

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(54) FIRE-PROTECTIVE COMPOSITION

(71) We, DYNA-THERM CORPORATION, a corporation organized under the laws of the State of Nevada, United States of America, of 598 West Avenue 26, Los Angeles, State of California, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a fire-protective composition.

In electrical utilities and other installations where large numbers of electrical cables are used, there is a constant, very serious danger of fire developing due to the heavy current passing through the cables and the heat which is produced when overloading occurs. Also, such cables are frequently operated at high voltages which can cause arcing between adjacent cables.

Since a typical utility may contain thousands of linear feet of cable, the danger of fire is enormous. Moreover, the cables may be totally destroyed resulting in a loss of production and also necessitating a sizable expenditure to replace the cables and other damaged equipment or buildings. In the case of nuclear generating stations, the danger posed by the threat of fire is further and dramatically increased.

In the case of electrical cables coated with polyvinyl chloride, there are additional disruptive results of fires. The chlorine in polyvinyl chloride (which may have a theoretical hydrochloric acid content of, for example about 56 percent by weight) is liberated as hydrogen chloride and may react with the humidity of the air or with water used for fire extinguishing and form hydrochloric acid which can penetrate concrete foundations and attack any steel reinforcement present.

In order to protect the cables against fire and to minimize the destructive results of

fires a coating of a fire-protective material may be applied to the exterior surface. One example of a coating formulation is a chlorinated rubber composition described in U.S. Patent No. 2,938,937. This composition is, however, formulated with a volatile organic solvent such as toluene or naphtha. The use of organic solvents is, of course, undesirable, because the solvent fumes are hazardous to persons applying the coating. The hazards may be great especially when the cables are in underground vaults. It has also been found that organic solvents cause neoprene and butyl rubber insulation on the cables to swell when a thick coating is applied.

It is accordingly highly desirable to have a fire-protective composition which does not require the use of an organic solvent and which contains a minimal chlorine content. It has, however, hitherto proved exceedingly difficult to provide such a composition which is also capable of providing satisfactory fire protection when applied to electrical cables, since the composition should be capable of protecting the cable for several minutes, in some instances as long as 30 minutes, during the fire and should prevent propagation of flames beyond the original heat source. The composition should also be capable of forming a coating on the cable which is sufficiently flexible to allow handling of the cables without breaking of the coating and to permit access to and removal of individual cables from a cable tray. The composition should also be capable of protecting electrical cables against the hazards of fire after immersion in water for prolonged periods of time, and should not significantly diminish the current carrying capability of the cables, i.e. the coating should not cause significant heat buildup within the coated cables.

The present invention provides a fire-protective composition comprising a water based resinous emulsion, a chlorinated hy-

drocarbon and one or more inorganic non-combustible fibrous materials.

The water based resinous emulsion is preferably based on a thermoplastic resin, for example polyvinyl acetate, GRS rubber, natural rubber latex, a methacrylate or acrylate resin, an elastomeric polyurethane, or a copolymer of vinyl acetate and vinyl chloride. Water emulsified epoxy resins may also be used. The composition should contain sufficient emulsion to produce a coherent plastic film or coating when the composition is applied to an electrical cable and also one which adheres well to the surface of the cable insulation but which can be easily removed. Accordingly, at least about 4 per cent by weight of the emulsion solid is preferably used, based on the total weight of the composition. In general, the quantity of emulsion solids should not exceed 25 per cent by weight since a minimum of organic binder, consistent with satisfactory physical properties, is preferably used in order to provide a coating which is tough and sufficiently flexible to permit easy handling of the coated cables and which contains as little combustible material as possible. The preferred range of emulsion solids is from 8 per cent by weight to 15 per cent by weight.

As chlorinated hydrocarbons there may be especially mentioned, for example, chlorinated paraffins, chlorinated naphthalenes, chlorinated terphenyls as well as mixtures of thereof. There are advantageously used from 1 to 15 per cent, preferably from 4 to 6 per cent by weight of the chlorinated hydrocarbon based on the total weight of the composition.

The composition preferably also contains a plasticizer to provide flexibility for the coating, although with some emulsions, e.g. elastomeric polyurethanes and rubbers, it may not be necessary to use a plasticizer. If a plasticizer is used, the selection of a particular plasticizer, of course, depends upon the particular emulsion used, the plasticizer employed preferably being one generally used to plasticize the resin used. If a polyvinyl acetate emulsion, for example, is used, suitable plasticizers are, for example, tris-beta-chloroethyl phosphate, chlorinated biphenyl, butyl benzyl phthalate, dibutyl phthalate, tricresyl phosphate, triphenyl phosphate, cresyl diphenyl phosphate, tritolyl phosphate or a mixture of two or more of said substances. Normally, the quantity of plasticizer if present, is relatively small, preferably within the range of from 1 to 5 per cent by weight based on the total weight of the composition.

The composition also contains one or more inorganic non-combustible, fibrous materials, for example asbestos and/or glass. The total quantity of such fibres is

preferably within the range of from 5 to 50 per cent by weight. The composition preferably comprises inorganic fibres of varying lengths, for example short fibres of about 1/32 inch or less in length and relatively longer fibres of up to about 1/2 inch in length, the shorter fibres preferably comprising from 20 to 80 percent advantageously from 50 to 70 per cent by weight of the total weight of the mixture of fibres. Particularly good results are obtained when both the long and short fibres are asbestos. It is believed that the asbestos fines or short fibres together with the long fibres form a tough film in the form of a dense interwoven network, which remains about the surface of the cable insulation after burning. This film in combination with the carbonaceous residue of the decomposed binder, is believed to facilitate removal of heat by radiation and at the same time to limit the access of oxygen to the flammable cable surface.

The fire-protective composition preferably also contains an antimony containing compound, for example antimony trioxide. Advantageously from 0.5 to 15 per cent by weight, preferably from 2 to 5 per cent by weight, of the antimony compound are used. The antimony oxide is believed to function in combination with the chlorinated hydrocarbon during burning by interfering with the normal combustion process, or to limit burning, possibly by reacting with the chlorinated hydrocarbon to form antimony pentachloride, a heavy gas which forms at the boundary of the burning surface and thus prevents oxygen from getting to the surface.

The fire-protective composition may also contain one or more inert inorganic fillers, for example calcium carbonate or silica or other such stable inorganic materials. The quantity of filler, if used, is preferably within the range of from 5 to 20 per cent by weight, based on the total weight of the composition. The composition may also contain organic and/or inorganic pigments, for example titanium dioxide or ferric oxide to provide a desired colour. The quantity of the pigment will, of course, be relatively small, generally no more than 4 per cent by weight.

In order to prepare the fire-protective composition according to the present invention, a polyvinyl acetate or other resinous emulsion, which preferably contain at least approximately 50 per cent solids in water is, for example, mixed with the chlorinated hydrocarbon and, if desired, the plasticizer with stirring, preferably at room temperature to form a substantially uniform mixture. The calcium carbonate or other inert filler and/or pigment, and/or antimony compound if required are added to the mixture obtained and thoroughly mixed there-

with, after which the asbestos or other inorganic material are added with mixing to provide a substantially uniform mixture.

The fire-protective composition may be applied as a liquid or as a mastic by, for example, spraying, brushing, trowelling or gunning. Depending upon the form of the composition, the composition will contain the requisite amount of water, slightly greater quantities of water being required if a sprayable composition is to be produced. The composition may also contain minor amounts of various additives to stabilize and protect the emulsion, for example wetting agents and/or defoaming agents and/or fungicides. The quantity of such ingredients will generally be within the range of from 1 to 5 per cent by weight based on the total composition.

The surface to which the coating is to be applied is preferably cleaned before the application, especially if it is contaminated with excessive oil or grease. The surface should preferably also be free of excess loose dirt and dust. When the composition is applied to electrical cables, the coating is preferably approximately 1/18 inch in thickness. To attain such a coating, the initial thickness should be approximately 3/16 inch when the wet composition is applied as it will shrink approximately 30 per cent on drying. If the fire hazard is small, the thickness of the coating may be only approximately 1/16 inch, and conversely, if a strong fire hazard exists, the coating may be approximately 1/4 inch thick. Depending upon the thickness applied and the atmospheric conditions, the composition will usually be dry to touch after a period of from 1 to 2 hours, and after approximately 4 hours, the cable may be handled or removed. Complete drying requires up to approximately 3 days, and consequently fire testing should not take place until at least 3 days after application since traces of moisture left on the inside of the coating could expand and loosen adhesion.

After drying, the water, of course, will have evaporated and a typical resulting coating, may comprise the following materials in the indicated approximate percentages:

Resin solid	20.25 wt. %
Chlorinated hydrocarbon	7.98 wt. %
Plasticizer	3.99 wt. %
Inorganic Fibres	39.40 wt. %
Inorganic Filler	19.06 wt. %
Antimony compound	9.31 wt. %

A typical dried coating composition may contain, for example, from 6 to 30 per cent by weight of resin solids from 1.5 to 20 per cent by weight of chlorinated hydrocarbon, from 1.5 to 7.5 per cent by weight of plasti-

cizer, from 7.5 to 75 per cent by weight of inorganic fibres, from 5 to 30 per cent by weight of inorganic filler, pigment and/or wetting agent and from 1 to 20 per cent by weight of the antimony compound, the percentages being based on the total weight of the dried coating composition.

An application of the coating composition according to the present invention will now be described, by way of example only, with reference to the accompanying drawing in which:

Figure 1 is a fragmentary perspective view of an electrical cable having a coating of a composition applied thereto; and

Figure 2 is a cross-sectional view through the line 2-2 of figure 1.

In the drawing, the numeral 1 denotes generally a piece of electrical cable having a coating 2 of fire protective composition thereabout. In this particular form, the cable core includes a plurality of metal wires 3 having an insulation coating 4 thereon, which may be, for example neoprene rubber, butyl rubber, polyvinyl chloride or cross-linked polyethylene. As is shown in Figure 2, the coating 2 of fire protective composition surrounds the cable and is adhered to the insulation coating 4.

The following Example illustrates the invention.

EXAMPLE

Approximately 26 percent by weight of a 50 per cent solids polyvinyl acetate water emulsion, about 5 per cent by weight chlorinated paraffin and about 2.5 per cent by weight tris-beta-chloroethyl phosphate plasticizer were mixed in sufficient water with stirring at room temperature for approximately 15 minutes to produce a substantially uniform dispersion containing about 22 weight per cent water. Approximately 7 per cent by weight of calcium carbonate filler, 3.5 per cent titanium dioxide pigment and approximately 6 per cent antimony trioxide were then added and the resulting composition was mixed thoroughly for approximately 30 minutes. Approximately 27 per cent by weight of asbestos fibres, consisting essentially of about 16 per cent of asbestos fines having a length of 1/32 inch or less and about 11 per cent of asbestos fibres of up to approximately 1/2 inch in length, were then added to the emulsion which was mixed thoroughly for approximately 60 minutes.

The resulting composition was applied, by spraying with standard spray-coating apparatus, to an 8 foot horizontal cable tray containing approximately 20 insulated electrical cables. The coating was applied to one-half of the cable tray, top and bottom, to provide approximately 1/8 inch thickness of coating. The remainder of the cable

tray and cables was not coated. The fire protective coating was left to dry for 2 days, and the test rig was then positioned in a wind protected area so that wind direction would not influence the results. Burlap bags soaked in transformer oil were then wrapped around the cables and ignited with a propane blow torch. The burning time of the heat source was approximately 6 minutes on the section of the tray which had been coated as described, after which the fire had burned out. On the uncoated cables, the fire did not burn out until the insulation had been totally decomposed and the metal cables charred and badly damaged. In contrast to this, the coated cables, after being permitted to cool, were inspected and found to be substantially unharmed and suitable for further use.

Tests have also been performed on electrical cables coated with the fire protective composition of the present invention to determine whether the coating affects the current carrying capability of the cable, as determined by the temperature rise in the cable during operation. It has been found that such coating does not reduce significantly the ampacity, the reduction being generally on the order of only between 2 and about 5 per cent, which is not sufficient to de-rate the cables, the temperature of the insulation on the cables increasing only approximately 2 per cent with a 1/8 inch thickness coating of the fire protective composition.

In addition to the previously described qualities, the fire protective composition of the present invention is odourless and non-toxic and has a Shore A hardness of up to about 85. An unsupported 1/16 inch thickness film passes a 1.8 inch mandrel bend per ASTM D 1737-62. A 1/16 inch film on aluminium is capable of withstanding an impact of at least 24 inches per pound on a Gardener Impact Tester.

The fire protective composition of the present invention is very effective in preventing the spreading of fire and thus in protecting, for example electrical cables from the destructive effects of fires. Also, the coating provided by the composition is highly flexible and it does not interfere in any way with the normal use of the cables. Additionally, the composition does not cause a significant temperature rise in the cables during operation and has also been found to be stable as a coating over long periods of time. Furthermore, the composition contains a relatively small amount of chlorine and, owing to the fact that it does not contain a toxic organic solvent, there is substantially no danger to persons applying the composition. Also it does not cause any appreciable swelling of cable insulation when applied thereto.

Although the composition is especially

suitable for use as a coating for electrical cables, it is also suitable, for example, for use as a fire stop for wall penetrations, in which case the composition may be applied to the cavity between electrical cables and walls or ceilings in order to seal off the cables and thus prevent the fire from being transmitted to other areas.

WHAT WE CLAIM IS:—

1. A fire-protective composition comprising a water based resinous emulsion, a chlorinated hydrocarbon and one or more non-combustible inorganic fibrous materials.
2. A composition as claimed in claim 1 wherein the resinous emulsion is a poly-vinyl acetate emulsion.
3. A composition as claimed in claim 1 wherein the resinous emulsion is an emulsion of GRS rubber, natural rubber latex, a methacrylate resin, an acrylate resin, an elastomeric polyurethane, a copolymer of vinyl acetate and vinyl chloride or an epoxy resin.
4. A composition as claimed in any one of claims 1 to 3 wherein the inorganic non-combustible fibrous material comprises long fibres and short fibres.
5. A composition as claimed in claim 4 wherein from 20 to 80 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
6. A composition as claimed in claim 5 wherein from 50 to 70 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
7. A composition as claimed in claim 5 or claim 6 wherein the remainder of the fibres have a length of from 1/32 to 1/2 inch.
8. A composition as claimed in any one of claims 1 to 7 wherein the inorganic non-combustible fibrous material is asbestos.
9. A composition as claimed in any one of claims 1 to 7 wherein the inorganic non-combustible fibrous material is glass.
10. A composition as claimed in any one of claims 1 to 9 wherein the chlorinated hydrocarbon is a chlorinated paraffin, a chlorinated naphthalene, a chlorinated terphenyl or a mixture of two or more thereof.
11. A composition as claimed in any one of claims 1 to 10 which also contains an antimony compound.
12. A composition as claimed in claim 11 wherein the antimony compound is antimony trioxide.
13. A composition as claimed in any one of claims 1 to 12 which also contains an inert inorganic filler.
14. A composition as claimed in any one of claims 1 to 13 which also contains a pigment.
15. A composition as claimed in any one of claims 1 to 14 which also contains a plasticizer for the resin.

tray and cables was not coated. The fire protective coating was left to dry for 2 days, and the test rig was then positioned in a wind protected area so that wind direction would not influence the results. Burlap bags soaked in transformer oil were then wrapped around the cables and ignited with a propane blow torch. The burning time of the heat source was approximately 6 minutes on the section of the tray which had been coated as described, after which the fire had burned out. On the uncoated cables, the fire did not burn out until the insulation had been totally decomposed and the metal cables charred and badly damaged. In contrast to this, the coated cables, after being permitted to cool, were inspected and found to be substantially unharmed and suitable for further use.

Tests have also been performed on electrical cables coated with the fire protective composition of the present invention to determine whether the coating affects the current carrying capability of the cable, as determined by the temperature rise in the cable during operation. It has been found that such coating does not reduce significantly the ampacity, the reduction being generally on the order of only between 2 and about 5 per cent, which is not sufficient to de-rate the cables, the temperature of the insulation on the cables increasing only approximately 2 per cent with a 1/8 inch thickness coating of the fire protective composition.

In addition to the previously described qualities, the fire protective composition of the present invention is odourless and non-toxic and has a Shore A hardness of up to about 85. An unsupported 1/16 inch thickness film passes a 1.8 inch mandrel bend per ASTM D 1737-62. A 1/16 inch film on aluminium is capable of withstanding an impact of at least 24 inches per pound on a Gardener Impact Tester.

The fire protective composition of the present invention is very effective in preventing the spreading of fire and thus in protecting, for example electrical cables from the destructive effects of fires. Also, the coating provided by the composition is highly flexible and it does not interfere in any way with the normal use of the cables. Additionally, the composition does not cause a significant temperature rise in the cables during operation and has also been found to be stable as a coating over long periods of time. Furthermore, the composition contains a relatively small amount of chlorine and, owing to the fact that it does not contain a toxic organic solvent, there is substantially no danger to persons applying the composition. Also it does not cause any appreciable swelling of cable insulation when applied thereto.

Although the composition is especially

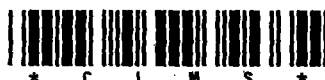
suitable for use as a coating for electrical cables, it is also suitable, for example, for use as a fire stop for wall penetrations, in which case the composition may be applied to the cavity between electrical cables and walls or ceilings in order to seal off the cables and thus prevent the fire from being transmitted to other areas.

WHAT WE CLAIM IS:—

1. A fire-protective composition comprising a water based resinous emulsion, a chlorinated hydrocarbon and one or more non-combustible inorganic fibrous materials.
2. A composition as claimed in claim 1 wherein the resinous emulsion is a poly-vinyl acetate emulsion.
3. A composition as claimed in claim 1 wherein the resinous emulsion is an emulsion of GRS rubber, natural rubber latex, a methacrylate resin, an acrylate resin, an elastomeric polyurethane, a copolymer of vinyl acetate and vinyl chloride or an epoxy resin.
4. A composition as claimed in any one of claims 1 to 3 wherein the inorganic non-combustible fibrous material comprises long fibres and short fibres.
5. A composition as claimed in claim 4 wherein from 20 to 80 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
6. A composition as claimed in claim 5 wherein from 50 to 70 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
7. A composition as claimed in claim 5 or claim 6 wherein the remainder of the fibres have a length of from 1/32 to 1/2 inch.
8. A composition as claimed in any one of claims 1 to 7 wherein the inorganic non-combustible fibrous material is asbestos.
9. A composition as claimed in any one of claims 1 to 7 wherein the inorganic non-combustible fibrous material is glass.
10. A composition as claimed in any one of claims 1 to 9 wherein the chlorinated hydrocarbon is a chlorinated paraffin, a chlorinated naphthalene, a chlorinated terphenyl or a mixture of two or more thereof.
11. A composition as claimed in any one of claims 1 to 10 which also contains an antimony compound.
12. A composition as claimed in claim 11 wherein the antimony compound is antimony trioxide.
13. A composition as claimed in any one of claims 1 to 12 which also contains an inert inorganic filler.
14. A composition as claimed in any one of claims 1 to 13 which also contains a pigment.
15. A composition as claimed in any one of claims 1 to 14 which also contains a plasticizer for the resin.



16. A composition as claimed in claim 15 wherein the resinous emulsion is a polyvinyl acetate emulsion and the plasticizer is tris-beta-chloroethyl phosphate.
17. A fire-protective composition comprising from 4 to 25 per cent of emulsion solids of a water based resinous emulsion, from 1 to 15 per cent of a chlorinated hydrocarbon and from 5 to 50 per cent of one or more inorganic non-combustible fibrous materials, the percentages being by weight based on the total composition.
18. A composition as claimed in claim 17 wherein the resinous emulsion is a polyvinyl acetate emulsion.
19. A composition as claimed in claim 17 wherein the resinous emulsion is an emulsion of GRS rubber, natural rubber latex, a methacrylate resin, an acrylate resin, an elastomeric polyurethane, a copolymer of vinyl acetate and vinyl chloride or an epoxy resin.
20. A composition as claimed in any one of claims 17 to 19 wherein the inorganic non-combustible fibrous material is in the form of a mixture of long fibres and short fibres.
21. A composition as claimed in claim 20, wherein from 20 to 80 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
22. A composition as claimed in claim 21 wherein from 50 to 70 per cent by weight of the total weight of the fibres have a maximum length of 1/32 inch.
23. A composition as claimed in claim 21 or claim 22, wherein the remainder of the fibres have a length of from 1/32 inch to 1/2 inch.
24. A composition as claimed in any one of claims 17 to 23, wherein the inorganic non-combustible fibrous material is asbestos.
25. A composition as claimed in any one of claims 17 to 23 wherein the inorganic non-combustible fibrous material is glass.
26. A composition as claimed in any one of claims 17 to 25, wherein the chlorinated hydrocarbon is a chlorinated paraffin, a chlorinated naphthalene, a chlorinated terphenyl or a mixture of two or more thereof.
27. A composition as claimed in any one of claims 17 to 26, which also contains from 0.5 to 15 per cent by weight of an antimony compound.
28. A composition as claimed in claim 27, wherein the antimony compound is antimony trioxide.
29. A composition as claimed in any one of claims 17 to 28 which also contains from 5 to 20 per cent by weight of an inert inorganic filler.
30. A composition as claimed in any one of claims 17 to 29 which also contains up to 4 per cent by weight of a pigment.
31. A composition as claimed in any one of claims 17 to 30, which also contains from 1 to 5 per cent by weight of a plasticizer for the resin.
32. A composition as claimed in claim 31 wherein the resinous emulsion is a polyvinyl acetate emulsion and the plasticizer is tris-beta-chloroethyl phosphate.
33. A fire protective composition comprising from 4 to 25 per cent by weight of emulsion solids of a water-based emulsion of polyvinyl acetate, from 1 to 15 per cent by weight of chlorinated paraffin, a chlorinated naphthalene or a chlorinated terphenyl, from 1 to 5 per cent by weight of a plasticizer for the polyvinyl acetate, from 5 to 50 per cent by weight of asbestos fibres, from 20 to 80 per cent by weight of the fibres having a maximum length of 1/32 inch (and the remainder having a length of from 1/32 inch to 1/2 inch) and 0.5 to 15 per cent by weight of an antimony compound, the percentages being by weight based on the total composition.
34. A composition as claimed in claim 33, wherein from 50 to 70 per cent by weight of the total weight of fibres have a maximum length of 1/32 inch.
35. A composition as claimed in claim 33 or 34 wherein the plasticizer is tris-beta-chloroethyl phosphate.
36. A composition as claimed in any one of claims 33 to 35 which also contains from 5 to 20 per cent by weight of an inert inorganic filler.
37. A composition as claimed in any one of claims 33 to 36 which also contains up to 4 per cent by weight of titanium dioxide.
38. A composition as claimed in claim 1 substantially as described in the Example herein.
39. An article which has thereon a fire-protective coating said coating being the dried residue of a composition as claimed in any one of claims 1 to 16.
40. An article which has thereon a fire-protective coating said coating being the dried residue of a composition as claimed in any one of claims 17 to 38.
41. An article as claimed in claim 39 or claim 40 which is an electrical cable.
42. An electrical cable comprising a metal core, a layer of insulation surrounding the core, and a fire protective coating surrounding the layer of insulation, which coating is the dried residue of a water based resinous emulsion and comprises from 6 to 30 per cent of resin solids, from 1.5 to 20 per cent of a chlorinated hydrocarbon, and from 7.5 to 75 per cent of an inorganic non-combustible fibrous material, the percentages being by weight based on the total weight of the coating.
43. A cable as claimed in claim 42 wherein the resin is polyvinyl acetate.
44. A cable as claimed in claim 42



wherein the resin is GRS rubber, natural rubber latex, a methacrylate resin, an acrylate resin, an elastomeric polyurethane, a copolymer of vinyl acetate and vinyl chloride or an epoxy resin.

45. A cable as claimed in any one of claims 42 to 45 wherein the inorganic non-combustible fibrous material is in the form of long fibres and short fibres.

46. A cable as claimed in claim 45 wherein from 20 to 80 per cent by weight of the total weight of fibres have a maximum length of $1/32$ inch.

47. A cable as claimed in claim 46 wherein from 50 to 70 per cent by weight of the total weight of fibres have a maximum length of $1/32$ inch.

48. A cable as claimed in claim 46 or 47 wherein the remainder of the fibres have a length of from $1/32$ to $1/2$ inch.

49. A cable as claimed in any one of claims 42 to 48 wherein the inorganic non-combustible fibrous material is asbestos.

50. A cable as claimed in any one of claims 42 to 48 wherein the inorganic non-combustible fibrous material is glass.

51. A cable as claimed in any one of claims 42 to 50, wherein the chlorinated hydrocarbon is a chlorinated paraffin a chlorinated naphthalene, a chlorinated terphenyl or a mixture of two or more thereof.

52. A cable as claimed in any one of claims 42 to 51, wherein the coating also contains from 1 to 20 per cent by weight of an antimony compound.

53. A cable as claimed in claim 52, wherein the antimony compound is antimony trioxide.

54. A cable as claimed in any one of claims 42 to 53, wherein the coating also

contains from 1.5 to 7.5 per cent by weight of a plasticizer for the resin.

55. A cable as claimed in any one of claims 42 to 54 wherein the coating also contains from 5 to 30 per cent by weight of wetting agents, inorganic fillers and/or colouring agents.

56. A cable as claimed in any one of claims 42 to 55 wherein the fire-protective coating has a thickness of from $1/16$ inch to $1/4$ inch.

57. A cable as claimed in claim 56 wherein the coating has a thickness of about $1/8$ inch.

58. A cable as claimed in any one of claims 42 to 57, wherein the layer of insulation comprises neoprene rubber, butyl rubber, polyvinyl chloride or cross-linked polyethylene.

59. A cable as claimed in claim 42 wherein the coating comprises from 20.25 weight percent of resin solids, 7.98 weight percent of a chlorinated hydrocarbon, 3.99 weight percent of a plasticizer, 39.40 weight percent of an inorganic non-combustible fibrous material, 19.06 weight percent of an inorganic filler and 9.31 weight percent of an antimony compound.

60. A cable as claimed in claim 42 substantially as described herein with reference to and as illustrated in the accompanying drawings.

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