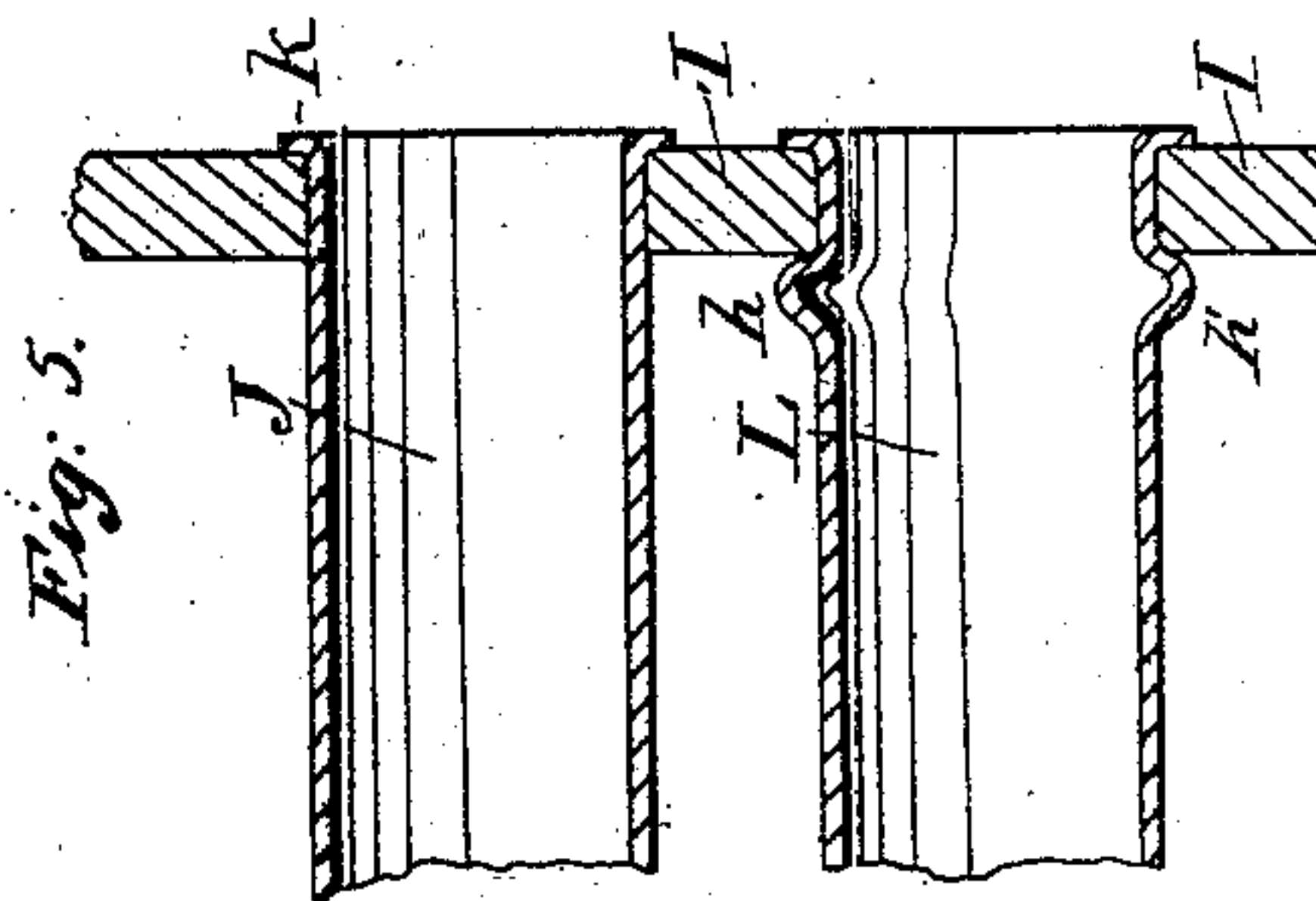
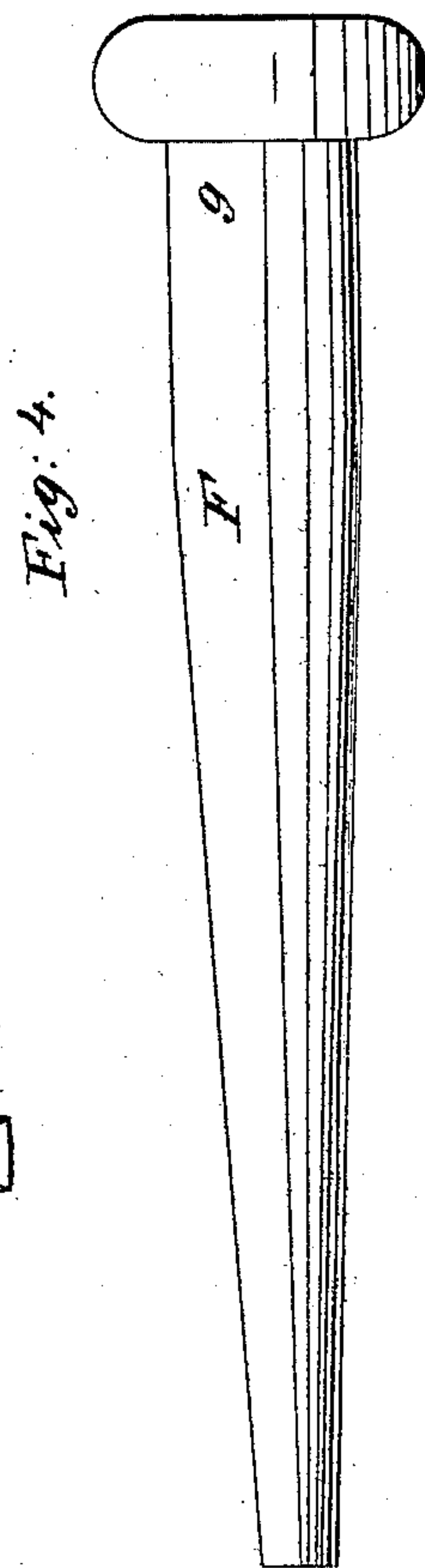
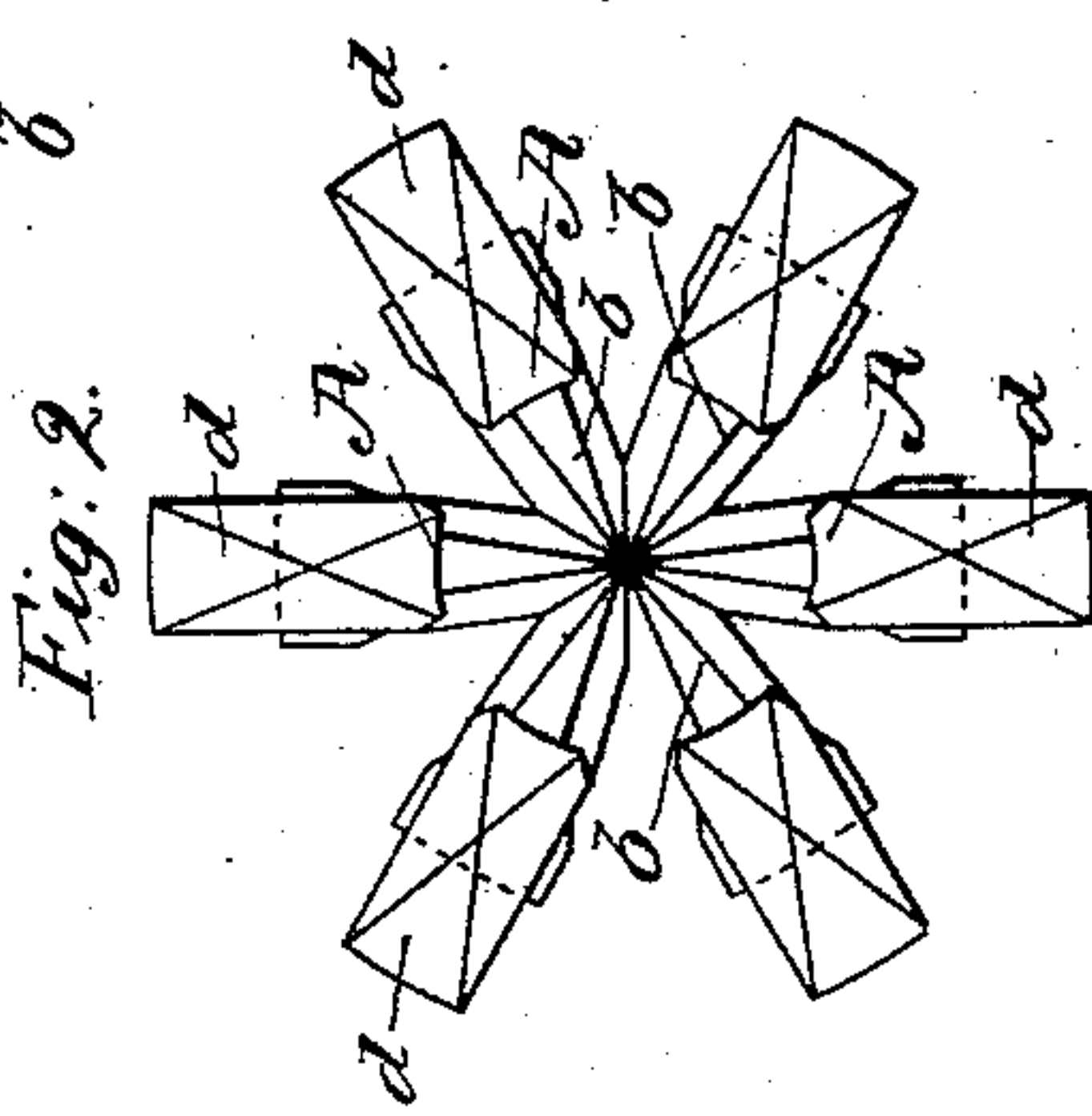
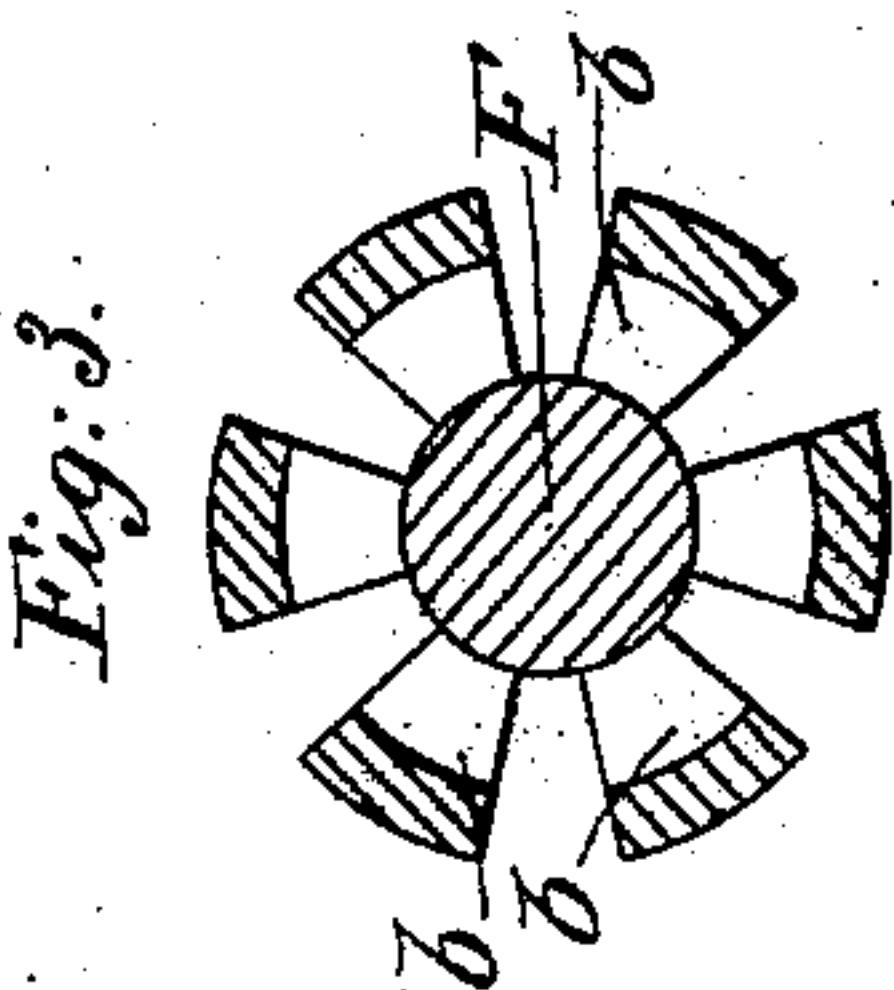
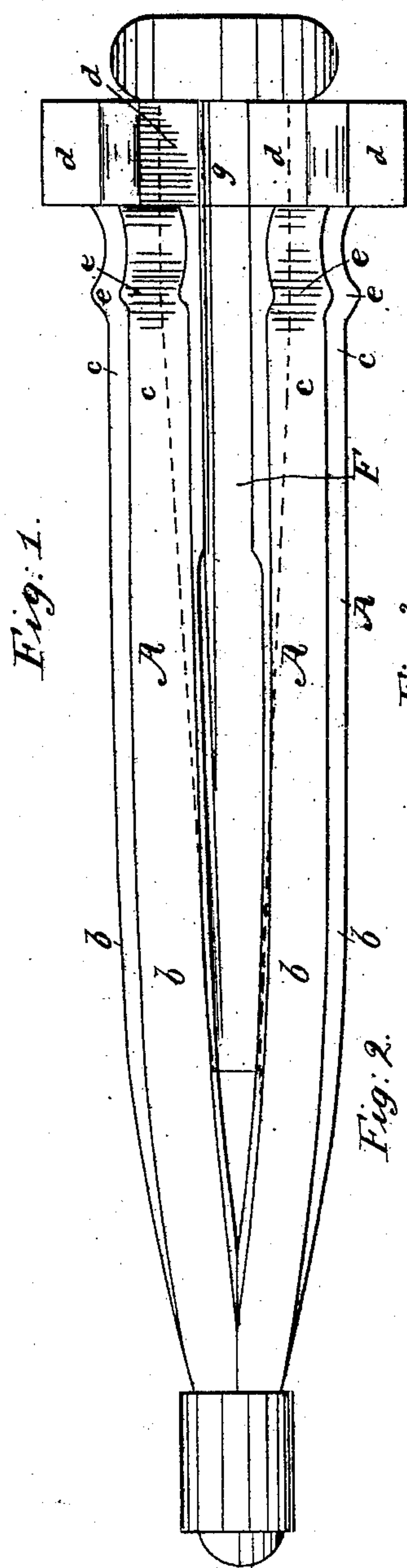


*J. McCarty,
Pine Expander.*

No 8,256.

Patented July 29, 1851.



UNITED STATES PATENT OFFICE.

JAMES McCARTY, OF READING, PENNSYLVANIA.

SPRING-EXPANDING SWAGE FOR BOILER-TUBES, &c.

Specification of Letters Patent No. 8,256, dated July 29, 1851.

To all whom it may concern:

Be it known that I, JAMES McCARTY, of Reading, in the county of Berks and State of Pennsylvania, have invented a new and useful Improvement in Expanding Swages for Boiler-Makers' Use; and I do hereby declare that the following is a full, clear, and exact description of my said improvement, reference being had to the accompanying drawing, which forms part of this specification, and in which—

Figure 1 represents an elevation of my expanding swage in an expanded state; Fig. 2 is a top view of the same with the expanding plug withdrawn; Fig. 3 is a transverse section of the same at the line $x x$ of Fig. 1; Fig. 4 is an elevation of the expanding plug detached; and Fig. 5 is a section of a portion of a boiler flue sheet with two tubes applied thereto.

My invention consists of an expanding swage composed of sections which are connected together and to a common center by spring shanks in such manner that while the several sections preserve their relative angular positions they may be forced outward from the axis of the tool by means of a conical plug so as to expand a tube in which the tool is inserted.

The tool represented in the accompanying drawing is adapted to raising a ring swelling or shoulder upon the tubes of boilers by forcing the metal of the tube from within outward. Its general form is that of a hollow conoid cut into equal segments or staves A, A, which are all connected at the apex of the conoid, and which are separated throughout the rest of their length. Those portions b, b , of the staves or sections which are nearer the apex are thin and flexible, while the portions $c c$ of the sections nearer the base of the conoid are heavy and rigid to adapt them to performing the duty of swages. The extremities of the heavier portions of the sections terminate in gib heads d, d , which radiate from a common center and form the head of the tool. Each section is formed with a snug or swell e upon its outer or acting face, corresponding in size, and in distance from the head d of the section, with the size of the swell to be raised and its distance from the extremity of the tube. The shanks, or thin portions b of the sections, are made thin and elastic, and are of such form that they cause the heads of the sections to diverge with sufficient force

to hold the tool steady in the tube in which it is inserted.

A conical plug F is provided of such size that its point will enter within the radiating sections of the swage when they are nearest each other; the taper of this plug is such that it can readily be driven into the space between the sections and thus force them outward, and its base or head g , which is cylindrical, is of such diameter that when driven into the swage it will expand it sufficiently to swell the largest sized tube to which the tool is adapted.

The object to be effected by the tool above described is as before stated the raising of a ring swell or shoulder upon tubes, by forcing the metal from within outward. It is applicable particularly to the construction of tubular boilers, in which a ring shoulder as at h Fig. 5 is to be raised up at the inside of the flue-sheet I. In building tubular boilers the tubes are inserted through the flue sheet and their extremities are upset or bent over the lips of the hole in the usual manner as shown at k, J , Fig. 5. The expanding swage having the conical plug F withdrawn therefrom, is now inserted in the extremity of the tube; as it is thrust in, its sections converge, but, by the tendency of the spring shanks to force them outward, they are borne against the interior surface of the tube. The operator now inserts the conical plug F, and driving it into the space within the radiating sections or swages forces them to diverge; as the swages are thus forced outward their snugs e bearing against the inside of the tube force it to expand and assume the shape represented at L Fig. 5; thus forming a ring swell or shoulder h on the outside of the tube behind the flue sheet, and a corresponding groove on the inside of the tube.

The distance to which the swelled portion of the tube is raised, or its diameter, is governed by the diameter of the cylindrical part or head g of the plug F, which thus acts as a gage to determine the size of the swell; if the swells are for any reason to be of different diameters, plugs having heads of different sizes should be provided, so that by applying the proper one, the requisite swell may be produced with precision. When the operation is completed the workman withdraws the plug, and then, applying his hands to the head of the tool in the tube, compresses its sections together thus

drawing the snugs *e* from the groove or swell they have formed, and withdraws the tool from the tube. If the swell is to be made at a distance from the end of the tube less than that of the snugs from the heads of their corresponding sections, a ring should be placed upon the tool before inserting it in the tube; this ring will intervene between the heads of the sections and the flue sheet and will thus prevent the snugs from entering as far into the tube.

From the above description it will be perceived that this swage is always in the proper position for acting when inserted in a tube, as the spring shanks of its sections cause them to diverge as far as the size of the tube will permit and thus press the faces of the sections against the surface of the tube with sufficient force to hold them in their place until the plug is inserted. This peculiarity of the tool is of great advantage and renders it superior to a similar instrument in which the sections do not have this natural diverging tendency, for it does not require any time or trouble to place the sections in their proper relative positions be-

fore inserting the plug, nor does it require any care on the part of the workman to keep the tool in a central position with respect to the tube. In fact the tool I have described is so perfectly adapted to produce the desired result that it might be used in the dark without risk of its several members being misplaced or performing their functions improperly. Moreover the low price at which this tool can be constructed is a great recommendation especially when this quality is combined with its superior durability and efficiency.

What I claim as my invention and desire to secure by Letters Patent is—

An expanding swage constructed as herein set forth and consisting essentially of radiating sections which are connected with each other and to a common center by spring shanks as herein described.

In testimony whereof I have hereunto subscribed my name.

JAMES McCARTY.

Witnesses:

JOHN McMANUS,
DANIEL T. WERNER.