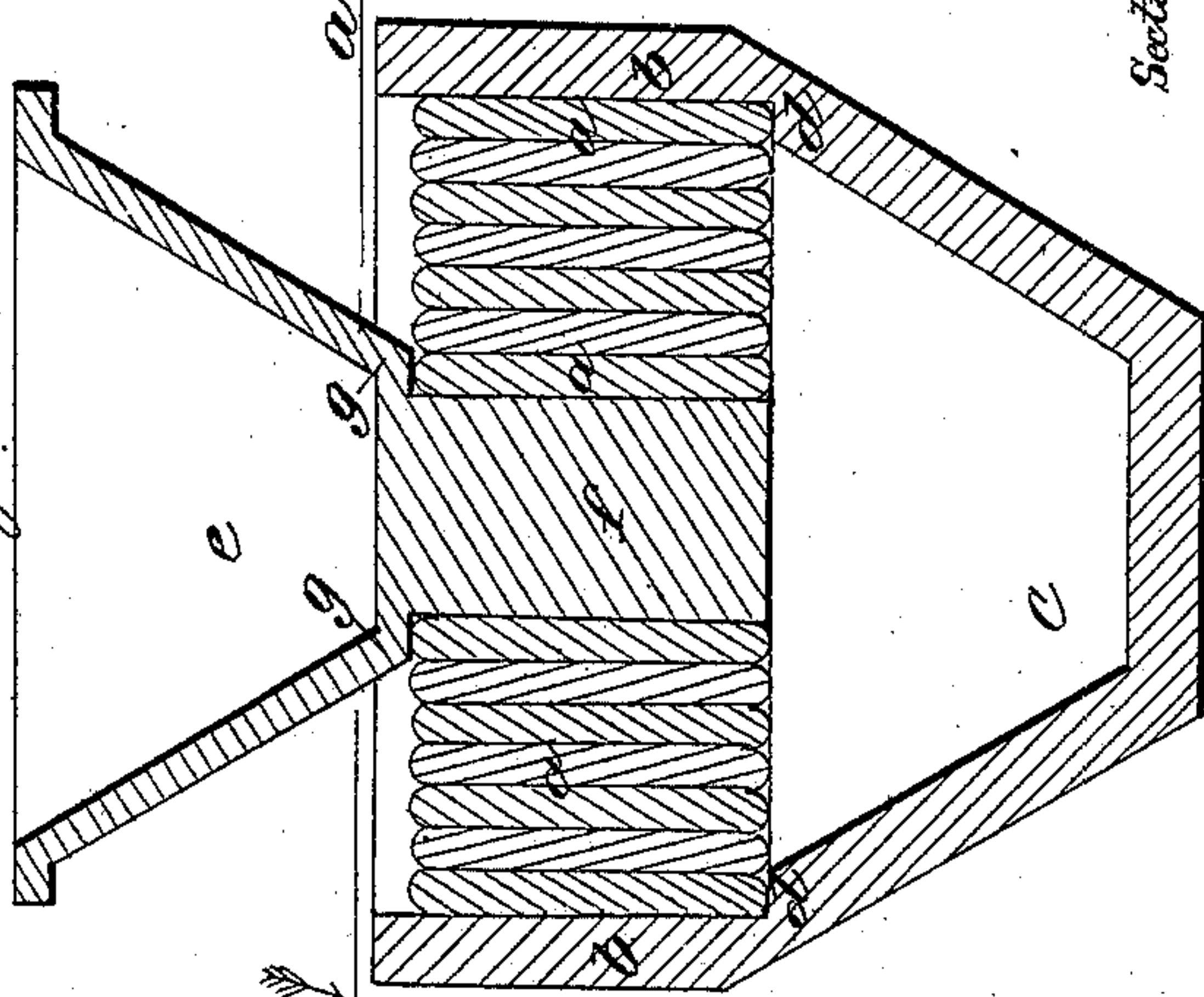
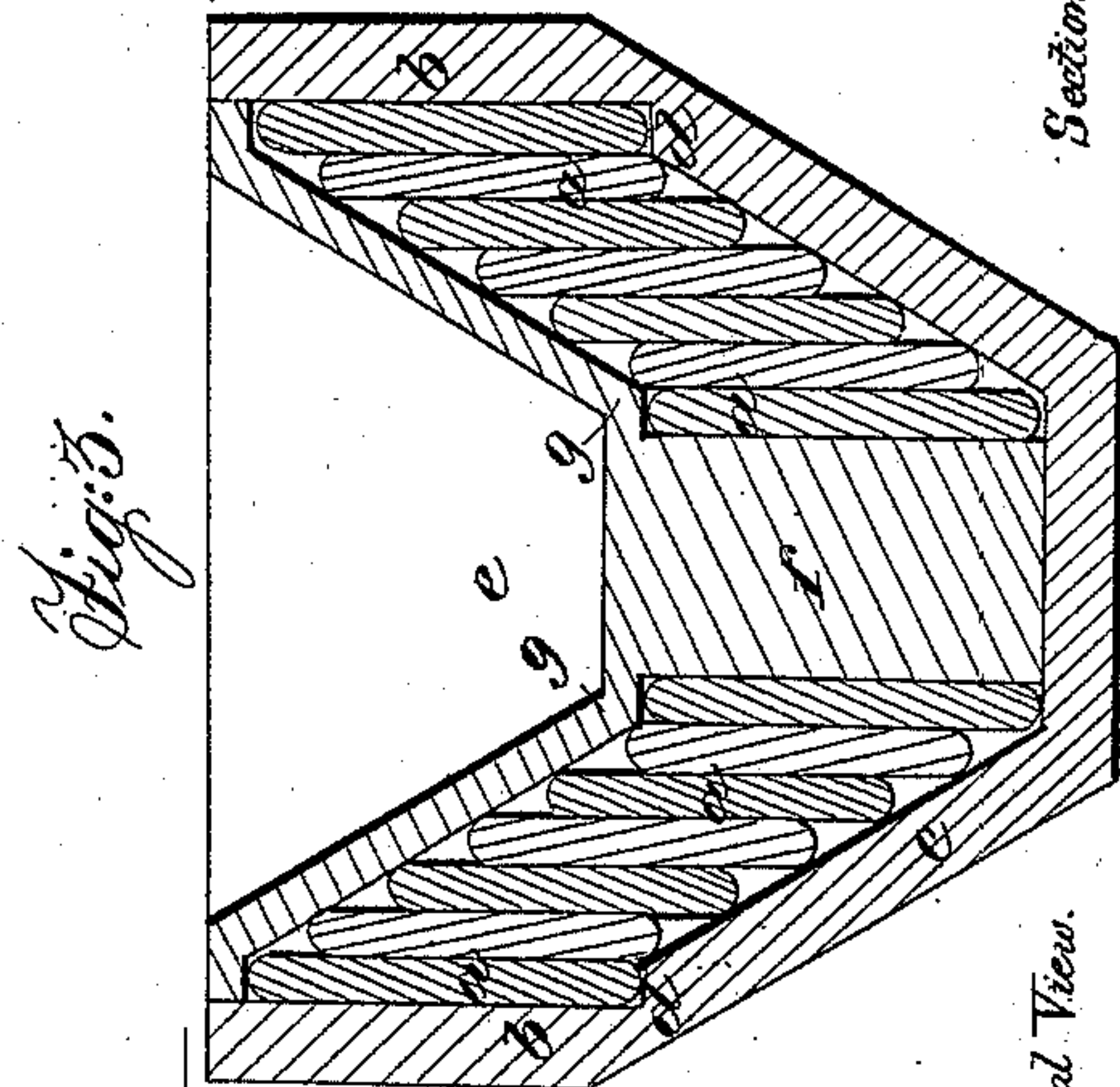
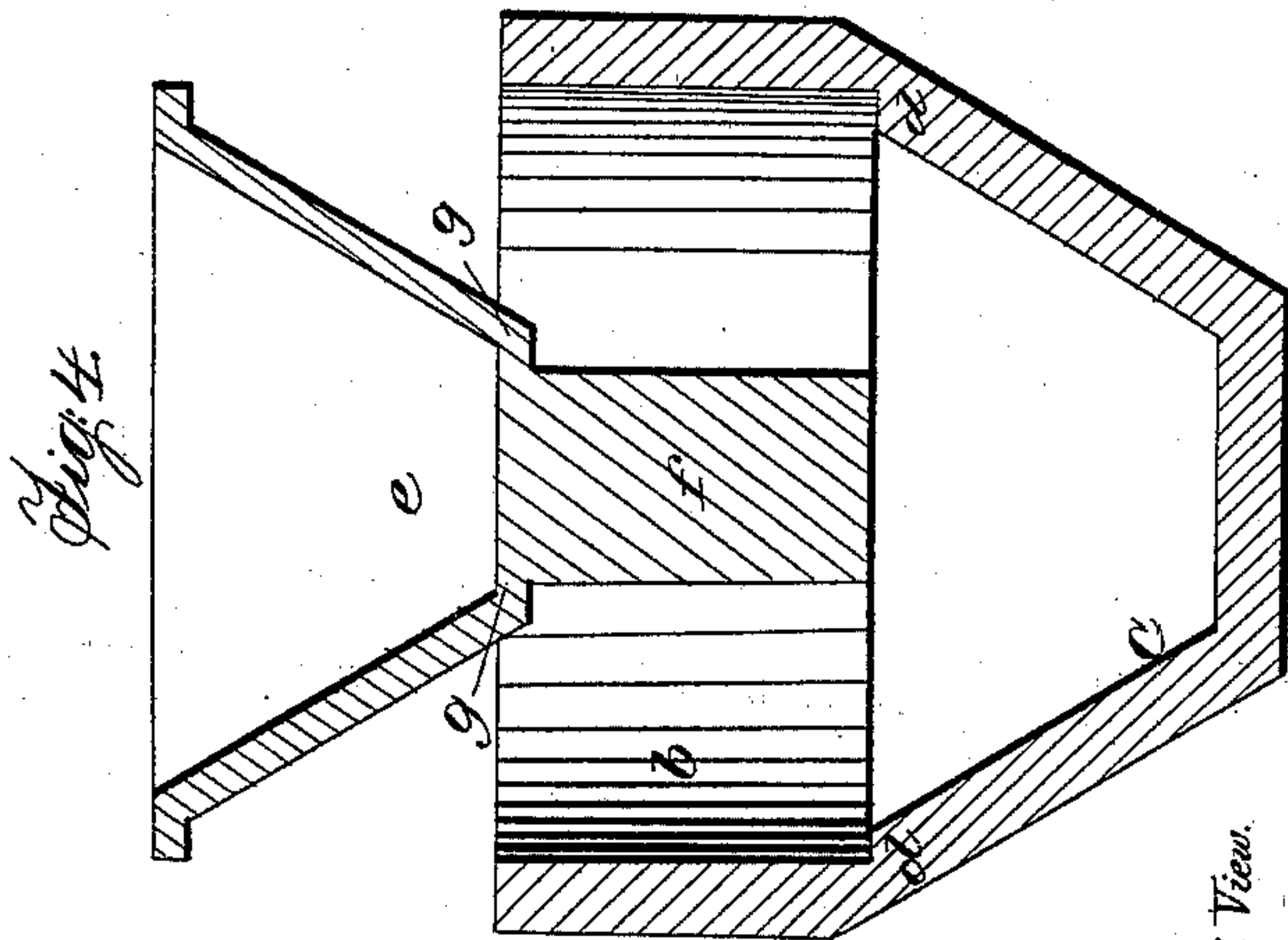
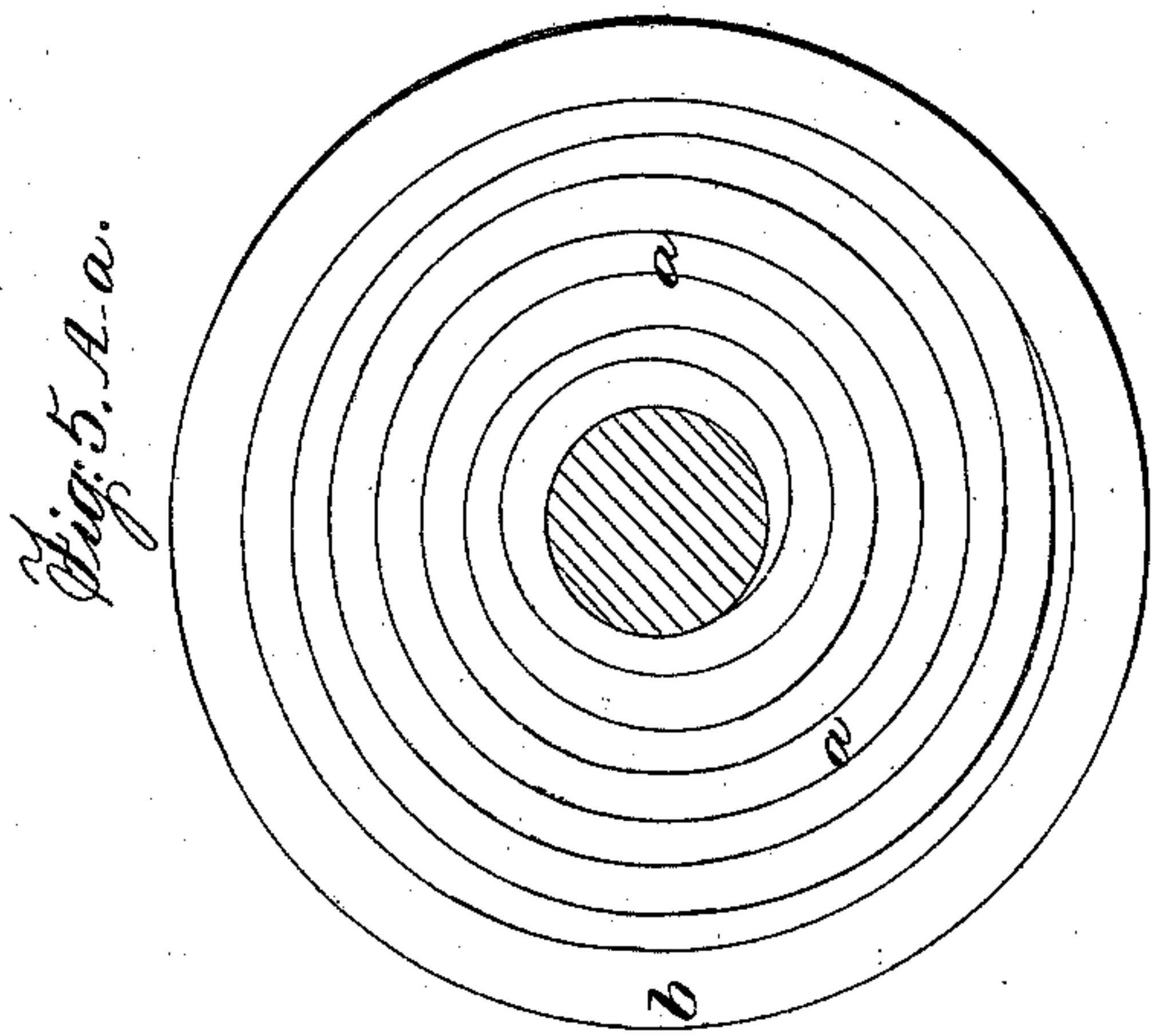
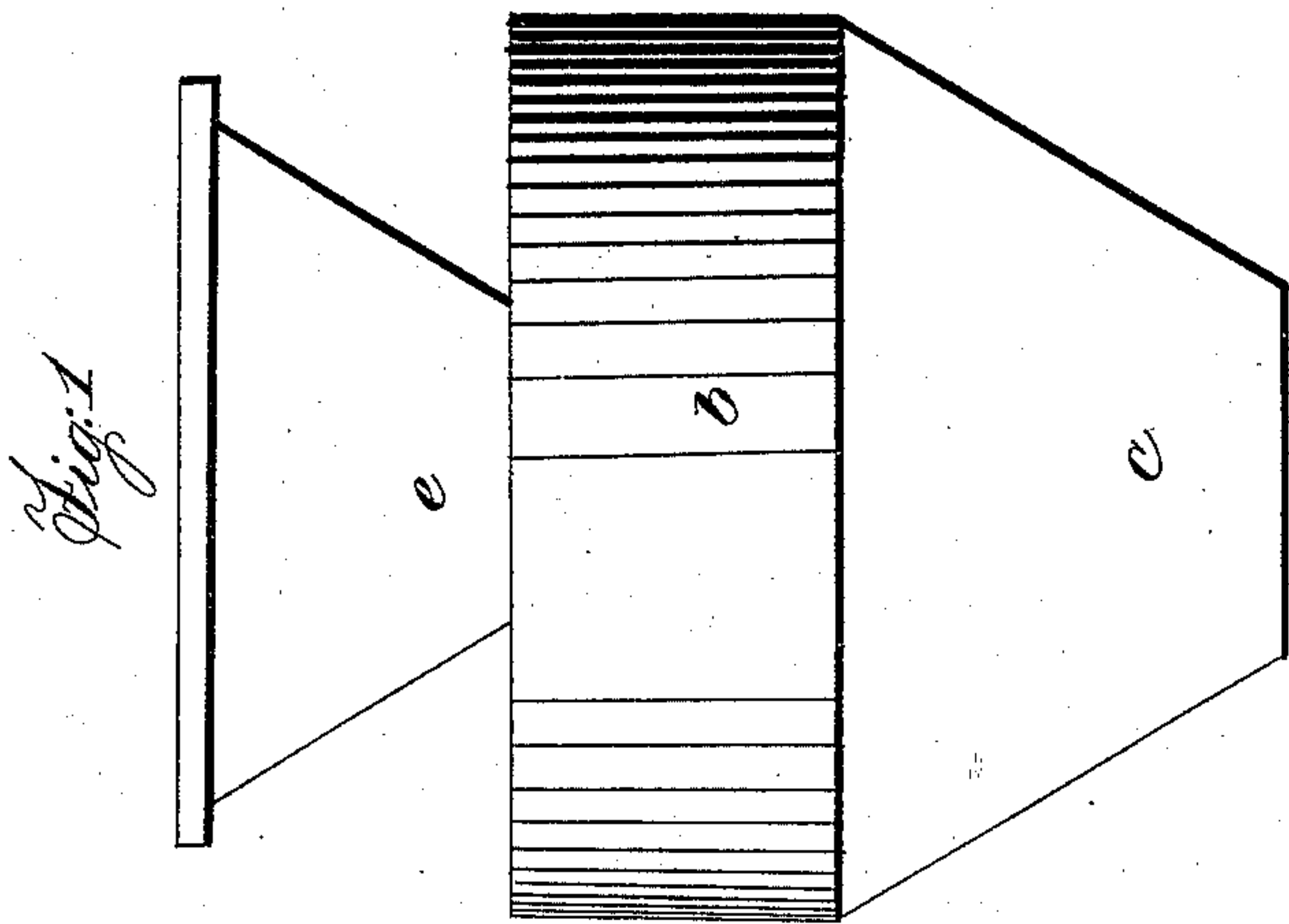


F. M. RAY.
Car Spring.

No. 10,784.

Patented Apr. 18, 1854.



Sectional View.

Sectional View.

UNITED STATES PATENT OFFICE.

FOWLER M. RAY, OF NEW YORK, N. Y.

SPIRAL SPRING FOR RAILROAD-CARS.

Specification of Letters Patent No. 10,784, dated April 18, 1854.

To all whom it may concern:

Be it known that I, FOWLER M. RAY, of New York city, have invented certain new and useful Improvements in Springs for Machinery, Railroad-Cars, and other Purposes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, is an elevation; Fig. 2, a vertical section without any weight or force applied; Fig. 3, a like section with the spring under full tension; Fig. 4, a like section with the spring removed; Fig. 5, another section taken at the line A, *a*, of Fig. 2.

The same letters indicate like part in all the figures.

My invention relates to a novel mode of employing volute or coiled springs, that is, springs formed of bars rolled up close in the form of clock or watch springs, or other analogous form, with a view to obtain a greater amount of tension with a given weight of metal, and within a given compass, than by any other mode of application.

My said invention consists in sustaining the outer coil of such a flat volute spring, by a case, when this is combined with the application of the force in lines parallel or nearly so with the axes of the coil of the spring by connecting the outer coil of said spring with one, and the inner coil with the other of the two bodies to be kept apart by the elastic medium. The spring is thus rendered more efficient to resist the force applied to bend it from a flat to a spiral shape, for in so doing, the tendency is to reduce the diameter of each coil, instead of enlarging it as when the force is applied to flatten a spiral spring. A much longer spring can be obtained within a given compass than by any other mode of application before known. And when of such form, and thus applied, they can be made at less cost, and can be readily restored when they have yielded under the force applied, which is done by simply reversing them.

My said invention also consists in employing such springs when combined with, and acted upon by a conical surface, or its equivalent, or one conical surface on each side, so that as the power, applied in a line parallel or nearly so with the axes, bends the spring, the said conical surface or surfaces shall gradually come in contact with

the edges of the coils, and give them support, and thus reduce, by the gradual approach of the points of support, the length of the active portion, in proportion to the weight or force applied, so that the tensile power of the spring increases in a much greater ratio than on any other known plan, and therefore reducing the extent of play required where the weight or force applied is liable to great variations, such as in railroad cars.

In the accompanying drawings *a*, represents a volute spring rolled up, with the coils in contact, or nearly so, and fitted inside of the cylindrical part of a case *b*, the bottom *c*, of which is a cavity in the form of a conical frustrum. The greatest diameter of this conical cavity should be a little less than the cylindrical part in which the spring is placed to form a shoulder *d*, to support the outer coil of the spring. Above the spring is placed a conical frustrum *e*, having a cylindrical projection *f*, fitted to the inside of the inner coil of the spring, there being a shoulder *g*, between the cylindrical projection and the frustrum to rest on the inner coil of the spring. The case *b*, containing the spring and the frustrum *e*, are to be properly fitted and secured, in any suitable manner, to the bodies which are to be separated by the required elastic medium.

The form of the parts represented in the accompanying drawings is such as I have adopted for railroad cars, but it is obvious that the external form may be varied at pleasure to suit the various purposes to which my said invention may be applied. But the conical cavity of the case *b*, and the exterior surface of the conical frustrum should correspond, or nearly so.

The two conical surfaces being arranged as specified, with the volute spring interposed between them, on the application of weight or pressure the spring will be forced by the frustrum *e*, into the conical cavity of the case *b*, and is thus forced into the form of a spiral, the edges gradually coming into contact with, and receiving support from the two conical surfaces which keep the several coils parallel in their proper relations to each other. I am thus enabled to obtain a much greater tension with a given weight of steel than by any other known plan for the reasons above stated.

After the spring has given way in part by use, it can be restored by simply taking it out of the case and reversing it.

Instead of making the spring of a flat bar it may be made of a square or round bar, but when made of such form it will present less tensile force for a given weight of metal than when made of a flat bar.

If it be desired to apply the first part of my invention without combining therewith the conical surface or surfaces, which may be termed the progressive supports, it is simply necessary to make the case *b*, with the shoulder *d*, and without the conical bottom *c*, and to dispense with the conical frustrum *e*, leaving the plug or projection *f*, that fits in the inner coil with the shoulder *g*.

I am aware that flat volute or coiled springs have been applied to carriages with the weight or force acting in the direction of the volute or coil, the center of the spring being connected with the running gear, and the body of the carriage suspended to the outer end of the coil, from which it follows that the lateral thrusts of the carriage must act incidentally on the spring, in, or nearly in, a line parallel with the axis of the spring; but in such mode of application the force in that line being merely incidental, the spring is not and cannot be coiled and confined close in a surrounding case, for the play of the spring being in the direction of the coil, entire freedom between the several coils is in-

dispensable and hence the several coils do not mutually support each other as under my mode of application in which the coils are in contact, or nearly so, with each other, and thus held by a surrounding or confining case.

I do not therefore claim as of my invention the application of force to a flat volute or coiled spring irrespective of the manner in which the coil is made and confined so that the several coils shall support each other, on the principle specified.

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

1. The employment of a flat volute or coiled spring, with the outer coil supported by the outer case, substantially as specified, when this is combined with the application of the weight or force to the inner and outer coils in lines parallel, or nearly so, with the axis of the spring, substantially in the manner and for the purpose specified.

2. And I also claim the employment of one or more conical surfaces, or the equivalents thereof, as specified, in combination with the coiled spring substantially as specified, for the purpose of reducing the active length of the spring, as the weight or force applied is increased, as specified.

F. M. RAY.

Witnesses:

WM. H. BISHOP,
H. C. BANKS.