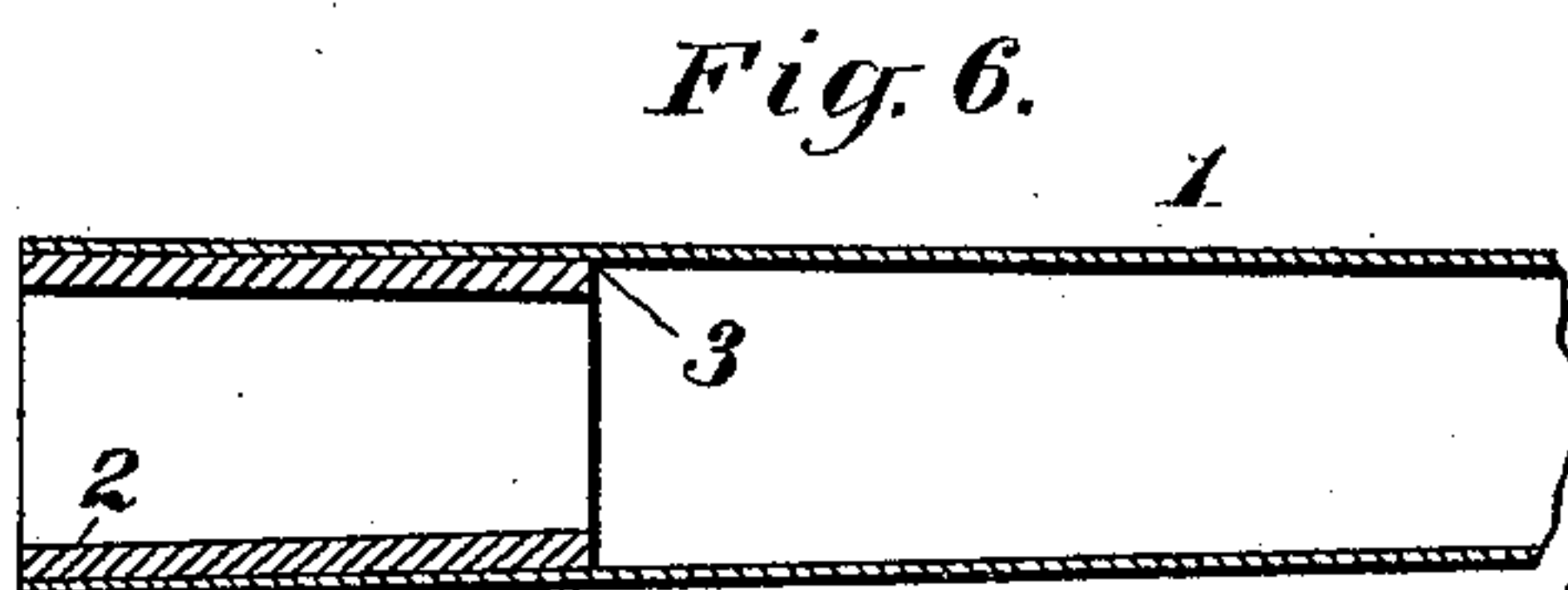
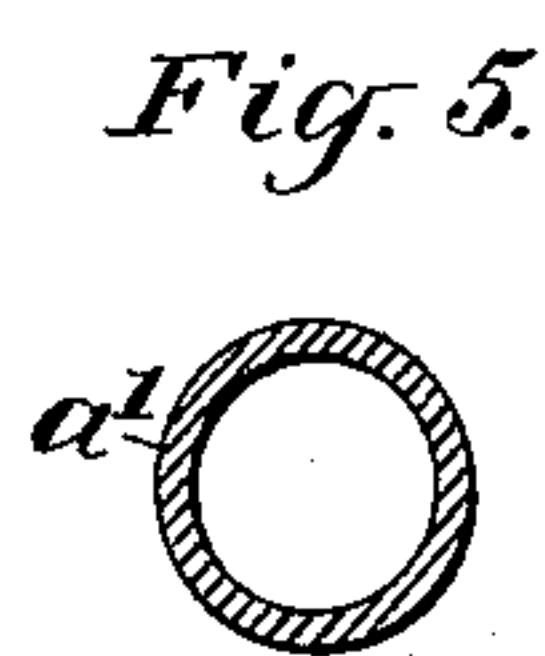
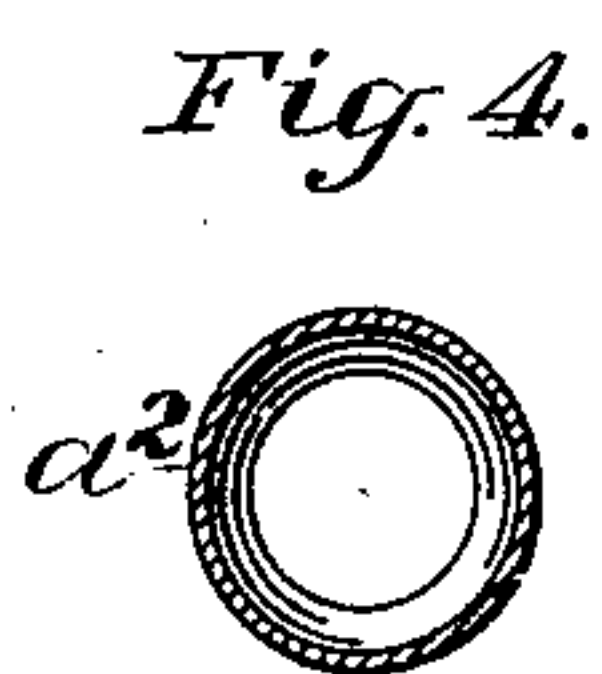
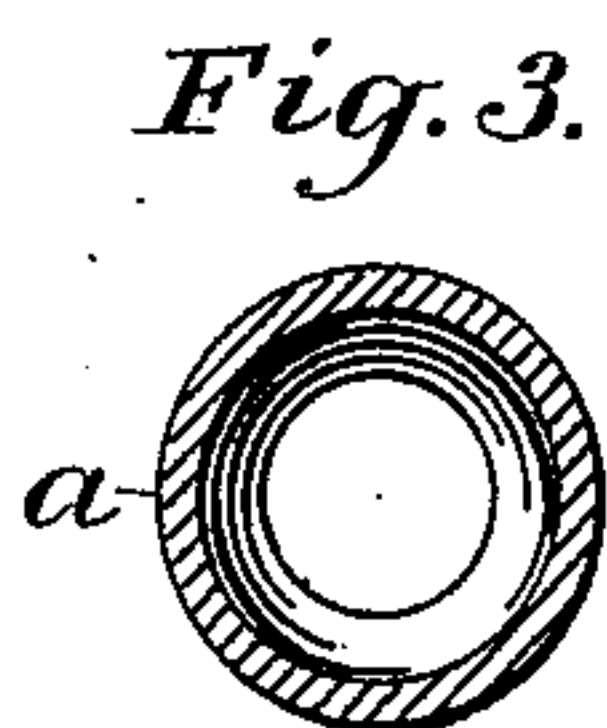
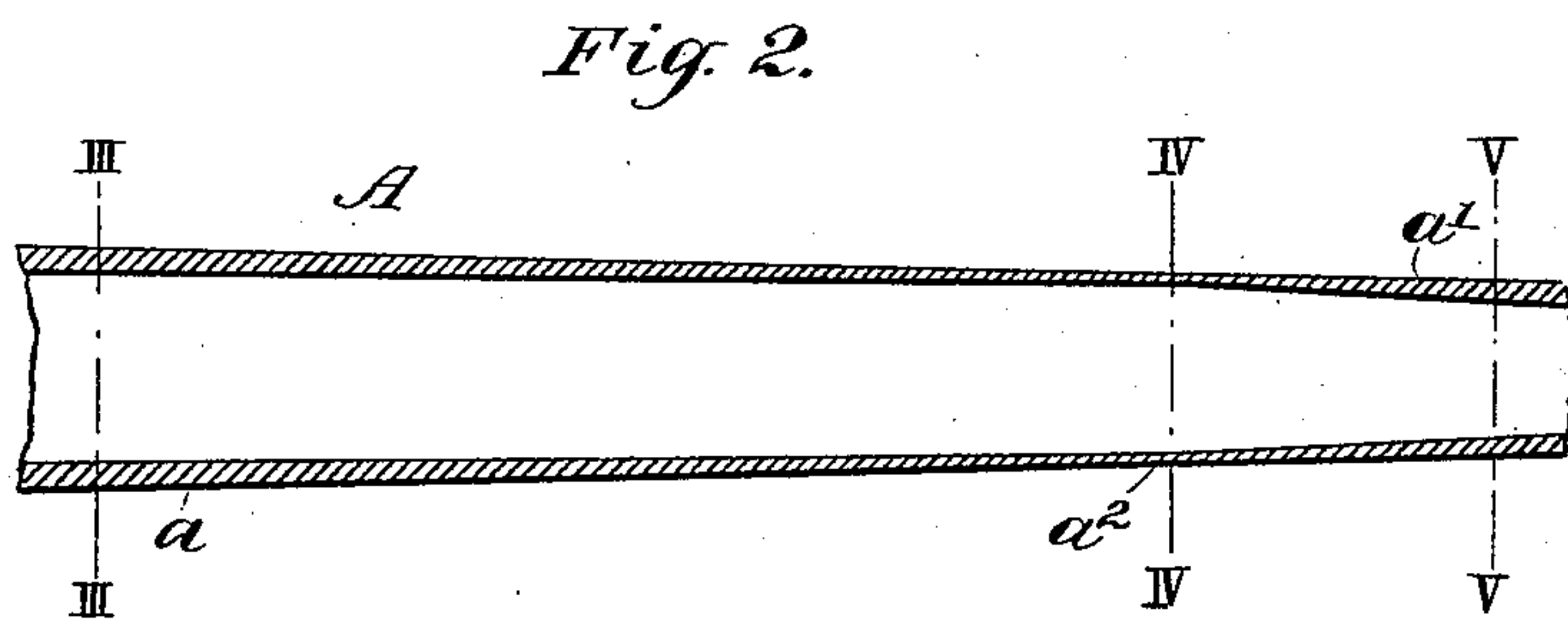
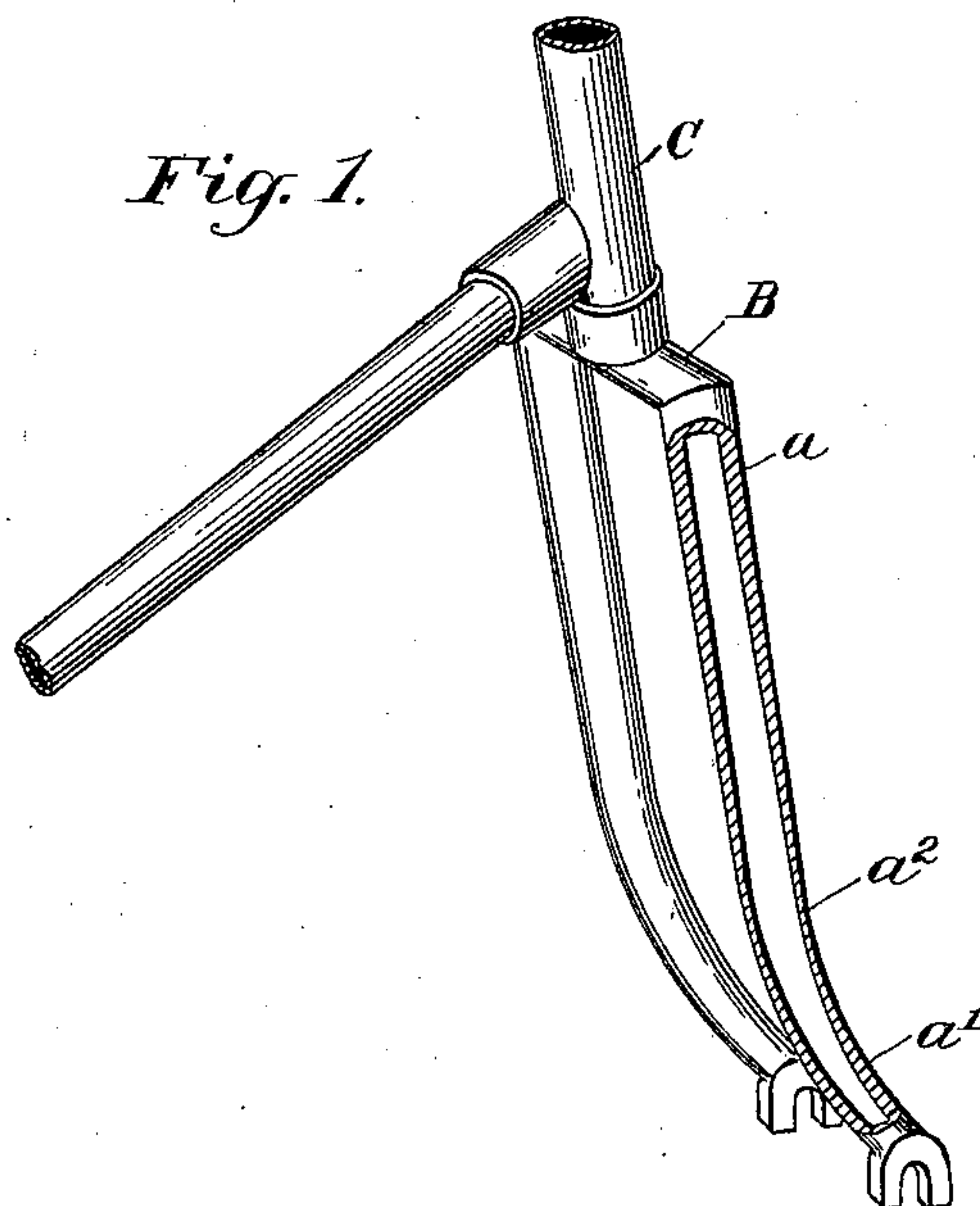


(No Model.)

E. IVINS.  
FORK SIDE FOR BICYCLES.

No. 602,012.

Patented Apr. 5, 1898.



Witnesses  
Charles E. Riordan.  
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# UNITED STATES PATENT OFFICE.

ELLWOOD IVINS, OF PHILADELPHIA, PENNSYLVANIA.

## FORK SIDE FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 602,012, dated April 5, 1898.

Application filed July 2, 1895. Renewed March 14, 1898. Serial No. 673,867. (No model.)

*To all whom it may concern:*

Be it known that I, ELLWOOD IVINS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Fork Sides for Bicycles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to tubular fork sides for bicycles.

The invention will first be described with reference to the accompanying drawings, which form a part of this specification, and then pointed out in the claim at the end of the description.

In the drawings, in which I have illustrated the application of the invention to a bicycle-fork, Figure 1 represents a perspective fragmentary view of the head portion of a bicycle-frame having a fork embodying my invention, one arm or side of the fork being shown in section. Fig. 2 is a longitudinal section of a tube embodying my invention and adapted to form a fork side—i. e., one side of the fork of a bicycle-frame. Figs. 3, 4, and 5 are cross-sections of the tube shown in Fig. 2, said sections being taken on the lines 3 3, 4 4, and 5 5, respectively, in Fig. 2. Fig. 6 is a detail sectional view illustrating the common method of reinforcing a fork side.

It has heretofore been customary to insert a separate piece or tube-section in an ordinary tube or fork side, having its interior of a uniform diameter, at such places as require strengthening or reinforcement in order to withstand the additional strain that may be exerted thereon in use and to secure such reinforcement in the tube by brazing or soldering. The common method of doing this is illustrated in Fig. 6 of the drawings. The reinforcement or extra tube 2, when inserted in the ordinary tube 1, necessarily leaves a sharp or abrupt shoulder at the junction or terminus 3 of the inserted section, as indicated in Fig. 6, and the tube is liable to break at this particular point.

My invention is designed to dispense with the necessity for reinforcing in the manner described, and to overcome the objections in-

cident to such practices by providing a tube which shall be so constructed as to have the greatest strength at points where the greatest strain is exerted and the most strength required and its weaker portions at those parts thereof whereon the least strain is exerted, so as to economize in the use of metal and at the same time combine lightness with strength.

In the drawings, A denotes a tube which is preferably conical in form and is adapted to form one side of the fork of a bicycle, the larger end *a* thereof being adapted to be firmly secured to the head-piece or socket-piece B, attached to the upright bar or head C of the bicycle-frame, while the smaller reduced end *a'* is attached to one end of the axle of the wheel in the usual or any preferred manner. This tube is formed at each end with a thickness of metal forming the walls thereof sufficient to give the desired strength, and its walls gradually decrease in thickness from both ends towards its center. In the form shown the thickness of the metal gradually decreases as it recedes from each end of the tube to about the point marked *a*<sup>2</sup>, at which point the metal is quite thin, thus providing a tube with a double taper—that is, a tube the walls of which taper from both ends to a point intermediate its ends, the location of such point being determined by the use to which it is to be put—whereby the ends of the tube are made heavier and stronger than any intermediate portion thereof, and the thickness of its walls and the strength of the intermediate portion gradually increase as the distance from the weaker point toward the end of the tube increases. The walls of the tube are preferably of about the same thickness at and near each end and gradually diminish in thickness as the distance from each end toward the point of least strength increases.

In the form shown the diminishing thickness or taper of the metal from the larger end extends for a greater distance than from the smaller end of the tube, so as to bring the thinnest portion at a point *a*<sup>2</sup> approximately about one-third of the length of the tube from its smaller end. This, however, is a matter of detail which may be varied as desired or as circumstances or the uses to which the tube is to be put may require. It may be desirable in some cases to have the larger end of



the tube of a greater thickness, or vice versa, while the point at which the gradually-diminishing thicknesses of the metal merge into each other may be varied, provided the metal  
5 is so distributed as to insure the necessary strength where the strain is greatest, less strength where the strain is least, and gradually-increased strength between these two extremes as the distance increases from the  
10 point of least strength in both directions toward the ends of the tube.

The tube shown and described is tapered both inside and out and is preferably cylindrical in form; but it may be made polygonal  
15 in cross-section.

The tube is formed by providing a mandrel of suitable shape, made of metal, and then spinning the tube on the mandrel in a manner well known in the art, the process of  
20 spinning metal being too well known to require explanation, the mandrel to be of the diameter required for the interior of the finished tube.

A tube or fork side of the form described  
25 has the advantage of being seamless and weldless throughout, and the reinforcement or heavy parts being a part of the tube itself and the gradual taper being given to the heavy or reinforced portions it is obvious that the  
30 tube will be very much stronger than one made with a separate tube or reinforcement

inserted therein to strengthen the weaker parts. Furthermore, the cost of manufacture is very decidedly in favor of the seamless weldless tube, there being no soldering or  
35 brazing necessary.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

As an article of manufacture, a fork side  
40 for bicycles consisting of a seamless tube having each end thereof made comparatively thick and gradually diminishing in thickness from both ends toward its center, such gradually-diminishing thicknesses of metal merging  
45 into each other at a distance from the ends of the tube and at a point where the least strength is required; the exterior of the tube being cylindrically tapering from end to end and its interior cylindrically tapering or con-  
50 ical from an intermediate point in opposite directions toward each end, so that the strength of the tube may gradually increase from its weakest point toward either end, where increased strength is required, substan-  
55 tially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ELLWOOD IVINS.

Witnesses:

DAVID HARMER,  
GEO. W. HARMER.