United States Patent

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[33] **Germany**
[31] **P 18 01 143.3**

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[54] **DEVICE FOR PASSING A TENSION SUPPLY LINE THROUGH THE COVER OF AN ELECTRIC FILTER**
11 Claims, 5 Drawing Figs.

[52] U.S. Cl. ..... 174/31.5, 55/146, 174/12 BH
[51] Int. Cl. B03c 3/34, H01b 17/26
[50] Field of Search 174/11.3, 12.3, 14.3, 15.3, 16.3, 17.06, 18, 31, 31.5, 139; 55/101, 140, 141, 146

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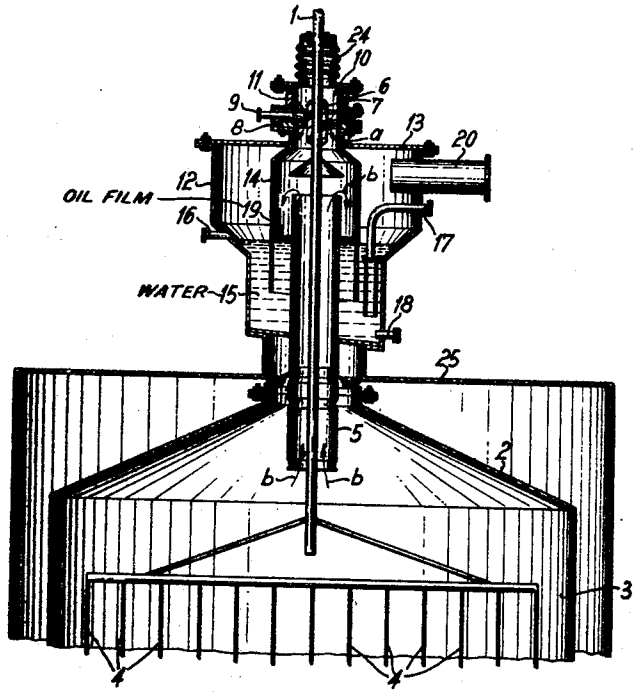
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Primary Examiner—Laramie E. Askin
Attorney—Connolly and Hutz

ABSTRACT: Lead-in device for passing a tension supply line or conductor through the cover of an electric filter down to its spray system, the tension supply line or conductor being concentrically surrounded by a duct arranged to run from the filter cover to the interior of the filter. The tension supply line or conductor is arranged to be surrounded by an insulator by positioning the said insulator above the filter cover so as to be spaced therefrom and so as to be radially spaced from the tension supply line or conductor, and an insulating bush is secured to the tension supply line or conductor at a position below the insulator. The insulating bush is arranged to be surrounded by a barrier disc so as to leave a barrier slit, and the space left above the barrier disc is occupied by a sealing gas maintained under overpressure with respect to the pressure prevailing inside the filter.



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FIG. 1

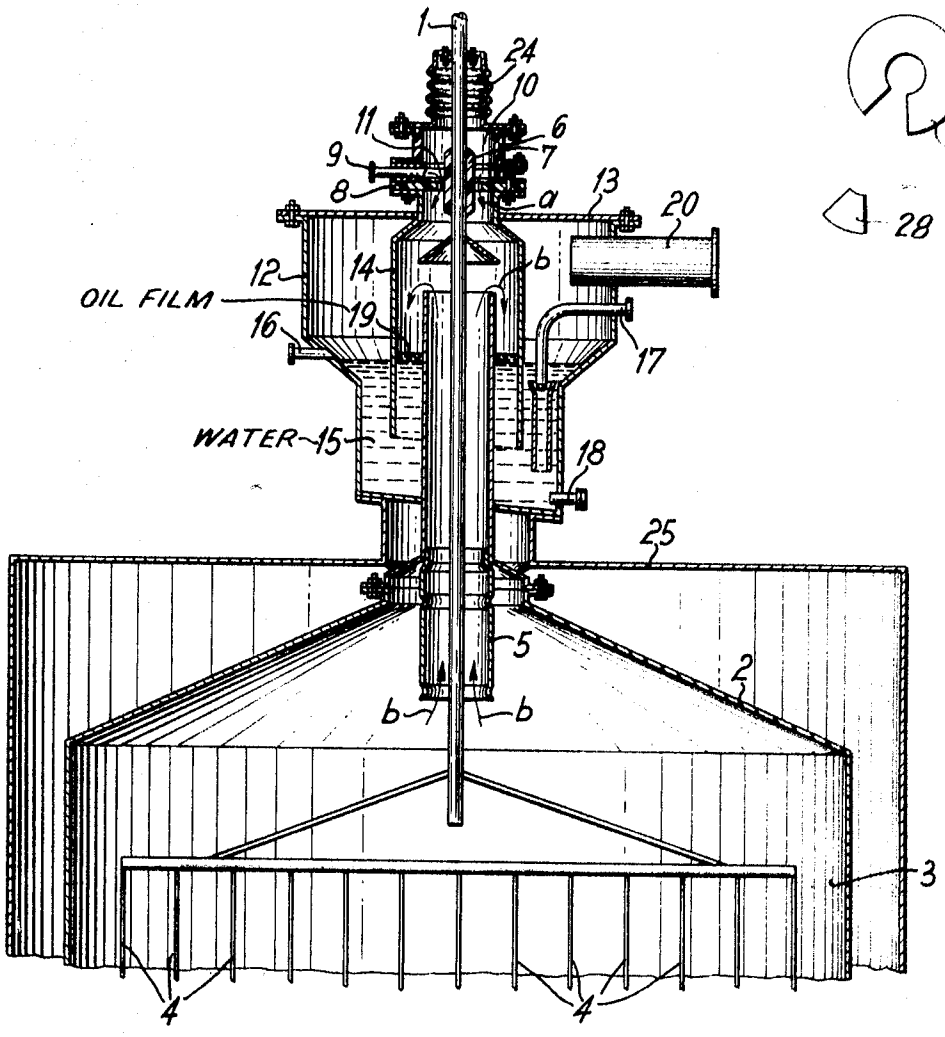


FIG. 1a

FIG. 2

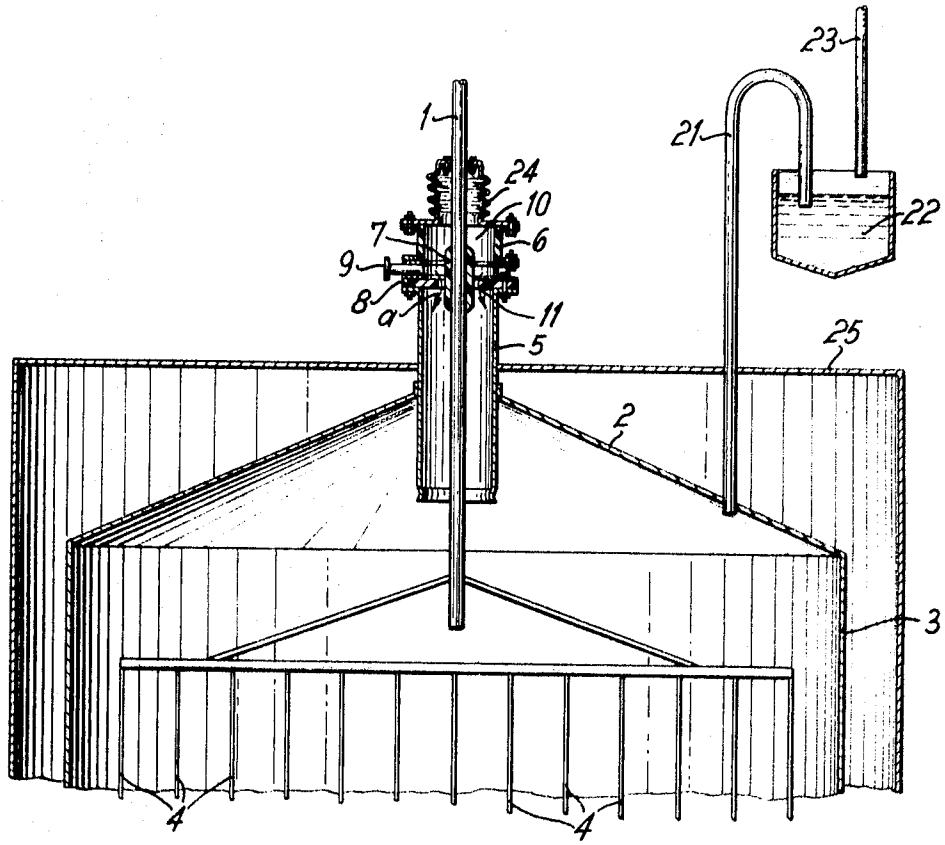


FIG. 3

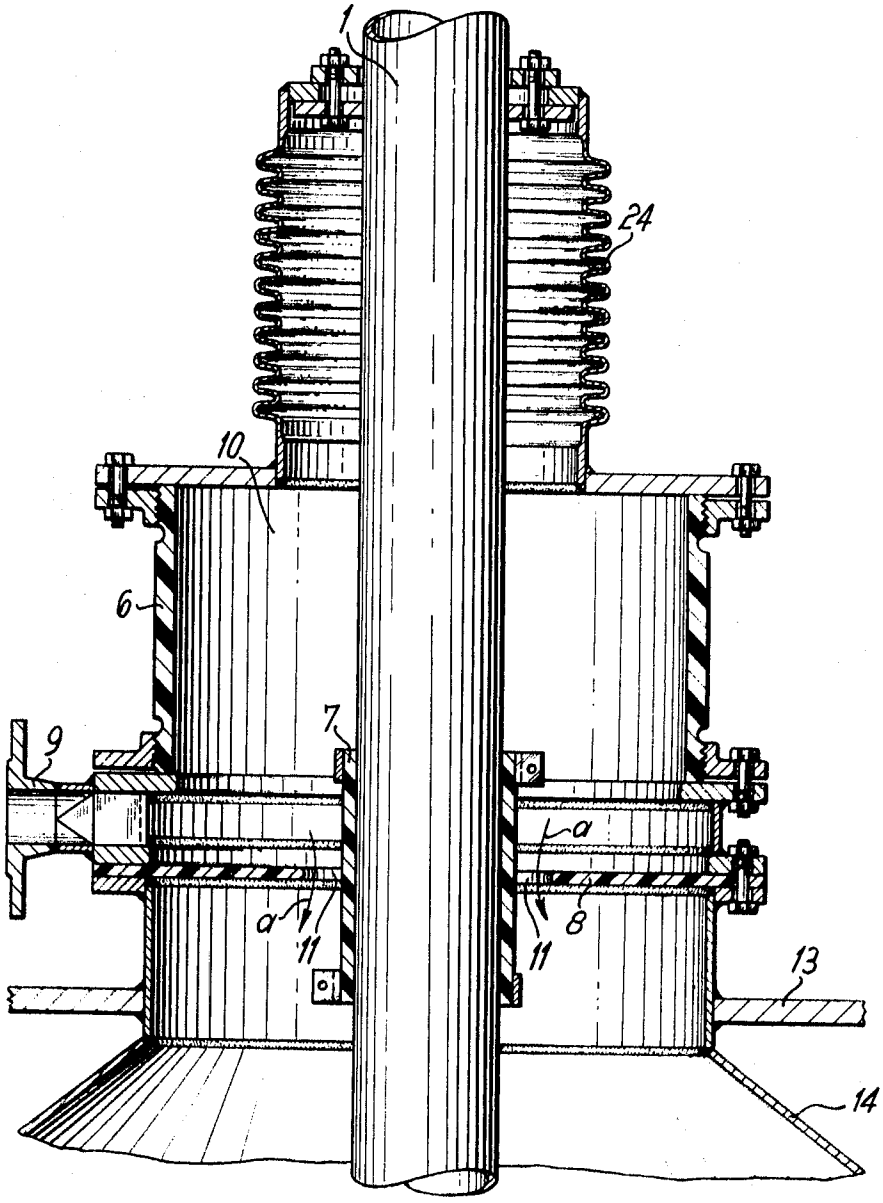
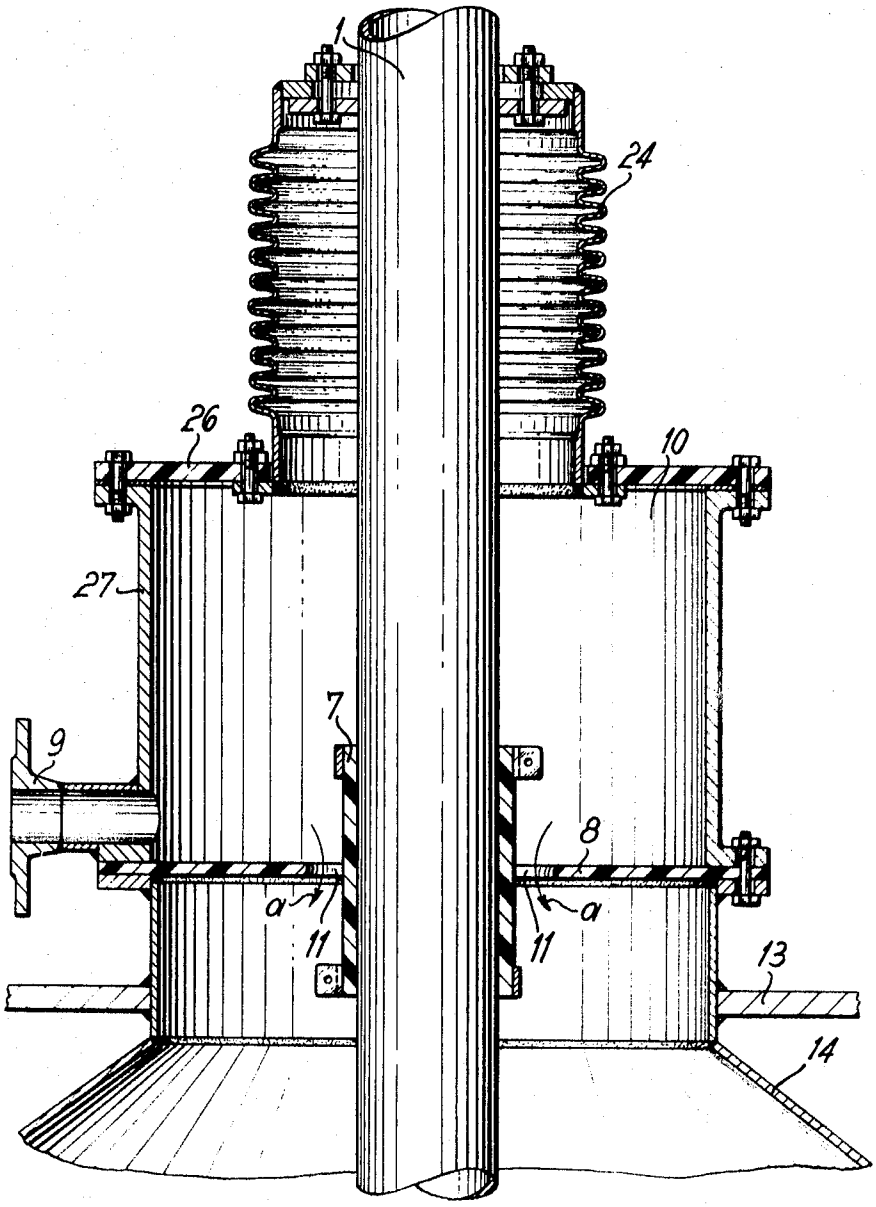


FIG. 4



DEVICE FOR PASSING A TENSION SUPPLY LINE THROUGH THE COVER OF AN ELECTRIC FILTER

The present invention relates to an apparatus for passing a tension supply line or conductor through the cover of an electric filter down to its spray system, the tension supply line or conductor being concentrically surrounded by a duct arranged to run from the filter cover to the interior of the filter.

In a known device of the type described above, the tension supply line or conductor is arranged to run through an oil cup which simultaneously serves as an insulator and as an overpressure safety means. At the level of the filter cover, the tension supply line or conductor is concentrically surrounded by a duct running from the interior of the filter to the oil cup. The oil cup is made slightly higher than the duct and substantially half its volume is filled with oil. Approximately level with the upper edge of the oil cup, the tension supply line or conductor has a diving bell connected to it, which is arranged to project approximately into the lowermost quarter of the oil cup and the oil therein. This method of passing a tension supply line or conductor through the cover of an electric filter down to its spray system is not fully satisfactory. Upon the occurrence of undue overpressure in the interior of the filter, the oil in the diving bell is expelled therefrom, and gaseous and vaporous matter coming from the interior of the filter can escape into the atmosphere through the space left between the diving bell and the pneumatic dashpot. In those cases in which the gas penetrating into the oil cup is carbon monoxide or phosphorus in vapor form with a temperature of about 350° C. coming from the interior of the filter—these are evolved, for example, in phosphorus production—heavy fire outbreaks are very likely to occur. This may effect injury not only to neighboring facilities, but also scalding injury to operating personnel standing close by. A further defect resides in the fact that gas penetrating into an oil cup—this means lack of homogeneity for the electric field—may effect (a) electrical flashing over or breakdown firstly between the duct and the diving bell and secondly between the oil cup and the diving bell, and (b) fire outbreak inside the oil cup. A further negative effect resides in that the insulating oil, once it has been contaminated by dust and condensed phosphorus coming from the interior of the filter, loses its electrically insulating properties, and must be replaced at rather short intervals of time.

The object of the present invention is to provide a lead-in device for passing a tension supply line or conductor through the cover of an electric filter, which is free from the defects reported above and enables fire outbreaks in an oil cup and their consequences to be effectively avoided. To this effect, the present invention substantially provides a lead-in device comprising a tension supply line or conductor and an insulator, the tension line or conductor being arranged to be surrounded by the insulator by positioning the insulator above the filter cover so as to be spaced therefrom and so as to be radially spaced from the tension supply line or conductor; an insulating bush and a barrier disc, the insulating bush being secured to the tension supply line or conductor at a position below the insulator and being surrounded by the barrier disc so as to leave a barrier slit, the space left above the barrier disc being occupied by a sealing gas maintained under overpressure with respect to the pressure prevailing inside the filter. The insulator may be given a cylindrical shape and form the space receiving inert gas. It is also possible to use as the insulator an insulating disc secured to the electrically conducting casing receiving the inert gas. The device designed in the manner described above is perfectly apt to meet the requirements set forth hereinabove. It is advantageous for the insulator, the insulating bush and the barrier disc to be made up of polytetrafluoroethylene or another suitable material. The result of this is that the diving bell is set to earth potential as are all the further parts of the apparatus. In other words, it is no longer necessary to use insulating oil to effect insulation firstly between the diving bell and the duct and secondly between the diving bell and the pneumatic dashpot. As mentioned above, the sealing gas, which generally and advantageously is an inert gas, introduced into the space left above the barrier disc, is maintained under overpressure with respect to the pressure prevailing inside the filter. This is done to effect continual gas flow from the space above the barrier disk through the slit left between the insulating bush and the barrier disc to the interior of the filter, and thereby to effectively avoid the deposition on the insulator of contaminants coming from the interior of the filter. In other words, it is impossible for the insulator to become soiled and thereby to lose its initial dielectric strength. It can definitely be kept clean. As results therefrom, it is ensured that the lead-in device of the present invention always reliably fulfills its assigned functions.

A further preferred feature of the present invention provides for the arrangement of a metal bellows for use as an axial compensator, of which the lower end is fast with the insulator and the upper end is fast with the tension supply line or conductor, in order not to handicap the up-and-down movements of the tension supply line or conductor necessary to cleanse the spray system.

In accordance with a still further feature of the present invention, a pneumatic dashpot is arranged concentrically with respect to the tension supply line or conductor and between the lead-in device and the filter cover. As to the dashpot, it is sufficient for its lower portion to be filled with water. In order to prevent water, which may have been evaporated or vaporized, from depositing on the insulating apparatus parts, it is advantageous to make an oil film float on the water in the dashpot, and to heat the inert gas to a temperature substantially of 60° C.

A conduit coming from a chimney is arranged to project into the upper portion of the dashpot in order to permit the escape of gaseous and vaporous matter issuing from the dashpot in the case of gas penetrating thereinto.

It is also possible for the dashpot secured to the filter cover to be replaced by a tube arranged to project into a diving vessel. Also, there are no difficulties standing in the way of constructing the present apparatus without the above two structural parts, namely dashpot and diving vessel. Still further, it is possible to operate the present apparatus without the use of any overpressure safety device, which incidentally may be a bursting disc positioned on the filter cover.

An exemplary representation of the apparatus of the present invention is shown diagrammatically in the accompanying drawings, wherein

FIG. 1 is an overall representation of the lead-in device and the dashpot,

FIG. 1*a* is a top plan view of the barrier disc portion of the embodiment shown in FIG. 1,

FIG. 2 is an overall representation of the lead-in device and the diving vessel,

FIG. 3 is an enlarged scale representation of the lead-in device,

FIG. 4 is a representation on an enlarged scale of a modified lead-in device.

The lead-in device designed in accordance with the present invention and shown diagrammatically in the accompanying drawings is used for passing a tension supply line or conductor **1** through the cover **2** of an electric filter **3** down to its spray system **4**. At the level of filter cover **2**, the tension supply line or conductor **1** is arranged to be concentrically surrounded by a duct **5**, projecting into the interior of the filter. Tension supply line or conductor **1** is surrounded by insulator **6**, **26** which is radially spaced therefrom and axially spaced from electric filter **3**. The insulator **6**, **26** may be cylindrical as shown in FIG. **3**, or disc-shaped as shown in FIG. **4**. When the insulator **26** is disc-shaped as shown in FIG **4**, then cylinder **27** is made up of conductive material. Placed below insulator **6**, **26** and on tension supply line or conductor **1** is an insulating bush **7** enveloped by a barrier disc **8** which may be provided with a wedge-shaped segment **28**, to facilitate assembly and disassembly thereof. Above insulator **6** and **26** there is posi-

tioned a bellows **24** which is connected to insulator **6**, **26** and conductor **1**. Pipe **9** is used to supply space **10** formed above barrier disc **8** with sealing gas maintained under overpressure with respect to the pressure prevailing inside the filter. The sealing gas travelling through pipe **9** flows in the direction indicated by arrow *a* through slit **11** left between insulating bush **7** and barrier disc **8** to the interior of the electric filter, and is removed therefrom together with vaporous and gaseous matter. The continual flow of the sealing gas makes it impossible for contaminated gaseous and vaporous matter coming from the interior of the filter to flow through barrier slit **11** and enter space **10** above barrier disc **8**. As results therefrom, contamination of insulator **6**, **26** is practically avoided. This is extremely important in order to avoid electric flashing over or creeping currents. Insulator **6**, insulating bush **7** and barrier disc **8** can be made up, for example, of polytetrafluoroethylene.

As shown in FIG. **1**, a pneumatic dashpot is arranged concentrically with respect to tension supply line or conductor **1** between the lead-in device and filter cover **2**. Duct **5** is arranged to run from the interior of the filter through filter cover **2** down to substantially the upper third of dashpot **12**. Secured to cover **13** of dashpot **12** is a diving bell **14**, which is disposed to project down into substantially the lowermost quarter of dashpot **12**. Dashpot **12** is filled with water **15**, which occupies substantially half its volume, and has an overflow **16** disposed near its center portion. Supply pipe **17** is used to feed fresh water to dashpot **12**, and outlet pipe **18** is used for emptying it. Evaporated or vaporized water is prevented from depositing on the insulating structural parts, by means of an oil film **19** floating on the water inside diving bell **14**. The upper portion of dashpot **12** has a conduit **20** connected to it. Conduit **20** runs to a chimney and enables gaseous and vaporous matter issuing from the interior of the filter in the direction indicated by arrow *b* upon the possible occurrence of overpressure in the interior of the filter and penetration of gas into the dashpot, to be removed.

In the modification shown in FIG. **2**, filter cover **2** has a pipe **21** connected to it which is arranged to project into a diving vessel **22** which in turn has a pipe connection **23** running to a chimney, for example.

It is also possible for the lead-in apparatus of the present invention to be designed without the two overpressure safety means, namely the dashpot shown in FIG. **1** and diving vessel shown in FIG. **2**. These can be replaced by a bursting disc which is placed on filter cover **2** (not shown in the drawings) and designed to burst upon the occurrence of undue overpressure.

The invention is in no way limited to the exemplary representations of the apparatus shown in the accompanying drawings. It admits of various modifications without departing from its scope.

We claim:

1. A lead-in device passing a conductor through the cover of an electric filter down to its spray system, the conductor being concentrically surrounded by a duct running from the filter cover to the interior of the filter, the conductor being surrounded by an insulator, the insulator being positioned above the filter cover and being radially spaced from the conductor, an insulating bush being secured to the conductor, and the insulating bush being surrounded by a barrier disc so as to leave a barrier slit between them, a bellows disposed above the insulator and contacting the conductor, a space being formed by the barrier disc, the insulator and the bellows and said space being occupied by a sealing gas maintained at a relatively higher pressure than that prevailing inside the filter.

2. The device as claimed in claim **1**, wherein the insulator has a cylindrical shape, and wherein the insulating bush is positioned near the lower end of the insulator.

3. The device as claimed in claim **1**, wherein the insulator comprises an insulating disc, and an electrically conducting casing, the insulating disc being secured to the electrically conducting casing, and wherein the insulating bush is positioned below the insulating disc.

4. The device as claimed in claim **1**, wherein sealing gas is an inert gas having a temperature substantially of 60° C.

5. The device as claimed in claim **1**, wherein the insulator, the insulating bush and the barrier disc are made up of polytetrafluoroethylene the barrier disc being an annular ring with a wedge-shaped segment to facilitate assembly and disassembly.

6. The device as claimed in claim **1**, wherein a metal bellows is used as an axial compensator, of which the lower end is fast with the insulator and the upper end is fast with the conductor.

7. The device as claimed in claim **1**, wherein a dashpot is arranged concentrically with respect to the conductor and between the lead-in device and the filter cover.

8. The device as claimed in claim **7**, wherein the lower portion of the dashpot has water therein.

9. The device as claimed in claim **8**, wherein the water in the dashpot is covered with an oil film floating thereon and the inert gas is heated to a temperature of substantially 60° C.

10. The device as claimed in claim **7**, wherein a conduit coming from a chimney projects into the upper portion of the dashpot.

11. The device as claimed in claim **1**, wherein the filter cover has a tube connection projecting into a diving vessel.