

(No Model.)

3 Sheets—Sheet 1.

E. F. ROBERTS.  
PIPE COUPLING.

No. 418,591.

Patented Dec. 31, 1889.

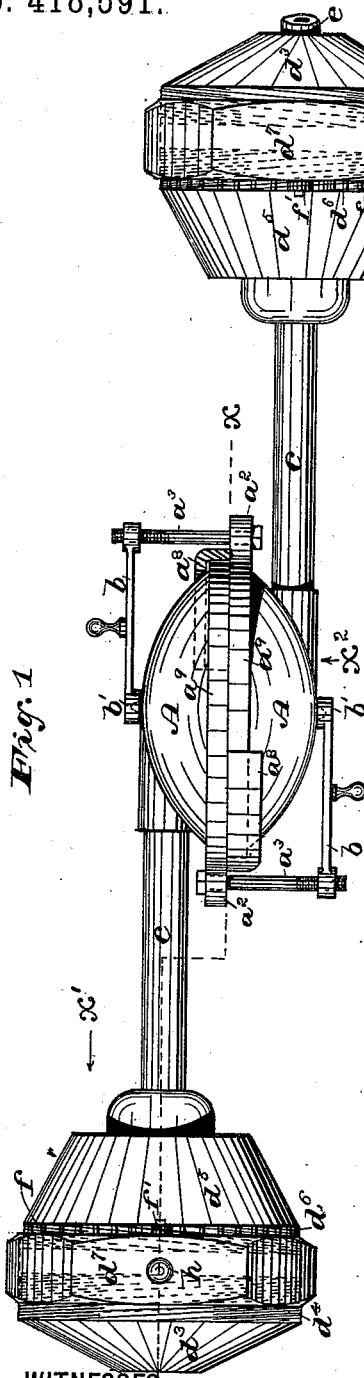


Fig. 1

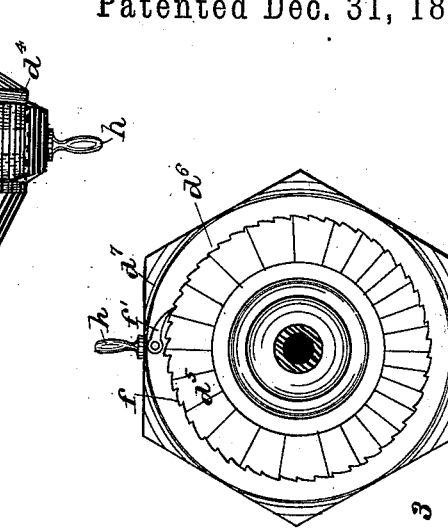


Fig. 3

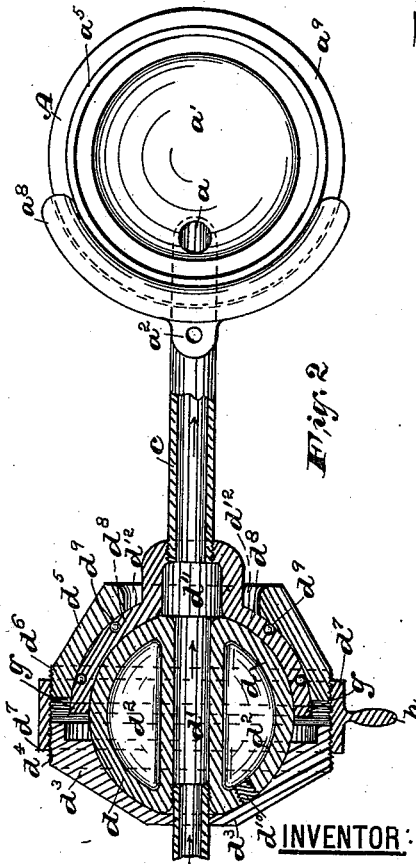


Fig. 2

WITNESSES:

J. V. Pastine.  
D. S. Cook.

INVENTOR:

Edward F. Roberts.

BY Campbell & Co. ATT'YS

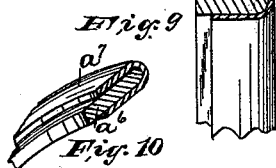
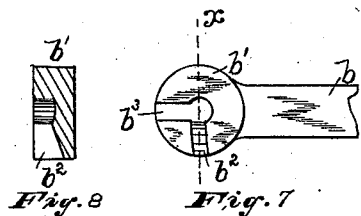
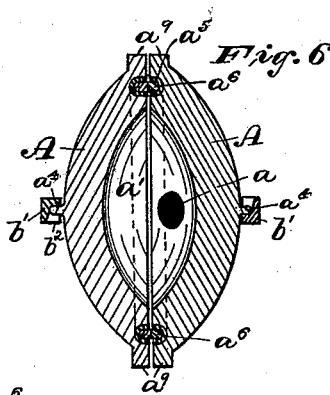
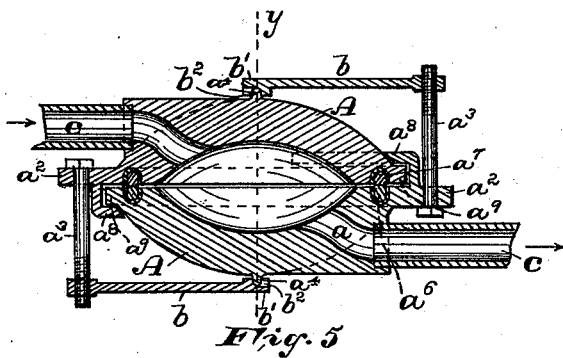
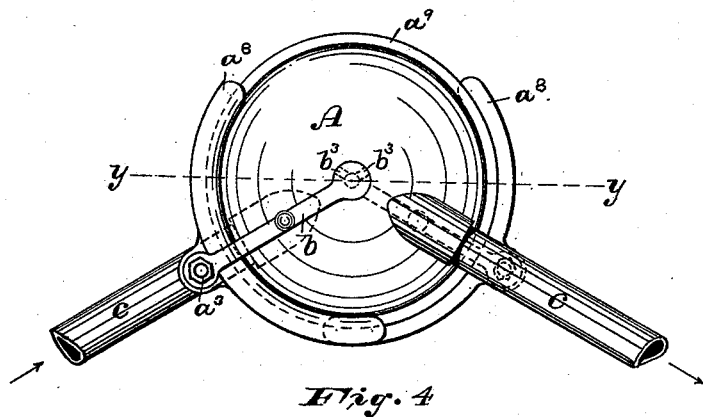
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L. S. Cook,

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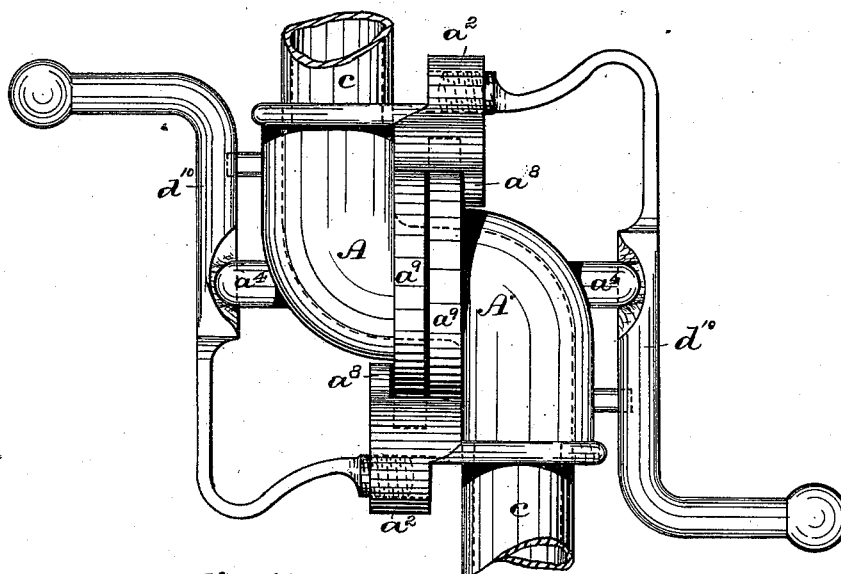


Fig. 11

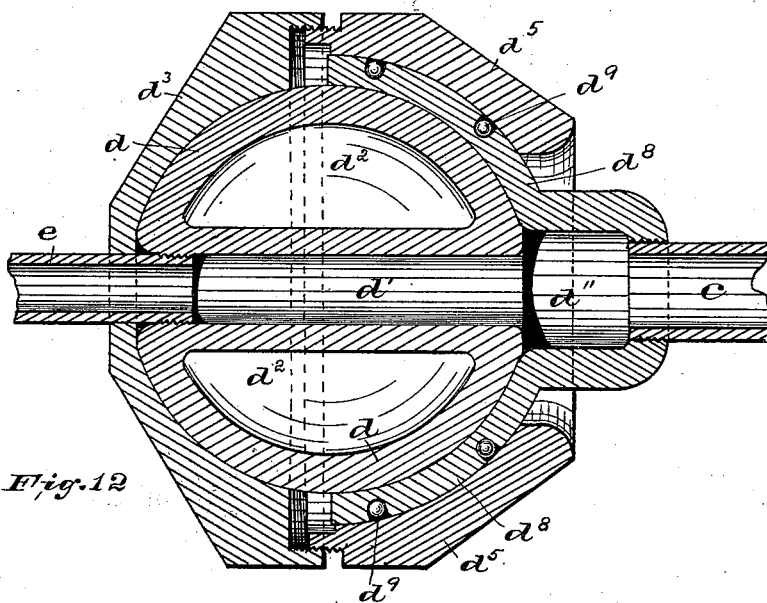


Fig. 12

WITNESSES:

*Frederick S. Adams,*  
*Russell Wright.*

INVENTOR:

*Edward F. Roberts*

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# UNITED STATES PATENT OFFICE.

EDWARD F. ROBERTS, OF ROCHESTER, ASSIGNOR OF ONE-HALF TO THOMAS R. SULLY, OF BUFFALO, NEW YORK.

## PIPE-COUPLING.

SPECIFICATION forming part of Letters Patent No. 418,591, dated December 31, 1889.

Application filed July 16, 1887. Serial No. 244,470. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD F. ROBERTS, a citizen of Great Britain, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Pipe-Couplings; 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, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

The purpose of this invention is to provide a coupling of improved construction, which is designed especially to be used in connection with heating systems in railway-cars, in which either air, steam, water, or any heating medium is used, to connect the pipes through which the steam, &c., is conducted from car to car.

The objects which my invention is further intended to attain are to secure a coupling which will automatically accommodate itself to the motion of the cars, to provide a coupling that is freely interchangeable, so that one of the separable portions of the coupling may be attached to any other of said separable portions, to reduce the amount of wear by employing a fewer number of moving parts, and also to prevent the condensation of the steam at the joints.

As above stated, the coupling is designed to accommodate itself automatically to the motion of the cars, both the lateral and swinging motion, and also the increase and decrease of the distance between the cars in stopping and starting. In addition to this, the coupling is so constructed that should the coupling which connects the cars break and the cars draw apart, the pipe-coupling separates automatically without any injury thereto.

In the accompanying drawings, in which is illustrated my improvement, Figure 1 is a top view of my improved coupling. Fig. 2 is a section of the same through X. Fig. 3 is a section through one of the connecting-pipes, looking in the direction of the arrow  $a'$ . Fig. 4 is a side elevation of the knee or elbow joint and a portion of the pipes connected therewith shown in that position which they

assume when on the cars. Fig. 5 is a section through  $y$ , Fig. 4, when the connecting-pipes are in the same line. Fig. 6 is a section through  $y$ , Fig. 5, at right angles to that shown in said Fig. 5. Fig. 7 is a front elevation of the end of one of the pivoted holding-rods. Fig. 8 is a section through  $z$ , Fig. 7, and Figs. 9 and 10 are detail views illustrating the packing-rings. On Sheet 3, Fig. 11 is a plan view illustrating a construction described hereinafter, and Fig. 12 is a sectional view illustrating a modified construction of the ball-and-socket joint.

Similar letters of reference are employed to indicate corresponding parts in said above-described figures.

In said views, A indicates the plates or disks which constitute the duplicate sections or separable portions of the knee or elbow joint. In each of said plates is a passage  $a$ , which, when the plates are clamped together in their operative position, lead into and from an inner chamber  $a'$ , thus forming a continuous passage through the joint for the steam or other fluid conveyed by the coupling. When the plates are formed without the inner chamber and are flat on the engaging faces, the passages  $a$  unite at the center of the disks and together preferably form an S-shaped duct through the joint. On each plate is formed a lug  $a^2$ , which receives a threaded rod  $a^3$ , on which turns the holding-bar  $b$ , that engages with the opposite plate, as shown in Fig. 1. Said bar is provided with a slotted end  $b'$ , having slots  $b^2 b^3$  therein, which unite at the center of the end  $b'$ , and, while preferably arranged at right angles one to the other, still the angle may be varied according to the amount of movement of the knee-joint. One of said slots, as  $b^2$ , is inclined upward toward the center of the end  $b'$ , being deeper at the outer edge of said end than at the center, where it joins the slot  $b^3$ , which is preferably of the same depth throughout. On each of the plates A, at about the center thereof, is a pin  $a^4$ , which engages with the slotted end of the holding-bar, as in Fig. 5.

As shown in Fig. 1, the arms for holding the plates A together project from one of the said plates and engage with the pin  $a^4$  on the other of said plates, the plates turning on

the pins, which thus serve as journals, turning in the center of the slotted end  $b'$  of the holding arm or bar, which acts as a journal-box.

5 In either or both of the engaging faces of the plates A is formed an annular recess  $a^3$ , to receive a packing ring or rings  $a^6$ , which renders the joint between the rotating faces of the plates air or steam tight. To prevent  
10 the friction of the rotating plates from wearing directly upon the packing-rings, said rings are inserted in a recessed or slotted ring  $a^7$ , formed of any suitable anti-friction metal, in the recess  $a^5$  in said plates, and owing  
15 to the pressure with which the rotating plates are held together the engaging faces of the packing-ring do not move, but the movement takes place between the inclosing metallic covering  $a^7$  and the slots  $a^5$  in the  
20 faces of the rotating plates. By this construction the joint between the plates is kept perfectly tight, the wear being between the metallic surfaces and not between the packing-surfaces. In connecting the knee-joint  
25 the plates are placed face to face and the arms  $b$  are turned so that the inclined slot strikes the journal-pin on each plate, and as the pins ride up on the incline and reach the center of the end of the arm the plates  
30 are pressed together. By one method of connecting the joint the plates are turned until the arms A are parallel and in the same plane as in Fig. 4, when the pins will pass through the slots  $b^3$  by pulling the disks A in  
35 opposite directions. This mode of separating is intended to be used especially when the link-coupling breaks and the cars draw apart and the air or steam coupling is straightened out.

40 The plates or disks may be separated at any time by drawing the arms  $b$  off from the pins  $a^4$  through the slot  $b^3$ , which, as indicated in Fig. 7, is slightly curved.

As specified hereinbefore, each of the separable plates are alike, so that one plate on one car will couple with any other plate on another car. The said plates may be covered with a covering of suitable material to prevent loss of heat and condensation when the  
50 coupling is used in connection with steam-heating systems. On each side of the previously-described knee-joint are arranged ball-and-socket joints, which are connected with said knee-joints by pipes  $c$ , as shown in Fig.  
55 1. As shown more particularly in Fig. 2, said ball-and-socket joints consist of an inner spherical portion  $d$ , provided with a central duct  $d'$  and a surrounding cavity  $d^2$ , and which is rigidly secured to the end of a pipe  
60  $e'$ . On one side of said portion  $d$  is an immovable concave plate  $d^3$ , which incloses about one-half of the spherical portion and is threaded on the outer surface  $d^6$ . On the opposite side of said portion  $d$  is a second concave plate  $d^5$ , corresponding to the plate  $d^3$ ,  
65 which is also threaded on the outer surface  $d^6$ , and connecting said portions  $d^3$  and  $d^5$  is a

threaded ring  $d^7$ , which, when turned, draws the plate  $d^5$  toward the plate  $d^3$ . Said ring  $d^7$  is provided with faces similar to an ordinary  
70 nut, or with a handle  $h$ , or with both, as in Fig. 1, by which said ring is turned. Between the inner spherical portion  $d$  and the concave plate  $d^5$  is a hemispherical portion  $d^8$ , which is secured to the end of the pipe  $c$ , that connects  
75 the ball-and-socket joints with the interposed knee or elbow joint. Between the outer surface of the hemispherical portion and the inner surface of the concave plates  $d^5$  are preferably arranged globules or balls  $d^9$  of anti-friction metal, Fig. 2, so as to reduce the  
80 friction between said moving surfaces. The joint between the outer surface of the portion  $d$  and the inner surface of the movable hemispherical portion  $d^8$  is ground and perfectly steam-tight. A plugged opening  $d^{10}$  is  
85 provided in the inner portion  $d$  to permit the insertion of mineral wool, asbestos, or any desired material, so as to pack the space around the steam-duct  $d'$  and prevent any condensation therein.

To lock the ring  $d^7$  ratchets  $f$  are provided in either of the threaded surfaces  $d^6$ , and a pawl  $f'$  is secured to said ring to engage with  
90 said ratchets, as indicated in Fig. 3. A packing-ring  $g$  is interposed between the faces of the parts  $d^3$   $d^5$  and around the portion  $d$ , as shown in Fig. 2.

In a coupling constructed as above set forth there is provision for any degree of motion in a lateral plane at the ball-and socket  
95 joints, and also any degree of movement in a plane at right angles to said lateral plane in the knee-joint.

In the telescopic or sliding coupling which  
100 has been heretofore used the friction between the sliding portions is very great, and much difficulty is experienced in keeping the joint steam-tight because of the wear of the sliding parts.

The construction of my coupling between  
110 the ball-and-socket joints permits of a much greater amount of play between the cars, and at the same time with much less friction and its consequent wear and opening of the joints.  
115 The cost of the coupling is further reduced, because of the less number of the parts thereof.

In Figs. 1, 2, 5, &c., are illustrated angular flanges  $a^8$ , which project from the annular  
120 rims  $a^9$  of each of the disks A and extend about half-way around each of said disks, as in Fig. 2, and when the disks are brought together the annular flange on each disk receives and projects over the rim  $a^9$  on the  
125 opposite disk, as indicated in Fig. 5. The object of this construction is to prevent any strain upon the arms and rods  $b$  and  $a^3$  and the separation of the disks.

Instead of the pivoted arms  $b$  and rod  $a^3$ ,  
130 I may use a continuous spring-arm  $a^{10}$  to accomplish the same purpose, as shown in Fig. 11.

As a modified construction of the ball-and-

socket joint, the concave portions  $d^3$  and  $d^5$  may screw one into the other, as in Fig. 12, instead of taking up the wear by the ring  $d^7$ , as previously described as the preferred form.

5 The shell or portion  $d^8$  is provided with an enlarged chamber or recess  $d^{11}$ , which is considerably larger than the end of the duct  $d^7$ , to prevent the closing of the end of said duct as the shell  $d^8$  turns. The concave plate  $d^5$  is cut away at  $d^{12}$  to permit the desired movement of the said portion  $d^8$ .

I am aware of English patent, No. 4,175 of 1883, and hereby disclaim anything herein anticipated by said patent.

15 Having described my invention, I do not claim, simply and broadly, a pipe-coupling composed of separate members united by universal joints. Neither do I claim, broadly, a coupling-joint having packings inserted in 20 grooves; but

What I claim as new, and desire to secure by Letters Patent, is—

1. A pipe-coupling having ball-and-socket or universal joints and an intermediately-arranged oscillating joint composed of automatically separable sections having meeting 25 faces oscillating or turning in opposite directions one upon the other when in operative engagement and provided with air or steam ducts therethrough, and means on each section adapted to engage with the other of said sections to hold said sections in their oscillatory engagement and to cause the automatic separation of said sections when the oscillating joint and universal joints are in a straight 30 line, or approximately so, for the purpose specified.

2. In a pipe-coupling, the combination of end members provided with universal joints, 40 and an intermediate member consisting of two sections in elbow form, the outer ends jointed directly to the end members and the inner ends connected by an articulating-joint fitted to allow the parts of the intermediate member to turn in parallel planes when 45 coupled, spring-actuated locking-arms adapted to engage with said sections and exercise pressure in opposite directions and to hold said sections in operative engagement, and 50 means on said spring-arms adapted to cause the automatic separation of the sections when said elbows and universal joints are in a straight line, as and for the purpose specified.

3. In a pipe-coupling, the combination, with 55 end members provided with universal joints, of an intermediate member jointed to the end members and together at the center, the two flat coupling-heads of the central joint being provided with circular grooves of loose rings 60 fitting in said grooves and turning freely, and packings fitted in grooves of the loose rings, as shown and described, and for the purpose specified.

4. A pipe-coupling having ball-and-socket 65 or universal joints, and an elbow-joint arranged between and connected with said universal joints by suitable pipes, said elbow-

joint being composed of separable plates or sections having steam or air ducts there- 70 through, each half-section provided with a spring-arm adapted to engage with means on the other of said half-sections to hold or lock said sections pivotally together and to allow the sections to turn in horizontal planes, said 75 arms adapted to turn with said sections and having slots therein to cause the disengagement of the said arms with the sections when said elbow and universal joints are in a straight line, substantially as and for the purpose 80 specified.

5. A pipe-coupling having ball-and-socket joints, and an elbow-joint arranged between and connected with said ball-and-socket joints by suitable pipes, said elbow-joint being composed of like sections, spring-arms on 85 each of said sections, turning with the same, adapted to exercise their pressure in opposite directions and pivotally holding the sections together, and means on said arms for causing the locked engagement of the sections as long 90 as the elbow and the ball-and-socket joints are not in a straight line and the automatic separation of the said sections when said joints are in a straight line, substantially as described.

6. A coupling device consisting of a spherical shell having a duct therethrough and a 95 packing-chamber within said shell and around said duct, a pipe to which said spherical shell is rigidly attached, a semi-spherical shell moving around said spherical shell and having a 100 pipe attached thereto, a divided inclosing-shell consisting of the portions  $d^3$  and  $d^5$ , provided with threads and ratchets on the outer surface thereof, and a threaded ring 105 connecting said portions  $d^3$  and  $d^5$  and provided with a detent or pawl thereon which engages with the ratchets and locks said rings, substantially as and for the purpose set forth.

7. A coupling device consisting of a spherical 110 shell having a duct therethrough, a pipe to which said shell is rigidly attached, a semi-spherical shell moving around said spherical shell and having a pipe attached thereto, a divided inclosing-shell consisting of the portions 115  $d^3$  and  $d^5$ , threaded on the outer surface, as set forth, and a threaded ring connecting said portions  $d^3$  and  $d^5$ , all of said parts being arranged and operated for the purpose set forth.

8. A pipe-coupling having a ball-and-socket 120 or universal joints and an elbow-joint arranged between and connected with said universal joints by suitable pipes, said elbow-joint being composed of automatically-sepa- 125 rable plates or sections having pins projecting therefrom and pivotally held together by arms projecting from one section and engaging with the pin on the opposite section, the end of said arm which engages with the pin 130 being provided with grooves which meet at an angle and into which said pin projects, substantially as and for the purpose set forth.

9. In a coupling device, the combination,

with automatically-separable plates or sections A, having ducts therethrough, each of said sections being provided with a journal-pin thereon, as set forth, of journal-arms projecting from each of said sections and engaging with the pin on the opposite section, the end of said arm which engages with the pin being provided with grooves which meet at an angle and into which said pin projects, substantially as and for the purpose set forth.

10 10. A pipe-coupling having ball-and-socket or universal joints and an elbow-joint arranged between them and connected with said universal joints by suitable pipes, said elbow-joint being composed of automatically-separable sections pivotally and automatically

held together, as set forth, the faces of each of said sections being recessed and provided with packing-rings recessed and provided with packing therein, said packing-rings moving freely in the recessed sections and engaging faces of the said sections as said sections turn, substantially as and for the purpose set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 29th day of June, 1887.

EDWARD F. ROBERTS.

Witnesses:

FREDK. F. CAMPBELL,  
L. S. COOK.