

SPECIFICATION

Method of providing watertight and fireproof routing of cables

- 5 The invention relates to a method of providing watertight and fireproof routing of cables through a duct section extending through a ceiling, wall or floor.
- 10 There is known a cable box, through which cables are drawn, for the feeding of cables and other such conductors through ceilings and walls of buildings and on board ships. After drawing all the cables through the cable
- 15 box, which can have a rectangular or round cross-section, the end surfaces thereof are closed off by a sealing mass and liquid hardenable casting resin is fed into the interior of the cable box through filling stubs disposed
- 20 on the surface until the interior is completely filled. By way of example, the pamphlet "Schottdurchführungen" of AEG, reference 0806.611 E 23/V 1165, is referred to.
- 25 One defect of this cable feedthrough is that the sealing mass cannot be introduced into all the spaces between the individual cables, so that a part of the very liquid casting resin is able to flow through the gaps before hardening.
- 30 To eliminate this defect, it has already been proposed in German (Fed. Rep.) Patent Specification No: 27 27 996 to surround each cable with a spacer of deformable foam material immediately in front of the ends of the
- 35 feedthrough and to compress this formed packet by means of a clamping device so that the hollow spaces between the cables are tightly closed off. The end surfaces of the feedthrough are closed off by the sealing
- 40 mass in known manner. Even though flowing out of the casting resin can be prevented by this feedthrough, the use of the clamping tool has proved to be difficult in the often restricted space conditions on board ships.
- 45 There is accordingly a need for a method which avoids the aforescribed disadvantages in cable feedthroughs and by which the build-up of watertight, gastight and fireproof feedthroughs can be manufactured rapidly
- 50 without special tools.
- According to the present invention there is provided a method of providing a watertight and fireproof routing of cables through a duct section extending through a wall, ceiling or
- 55 floor, the method comprising the steps of inserting an absorbent and swellable filler material in the end regions of the duct section to surround the cables and space the cables from each other and from the duct section, treating
- 60 the filler material with a liquid to cause the filler material to so swell and solidify as to close the ends of the duct section, and then filling the duct section with a hardenable substance.
- 65 In a method embodying the invention, a

sealing mass is not required in order to seal the ends of the duct section. Through the combination of the absorbent and swellable filler material and the hardenable substance, a

70 watertight and fireproof closure of the duct section is achieved.

Apart from these advantages, there may be a substantial material and work saving, amenability to assembly, a low technical input and

75 freedom from restraints imposed by the shape of the duct section.

Examples of the invention will now be more particularly described with reference to the accompanying drawings, in which:

80 *Figure 1* is a perspective view of a piece of filler material for use in a method according to one example of the invention;

Figure 2 is a perspective view of a duct section in an intermediate stage of said one example, with pieces of the filler material

85 inserted in the end of the duct section;

Figure 3 is a view similar to Fig. 2, showing the filler material expanded to close the end of the duct section; and

90 *Figure 4* is a perspective view of a duct section in an intermediate stage of a method according to another example of the invention.

Referring now to the drawings, in Fig. 1

95 there is shown in solid lines a piece of viscose 1 for use as a filler material in a method exemplifying the invention. The starting material of the piece 1 has been compressed during manufacture of the piece with different

100 pressures in two planes perpendicular to each other. After moistening the piece 1 with a liquid, it expands to different extents in the directions designated by the arrows and assumes the final shape 2 illustrated in dashed

105 lines. Material pieces 1 in the unexpanded shape (hereinafter termed "swell modules 1") are used for the packing of the ends of cable duct sections as described in the following with reference to Figs. 2 and 3.

110 The swell module 1 illustrated in Fig. 1 can have comblike incisions (not shown).

A joint face on board a ship is designated by 3 in Figs. 2 and 3. A rounded-off hollow body serving as duct section 4 is firmly connected by means of welds 5 with the joint

115 face 3. Arranged at the upper surface of the duct section 4 is a stub pipe 6, which serves for filling-in of a casting mass to fill out the interior of the duct section after closure of its

120 ends. A further stub pipe is provided for ventilation on the same surface behind the joint face.

Cables 7 (the term "cables" in this specification embraces other forms of conductors

125 analogous to cables) to be conducted from one room to an adjoining room are fed through the duct section 4. The ends of the duct section must be carefully closed off in order to prevent liquid casting mass, poured

130 into the duct section, from flowing out its

ends.

To close off each end, an end wall composed of swell modules 1, as illustrated in Fig. 2, is built up around the cables from the bottom upwards. Each cable is enclosed by swell modules 1, which are arranged horizontally and vertically and the swell directions of which always extend transversely to the duct section 4. At the same time, all necessary spacings are ensured by this arrangement. Swell modules 1 with comblike incisions are so introduced that their "teeth" are directed into the interior of the duct section 4. According to the size of the spaces left between the cables or between cables and the duct section, further material pieces are laid beside one another or one on top of the other in these spaces.

After the build-up of the end wall has been completed, it is sprayed with a liquid which lets the swell modules swell up and thereby close the end wall, as illustrated in Fig. 3. By the use of a special liquid, for example silica sol, the end wall simultaneously becomes fireproof. The swelling-up takes place very rapidly and in a few minutes forms a securely closed end wall. When the other end wall is closed off in the same manner, the casting mass can be fed in through the stub pipe 6 and the interior space of the duct section 4 is thereby filled without the danger of the casting mass issuing from the end walls.

In the example of Fig. 4, a duct section 4 of oval cross-section extends through a wall 3. Both parts are watertightly and gastightly connected with each other by welding seam 5 (see Fig. 3). The cables 7 are fed through the interior of the duct section.

A filling stub pipe 6 for the liquid casting mass is provided on the duct section 4. At the rear side of the wall 3, the duct section is constructed in like manner. The cables 7 are mounted in moulded parts 8 of absorbent material in the plane of the end face. These parts 8 have an approximately square cross-section. Each of the parts 8 is provided with a bore 9, which is matched to the diameter of a respective one of the cables, and with a longitudinal slot 10, through which the cable can conveniently be inserted into the part 8.

Spaces 11, 12 and 13, which are left after the insertion of all the cables into the moulded parts 8 in the ends of the duct section, are filled out by material pieces approximately adapted to the shape of these spaces. When all these spaces and any spaces between the moulded parts 8 are filled out, the entire material plug is somewhat under stress. Following this step, liquid fireproof casting mass can be poured through the stub pipe 6 into the interior of the duct section 4. The casting mass rapidly penetrates into the porous, absorbent material and solidifies before the outer layer of the moulded material parts is saturated. After the filling of the duct

section and the hardening of the casting mass, this is so intimately connected with the wall of the duct section and the sheathings of the cables that a gastight, watertight and fireproof cable routing is provided.

To ensure and to increase the safety and tightness of the end closure of the duct section, a preferably dry component of the casting mass is embedded in the material for the closure of the ends of the duct section during its manufacture in order to bring about a rapid solidification of the end wall on the filling of the duct section with the liquid casting mass. The surface of the end walls is pretreated with the liquid component of the casting mass. This prior treatment of the end walls causes the absorbent and swellable material to expand in such a manner that the smallest spaces between the cables are sealed off thereby. This is so effective that the filling of the duct section with the liquid casting mass can take place directly after the pretreatment.

A duct section produced by a method embodying the invention is usable in, inter alia, ship construction and may offer great economic and practical advantages compared with conventional processes.

CLAIMS

1. A method of providing a watertight and fireproof routing of cables through a duct section extending through a wall, ceiling or floor, the method comprising the steps of inserting an absorbent and swellable filler material in the end regions of the duct section to surround the cables and space the cables from each other and from the duct section, treating the filler material with a liquid to cause the filler material to so swell and solidify as to close the ends of the duct section, and then filling the duct section with a hardenable substance.

2. A method as claimed in claim 1, wherein the filler material and liquid coact to render the filler material fireproof.

3. A method as claimed in either claim 1 or claim 2, wherein the liquid is silica sol.

4. A method as claimed in claim 1, wherein the step of inserting comprises arranging an absorbent material to define end surfaces of the duct section.

5. A method as claimed in claim 4, wherein the step of inserting comprises arranging the absorbent material in the form of moulded bodies to enclose each cable and to fill in spaces between the enclosed cables and the duct section.

6. A method as claimed in either claim 1 or claim 2, wherein the step of treating comprises moistening the filler material with the hardenable substance in liquid form.

7. A method as claimed in any one of the preceding claims, wherein the filler material, prior to insertion in the duct section, includes a component of the hardenable substance.

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After the build-up of the end wall has been completed, it is sprayed with a liquid which lets the swell modules swell up and thereby close the end wall, as illustrated in Fig. 3. By the use of a special liquid, for example silica sol, the end wall simultaneously becomes fireproof. The swelling-up takes place very rapidly and in a few minutes forms a securely closed end wall. When the other end wall is closed off in the same manner, the casting mass can be fed in through the stub pipe 6 and the interior space of the duct section 4 is thereby filled without the danger of the casting mass issuing from the end walls.

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A filling stub pipe 6 for the liquid casting mass is provided on the duct section 4. At the rear side of the wall 3, the duct section is constructed in like manner. The cables 7 are mounted in moulded parts 8 of absorbent material in the plane of the end face. These parts 8 have an approximately square cross-section. Each of the parts 8 is provided with a bore 9, which is matched to the diameter of a respective one of the cables, and with a longitudinal slot 10, through which the cable can conveniently be inserted into the part 8.

Spaces 11, 12 and 13, which are left after the insertion of all the cables into the moulded parts 8 in the ends of the duct section, are filled out by material pieces approximately adapted to the shape of these spaces. When all these spaces and any spaces between the moulded parts 8 are filled out, the entire material plug is somewhat under stress. Following this step, liquid fireproof casting mass can be poured through the stub pipe 6 into the interior of the duct section 4. The casting mass rapidly penetrates into the porous, absorbent material and solidifies before the outer layer of the moulded material parts is saturated. After the filling of the duct

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6. A method as claimed in either claim 1 or claim 2, wherein the step of treating comprises moistening the filler material with the hardenable substance in liquid form.

7. A method as claimed in any one of the preceding claims, wherein the filler material, prior to insertion in the duct section, includes a component of the hardenable substance.

8. A method as claimed in claim 7, wherein the component is dry.

9. A method as claimed in any one of claims 1 to 3, wherein the filler material is in the form of viscose, each piece being constructed to provide different amounts of expansion in two mutually perpendicular directions, during the treating step.

10. A method as claimed in claim 9, wherein the material pieces are of predetermined lengths and are provided with a plurality of parallel incisions extending from an edge thereof.

11. A method of providing a watertight and fireproof routing of cables through a duct section extending through a wall, ceiling or floor, the method being substantially as hereinbefore described with reference to Figs. 1 to 3 of the accompanying drawings.

12. A method of providing a watertight and fireproof routing of cables through a duct section extending through a wall, ceiling or floor, the method being substantially as hereinbefore described with reference to Fig. 4 of the accompanying drawings.

13. A duct section with a watertight and fireproof routing of cables therethrough provided by a method as claimed in any one of the preceding claims.