EPA-AA-TEB-511-80-7

EPA Evaluation of the "Basko MW Enginecoat"

By

Edward Anthony Barth

March 1980

Test and Evaluation Branch
Emission Control Technology Division
Office of Mobile Source Air Pollution Control
U.S. Environmental Protection Agency

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15. SUPPLEMENTARY NOTES

16. ABSTRACT

This document announces the conclusions of the EPA evaluation of the "Basko MW Enginecoat" device under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

"Basko MW Enginecoat" is two paint-like products, one designed to insulate engine components, the second designed to cool other engine components. Application of these two coatings to the engine is claimed to improve fuel economy and performance while reducing emissions

Analysis of the information submitted by the Applicant did not prove that the use of "Basko MW Enginecoat" would enable a vehicle operator to improve a vehicle's fuel economy or emissions.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Fuel Consumption emission engines automobiles	Fuel Economy fuel saving device	

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ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 610]

[FRL _____]

FUEL ECONOMY RETROFIT DEVICES

Announcement of Fuel Economy Retrofit Device Evaluation for "Basko MW Enginecoat"

AGENCY: Environmental Protection Agency (EPA)

ACTION: Notice of Fuel Economy Retrofit Device Evaluation.

SUMMARY: This document announces the conclusions of the EPA evaluation of the "Basko MW Enginecoat" device under provisions of Section 511 of the Motor Vehicle Information and Cost Savings Act.

FOR FURTHER INFORMATION CONTACT: Merrill W. Korth, Emission Control Technology Division, Office of Mobile Source Air Pollution Control, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105, 313-668-4299.

BACKGROUND INFORMATION: Section 511(b)(1) and Section 511(c) of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 2011(b)) requires that:

(b)(1) "Upon application of any manufacturer of a retrofit device (or prototype thereof), upon the request of the Federal Trade Commission pursuant to subsection (a), or upon his own motion, the EPA Administrator shall evaluate, in accordance with rules prescribed under subsection (d), any retrofit device to determine whether the retrofit device increases fuel economy and to determine whether the representations (if any) made with respect to such retrofit devices are accurate."

(c) "The EPA Administrator shall publish in the Federal Register a summary of the results of all tests conducted under this section, together with the EPA Administrator's conclusions as to -

(1) the effect of any retrofit device on fuel economy;

(2) the effect of any such device on emissions of air pollutants; and

(3) any other information which the Administrator determines to be relevant in evaluating such device."

EPA published final regulations establishing procedures for conducting fuel economy retrofit device evaluations on March 23, 1979 [44 FR 17946].

ORIGIN OF REQUEST FOR EVALUATION: On March 4, 1980, the EPA received a request from Bask Industries, Inc. for evaluation of a fuel saving device termed the "Basko MW Enginecoat". An evaluation has been made and the results are described completely in a report entitled: "EPA Evaluation of the Basko MW Enginecoat Under Section 511 of the Motor Vehicle Information and Cost Savings Act". Copies of this report are available upon request.

Summary of Evaluation

"Basko MW Enginecoat" is two paint-like products, one designed to insulate engine components, the second designed to cool other engine components. Application of these coatings to the engine is claimed to improve fuel economy and performance while reducing emissions.

The Applicant submitted no valid test data with the application to support these claimed benefits. Analysis of the information submitted by the Applicant did not prove that the use of "Basko MW Enginecoat" would enable a vehicle operator to improve a vehicle's fuel economy or emissions. Thus, there is no technical basis to support any claims for a fuel economy improvement or emissions reduction due to the use of the "Basko MW Enginecoat" device.

Installation of the device on an engine already installed in a vehicle would be very time consuming.

Date

David G. Hawkins, Assistant Administrator
Office of Mobile Source Air Pollution Control

EPA Evaluation of the "Basko MW Enginecoat" Under Section 511 of the Motor Vehicle Information and Cost Savings Act

The following is a summary of the information on the Device as supplied by the Applicant and the resulting EPA analysis and conclusions.

1. Marketing Identification of the Device:

   Basko MW Enginecoat

2. Identification of Inventor and Patent:

   Inventor

   William J. Henning
   220 Forest Ave.
   Wyoming, OH 45215

   Patent

   Pending

3. Manufacturer of the Device:

   Bolce Paint Company
   4011 Red Bank Road
   Cincinnati, OH 45227

4. Manufacturing Organization Principals:

   Earl Bolce
   Val Jacobs

5. Marketing Organization/Applicant:

   Bask Industries, Inc.
   P.O. Box 15113
   Cincinnati, OH 45215

6. Applying Organization Principals:

   William J. Henning (contact)
   Ann S. Henning

7. Description of Device: Purpose, Theory, Detailed Description (as supplied by Applicant:

   A. Purpose: "Improved engine performance and increased fuel economy."

   B. Theory of Operation: "There are two coatings, one to dissipate and one to insulate. Coating is applied like a paint to the exterior surface of the intake manifold giving faster heat and a hotter interior intake manifold surface. This results in better

vaporization of the gasoline giving increased performance and better fuel economy. The other coating dissipates heat and is applied to the exhaust manifold and engine block."

C. Description: "Paintlike coating."

8. Applicability of the Device (as supplied by Applicant):

"All gasoline and diesel internal combustion engines."

9. Device Installation - Tools and Expertise Required (as supplied by Applicant:

"Easily applied with a paint brush."

10. Device Operation (as supplied by Applicant):

"Not Applicable."

11. Device Maintenance (as supplied by Applicant):

"Not Applicable"

12. Effects on Vehicle Emissions (non-regulated) (as supplied by Applicant):

No information supplied.

13. Effects on Vehicle Safety (as supplied by Applicant):

"None known"

14. Test Results (Regulated Emissions and Fuel Economy (as supplied by Applicant):

"Lowers HC and CO. NOx not known. In addition to actual tests done on vehicles we had some dynamometer tests conducted. These tests substantiated our actual tests and provided information regarding the lowering of HC and CO. I am enclosing copies of two letters, one from a taxi cab company, and one from a trucking company. The fleet average miles for gallon of gasoline for the cab company is 10. The average for the trucking company is 5.04 miles per gallon of diesel fuel. I might add that we only coated the intake manifold on the trucks and cabs. The addition of the dissipating coating is a more recent development. Hopefully this will lower NOx."

16. Analysis

A. Marketing Identification of the Device:

The Device (product) is identified in Section 1 as "Backo MW Enginecoat." However, in Section 7 the applicant describes " . . two coatings, one to dissipate and one to insulate." There are therefore clearly two Devices (products) described

with opposite properties. The Applicant is therefore judged to have not clearly described the marketing identification of the Devices (products).

B. Identification of Inventor and Patent

As an enclosure to a letter dated January 20, 1981 (Attachment A) the Applicant provided a copy of the recently issued patent No. 4,240,936 (Attachment B), covering the insulative coating.

The Applicant did not provide a patent description of the conductive coating.

C. Description of the Device:

(1) The Applicant's stated purpose of the Device, as stated in Section 7A, is "Improved engine performance and increased fuel economy." However the theory of operation as stated in Section 7B and Attachment A are conflicting.

> In Section 7B the Applicant stated the "coating is applied like a paint to the exterior surface of the intake manifold giving faster heat and a hotter interior intake manifold surface. This results in better vaporization of the gasoline giving increased performance and better fuel economy."
>
> In Attachment A the Applicant stated "In other words, when the coating is applied to the exterior surface of the intake manifold, we are in effect creating a cooler fuel charge which gives better engine performance and better fuel economy."(1)
>
> The Applicant has therefore claimed the Device (product) gives better performance and fuel economy by simultaneously both heating and cooling the fuel-air charge.

(2) The Applicant states in Attachment A that ". . . you will note that the coating when applied away from a heat source in thin coats has the capability to release heat faster than normal. This assumes that the high emissivity coating is applied to a low emissivity surface. Such could be the case with the intake manifold." Although this is true in theory as acknowledged by EPA in the note (1) on page 3, this effect is unlikely to occur in practice since intake manifolds are normally painted. The painted surfaces emissivity would typically be

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(1) Note: The Applicant is correct in stating in Attachment A that an insulating product applied in thin coats will increase the heat transfer in some cases. This occurs when a high emissivity insulation is applied in a sufficiently thin layer to a low emissivity surface. This occurs because the increase in radiant energy for the insulated surface is greater than the decrease in conductive energy.

between .85 and .95, nearly the same as the Basko coating's emissivity of .94. It is also unlikely a manufacturer would select this product for its heat transfer properties when a paint presently used would have very similar properties plus serve as a protective coating.

(3) Vehicle manufacturers seek to maintain a stable induction air temperature (typically 100°F) by blending warm air drawn over the exhaust manifolds with fresh air. This permits more precise fuel-air calibrations to improve both emissions and fuel economy. If the applicant's device did change the fuel-air charge temperature, the net effect would be to shift the fuel-air induction system's calibration from the manufacturer's design point to an off design point.

(4) The second product described in Section 7B is designed to dissipate heat and is to be applied to the exhaust manifold and engine block.

(a) The Applicant submitted no information on or description of this product. EPA is therefore unable to judge if this heat dissipation coating is able to function.

(b) If this product were able to dissipate heat, its use would not necessarily be desirable. Lowered exhaust manifold temperatures would lower exhaust gas temperatures. This could adversely delay catalyst "light off" and also lower catalyst efficiency under many vehicle operating conditions.

D. Applicability of the Device:

Since the device is a paint-like product, it is able to be applied to all gasoline and diesel engines as claimed. Information supplied in the patent indicates the device (product) will adhere to metal surfaces subjected to thermal stress. Also, the two testimonal letters (Attachments C-1, C-2) supplied by the Applicant, indirectly infer the product is durable in vehicle usage application (i.e. no complaints about durability noted in these letters).

E. Device Installation - Tools and Expertise Required:

The Applicants statement that the Device is "Easily applied with a paint brush" is misleading.

(1) The patent describes a Device with a wide range in the ratio of "pigment" to carrier vehicle and many different carrier vehicles. Not all of these can be expected to be applied easily.

(2) Proper application of the Device to an installed engine would be difficult due to the numerous hoses, belts, lines and accessory equipment blocking ready access.

(3) Proper application of the Device to the total exposed outside surface of either the intake manifold or exhaust manifold would require removal of these manifolds on most vehicles.

(4) An important part of the application of any paint-like product to a surface is initial surface preparation and surface preparation between coats. Proper surface preparation is many times considerably more work than the actual application of the product. The applicant submitted no detailed information on applying the product.

F. Device Operation:

It is judged to be not applicable as claimed.

G. Device Maintenance:

The Applicant states none is required. EPA is unable to satisfactorily judge this statement since the Applicant submitted little information by which EPA could judge the long term durability of the product in automotive use, i.e. its adherence to the surface for an extended time interval.

H. Effects on Vehicle Emissions (non-regulated):

The Applicant made no claims nor submitted any data relating to unregulated emissions. However, (a) since the Device does not modify the vehicle's emission control system and (b) any change in inlet air or exhaust temperature could be expected to be minimal, the Device is judged to be unlikely to effect non-regulated emissions.

I. Effects on Vehicle Safety and Operation:

The Applicant claims there are no known adverse effects on vehicle safety. This statement is judged to be probably true.

However, the actual application of the Device to the engine (i.e. painting) may entail safety hazards. Most paint-like products contain safety warnings that relate to the components of the vehicle and pigment. In extreme cases even special respiratory equipment or protective clothing is required. Since the Applicant submitted no information on application safety and many paint-like products have safety hazards, EPA is unable to conclude that application of the product is safe.

J. Test Results (Regulated Emissions and Fuel Economy):

Applicant did not submit any test data per the Federal Test Procedure or Highway Fuel Economy Test. These are the only EPA recognized test

procedures(2). This requirement for test data following these procedures is stated in the Application Format EPA sends to potential applicants. The Applicant was advised of this requirement on five separate occasions.

The test data submitted by the Applicant are listed below and evaluated.

(1) In Section 14 the Applicant referenced testing done on vehicles and some dynamometer testing. However, neither the test vehicles nor the test procedures were described and no test results were provided. Therefore the Applicant's claim of lower HC and CO emissions is unsubstantiated.

(2) Two testimonial letters, Attachments C-1 and C-2 were submitted with the application. The writers undoubtedly felt they had achieved significant fuel economy improvements with the Bask products. However, even one of these testimonials (C-1) recognizes that it is difficult to be sure that the fuel economy change was due to the Bask product. Therefore, because these were uncontrolled tests of the Device, they cannot be used to evaluate the Bask device.

On the basis of information supplied by the Applicant, there was no need for the EPA to conduct confirmatory testing.

Therefore, there is no technical basis to support the Applicant's claims for fuel economy improvement for "Basko MW Enginecoat".

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(2) From EPA 511 Application Format:
Test Results (Regulated Emissions and Fuel Economy):
Provide all test information which is available on the effects of the device on vehicle emissions and fuel economy.

The Federal Test Procedure (40 CFR Part 86) is the only test which is recognized by the U.S. Environmental Protection Agency for the evaluation of vehicle emissions. The Federal Test Procedure and the Highway Fuel Economy Test (40 CFR Part 600) are the only tests which are normally recognized by the U.S. EPA for evaluating vehicle fuel economy. Data which have been collected in accordance with other standardized fuel economy measuring procedures (e.g. Society of Automotive Engineers) are acceptable as supplemental data to the Federal Test Procedure and Highway Fuel Economy Data will be used, if provided, in the preliminary evaluation of the device. Data are required from the test vehicle(s) in both baseline (all parameters set to manufacturer's specifications) and modified forms (with Device installed).

17. Conclusions

The Applicant submitted no test data to justify the claim that the Bask products would improve vehicle fuel economy or reduce emissions.

The Applicant markets two Devices (products). However, marketing identification of each was not given.

The Applicant claimed two conflicting theories of operation to explain the Device's effect. The Applicant claimed improved fuel economy by both simultaneously heating and cooling the fuel air mixture.

Installation (i.e. painting) of the device on an installed engine would be difficult due to the inaccessibility of the entire exterior manifold surfaces.

List of Attachments

Attachment A	Letter dated January 20, 1981
Attachment B	Aqueous Insulative Coating Compositions Containing Kaolin and Staple Fibers, Patent 4,240,936 (provided with Attachment A)
Attachments C-1, C-2	Testimonial letters (provided with 511 Application)

Received 1/22/81

Bask Industries, Inc.

P.O. BOX 15113
CINCINNATI, OHIO 45215
(513) 769-6948

Attachment A

January 20, 1981

Mr. Merrill W. Korth
U.S. Environmental Protection Agency
Ann Arbor, Michigan 48105

Dear Mr. Korth,

In response to your letter of January 12, 1981. Yes, we still are desirous of having an EPA evaluation of our product.

I did not answer your earlier letters because I had no additional information about our product regarding internal combustion gasoline engines. The enclosed data (patent and testing) describes an aqueous insulative coating composition that has significant thermal resistance to heat transfer in thin coatings. If you examine the test data from Dr. DeWitt,PE you will note that the coating when applied away from a heat source in thin coats has the capability to release heat faster than normal. This assumes that the high emissivity coating is applied to a low emissivity surface.Such could be the case with the intake manifold. In other words, when the coating is applied to the exterior surface of the intake manifold, we are in effect creating a cooler fuel charge which gives better engine performance and better fuel economy. The insulative aspect of the coating has application on the air cleaner housing. That is, the coating shields the internal compartment heat away from the air cleaner housing,again,keeping the air cooler. There are other areas on an internal combustion engine where this coating has application. Perhaps, that is where the EPA could be of help to us.

If you need any additional information please contact me at any time. This information about our coating has also been submitted to the National Bureau of Standards in Washington for evaluation.

Very truly yours,

William J. Henning
President, Bask Industries

Attachment B

United States Patent [19]

Henning

[11] 4,240,936

[45] Dec. 23, 1980

[54] AQUEOUS INSULATIVE COATING COMPOSITIONS CONTAINING KAOLIN AND STAPLE FIBERS

[76] Inventor: William J. Henning, 220 Forest Ave., Cincinnati, Ohio 45215

[21] Appl. No.: 35,462

[22] Filed: May 3, 1979

[51] Int. Cl.³ C08L 1/28

[52] U.S. Cl. ..... 260/17 R; 106/163 R; 106/193 R; 106/197 C; 106/308 B; 260/17.4 R; 428/454; 428/537

[58] Field of Search ..... 260/17.4 R, 17 R; 106/308 B, 193 R, 197 C, 163 R

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Primary Examiner—Edward M. Woodberry

Attorney, Agent, or Firm—Wood, Herron & Evans

[57] ABSTRACT

A liquid multi-purpose coating composition is disclosed which has significant resistance to heat transfer. The coating composition may be applied to many different types of substrates including wood, metal, concrete and other structural materials. The composition is a water-based liquid containing principally kaolin, staple fibers and a dispersing agent. The coating composition and articles coated therewith exhibit excellent insulating properties against heat and radiant energy. Considerable energy savings and various economies are obtained by the insulative compositions.

14 Claims, No Drawings

AQUEOUS INSULATIVE COATING COMPOSITIONS CONTAINING KAOLIN AND STAPLE FIBERS

BACKGROUND OF THE INVENTION

The art of coating compositions has been very well veloped. Considerable effort has been devoted to the velopment of protective and decorative layers which y be formed on numerous substrates of metal, wood other structural materials. In recent times, more phasis has been placed upon the insulative capability various structural materials and, in view of the cur- t energy requirements and natural resources, there is gnificant need for highly efficient insulative materi- and structures.

A large body of [illegible]e generally exists relating to ting compositions. Among this patent art, the following U.S. Pat. Nos. are considered to be representative to serve as background information for this ention: 2,413,570; 2,414,391; 2,486,756; 2,509,599; 67,678; 2,572,252; 2,811,500; 3,202,567; 3,239,475; 24,378; 3,311,585; 3,325,425; 3,813,356; 3,836,495; 44,990; 3,907,726 and RE27,093. The above patents not represented to be the most pertinent patents, but considered to disclose coating compositions which known and may be compared to the subject matter his invention.

SUMMARY OF THE INVENTION

The insulative coating composition of this invention sists essentially of kaolin particles, staple fibers and a persing agent in an aqueous medium. It has been nd that a highly efficient insulative coating composi- n may be formulated in a liquid state having a viscos- which makes it easily employed as a paint composi- n or a multi-purpose coating. This composition has n found to provide substantial resistance to transfer heat or radiant energy. The composition can be very nomically formulated to provide an energy saving ting. In this connection, it has been discovered that cles such as walls, window frames, light fixtures, and like can be provided with a coating which will ble insulative properties to be enhanced on signifi- t orders of magnitude even with relatively thin coat- layers.

n a preferred form, the insulative coating composi- n consists essentially of an aqueous medium contain- film-forming solids consisting essentially of a sub- tial amount of kaolin, a minor amount of cellulose rs and a minor amount of a dispersing agent. In this nposition, it has been found that the kaolin may be n-formed onto a surface and provide a significant lating capability. The effects are considered to be prising and heretofore unappreciated. Also, the coat- may be subjected to environmental, as well as ex- me ambient stress conditions, and the coating will not ck, peel or powder. In this composition, the cellulose rs may be very economically provided by waste er or newsprint which has been shredded and nded with the kaolin and dispersing aids.

n another preferred form, the insulative coating nposition is formulated with kaolin in a substantial ount to provide insulating capability, cellulosic fibers binding amount, dispersing aids and a thickening or otropic agent in a minor amount. This formulation mits the employment of amounts of insulative kaolin y, adequately dispersed and stabilized in a liquid base

to be suitably employed as a paint or coating composition. Compositions containing these essential ingredients have been employed to coat various surfaces and such coatings formed thereby have been found to be adequately bonded to the substrate and capable of withstanding environmental stress without peeling or otherwise degrading.

In an alternative form of this invention, particularly to enhance the bonding strength of the coating composition to a surface, polymer or latex binders may also be employed. For instance, in a decorative paint or covering, such latex binders will enhance the finish the coating endurance. Furthermore, auxiliary additives including antifoaming agents, wetting agents, pigments, coalescing agents for the latex polymer particles, opacifying agents, extenders, bactericides, fungicides, and the like may be employed in the composition to obtain their needed effects, when desired. The inclusion of such compositions depends upon the end use, for instance, whether it is to be employed as a wall paint or in other environments where a decorative effect is not essential.

In formulating the compositions of this invention, the kaolin component is the critically essential component to provide the insulative capability necessary to obtain the benefits of the invention. The amount of kaolin employed will vary, but a substantial amount must be employed in the aqueous media in order to provide a coating which may be film-formed and insulating. Whereas kaolin has been employed in prior coating compositions, it is not known by applicant to have been employed in substantially large amounts such that the coating which is film-formed consists essentially of insulative kaolin. Therefore, amounts of kaolin on the order of about 30 to about 90% by weight are employed in aqueous media to achieve the desired results. Another essential component is the fibrous binder. It has been found that cellulose fibers, made from shredded newspaper which has been blended in the aqueous media, such that the fibers become dispersed therein, are suitable. In general, staple fibers, i.e., on an order of magnitude of about $\frac{1}{4}$ inch to about 2 inches, enable the coating composition to be applied satisfactorily to a surface. The fibers permit the aqueous kaolin coating composition to be film-formed on a surface and bound thereon without cracking. In other words, the fibers serve an essential binding function on the kaolin solids which are film-formed on a surface. The cellulose fibers also provide a supplemental insulating capability, depending upon the quantity employed in the composition. Generally, reinforcing staple fibers are included on an order of about 1 to about 5 percent by weight. It should be understood that the so called "staple" fibers vary in length, but are normally short fibers and these are preferred. Whereas, it is also preferable to employ cellulosic fibers because they are relatively inexpensive, and such fibers have been found to coact with the kaolin clay to provide the desired results, it should be understood that other fibers of a similar nature including cotton, wool, wood, glass, polyester, or the like may be employed to provide the desired results according to the principles of this invention. However, for economies and energy savings, waste paper fibers are preferred.

Dispersants are employed in the aqueous coating compositions to adequately suspend and stabilize the kaolin particles in the aqueous media along with the binding cellulosic fibers and other additives. Such dis-

sing agents or surfactants are well known and devel-
d in the coating art. Typically, the surfactants are of
anionic type. Inorganic anionic surfactants or dis-
sing aids include tetra potassium pyro phosphate,
er alkali metal phosphorus salts, or other alkali or
aline earth metal salts. Other anionic surfactants
ude alkali and alkaline earth metal salts of neutral-
d phosphoric acid esters of oxyalkylated higher alkyl
nols or aliphatic monohydric alcohols. Other ani-
surfactants of saponified fatty acids or soaps are
l known in the coatings art and reference may be
de to the above patents for further details of such
persing aids or surfactants. In general, a surfactant or
persing aid is employed in a minor amount, i.e., on an
er of about 0.01 to about 1.5% by weight. In addi-
to the anionic dispersing aids or surfactants, non-
c agents may also be employed. Typically, the non-
c surfactants have hydrophilic portions or side
ins usually of the polyoxyalkylene type. The oil
ble or dispersible part of the molecule is derived
n either fatty acids, alcohols, amides or amines. By
able choice of starting materials and regulation of
length of the polyoxyalkylene chain, the surfactant
s of the nonionic detergents may be varied as is well
wn. Suitable examples of nonionic surfactants in-
de alkyl phenoxy polyoxy ethylene glycol, for exam-
ethylene oxide adduct of either octyl-, nonyl- or
ecyl phenol and the like. These mentioned nonionic
factants are usually prepared by reaction of the alkyl
nol with ethylene oxide. Other anionic or nonionic
persants or surfactants which may be employed and
well known in the coating formulation art are dis-
ed, for example, in "Surface Active Agents and
ergents" by Schwartz et al (1958, Interscience Pub-
ers, New York).

When the kaolin is employed in a substantial amount
he aqueous media, for example 70 percent by weight,
nds to have its own thixotropic properties. Accord-
y, the coating composition may be so formulated at
h high solids concentrations of kaolin and the viscos-
is such that it may be readily applied as a paint or
ting. However, at lower concentrations of kaolin,
example about 30–40%, it may be necessary to em-
y a thickening agent. Thickening or thixotropic
nts such as hydroxy ethyl cellulose, methyl cellu-
, carboxy methyl cellulose therefore may be em-
yed in a very minor amount on the order of about
to about 1.5% by weight. Other thickeners which
be used are polyvinyl alcohol, gum arabic, gum
acanth, ammonium polyacrylate, sodium polyacryl-
ammonium alginate, sodium alginate, and the like.
s also mentioned, when desired, a polymer or latex
ler may be employed to serve as a supplemental
ler and aid in the adherence of the coating composi-
to a surface. Conventional latex polymers are usu-
thermoplastic. The polymer particles are made
iciently soft or additives are included in the formula-
to permit coalesence of the particles as a film after
formed. Polymers and copolymers of acrylic acid,
hacrylic acid, esters of these acids, etc., generally
ed as "acrylic resin" are usually employed. Vinyl
tate and ethylene copolymers are also employed in
latices. Among other water dispersible binders are
/vinyl alcohol, hydrolyzed polyvinyl acetate, hy-
lyzed copolymers of vinyl esters or organic acids
other polymerizible comonomers, for example,
olymer of vinyl acetate and ethyl acrylate, and the
. Other polymer based latices may be employed with
reference to the above mentioned patents. When em-
ployed, depending upon the desired effect, such latices
are used in amounts of from about 5 to about 20 percent
by weight. In compositions of this invention, an acrylic
resin, a polyvinyl acetate or copolymers thereof are
preferred.

Other ingredients, such as fungicides may also be
included. Among the suitable pigments which may be
used in accordance with this invention are the finely
divided rutile titanium dioxides. Pigments other than
rutile titanium dioxide can, however, also be used. The
pigment particles should not have a diameter in excess
of about 50μ, but particle sizes even as little as 0.1 are
suitable. The particle sizes of the kaolin follow the same
general rule.

The principles of this invention will be further under-
stood with reference to the following examples.

EXAMPLE I

An insulative coating composition was prepared by
blending the following ingredients:

Percent	
42.54	Water
.14	Tetra Potassium Pyro Phosphate (Surfactant or Dispersing Aid)
.43	Anti-foam
.43	Wetting Agent (Pigment Wetting Aid)
.36	Lecithin (Pigment Dispersing Aid)
2.13	Ethylene Glycol (Moisture Release Retardant)
1.42	Butyl Ether of Diethylene Glycol Acetate (Coalescing Agent for Polymer Particles)
.43	Diethylene Glycol Ethyl Ether (Coalescing Agent for Polymer Particles)
.07	Bactericide-Fungicide
3.13	Titanium Dioxide (Pigment)
4.26	Calcined Clay (Opacifying Agent)
3.55	Calcium Carbonate (Extender)
30.70	Kaolin (Particle Size Approximately 0.2 to 0.3μ)
.07	Hydroxy Ethyl Cellulose (Thickening Agent)
9.24	Vinyl Acetate Acrylic Copolymer Latex
1.00	Cellulose Fiber

The above composition was formulated for painting
interior surfaces. The kaolin component was contained
in a high percentage on a dry weight basis and the cello-
losic fibers were provided by shredded newsprint
which was dispersed throughout the aqueous media
during high speed blending. In this formulation a vinyl
acetate acrylic copolymer latex is used to provide addi-
tional binding strength of the coating on the wall sur-
face. The other ingredients and their function are identi-
fied in the above listing of the components.

The composition of Example I was coated onto the
interiors of aluminum window frames. The coating
composition was applied with a brush on an unpainted
aluminum interior window frame in a thickness of ap-
proximately 4–6 mils. With an outside air temperature
of about 40° F. and an indoor temperature of about 65°
F., the window frames coated with the insulative com-
position exhibited a temperature of about 55° F. The
temperature results were obtained using a Raytex Infra-
red Scanner No. R380RVF, having an accuracy of plus
or minus 2° F. The uncoated window frames in the same
room exhibited a temperature reading of 62° F. The
temperature reading on the outside frame that was

coated on the interior frame with the insulative coating composition was about 53° F. The temperature on the outside frame that was not coated on the interior frame was about 60° F. Accordingly, the insulative coating composition of this invention when applied to such an aluminum substrate provided about a 10 to 12% reduction in heat loss.

In order to further demonstrate the insulative characteristics of a coating composition formed in accordance with the principles of this invention, a 9 inch length of ½ inch OD copper tubing was coated with approximately a ¼ inch thickness of the insulative coating composition of Example I from one end of the tubing for 5 inches. The insulative coating was applied with a brush in successive layers allowing each layer to dry in order to achieve a ¼ inch thickness. A butane torch with a ¼ inch diameter flame tip, approximating 1000° F. or more, was used having a blue flame length of approximately ½ inch. The uncoated portion of the copper tube was held about ½ inch above the flame. The flame was directed ½ inch from the end of the tube. The hand-held tube was held ½ inch from the end of the coated portion of the tube for about 5 minutes. At this point, the flame was terminated and the coated portion of the tube ½ inch from the end was determined to be about 125° F. using the infrared scanner mentioned above. This demonstrates the highly insulative character of the coating composition of this invention.

The coating composition formulated in accordance with Example I was also applied to walls, ceilings and floors with suitable applicators in thicknesses approximating about 10–12 mils. After a passage of about 6 months, the coating did not chip, peel or powder. Furthermore, such coatings applied to heating ovens have exhibited considerable natural gas savings. For instance, the interior of a large industrial bake oven was coated on its walls, ceiling and floor with the composition of Example I having a thickness approximating 10–12 mils. This coating after six months has not chipped, peeled or powdered. Prior to coating the industrial bake oven, a start-up of the oven up to the oven temperature of 300° F. required about 55 minutes. After coating, only 30 minutes were required to come up to 300° F. Additionally, the following temperature readings were taken at four different locations on the exterior of the insulated oven booth, both before and after the coating was applied.

	°F. Before	°F. After
Control Area	100°	95°
Porthole Area	140°	130°
Main Access	110°	104°
Rear Access Door	105°	100°

The above temperature readings demonstrate that a significant reduction in heat loss employing the insulative coating composition of this invention.

EXAMPLE II

The following ingredients were formulated from a slurry by high speed blending.

Percent	Ingredient
16.16	Water
.83	Tetra Potassium Pyro Phosphate
.31	Anti-foam
2.55	Ethylene Glycol
1.70	Butyl Ether of Diethylene Glycol Acetate
.31	Diethylene Glycol Ethyl Ether
.08	Bactericide-Fungicide
3.74	Titanium dioxide
61.58	70% Kaolin Slurry
.08	Hydroxy Ethyl Cellulose
11.05	Vinyl Acetate Acrylic Copolymer Latex
1.19	Cellulose Fiber

The functions of the respective ingredients listed were essentially the same as the functions of the same ingredients of Example I. The composition of Example II was used to coat a reflective shield on a recessed ceiling light using a 200 Watt bulb to produce radiant heat. The ceiling light was located approximately 5 feet above a Formica top table having a medium brown color in a room heated at about 63° F. Prior to coating the reflective shield with the above composition, the light was turned on for about one hour. There was no temperature change observed upon taking readings of the table surface upon employing the infrared scanner described in Example I. However, after coating the reflective shield of the lighting fixture using the coating composition of this Example II, the temperature reading on the table was about 67° F. after one hour with the light. The room temperature remained at 63° F. The reflective shield was silver before coating and an off-white after coating. This Example demonstrates that heat energy was significantly reflected off of the light shield. The composition of Example II has also been applied to various surfaces in a manner similar to the composition of Example I with substantially similar results.

In addition, the composition of Example I has been employed on the intake manifold of an internal combustion engine of a car. Present data indicates that a significant increase in power performance is immediately observable. Mileage checks also demonstrate that approximately 20% fuel savings have been observed. This indeed demonstrates the advantageous energy saving and antipollution character of the coating compositions of this invention.

EXAMPLE III

The following ingredients were formulated in a manner similar to the above examples.

Percent	Ingredient
16.16	Water
.83	Tetra Potassium Pyro Phosphate
.31	Anti-foam
.08	Bactericide-Fungicide
61.58	70% Kaolin Slurry
.08	Hydroxy Ethyl Cellulose
1.19	Cellulose Fiber

The above formulation was essentially the same as Example II, except that the latex binder, coalescing agents and pigment were eliminated. When the formulation was employed to coat various surfaces in a manner substantially similar to the coating of articles according to Examples I and II, substantially similar results of insulative and reflective capabilities were achieved.

accordance with the above description and operat- examples, other modifications may be made to this ntion without departing from the spirit and scope eof.

claim:

An insulative aqueous coating composition con- ing film-forming solids consisting essentially of kao- particles in an amount on the order of about 30% to ut 90% by weight, staple fibers and a dispersing nt for said solids in the aqueous composition, said lin particles having a diameter less than about 50 rons.

. The composition of claim 1 further comprising a kening agent.

. The composition of claim 2 wherein said thicken- agent is a cellulosic thickener.

. The composition of claim 3 wherein said cellulosic kener is selected from the group of methyl cellulose, droxyethyl cellulose and carboxymethyl cellulose.

. The composition of claim 1 further comprising a nor amount of a latex binder.

. The composition of claim 5 wherein said latex der is selected from the group of an acrylic resin, a yl acetate polymer, and copolymers thereof.

. The composition of claim 1 wherein said fibers are lulose fibers.

8. The composition of claim 7 wherein said cellulose fibers are derived from waste paper.

9. An aqueous insulative coating composition having film-forming solids consisting essentially of kaolin particles in an amount of about 30 to about 90% by weight, waste paper fibers in an amount from about 1 to about 5% by weight and a minor amount of a dispersing agent for said solids in the aqueous composition, said kaolin particles having a diameter less than about 50 microns.

10. The composition of claim 9 wherein said dispersing agent is selected from the group consisting of nonionic and anionic surfactants.

11. The composition of claim 10 wherein said dispersing agent is present in an amount of from about 0.01 to about 1.5% by weight.

12. The composition of claim 9 further comprising a cellulosic thickener in an amount of from about 0.01 to about 1.5% by weight.

13. The composition of claim 9 further comprising a latex binder in an amount of from about 5 to about 20% by weight.

14. The composition of claim 13 wherein said latex binder is selected from the group consisting of an acrylic resin, a vinyl acetate polymer and copolymers thereof.

* * * * *

CINCINNATI YELLOW CAB CO., INC.
PHONE 241-2100 PARKWAY TAXI CO.

January 3, 1980

Mr. William J. Henning
Bask Industries, Inc.
P.O. Box 15113
Cincinnati, Ohio 45215

Dear Mr. Henning:

The following are results which we could detect from the Baskote coating which was applied to three of our vehicles.

The first result was the deterioration of heat build-up from within the engine compartment. This in our industry could be of very great importance by creating a longer engine life plus giving us additional ware from the belts and hoses necessary for the operation of our vehicles.

The next result was a slight increase in the gasoline mileage. We noticed approximately one (1) mile per gallon increase on an average. The effect of Baskote on gasoline mileage is a difficult one for us to determine due to two main factors;

1) The age of the vehicles which were used in the test and the fact each had over 100,000 miles.

2) The driving habits of the various drivers which were operating the vehicles during the test period.

The results received from our testing of Baskote could be of great benefit to our industry.

Sincerely,

J. Cahall

J. Cahall, President
Cincinnati Yellow Cab Co.,Inc.
Parkway Tasi Company

JC/eh

1110 KENNER STREET
CINCINNATI, OHIO 45214

Attachment C-2

December 17, 1979

Mr. William J. Henning
Bask Industries
P. O. Box 15113
Cincinnati, Ohio 45215

Dear Mr. Henning:

For your records, on the four trucks involved, we experienced, during the summer months, an honest 3/10 of a mile improvement on fuel economy.

We weren't sure of the effect of cold weather on these vehicles, but to date we have not noticed any drop in fuel economy while operating in cold temperatures.

Your product, Basko, seems to afford an excellent heat shield from engine temperatures.

Kindest regards,

BUDIG WESTERN

J. W. Headrick
Director of Maintenance

JWH: bc