

UNITED STATES PATENT OFFICE

2,021,141

WATERMARKING COMPOSITION

John C. Boyer, Los Angeles, Calif., assignor to
National Listing Exchange, Los Angeles, Calif.,
a corporation of California

No Drawing. Application May 1, 1933, Serial
No. 668,818. Renewed March 11, 1935

8 Claims. (Cl. 134-33)

This invention relates to what I term a water-
marking composition capable of being used on
printing presses of various types for the purpose
of creating in fibrous sheets such as the various
types of papers, a definitely bounded translucency
which does not impair the strength and writing
or printing characteristics of such fibrous sheets.

Heretofore watermarks have been made in pa-
pers during the manufacture of the paper and
while the fibers constituting the stock were in a
mobile condition. In addition it has been con-
templated that representations of watermarks be
made upon the finished sheets by the application
of waxes and fatty acids thereto but this latter
method is not practical inasmuch as a suitable
watermarking composition had not been provided
heretofore.

It is to be remembered that in order to suc-
cessfully apply a watermark to a finished sheet
of paper, the watermarking composition must
be adapted for use on various types of printing
presses such as, for example, the platen and cyl-
inder press. The composition should have all of
the desirable characteristics of a good printing
ink. It must work smoothly on the press and
have enough body and pitchiness or tack to create
a clear, smooth impression which is unmottled.
It must create the proper or suitable degree of
translucency and at the same time must dry with
a suitable surface for pen and ink, typewriting,
multigraphing, copywork or printing over the
same in any style and with any of the ordinary
writing fluids and printing inks. Moreover, the
watermarking compound or ink must be easily re-
moved from the press parts and rollers and in-
capable of drying on the press while in use.

Other requirements of a material of this char-
acter are that it does not deteriorate on storage,
injure or accumulate on the press rollers or other
ink-contacting parts of the press, and that it does
not spread in the paper or discolor while in use
on the press or in the paper.

The various problems presented have been
solved by the proper combination of ingredients
in accordance with this invention. Generally
stated, this invention relates to a watermarking
composition containing a substantially colorless
resin or oleoresin, a solvent, very finely divided
mineral matter and a suitable oil, these ingredi-
ents being combined with water in what appears
to be a colloidal solution or emulsion. The re-
sulting composition may be applied to the ink
plate or disc of a press and the watermark printed
on the paper just as readily as any surface print-
ing is accomplished.

It is an object of this invention, therefore, to
disclose and provide a watermarking composition
in the form of an emulsion which is capable of
imparting to desired portions of the fibrous sheets
a definite translucency without impairing the
writing or printing characteristics of such sheets.

Another object of the invention is to disclose
and provide a watermarking composition which
is stable and which will not deteriorate upon
storage.

A further object is to disclose and provide a
watermarking composition capable of being used
on printing presses without clogging type, injur-
ing the metal parts, or changing in consistency
or color during use.

A further object of the invention is to disclose
and provide a watermarking composition which
when applied to paper will produce a desired
transparency or translucency in the specific area
to which it is applied without causing spreading
and without impairing either the strength or the
writing and printing characteristics of the paper.

These and other objects, uses and advantages
of the invention will become apparent to those
skilled in the art from a contemplation of the in-
vention as described hereinafter.

A preferred watermarking composition having
all of the desired characteristics may be made
from the following ingredients in the propor-
tions stated:

	Parts	Percent
Water solution of ammonium sulfate	7 to 12	(20-40)
Finely divided mineral matter	3 to 5	(8-25)
Precipitated chalk	1 to 2	(3- 8)
Starch or flour	2 to 4	(5-15)
Oil, such as castor oil	5 to 7	(12-30)
Colorless resin or oleo-resin, such as Canadian balsam	3 to 5	(8-20)
Solvent for resin and/or oil, such as gum turpentine	2 to 4	(5-17)

The above proportions are by volume and
the proportions and specific ingredients stated
have been found to give particularly good re-
sults. In making the composition it has been
found that the ammonium sulfate solution (pre-
ferably containing 1 part of alum to 20 parts of
water) is first preferably mixed with the mineral
matter and starch and these two ingredients
thoroughly incorporated in the solution. A suit-
able mineral material for use in this composition
should be in the form of an impalpable powder
which is substantially colorless when wet as, for
example, very finely ground glass. It has been

found that diatomaceous silica answers these requirements and that form of diatomaceous silica which is the result of calcination in the presence of an alkali salt is particularly adapted because of its whiteness when dry and its ability to become substantially colorless when wet. Flour or dextrin may be used instead of starch but the latter is preferred. After the aqueous suspension and solution of these three ingredients has been formed the oil, solvent, calcium carbonate and resin or oleo-resin such as Canadian balsam, are incorporated into the solution and suspension during agitation. The agitation is continued until all of the ingredients are homogeneously intermixed whereupon it will be found that the mass has assumed the consistency of a salve capable of being readily used on the discs, ink plates, rollers and fountains of cylinder and platen types of printing presses.

The preferred ingredients as indicated hereinabove are an aqueous solution of ammonium sulfate or ammonium alum, Canadian balsam, turpentine, calcined diatomite, starch, castor oil and precipitated chalk but it is to be understood that not only the quantities may be varied but the ingredients may also be varied. For example, any substantially colorless resin or oleo-resin may be substituted for the Canadian balsam, gum Damar, tragacanth, arabic, sandarac, elemi and pectin being capable of being used in compositions of this type.

It is to be understood, however, that Canadian balsam is the preferred substance inasmuch as neither the watermarking composition nor the paper watermarked therewith will be discolored with age, whereas some of the other gums mentioned are inherently darker and have the property of causing the watermark to become yellowish with age.

Instead of turpentine, certain of the mineral oils may be used. Instead of castor oil, it has been found that neat's-foot oil, sperm oil, cottonseed oil, eucalyptus oil, sesame oil, croton oil and oil of peppermint may be used. The precipitated chalk may be eliminated altogether when larger proportions of the diatomite are used but when desired zinc and titanium oxides, magnesium carbonate and lead carbonate may be substituted for the calcium carbonate.

The water solution of ammonium sulfate exerts a stabilizing and emulsifying effect upon the composition. It has been found that borax, sodium carbonate and other water-soluble salts of alkali-forming metals may be used instead of alum, provided they are present in quantities sufficient to give a solution having substantially the same alkalinity as that obtained with ammonium sulfate. The resulting emulsion is substantially neutral, however, and contains the aqueous component in the internal or dispersed phase.

Those skilled in the art are again cautioned that although various substances have been enumerated hereinabove as being capable of use in the composition, they are not to be considered as complete equivalents of the preferred ingredients because the resulting composition will either have a slightly different consistency or it will not handle as readily in actual use, will not store without deterioration, or will have a tendency to discolor during use or upon aging of the watermarked paper. The impairment in properties may be only slight in some cases but in others it may be sufficient to render the composition unsatisfactory when perfect results are desired.

The watermarking composition above described has, as stated, the consistency of a salve or plastic substance and is in the form of an emulsion which will not stratify, segregate or spread upon shipment, handling or storage. It is readily applied to the discs and fountains and even detailed and intricate watermarks may be reproduced with fidelity upon the paper. The oily and resinous constituents of the composition readily permeate the paper completely, this action being greatly facilitated by the aqueous constituent of the emulsion, but do not spread and as a result, faithful reproductions of the desired watermark are obtained.

The impalpable mineral matter becomes tenaciously adherent to the surface of the paper in a film of imperceptible thickness and furnishes a suitable ink-receiving surface. The composition sets very readily so that the paper may be quickly removed from the press and stacked as high as desired, no extraordinary care being necessary in the handling of the paper. Several days may elapse, however, before a desired writing surface is obtained.

The composition is applicable to the various kinds of paper, including rag stock, sulfite stock, etc. Slightly higher proportions of turpentine and resin are used when the composition is to be applied to rag stock than the proportions employed in watermarking compositions when such composition is to be applied to sulfite stock. It is to be understood that the watermarking composition need not be applied to writing paper alone nor is it limited to the application of simple watermarks. The watermarking composition is eminently suited for the manufacture of so-called "safety papers" adapted for use in checks, legal instruments, promissory notes, etc. Attention is called to the fact that the preferred composition is of substantially neutral character and when a safety paper is produced with the watermarking composition of this invention, alterations are impossible inasmuch as in altering documents and in removing writing fluids, it is necessary to use either an alkali or an acid liquid, or both. When a colorless substance, such as phenolphthalein or litmus in powdered form, (or a colorless dye, such as a diazo dye) is incorporated in the composition described hereinabove, the application of either an acid or an alkaline eradicator causes pronounced and permanent changes in the coloring of the paper, thereby immediately giving rise to a signal indicating an attempted alteration of original writing or printing.

Those skilled in the art will readily appreciate the advantages of the composition of this invention and the various adaptations, modifications, changes, uses and results which may be attained thereby.

All such changes as come within the scope of the appended claims are embraced thereby.

I claim:

1. A watermarking composition in the form of an emulsion and having a suitable printing ink consistency, comprising 12% to 30% of oil, 8% to 25% of a finely divided substantially colorless mineral matter, 8% to 20% of a resin, 5% to 17% of a solvent for the resin, and 5% to 15% of starch, emulsified with 20% to 40% by volume of an aqueous slightly alkaline solution.

2. A watermarking composition of the character described in the form of an emulsion and having a suitable printing ink consistency, comprising between 8% and 20% of a resin or oleo-resin, a solvent therefor, finely divided substan-

5 tially colorless mineral matter and a vegetable
oil from the group consisting of castor oil, neat's-
foot oil, sperm oil, cottonseed oil, eucalyptus oil,
sesame oil, croton oil, and oil of peppermint, emul-
sified with 20% to 40% by volume of a slightly
10 alkaline aqueous solution of salts from the group
consisting of aluminum sulfate, borax and so-
dium carbonate, said watermarking composition
being adapted to render paper translucent at point
of application without impairing ink-receiving
characteristics of the paper.

3. A watermarking composition in the form of
an emulsion and having a suitable printing ink
consistency, comprising 12% to 30% of castor oil,
15 8% to 25% of a finely divided substantially color-
less mineral matter, 8% to 20% of Canadian
balsam, 5% to 17% of a solvent for the Canadian
balsam and 5% to 15% of starch, emulsified with
20% to 40% by volume of an aqueous solution of
20 aluminum sulfate containing 1 part of aluminum
sulfate to 20 parts of water.

4. A watermarking composition of the charac-
ter described in the form of an emulsion and
having a suitable printing ink consistency, compr-
ising between 8% and 20% of a resin or oleo-
resin, a solvent therefor, between 8% and 25%
25 of finely divided diatomaceous silica, and a vege-
table oil, emulsified with a slightly alkaline
aqueous solution of salts from the group consist-
ing of aluminum sulfate, borax and sodium carbo-
30 nate, said composition containing a signalling
substance adapted to change in color when said
watermarking composition is brought in contact
with caustic alkali and acid.

5. A substantially neutral watermarking com-
position in the form of an emulsion and having
a suitable printing ink consistency, comprising
from about 8% to 20% by volume of Canadian
balsam, 5% to 17% of turpentine, 8% to 25% of
40 finely divided substantially colorless mineral mat-
ter, and from 12% to 30% of castor oil, emulsi-
fied with a slightly alkaline aqueous solution of
borax, said composition containing a substan-

tially colorless signalling substance reactive to
both acids and alkalis.

6. A watermarking composition of the charac-
ter described having a suitable printing ink con-
sistency and adapted to render paper translucent 5
when applied thereto without impairing ink-re-
ceiving characteristics of the paper, said water-
marking composition consisting of an intimate
mixture of 8% to 20% of Canadian balsam, with
turpentine, finely divided substantially colorless 10
mineral matter, and a substantially colorless vege-
table oil with 20% to 40% by volume of an aque-
ous, slightly alkaline solution of salts from the
group consisting of aluminum sulfate, borax and
sodium carbonate. 15

7. A watermarking composition of the charac-
ter described having a suitable printing ink con-
sistency and adapted to render paper translucent
when applied thereto without impairing ink-re-
ceiving characteristics of the paper, said water- 20
marking composition comprising 8% to 20% by
volume of Canadian balsam, 5% to 17% of tur-
pentine, 8% to 25% of finely divided substantially
colorless mineral matter, and 12% to 30% of an
oil from the group consisting of castor oil, neat's- 25
foot oil, sperm oil, eucalyptus oil, sesame oil, cot-
tonseed oil, croton oil and oil of peppermint, in-
timately mixed with 20% to 40% of an aqueous
solution of salts from the group consisting of alu-
minum sulfate, borax and sodium carbonate. 30

8. A watermarking composition in the form of
an emulsion and having a suitable printing ink
consistency, comprising between 8% and 20%
of Canadian balsam intimately dispersed and
emulsified with turpentine and diatomaceous 35
silica, castor oil, and a slightly alkaline aqueous
solution of salts from the group consisting of alu-
minum sulfate, borax and sodium carbonate, said
watermarking composition being adapted to ren-
der paper translucent at point of application 40
without impairing ink-receiving characteristics
of the paper.

JOHN C. BOYER.