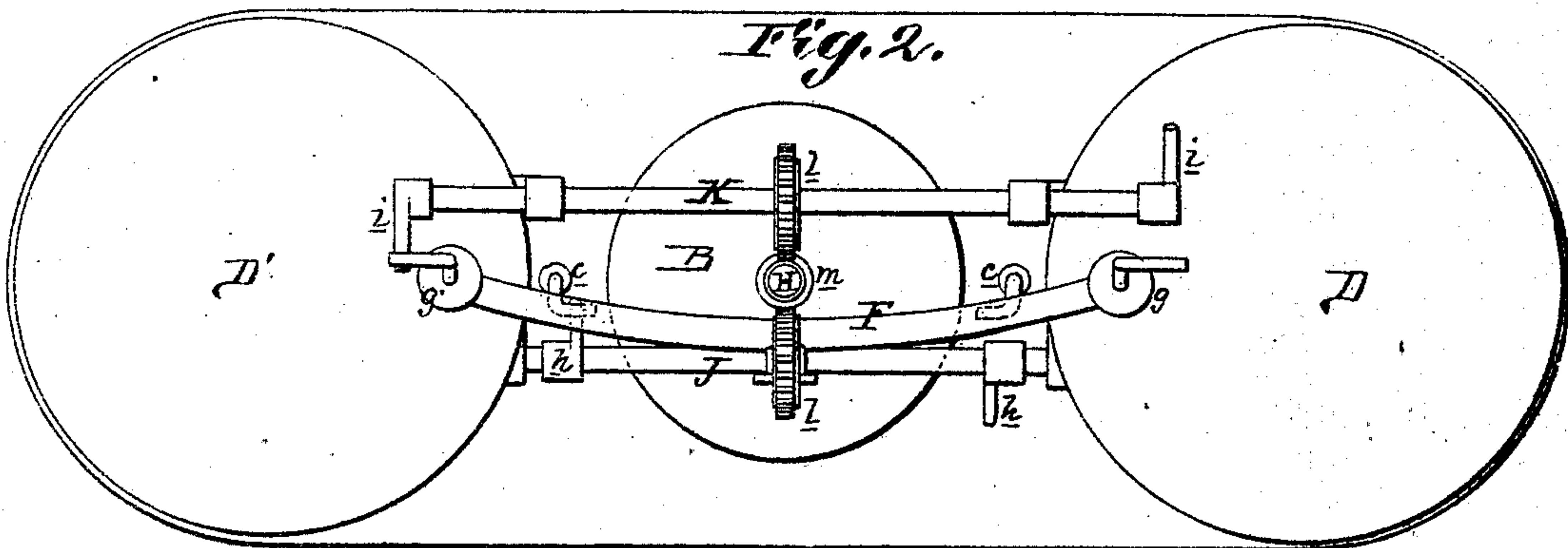
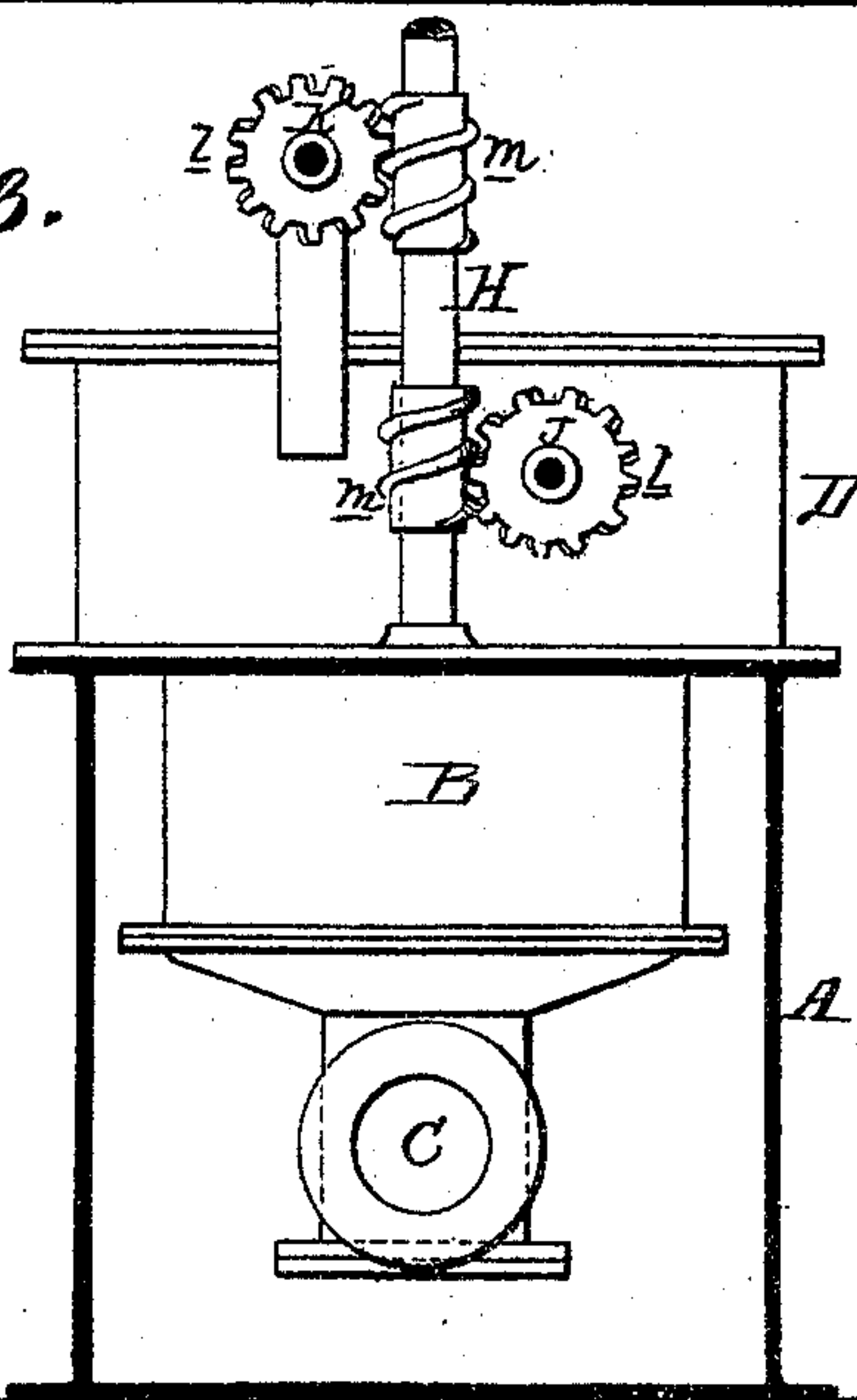


Fig. 3.



Witnesses:
Harry Smith
Thos. McSwain

Charles L. Stevens
by his Attys.
Horton and Son

UNITED STATES PATENT OFFICE.

CHARLES L. STEVENS, OF GALESBURG, ILLINOIS, ASSIGNOR TO HIMSELF AND L. B. FLANDERS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN HYDRO-PNEUMATIC MOTORS.

Specification forming part of Letters Patent No. 120,545, dated October 31, 1871.

To all whom it may concern:

Be it known that I, CHARLES L. STEVENS, of Galesburg, county of Knox, State of Illinois, have invented a Hydro-Pneumatic Motor, of which the following is a specification:

My invention consists of a hydro-pneumatic motor, in which a turbine or other water-wheel is actuated by atmospheric pressure, through the intervention of liquid, in the peculiar manner fully described hereafter.

Figure 1 is a longitudinal section of my hydro-pneumatic motor; Fig. 2, a plan view of the same; and Fig. 3, a transverse section on the line 1 2, Fig. 1.

A represents a water-vessel of any suitable size and shape, open at the side or top so as to afford free communication of the interior with the external atmosphere, and kept constantly filled with water to about the level *xx*, Fig. 1. Within and about the center of this vessel is a casing, B, communicating at the top with the interior of the vessel through a branch, *a*, and at the bottom with two pipes, C and C', each provided with a valve, *b* or *b'*, and forming connections between the said casing and two cylinders or chambers, D and D', arranged upon the top of the vessel A. The valves *b b'* of the pipes C C' are provided with rods *c c*, by which they may be opened and closed alternately, as hereafter described; and the said pipes are also provided, at points close to the chambers D D', with flap-valves *e e'*, opening outward, and through which the contents of the said chambers D D' may be alternately discharged into the vessel A when the valves *b* are closed. The chambers D D' are to be made of wood, or of metal lined with wood or other non-conducting material, in order to prevent the premature condensation within the said vessels of steam admitted to the same alternately through a pipe, F, which is provided with valves *g g'*, arranged to be operated automatically, as hereafter described. The casing B within the water-vessel A communicates freely at all times with the latter through the branch *a*, and is adapted for the reception of a turbine or other submerged wheel, G, which can be rotated by water under pressure caused to flow through its passage. This wheel is hung to a vertical shaft, H, which extends upward through the top of the casing and vessel A, and from which the power obtained is transmitted. The valves *b b'* of the water-pipes C C' and the valves *g g'* of

the steam-pipe are operated automatically, and in proper time in respect to each other, by curved arms *h h* and *i i'*, on two spindles, J and K, furnished with worm-wheels *z z*, which gear into and are turned by worms *m m* on the turbine-shaft H.

The operation of the apparatus is as follows: It being supposed, in the first instance, that the chamber D is filled or nearly filled with water forced into the same by atmospheric pressure through the pipe C, that the chamber D' is filled with steam admitted from the pipe F, and that the valve *b* is opened and the valve *b'* closed, shortly before the chamber D is completely filled with water the steam in the chamber D' is suddenly condensed by a water-jet or otherwise, so as to produce a vacuum within the said chamber, and the valve *b* is then closed and the valve *b'* opened. As soon as the valves have been thus adjusted water will be forced, by atmospheric pressure, from the vessel A through the branch *a* into the casing B; thence through the turbine wheel G, which, with its shaft, will be caused to rotate; and thence past the valve *b'* and through the pipe C' into the chamber D', in which a vacuum has been produced, as before described. The water will be thus forced into the chamber D' by atmospheric pressure until the said chamber is nearly filled, the turbine wheel continuing to turn as the water flows through it toward the said chamber; and while this is occurring steam is admitted into the chamber D by opening the valve *g* of the steam-pipe, when the water will, partly owing to the steam-pressure and partly by its own gravity, immediately flow out of the said chamber and into the vessel A, the flap-valve *e* opening freely in order to permit the escape of this water. The operation having progressed thus far, the chamber D' being filled with water and the chamber D with steam, the latter is suddenly condensed so as to produce a vacuum within the chamber D, and the valve *b* is opened and the valve *b'* closed. This having been accomplished, the water will flow through the turbine wheel and pipe C into the chamber D to fill the vacuum there created, the water thus forced from the vessel A turning the wheel in the same manner and in the same direction as that forced into the chamber D'. While the chamber D is being filled with water the chamber D' is emptied through the outlet-valve *e'* and filled with steam, which is condensed as before, so that as soon as

the vessel D is sufficiently filled and the valves properly turned the water may be immediately forced, by atmospheric pressure, into the vessel D' without any pause or cessation in the motion of the turbine wheel and its shaft, which are turned continuously by water under pressure passing into the chambers D and D' alternately.

The apparatus might, if desired, be so modified as to permit the water escaping from the chambers D and D' to pass directly into the casing B above the wheel, and thus aid to turn the latter, instead of escaping at once into the vessel A, as before described.

The apparatus may be properly termed a hydro-pneumatic motor, as, through the agency of

water, the pressure of the atmosphere is the force which is exerted to turn the turbine wheel.

I claim—

A hydro-pneumatic motor, in which water is forced from and a vacuum created in two or more chambers by steam and water-jets, and is caused to actuate continuously a turbine wheel contained in a casing communicating with said chambers, substantially as described.

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

Witnesses:

CHAS. L. STEVENS.

WM. A. STEEL,

HARRY SMITH.

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