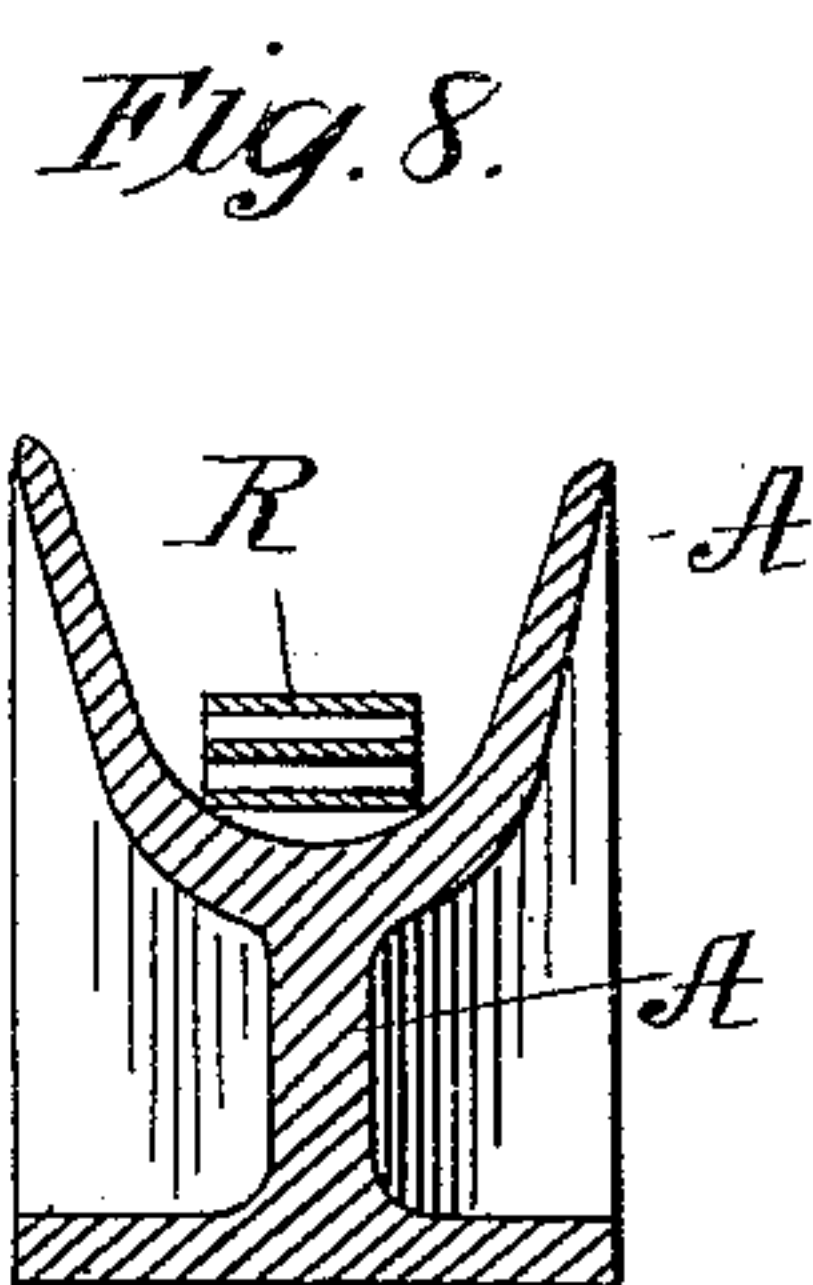
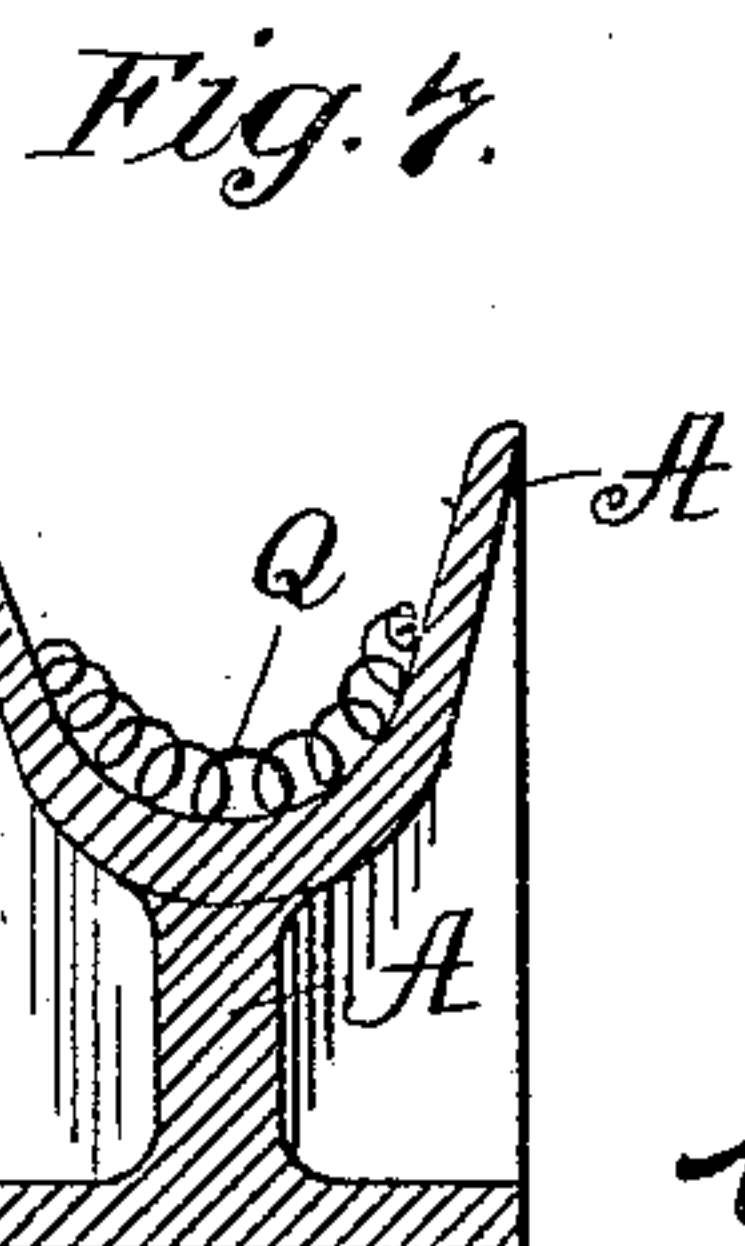
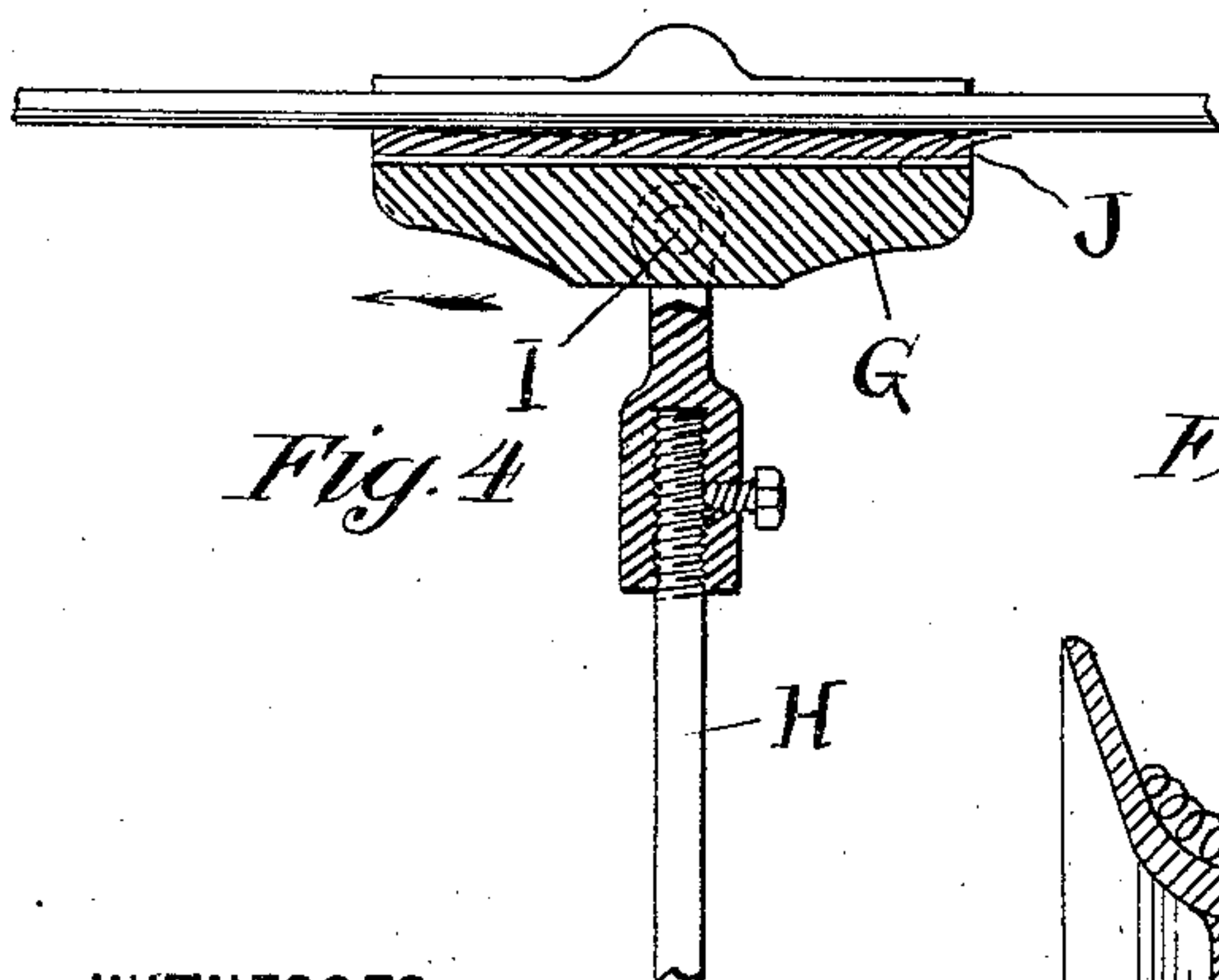
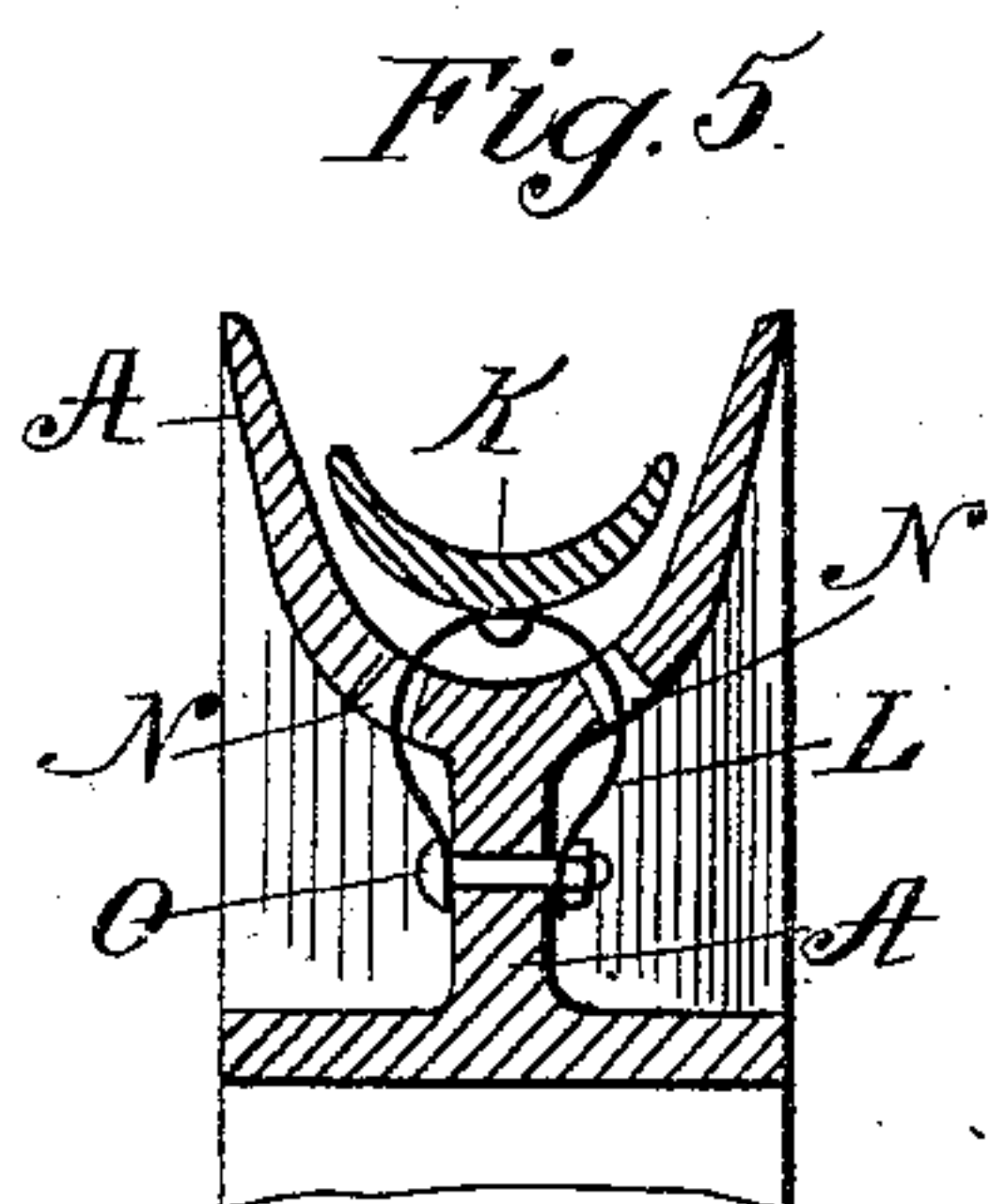
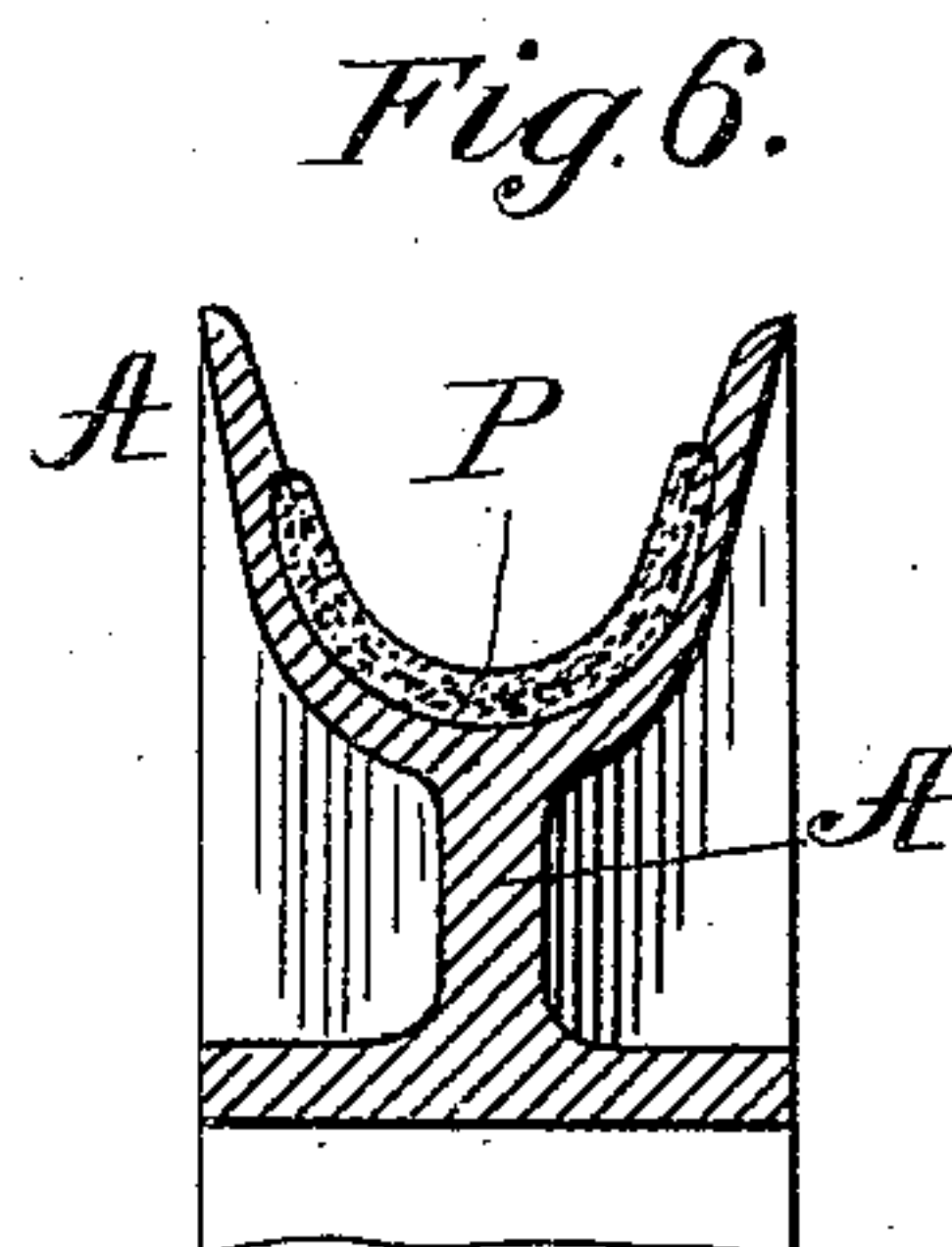
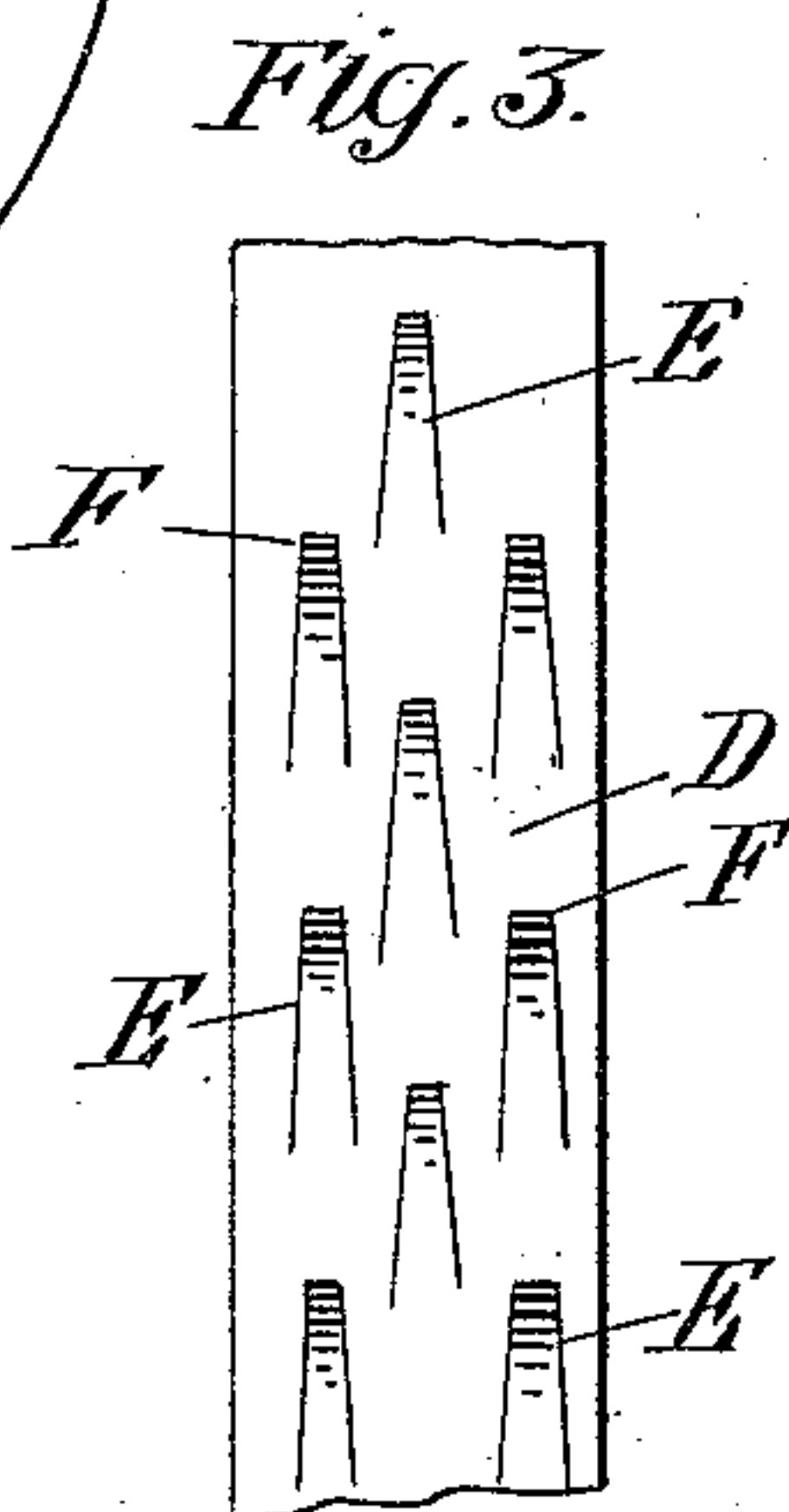
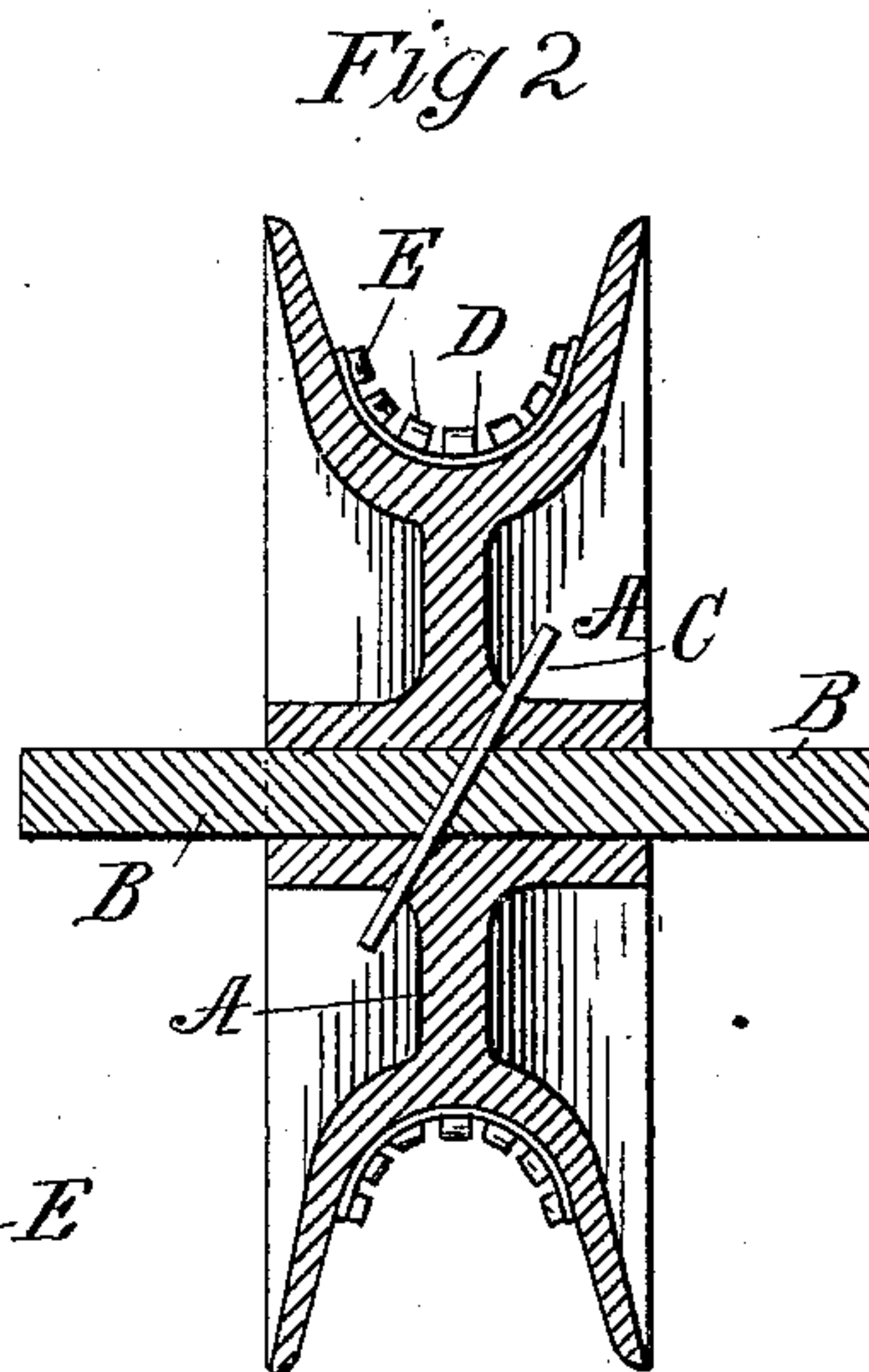
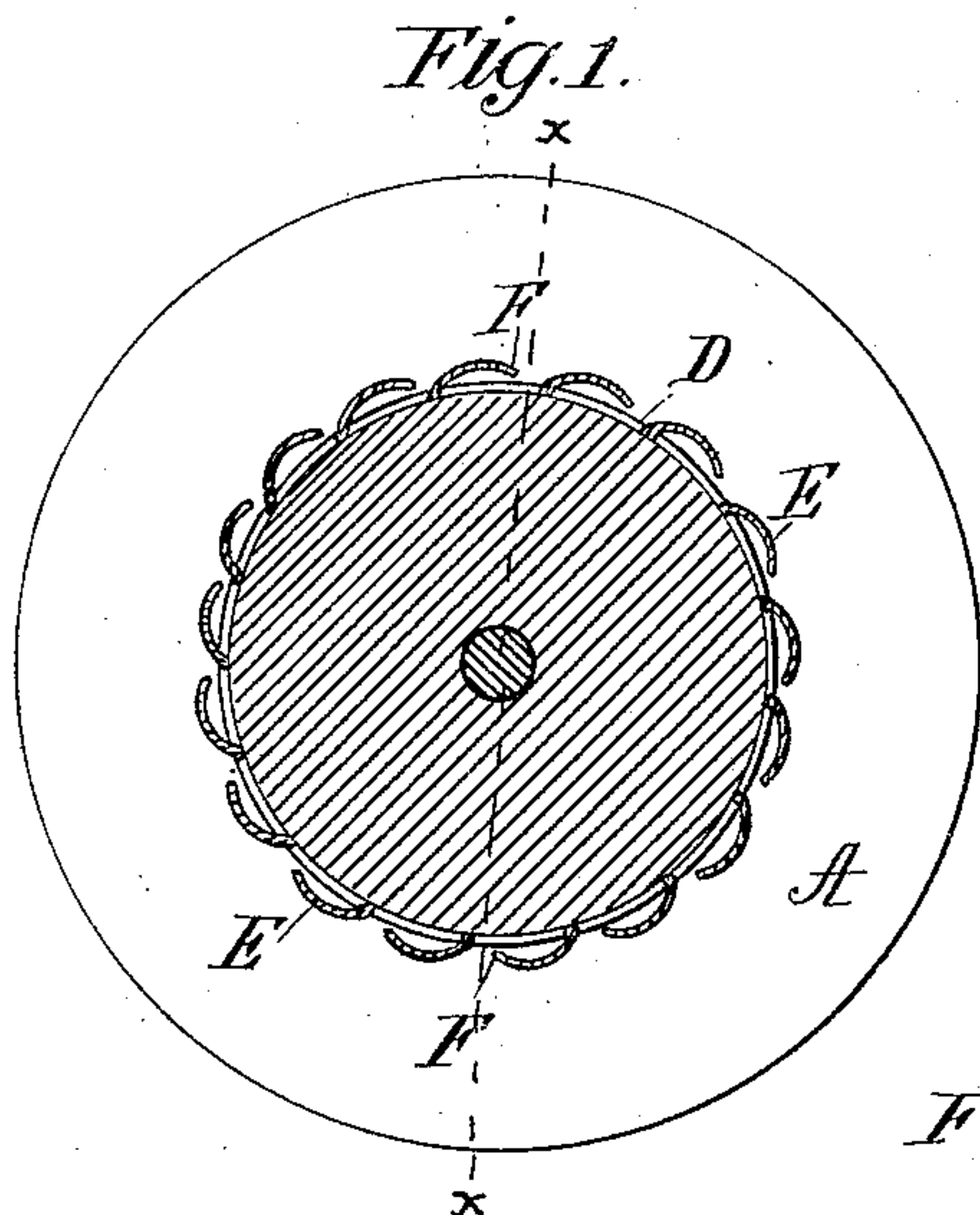


(No Model.)

C. A. LIEB.
ELASTIC TROLLEY.

No. 444,447,

Patented Jan. 13, 1891.



WITNESSES:
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UNITED STATES PATENT OFFICE.

CHARLES A. LIEB, OF NEW YORK, N. Y.

ELASTIC TROLLEY.

SPECIFICATION forming part of Letters Patent No. 444,447, dated January 13, 1891.

Application filed November 28, 1890. Serial No. 372,790. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LIEB, a citizen of the United States, and resident of New York, in the county of New York and State of New York, have invented certain new and useful Improved Elastic Trolley, of which the following is a specification.

My invention relates to an improvement in trolley wheels or slides, whereby I reduce noise, reduce wear, prevent or reduce "sparking," and secure better and more uniform contact between the trolley and the trolley-wire.

My invention generally stated consists in providing the groove or contact-surface of the trolley wheel or slide with an elastic, flexible, or yielding face, whereby the above-stated beneficial results will follow. This may be done in a number of ways.

I will illustrate and describe some, but not by any means all, of the forms in which my invention may be practiced.

Figure 1 illustrates a longitudinal section of a trolley-wheel, showing the invention in the form of a lining of springs in the groove of the trolley-wheel. Fig. 2 illustrates a cross-section on the line $x x$, Fig. 1. Fig. 3 illustrates a plan of the metallic ribbon, showing one mode in which the spring-lining seen in Figs. 1 and 2 may be made. Fig. 4 illustrates a longitudinal section of a sliding trolley having the yielding lining in the groove of the sliding block. Figs. 5, 6, 7, and 8 illustrate transverse sections of trolley-wheels, showing in each a different method of applying the yielding surface to the groove thereof.

Referring first to Figs. 1, 2, and 3, A is the trolley-wheel made fast on its shaft B by a pin C. D is a lining for the wheel, as shown. It is a piece of brass or other suitable metal, from which the springs E are cut, (see Fig. 3,) and they are curved outwardly away from the plane of the sheet and having their ends F curved inwardly again, as seen in Fig. 1, so that they will not catch and be turned back by the trolley-wire when running in either direction. The operation is obvious. The pressure of the trolley-wire on the springs compresses them. Thus there is relatively no shock or jar of the trolley against the wire, and separation of them one from the other is largely avoided, and also the shock of the trolley, when it comes in contact with the clamps or

other devices whereby the trolley-wire is suspended, is largely avoided. Thus the movement of the trolley upon and along the trolley-wire is smooth and even, and sparking, wear on the parts, and noise are all avoided or largely reduced.

It will be especially observed that whereas in the old forms the trolley-wire comes in contact with a very small arc only of the trolley-wheel and at one point only at and through which the contact must be made, in my improved construction the flattening or compressing of the yielding surface of the wheel upon pressure by the wire or its attachments greatly enlarges the area of contact and also affords a plurality of points of contact, one or more of which at all times affords electrical connection, the effect being the same as though a series of trolley-wheels were used to make the same electrical connection.

In Fig. 4 I show substantially the same form of the invention applied to a sliding trolley-block. G is the block attached to the trolley-pole H by pivot or ball-and-socket joint I. J are the springs, which are or may be the same as shown in Figs. 1, 2, and 3, or of other construction, as preferred. The operation is obvious from what has already been said and does not require further description.

In Fig. 5 I show a form in which an expansible lining for the trolley-wheel made of circular metallic sections is employed. K are the circular expansible sections. Their ends are somewhat separated from each other, so that they will not jam against each other endwise during their inward movement. They are supported upon springs L at their ends and intermediate their ends also, if desired. These springs may be spiral springs, somewhat like those shown in Fig. 8, hereinafter described; but I prefer the form of spring shown in Fig. 5, which pass through slots N N in the trolley-wheel, and are attached by suitable means O to the web of the trolley-wheel. The slots N N are made sufficiently wide to allow of the necessary movement of the springs. These springs convey the current from the sections K to the trolley-wheel.

In Fig. 6 I show a form of the invention in which a lining P of metal sponge or equivalent elastic or flexible conveyer of electricity is placed in the groove of the wheel.

In Fig. 7 I show at Q a woven or spirally-
arranged spring-metal lining for the trolley-
wheel. It may be simply convoluted pieces
of elastic wire placed side by side crosswise
5 of the groove in the wheel or trolley-block, if
it be a sliding trolley, or it may be woven
similar to certain kinds of spring-mattresses,
but of course of smaller mesh.

In Fig. 8 I show still another form in which
10 a series of short spiral springs R are arranged
in the bottom of the groove of the trolley
side by side or near each other.

From the foregoing it abundantly appears
that my invention may be constructed in a
15 large number of forms. I do not therefore
limit myself to the details of construction.

I claim—

1. A trolley device provided with a groove
and a yielding surface in the groove, substan-
20 tially as set forth.

2. A trolley device having a groove and a
bearing-surface for the trolley-wire within the
grooves supported upon a spring or springs,
substantially as set forth.

3. A trolley-wheel having its contact-sur- 25
face composed of a plurality of yielding con-
tact-points, substantially as set forth.

4. A contact-surface for trolleys, compris-
ing, essentially, a series of compressible elas-
tic contact-points adapted to contact succes- 30
sively with the wire, substantially as set forth.

Signed at New York, in the county of New
York and State of New York, this 25th day of
November, A. D. 1890.

CHARLES A. LIEB.

Witnesses:

PHILLIP ABBOTT,
FREDERICK SMITH.