E. L. BARNES.

EXPANSION DEVICE OR SLIP JOINT.

APPLICATION FILED NOV. 9, 1920.

1,367,349.

Patented Feb. 1, 1921.

2 SHEETS—SHEET 1.

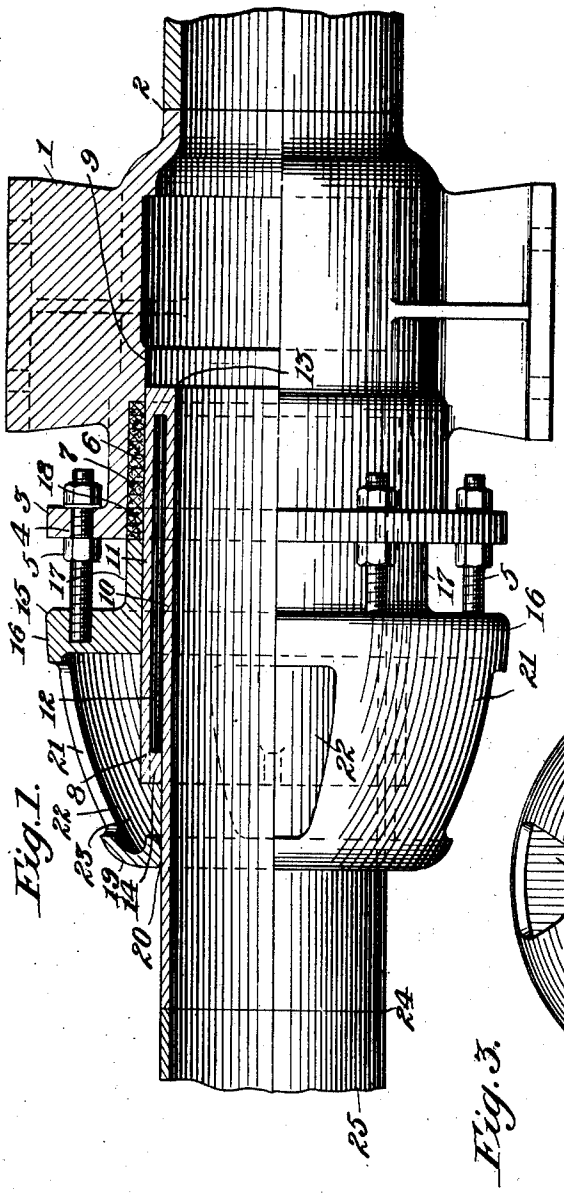


Fig. 1.

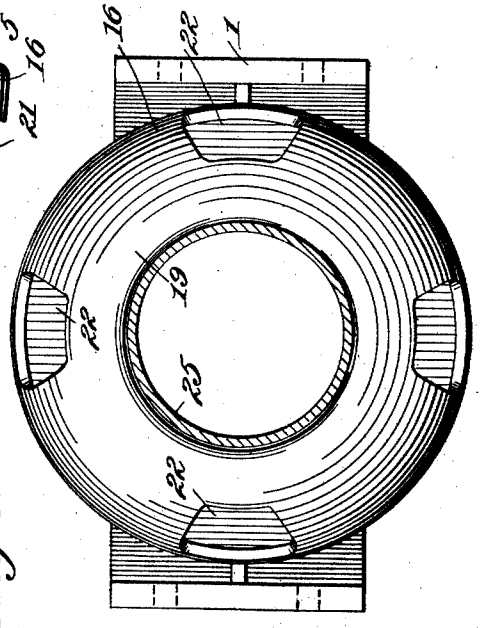


Fig. 3.

Inventor:
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by Emmons & Harvey
Atty.

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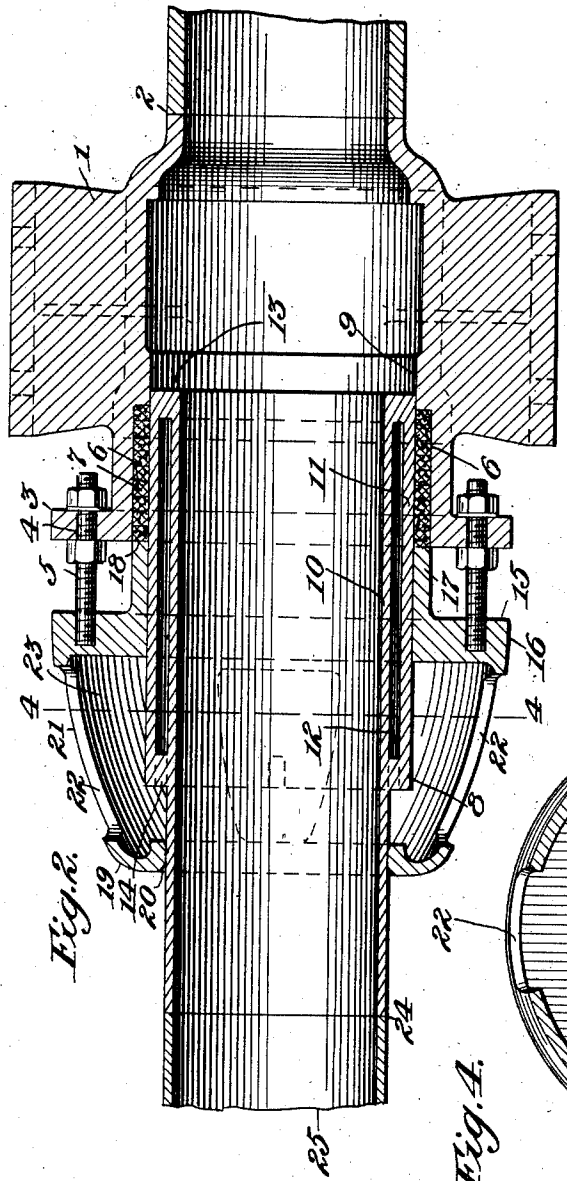


Fig. 2.

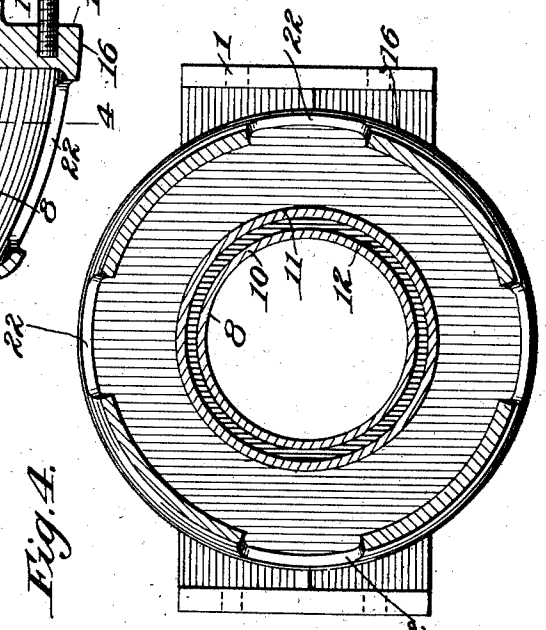


Fig. 4.

Inventor:
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Att'y.

UNITED STATES PATENT OFFICE.

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EXPANSION DEVICE OR SLIP-JOINT.

1,367,349. Specification of Letters Patent. Patented Feb. 1, 1921.

Application filed November 9, 1920. Serial No. 422,880.

To all whom it may concern:

Be it known that I, EUGENE L. BARNES, a citizen of the United States, residing at Buffalo, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Expansion Devices or Slip-Joints, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to expansion structures, also known as slip joints, and is primarily designed for use in connection with steam and similar systems wherein provision is made for the normal tendency of the connected portions of a pipe line to expand, contract, or creep.

The subject-matter of the present case is an improvement on the structure disclosed in my application Serial No. 305,476, filed June 20, 1919. The structure thereof includes an inner or slidable joint-member provided with a guiding flange at its outer extremity that has a sliding movement within the bore of a casing-member bolted or otherwise secured to an outer sleeve and housed by the casing member. Secured to the outer sleeve is a packing-gland. In that instance, the slidable joint member was guided by means independent of the packing-gland.

In an application for United States Letters-Patent, filed May 12, 1920, Serial No. 380,877, I have disclosed an improvement upon the structure disclosed in my application Serial No. 305,476; and in that case the casing-member of the first construction is omitted and the gland is so constructed as to constitute a support for and a guiding medium of the slidable member which forms a component of the joint and, thus, the gland element is therein utilized to perform a dual function, namely, that of maintaining the packing in proper position, and, also, that of guiding the movable component of the joint.

The structure of the present case utilizes certain of these features of the application Serial No. 380,877, but includes certain novel features that make for improved operation of the structure and, at the same time, the manufacturing thereof is greatly simplified. This structure of the present case primarily differs from that of the application Serial No. 380,777 in omitting the guiding flange on the movable component of the joint and, instead, the gland element is so formed as to engage that member both in proximity to the gland which it holds in position and, also, at a spaced-apart point whereby that member is guided in its movement and the various components of the structure are maintained in proper operative relation so that injury to the contained packing is prevented.

In order that the invention may be more readily comprehended, I have disclosed the same in the accompanying drawings, in which a practical embodiment of my inventive-concept is illustrated; but it is to be understood that in thus illustrating the single embodiment, the invention is not limited thereto, since it is susceptible of a wide range of modification and variation without departing from its underlying principles and salient features.

In these drawings:

Figure 1 is a view, partly in elevation and partly in longitudinal section, of an expansion-structure made in accordance with my invention;

Fig. 2 is a view in central longitudinal section of the same;

Fig. 3 is a view in end elevation of the structure; and

Fig. 4 is a view in vertical transverse section, on the line 4—4, Fig. 2.

Referring, now, to these drawings, it will be noted that the reference-character 1 designates an outer or encompassing component or joint-member to which a pipe may be secured, as by welding at 2; though it is to be understood that the pipe may be otherwise attached to the member. The encompassing member is, preferably and as shown, provided with a flange 3 and having a series of bolt-holes 4 through which extend bolts 5.

The member 1 is formed with an internal annular recess 6 adapted to receive packing 7. Disposed for a sliding movement within the member 1 is an inner or slidable member or component 8 which, preferably and as shown, is of such exterior diametral dimensions as to have a sliding fit within the bore 9 of the member 1.

The member 8 is of duplex construction and comprises two tubular portions 10 and 11, the outer portion (11) encompassing a section of the inner portion 10 and being spaced therefrom to provide an annular chamber or space 12 for containing a cooling medium, such as air. The portions 10 and 11

are joined at 13 so that the member 8 at that point is closed. Between the portions 10 and 11, at their opposite ends, is disposed a series of spacers 14, these being spaced apart to provide openings for the passage of air or other cooling fluid into the chamber 12. By reason of the fact that the portion 11 of the member 8 is always in direct contact with the packing 7, the air in the chamber 12 acts as an insulator to prevent the heat of the fluid passing through the joint structure from imparting its heat to the packing. Thus, the life of this packing is unaffected by heat and, in consequence, seldom requires replacement.

The packing 7 is maintained within the recess 6 by a gland element 15 comprising a body portion 16, and a packing engaging portion 17 extending therefrom and of a diameter to be insertible at 18 in the recess 6. This packing-engaging portion has a sliding fit with the member 8 and serves, in part, as a bearing for the member 8. This member 8, however, is further supported by a member-guiding portion 19 extending from the body portion 16 of the gland element 15. This guiding portion has its extremity inturned to provide a bearing 20 for the member 8. The portion 19 is integral with the body portion 16 through web or skeleton 21, the construction being such as to provide openings 22 for the passage of air from the atmosphere into an enlarged space 23 formed within the element 15.

The bolts 5 are threaded into the body portion 16 of the gland element 15 and serve as means to adjust the gland element in respect to the packing 7. By reason of the fact that the bolts are all accessible from the exterior of the structure, it does not require any dismantling thereof to manipulate the packing 7 or to replace it.

To the member 8 may be secured, as by welding at 24, a pipe 25.

From this construction, it will be perceived that the expansion structure comprises, primarily, the encompassing component 1 which is recessed at 6 to receive the packing 7, and carries the bolts 5; also the air insulated member 8 comprising the two portions 10 and 11 with the air-space or chamber 12 formed between them and adapted to receive a cooling air from the space 23; the gland element 15 formed with the packing-engaging portion 17 and with the member-guiding portion 19, these two portions having a sliding engagement with the member 8 but at spaced-apart points. In this instance, in contradistinction to the structure disclosed in my application Serial No 380, 877, the duplex member 8 carries no flange or head at its end to slide within the gland element; but, on the contrary, the gland element itself is formed with the bearing portion 20 which encompasses and has a sliding engagement with the portion 10 of the duplex member 8. In consequence, the movement of the duplex member 8 is very accurately controlled, with the result that it effects no cramping action upon the package 7 in the space 6, such cramping action being precluded by reason of the engagement of the member 8, first with the bore 9 of the member 1, then with the bearing 18 of the portion 17, and then with the bearing 20 of the portion 19. The member 15, therefore, maintains the packing in proper place and condition and likewise maintains the sliding member 8 in accurate relation to the parts with which it has a sliding engagement.

In practical use of the types of expansion structures herein referred to, it has been found advantageous to maintain the duplex member 8 in accurate sliding position with respect to the other associated parts by having the gland element in contact with this member as near to its axis as possible.

It will now be seen that I have devised an effective type of expansion structure and that, in comparison with those of my other cases, I have simplified the components thereof to a material extent.

What I claim is:

1. An expansion-structure including a plurality of members associated for relative movement, and a gland element adjustably secured to one of the members and having offset bearing portions slidably engaging one of the members at spaced-apart unalined points, the outermost bearing portion being of smaller diameter than that of the other bearing portion.

2. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; and a packing-holding element having a packing-engaging portion in sliding engagement with the tubular member and a member-guiding portion inwardly offset from the engaging portion and also in sliding engagement with the tubular member.

3. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging portion in sliding engagement with the tubular member and a member-guiding portion inwardly offset from and unalined with the engaging portion and also in sliding engagement with the tubular member.

4. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging

portion in sliding engagement with the tubular member and adjustable against packing in said recess and a member-guiding portion spaced apart and inwardly offset from the engaging portion and also in sliding engagement with the tubular member.

5. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging portion in sliding engagement with the tubular member and adjustable against packing in said recess and a member-guiding portion inwardly offset from the engaging portion and also in sliding engagement with the tubular member; and means accessible from outside of the recessed member for adjusting said gland-element in the recess.

6. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging portion in sliding engagement with the tubular member and adjustable against packing in said recess and a member-guiding portion spaced apart from the engaging portion and also in sliding engagement with the tubular member; and means accessible from outside of the recessed member for adjusting said gland-element in the recess; said element having an annulus with openings in its walls to permit circulation of air to the tubular member.

7. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging portion in sliding engagement with the tubular member and adjustable against packing in said recess and a member-guiding portion spaced apart from the engaging portion and also in sliding engagement with the tubular member; and means accessible from outside of the recessed member for adjusting said gland-element in the recess; said tubular member having an air-containing space between its walls to insulate the packing from the heat of fluid flowing through the structure.

8. An expansion-structure including a pair of members associated for relative movement; one of the members being tubular in form; the other member having an internal annular recess for packing; and a gland element having a packing-engaging portion in sliding engagement with the tubular member and adjustable against packing in said recess and a member-guiding portion spaced apart from the engaging portion and also in sliding engagement with the tubular member; and means accessible from outside of the recessed member for adjusting said gland element in the recess; said tubular member having an air-containing space between its walls to insulate the packing from the heat of fluid flowing through the structure; and said gland element being open to the atmosphere to permit air to circulate into said air-containing space in the tubular member.

9. An expansion-structure including a plurality of associated members, one of which has relative movement within the other, and one of which members is of duplex form, comprising inner and outer portions, the latter encompassing, but spaced apart from, the inner portion to provide an annular air-space; and a packing-holding element carried by one of the members and provided with a packing-engaging portion and with a member-guiding portion in sliding engagement with the inner portion of the duplex member.

10. An expansion-structure including a plurality of associated members having relative movement; one member constituting an air-insulating component and being of duplex construction comprising a pair of tubular portions, one encompassing, but spaced apart from, the other to provide an air-space therebetween; the other relatively-stationary member encompassing a portion of the duplex member; and a gland element adjustably carried by the stationary member and provided with a packing-engaging portion and with a member-guiding portion in sliding engagement with the inner portion of the duplex member and sustaining the same.

11. An expansion-structure including a pair of associated members adapted for relative movement; one member constituting an air-insulated component having a tubular portion and an annular air-containing space between its inner and outer walls and encompassed in part by the other of the members; and a packing-holding element adjustably secured to said encompassing member and comprising a packing-engaging portion and a member-guiding portion spaced from the packing-engaging portion and having a sliding engagement with the tubular portion of the air-insulated component.

12. An expansion-structure including a plurality of members associated for relative movement; one member constituting an encompassing component within which the other member has a sliding movement; said other member constituting an air-insulated component and comprising a tubular portion and an annular chamber between its inner and outer walls for a cooling medium; the encompassing component being formed with an internal annular recess for packing; and a gland element secured to the encompassing

member and adjustable against the packing in the recess; said element comprising a packing-engaging portion and a member-guiding portion having a sliding engagement with the tubular portion of the air-insulated component.

13. An expansion-structure including a plurality of members associated for relative movement; one member constituting an encompassing component within which the other member has a sliding movement and internally recessed to receive packing; the other member constituting an insulating component; and a combined gland and member-guiding component comprising a body portion, a packing-engaging portion extending therefrom into the recess in the encompassing component and having a sliding engagement with the insulating component, and a member-guiding portion extending from the body portion and formed with an angulated extremity having a sliding engagement with the insulating component at a point thereon spaced from the point of engagement therewith of the packing-engaging portion.

14. An expansion-structure including a plurality of members associated for relative movement; one member constituting an encompassing component within which the other member has a sliding movement and internally recessed to receive packing; the other member constituting an insulating component; and a combined gland and member-guiding component comprising a body portion, a packing-engaging portion extending therefrom into the recess in the encompassing component and having a sliding engagement with the insulating component, and a member-guiding portion extending from the body portion and formed with an angulated extremity having a sliding engagement with the insulating component at a point thereon spaced from the point of engagement therewith of the packing-engaging portion; and packing in the recess and insulated and maintained relatively cool from the heat of fluid flowing through the structure.

15. An expansion-structure including a plurality of members associated for relative movement; one member constituting an encompassing component within which the other member has a sliding movement and internally recessed to receive packing; the other member constituting an insulating component and comprising a tubular device having inner and outer portions, one encompassing but spaced from the other portion to provide an air-space in the device, one end thereof being closed and the other open for the ingress of air into the air-containing space; and a combined gland and member-guiding component comprising a body portion, a packing-engaging portion extending therefrom into the recess in the encompassing component and having a sliding engagement with the insulating component, and a member-guiding portion extending from the body portion and formed with an angulated extremity having a sliding engagement with the insulating component at a point thereon spaced from the point of engagement therewith of the packing-engaging portion; and packing in the recess and insulated and maintained relatively cool from the heat of fluid flowing through the structure.

16. An expansion-structure including a plurality of members, one of which has movement in relation to the other; the movable member comprising a plurality of spaced-apart portions to form an annular air-space; and an open-sided gland-element carried by the other member and provided with an annular gland portion adjacent one end and, adjacent its opposite end, with a member-guiding portion spaced apart from the gland-portion and directly engaging one portion of the movable member while the gland portion engages the other portion of that member.

17. An expansion-structure including a plurality of members, one of which has movement in relation to the other and comprises two portions, one of which encompasses the other and is spaced apart therefrom to form an annular air-space, and a gland-element secured to the other member and provided at one end with an annular gland portion and, at the other side end, provided with a member-guiding portion having a sliding engagement directly with the inner portion of the slidable member while the gland portion has a sliding engagement with the outer portion of that member.

18. An expansion-structure including a slidable tubular member attachable to piping and having a three-point bearing comprising an encompassing member also attachable to piping and bored to receive and slidably support one end of the tubular member, and a gland element provided with a packing-engaging portion secured to the encompassing member for adjustment in respect to packing therein and for slidably supporting the tubular member and provided, also, with an angulated member-guiding portion spaced apart from the gland-engaging portion and relatively remote from the encompassing member for supporting and guiding the tubular member.

19. An expansion-structure including a slidable tubular member attachable to piping and of duplex construction to constitute a heat-insulating component and having a three-point bearing comprising an encompassing member also attachable to piping and bored to receive and slidably support one end of the tubular member, and a gland element provided with a packing-engaging por-

tion secured to the encompassing member for adjustment in respect to packing therein and for slidably supporting the tubular member and provided, also, with an angulated member-guiding portion spaced apart from the packing-engaging portion and relatively remote from the encompassing member for supporting and guiding the tubular member.

20. An expansion-structure including a plurality of members associated for relative movement one within the other, and an element secured to one of the members and provided with an inturned outer extremity and having bearing portions slidably engaging one of the members at spaced-apart points.

21. An expansion-structure including an encompassing member, a sliding member associated therewith for relative movement therein, and a packing-holding element adjustably secured to the encompassing member and having an angulated bearing-portion in engagement with the sliding member at a point relatively remote from the encompassing member.

22. An expansion-structure including a packing-supporting member, a sliding member associated therewith for relative movement therein, and a bearing element secured to one of the members and provided with outer and inner bearing portions slidably engaging the sliding member at spaced-apart points, the outer bearing portion being of diametral dimensions smaller than those of the inner bearing portion.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE L. BARNES.

Witnesses:

HOWARD LONG,

GEORGE H. WEST.