J. P. CULVER.

Flexible Joints for Pipes.

No. 163,051. Patented May 11, 1875.

Fig 1.

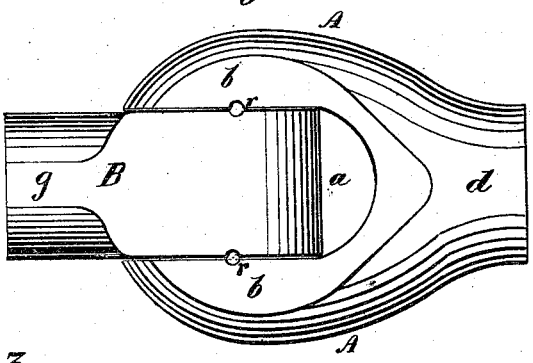


Fig 3.

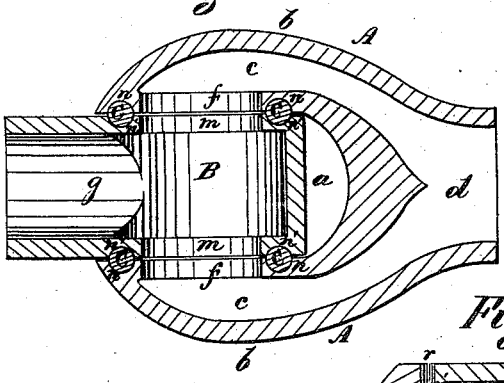


Fig 2.

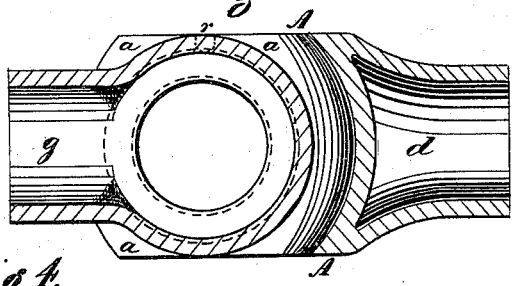


Fig 4.

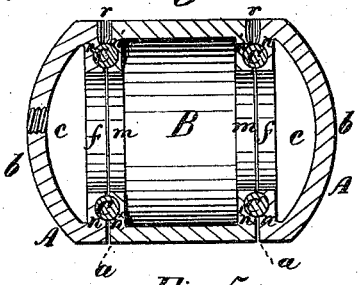


Fig 5.

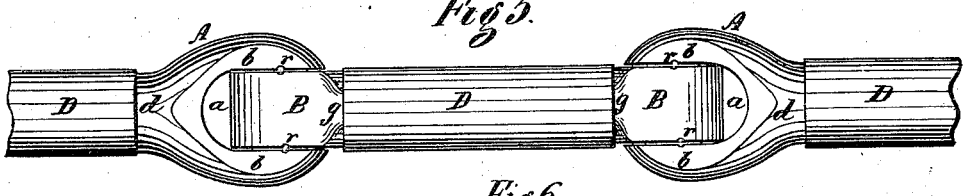
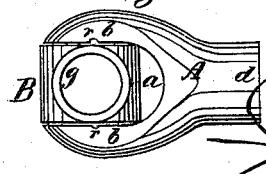


Fig 6.



Witnesses.

W. M. Edwards.

Wm. C. Brown

Inventor

Jno. P. Culver

UNITED STATES PATENT OFFICE.

JOHN P. CULVER, OF JERSEY CITY, NEW JERSEY.

IMPROVEMENT IN FLEXIBLE JOINTS FOR PIPES.

Specification forming part of Letters Patent No. **163,051**, dated May 11, 1875; application filed April 5, 1875.

To all whom it may concern:

Be it known that I, JOHN P. CULVER, of Jersey City, in the county of Hudson and State of New Jersey, have invented an Improvement in Flexible Joints for Pipes, of which the following is a specification:

This invention is more particularly intended to facilitate the laying of submerged pipes across the beds of rivers, &c.; but it may be applied as well in pipes used under other conditions for conducting water, steam, air, or other fluids. The invention comprises a joint composed of two hollow sections of peculiar construction, communicating with each other by suitably-arranged passage-ways, and connected by annuluses of soft metal, so arranged as to serve the triple purpose of packing the joint, of providing a hinge or pivot thereto, and of holding the sections together against tension or longitudinal strain.

Figure 1 is a plan view of a flexible joint for pipes made according to my invention. Fig. 2 is a central longitudinal section of the same, taken in a vertical plane. Fig. 3 is a central longitudinal section of the same, taken in a horizontal plane. Fig. 4 is a vertical transverse section, taken in the line *x* of Figs. 1, 2, and 3. Fig. 5 is a plan view, on a smaller scale, showing the manner in which the joint is applied to use in joining pipe-lengths or pipe-sections; and Fig. 6 is a like view, showing the manner in which one section of the joint may be turned to an angle to the other, as required in the use or operation of the invention.

A is one section of the coupling, and B is the other. The section A is bifurcated, as shown more fully in Figs. 1, 3, 5, and 6, there being a recess, *a*, between the two lateral portions *b*. Each lateral portion *b* of the section A is hollowed or chambered, as represented at *c* in Figs. 3 and 4. These chambers *c* communicate direct with the tubular throat or neck *d* of the section. The inner surfaces of the lateral portions *b* are flat, and in each is provided a circular port, opening, or passage-way, *f*, the two passage-ways being opposite to, and coincident with each other. Provided in each of the inner flat surfaces of the bifurcated section A is an annular groove, *n*, surrounding, and, preferably, concentric with, the passage-way *f* thereof. The closed or inner end of the section B is formed with flat sides, and is of such thickness or width as to fit within the recess *a* of the section A, snugly, but without binding. The open end or neck *g* of this section is of cylindrical form, answering in shape and size to the corresponding part of the section A. In each of the flat sides of the section B is an opening, port, or passage-way, *m*. These two passage-ways of section B are coincident with each other, and when the closed end of the said section is properly adjusted in the recess *a* of section A, the passage-ways *m* of the one section are brought opposite to, and coincident with, those *f* of the other, so that communication is established from the interior of one section to that of the other. In each of the flat sides of section B is an annular groove, *n'*, concentric with the passage-way *m* of such side, and when the two parts are brought into juxtaposition, as herein previously set forth, opposite to and coincident with the groove *n* in the opposite adjacent inner surface of the adjoining lateral portion *b* of section A, there is formed an annular chamber. At *r* are holes extending from the outer surface of the two sections inward to the annular chambers, formed one on each side of the inner closed end of the section B, by the coincidence of the annular grooves *n n'*.

Preparatory to completing the joint, the crevice between the inner end aforesaid of the section B, and the adjacent surfaces of the bifurcated section A, around the circumferences of the passage-ways *m f*, is luted with clay, and the external crevices at the sides of the section B may be temporarily luted in like manner. This done, melted lead or equivalent soft metal is poured into the annular chambers (formed, as hereinbefore set forth, by the grooves *n n'*) through the holes *r*, and, being allowed to cool and solidify, provide solid metal annuluses C, situate partly in the grooves *n* of the section A, and partly in the grooves *n'* of section B, as shown in Figs. 3 and 4. These annuluses constitute packing-rings concentric with the passage-ways, whereby the two sections communicate one with another, and thereby prevent leakage between the two sections when the joint is in actual use. The said annuluses, moreover, being of circular form, constitute pivots upon which

one section of the joint may be turned to any desired angle with reference to the other—for example, to a right angle, as shown in Fig. 6. Furthermore, the two annuluses, being bedded in the opposing surfaces of the two sections, effectually lock the same together against all tendency to displacement one from another.

It will be observed that the luting with clay, hereinbefore set forth, is to prevent the molten lead from escaping from the chambers formed by the grooves *n n'* during the operation of casting the annuluses therein; also, that the two sections are, ordinarily, to be made of cast-iron.

In the use of the flexible joints thus constructed, the pipe-sections to be joined are fitted upon the necks of the two sections A B, as represented in Fig. 5, D indicating pipe-sections thus attached to, and connected by, the joints.

By using any desired number of pipe-sections thus connected, a flexibly-jointed pipe may be formed, which may be readily laid across rivers, falling nearly vertical from the vessel from which it is payed out to the bottom, and accommodating itself, in a vertical plane, to any conformation of said bottom.

A pipe as thus made flexible is much less liable to injury at the joints than has been found to be the case with any flexibly-jointed pipe previously known; its sections may be brought or adjusted to a more acute angle with reference to each other, and the joints themselves may be made at a comparatively moderate cost, and are very durable.

What I claim as my invention is—

The two hollow sections A B, communicating with each other by means of the passages *m f*, in combination with the annuluses C, of soft metal, cast into the grooves *n n'*, and surrounding the passages *m f*, the whole constructed and arranged for operation, substantially as and for the purpose set forth.

JNO. P. CULVER.

Witnesses:

R. M. C. BROAS,

JAMES A. WHITNEY.