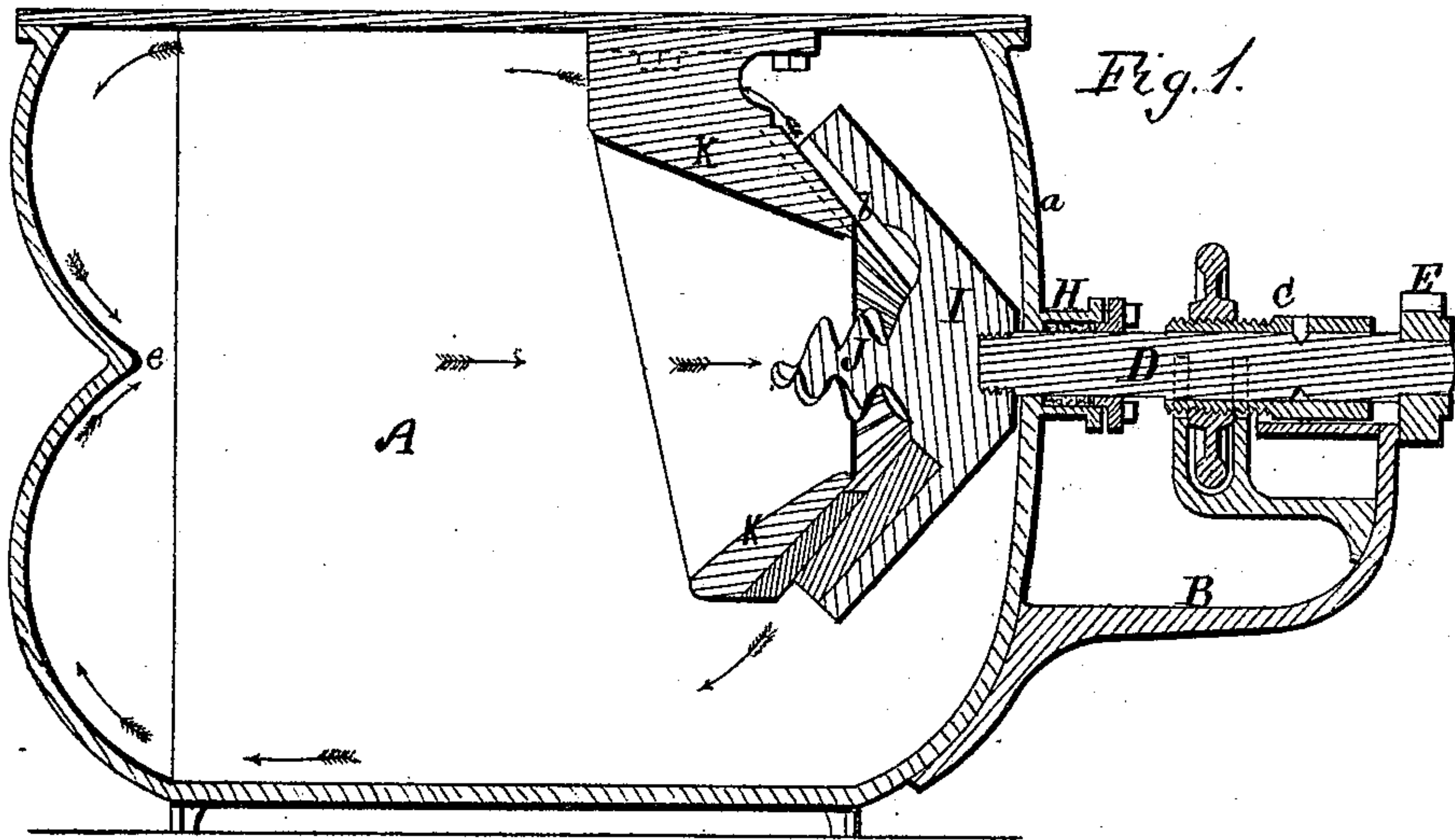
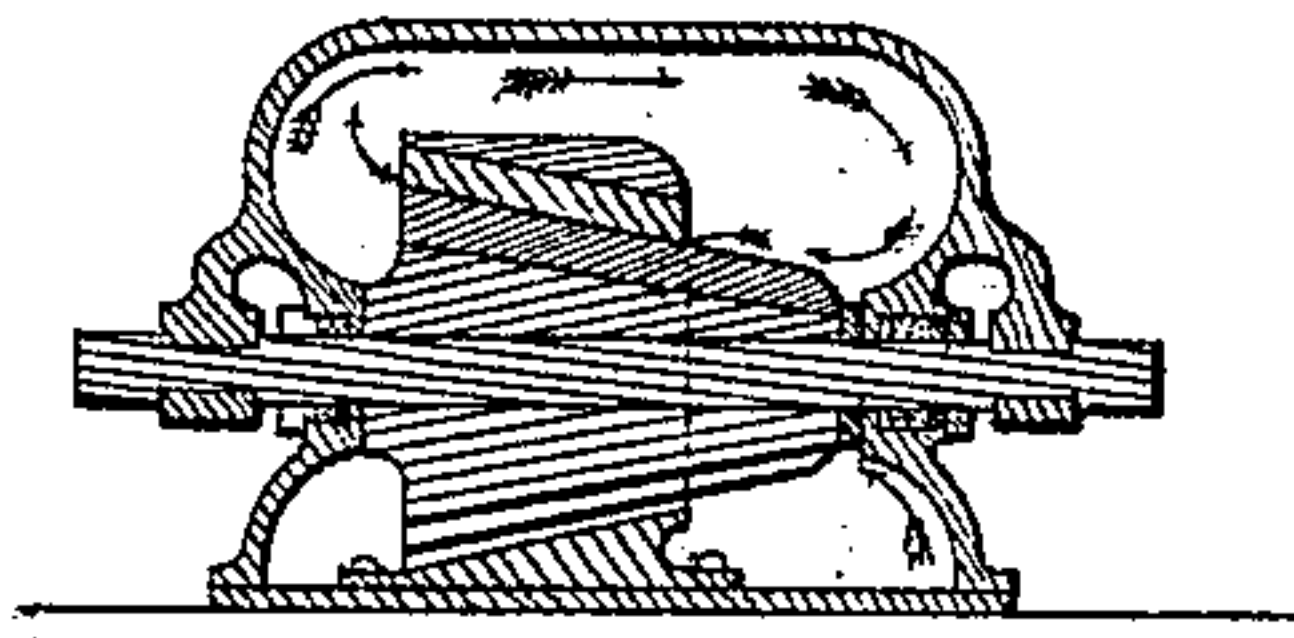


S. L. GOULD.  
PAPER PULP ENGINE.

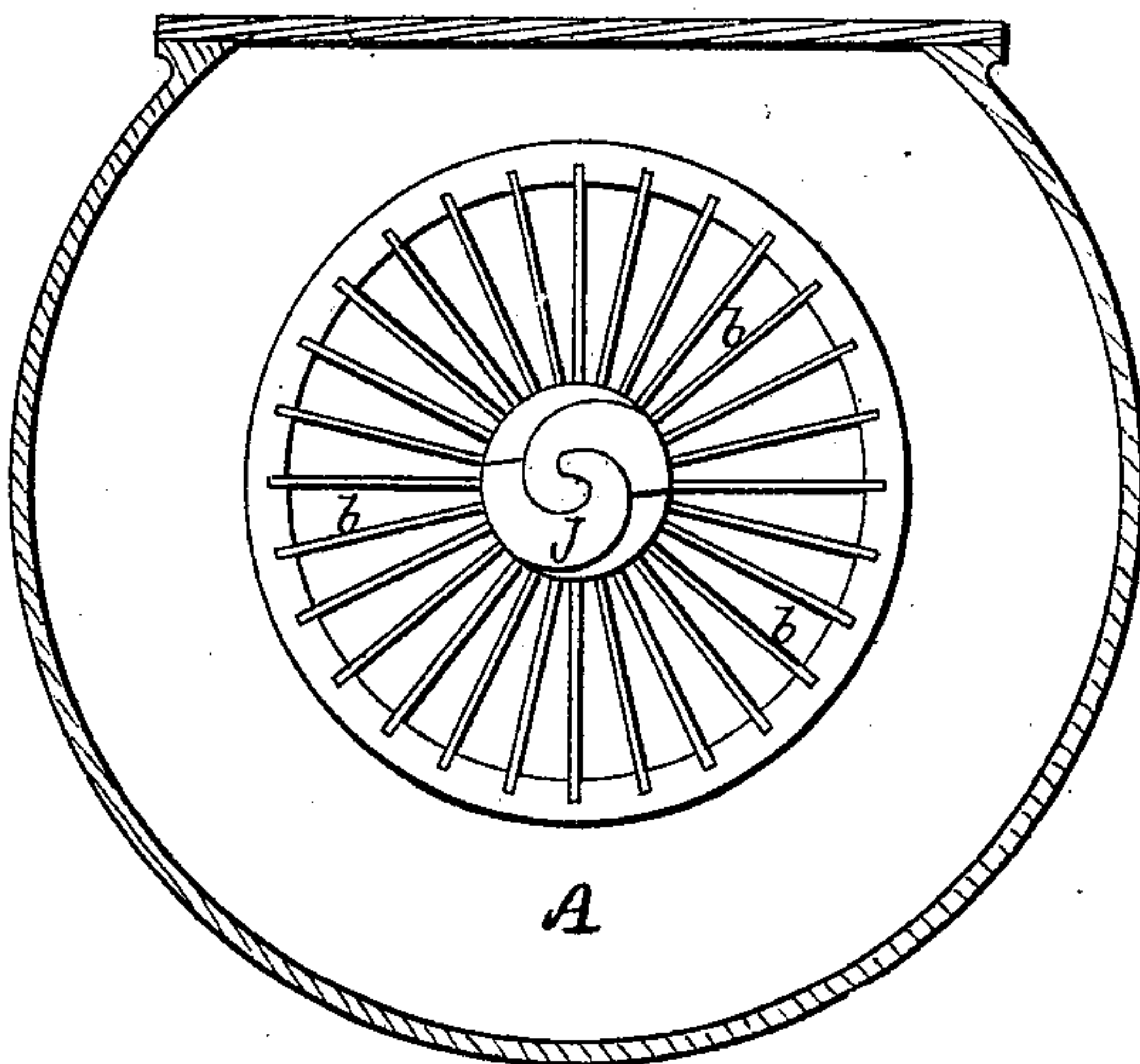
No. 174,805.

Patented March 14, 1876.

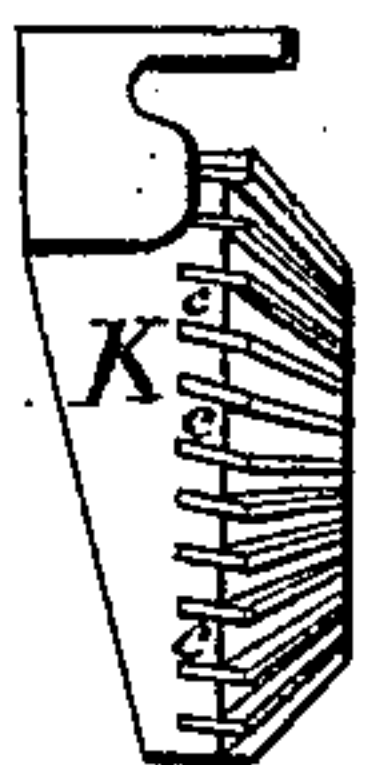
*Fig. 5.*  
*Reduced.*



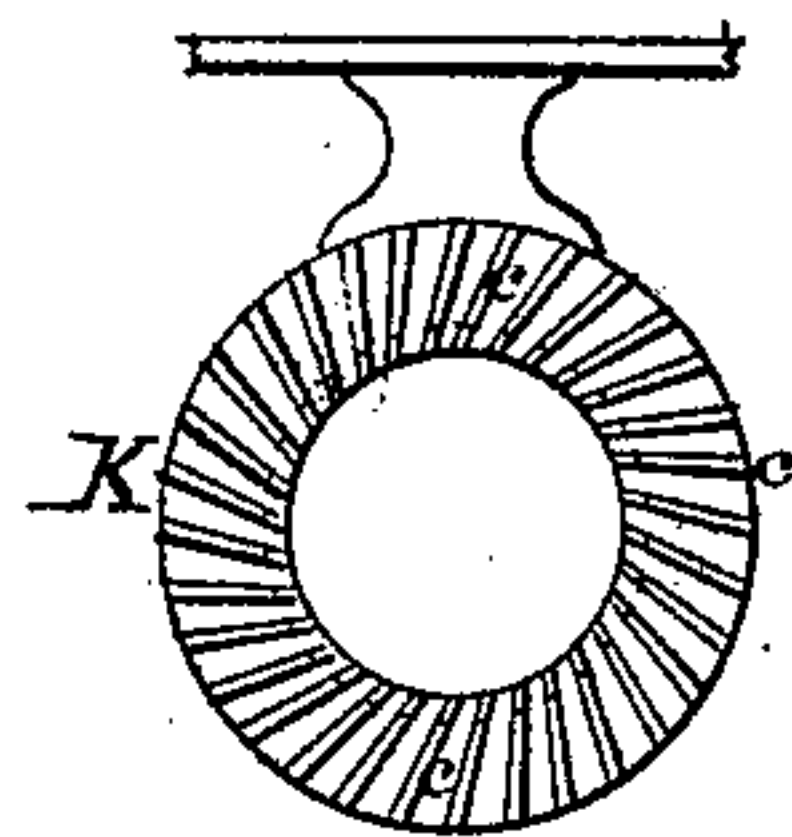
*Fig. 2.*



*Fig. 3.*  
*Reduced.*



*Fig. 4.*  
*Reduced.*



Witnesses.  
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# UNITED STATES PATENT OFFICE.

SIMEON L. GOULD, OF GARDINER, MAINE.

## IMPROVEMENT IN PAPER-PULP ENGINES.

Specification forming part of Letters Patent No. **174,805**, dated March 14, 1876; application filed May 20, 1875.

*To all whom it may concern:*

Be it known that I, SIMEON L. GOULD, of Gardiner, Kennebec county, Maine, have invented certain Improvements in Paper-Pulp Engines, of which the following is a specification:

This invention has reference to pulp grinding or rag engines of paper machinery. Its object is to avoid the many serious objections attendant upon the method, now universally practiced, of stepping or mounting both ends or journals of the shaft of the rotary grinder in boxes or bearings, such objections being, among others, great friction, rapid wear, and constant liability to derangement and clogging by pulp.

The class of engines upon which my present improvement is based is that which embraces a mode of maintaining the circulation of stock within the case or curb, and between the grinding-surfaces, by centrifugal action, induced and maintained by the revolution of the grinding disk or head; and my present invention presents a broad distinction against others of its class, in that I dispense entirely with the bottom or outer step or bearing of the shaft, and leave a free and unobstructed space between the grinding-surfaces and bottom or outer end of the case of the engine.

The advantages attaching to such a construction, as well as the mechanical details of the same, will be duly alluded to.

The drawings accompanying this specification represent, in Figure 1, a vertical central and longitudinal section of the same. Fig. 2 is a vertical cross-section of such engine, taken through the spheroidal case, and in front of the grinding-head, the annular grinding-bed being removed. Fig. 3 is a side elevation; and Fig. 4 is an outer face view of the stationary annular grinding-bed.

In these drawings the shell, case, or curb of a pulp-engine is shown at A, as preferably prolate spheroidal in general form, (though this form is not arbitrary,) and placed, in the present instance, with the axis of the spheroid in a horizontal plane, though it may be in a vertical plane.

The case A may be a circular cylinder in cross-section, and cast in halves, united at center by bolts passing through flanges, or it may be formed with a flattened top, covered

by a plate, to enable ready access to be had to its interior.

Upon the head or one end *a* of the shell or curb A I affix a horizontal bracket or stage, B, centrally, upon which, and of the case A, I erect a box, or bearing, C, in which the outer end of a horizontal shaft, D, rotates, the means for driving this shaft, in the present instance, being a pinion, E, fixed to its outer end, which may engage a multiplying driving-gear mounted upon a counter-shaft revolving in bearings affixed to the bracket B. The shaft D finds its second and inner bearing in a stuffing-box, H, applied to the head *a* of the case A, and terminates at the inner face of such head, where it is secured in any proper manner, centrally, to the rear and outer side of an interiorly concave or frusto-conical head or stock, I, which is arranged axially with respect to the shaft D and case A, and revolves with such shaft. The inner wall or periphery of the flaring head I is armed with a series of grinding blades or knives, *b b*, &c., which extend from a point near the axis of such head outwardly to its periphery; and these blades may be disposed radially or tangentially of the head, according to circumstances, and the manner in which they are to cut. J in the accompanying drawings represents a conoidal or tapering screw or worm which is disposed centrally within the head I, and is secured to or constitutes a prolongation of the inner end of the shaft D, the purpose of this worm being to prevent stagnation and eddy of the "stuff" within the case, and accelerate the circulation of such stuff by throwing it off and outward to the periphery of the head, in addition to the force exerted to produce this result by the centrifugal action of the revolutions of such head.

The fellow and stationary grinder, which operates with the revolving head I to reduce, disintegrate, and separate the fibers of the stock, by obtaining two grinding-surfaces, between which such action is produced, is shown at K as an annular bed or disk in the form of a hollow conic frustum, whose exterior tapering surface or periphery corresponds to the interior of the head I, and is supplied with a series of grinding-blades, *c c*, &c., as shown in Fig. 4 of the drawings, these blades being shown in the present instance as arranged



tangentially upon the bed K, while the teeth *b b*, &c., of the head I, are disposed radially, by this means producing a shearing cut upon the stock, which is highly effectual, and also increasing the centrifugal force exerted upon such stock by the rotations of the head.

The annular or open bed K is supported from the top of the curb A, in any suitable manner, to obtain great rigidity and strength of parts, and, as will suggest itself to the minds of good mechanics, may be stayed at bottom, if desirable; but in any event a free and unobstructed space exists in front of it, and between it and the opposite pole or center *e* of the said curb. This last-named pole *e* of the curb A is an apiculated deflector, which extends a short distance axially into the interior or grinding chamber of such curb, and by deflecting or throwing off toward and into the center of the grinding-bed the stuff in the engine aids very materially in maintaining an effectual circulation of such stuff throughout the circuit of the chamber.

In addition to dispensing with the outer end bearing of the shaft D, my engine presents a wide variation from others of its class, in that its grinding-surfaces are arranged and revolve in a vertical plane in lieu of a horizontal plane, as heretofore; and it is available, with some additions or removals, equally for beating and washing, as no arms or obstructions present themselves; and I am enabled to produce pulp of any length of fiber desired.

I avoid the thrusts, strains, great friction, and wear, and danger of misplacement now attendant upon stepping the outer or lower end of the shaft D in a bearing, and I avoid also the stagnation and eddy of the stock about such step, and the accumulation of stones, pieces of iron, or other foreign injurious substances, which would result in much harm.

The operation of this engine in grinding and beating stock is as follows—it being presumed that the engine has been previously “furnished:”

The rotation of the head I produces a centrifugal action, which induces a powerful and continuous current or circulation of the stock in the directions shown by the arrows in Fig. 1 of the drawings—that is, pass between the head I and annular bed K, and is acted upon by the knives, with which these parts are armed. Thence the stock is thrown off outwardly from the periphery of the head and bed against the inner periphery of the case A, and toward and against the deflector *e*, by which the current is deflected in a reverse direction into and through the center of the bed K, and again between the grinding-surfaces, the conical screw J acting to draw the stock inward, and, as before stated, preventing stagnation and eddying of the stock, which otherwise might exist at this point.

The form of the case A and of the head I and annular bed K, aided by the screw J and

deflector *e*, effectually prevent settling and accumulation of stock at the bottom of the said case, and a lively circulation throughout the entire circuit of the case is at all times apparent.

The grinding head I is to be fed toward or away from the bed K by suitable means, and other details are to be added to the engine which are not shown herein, as they embody nothing peculiar to my present improvements.

I do not confine myself to the precise form of the case A, or of the head I and annular bed K, as herein illustrated, as these may be departed from to a considerable extent.

Manifestly a modification of my invention would be to transpose the relative positions of the rotary grinder and grinding-bed—that is, the ring or female grinder may be stationary, and the male grinder revolve within it, as shown in Fig. 5 of the accompanying drawings, which is a section of such a modification. In this case, as in the former, a continuous circulation throughout the shell or case A is maintained by centrifugal force generated by the revolving male grinder. In this construction, however, the two grinders are necessarily longer than in the former, and a shaft bearing within both ends of the case A will probably be desirable, if not necessary.

Having thus described my invention. I claim as such, and desire to secure by Letters Patent, the following:

1. The combination, with the case or curb and the stationary annular grinding-bed, of the rotary grinder and its supporting-shaft, which takes its bearing at one end only of the case, and terminates in the rotary grinder, substantially as shown and set forth.

2. The stationary annular grinding-bed and rotary grinder, in combination with the screw or worm attached to and revolving with the rotary grinder, and extending into the opening in the stationary annular grinding-bed, substantially as shown and set forth.

3. In combination with a rotary grinder, a stationary annular grinding-bed, arranged within the case, substantially as described, whereby a space is left between it and the end of the case opposite to that in which the driving-shaft of the rotary grinder is supported, and having an unobstructed opening through its center, or thereabout, to permit free circulation and passage therethrough of the stock to and between the grinding-surfaces, substantially as set forth.

4. The stationary annular grinding-bed, the rotary grinder, the axial worm or screw, attached to and moving with the rotary grinder, and the deflector *e*, said parts being arranged together within the case or curb for joint operation, substantially as shown and described.

SIMEON L. GOULD.

Witnesses:

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