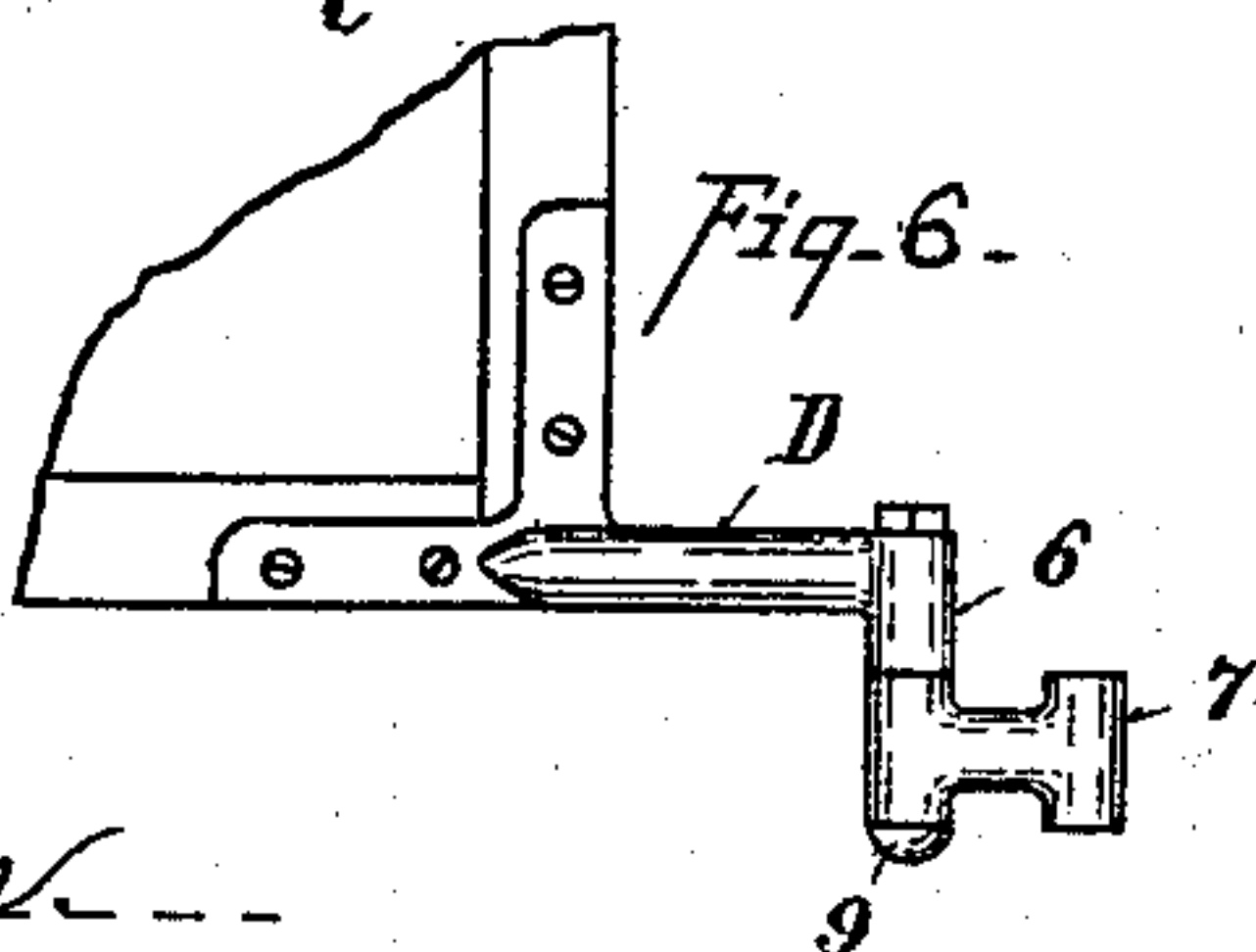
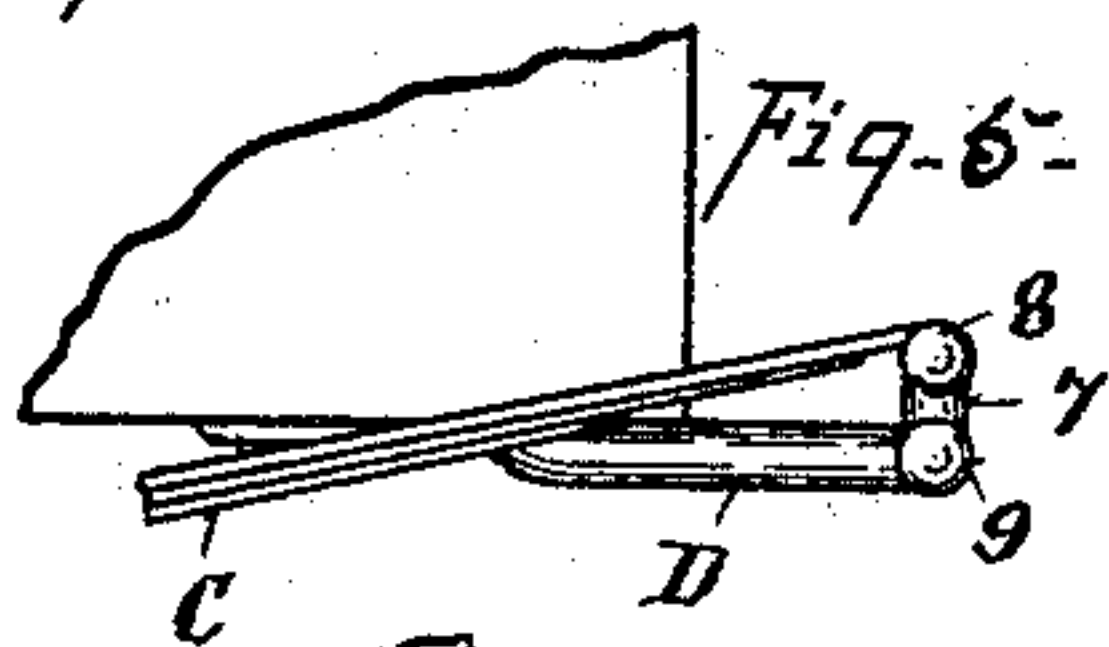
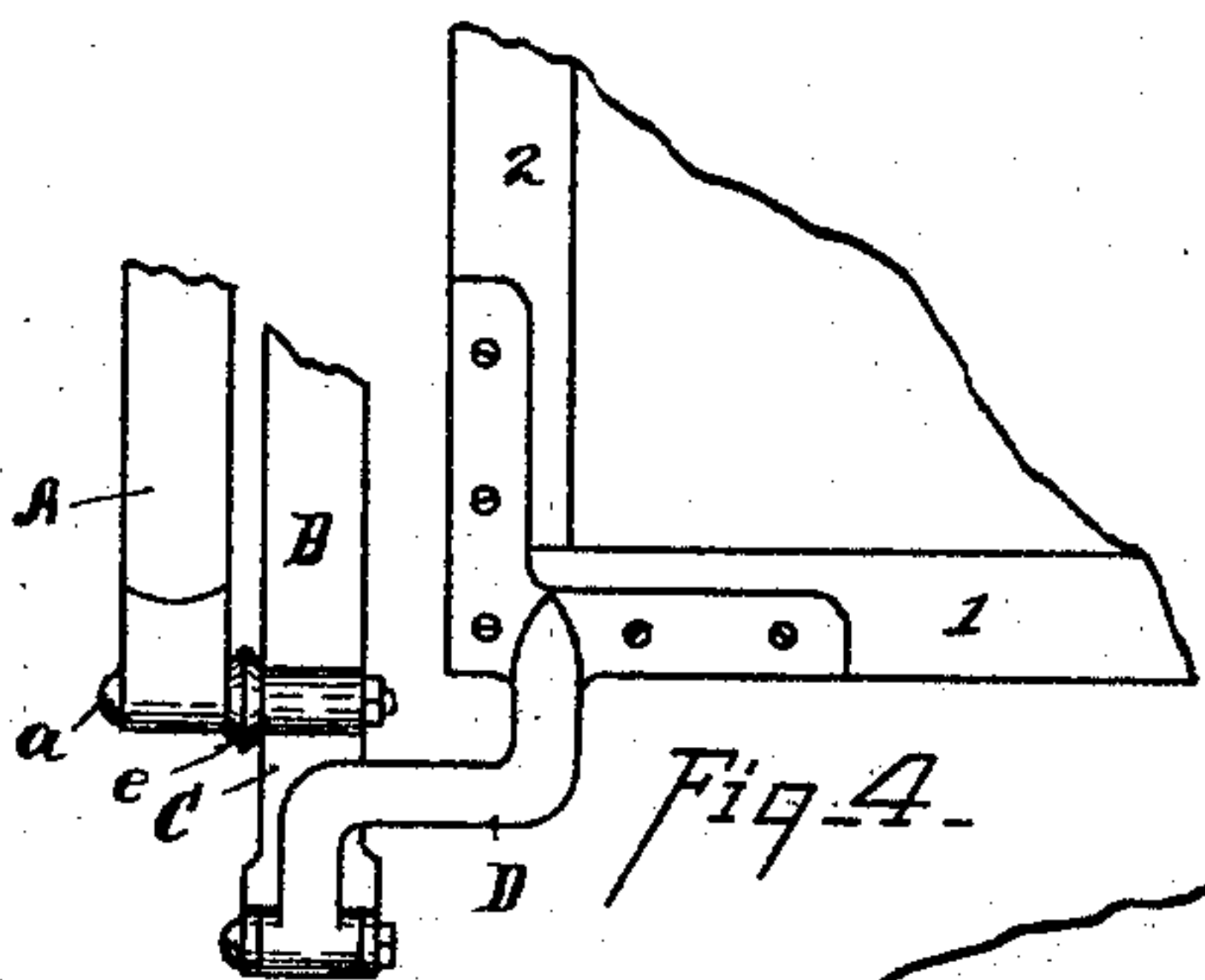
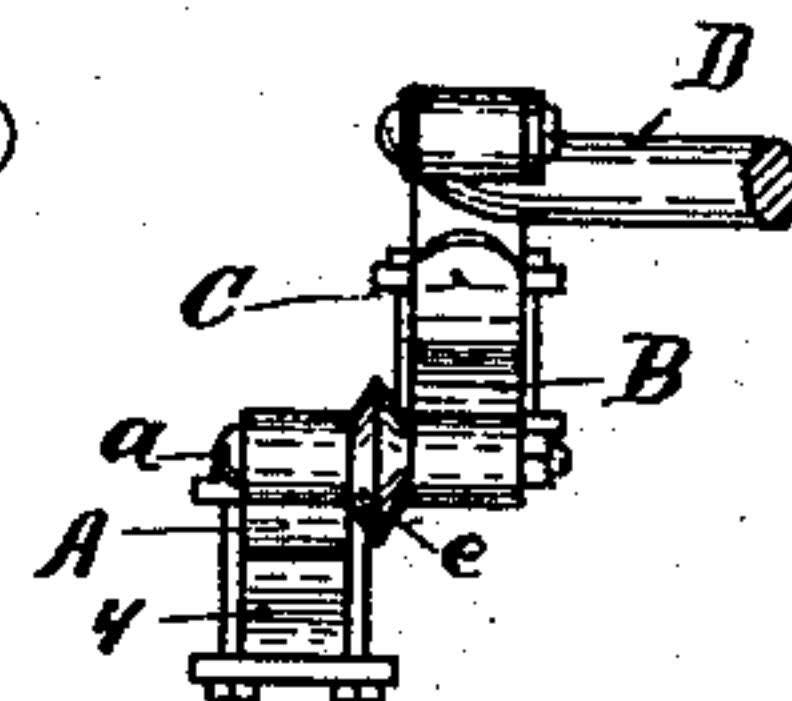
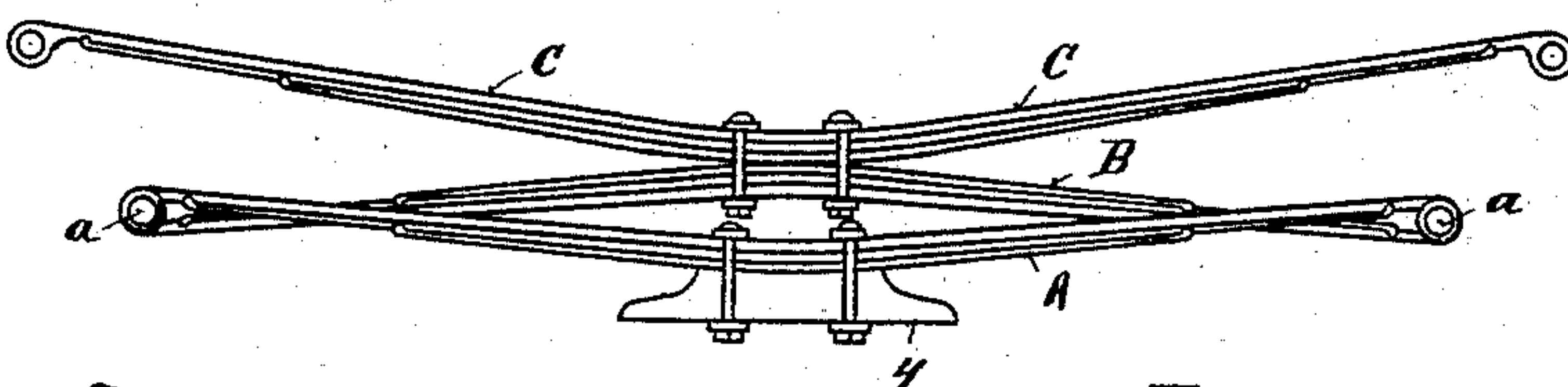
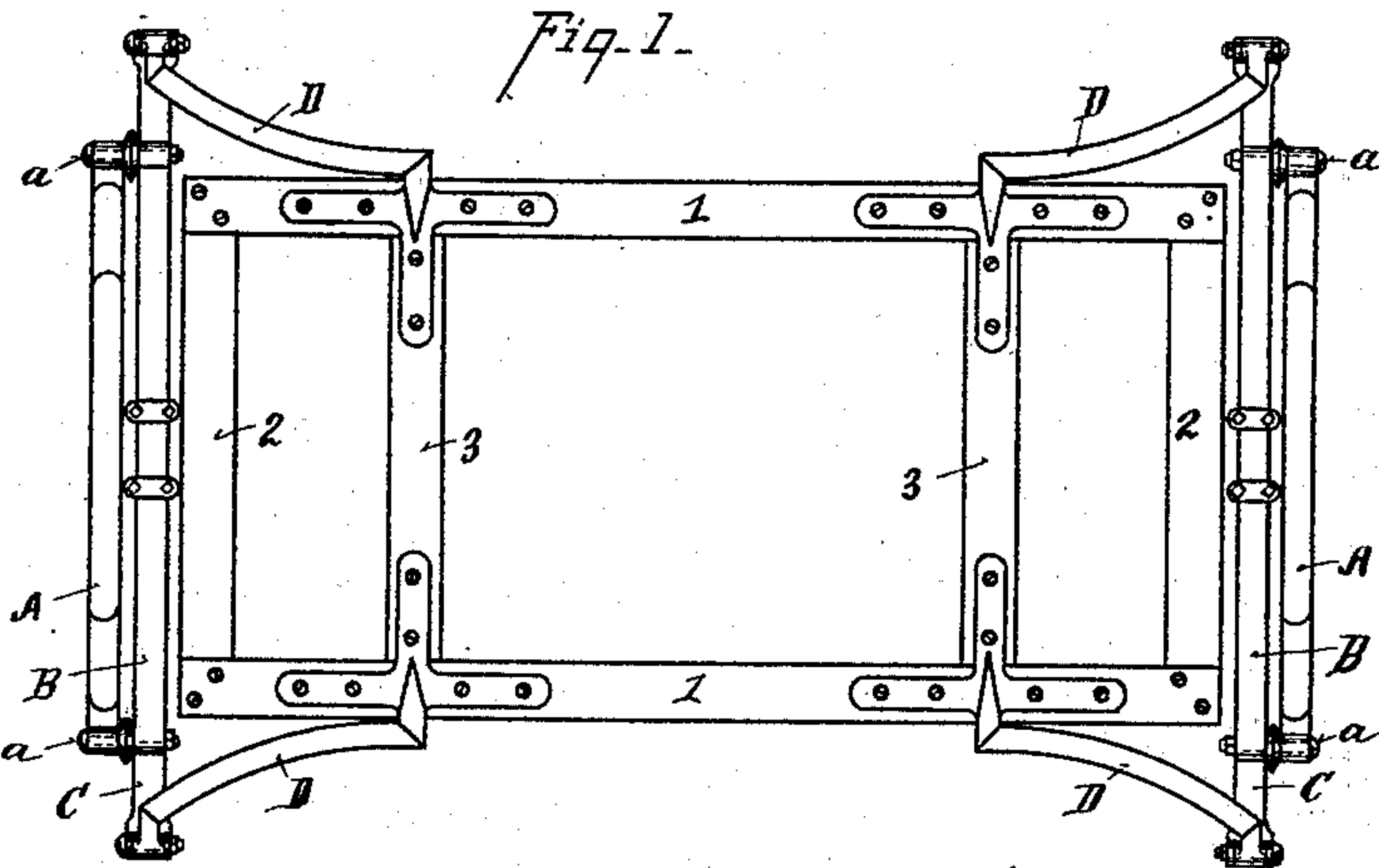


(No Model.)

C. A. BEHLEN.  
CARRIAGE SPRING.

No. 524,929.

Patented Aug. 21, 1894.



Witnesses  
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# UNITED STATES PATENT OFFICE.

CHARLES A. BEHLEN, OF CINCINNATI, OHIO, ASSIGNOR TO LOUIS G. MAYER,  
OF SAME PLACE, AND HOWARD K. JAMES, OF COVINGTON, KENTUCKY.

## CARRIAGE-SPRING.

SPECIFICATION forming part of Letters Patent No. 524,929, dated August 21, 1894.

Application filed September 22, 1892. Serial No. 446,577. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES A. BEHLEN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Carriage-Springs, of which the following is a specification.

My invention relates to that class of springs known as end-elliptic.

10 The object of the invention is to arrange the springs so that they resist the various strains, the springs being placed so that one spring braces the movement of the other, destroys the rolling motion due to end thrusts, 15 and employing three leaves of springs, two of which are placed out of the same horizontal plane, and co-acting so as to cushion against each other, avoiding all liability of jars or jolts, and hence materially lessening the danger of breaking the springs.

20 The various features of my invention are fully set forth in the description of the accompanying drawings making a part of this specification, in which—

25 Figure 1 is a bottom plan view of my improvement attached to a carriage body. Fig. 2 is a rear elevation of the springs. Fig. 3 is an end elevation of Fig. 2. Fig. 4 is a bottom plan view of a modification of Fig. 1. 30 Fig. 5 is a detail rear elevation of a modification of the spring attachment. Fig. 6 is a bottom plan view of the same.

1 represents the frame of a carriage.

35 2 represents the end rails, and 3 cross bars forming the frame.

4 represents a bolster on which the spring A is clamped.

40 B represents another set of leaves hinged to the axial bolt *a*. The said springs A, B, are in parallel vertical planes, so as to pass each other when compressed.

45 C represents a spring clamped upon the spring B, and hinged to the brackets D; said brackets are shown in Fig. 1 as of T-form, and connected to the rails 1 and 3. The spring C, preferably, is longer than the spring B, so that when it is depressed it will not strike the joint or eye of the spring B. In the preferred form the clamping bolt *a* is provided with a 50 sleeve having a collar *d* in the center. The eye of spring A swiveling on the journal *b*,

and the eye of spring B swiveling on the journal *c*.

In the modification shown in Fig. 4 the bracket is shown of L-shape and attached to 55 the corners of the carriage body. And in the modification in Figs. 5 and 6, the spring C is connected to bracket D by the link 7, one end of which is hinged to the spring C by bolts 8, and the other end to the arm 6 of the bracket 5c D by the center 9; this allows the longer spring C to bend with less strain upon the arm D than when connected directly to the same.

It will be observed that when the springs 65 are attached to the body as herein shown the spring B passes spring A and receives a large portion of the downward motion of the body; and is assisted by the spring C to receive the strains or thrusts of the starting and stop- 70 ping movement. The spring movement is thoroughly cushioned between these three springs avoiding joltings, which occur when the springs are arranged so as to stop one against the other.

75 The springs A B while they have a common axis on the bolt *a*, each have a separate bearing *d*, *c*, upon the journal sleeve, the eyes of the springs being separated by the collar *b* or *e*, and this separation of the springs and the 80 use of the spool or sleeve is an essential requisite to their successful operation, as it avoids shearing or cutting the bolt off caused by the strain of the eyes of the springs in opposite directions across the center portion of 85 the bolt; and by the use of the spool or sleeve journaling on the bolt the strains are distributed throughout the entire length of the bolt; the eyes of the springs also abutting against the collars or washers of the head and 90 nut prevents their rocking laterally on the journal in case of wear or lost motion; the latter can be readily taken up by tightening the nuts.

Having described my invention, what I 95 claim is—

1. The combination in a carriage spring, of a bolster 4 centrally supporting a spring A, a spring B located at one side of the spring on the bolster and connected at its ends therewith, a spring C centrally supported by the 100 spring B and rising and falling with the latter

at one side of the spring on the bolster, and the brackets D connecting the ends of the spring C with the vehicle body, substantially as described.

- 5 2. In a carriage spring, the pivot bolts *a* each provided with a sleeve having a center collar to form the journal portions *b* and *c*, in combination with the springs A and B located in different vertical planes and having  
10 their extremities mounted on the said journal

portions of the sleeves on the pivot bolts, and a spring C centrally mounted on the spring B and having its ends connected with the vehicle body, substantially as described.

In testimony whereof I have hereunto set 15 my hand.

CHARLES A. BEHLEN.

Witnesses:

T. SIMMONS,  
C. W. MILES.