TAB 1

PATENT APPLICATION SERIAL NO. 07/922918

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

PTO-1556
(5/87)

BAR CODE LABEL

U.S. PATENT APPLICATION

SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT
07/922,918	07/31/92	428	1508

APPLICANT

JAMES R. MC CULLOCH, PROVIDENCE, RI.

CONTINUING DATA********
VERIFIED

_____

FOREIGN/PCT APPLICATIONS********
VERIFIED

_____

FOREIGN FILING LICENSE GRANTED 10/27/92 ***** SMALL ENTITY *****

STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS	FILING FEE RECEIVED	ATTORNEY DOCKET NO.
RI	2	25	4	$ 496.00	2626-3

ADDRESS

RHODES, COATS & BENNETT
P.O. BOX 2974
GREENSBORO, NC 27402

TITLE

TRANSFER PRINTING FLOCKED FABRIC

This is to certify that annexed hereto is a true copy from the records of the United States Patent and Trademark Office of the application as filed which is identified above.

By authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS

Date Certifying Officer

07/922918

MAIL ROOM JUL 31 1992 PAT. & TRADEMARK OFF.

For: PTO-1082

Case Docket No. 2626-3
Date: July 31, 1992

THE COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing is the patent application of

Inventor: James R. Mc Culloch

For: TRANSFER PRINTING FLOCKED FABRIC

Enclosed are:

- ☐ 2 sheets of drawings.
- ☐ An assignment of the invention to _____.
- ☐ A certified copy of a _____ application.
- ☐ An associate power of attorney.
- ☐ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.

The filing fee has been calculated as shown below:

	(Col. 1)	(Col. 2)
For:	No.Filed	No.Extra
Basic Fee		
Total Claims	20 -20=	x 0
Indep. Claims	4 -3=	x 1
Multiple Dependent Claim Presented		
Assignment Fee		

Small Entity	
Rate	Fee
	$345
x$10	$
x$36	$ 36
$110	$
$ 40	$ 40
Total	$

Other than Sm. Entity	
Rate	Fee
	$690
x$20	$
x$72	$
$220	$
$ 40	$
Total	$

☐ A check in the amount of $_____ to cover the filing fee is enclosed.

☐ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment, to the Deposit Account No. 18-1164. A duplicate copy of this sheet is enclosed.

Howard A. Kilberg
ATTORNEY/AGENT FOR APPLICANT
Reg. No 28639

Revised 12/91

IFC-02240



MAIL ROOM JUL 31 1992 PAT. & TRADEMARK OFF.

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~~08/293749~~

Abstract of the Invention

A transfer printed, flocked fabric includes a textile substrate, raised nylon fibers on the substrate, a black-pigmented adhesive adhering the nylon fibers to the substrate and disperse dye distributed in a pattern in upper portions of the nylon fibers and the upper portions of the nylon fibers being colored only by disperse dye, thereby forming a deep, dark, crock-fast, colored print.

MAIL ROOM JUL 31 1992 PAT. & TRADEMARK OFF.

TRANSFER PRINTING FLOCKED FABRIC

Background of the Invention

The present invention relates to improvements in transfer printing on flocked fabrics.

Flocked fabrics are known to be made by adhering short fibers, typically nylon or polyester to a substrate using, conventionally, a clear adhesive. The fibers may be pre-dyed, known as fiber-dye, or in their natural state, in which they are a white, translucent color.

Transfer printing entails combining a paper having the dyestuffs for the fabric arrayed on it in a print pattern, placing the paper and fabric into intimate contact and exposing the paper and fabric to pressure and heat. The result is the sublimation of the disperse dye and its entry into the fibers of the fabric. It is conventional for transfer print papers to have the print arrayed over the entire extent of the paper, so that the pattern to be printed can be seen in reverse on the paper itself. Transfer printed fabrics, having been exposed to heat and pressure in the printing process typically have a flat and papery look and hand. This is often deemed undesirable, especially in a flocked fabric.

It is known to add pigment to an adhesive used in some flocked fabric manufacturing. In one case, the pigmented adhesive is used to bind flock on fabric which is subsequently printed using wet processing techniques to achieve deep rich colors. However wet processing involves very different considerations from transfer printing, which is a lower-cost, dry process. Tinted adhesives are also known for use with pre-dyed flock, to obtain an overall intensity of shade.

However, it has not been possible previously in printing the flocked fabrics with transfer printing to achieve deep, dark shades using conventional print papers. When this is attempted, there are problems of grin-through, crocking and inferior lightfastness. The fabric substrate can be seen between the fibers, interfering with the desired visual effect of the printed pattern. Efforts to add dyestuff to the print paper in order to

achieve deeper shades have been unsuccessful because the dyestuff in such a heavy concentration is not fully absorbed into the fibers. As a result, the dyestuff can rub off, an undesirable and commercially unacceptable result. The rubbing off of the colors in this fashion is known as "crocking".

Accordingly, there is a need in the art for an improved method for transfer printing onto flocked fabrics to achieve deep, dark shades, and also a need for deep, darkly transfer printed flocked fabrics.

Summary of the Invention

The present invention fulfills this need in the art by providing a transfer printed, flocked fabric comprising a textile substrate, raised thermoplastic fibers on the substrate, a dark pigmented adhesive adhering the fibers to the substrate and disperse dye distributed in a pattern in upper portions of the thermoplastic fibers. The disperse dye makes a deep, dark colored print. In a preferred embodiment the pigment is black. Other dark pigments usable include those which are blue, green or red. Typically, the upper portions of the fibers are colored only by disperse dye. The invention results in the dyed pattern being crock-fast. The fibers are typically nylon or polyester.

The printed fabrics may have loftier, more erect pile than conventional transfer printed flocked fabrics, and a softer hand.

The fibers may be arrayed on the substrate in a textured array, so that some fibers diverge from neighboring fibers more than other fibers and the pigmented adhesive is visible between the diverging fibers.

The invention also includes a method of printing a flocked fabric including adhering undyed thermoplastic fibers to a substrate with a pigmented adhesive so that the fibers have a lower portion adhered to the substrate and an upper portion forming a nap and thereby forming a flocked fabric, and transfer printing the flocked fabric. Preferably, the adhering step comprises adhering the fibers with a darkly pigmented adhesive. The adhering step may include adhering nylon fibers.

In one embodiment the adhering step includes adhering the fibers with a black pigmented adhesive.

The invention preferably includes heat setting the flocked fabric between the adhering step and the transfer printing step. Alternatively, the flocked fabric may be thermally brushed after the transfer printing step. The transfer printing step preferably includes printing with a pattern having deep, dark colors.

The adhering step may include texturizing the fibers on the substrate to cause some fibers to diverge from neighboring fibers more than other fibers so the pigmented adhesive is visible between the diverging fibers.

Typically, when using the method of the invention the printing step may include pressing the fabric to a transfer print paper at pressures lower than in conventional transfer printing. For example, the pressure may be between about 10 and about 59 pounds.

Brief Description of the Drawings

The invention will be better understood after a reading of the Detailed Description of the Preferred Embodiments and a review of the drawings in which:

FIGURE 1 is a schematic view of a transfer print process suitable for use in the present invention;

FIGURE 2 is an enlarged, schematic view of the fabric according to the invention; and

a Sheet of 1

Detailed Description of the Preferred Embodiments

The present invention is made possible, in part by preparation of the flocked fabric. In lieu of using the conventional clear adhesives used for adhering the flock to the substrate, a pigmented adhesive is substituted. The adhesive may be any adhesive conventionally used for adhering flock to substrates in making flocked fabrics, including those available from B.F. Goodrich, 9911 Brecksville Rd., Brecksville, Ohio, and other suppliers. A pigment is added to the basic adhesive, the precise color of the pigment

being dictated by desired results. Preferably, the pigment is of a dark color to help achieve the deep, dark color in the printed fabric. The pigment may be black or other dark shades such as navy blue, dark red, dark green, or the like.

The adhesives are typically water-based acrylic polymers. Conventional processing of the adhesive may also be used including viscosity adjustments and other conventional additive treatments. A suitable pigment for inclusion in the adhesive is Ecco Brite HL 7417 BK 4-710, available from Eastern Color and Chemical Co., 35 Livingston St., Providence, Rhode Island 02904. Other similar pigments can be substituted. The fibers used in the flocking process are the natural, undyed fibers, so that they have their normal translucent, whitish color.

If desired, the flocked fabric can be air texturized, a conventional procedure involving the application of an air flow to cause the fibers to be oriented on the fabric surface in a decorative pattern before the adhesive is allowed to set or cure. This results in some fibers being arrayed on the substrate in a textured array, so that some fibers diverge from neighboring fibers more than other fibers. The pigmented adhesive is visible between the diverging fibers, but since it is a dark color, it contributes to the depth of shade effect, rather than being an objectionable grin-through.

The fabric so made is fed into a conventional transfer printing machine, as shown schematically in Figure 1. The fabric 22 is fed along with the transfer print paper 28 into the machine 20. A large, heated roll 24 puts the fabric into intimate contact with the paper and begins the sublimation process of the disperse dye on the paper 28 for impregnation into the fibers of the fabric 22. The combined paper and fabric follow a path 26 through additional rollers to provide enough residence time for complete sublimation of the disperse dye into the fibers of the fabric.

However, the pressure applied to the fabric need not be as great as when flocked fabrics are transfer printed conventionally. Since the dyestuff need only color the upper portions of the fibers, the damaging pressure conventionally used to penetrate to the depths of the pile need not be

used. The result is that the pile remains more upright and erect, giving the fabric a softer and loftier hand than conventionally transfer printed flocked fabrics, as well as less grin-through and crocking. For example, when using a Gessner transfer print machine (available from Gessner Co., Greensboro, NC USA), pressures on the order of 60 pounds (27.3 kg) are used conventionally. With the invention, the pressure can be reduced to as low as 10 pounds (4.5 kg) for some print patterns and still achieve good depth of shade.

The fibers are any fibers which can be suitably transfer-printed. Presently thermoplastic fibers are known to be transfer-printable, with nylon and polyester fibers being the most common candidates for transfer-printing. The transfer-print dyestuffs are typically disperse dyes, well-known for printing and dyeing nylon and polyester.

A schematic sectional view of the printed fabric can be seen in Figure 2. The fabric 32 includes the substrate 12, which may be woven, as shown, or any the other suitable construction. Nylon fibers 18 are adhered to the substrate 12 with an adhesive 14 so that lower portions of the fibers are imbedded in the adhesive and upper portions form a nap standing up from the fabric. The adhesive 14 has pigment particles 16, shown schematically in Figure 2, arrayed through it to give the adhesive an overall dark color, the color being determined by the color of the pigment particles 16. Similarly, the fibers 18 are colored by the disperse dye 19 which has impregnated into the upper portions of the fibers by the transfer printing process. Of course, the transfer print will form a pattern of various colors on various different portions of the fabric, depending on the print pattern. Also, the disperse dye will form a uniform dispersion in the thermoplastic fiber, but is shown only schematically in the figure as particulate colorations.

It is desirable to assure the upright orientation of the fibers in the fabric, and this can be done by two alternate methods. In the first, the fabric is heat set after the fibers are adhered to the substrate and before printing. Alternatively, the fabric can go straight from flocking to transfer-

printing and be subjected to a thermal brushing after transfer-printing to restore the nap in the fabric.

The resulting fabric provides a deep, dark print which is crock-fast, and not subject to objectionable grin-through. Also, the hand is softer and loftier than conventionally transfer printed flcoked fabrics, largely because the pile is more erect.

Those of ordinary skill in the art will appreciate that the invention can be carried out in various other embodiments beyond the specific embodiments disclosed herein. These are deemed to be within the scope of the invention as claimed.

What is claimed is:

1. A transfer printed, flocked fabric comprising a textile substrate, raised thermoplastic fibers on the substrate, a dark pigmented adhesive adhering said fibers to said substrate and disperse dye distributed in a pattern in upper portions of said thermoplastic fibers.

2. A fabric as claimed in claim 1 wherein said disperse dye makes a deep, dark colored print.

3. A fabric as claimed in claim 1 wherein said pigment is black.

4. A fabric as claimed in claim 1 wherein said pigment is blue.

5. A fabric as claimed in claim 1 wherein said pigment is green.

6. A fabric as claimed in claim 1 wherein said upper portions of said fibers are colored only by disperse dye.

7. A fabric as claimed in claim 1 wherein said dyed pattern is crock-fast.

8. A fabric as claimed in claim 1 wherein said fibers are nylon.

9. A fabric as claimed in claim 1 wherein said fibers are polyester.

10. A fabric as claimed in claim 1 wherein said fibers are arrayed on said substrate in a textured array, so that some fibers diverge from neighboring fibers more than other fibers and said pigmented adhesive is visible between said diverging fibers.

11. A fabric as claimed in claim 1 wherein said fabric has a loftier, more erect pile and a softer hand than conventional transfer printed flocked fabrics~~, and a softer hand~~.

12. A transfer printed, flocked fabric comprising a textile substrate, raised nylon fibers on said substrate, a black-pigmented adhesive adhering said nylon fibers to said substrate and disperse dye distributed in a pattern in upper portions of said nylon fibers and said upper portions of said nylon fibers being colored only by disperse dye, thereby forming a deep, dark, crock-fast, colored print.

13. A method of printing a flocked fabric comprising the steps of:
adhering undyed thermoplastic fibers to a substrate with a pigmented adhesive so that the fibers have a lower portion adhered to the substrate and an upper portion forming a nap and thereby forming a flocked fabric, and
transfer printing the flocked fabric.

14. A method as claimed in claim 13 wherein said adhering step comprises adhering the fibers with a darkly pigmented adhesive.

15. A method as claimed in claim 13 wherein said adhering step comprises adhering nylon fibers.

16. A method as claimed in claim 13 wherein said adhering step comprises adhering the fibers with a black pigmented adhesive..

17. A method as claimed in claim 13 further comprising heat setting the flocked fabric between the adhering step and the transfer printing step.

18. A method as claimed in claim 13 further comprising thermal brushing the flocked fabric after the transfer printing step.

19. A method as claimed in claim 13 wherein said transfer printing step comprises printing with a pattern having deep, dark colors.

20. A method as claimed in claim 13 wherein said adhering step includes texturizing the fibers on the substrate to cause some fibers to diverge from neighboring fibers more than other fibers and the pigmented adhesive is visible between the diverging fibers.

21. A method as claimed in claim 13 wherein said printing step includes pressing the fabric to a transfer print paper at pressures lower than in conventional transfer printing.

22. A method as claimed in claim 13 wherein said printing step includes pressing the fabric to a transfer print paper in a transfer print machine at a pressure between about 10 and about 59 pounds.

23. A method of printing a flocked fabric comprising the steps of:
adhering undyed nylon fibers to a substrate with a darkly pigmented adhesive so that the nylon fibers have a lower portion adhered to the substrate and an upper portion forming a nap and thereby forming a flocked fabric, and
transfer printing the flocked fabric at pressures less than those used in conventional transfer printing with a pattern having deep, dark colors.

24. A method as claimed in claim 23 further comprising heat setting the flocked fabric between the adhering step and the transfer printing step.

25. A method as claimed in claim 23 further comprising thermal brushing the flocked fabric after the transfer printing step.

922918

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled TRANSFER PRINTING FLOCKED FABRICS
the specification of which (check applicable box(es)):
[X] is attached hereto.
[ ] was filed on _____ as U.S. Application Serial No. _____
[ ] was filed as PCT international application No. PCT/____/_____ on _____
and (if applicable to U.S. or PCT application) was ammended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with 37 C.F.R. 1.56(a). I hereby claim foreign priority benefits under 35 U.S.C. 119/365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed or, if no priority is claimed, before the filing date of this application:

Prior Foreign Application(s):

Application Number	**Country**	**Day/ Month/ Year Filed**

I hereby claim the benefit under 35 U.S.C. 120/365 of all prior United States and PCT international applications listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in such prior application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose material information as defined in 37 C.F.R. 1.56(a) which occurred between the filing date of the prior applications and the national or PCT international filing date of this application:

Prior U.S./PCT Application(s):

Application Serial No.	**Date/ Month/ Year Filed**	**Status: patented, pending, abandoned**

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint the firm of Rhodes, Coats & Bennett, comprising C. Robert Rhodes, Reg. No. 24,200, Edward W. Rilee, Reg. No. 31,869, Howard A. MacCord, Jr., Reg. No. 28,639, Larry L. Coats, Reg. No. 25,620, and David E. Bennett, Reg. No. 32,194, as my attorneys and/or agents with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith. **Address all communications and telephone calls to: Rhodes, Coats & Bennett, P.O. Box 2974, Greensboro, North Carolina 27402, (919) 273-4422.**

1) Inventor's Signature _____ Date _____

Inventor's Name (typed) James (First) R (Middle Initial) McCulloch (Family name) USA (Citizenship)

Residence(City) Providence (State/ Foreign Country) Rhode Island

Post Office Address 38 Cooke Street, Providence, RI Zip Code 02904

2) Inventor's Signature _____ Date _____

Inventor's Name (typed) _____ (First) (Middle Initial) (family name) (citizenship)

Residence(City) _____ (State/ Foreign Country) _____

Post Office Address _____ Zip Code _____

3) Inventor's Signature _____ Date _____

Inventor's Name (typed) _____ (First) (Middle Initial) (family name) (citizenship)

Residence(City) _____ (State/ Foreign Country) _____

Post Office Address _____ Zip Code _____

FOR ADDITIONAL INVENTORS, check box [ ] and attach sheet with same information and signature and date for each.

Rhodes, Coats & Bennett (8/91)

RINT OF DRAWINGS
S ORIGINALLY FILED

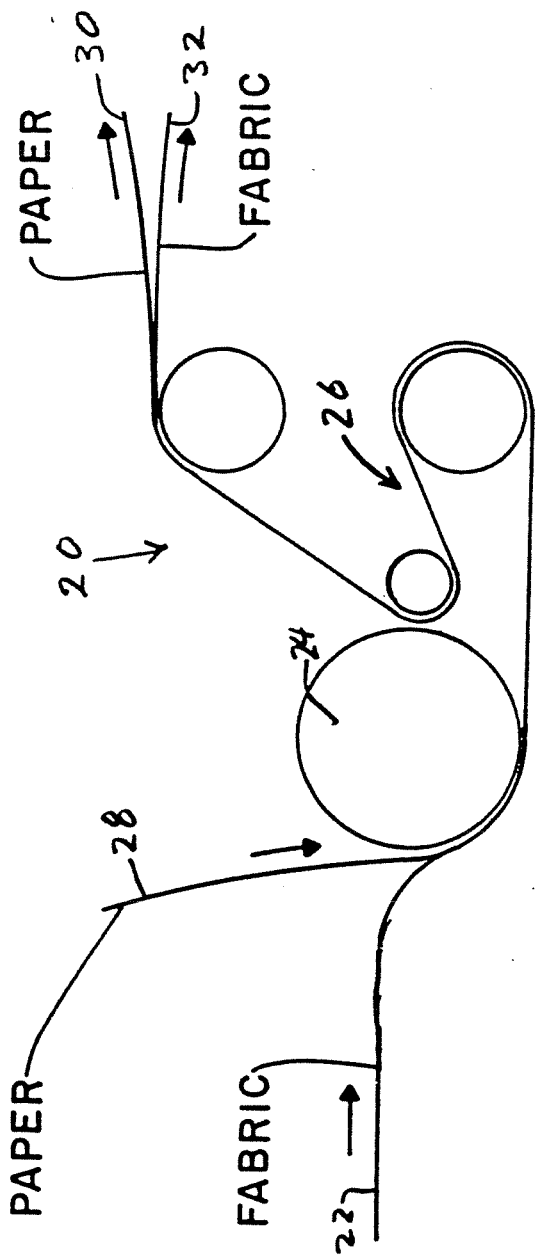

FIG. 1

PRINT OF DRAWINGS
IS ORIGINALLY FILED

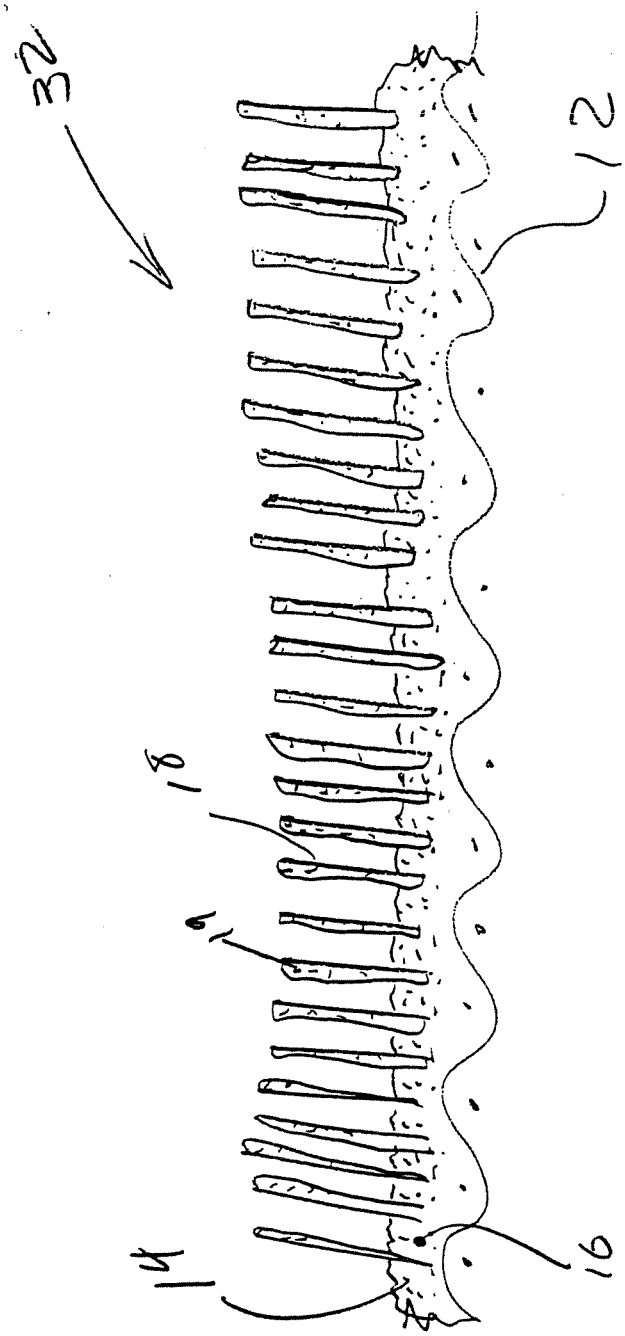

FIG. 2



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Honorable Commissioner of Patents and Trademarks
Washington, D.C. 20231

Sir:

CERTIFICATE OF MAILING/EXPRESS MAIL

"Express Mail" Mailing Label Number RB790614726

Date of Deposit 07/31/92

I hereby certify that this paper, which is a new patent application (our file 2626-3) is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Howard A. MacCord, Jr.
Registration No. 28,639

Mailed By: Howard A. MacCord, Jr.

UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NUMBER	FILING DATE	FIRST NAMED APPLICANT		ATTY DOCKET NO./TITLE
07/922,918	07/31/92	MCCULLOCH	J	2626-3

RHODES, COATS & BENNETT
P.O. BOX 2974
GREENSBORO, NC 27402

0000

DATE MAILED: 08/17/92

NOTICE TO FILE MISSING PARTS OF APPLICATION
FILING DATE GRANTED

A filing date has been granted to this application. However, the following parts are missing.

If all missing parts are filed within the period set below, the total amount owed by applicant as a ☒ large entity, ☐ small entity (verified statement filed), is $ 691.00.

1. ☒ The statutory basic filing fee is: ☒ missing ☐ insufficient. Applicant as a ☒ large entity ☐ small entity, must submit $ 690.00 to complete the basic filing fee and MUST ALSO SUBMIT THE SURCHARGE AS INDICATED BELOW.

2. ☒ Additional claim fees of $ 171.00 as a ☐ large entity ☐ small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due. NO SURCHARGE IS REQUIRED FOR THIS ITEM.

3. ☐ The oath or declaration:
   ☐ is missing.
   ☐ does not cover items omitted at time of execution.

   An oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.

4. ☐ The oath or declaration does not identify the application to which it applies. An oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.

5. ☒ The signature to the oath or declaration is: ☒ missing; ☐ a reproduction; ☐ by a person other than the inventor or a person qualified under 37 CFR 1.42, 1.43, or 1.47. A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.

6. ☐ The signature of the following joint inventor(s) is missing from the oath or declaration:

   _____. An oath or declaration listing the names of all inventors and signed by the omitted inventor(s), identifying this application by the above Application Number and Receipt Date is required. A SURCHARGE MUST ALSO BE SUBMITTED AS INDICATED BELOW.

7. ☐ The application was filed in a language other than English. Applicant must file a verified English translation of the application and a fee of $30.00 under 37 CFR 1.17(k), unless this fee has already been paid. NO SURCHARGE IS RERQUIRED FOR THIS ITEM.

8. ☐ A $50.00 processing fee is required for returned checks. (37 CFR 1.21(m)).

9. ☐ Your filing receipt was mailed in error because check was returned without payment.

10. ☐ Other.

An Application Number and Filing Date have been assigned to this application. The missing parts and fees identified above in items 1 and 3-6 must be timely provided ALONG WITH THE PAYMENT OF A SURCHARGE of ~~$120.00~~ for large entities or ~~$60.00~~ for small entities who have filed a verified statement claiming such status. The surchage is set forth in 37 CFR 1.16(e). Applicant is given ONE MONTH FROM THE DATE OF THIS LETTER, OR TWO MONTHS FROM THE FILING DATE of this application, WHICHEVER IS LATER, within which to file all missing parts and pay any fees required above to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

Direct the response to, and any questions about, this notice to ATTENTION: Application Division, Special Handling Unit.

A copy of this notice MUST be returned with response.

For: Manager, Application Division
(703) ~~557~~ 305-1202

FORM PTO-1533 (REV. 8-90) ATTORNEY'S/APPLICANTS COPY

IFC-02255