Jan. 9, 1923. 1,441,200

W. G. ALLAN.
COUPLING.
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Fig. 1.

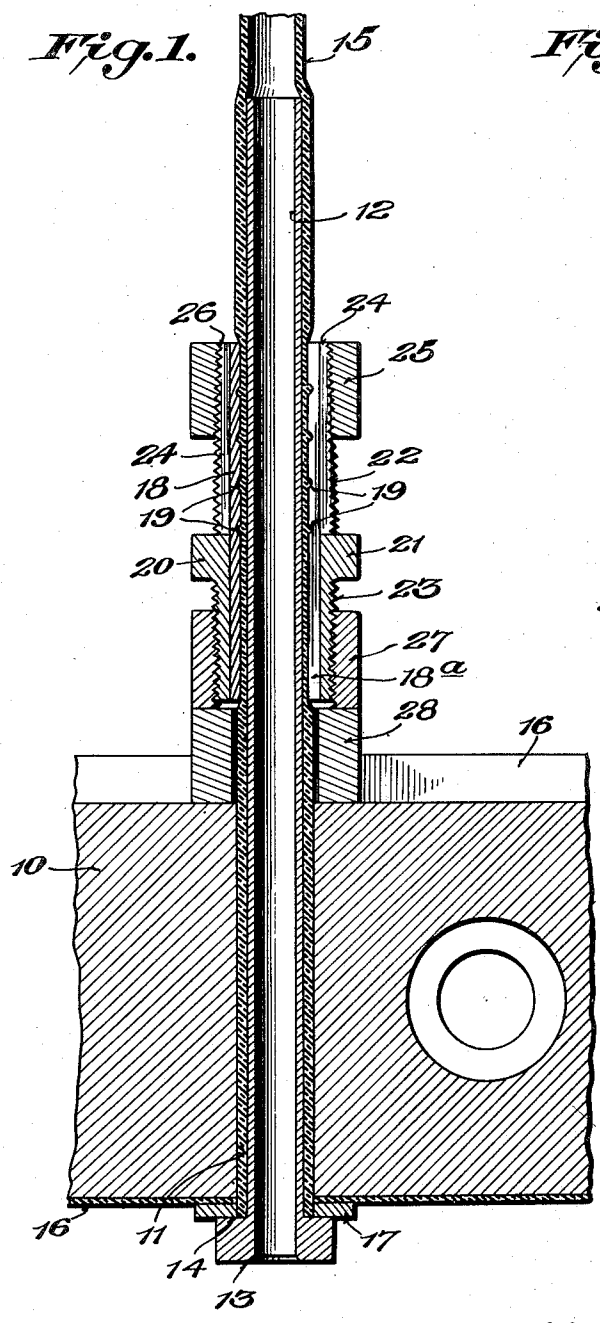
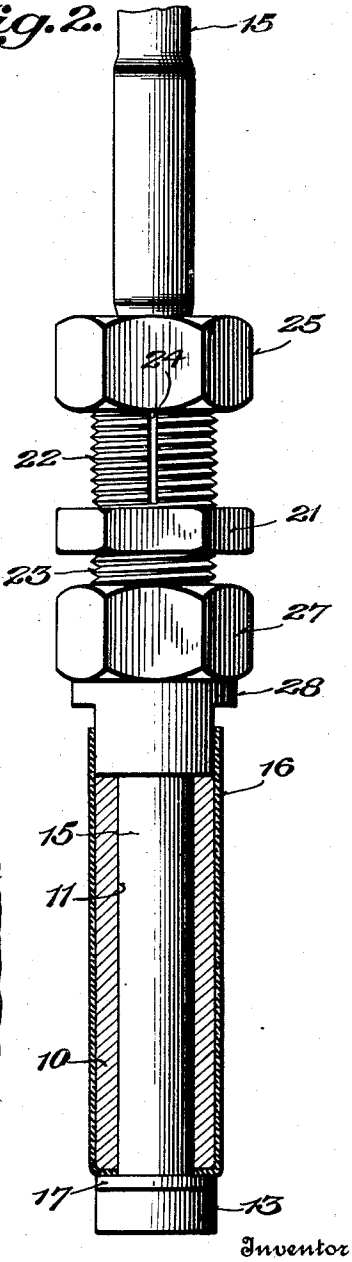


Fig. 2.



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UNITED STATES PATENT OFFICE.

WILLIAM G. ALLAN, OF TORONTO, ONTARIO, CANADA.

COUPLING.

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To all whom it may concern:

Be it known that I, WILLIAM G. ALLAN, a subject of the King of Great Britain, residing at Toronto, county of York, Province of Ontario, Canada, have invented certain new and useful Improvements in 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.

This invention relates to couplings, and particularly to offtake or intake tubes for electrolytic cells and means for coupling them to and insulating them from the cell frame; but some features of the invention are of general application as coupling means for tubes and pipes, and are not necessarily limited to use in an electrolytic apparatus.

In the production of gases by the electrolysis of an electrolyte as, for example, in producing oxygen and hydrogen by the electrolysis of water, an electrolytic apparatus may be employed, such for example, as the general type shown in my copending application Case A Ser. No. 355987 filed herewith. In the operation of such electrolytic apparatus the gaseous products of the electrolysis are removed through suitable offtake pipes from the zone of action and from the cell as they are formed, accompanied or not by electrolyte. Similarly, intake pipes are provided for supplying electrolyte to the cells. It is important that the intake and offtake pipes be electrically insulated from the cell frames and also from ground. It is also frequently important that these tubes or conduits shall be of small diameter or cross section because of the small width of the anode and cathode chambers into or from which they lead; and the connections of such conduits to the cell frame should therefore occupy little space and should be readily disconnectable from the call frame to permit the removal, inspection and replacement of parts of the apparatus.

Accordingly, a principal object of this invention is to provide means whereby an offtake or intake tube, especially a tube of small cross sectional area, may be coupled to a cell frame in such manner as to be readily attachable and detachable and at the same time to provide an insulated and fluid-tight joint with the cell frame. Another object of this invention is to provide coupling means of the character described that shall be inexpensive to manufacture, simple and compact in construction, and effective in operation. These and other objects and the novel features of this invention will be apparent from the following description taken in connection with the drawings which illustrate an advantageous embodiment of this invention, and in which,—

Fig. 1 is a vertical sectional view taken through an offtake tube of an electrolytic apparatus, embodying the coupling means of the present invention and showing a portion of a cell frame to which the tube is coupled; and

Fig. 2 is a view in elevation of the offtake tube, showing sectionally the cell frame to which it is attached.

Referring to the drawings, 10 designates a portion of a cell frame of an electrolytic apparatus that may contain one cell or any desired number of cells, for the electrolysis of an electrolyte. For purposes of further illustration and a more complete description of one type of electrolytic apparatus in which the coupling means of this invention may be employed, reference may be had to my copending application aforesaid. However, it will be understood that while the invention is particlularly well adapted for use in connection with electrolytic apparatus, as previously stated, various features, such as the coupling means, may be of general application in other connections, as for example in securing a tubular or non-tubular member or rod to an apertured plate or frame member.

The frame member 10 may have one or more passages or bores 11 extending therethrough, those at the top of the frame member being designed to receive the offtake tubes, and those at the bottom of the frame member being designed to receive the intake tubes. The offtake tube here illustrated as embodying my invention comprises a metal tube 12, which in this particular instance is of comparatively small exterior cross sectional area or diameter extending through passage 11, and has a head 13 at its inner end which provides an abutment shoulder 14 adapted to serve as a bearing surface when the tube is coupled to the cell frame 10. The tube 12 is of substantially uniform external diameter and extends a considerable distance outside the cell frame member 10, for a purpose which will appear presently.

In a complete electrolytic apparatus of the type here referred to for the sake of a concrete example, each of the tubes 12 is connected to a manifold or header by a suitable conduit 15 which should be non-conducting. Flexible rubber tubing is suitable for this purpose, and is employed in the specified construction here illustrated; but the conduit 15 may be of any other suitable insulating material such as hard rubber, bakelite, glass, or the like for example. In the present example, the rubber tubing fits over the upper or outer end of the tube and covers the entire length of the tube to the head 13, thus insulating it from the cell frame. In the illustrated construction, the tube 12 and its head 13 are further insulated from the cell frame by insulation 16 which extends around the sides and bottom of the cell frame member 10, thus separating the shoulder 14 and the washer 17 against which the said shoulder bears from the cell frame.

In order to prevent leakage of gas or electrolyte through the passage 11 or between the walls of the tubes 12 and 15, I have provided suitable means for tightly clamping the rubber tube 15 to the rigid metal tube 12 and for drawing the shoulder 14 of the metal tube securely against the inner side of the cell frame member 10, thereby providing fluid-tight joints at all points where leakage might occur in the coupling. In carrying out the present invention, the coupling member is arranged to compress the rubber tube tightly against the metal tube to frictionally and securely connect these parts. By the same means a grip is also formed whereby the telescopically connected tubes may be drawn in an axial direction until the shoulder 14 on the metal tube limits the further movement of the connected tubes and parts. I have illustrated a particularly effective and desirable means for accomplishing this purpose, but it will be understood that other suitable arrangements may be employed within the scope of the invention to attain the results desired.

In the device here disclosed, I employ a compressible sleeve 18, most desirably formed of or internally surfaced with copper, which surrounds a substantial length of the telescopically arranged tubes 12 and 15 where they extend outside of the cell. Contacting surfaces of vulcanized rubber and copper tend to cohere tenaciously after a time, especially after being subjected to heat, due to the cementing action of the intervening film of copper sulfid that is formed. The sleeve 18 may be split longitudinally as at 18^a, and is preferably provided with a suitable gripping surface, here shown as afforded by indentations or grooves 19 in its inner wall into which the adjacent soft rubber tubing may be pressed when the sleeve 18 is compressed tightly around the telescopically arranged tubes 12 and 15, so that the sleeve 18 will more firmly grip the rubber tube. Such indentations may however be omitted where the friction between the parts is sufficient to provide a firm grip. Suitable means for compressing the sleeve 18 are here shown as comprising a nipple 20 advantageously of steel that has a wrench head 21 intermediate its ends and is threaded above and below such head as at 22 and 23. The upper threaded portion 22 is adjustable in diameter, and to this end may be split longitudinally of the nipple and transversely of the threads at a number of points, as illustrated at 24, to render this portion of the nipple resilient so that the several parts of the threaded portion 22 may be sprung together slightly to compress the sleeve 18 and to grip it. For purposes of illustration, and on account of advantages in the way of simplicity in manufacturing, there are four slits 24 in the nipple shown, but this number may of course be varied. Suitable means are provided for compressing the threaded gripping part 22, and to accomplish this purpose I have herein shown an effective and simple means which consists of a nut 25, provided with an internal thread 26, that tapers a sufficient amount to cause the sections of the threaded part 22 to be pressed inwardly when the nut is turned down, thereby compressing the sleeve 18 and forming a fluid-tight joint between the tubes 12 and 15, besides ensuring a firm grip between the sleeve 18, nipple 20, and the two tubes that resists relative movement of these parts.

The necessary movement to draw the shoulder 14 and washer 17 into fluid-tight engagement with each other and with the inside rubber lining of the cell frame 10 may be obtained by various means. As herein shown, this result is advantageously obtained by means of a thrust member in the form of an internally threaded nut 27 which fits the threaded lower end 23 of the nipple and is adapted to exert a thrust against the upper edge of the cell frame 10. The nut 12 may bear directly against the top end of the cell frame or, as in the arrangement illustrated, it may bear against a metal spacer 28 which surrounds the telescopic tubes and bears against the upper side of the cell frame. After the nut 25 has been turned down to provide the necessary grip between the sleeves and the telescoping tubes, the lower nut 27 may be turned so as to back it away from the wrench head 21 and against the spacer 28, thereby drawing the head of the tube 12 and the washer 17 against the inside lining of the cell frame, the head 21 being held by a wrench, if necessary, during this operation.

While I have shown and described in detail an especially desirable form of improved

coupling and tube within the invention, it is to be understood that various features thereof may be modified without departing from the spirit and scope of the invention.

What I claim is:

1. The combination with an apertured member, of tubular means having a portion of substantially uniform external diameter projecting through the aperture in said member, tubular insulating means telescopically fitting such projecting portion of the first-named tubular means and insulating the same from said member, and means for securing said tubular means to each other and to said apertured member.

2. The combination with an apertured member, of a tubular member having a portion of substantially uniform external diameter projecting through the aperture in said member, a non-metallic insulating tube telescopically fitting such projecting portion of said tubular member and insulating the same from the wall of such aperture, and means whereby said tubular member and non-metallic tube are clamped together and to said apertured member.

3. The combination of a metal cell frame member having a passage therethrough, of a metal tube projecting through said passage, a rubber tube telescopically fitting said metal tube and insulating the same from the wall of said passage, and releasable means for clamping said tubes together and to said frame member to provide an insulated, fluid tight connection between said frame member and tubes.

4. In a coupling construction of the character described, the combination with a tube having abutment means, of a threaded tubular member embracing said tube and having a compressible clamping portion, a nut on said member for compressing said clamping portion, and a thrust nut cooperating with said tubular member to force said abutment means against conduit means to which said tube is to be coupled.

5. The combination with a member having a passage therethrough, of a member projecting through said passage, and means for coupling the second-named member to the first-named member comprising nipple means having threaded portions at opposite ends, the threaded portion at one end being provided with compressible gripping means, means cooperating with such compressible gripping means to frictionally secure said nipple to said second member, and means cooperating with said first member and the other threaded portion of said nipple to couple the members together.

6. The combination with a member having a passage therethrough, of a member projecting through said passage and means for coupling the second-named member to the first-named member comprising sleeve means having a threaded portion at one end slotted transversely of the threads to provide adjustable gripping means, tapering threaded means adapted to cooperate with said slotted threaded portion to compress said adjustable gripping means, and means cooperating with the other end of the sleeve means to couple said members together.

7. The combination with a frame member having a passage therethrough, of a member projecting through said passage and means for coupling the second-named member to said frame member comprising a nipple having threaded portions at opposite ends thereof, the threaded portion at one end being slotted transversely of the threads to provide compressible gripping means, tapering threaded means adapted to cooperate with said slotted threaded portion to compress said gripping means, and means cooperating with the other threaded portion of the sleeve and said frame member to couple said members together.

8. The combination with a frame member having a passage therethrough, of tubular means projecting through said passage and means for coupling said tubular means to said frame member, comprising a nipple having threaded portions at opposite ends thereof, the threaded portion at one end being slotted transversely of the threads to provide resilient gripping means, a nut having a tapering threaded opening adapted to cooperate with said resilient gripping means to compress the same inwardly toward said tubular means, and means cooperating with the other threaded portion of the nipple to exert a thrust against said frame member.

9. The combination with a metal member having a passage therethrough, of a metal tube projecting through said passage, a tube of yieldable insulating material telescopically fitting the portion of said tube in said passage to insulate said metal tube from said metal member, said tube of yieldable material also telescopically enclosing the projecting portion of said metal tube, and means for coupling said tubes together and to said metal member, comprising a nipple having threaded portions at opposite ends thereof, the threaded part at one end comprising portions compressible inwardly to provide gripping means, means cooperating with such gripping means to compress the same and said tube of yieldable material against said metal tube, and means cooperating with the other threaded portion of said nipple to couple said tubes to said metal member.

10. The combination with a frame member having a passage therethrough, of tubular means projecting through said passage, and means for coupling said tubular means to said frame member, comprising

a sleeve of relatively soft metal disposed about a portion of said tubular means, a nipple having threaded portions at opposite ends thereof, the threaded portion at one end comprising resilient gripping means surrounding said sleeves, means co-operating with said resilient means to compress the same and said sleeve inwardly, and means co-operating with the other threaded portion of the nipple and said frame to couple said tubular means to said frame member.

11. In an electrolytic apparatus, the combination with a cell frame member having a covering of insulating material thereon and a passage therethrough, of a rigid metal tube projecting through said passage and having a head forming a shoulder at one end, a washer between said shoulder and the covering of said frame member, a rubber tube telescopically enclosing said metal tube, terminating at said shoulder and insulating said metal tube from the wall of said passage, and means on one side of said frame member co-operating with said shoulder and washer on the other side of said frame member to provide a fluid tight joint between said tube and frame member and to couple the same together, such means comprising a compressible sleeve disposed around contiguous portions of said tubes and adapted to grip said rubber tube, a nipple surrounding said sleeve and having threaded portions at opposite ends and a wrench head intermediate such threaded portions, the threaded portion of the nipple more remote from said frame having slots extending transversely of its threads forming resilient gripping fingers, a nut having a tapering threaded opening adapted to cooperate with said resilient gripping fingers to compress the same inwardly against said sleeve to compress the soft rubber tubing against the rigid metal tube, a spacer between the other end of said nipple and said frame member, and a nut cooperating with the other threaded end of said nipple and with said spacer and frame member to draw said shoulder and washer against the opposite side of said frame member and couple said tubes to the frame member to produce a fluid tight joint therebetween.

12. The combination, with a compressible gripping sleeve, of a tubular member embracing the same, said tubular member having a wrench head intermediate threaded end portions, one of said end portions being compressible, and nuts working on said threaded end portions.

In testimony whereof I hereunto affix my signature.

WILLIAM G. ALLAN.