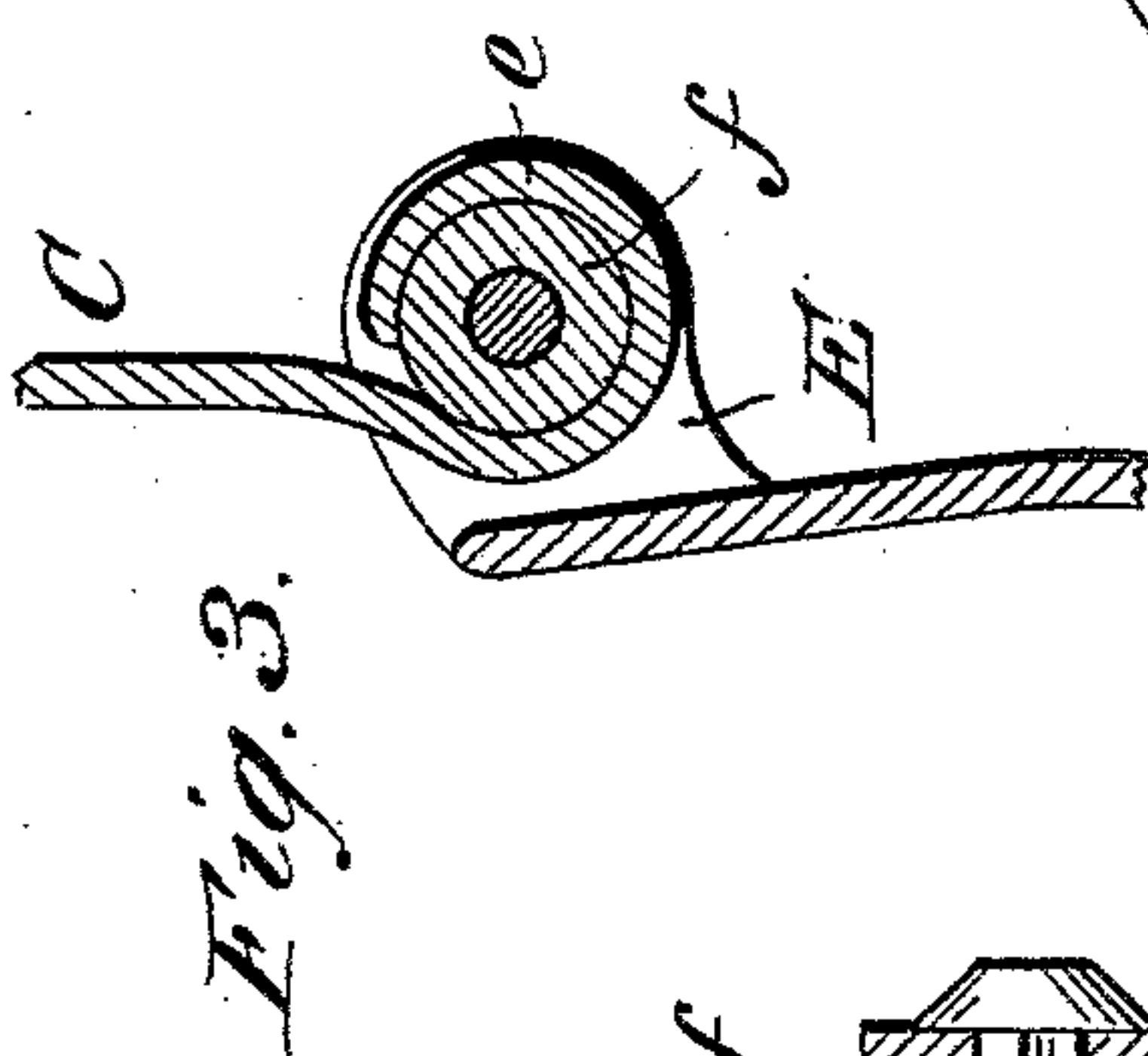
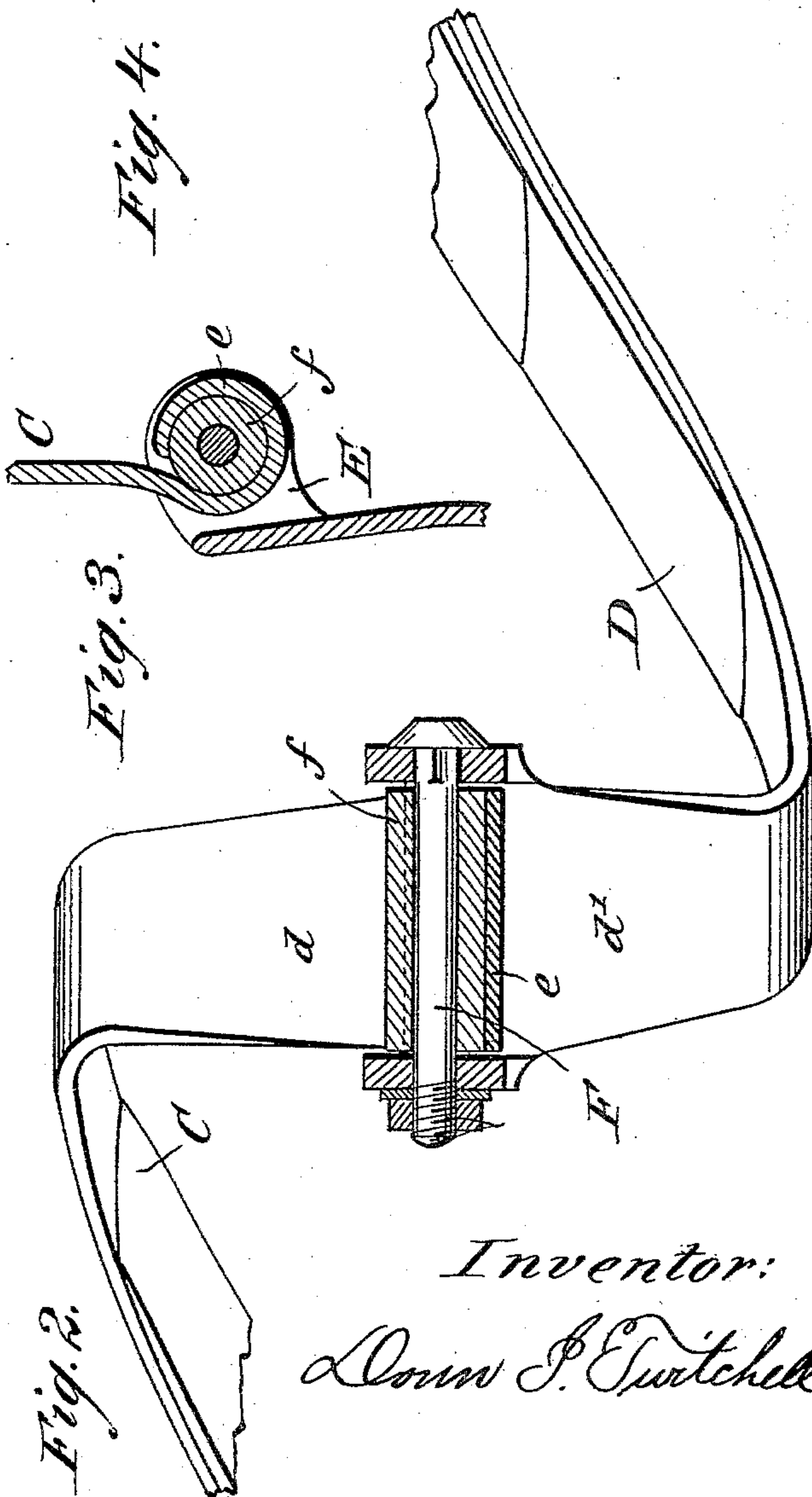
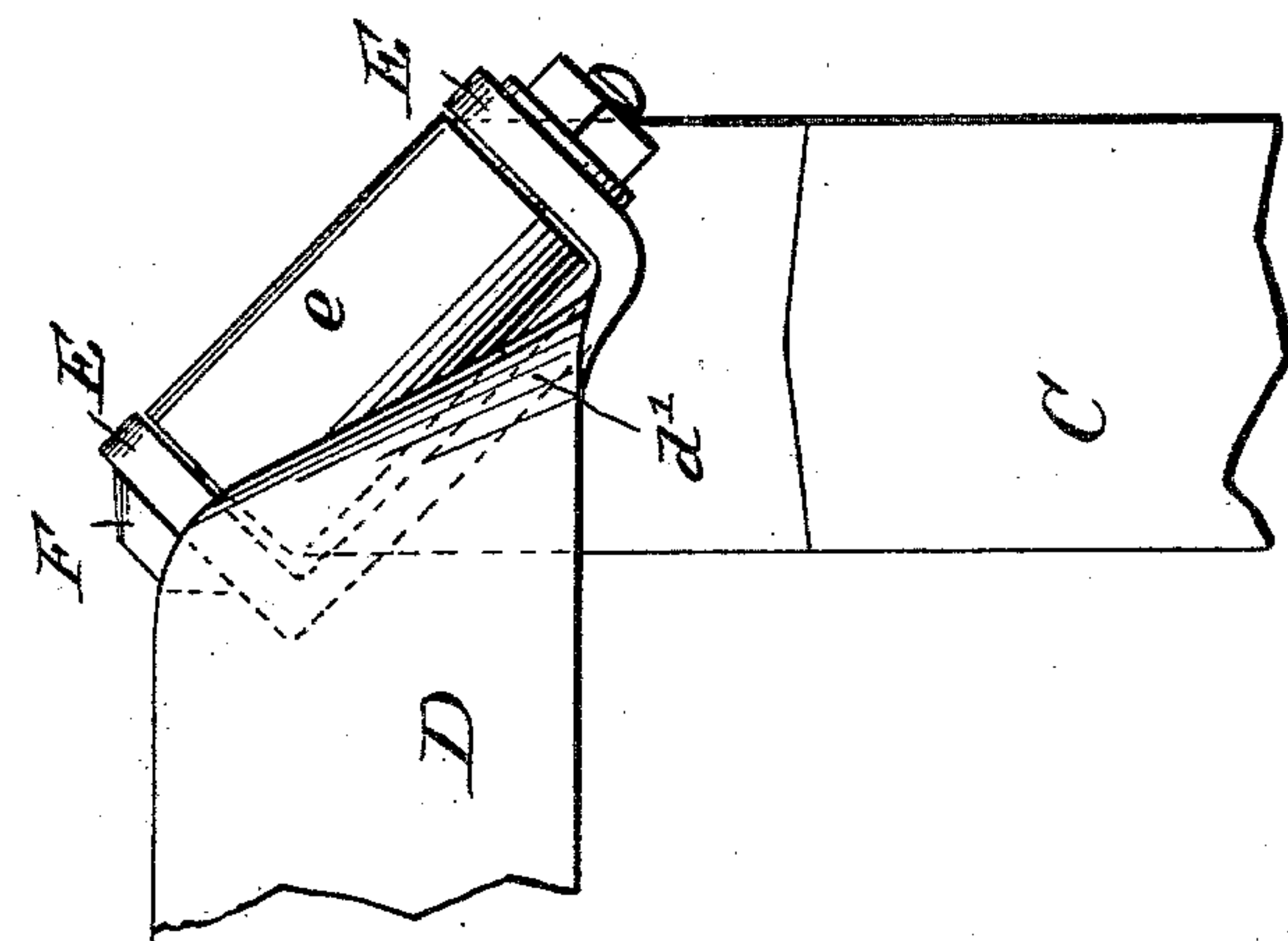
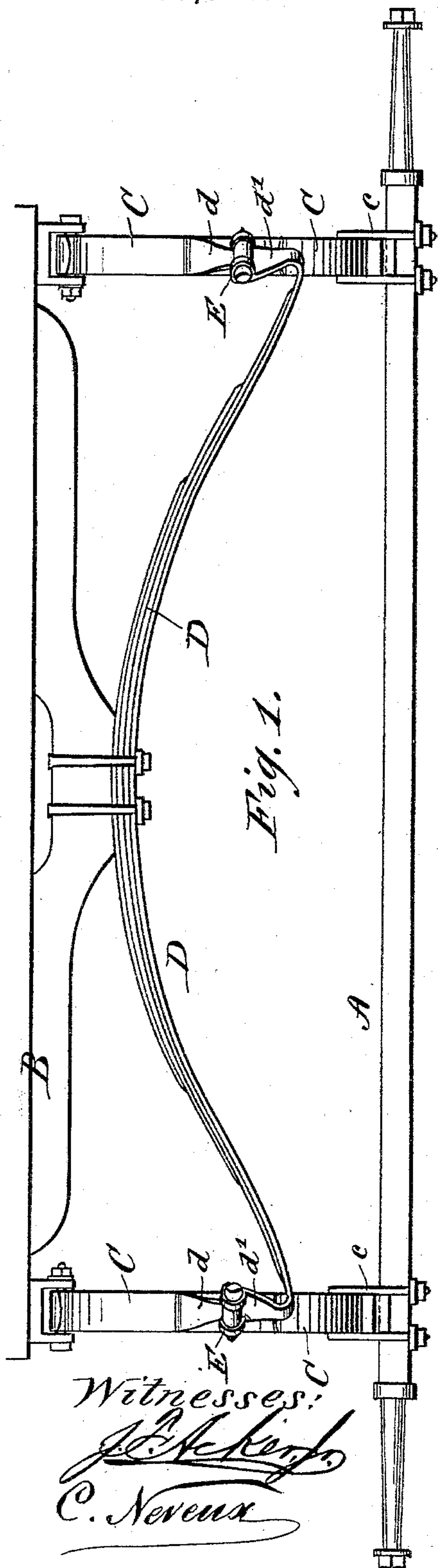


(No Model.)

D. I. TWITCHELL.
VEHICLE SPRING.

No. 359,986.

Patented Mar. 22, 1887.



Witnesses:
J. E. Kier
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Inventor:
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UNITED STATES PATENT OFFICE.

DONN I. TWITCHELL, OF NEW YORK, N. Y.

VEHICLE-SPRING.

SPECIFICATION forming part of Letters Patent No. 359,986, dated March 22, 1887.

Application filed November 30, 1886. Serial No. 220,230. (No model.)

To all whom it may concern:

Be it known that I, DONN I. TWITCHELL, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in the Connection of Semi-Elliptic Springs, of which the following is a specification.

My invention relates to an improvement in the connection of semi-elliptic springs, and has for its object to provide a simple and effective connection, whereby the complication of a shackle will be dispensed with.

The invention consists in the construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate similar parts in all the figures.

Figure 1 is a rear elevation of my spring-connection applied. Fig. 2 is a longitudinal section through the connection of the springs, and Fig. 3 a transverse vertical section through the same. Fig. 4 is a reverse plan view of the complete attachment.

In illustrating my invention, A represents an axle, and B the body, of an ordinary wagon. At a point near the front of the wagon-body, and at each side thereof, I attach semi-elliptic springs C, which springs are carried through clips *c* upon the axle, in the usual manner. The free end *d* is now carried in a curved line toward the convex surface of the spring at an acute angle, with a twist or inclination transversely the said curved end at an angle of forty-five degrees longitudinally of the spring.

The semi-elliptic spring D, which may be attached centrally to the wagon-body in any approved manner, is provided with upwardly-curved ends *d'*, made to face in opposite directions, the said curve being made as in the aforesaid side springs, C, at an acute angle in the direction of the convexed surface of the spring, and also with a twist or inclination transversely the said ends at an angle of forty-five degrees longitudinally of the spring. The bearings of the said ends of each spring are sufficiently removed from the plane of the springs to allow for all necessary end-play.

Upon the bent ends *d'* of the rear spring, D, I form ears E, having a central aperture, and enter between said ears E the eyes *e*, formed integral with the bent portion *d* of the side springs, C, which eyes are made to inclose an annular collar, *f*. I now pass a bolt, F, through the ears E of the spring D and the collar *f* of spring C, tangentially to the body of the united springs, as illustrated in Fig. 4. Thus we have the two bent ends of the back and side springs, the one above the other, in essentially the same vertical plane, the twist in the end of the side springs, however, being the reverse of the twist in the end spring, and a bolt extending, as above stated, tangentially to the joint springs.

When weight is placed upon the end spring to expand the same, it rocks on the bolt, while the side springs will also oscillate or rock on the same bolt, and as the rounded end *d'* of spring D rocks that end of bolt farthest removed from the center of the spring is tipped upward, while its inner end is tipped downward. The connection to spring C being reversed, it will be seen that the bolt is tipped in one direction by the joint action of the two springs. Therefore I obtain perfect unison of action, the tipping of the bolt by the action of one spring corresponding with the tip given to it by the other, and the rounded ends *d* and *d'* being free to rock upon the bolt, ample end-play is given to each spring.

By my invention I am enabled to dispense entirely with shackles, and connect two semi-elliptical springs directly one to the other at right angles, and obtain perfect unison of action and all necessary end-play.

It is not necessary that the ears be formed in the end spring and the eyes in the side springs, as the order may be reversed without departing from the spirit of my invention. It is, however, necessary that the connecting-bolt be placed tangentially to the united springs.

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

1. A semi-elliptic spring having its ends bent toward the convex side of the same and said ends then twisted at an angle of forty-five degrees to the longitudinal axis of the spring, substantially as shown and described, and for the purpose herein set forth.

2. Two semi-elliptic springs arranged at right angles to each other, having their ends bent toward each and united by a tangential bolt, substantially as shown and described,
5 and for the purpose herein set forth.

3. A semi-elliptic spring having its ends bent bodily from the concave side and toward the convex side thereof, substantially in the manner and for the purpose herein set forth.

Signed at New York, in the county of New York and State of New York, this 20th day of November, A. D. 1886.

DONN I. TWITCHELL.

Witnesses:

J. F. ACKER, Jr.,
C. NEVEUX.