

UNITED STATES PATENT OFFICE

2,367,918

FIREPROOFING GREASE DUCTS

Alex Bartel, Cincinnati, Ohio

No Drawing. Application February 5, 1943,
Serial No. 474,881

6 Claims. (Cl. 117-89)

This invention relates to a fire-proofing composition and the method of applying it to the interior of grease duct systems associated with the hoods which overlie cooking apparatus in restaurants, hotels and other places where considerable cooking is done, for the purpose of reducing the fire hazard ordinarily existing in such systems due to the accumulation of condensed grease which readily catches fire through a flaming pot or pan, or grease spilled on the range in the operation of cooking.

One of the objects of the invention is to provide a coating composition for the inside walls of grease ducts which acts both chemically and physically in relation to the condensed grease to render it substantially nonflammable.

Another object of the invention is to coat the interior walls of the grease ducts with a substance having the property of converting the distilled grease into a nonflammable, and preferably, water insoluble soap.

A further object of the invention is to provide a coating composition of matter, including an insoluble-soap forming base preferably in fine granular form to provide maximum surface contact with the grease in the interest of quick and complete reaction, and containing chemically inert noncombustible fine granular matter having the dual functions of drawing the condensed grease by adsorption, absorption or capillarity into intimate surface contact with the soap forming base, and by being physically interspersed in the condensed grease film, raising the flash point of said film through the dissipation of heat absorbed by said matter, rendering the grease film fire-resistant.

Another object of the invention is the method which involves the application of a binder film to the inner walls of the grease duct to obtain adherence of the fire-proofing composition thereto, and circulation of the fireproofing composition through said duct to thoroughly cover the binder film with a coating of said composition in adherence therewith.

Other objects of the invention will appear as the following description of a preferred and practical embodiment thereof proceeds.

In contemplating a method and means for fire-proofing grease ducts, a number of considerations are involved. The saponification of the condensed grease, which requires moisture, is made possible by the presence of steam or water vapor in the vapors exhausted through the duct. If the formed soap were soluble, excess moisture would dissolve it and it would run down the vertical

limbs of the duct, disintegrating the coating and perhaps dripping from the hood. Therefore, an insoluble soap is indicated. If the saponifying reaction were to take place only at the interface between the soap forming base and the film or layer of condensed grease, the soap forming base would soon be covered with a thin film of insoluble soap which would so isolate the soap forming base from the outer portion of the grease film that the latter would be unconverted and remain a fire hazard, and further action of the soap forming base would be inhibited. The presence in mixture with the fine granular soap forming base of the nonflammable fine granular inert particles, having adsorptive, absorptive and capillary properties causes the condensed grease film to be quickly drawn into intimate contact with the soap forming base so that the entire film is quickly converted.

From the standpoint of cheapness, availability, as well as efficiency of reaction, calcium and magnesium hydroxide have been selected as the optimum soluble-soap forming reagents. Either of these hydroxides may be used alone, but since dolomite is the raw material employed and this consists mainly of a mixture of lime and magnesium carbonate, calcine dolomite, obtaining hydroxide of both elements and, there being no particular reason for separating them, I use both calcium and magnesium hydroxide in the natural proportions in which they occur in the dolomite. This is employed in powdered form.

The inert fine granular substances which are added, principally for their effect in quickly drawing the grease film and moisture into intimate contact with the soap forming base material and for raising the flash temperature of the uncombined grease film, are selected from a range of equivalents and may be alternatively used. Powdered talc, powdered alum and powdered asbestos have been tested. All exhibit good properties of adsorption, absorption and intergranular capillarity toward both water and animal fat, and therefore function efficiently in continuously drawing the condensed steam and grease quickly into contact with the soap forming base.

A practical formula may consist of powdered calcined dolomite, 75% to 95%, the rest of the composition consisting of one, or a mixture of, the chemically inert granular substances. Dolomite varies somewhat in the ratio of its content of magnesium to calcium carbonate, but since calcium and magnesium may be interchangeably used with equally good results, this variation makes no appreciable difference in the operation

of this fire-proofing composition. Tests show that certain samples of the fire-proofing composition contain:

41% calcium hydroxide
42% magnesium hydroxide

Other samples have tested:

52% calcium hydroxide
42% magnesium hydroxide

Due to differences in hardness of the chemically inert ingredients of the composition, they grind to different particles size when pulverized, so that it is advantageous to use a mixture of more than one to obtain ordinary optimum cohesion and capillary action.

A formula which I have found to give good results consists of:

	Per cent
Ca(OH) ₂ -----	52
Mg(OH) ₂ -----	42
Powdered talc -----	4
Powdered alum -----	2

Another formula giving equally good results consists of:

	Per cent
Ca(OH) ₂ -----	42
Mg(OH) ₂ -----	41
Powdered talc -----	2
Powdered asbestos -----	15

As has been stated, the entire percentage of the insoluble soap forming base may be calcium or magnesium hydroxide.

In applying the powdered fire-proofing composition to a grease duct, the inner walls of the duct are first sprayed with a film of oil for the purpose of obtaining adherence of the powdered fire-proofing composition to said walls. The oil is applied by means of a spray gun deriving air pressure from a compressor. The oil is preferably an animal or vegetable fat which will react with the fire-proofing composition to form a film of insoluble soap on the wall surface, to which the powdered composition tenaciously adheres.

The application of the powdered composition is made by means of a blower which introduces the composition into the duct opening inside the hood located above the range. During this operation the exhaust fan of the grease duct is also running and is drawing the composition through the entire duct system. The blower used in applying the mixture may be an industrial vacuum cleaner having a length of hose on its intake, picking up the powdered composition from a source of supply and a length of hose from its exhaust which forces the mixture through the duct.

The composition coats the inner surface of the duct to a thickness approximating one-eighth of an inch, sealing any fissure or crack which may exist in the seams of said duct, thus removing any fire hazard from this cause. The thin film of soluble soap which is formed on the surface of the composition coating dries under the influence of the air flow through said duct, between cooking periods, when no grease nor water is present, forming a sort of fly ash which is scoured off of the underlying active surface of the composition coating by the passage of air through the duct. The coating, therefore, remains active for a long period of time. Finally, practically all has disappeared having been converted, with the grease, into the dried soluble soap powder, and blown away, together with the inert granular content.

The composition coating gradually loses its efficiency through depletion, and the consequent accumulation of unconverted grease. When tested for flammability after short use, and after some grease conversion into insoluble soap has taken place, it was not affected by temperatures up to 1500° F. Nine months after its application, under the conditions of use prevailing in a restaurant kitchen, the residual coating with uncombined grease was fire resistant up to a temperature of 430° to 460° F.

When it becomes timely to renew the coating, the interior surface of the duct is usually sufficiently bare to permit reapplication to be made in the same manner as the original treatment. Occasionally, there is a light clinker which should first be scraped away.

While I have in the above description disclosed what I believe to be a preferred and practical embodiment of the invention, it will be understood to those skilled in the art that the invention is entitled to the substitution of equivalents and that the proportion limits of the ingredients as claimed are approximately, although not absolutely, critical.

What I claim as my invention is:

1. Method of preventing the accumulation of a flammable coating of grease in grease ducts of that type which periodically conduct flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, comprising providing on the interior surface of said duct an expendable coating of an alkaline earth oxide capable of reacting the grease and moisture to form insoluble nonflammable soap, letting grease and moisture laden air flow through said duct in contact with said coating whereby the grease becomes combined in a reaction film of insoluble nonflammable soap on the surface of said coating, then letting grease and moisture-free air flow in contact with said reaction film whereby it is dried and blown away as a fly ash, exposing a fresh reactive surface of said coating.

2. Method of preventing the accumulation of a flammable coating of grease in grease ducts of that type which periodically conduct flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, comprising providing on the interior surface of said duct an expendable coating of a substance selected from the group consisting of dolomite, calcium hydroxide, magnesium hydroxide, capable of reacting the grease and moisture to form insoluble nonflammable soap, letting grease and moisture laden air flow through said duct in contact with said coating whereby the grease becomes combined in a reaction film of insoluble nonflammable soap on the surface of said coating, then letting grease and moisture-free air flow in contact with said reaction film whereby it is dried and blown away as a fly ash, exposing a fresh reactive surface of said coating.

3. A grease duct of that type which periodically contacts flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, having a coating including an inner layer of a powdered substance selected from the group consisting of dolomite, calcium hydroxide, magnesium hydroxide, in adherence to the interior surface of the duct, and reactive with grease and moisture to form insoluble nonflammable soap, and an outer film of such soap converted from the flammable grease condensing on said inner layer.

4. A grease duct of that type which periodically conducts flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, having a coating including an inner layer of a powdered alkaline earth oxide in adherence to the interior surface of the duct and reactive with the grease and moisture to form insoluble nonflammable soap, and an outer film of such soap converted from the flammable grease condensing on said inner layer.

5. A grease duct of that type which periodically conducts flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, having a film of oil on the interior surface thereof and an interior

coating of a powdered substance selected from the group consisting of dolomite, calcium hydroxide, magnesium hydroxide in adherence with said oil film.

6. A grease duct of that type which periodically conducts flows of grease and moisture laden air alternated with flows of air substantially free from grease and moisture, having a film of oil on the interior surface thereof and an interior coating of a powdered substance selected from the group consisting of dolomite, calcium hydroxide, magnesium hydroxide, in mixture with a powdered substance selected from the group consisting of talc, alum, asbestos, said coating being in adherence with said oil film.

ALEX BARTEL.