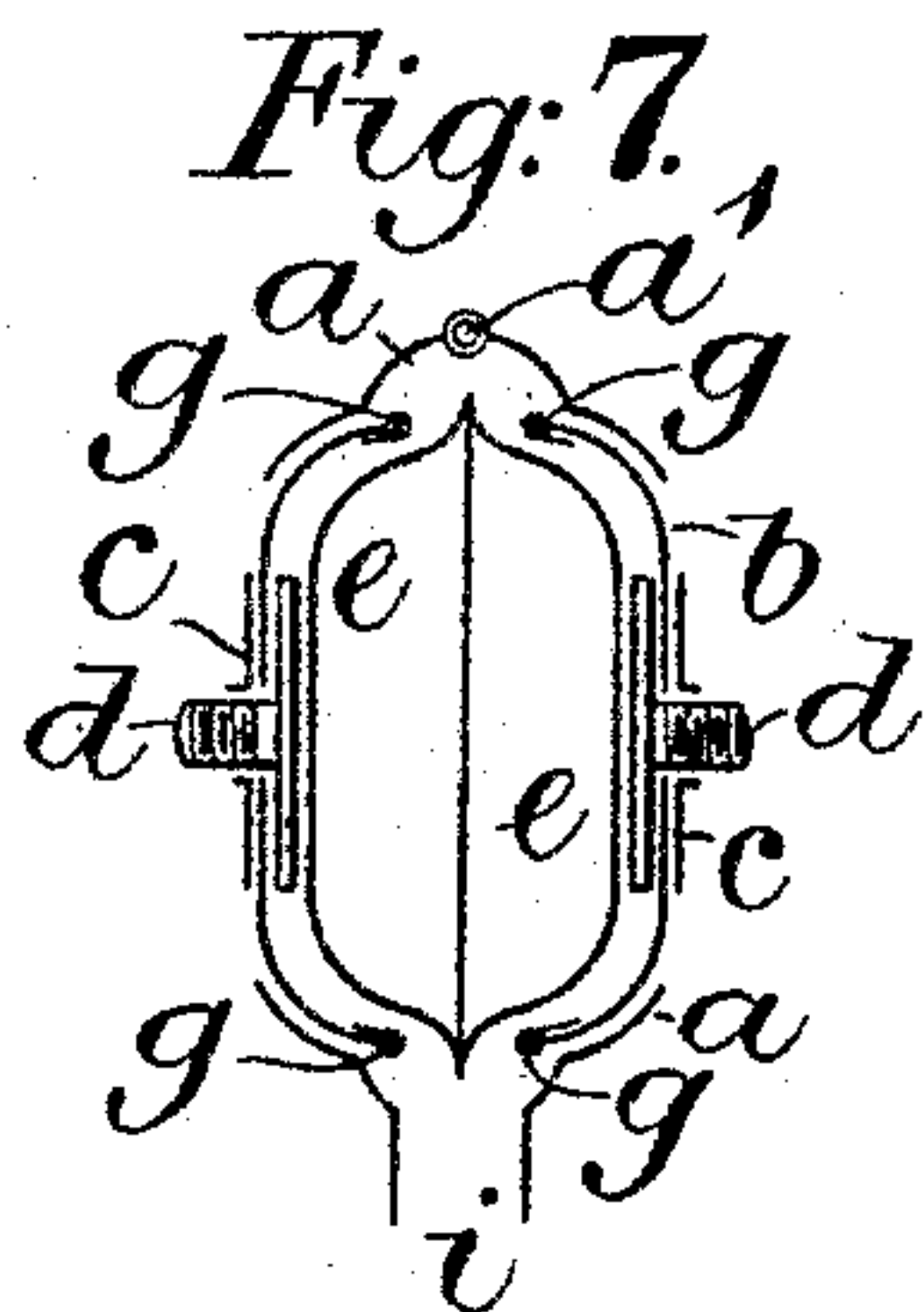
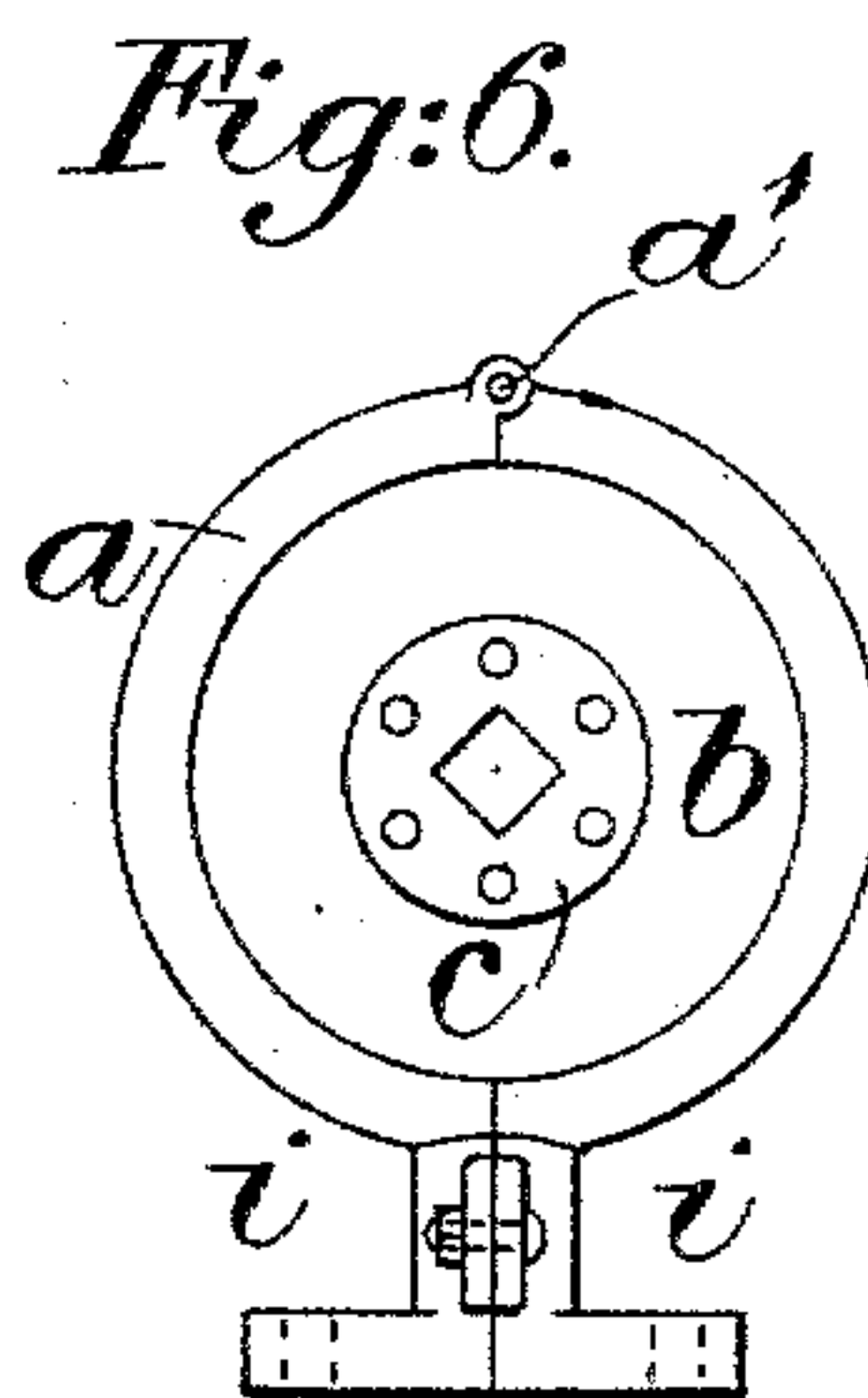
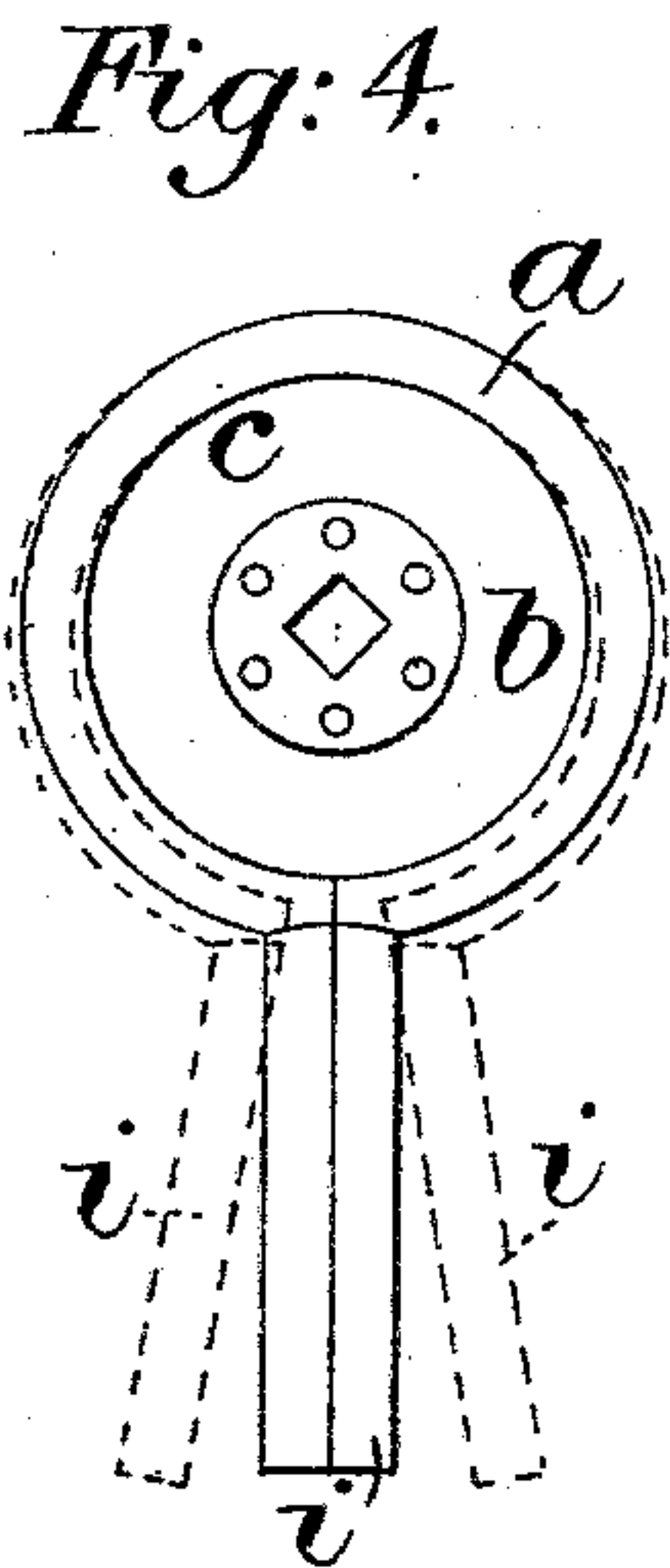
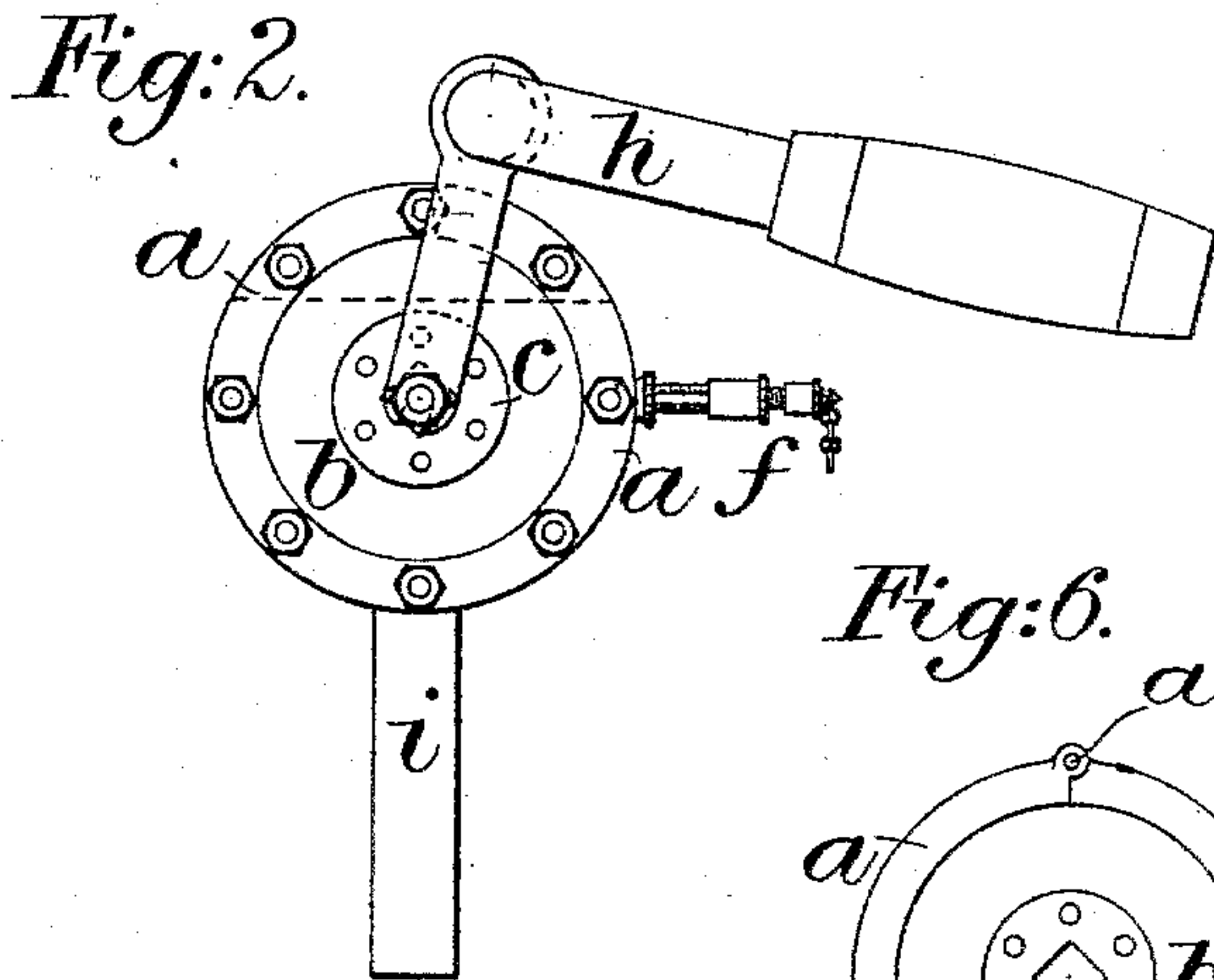
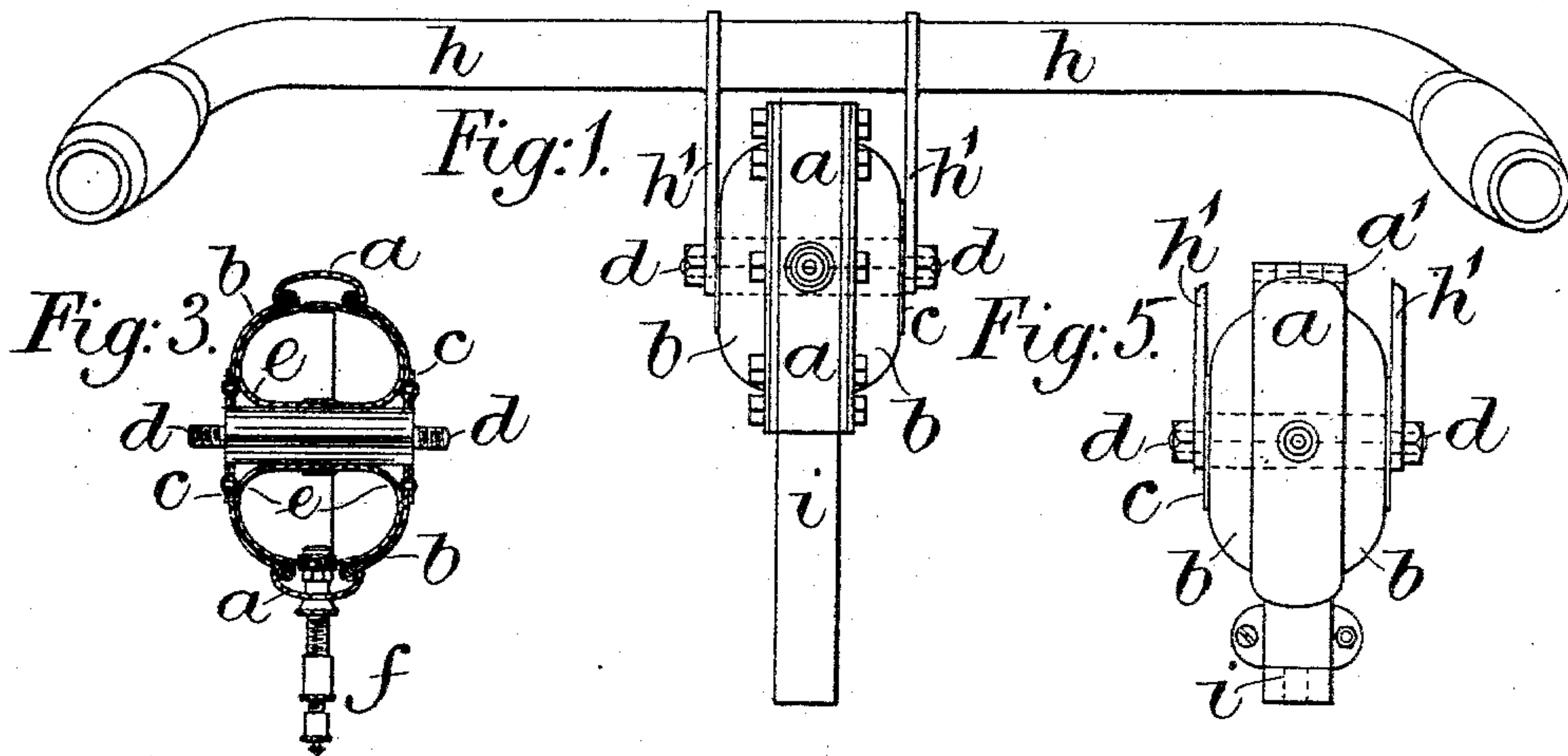


(No Model.)

W. & D. DOIG.
PNEUMATIC SPRING FOR VELOCIPEDES.

No. 589,820.

Patented Sept. 14, 1897.



Witnesses:

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UNITED STATES PATENT OFFICE.

WILLIAM DOIG AND DAVID DOIG, OF LONDON, ENGLAND.

PNEUMATIC SPRING FOR VELOCIPEDES.

SPECIFICATION forming part of Letters Patent No. 589,820, dated September 14, 1897.

Application filed November 13, 1896. Serial No. 611,958. (No model.) Patented in England July 31, 1895, No. 14,551, and in France June 5, 1896, No. 256,976.

To all whom it may concern:

Be it known that we, WILLIAM DOIG and DAVID DOIG, subjects of the Queen of Great Britain, residing at London, England, have
5 invented certain new and useful Improvements in Pneumatic Springs for Velocipedes or other Road-Vehicles, (for which we have obtained Letters Patent of the United Kingdom of Great Britain and Ireland, No. 14,551,
10 dated July 31, 1895, and Letters Patent of France, No. 256,976, dated June 5, 1896,) of which the following is a specification.

This invention relates to improvements in pneumatic springs for velocipedes or other
15 road-vehicles, whereby shock and vibrations caused by inequalities of the roadway are more or less absorbed or diminished.

The invention consists of one or more air-tight and inflatable chambers placed either
20 directly between the axle or axles and the body of the vehicle or the rider or in any other equivalent position where it is required to reduce vibration.

In the further description of this invention reference is made to the accompanying drawings, in which—

Figure 1 is an elevation of the handle-bar of a velocipede to which the improved spring is applied. Fig. 2 is a side elevation of the
30 same, and Fig. 3 is a section through the improved air-tight chamber. Fig. 4 is an elevation of an air-tight chamber partially inclosed in a spring-clip. Figs. 5 and 6 are elevations showing the air-chamber partially inclosed in a hinged metal frame, and Fig. 7 is
35 a diagrammatic section of an air-chamber and its surrounding parts.

The air-tight chamber or spring consists of a circumferential metal frame or clip *a*, in
40 two or more parts, with suitable means for connecting the said parts. Leather side disks *b* are secured to or within the frame *a*, and a metal washer *c* is attached to the center of each disk. A bolt or stud *d*, sometimes made
45 square in section where it passes through the washers, is provided with suitable means of attachment to the required parts of the vehicle. The stud *d* may pass entirely through the air-chamber, as in Figs. 1, 2, 3, and 5, or
50 be in the form shown in Fig. 7, separate on each side. An air-tight india-rubber bag *e*,

having a valve *f* through which it may be inflated or deflated, is also provided and is inclosed between the leather disks *b*. The bag
55 *e* is so formed and proportioned as to throw a considerable strain upon the leather disks when it is fully inflated, so that any strain communicated to the leather disks is sustained by the air under compression within the bag. The bag *e* is sometimes made as an
60 annular bag with a hole or central space through it for the passage of a stud *d*, as in Fig. 3, or without the central space, as in Fig. 7. It is convenient sometimes to attach metal
65 rings *g* to the outer edges of the leather disks *b* as a means of securing them within the metal frame *a*. This method is indicated in Fig. 7; but sometimes the disks are clamped to the frame *a* by screws, as indicated by Figs.
1 and 2.

In Figs. 1 and 2 the air-chamber is shown
70 as placed between the handle-bar *h* of a velocipede and a tubular extension *i* of the frame *a*, which is attached to the steering-head in any suitable manner. In this case
75 the handle-bar *h* is secured to the stud *d* by means of two side arms *h'*, so that the leather disks *b*, supported by the interior inflated bag *e*, cut off or diminish the vibration that would
80 otherwise be communicated from the steering-head through the tubular extension *i*. Thus there is no metallic connection between the metal point of support *a* (which is directly
85 connected with *i*) and the metal point of suspension *d*, and it will be evident that the handle-bar *h* might be connected directly to the frame *a* and the tubular extension *i* to the stud *d* by a fork with the same effect and without departing from the nature of the invention. Similarly a velocipede-saddle can
90 be substituted for the handle-bar *h*, thus avoiding much of the vibration now communicated to the body of the rider. In this case the form and shape are modified as indicated by dotted line in Fig. 2, to permit the saddle
95 to be kept as low as may be required.

In Figs. 5 and 6 the metal point of support
100 *i* is modified to suit its position on vehicles—as, for example, on the axles of vehicles—while the body of the vehicle (or its equivalent) would be mounted on the point of suspension *d*. It will be evident from this de-

scription that our improved air-chamber can be placed between two ordinary sets of metallic springs—as, for example, at the junction of the side and back springs of a hansom-cab—one spring being attached to the point of support in any convenient manner and the other similarly to the point of suspension.

In Fig. 4 the frame *a* consists of a spring-clip (semicircular in transverse section) with semicircular extensions *i*, which when closed form a tube. This tubular extension may be arranged to embrace or to be inserted within another tube and be fixed in position or adapted for axial movement, so that in the latter case its movement is guided in the required direction. The diagrammatic section, Fig. 7, indicates a spring-clip frame *a* which in cross-section is formed as a compound curve to inclose not only the metal rings *g* at the edges of the leather disks, but also shaped to give some additional support to the exterior of the disks and to prevent undue transverse motion. By using a through-stud *d* of tubular form to act as a guide this object is further provided for in a similar manner to that already mentioned for the tubular extension *i*, while avoiding continuous metal contacts throughout. The rectangular-shaped frame *a* in Figs. 5 and 6 is provided with a hinge-joint *a'* and suitable means for fastening the halves of the frame together, as indicated in the figures.

It is to be understood that while we believe the materials named are the best for our purpose we do not restrict ourselves to the use of the materials herein specified, as others may be found sufficient for the purposes in

many forms of road-vehicles, and that the positions of suspension and support are reversible.

What we claim, and desire to secure by Letters Patent of the United States, is—

1. In a pneumatic spring for velocipedes or other road-vehicles, the combination of a circumferential frame *a* in two or more parts connected together; leather side disks *b*, *b*, having their circumferential edges secured to the said frame; metal washers *c*, *c*, secured to the central portions of the said disks, a stud or studs *d* on which the said washers are mounted; and an inflatable air-tight bag *e*, placed within the said frame and adapted to distend the said leather disks when inflated, substantially as and for the purpose set forth.

2. In a pneumatic spring for velocipedes or other road-vehicles, the combination of a spring-clip circumferential frame *a* semicircular in cross-section and having extensions *i*; leather side disks *b*, *b*, having metal rings *g* at their circumferential edges; metal washers *c*, *c*, secured to the central washers of the said disks, a stud or studs *d* on which the said washers are mounted; and an inflatable air-tight bag *e*, placed within the said frame and adapted to distend the said leather disks when inflated, substantially as and for the purpose set forth.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

WILLIAM DOIG.
DAVID DOIG.

Witnesses:

M. E. CARRINGTON,
CHAS. ROCHE.