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PATENTED DEC. 17, 1907.

S. S. ARNOLD.

HINGE.

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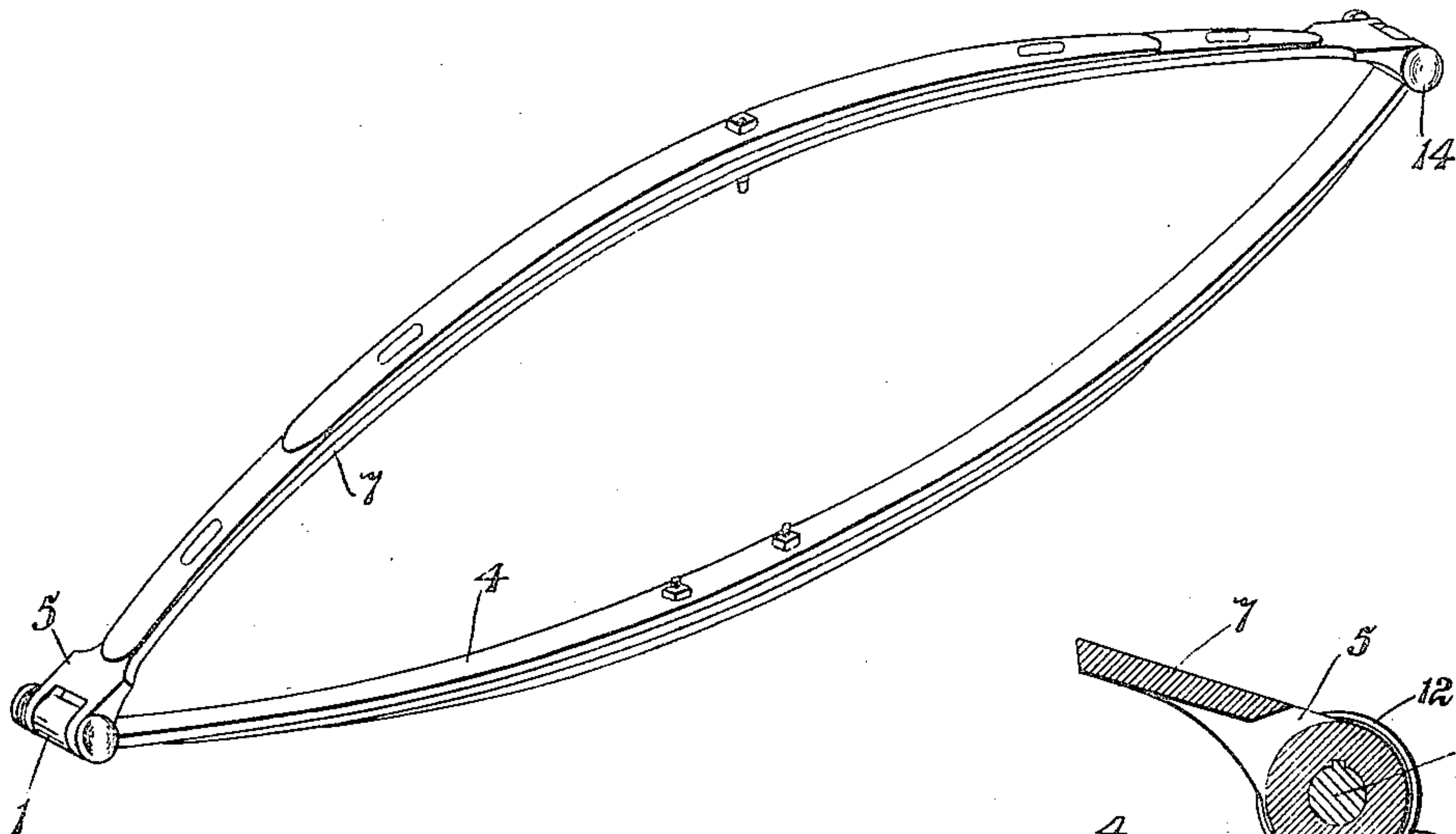


Fig. 1.

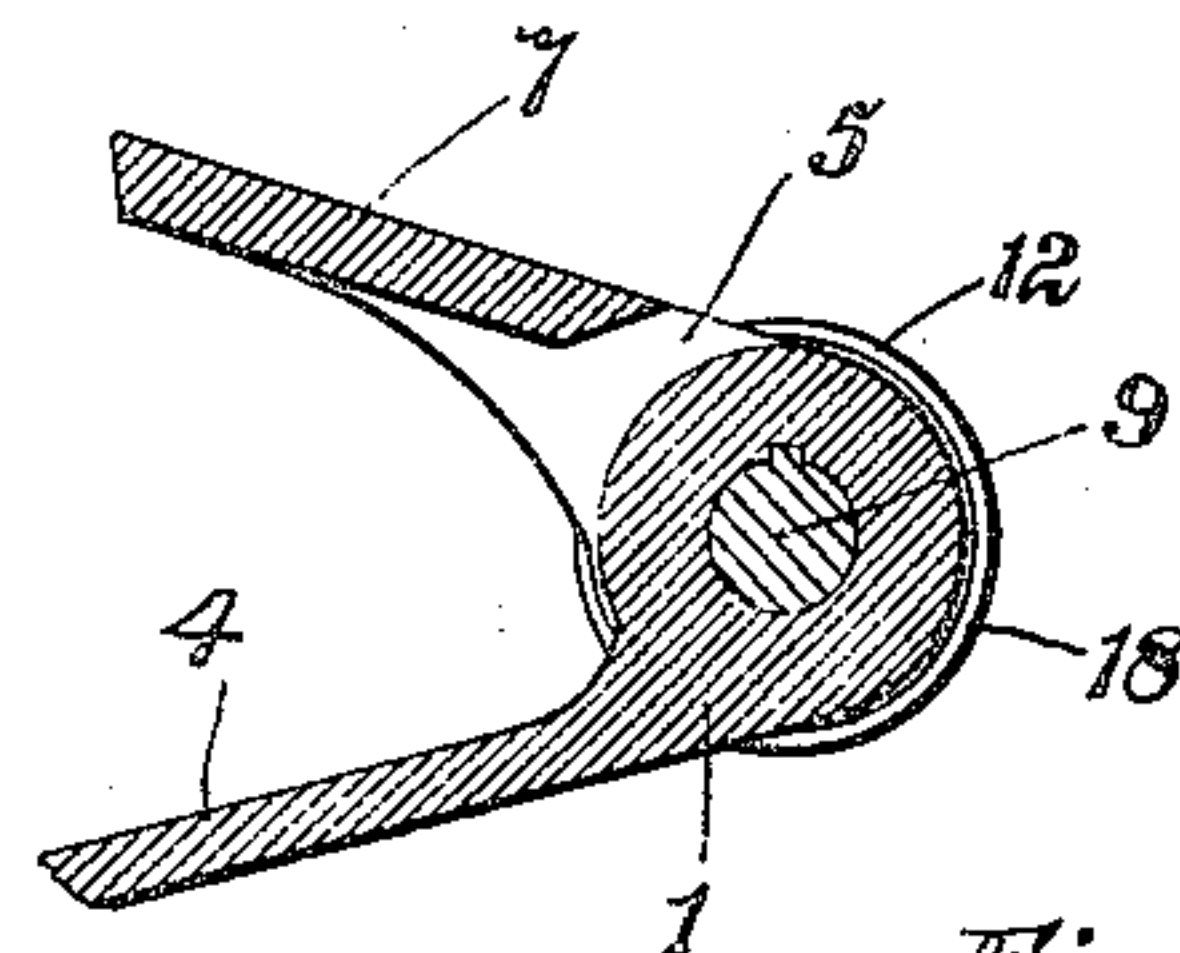


Fig. 7.

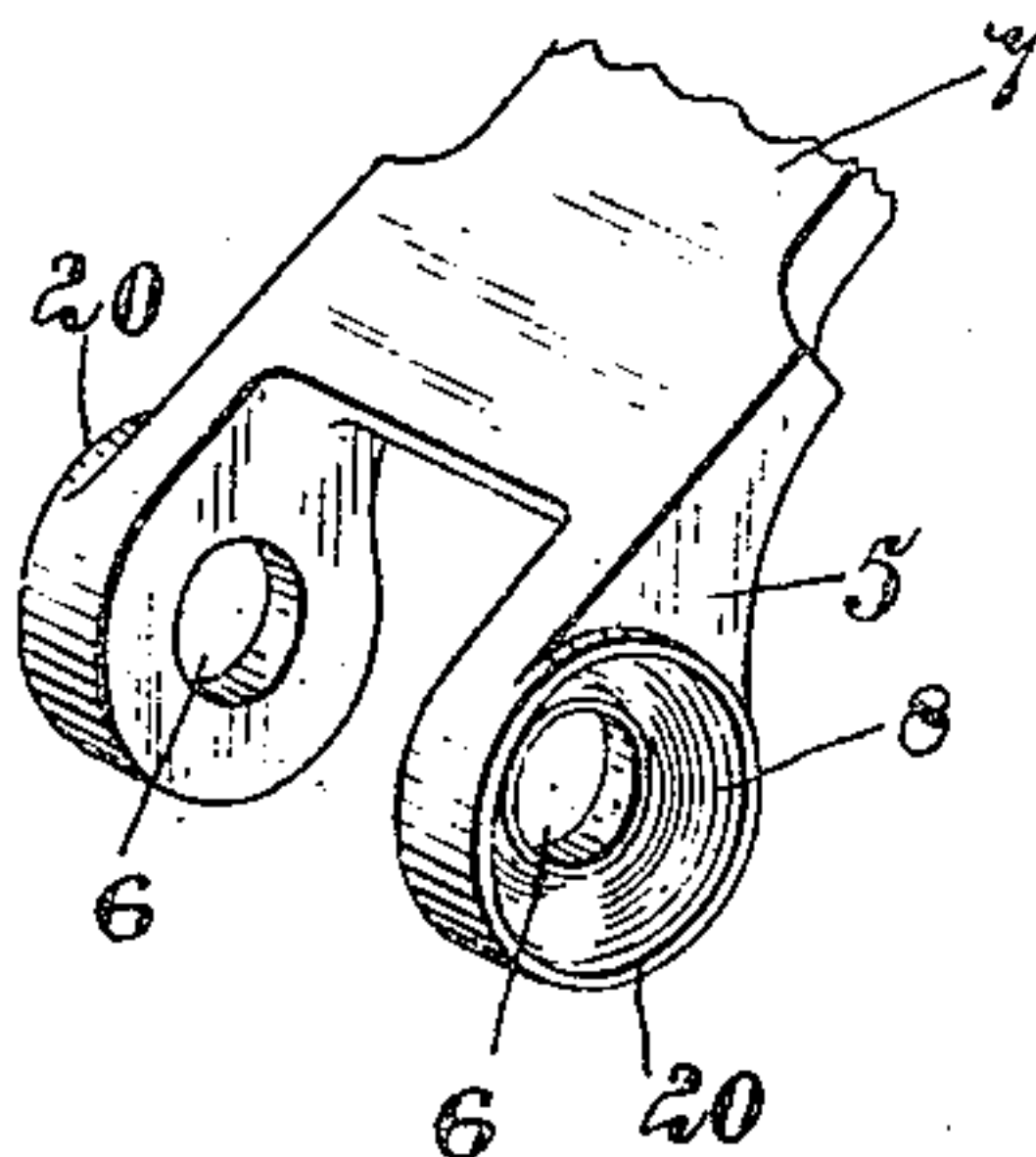


Fig. 2.

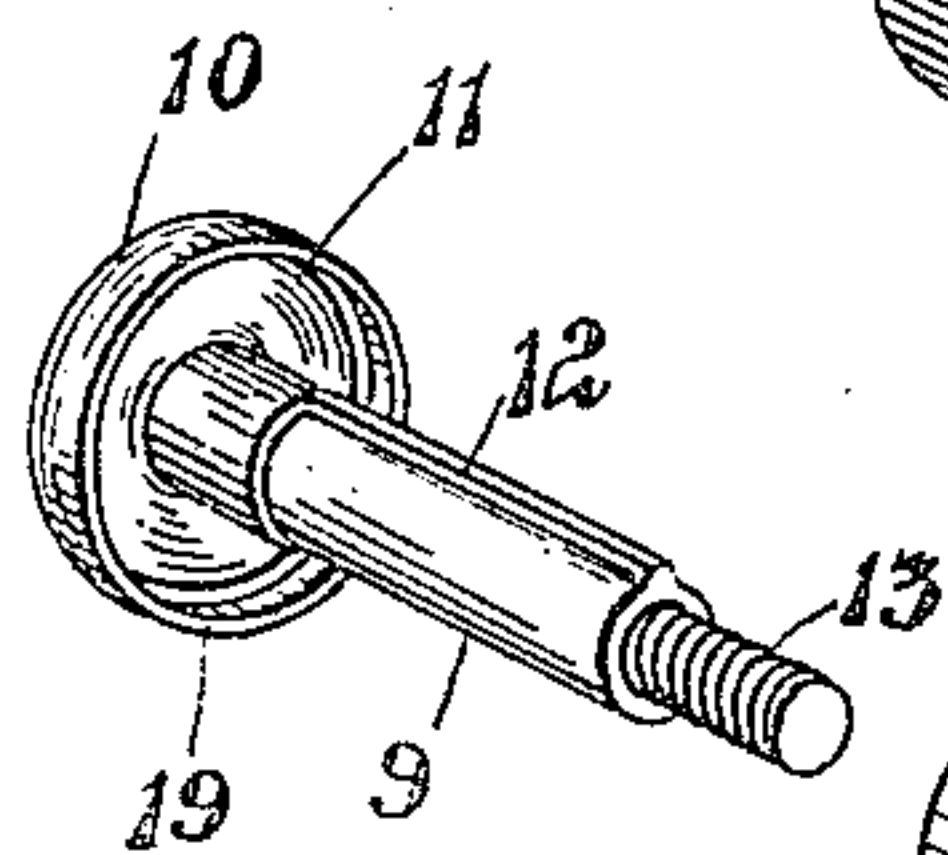


Fig. 4.

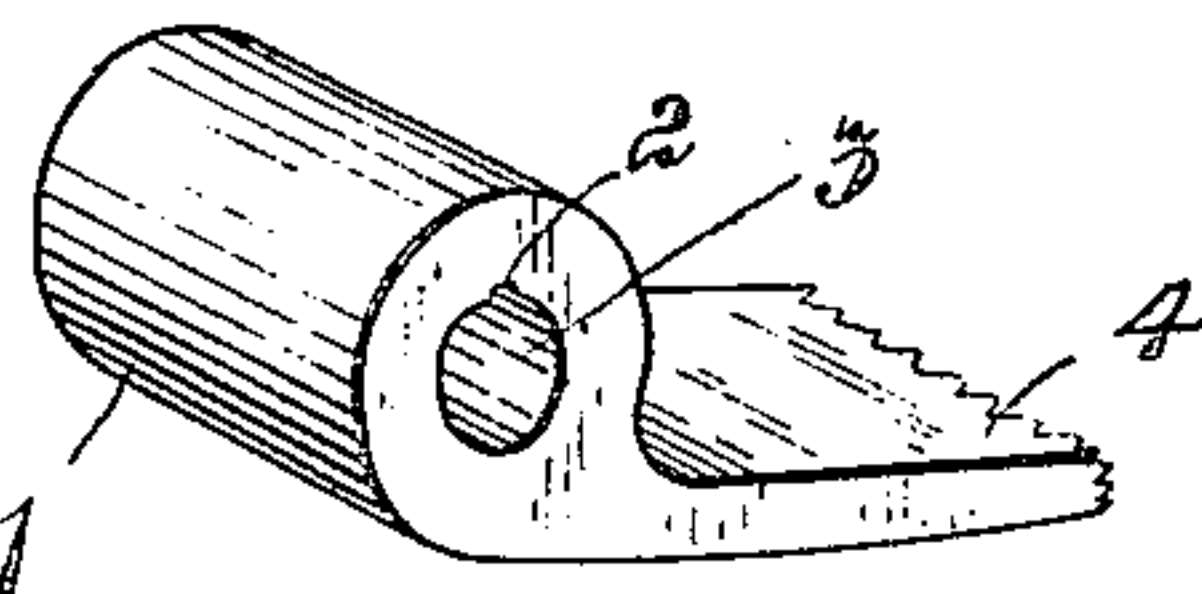


Fig. 3.

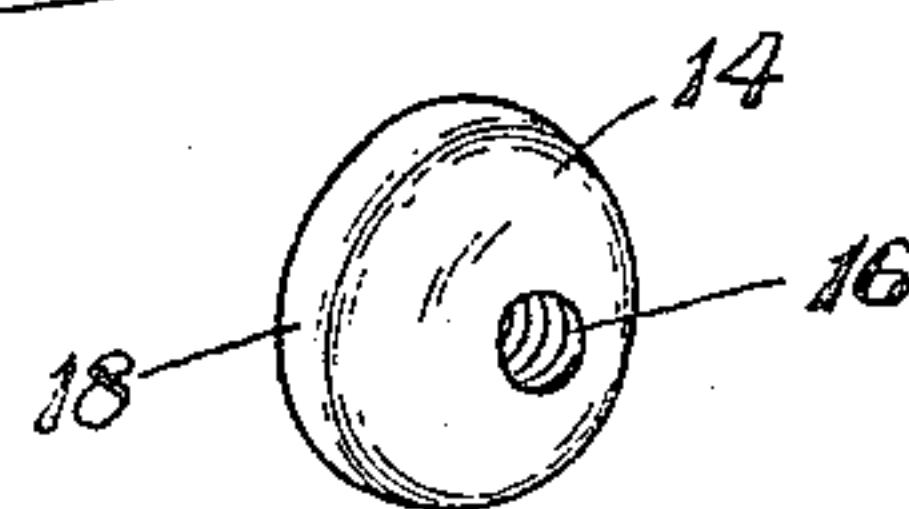


Fig. 5.

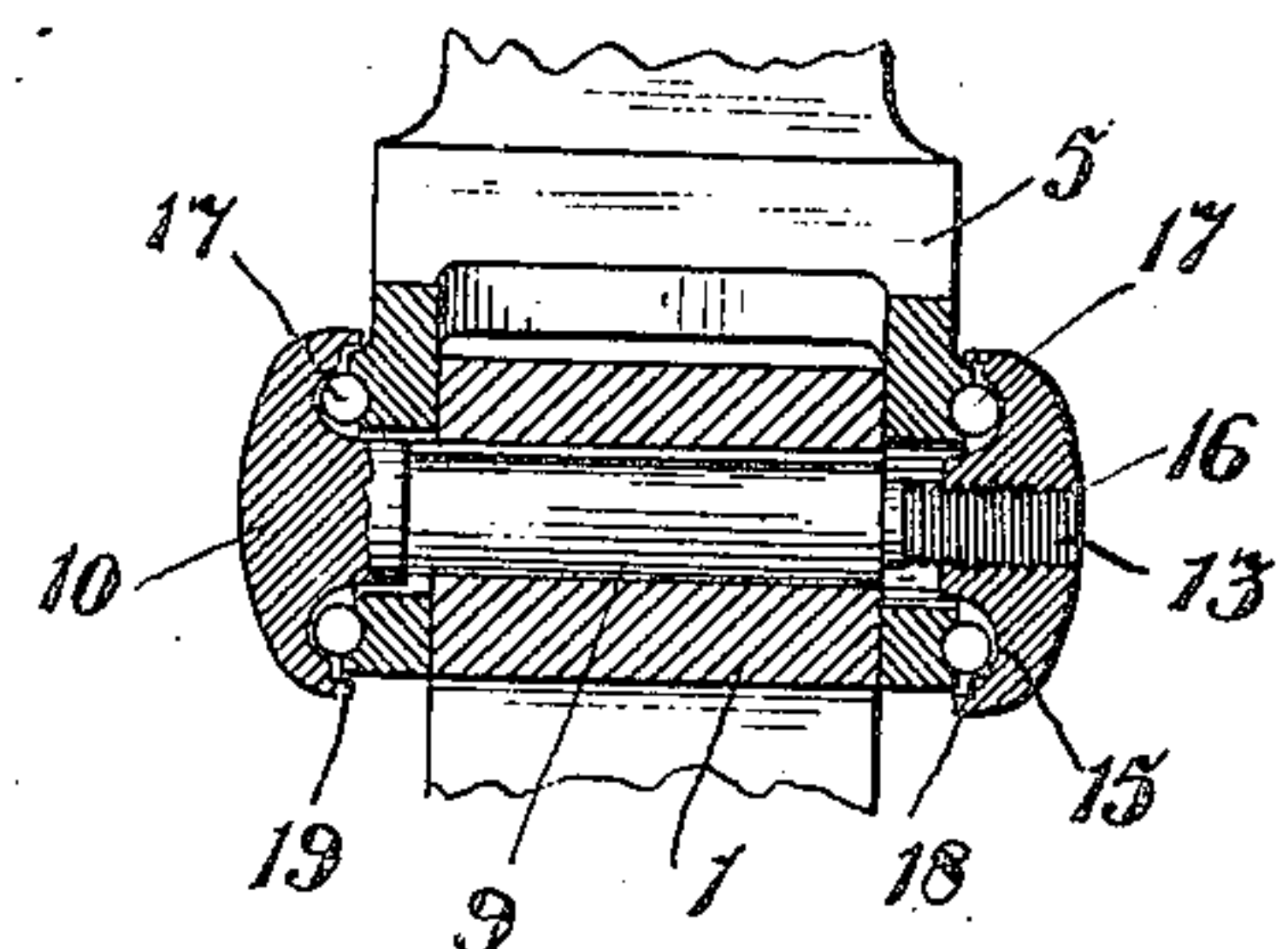


Fig. 6.

Witnesses

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Inventor

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Att'y.



# UNITED STATES PATENT OFFICE.

SAMUEL STEPHEN ARNOLD, OF TORONTO, ONTARIO, CANADA.

## HINGE.

No. 873,704.

Specification of Letters Patent.

Patented Dec. 17, 1907.

Application filed March 5, 1907. Serial No. 360,655.

*To all whom it may concern:*

Be it known that I, SAMUEL STEPHEN ARNOLD, a subject of the King of Great Britain, resident of the city of Toronto, county of York, Province of Ontario, in the Dominion of Canada, have invented certain new and useful Improvements in Hinges, of which the following is a specification.

The invention relates to improvements in hinges and particularly to hinges used in joining the ends of elliptical springs, as described in the present specification and shown in the accompanying drawings that form part of the same.

The invention consists essentially of the novel arrangement and construction of hinge parts whereby balls are set in between the flat adjoining faces of the pin and knuckle portion of the hinge.

The object of the invention is primarily to improve the resilient properties of elliptical springs and thus increase their usefulness and to provide a durable hinge which may be used for other purposes than that described herein.

In the drawings, Figure 1 is a perspective view of the hinge shown at the ends of an elliptical spring. Fig. 2 is an enlarged perspective detail of the ends of the knuckle of the hinge and showing a leaf extending therefrom and broken away. Fig. 3 is an enlarged perspective detail of the central portion of the knuckle showing a leaf extending therefrom and broken away. Fig. 4 is an enlarged perspective detail of the hinge pin. Fig. 5 is a perspective detail of the nut. Fig. 6 is an enlarged longitudinal sectional view through the hinge. Fig. 7 is a cross sectional view.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 is the central knuckle portion of the hinge having the key-way 2 in its central pin hole 3 and the leaf 4 extending therefrom and here shown as forming the end of the lower inner band of an elliptical spring.

5 are the ends of the knuckle portion of the hinge fitting to each end and in alinement with the central knuckle portion 1 having the pin holes 6 slightly larger than the pin hole 3 and the leaf 7 extending therefrom and here shown as forming part with the upper inner band of an elliptical spring.

8 are annular grooves made in the outer faces of the end knuckle portions 5 and sur-

rounding the pin holes 6 and having a rounded bed.

9 is the hinge pin having the head and 10 the annular groove 11 made in the inner face of said head in proximity to the pin, said groove 11 having a rounded bed and opposing one of the annular grooves 8. The pin 9 is of corresponding dimensions to the pin hole 3 in the central knuckle 1 and has the key 12 longitudinally arranged thereon corresponding and fitting in the key-way 2 on the insertion of the pin in the knuckle portions, further the pin at the end thereof has the reduced threaded portion 13 adapted to receive a nut.

14 is the nut and 15 is an annular groove in the inner face of said nut surrounding its central hole 16 and the said hole is threaded to screw on to the threaded end 13 of the pin 9. The annular groove 15 has a rounded bed and opposes the other of the annular grooves 8.

It will be seen from the foregoing description that the end knuckle portions 5 of the hinge will not bear on the pin and the central knuckle portion, while bearing on the pin will not permit the rotation of the said pin therein as said pin is locked from rotation therein by the key 12 in the key-way 2. In consequence of this, the bearing of the hinge will be thrown on to the balls 17 inserted between the opposing grooves 8 and 11 and 8 and 15, which form ball races for the said balls.

The nut 14 may be locked on in any suitable manner, such as by splaying the end of the pin or by providing a suitable form of lock nut.

In this invention constant lubrication is eliminated as the balls may be set in place in graphite and this will last indefinitely as the inner edge face 18 of the nut and projecting surface 19 of the head overlap the slightly projecting annular surfaces 20 of the end knuckle portions 5 and completely shut in said ball races and keep them free from dirt or grit.

The most suitable application of this invention is for joining the ends of elliptical springs as described in the present specification, but it will readily be understood that it may be applied to many forms of hinges, with equal facility and to equal advantage.

What I claim as my invention is:—

1. A hinge, comprising a central knuckle portion, end knuckle portions adjoining said

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central knuckle portion and having ball races in their outer faces, a pin non-rotatably secured in said central portion and extending through said knuckle portions and having a ball race in the head thereof to the outside of one of said end portions and opposing the ball race in said end portion, a nut secured to the end of said pin and having a ball race in its under face opposing the ball race in the other of said end portions, and balls inserted between the opposing annular grooves respectively, substantially as described.

2. A hinge, comprising end knuckle portions extending from the leaf portion and having on each of the outer faces thereof an annular groove surrounding the pin hole, said annular grooves having rounded beds and forming annular projections therearound, a central knuckle portion having a pin hole of smaller dimensions than the pin holes in said knuckle portions and a suitable leaf extending therefrom and a key-way in said pin hole, a pin having a key projecting therefrom corresponding to said key-way and fitting therein and an annular groove in the inner face of the head thereof opposing one of the aforesaid annular grooves, a nut screwing on to the end of said pin and having an annular groove in the inner face thereof opposing the other of the said annular grooves in the end knuckles, said grooves in said head and said nut having rounded beds corresponding to the rounded beds of the knuckle grooves, and balls inserted

in said opposing grooves, substantially as described.

3. In a device of the class described, in combination, end knuckle members extending from a suitable leaf and having projecting annular surfaces on the outer sides thereof extending from annular grooves in the side faces surrounding the pin holes, a central knuckle portion extending from a suitable leaf and having its pin hole of smaller dimensions than the aforesaid pin hole and a key-way longitudinally arranged therein, a pin of corresponding dimensions to said pin hole in the central knuckle portion and having a key projecting therefrom fitting into the aforesaid key-way and the inner face of the head grooved to form the annular projecting faces overlapping the aforesaid annular projecting faces from one of the end knuckles, a nut screwed on to the end of said pin and having a groove surrounding the central hole therein forming annular projecting faces overlapping the aforesaid projecting surfaces on the other of said end knuckles, and balls inserted in the opposing grooves so arranged, substantially as described.

Signed at the city of Toronto, in the county of York, Province of Ontario, in the Dominion of Canada, this 17th day of January, 1907.

SAMUEL STEPHEN ARNOLD.

Witnesses:

H. DENNISON,  
E. WILKIN.