

(No Model.)

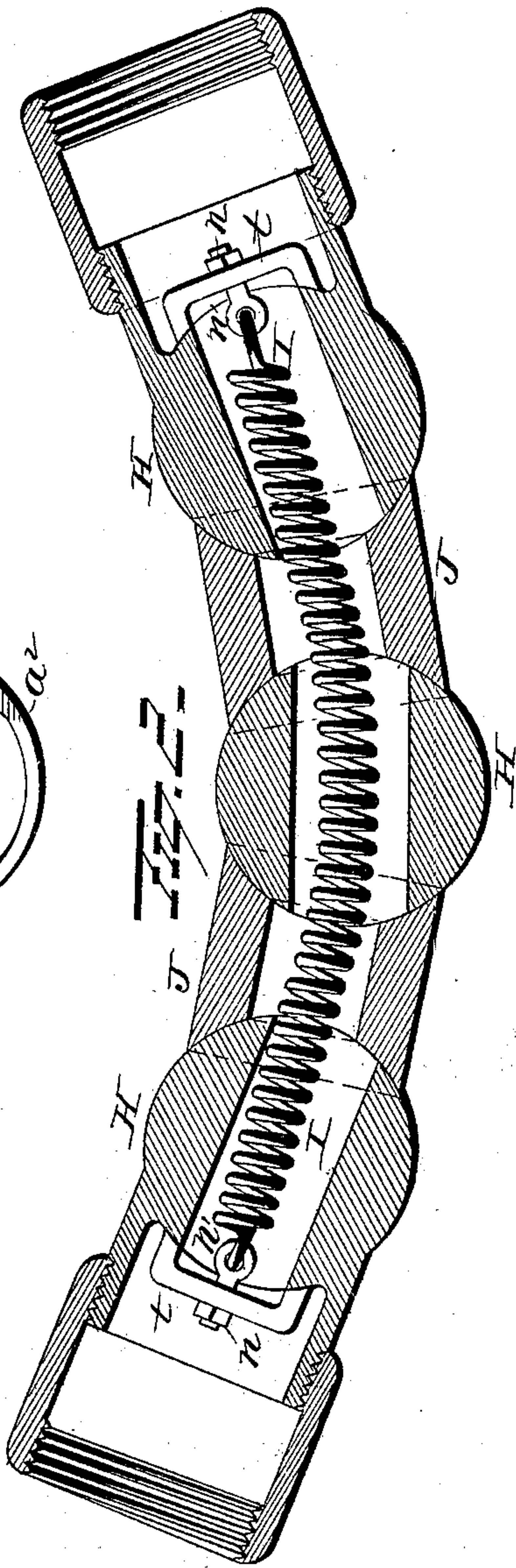
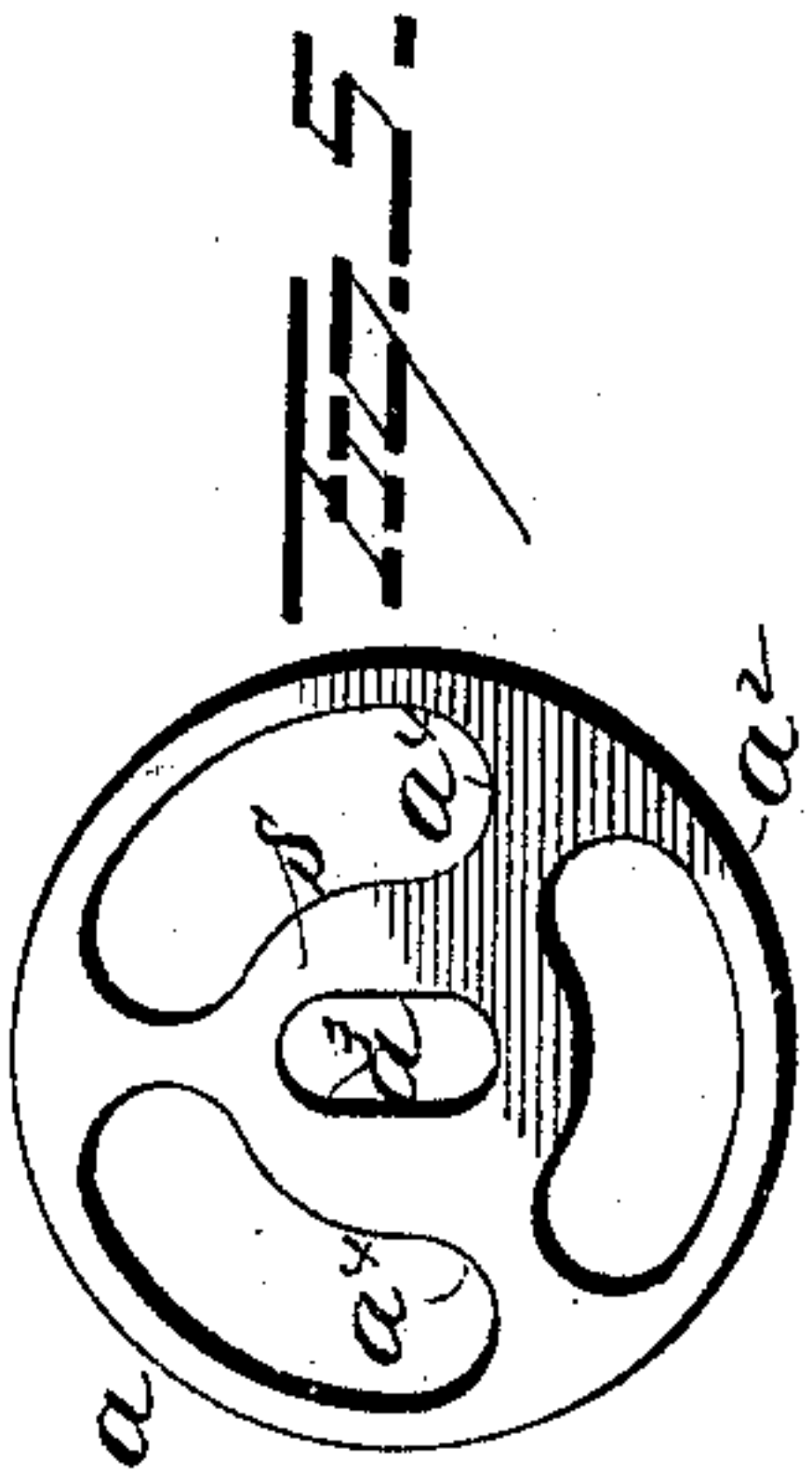
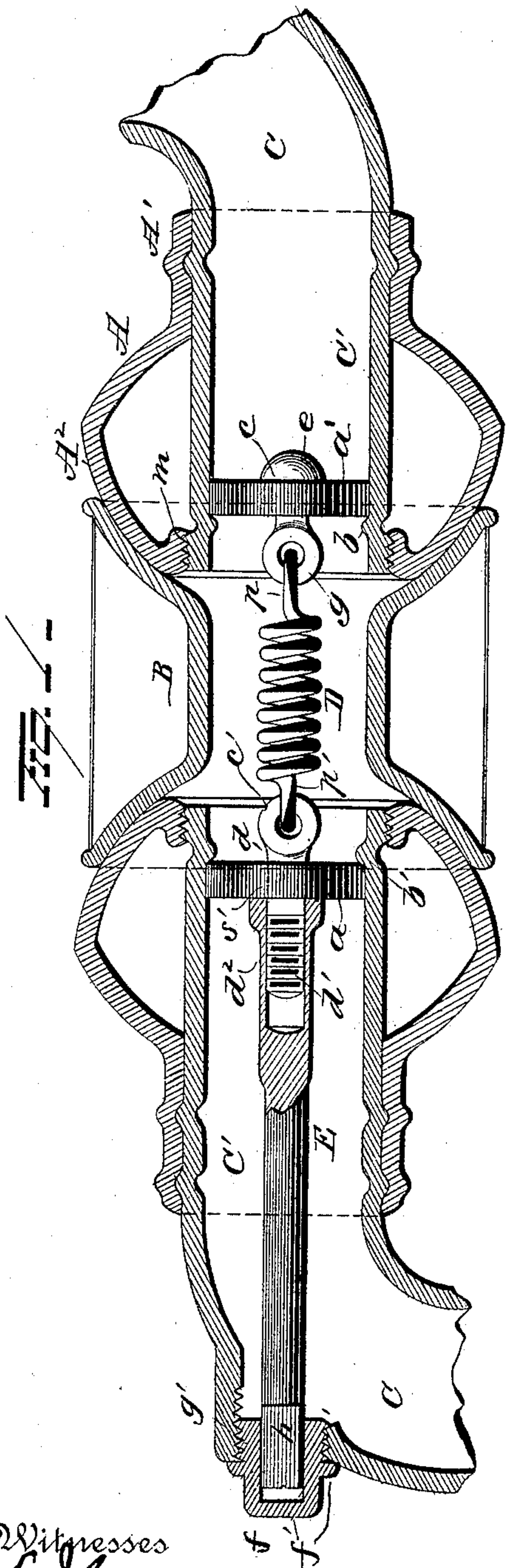
2 Sheets—Sheet 1.

C. G. THAYER.

# PIPE COUPLER.

No. 395,671.

Patented Jan. 1, 1889.



Witnesses

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(No Model.)

2 Sheets—Sheet 2.

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FIG. 3.

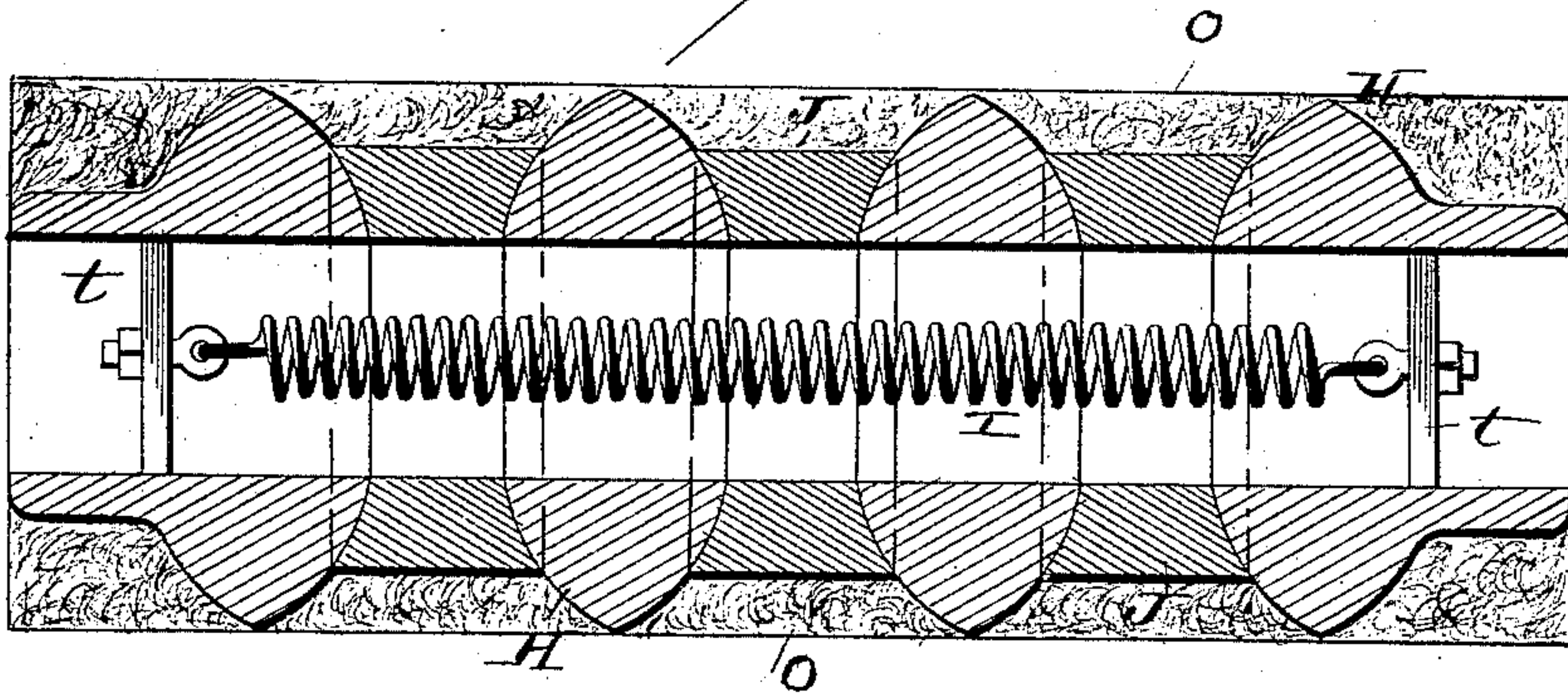
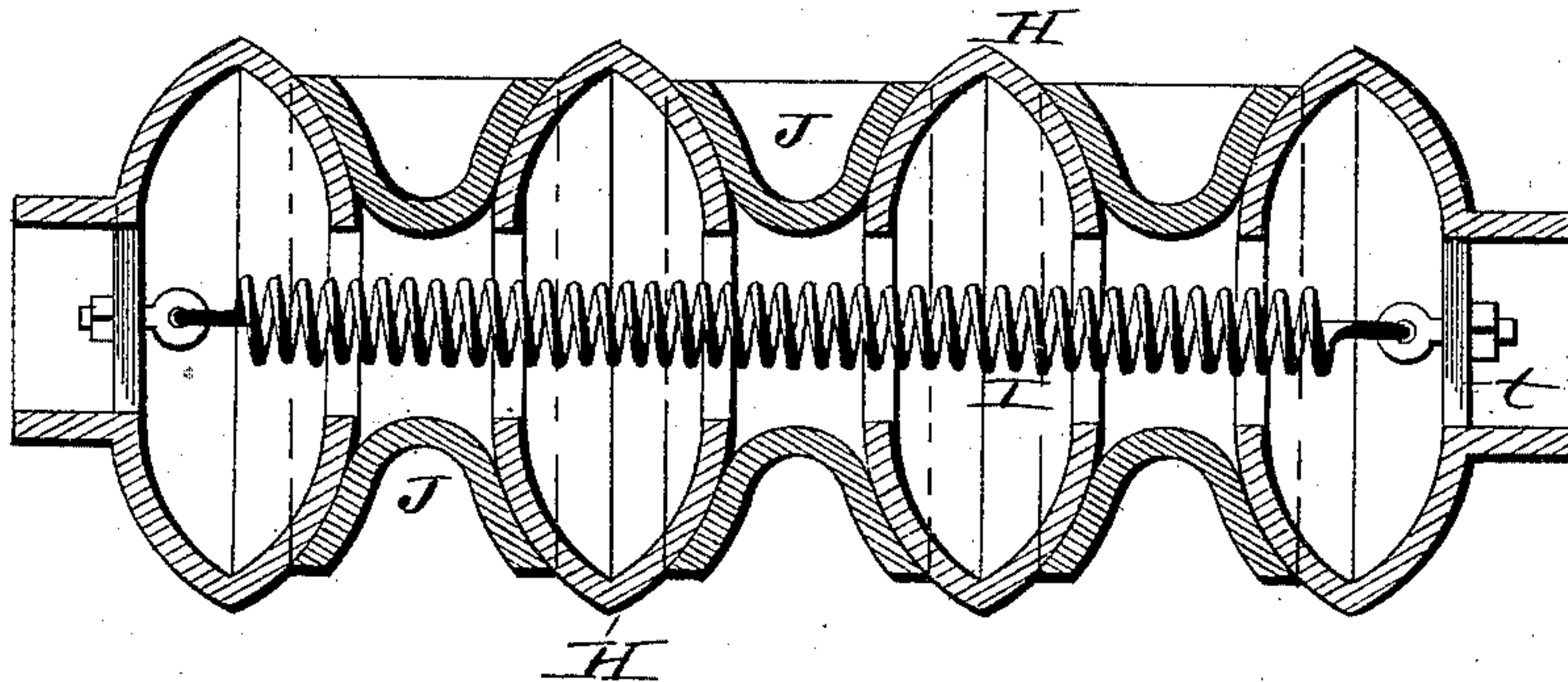


FIG. 4.



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# UNITED STATES PATENT OFFICE.

CHARLES G. THAYER, OF DUNKIRK, NEW YORK.

## PIPE-COUPLER.

SPECIFICATION forming part of Letters Patent No. 395,671, dated January 1, 1889.

Application filed February 15, 1888. Serial No. 264,115. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES G. THAYER, of Dunkirk, in the county of Chautauqua and State of New York, have invented certain new and useful Improvements in Pipe-Couplers; 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.

My invention relates to an improvement in pipe-couplers, and more particularly to a device which will afford a flexible metallic connection between the ends of steam, water, or gas conduit tubes or pipes.

The object of my present invention is to provide a simple and reliable jointed pipe-coupling, which may be constructed of sheet metal spun, struck, or otherwise formed, or be cast into shape of any proper material, and which will afford a universal flexibility between ends of steam, water, gas, or air conduit pipes which may be utilized for the connection of steam-heating pipes in car-heating systems, or other analogous purposes.

With these objects in view my invention consists in certain features of construction and combinations of parts, which will be hereinafter described, and pointed out in the claims.

Referring to the drawings making a part of this specification, Figure 1 represents a side elevation, in section, of the device in the preferred form of construction of the same. Fig. 2 is a view in longitudinal section of a modified form of the flexible pipe-coupler. Fig. 3 is a sectional elevation of a different modification of form, but embodying same general principles of action as shown in Fig. 2. Fig. 4 is a sectional elevation of a flexible pipe-coupler, similar in form to that shown in Fig. 3, cut and struck or spun into form from sheet metal. Fig. 5 is a detached end view of one of the interior pieces shown in side elevation in Fig. 1.

The preferred form of construction will first be described. (See Fig. 1.)

The elbows C are bent substantially in form as shown. These may be made of any proper metal or material, which may be drawn with dies from sheet metal, or cast into shape.

There may be any desired number of the bent tubular pieces C used in the construction of the flexible coupler. It is essential for its proper operation that two at least be provided, and as both are of similar form, a description of one will suffice for any number employed. The portions C' of the bent pieces C are threaded externally at their extremities *m*, and thus adapted to receive the threaded end of the semi-spherical heads A, which are contracted into cylindrical form at A', to neatly fit upon the exterior surface of the portions C' of the elbows C. The semi-spherical heads A have their faces A<sup>2</sup> made truly globular by any proper means, and the cylindrical portions A' are secured with tight joints on the elbows C, to prevent escape of any liquid, steam, water, or air, through these joints. Between each pair of the semi-spherical heads A a sleeve or tubular piece, B, of proper diameter, is introduced, and each end of the sleeve-piece B is made of such concavity of form as to cause said end surfaces to exactly conform to the opposed semi-spherical faces of the heads A, which they have close contact with.

The ends of the elbows C, which are opposite to those on which the heads A are secured, are attached by sockets, unions, or other approved means, to the ends of the conduit-pipes to which the coupler is applied.

In one of the elbows C a washer, *a'*, is inserted that has a bearing against the inwardly-projecting shoulder or bead *b*, which latter is formed near the end of the elbow upon which one of the heads A is secured. (See Fig. 1.) The washer *a'* is constructed as shown in Fig. 5, which is a side view of the same, it having any suitable number of perforations made through it at spaced intervals, so as to leave the radial arms *a*<sup>4</sup> remain to connect a central hub, S, with the rim *a*<sup>2</sup>. The hub of the washer *a'* has an elongated hole, *a*<sup>3</sup>, made in it, the center of which is the center of the periphery of the washer, this hole being adapted to receive the short bolt *c*, the body of which may be flattened to enter the elongated hole in the washer *a'*, the end *g*, which is inserted therein, being enlarged and perforated to produce an eye in which the hooked end *p* of the spiral spring D is inserted, as shown in Fig. 1. The other end of the bolt *c* is provided



with a head, *e*, which is of sufficient diameter to insure a proper bearing upon the surface of the washer that it engages.

The spiral spring D is constructed of elastic metal of proper retractile strength, and is provided at its opposite end with a hook or loop, *p'*, for a purpose that will be explained.

Within the end of the elbow C' that is adjacent to the looped end *p'* of the spiral spring D a washer, *a*, is inserted, to bear against a bead or shoulder, *b'*, which latter is formed near the open end of the elbow on its inner surface. (See Fig. 1.) This washer is similar in construction to the washer *a'*, already described, and in the elongated or oval hole made through its central hub, *s'*, an eyebolt, *d*, is inserted, the body of this bolt being flattened on two opposite sides to permit it to slide in the hole, but not revolve. The eye *c'* of the eyebolt *d* is provided with the hooked or looped engagement of the end *p'* of the spring D, said spring being of such a relative length to that of the sleeve B as to permit this connection of parts. A screw portion, *d'*, of the eyebolt *d* projects through the washer *a*, and has threaded engagement with a tapped hole formed axially in the adjacent end of the metal shaft E, which has an enlargement or thickening collar, *d''*, produced on this end, said collar having a bearing on the surface of the washer *a* when the parts are assembled and arranged as shown in Fig. 1. The body of this shaft E is of such a relative length that its end *h* will extend through a hole made in the elbow C, this perforation *g* being threaded to receive a screw-plug, *f*, that is centrally perforated for the reception loosely of the end of the shaft, which latter is squared for the accommodation of a wrench or key to effect the rotation of the same. The screw-plug *f* has an integral squared head and a flange, *f'*, that bears upon the end of the boss through which the perforation *g'* is made, so that when the plug *f* is inserted in place by means of a wrench applied to its squared or hexagonal head the flange *f'* will joint tightly thereon and prevent leakage at this point.

When the shaft E is rotated in a proper direction, the eyebolt *d* will be shortened or drawn back to stretch the spiral spring D, and this by its retractile strength holds the connected parts intact, secure but yielding joints being afforded between the spherical heads A and the interposed sleeve B'.

It will be apparent that when the spring D is stretched sufficiently by a rotative adjustment of the shaft E to hold the semi-spherical heads A in close contact with the concave ends of the sleeve-piece B there will be a universal movement permitted at the junctures of the sleeve ends with the heads, so that lateral, vertical, or any intermediate flexure of the joints may be effected and not endanger the integrity of the joints or permit any escape of fluids, steam, or gas under pressure which are flowing through the conduit-pipes to which the coupler is secured.

In Figs. 2, 3, and 4 are shown modifications of the flexible pipe-coupler, which are constructed having ball joints and sleeves interposed to joint with the convex surfaces on the balls or oblate spheres, these pieces being held together and permitted to "flex" in any direction by the contractile force of a spiral spring, which latter is located lengthwise of the hollow interior produced by the joined parts of the flexible coupler.

In Fig. 2 a series of balls or spheres, II, are combined with a series of interposed sleeves, J, the ends of the sleeves being adapted to form tight joints with the spherically-true surfaces of the balls. Both the sleeves and the spheres are perforated axially, and into these orifices, which, when joined, produce a continuous passage for steam, water, gas, or air, there is introduced a spiral spring, I, this spring being secured at each end to cross-bars *t*, which are secured to the terminal pieces of the flexible coupler by the eyebolts *n'* and nuts *n*, so that the spring may be stretched to afford proper retractile strength, which will hold the several joints of the coupler together and afford flexible movement with security against leakage.

Fig. 3 is substantially similar in form to the device just described, with the exception that, instead of true spheres being used, the pieces II are flattened to produce elliptical or oblate spheres, and the sleeves J are made concave to fit the shape of the convex surface of the flattened spheres II.

Fig. 4 is a modified form of the coupler shown in Fig. 3, that is designed to permit sheet-metal pieces with concave and convex joints to be utilized and a flexible coupler formed therefrom, with a spiral spring introduced and secured at each end, in a manner similar to that displayed in Fig. 2.

The several forms of the flexible coupling shown in the figures may be covered with asbestos fiber, mineral wool, felt, cloth, or other similar non-conductor, O, as shown in Fig. 2, to prevent improper radiation and consequent condensation of heat or steam within the coupler when necessary.

Many slight changes might be made in this device without departure from the spirit of the invention or exceeding its legitimate scope; hence I do not wish to restrict myself to the exact forms herein shown; but,

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

1. In a flexible pipe-coupler, the combination, with convex heads and means of securing the heads to pipe ends with tight joints, of a sleeve having concave ends that fit the convex heads, and a spring located longitudinally in the sleeve and heads, which is so secured to the heads as to hold the parts together elastically, substantially as set forth.

2. In a flexible metallic pipe-coupler, the combination, with elbows, heads having convex or spherical faces, and a sleeve-piece in-



terposed between the heads having concave ends that engage the convex or spherical ends of the heads, of a spiral spring, and a means for connecting the spring to the heads, substantially as set forth.

3. In a flexible metallic coupler for pipes, the combination, with elbows or sockets, perforated balls or oblate spheres, and a sleeve having cupped ends that are adapted to form tight joints with the convex surfaces of the balls or spheres, of a spiral spring which by its retractile force holds the parts together and permits a flexing movement in any direction, substantially as set forth.

4. In a flexible metallic coupler for pipes, the combination, with heads adapted to connect with the ends of steam conduit-pipes, the heads having convex or spherical faces, of a sleeve or short cylinder having concave ends, and a spiral spring which holds the parts together by its contractile force, substantially as set forth.

5. In a pipe-coupling, the combination, with pipe-elbows, semi-spherical heads mounted

thereon, and a sleeve with concave ends adapted to receive said heads, of a spring, and means for longitudinally adjusting and securing this spring to the heads and elbows, thereby regulating the tension of the spring, substantially as set forth.

6. In a flexible metallic pipe-coupler, the combination, with spheres formed of sheet metal that may be struck, spun, or otherwise made to afford true convex surfaces, of sleeves interposed between these oblate or true spheres to joint with them, and a spiral spring that is secured within the abutting spheres, and sleeves to hold them together by its contractile force and permit a flexible movement of the joined parts in any direction, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES G. THAYER.

Witnesses:

HARRY C. LESTER,  
DEWITT C. MOON.