

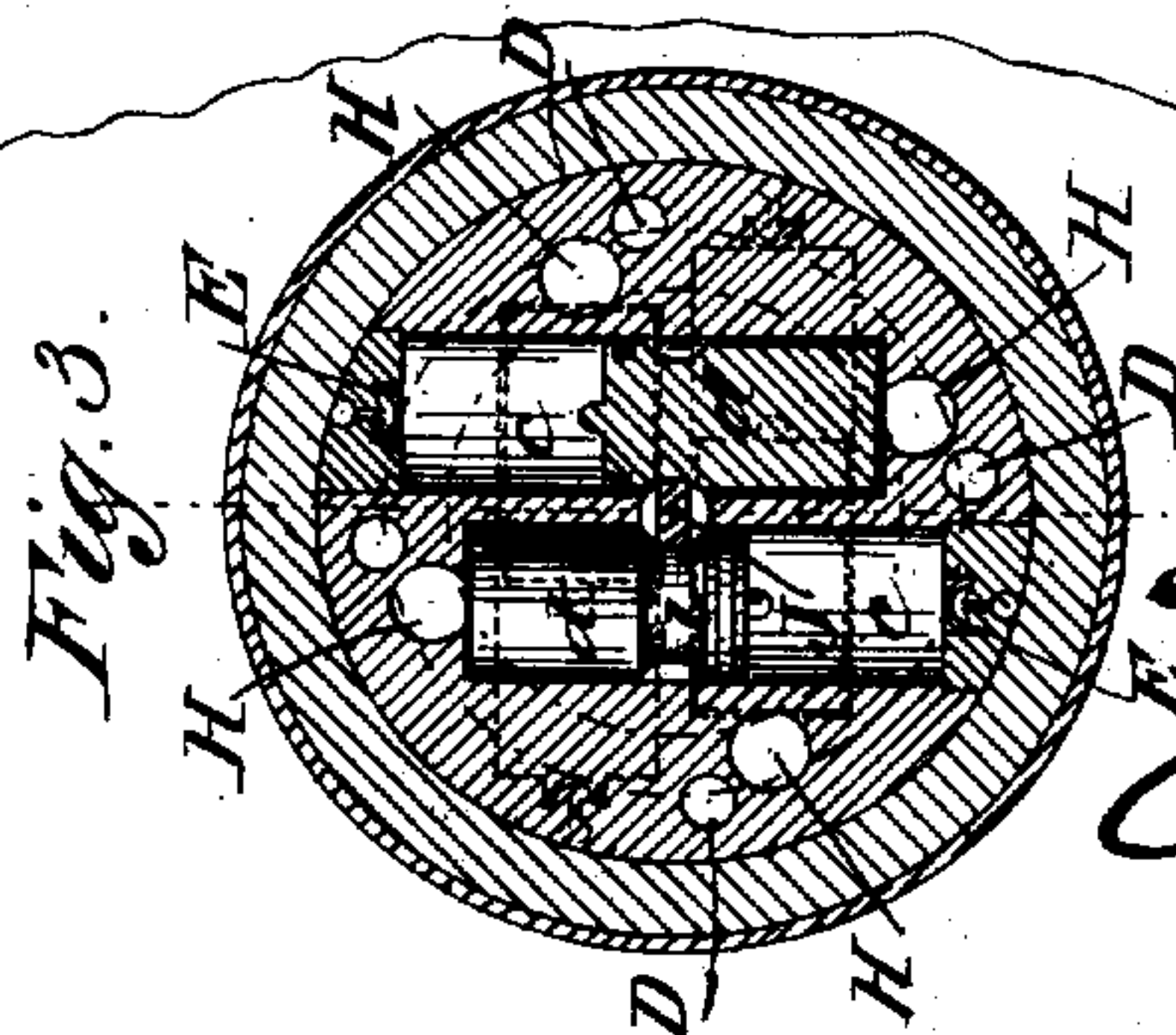
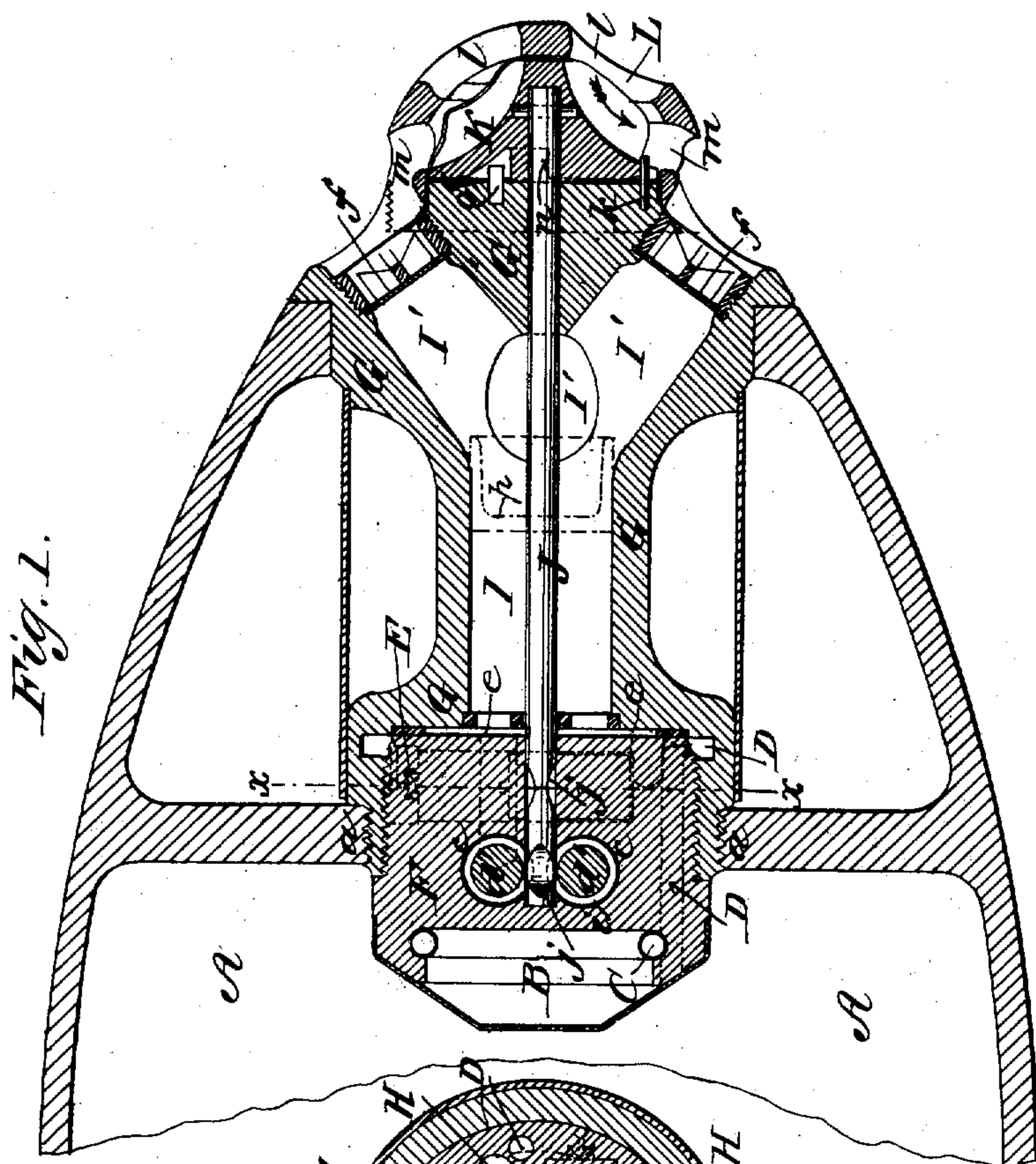
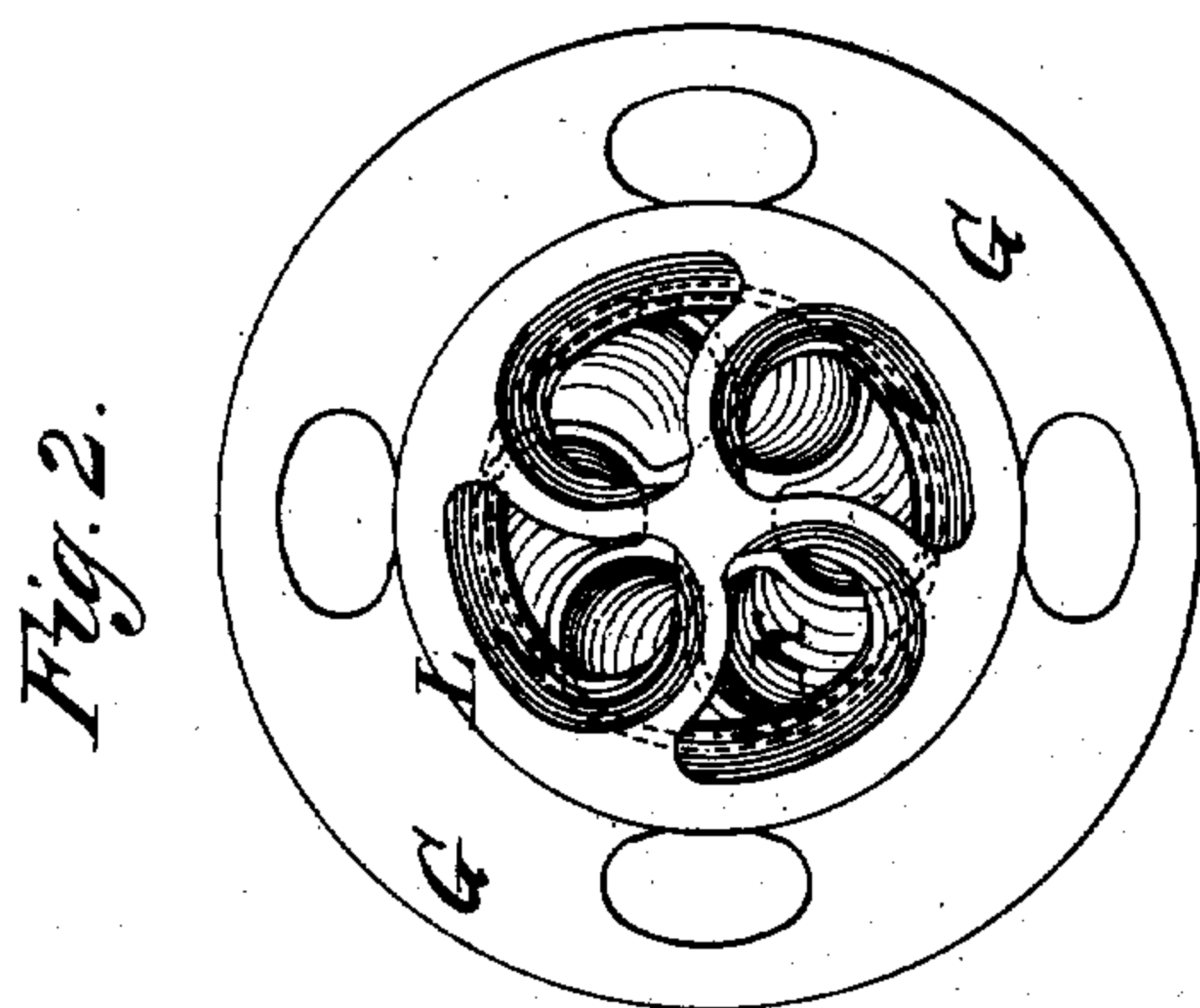
(No Model.)

H. P. MERRIAM.

DETONATING MECHANISM FOR EXPLOSIVE SHELLS.

No. 431,377.

Patented July 1, 1890.



WITNESSES:

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DETONATING MECHANISM FOR EXPLOSIVE SHELLS.

SPECIFICATION forming part of Letters Patent No. 431,377, dated July 1, 1890.

Application filed December 23, 1889. Serial No. 334,694. (No model.)

To all whom it may concern:

Be it known that I, HENRY P. MERRIAM, a citizen of the United States, residing at the city, county, and State of New York, have invented certain new and useful Improvements in Detonating Mechanism for Explosive Shells, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal section of the head of a shell; Fig. 2, a front elevation of the apex; and Fig. 3, a cross-section $x x$ of Fig. 1.

My invention relates to dynamite or other highly-explosive shells; and its object is to detonate the shell-charge by the blow of immersion on the head of the shell when it strikes a water-target.

My invention relates especially to detonators wherein plungers that explode the detonating compound are actuated by pressure received through a conducting tube or passage from a column of water admitted therein when the shell is immersed, as described and claimed in my separate Patent, application filed December 23, 1889, Serial No. 334,693.

The invention herein consists of an improved device for locking or retaining the plungers away from the fulminate-caps under normal conditions and releasing the same automatically at the proper time to be actuated by pressure, the entire mechanism being embodied in a single case forming the apex of the shell.

A is the chamber of the shell filled with high explosive.

B is a chamber filled with gun-cotton; C, an annular tube containing fulminating mercury, and D are time-fuses filled with slow-burning compound—such as meal-powder—to promote or delay action, communicating with the tube C and with the primers of the fulminate caps E. These parts composing the detonator are contained in a case F, screwed into the apex piece G, which is removable, being screwed into the head of the shell at a .

The case F is provided with cylinders c , which are perpendicular to the axis of the shell, containing plungers $d d'$, fitting airtight therein, which when released are movable toward the fulminate-caps E. It is to be observed that the plungers $d d'$ are arranged

tangentially to a central circle intersecting their axes, so that they move severally in different directions. The holes H communicate with the cylinders c at the backs of the plungers, and through the space or passage $e a$ a tube I or water-way in the apex piece connects with said holes H and plungers $d d'$. The tube I has diverging branches I', opening at different sides of the head of the shell to insure the entrance of water should the shell strike on its side. The tubular branches I' are provided with diaphragms f , of thin material, which is ruptured by the blow of immersion, as described and claimed in my said separate patent application.

The locking device for the hammers $d d'$ consists of a rotary shaft J, axial to the shell, which shaft carries a spirally-bladed wheel K at its outer end in the apex, imparting rotation to the shaft at the instant of immersion. The several plungers $d d'$, arranged tangentially to the shaft, are provided with circumferential grooves i at the parts thereof opposite the shaft when the plungers are retracted. The normal diameter of the shaft J intersects these grooves i and retains the plungers in their inactive position; but there are recesses j in the sides of the shaft, the same being the equivalent of the elevations and depressions of the collar 20 in my said separate patent application, which recesses when rotated—say a quarter of a turn—coincide with the surfaces of all the cylinders c simultaneously, giving clearance to the plungers and releasing them, subject to action by the pressure from the tube I. The spirally-bladed wheel K is retained from accidental rotation by the shear-pin k , which is sheared off when the wheel is struck forcibly by the water.

L is a stationary guard placed over the wheel for the purpose of protection, and the guard L has inlets l and outlets m , giving free water-way through the face of the wheel.

Any suitable stop may be employed to prevent the rotation of the shaft J beyond the releasing-point, a shoulder n being indicated, terminating a recess in the back of the wheel, into which recess a pin o projects, so as to abut on said shoulder at the completion of a quarter-turn.

In operation the diaphragms f are burst upon striking the water, and the latter enters

one or more branches I' in solid columns, compressing the air in the tube I and in the spaces back of the plungers $d d'$. The wheel K, rotating at the same instant, releases all the plungers, permitting the pressure to act forcibly thereon in effecting the discharge of the several fulminate caps E. The caps being instantly discharged, the time element necessary to give the shell proper immersion under a hostile vessel or other object is obtained by regulation of the slow-burning composition in the passages D.

In order to more fully insure the compression of the air and full effect of the column of water, a piston p may be interposed in the tube I, as indicated by dotted lines, this feature being also claimed in said separate application. The access of water to the detonator-case is thereby also prevented.

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

1. The combination, with an explosive shell, of a pressure-actuated detonating plunger or plungers, a rotary locking-shaft bearing circumferential elevations and depressions, which elevations intercept the path of the plungers, and a spirally-bladed wheel exposed at the surface of the shell for rotating the shaft to disengage the plungers.

2. The combination, with an explosive shell, of a pressure-actuated detonating plunger or plungers perpendicular to the axis of the shell, and a rotary locking-shaft parallel to the axis of the shell having circumferential elevations and depressions at portions opposite the plun-

ger or plungers, which respectively intercept or clear the path of the latter, and a spirally-bladed wheel exposed at the surface of the shell for rotating the shaft to disengage the plungers.

3. The combination, with an explosive shell, of a pressure-actuated detonating plunger or plungers perpendicular to the axis of the shell, a rotary locking-shaft axial to the shell, having circumferential elevations and depressions at portions opposite the plunger or plungers, which respectively intercept or clear the path of the same, a spirally-bladed wheel on the shaft exposed at the apex of the shell, and a guard or perforated shield placed over the said wheel, having inlet and outlet passages, substantially as described.

4. As a structural combination in an explosive shell, a detonator-case containing firing-plungers tangentially arranged about a common axial locking-shaft, recesses in the shaft to clear the plungers when turned opposite them, a spirally-bladed wheel on the shaft exposed at the apex of the shell, and a tubular water-passage concentric with the shaft, through which the latter extends, communicating with the pressure side of the plungers and branched to open around the apex, the whole being combined in a removable apex-piece, substantially as shown.

HENRY P. MERRIAM.

Witnesses:

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