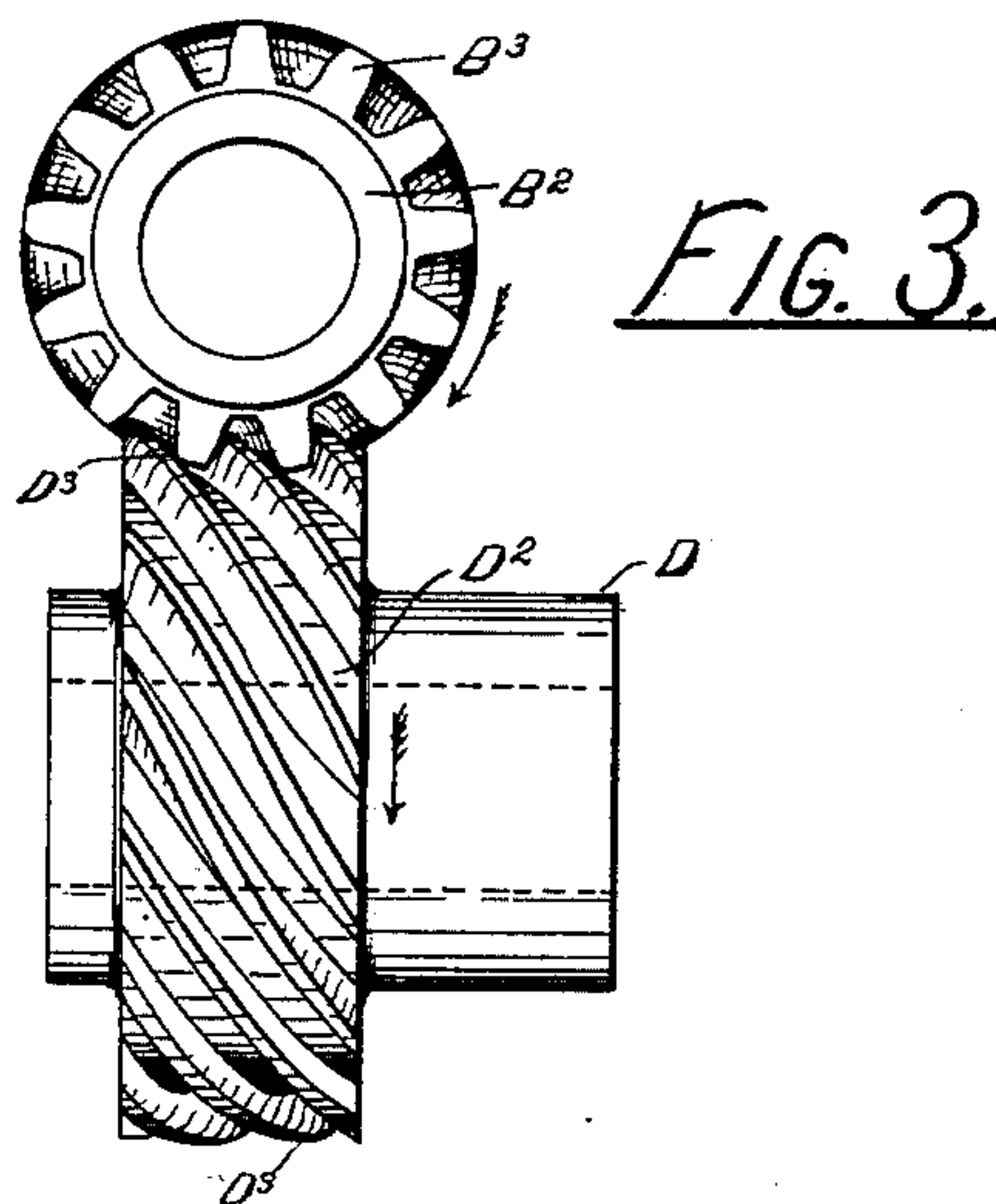
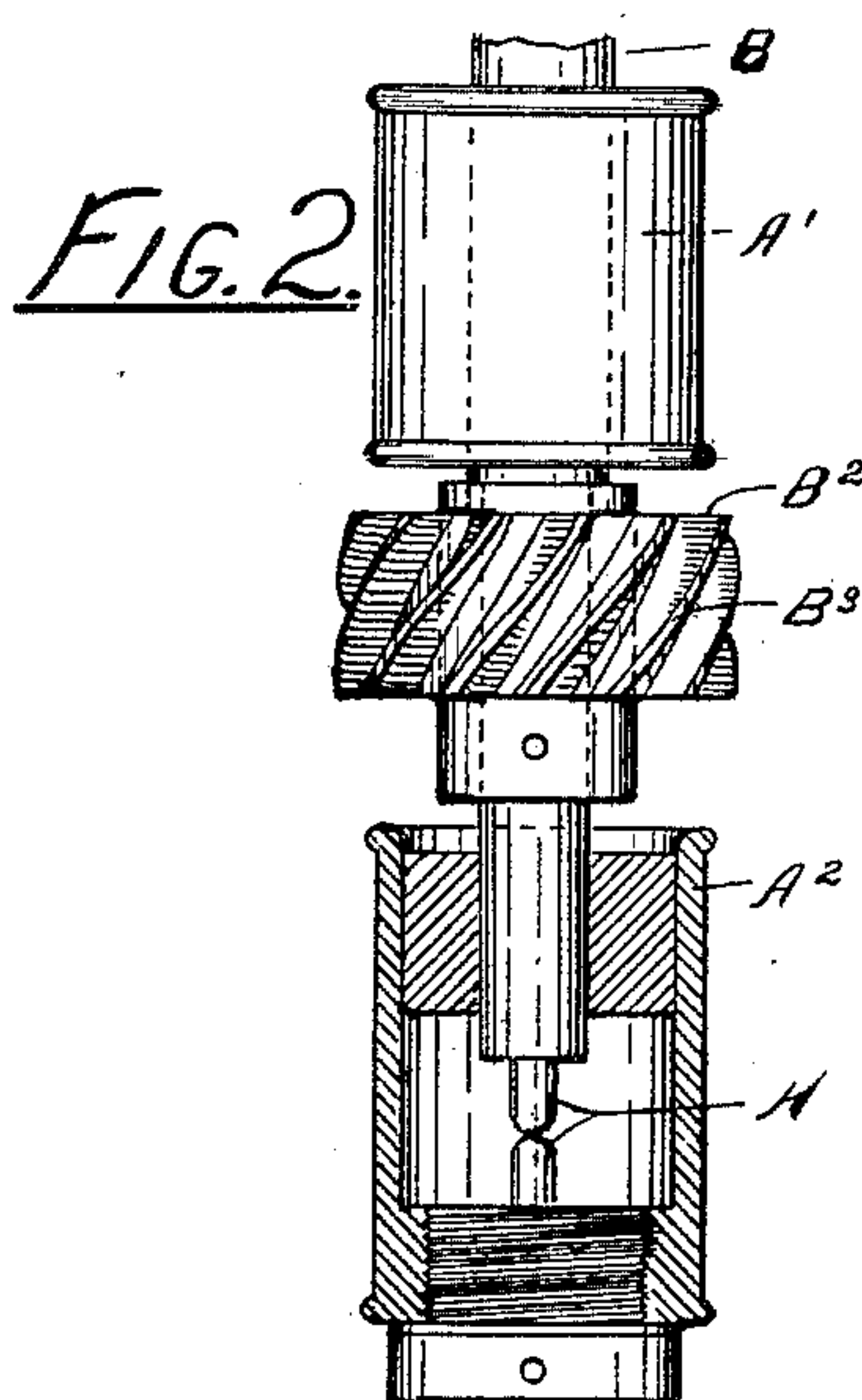
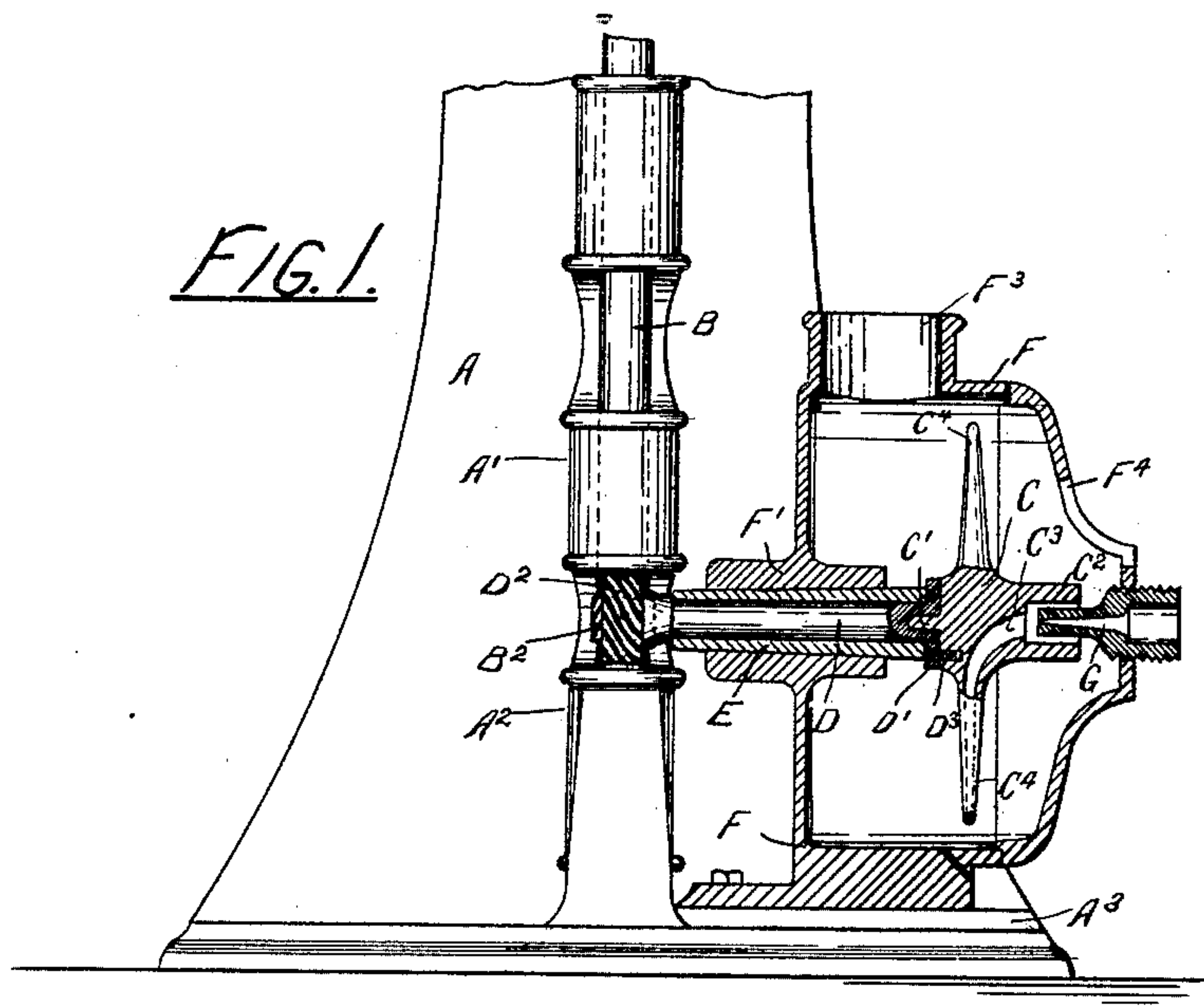


(No Model.)

P. M. SHARPLES.
MOTOR FOR CENTRIFUGAL MACHINES.

No. 435,591.

Patented Sept. 2, 1890.



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MOTOR FOR CENTRIFUGAL MACHINES.

SPECIFICATION forming part of Letters Patent No. 435,591, dated September 2, 1890.

Application filed November 15, 1889. Serial No. 330,486. (No model.)

To all whom it may concern:

Be it known that I, PHILIP M. SHARPLES, a citizen of the United States, residing at West Chester, in the county of Chester, State of Pennsylvania, have invented certain Improvements in Motors for Centrifugal Machines, &c., of which the following is a specification.

This invention relates to improvements in motors adapted more especially for operating machines of high velocity—such, for instance, as are used for separating compounds by centrifugal action.

Heretofore steam reaction-wheels have been applied to such machines; but the disadvantages incident to their use have been such as to prevent their more general application. Owing to its great velocity a very large percentage of the power inherent in the steam has not been utilized, it being impracticable to run the wheel at anything like the velocity of the escaping steam. Moreover, there has been considerable trouble caused by leaky steam-joints and hot bearings, and the making of necessary repairs has been inconvenient and expensive. The main object of my invention is to overcome these disadvantages as far as as possible, and the features involved are fully set forth herein in connection with the accompanying drawings, and are specifically pointed out in the claim.

Figure 1 is an elevation of a vertical machine provided with my improved motor, which is shown in section. Fig. 2 shows more clearly the lower portion of the machine-shaft. Fig. 3 is a plan view of the screw-gearing employed.

A represents the frame of a vertical centrifugal machine, and B the shaft upon which the centrifugal vessel is supported, the latter, as well as the whole upper portion of the machine, not being shown.

A' and A² are bearings for the shaft B, and H is a suitable step for the same.

A³ is the base of the machine-frame, and to it is bolted the frame F of my improved motor, which frame is formed to serve also as a casing for the steam reaction-wheel C. The latter is supported therein in a horizontal bearing F', forming part of the casing, and is represented as secured to its spindle by means of a central teat C' and bolts D³, passing through a flange D', formed on the end of the

spindle D. The latter runs in a bush E. The central steam-passage C³ of the wheel branches outward into one or more arms C⁴, from the open ends of which the steam, which is admitted from the steam-nozzle G, issues. This nozzle, which is secured to the casing, loosely enters the hollow extended hub C² of the reaction-wheel, leaving an annular space around it, and the contracted opening of the nozzle is brought sufficiently close to the steam-passage C³ of the wheel to insure the spreading jet being inclosed by said passage. The nozzle G is entirely free, there being no attempt at a steam-joint. The casing is provided with an opening F³ beyond the circle of the steam-wheel, and preferably also with an opening F⁴ within said circle and near the center of rotation.

To the shaft B of the machine is secured, between the bearings A' and A², a gear wheel or pinion B², the spiral cogs B³ of which approximate the axial line, as indicated most clearly in Fig. 2. On the end of the steam-wheel spindle, which stands at an angle to the shaft B, is secured a gear-wheel D², of larger size than B², and also formed with spiral cogs D³, the angle of which corresponds with that of the cogs on the wheel B², as shown in Fig. 3, thus causing the cogs D³ to be approximately circular. The number of teeth upon the two wheels is evidently not in proportion to their respective diameters, the larger wheel being preferably formed with a less number of cogs than the smaller one. The effect of this construction is that the spindle D makes a greater number of revolutions than the shaft B, and the friction and the wear of the gear are very much less than where the wheels are proportioned in diameter to the number of cogs.

The shaft may be provided with a belt-pulley, either secured thereto permanently or in the place of the cog-wheel B², thus forming a belt-machine. To apply my reaction-motor to such a machine requires no change, one style of machine only being required for either belt or steam, thus avoiding the necessity of manufacturing and keeping in stock two different styles, and also permitting them to be quickly converted from one to the other, if desired. The few parts upon which there is any wear can be very easily replaced.

The operation of my improved motor is as follows: The steam supplied through the nozzle G enters the central steam-passage C³ of the wheel in the same manner as an injector, the spreading jet being inclosed by the enlarged passage C³ and conducted outward to the open ends of the curved arms C⁴ of the wheel, the rapid rotation of which, caused by the recoil of the wheel in a direction opposite to that of the issuing steam, assists by its centrifugal action the free passage of the steam through the arms and prevents any possible leakage of steam around the loose nozzle G. The same centrifugal action also prevents any of the exhaust-steam from occupying the space within the circle of rotation, thus barring any escape of said exhaust through the opening F⁴. This opening thus serves the purpose of permitting ready inspection of the motor during its operation and greatly facilitates the proper balancing of the reaction-wheel. It also permits an inflow of fresh air to the casing, thus assisting the escape of the exhaust-steam through the opening F³ and increasing the effective power of the motor. The screw-gearing B² D² allows the steam-wheel to be run at a much higher speed than is practicable with ordinary forms

of gear on account of excessive friction and wear with the latter, and a high wheel-speed is very desirable on account of the very great velocity with which the steam (as before referred to) issues from the wheel and which necessitates a high speed to get economical results.

Having thus fully described my invention, I do not limit myself to the exact construction shown, but what I claim is—

The combination, with a shaft stepped, substantially as described, in suitable bearings and having a gear-wheel thereon, said shaft adapted to carry the vessel to be rotated, of a casing, a shaft journaled therein and carrying a gear-wheel which meshes with the wheel on the other shaft, a reaction-wheel having a hollow hub, and a steam-nozzle discharging into said hub, said casing having an exhaust-steam port and an air and sight opening therein, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

PHILIP M. SHARPLES.

Witnesses:

MARTHA SHARPLES,

CARRIE H. JACKSON.