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PROCESS OF PRODUCING DIAZOTYPE PAPER
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ware
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This invention relates to a process of producing diazo-
type paper having a reduced tendency to curl, improved
development characteristics, increased density, as well
as other desirable qualities such as better feel, rattle
and bulkiness.

As is well known, diazotype materials having a paper
base coated on one side with a light-sensitive diazotype
composition have a tendency to curl after being wetted
as after development. To counteract this tendency to
curl, it has already been proposed to coat the back side
of the paper with various water-soluble resins, natural
gums or inorganic salts. Wetting the back of the paper
with water alone has also been proposed for this pur-
pose. The particular type of paper used as the base also
has an effect upon development. Thus, it was found that
better development is obtained when the base is made of
paper which is highly calendered to have a very smooth
surface and highly compacted so as to have a very low
gas permeability. It was found, however, that paper
which has been highly calendered has a greater tendency
to curl than does paper which is not so highly calen-
dered.

It is, accordingly, an object of this invention to pro-
vide a process for producing a diazotype paper having a
greatly reduced tendency to curl, greatly improved de-
velopment characteristics and greater density.

It is a further object of this invention to provide a
process for producing a diazotype paper having greatly
improved development characteristics and density by coat-
ing the back and front sides of the paper in a particular
sequence of steps.

Other objects and advantages of this invention will be-
come apparent to those skilled in the art from the de-
tailed description given below.

We have found that if a highly calendered paper having
a low gas permeability or porosity, as, for example, a
paper having a porosity of 100 on the TAPPI scale, is
first coated with a water-soluble, film-forming material
on the back side thereof, dried and thereafter coated on
the front side thereof with a light-sensitive composition
containing a light-sensitive diazo compound, greatly im-
proved development characteristics, image density, rat-
tle, feel and bulkiness are imparted to the paper. Poros-
ity on the TAPPI scale is defined as the number of sec-
onds required to force a given volume of air through a
given volume of paper under certain specified conditions.
(TAPPI Method—T-460-m-46.) This order of steps
is critical since if this order is not followed, the improved
results stated above are not obtained.

We have tried first coating the front side of the paper
with the light-sensitive diazo composition, drying and
thereafter coating the back thereof with a water-soluble,
film-forming material. The development characteristics,
image density, etc. of the thus coated paper were found,
in fact, to be inferior to a diazotype paper having no
coating on the back thereof.

We have also tried coating the front side of the paper
with the diazotype composition and immediately there-
after, and before drying, coating the back of the paper
with the water-soluble, film-forming material. The re-
sults upon development were as unsatisfactory as those

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obtained by the process described in the preceding para-
graph.

Another method tried by us was to first coat the back
of the paper with a solution of the water-soluble, film-
forming material and immediately thereafter, and before
drying, coat the front side with a diazotype composition.
The results upon development were also unsatisfactory.

The exact reason for the beneficial results obtained by
our process is not known. Our theory is that whenever
the diazo-type composition is placed on the paper when
the latter is wet or the paper is wetted after the diazo-
type composition is placed thereon and before exposure,
the diazotype composition diffuses into the body of the
sheet which results in impaired development, lowered
density and a flat, washed-out looking print. We do not
intend to be bound by this theory, however. Whatever
the reasons, the fact is that by following the steps of our
novel process as outlined above, we obtained a new
and unexpected improvement in the development charac-
teristics, density, etc. of the diazotype paper.

We have also attempted to mix the water-soluble, film-
forming material with the diazotype composition and then
coat the mixture on the front of the paper. The results
were unsatisfactory. The development characteristics
and density were not as good as with a paper where no
film-forming material was used.

We also attempted to coat the front face of the paper
with a coating of the water-soluble, film-forming material
and overcoating the same with the light-sensitive diazo-
type composition. The results were also unsatisfactory.
It appears that the vapor barrier produced by the film-
forming material should not be too close to the sensi-
tized surface but rather that there be a more or less
deep pocket which can act as a reservoir for the ammonia
gas absorbed during development.

An example of our novel process is given below. It
is to be understood, however, that this example is given
by way of illustration and not by way of limitation.

Example

A highly calendered sheet of paper having a very
smooth surface and a porosity reading of over 100
(TAPPI) was coated on the back side with a 5% water
solution of gelatin and the paper dried. After drying, the
front side (felt side) was coated with the following light-
sensitive solution and dried:

Water	cc	60.0
Ethylene glycol	cc	6.0
Isopropanol	cc	2.0
Citric acid	grams	2.0
Zinc chloride	do	8.0
Thiourea	do	4.0
2,3-dihydroxynaphthalene-6-sulfonic acid	do	4.0
Zinc chloride double salt of diazo from N-diethyl- amino-p-phenylenediamine	do	1.0
Saponin	do	0.1
Water to make 100.0 cc.		

The thus coated paper was exposed, under an original,
to actinic light and developed in the ammonia chamber
of a white-print ammonia development machine in the
usual manner. In addition to the expected improvement
in the curl characteristics of the paper due to back coat-
ing with the gelatin, there was a remarkable and wholly
unexpected improvement in the development characteris-
tics of the paper and in the density of the image produced
over the development characteristics and image density
of uncoated paper. There was also a great improve-
ment in the feel, rattle and bulkiness over that of un-
coated paper.

Following the procedure outlined in the above ex-

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ample, we coated samples of high density paper with an aqueous solution of any one of the following film-forming materials: hydroxyethyl cellulose, carboxymethyl cellulose, methyl cellulose, polyvinyl alcohol, carboxymethyl hydroxyethyl cellulose and sodium cellulose sulfate instead of the gelatin as in the example. The results obtained by the use of any one of these materials were substantially the same as those obtained by the use of gelatin. We found that solutions having concentrations of 1-5% of these film-forming materials give the best results.

It is to be understood that in lieu of the 2,3-dihydroxynaphthalene-6-sulfonic acid coupler of the example, other couplers may be used such as 2-amino-8-naphthol-3,6-disulfonic acid, 2,3-dihydroxynaphthalene, 2,7-dihydroxynaphthalene, 1,7-amino-naphthol-2-hydroxy-8-biguanide, resorcinol, phloroglucinol, m-hydroxyphenyl-urea, acetoacetanilide, 7-hydroxy-1,2-naphthimidazole and the like.

Furthermore, instead of the particular diazo mentioned in the example, diazos may be employed which are derived from any of the usual p-aminophenylenediamines. Examples of such diazos are those from p-amino-N-methylaniline, p-amino-N-dimethylaniline, p-amino-N-ethylaniline, p-amino-N-hydroxyethylaniline, p-amino-N-ethyl-N-hydroxyethylaniline, 4-amino-2-methoxy-1-cyclohexylaniline and the like.

Modifications may be resorted to within the scope of the appended claims.

We claim:

1. A process of producing a light-sensitive diazo-type paper which comprises first coating one side of a highly calendered smooth surfaced paper having a porosity of about 100 on the TAPPI scale with an aqueous solution of a water-soluble, film-forming material, selected

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from the group consisting of gelatin, hydroxyethyl cellulose, carboxymethyl cellulose, methyl cellulose, carboxymethyl hydroxyethyl cellulose, polyvinyl alcohol and sodium cellulose sulfate, drying the paper and thereafter coating the other side of the dried paper with a solution of light-sensitive diazotype composition and drying.

2. A process as recited in claim 1 wherein the water-soluble, film-forming material is gelatin.

3. A process as recited in claim 1 wherein the water-soluble, film-forming material is hydroxyethyl cellulose.

4. A process as recited in claim 1 wherein the water-soluble, film-forming material is carboxymethyl cellulose.

5. A process as recited in claim 1 wherein the water-soluble, film-forming material is methyl cellulose.

6. A process as recited in claim 1 wherein the water-soluble, film-forming material is carboxymethyl hydroxyethyl cellulose.

7. A process as recited in claim 1 wherein the water-soluble, film-forming material is polyvinyl alcohol.

8. A process as recited in claim 1 wherein the water-soluble, film-forming material is sodium cellulose sulfate.

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