

E. J. DEEGAN.
EXPANSIBLE TUBE.
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1,010,123.

Patented Nov. 28, 1911.

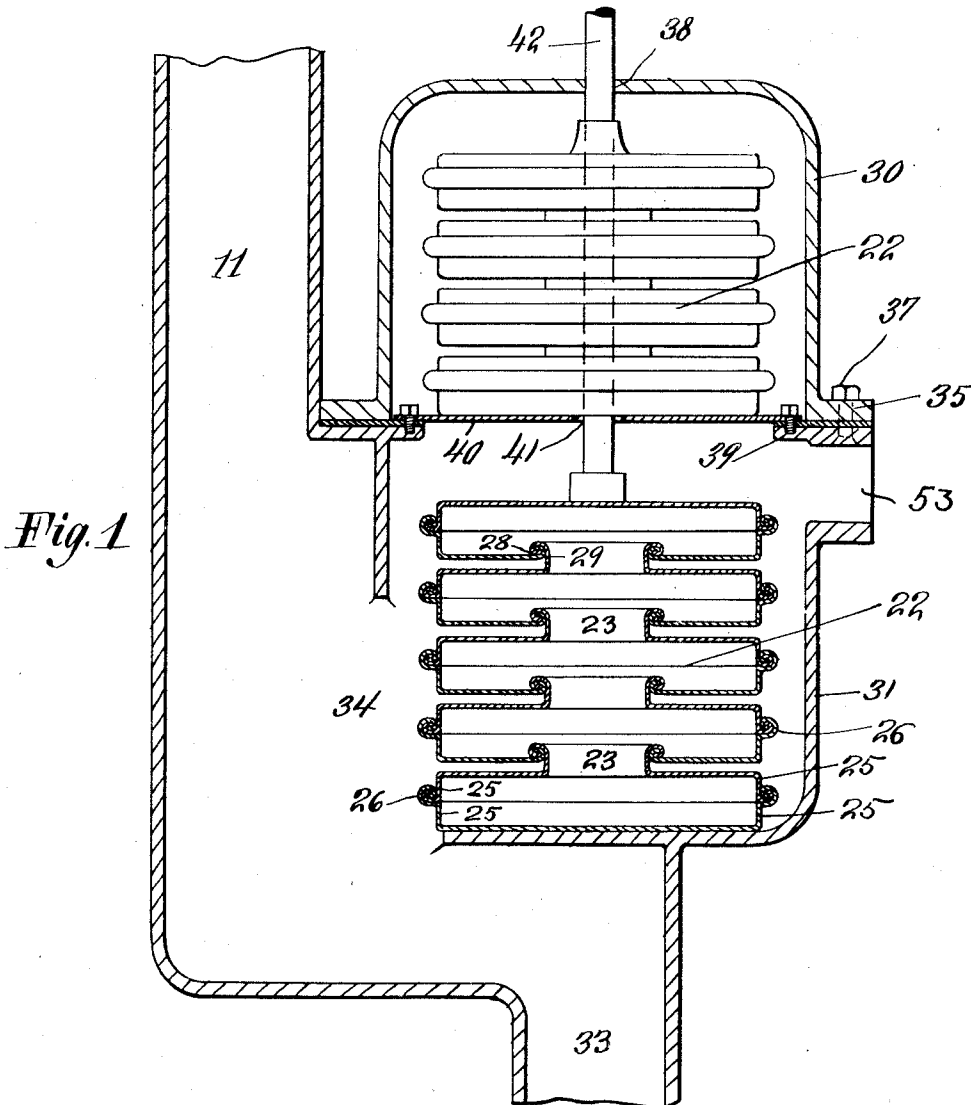


Fig. 1

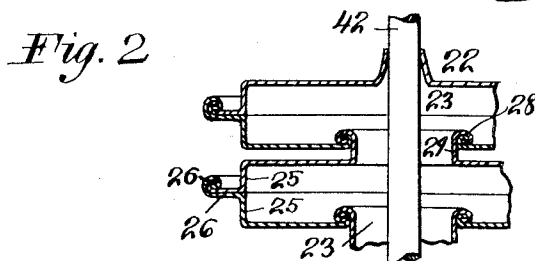


Fig. 2

Witnesses:
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UNITED STATES PATENT OFFICE.

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EXPANSIBLE TUBE.

1,010,123.

Specification of Letters Patent. Patented Nov. 28, 1911.

Application filed November 3, 1910. Serial No. 590,436.

To all whom it may concern:

Be it known that I, EDWARD J. DEEGAN, a citizen of the United States of America, residing at the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Expansible Tubes, of which the following is a specification.

My invention relates to expansible tubes; that is to say, a tube so constructed that it will expand or collapse to a considerable extent, more than would normally occur with a straight metal tube, simply because of the elongation or contraction due to changes in temperature of the metal of which it is composed; and said invention consists in the particular construction hereinafter described and claimed, whereby I secure a greater variation in the length of the tube, with less strain upon the metal, than can be accomplished in some other forms, and yet, by reason of the fact that my tube is built up of units, I am enabled to make use of stronger material than could be conveniently manipulated in making a tube of a single piece. Such tubes are of use in many combinations,—for instance—to hold a volatile fluid whose expansion and contraction may be utilized to move the rod of a regulator, also in many other combinations.

Figure 1, is a view, partly in section and partly in full lines, of several units, assembled to make up expansible tubes embodying my invention. Fig. 2, is a sectional view of a portion of such a tube, showing a rod extending through it.

In Fig. 1, I have shown the tube as employed to make part of a regulator. In such a device, the tube, shown in section, would be partially filled with a volatile liquid. I have shown such a tube in full lines in the upper part of Fig. 1 and in section in the lower part of that figure, the upper tube substantially inclosed by a casing 30 and the lower one by a casing 31, a diaphragm 40 being interposed between the two tubes so shown. By securing a rod 42 to the top of the tube shown in section, passing it through the tube shown in full lines and soldering or otherwise securing it tightly to the upper part of said tube which is shown in full lines, I provide means which may be readily employed to lift the lever arm of a regulator or move any other device which

it is desired to move upon an increase of 55 temperature.

Steam or other heating medium entering through either of the openings 11—34, 33—34, or 53, in the casing 31, would heat the volatile medium within the tube shown 60 in section, and its consequent expansion would so elongate the units of the tube that the rod 42 would be lifted to operate any device with which it might be connected. The tube shown in full lines in the upper 65 part 30, of the casing is substantially similar to that shown in section in the lower part 31, of the casing, but it is not entirely closed. There is an opening 41, through the diaphragm 40. 70

The upper part 30, of the casing, and the lower part 31, as shown, are connected together, the lower part 31 being provided, at the upper edge with an inwardly extending flange 39 to which the intervening diaphragm 40 is secured. Said upper part 30 75 of the casing is also provided with an aperture 38 through which the end of rod 42 projects and the opening 41 in diaphragm 40, is large enough to permit the passage 80 of rod 42 and to also permit steam, entering casing 31 as stated, to pass to the interior of the upper tube and thus more quickly effect its heating and consequent elongation, but such arrangement is not in 85 all cases necessary.

The tube itself, as here shown, consists of a series of preferably circular disks 22, with their peripheral edges struck up to form flanges 25, extending upwardly or downwardly from the main planes of the disks, and other flanges 26 extending out from the vertical flanges; also a central opening 23. The flanges 26 are secured together, preferably with a double seam as shown. The interior edges of openings 23 are also shown with flanges, one member of a set being preferably provided with a flange 29, long enough to reach up into the central opening of the next disk, and over the edge or flange 100 28, so as to permit the formation of a double seam (if that method of joinder be used) between flange 29 of one disk and flange 28 of the succeeding disk. In assembling disks of this character, one with a flange 25 105 extending upwardly, may be placed on one with a flange 25 extending downwardly and the outer edges secured as related. Then a

succeeding disk with a preferably upwardly extending flange, is so placed that the flange 29 of the adjacent disk projects upwardly through the central opening 23 of the said succeeding disk and said succeeding disk and the preceding one, having flange 29, are secured together, preferably with the double seam as shown.

Following the procedure named, a tube as long as desired, is constructed, the exterior disks being without central openings as shown in Fig. 1, at the top and bottom of the tube in section, or with openings for a rod or other attachment, as shown in Fig. 2 in section, and as indicated in Fig. 1 in full lines. If a volatile liquid is to be employed, it would of course be introduced into the tube before the top section was secured in place.

My arrangement thus described permits me to make the disks of substantially any desired diameter and thus spread the vibration over much space and the presence of a flange such as 25 gives more flexibility with less liability of breaking joints than if no such flanges were employed.

I prefer to construct my tubes as described, but variations not exceeding the limits of the claims may of course be made without departing from the spirit of the invention.

What I claim as my invention and desire to secure by Letters Patent is:

1. An expansible tube composed of a series of flexible annular metal disks, arranged in pairs, and secured successively together, one of each pair being provided with a flange surrounding its central orifice and projecting from the main plane of the disk at an angle approximating a right angle, one of each pair being provided with a flange at or near its periphery, extending from the main plane of the disk at an angle approximating a right angle, and, beyond said flange near the periphery, with an extension adapted to be secured to a substantially similar extension on the next disk, said series of disks being joined one directly to the next by an air tight joint, located alternately at or near the peripheries and at or near the interior edges, the main plane of one disk, being, normally, substantially parallel to the main planes of the other corresponding disks, all substantially as set forth.

2. An expansible tube composed of a series of flexible annular metal disks, arranged in pairs, and secured successively together, one of each pair being provided with a flange surrounding its central orifice and projecting from the main plane of the disk at an angle approximating a right angle, one of each pair being provided with a flange at or near its periphery, extending from the main plane of the disk at an angle approximating a right angle, and, beyond said flange

near the periphery, with an extension adapted to be secured to a substantially similar extension on the next disk, the extension of each disk being hermetically sealed to the extension of the complementary disk of that pair, the interior flange of each disk being seamed to the adjacent disk of the next pair, and arranged with the main planes of the disks of the series, normally, substantially parallel one to the other corresponding disks, all substantially as set forth.

3. An expansible tube composed of a series of flexible annular metal disks, arranged in pairs, and secured successively together, one of each pair being provided with a flange surrounding its central orifice and projecting from the main plane of the disk at an angle approximating a right angle, one of each pair being provided with a flange at or near its periphery, extending from the main plane of the disk at an angle approximating a right angle, and, beyond said flange near the periphery, with an extension adapted to be secured to a substantially similar extension on the next disk, the extension of each disk being seamed to the extension of the complementary disk of that pair, the interior flange of each disk being seamed to the adjacent disk of the next pair, and arranged with the main planes of the disks of the series, normally, substantially parallel one to the other corresponding disks, all substantially as set forth.

4. An expansible tube composed of a series of flexible annular metal disks, arranged in pairs, and secured successively together, each interior disk being provided with a flange surrounding its central orifice and projecting from the main plane of the disk at an angle approximating a right angle, adapted to register and make a joint with the interior flange on the succeeding disk of the series, one of each pair being provided with a flange at or near its periphery, extending from the main plane of the disk at an angle approximating a right angle, and, beyond said flange near the periphery, with an extension adapted to be secured to a substantially similar extension on the next disk, said series of disks being joined one directly to the next by an air tight joint, located alternately at or near the peripheries and at or near the interior edges, the main plane of one disk, being, normally, substantially parallel to the main planes of the other corresponding disks, all substantially as set forth.

5. An expansible tube composed of a series of flexible annular metal disks, arranged in pairs, and secured successively together, one of each pair being provided with a flange surrounding its central orifice and projecting from the main plane of the disk, to a height some distance above the adjacent main plane and constituting a stop to the

collapsing movement of the opposite disk,
one of each pair being provided with a
flange at or near its periphery, extending
from the main plane of the disk at an angle
5 approximating a right angle and, beyond
said flange near the periphery, with an ex-
tension adapted to be secured to a substan-
tially similar extension on the next disk, said
series of disks being joined one directly to
10 the next by an air tight joint, located alter-
nately at or near the peripheries and at or
near the interior edges, the main plane of

one disk being, normally, substantially par-
allel to the main planes of the other corre-
sponding disks, all substantially as set forth. 15

In testimony whereof, I have signed my
name to this specification in the presence of
two subscribing witnesses, this 25th day of
October 1910.

EDWARD J. DEEGAN.

Witnesses:

A. G. N. VERMILYA,
LILA B. WARREN.