No. 872,226. PATENTED NOV. 26, 1907.

C. T. EDGERTON & W. J. GOLDEN.

SPRING.

APPLICATION FILED SEPT. 10, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

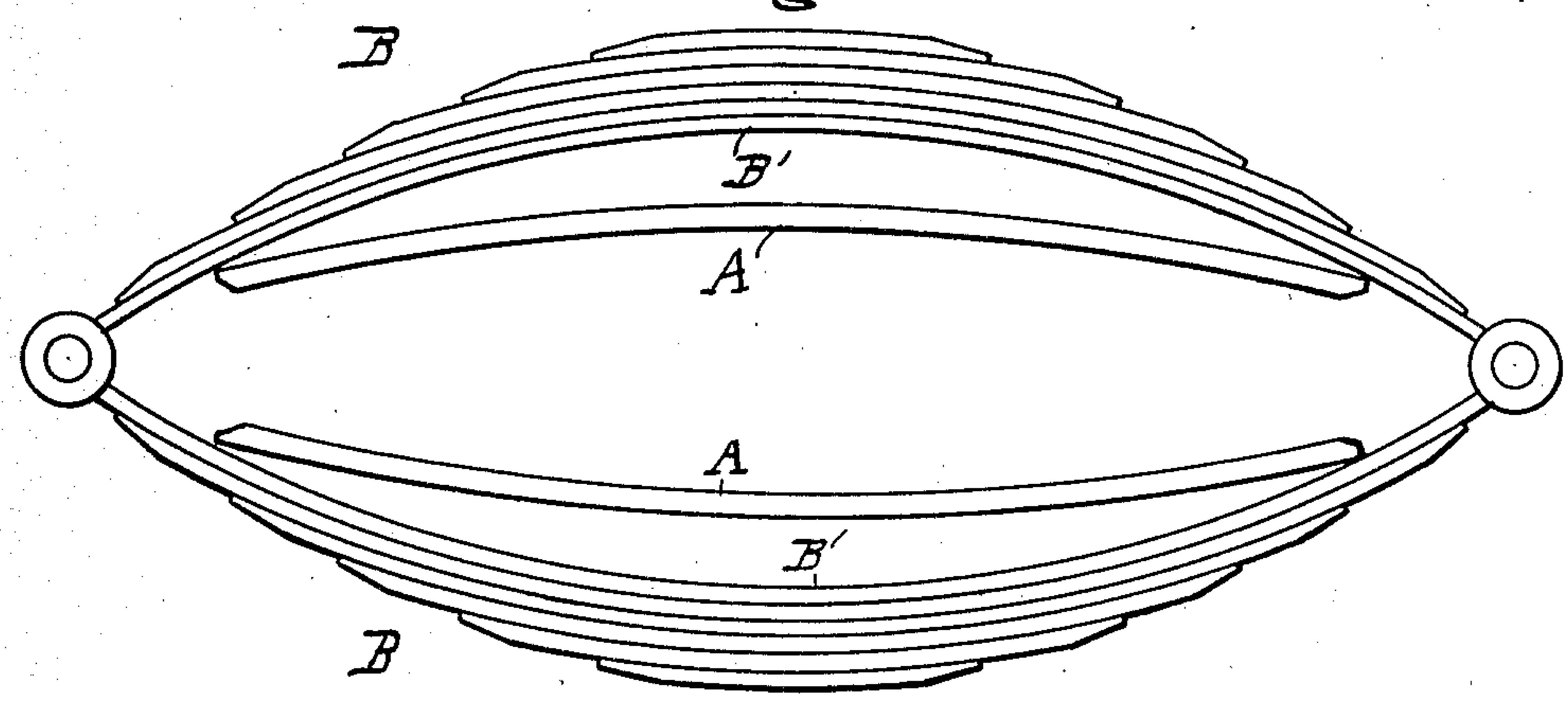
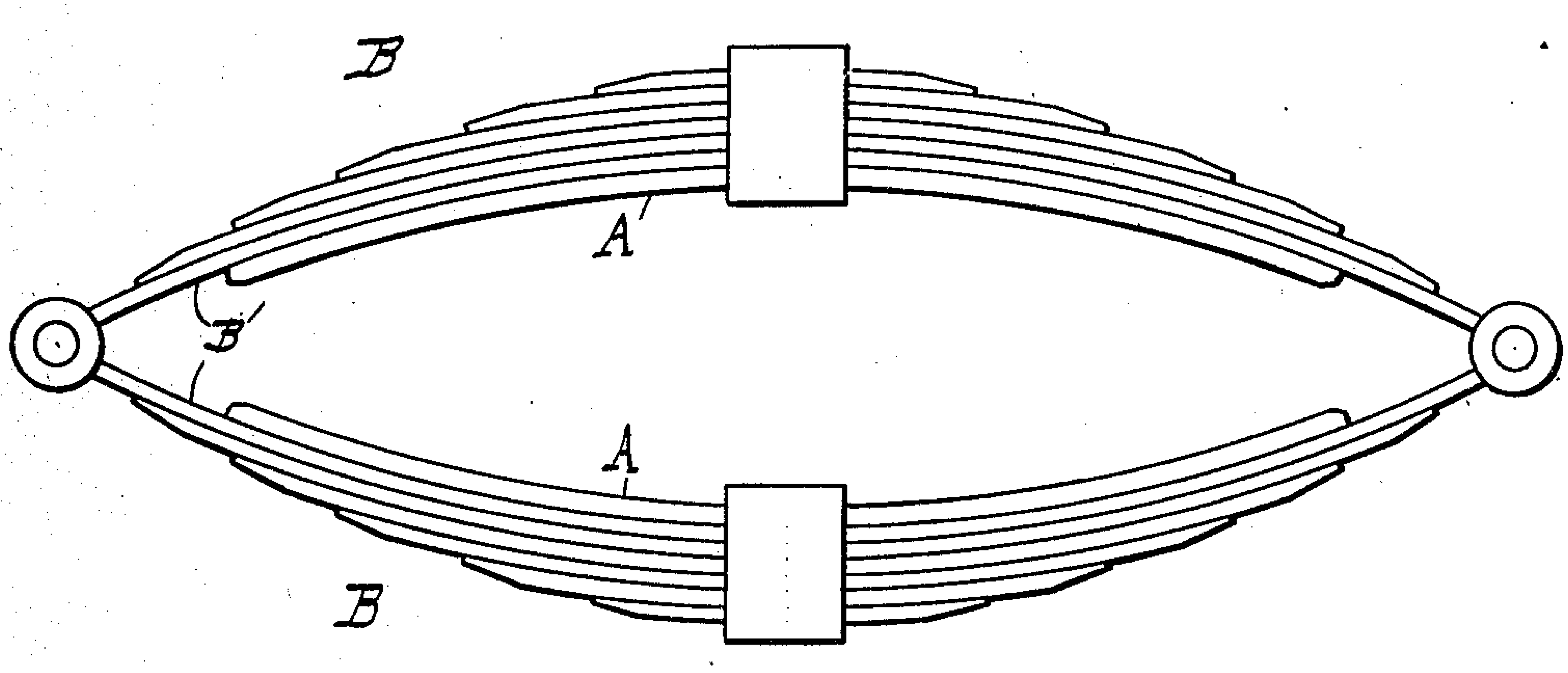


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 3.

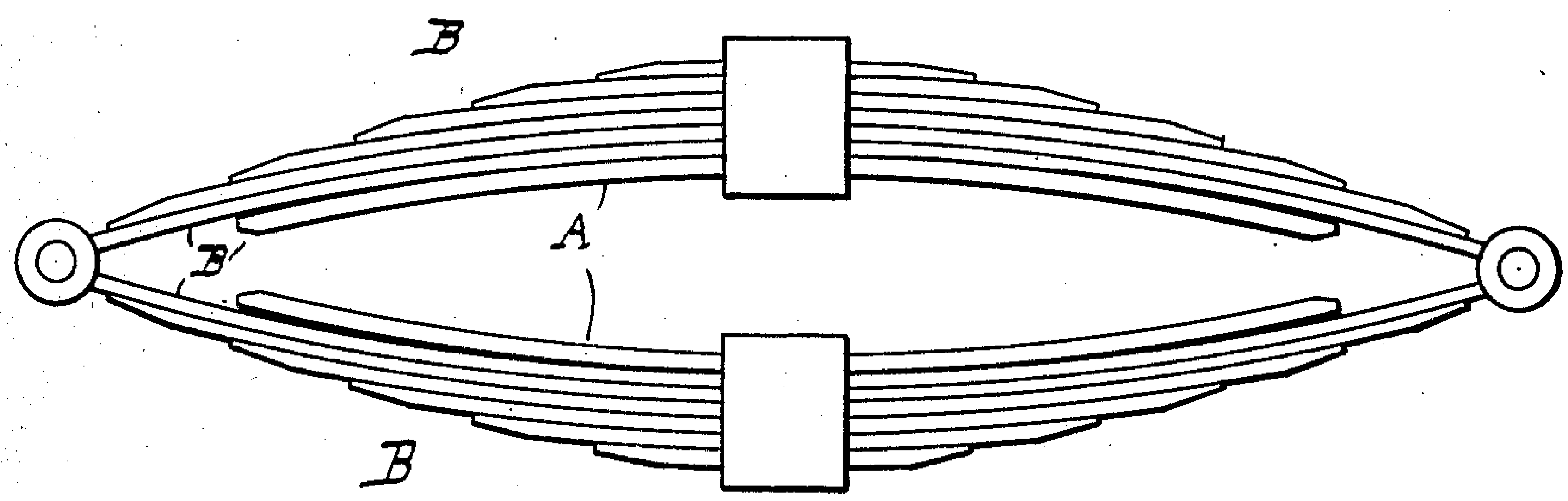


Fig. 4.

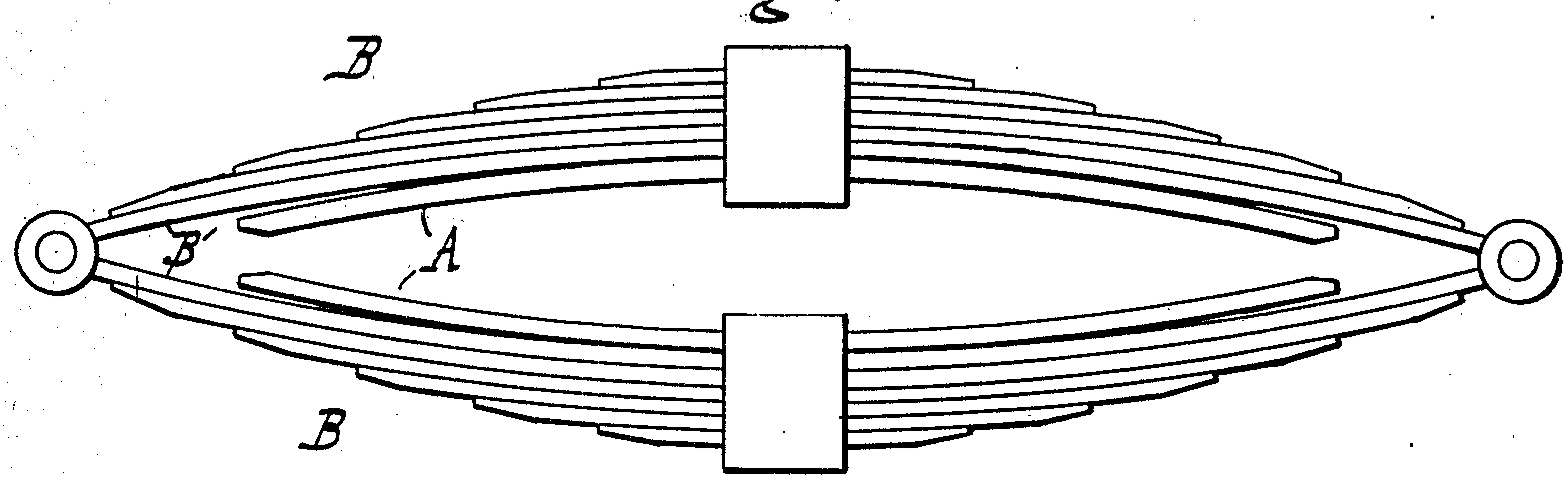
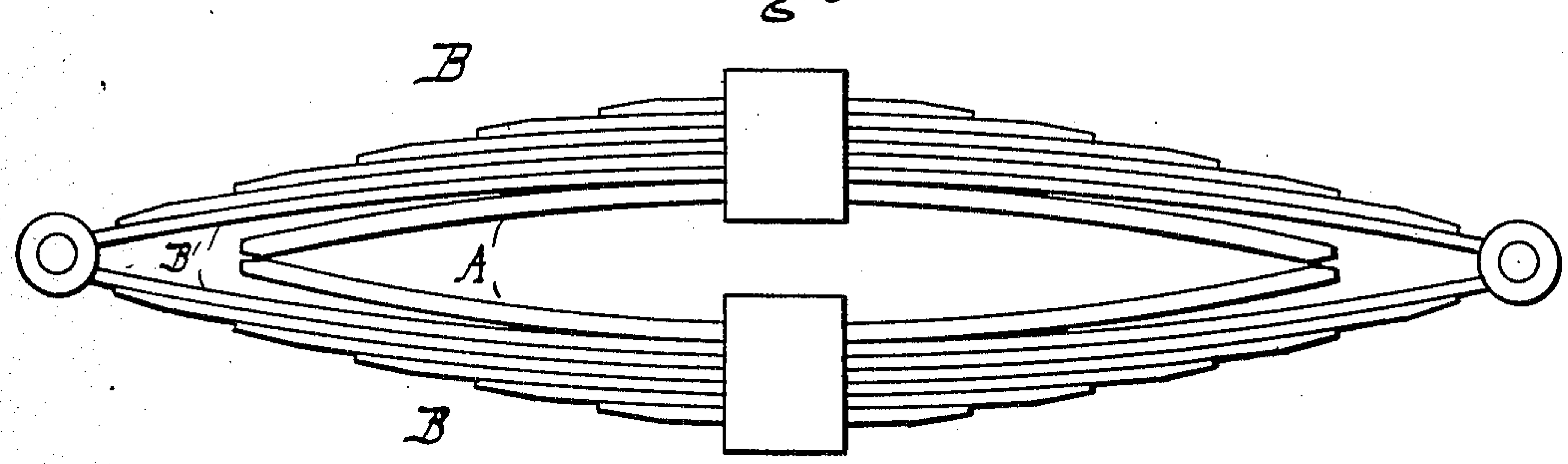


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 6.

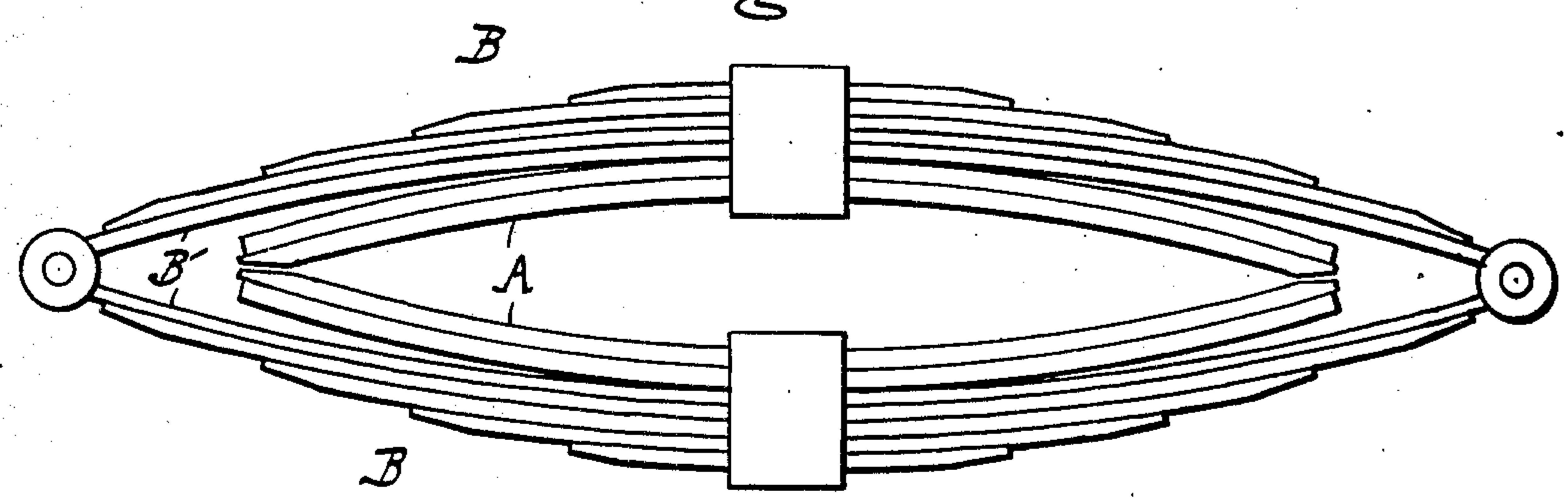
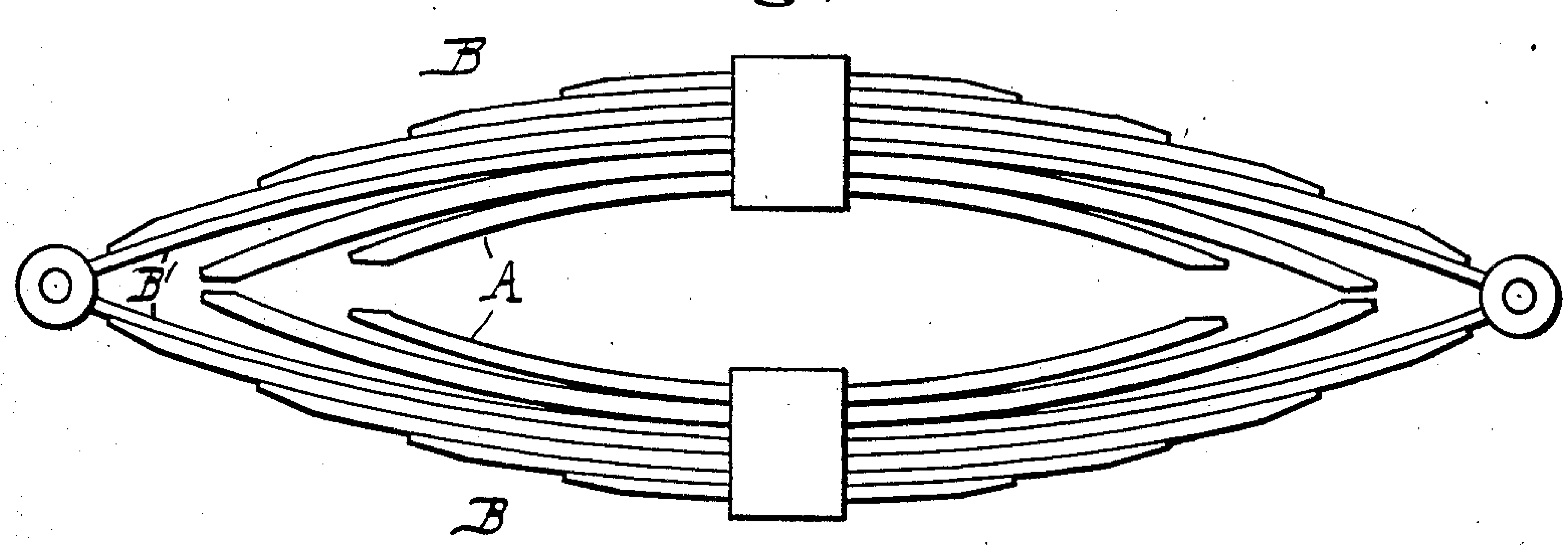


Fig. 7.



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CHAUNCEY T. EDGERTON, OF RICHMOND HILL, AND WELFORD J. GOLDEN, OF OSWEGO, NEW YORK.

SPRING.

No. 872,226. **Specification of Letters Patent.** **Patented Nov. 26, 1907.**

Application filed September 10, 1907. Serial No. 392,139.

To all whom it may concern:

Be it known that we, CHAUNCEY T. EDGERTON and WELFORD J. GOLDEN, citizens of the United States of America, and residents of Richmond Hill, in the county of Queens, in the State of New York, and Oswego, in the county of Oswego, in the State of New York, respectively, have invented certain new and useful Improvements in Springs, of which the following is a specification.

This invention relates to springs, and particularly to leaf springs of both the elliptic and semi-elliptic type.

It is well understood that the usual leaf or elliptic spring gives deflections practically proportionate to the load producing themup to the elastic limit of the material. Now, for many purposes to which such springs are applied, it would be highly desirable that deflections should not be proportional to loads. Take the case of a railway car designed to carry loads which are a considerable proportion of the weight of the car itself. When traveling empty, or nearly so, certain inequalities in the roadbed would produce certain deflections in the springs under the car. With the same car, traveling over the same stretch of road, heavily loaded, these inequalities would produce considerably greater deflections than before, since the weight available to produce shock, or suddenly applied load, is greater. But it is generally recognized that for a given class of service the ideal spring, traveling over an average roadbed should give a certain fixed deflection to insure easy riding, irrespective of the load carried. Manifestly the usual type of elliptic would not do this. Again, take the case of an automobile traveling over a rough country road. The deflections with good flexible springs of the usual type are excessive. The ideal design would embody extreme flexibility at the "loaded heights" of the spring, *i. e.*, under the car body normally loaded; and a gradual stiffening in both directions as the spring oscillated. Thus would be obtained extreme easy riding over a smooth road and over a rough road, where the oscillations would otherwise be unpleasantly excessive, the stiffening up of the spring would "damp" the vibration.

The object of this invention is to provide a spring which approximates the ideal design outlined above, by separating out from the body of the spring one or more of the leaves, and so applying them that they are idle under normal load but come into play to prevent undesirable flexion of the spring under light load and to reinforce it when overloaded or in case of sudden shock. Our invention differs radically from the old "auxiliary plate" design, which it resembles in appearance only.

In the accompanying drawings Figure 1 is a side elevation of the usual elliptic leaf spring with our improved auxiliary leaf in position for attachment; Fig. 2 shows our auxiliary leaf attached; Figs. 3, 4 and 5 show diagrammatically the spring under compression, illustrating the action of our auxiliary leaf; Figs. 6 and 7 show modifications of our auxiliary leaf construction.

Referring to the drawings it will be seen that whereas in the old auxiliary plate type of leaf spring, the auxiliary plates have merely a slightly less curvature than the other plates of the spring, so as to secure their lying snugly against the same, our improved design contemplates auxiliaries A fitted with little or no camber and pulled up against the back plate B^1 of the body of the spring B by the band C, as shown in Figs. 1 and 2. The reaction of the auxiliaries when thus pulled up materially tensions the main spring plates and thus reduces the free height of spring. It has the further effect of stiffening, throughout the range of movement, the spring from free position, (Fig. 2) to the position shown in Fig. 3 at which the auxiliaries are clear of the back plates. From position Fig. 3 to position Fig. 5 the auxiliaries are idle. Somewhere within this "flexible" range the "working position" (Fig. 4) of the spring will fall. At position Fig. 5 the auxiliaries touch, and the spring becomes correspondingly stiffer. The stiffness increases as the auxiliaries straighten out and roll up against the back plates, thus reducing their own effective length. The total range of movement of the spring may thus be divided into three phases. Phase 1 includes movement from Fig. 2 to Fig. 3; phase 2 from Fig. 3 to Fig. 5; and phase 3 from Fig. 5 to the solid position. Throughout phase 2 the auxiliaries are idle, and the working plates only carry the load. In phases 1 and 3 the strength of the auxiliaries is added to that of the working plates. The increase in strength is the more marked because the auxiliaries are made usually, though not necessarily, of heavier steel than the working plates. They are designed of such thicknesses to be subjected to maximum allowable fiber stress, when the spring is in solid position. Herein our plate differs again from the old auxiliary plate type in which all plates were of the same thickness and the auxiliaries were never worked to their capacity.

Obviously the peculiar characteristics of our design may be made more marked by using two auxiliaries in each band. Either they may be of same length, one strengthening the other as in Fig. 6, or they may be of different lengths and designed to come into action at different times, thus giving 5 instead of 3 phases for the movement of the spring.

Our device may be applied to a semi-elliptic spring of the common locomotive type by the use of proper appliances, either in the shape of stirrups on the hanger links, of fittings on the car or carriage frame, or any other convenient devices which will engage the ends of the auxiliary at the desired point in its movement.

We claim as our invention:

1. In a leaf spring, an auxiliary plate of less camber than the working plates of the spring and tending by its reaction to substantially reduce the free height of the spring.

2. In a leaf spring, an auxiliary plate of less camber than the working plates of the spring which by its reaction substantially stiffens the spring under the initial range of load.

3. In a leaf spring, an auxiliary spring plate of less camber than the plates of the spring which is idle in the working position of the spring but substantially affects its action under light and overloaded conditions.

4. In a leaf spring, an auxiliary plate of less camber than the plates of the spring and so proportioned that with the spring in solid position, said auxiliary is subjected to the maximum safe fiber stress.

5. In a leaf spring, a plurality of auxiliary spring plates of less camber than the plates of the spring, which are idle in the working position of the spring but substantially affect its action under light and overloaded conditions.

6. In a leaf spring, a plurality of auxiliary spring plates of unequal length and of less camber than the plates of the spring which are idle in the working position of the spring but substantially affect its action under light and overloaded conditions.

7. In a leaf spring, a plurality of auxiliary spring plates of unequal camber but of less camber than the plates of the spring, which are idle in the working position of the spring but substantially affect its action under light and overloaded conditions.

8. In an elliptic leaf spring, auxiliary plates of less camber than the plates of the spring, facing each other and so shaped and proportioned that they meet and are subjected to the maximum safe fiber stress when the spring is in solid position.

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

CHAUNCEY T. EDGERTON.
WELFORD J. GOLDEN.

Witnesses:
HERBERT W. YOUNG,
S. ELMER DELANEY