

In the United States Court of Federal Claims

No. 01-33C
(Filed August 16, 2004)

**PAYMASTER
TECHNOLOGIES, INC.,**

Plaintiff,

v.

THE UNITED STATES,

Defendant.

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* Patents; infringement; invalidity, 35
* U.S.C. § 112 (2000); implied license;
* obviousness, 35 U.S.C. § 103(a);
* anticipation; on-sale bar, 35 U.S.C.
* § 102(b); joint inventorship, 35 U.S.C.
* § 116; reasonable royalty.

Paul L. Brown, Chicago, IL, for plaintiff. Ronald R. Snider, Snider & Associates, Washington, DC, of counsel.

Robert G. Hilton, Washington, DC, with whom was Assistant Attorney General Peter D. Keisler, for defendant. John Fargo, Commercial Litigation Branch, Department of Justice, and Stephen Lobaugh, United States Postal Service, of counsel.

OPINION

MILLER, Judge.

This case is before the court after trial on plaintiff’s claim that the United States, through the United States Postal Service, infringed plaintiff’s patent covering imprinted money order forms. After the court ruled on the construction of the disputed language in claims 1, 5, 6, and 10, plaintiff sought to prove defendant’s liability and damages, while defendant asserted several affirmative defenses. A key issue for trial was whether the accused money order forms exhibited imprinted characters in a mirror-like image on the back surface of the money orders.

FACTS

During the 1970s the United States Postal Service (the “USPS”) implemented automated computer processing of its postal money orders (“PMOs”). Specifically, the USPS instituted an automated system whereby PMOs that were cashed throughout the United States were rectified against the amounts in which those PMOs issued. After a branch post office issued a PMO, the branch office’s voucher was sent to the USPS Accounting Services Center (the “ASC”) in St. Louis, Missouri. The ASC reconciled vouchers for issued PMOs with PMOs cashed at post office branches and banks. For the automated system to be effective, the PMOs had to possess the capability of being read by an optical scanning device that processed them into a central computer.

PMOs at the time were imprinted with an Addressograph-Multigraph device, which was similar to the imprinter used with early credit card transactions. After a PMO was placed in the Addressograph-Multigraph, a roller slid over the form to imprint the required information. This system used no ink, but, rather, a five-part set of papers to inscribe the dollar amount on the cashable PMO, which appeared as the middle sheet of the form set. The device would imprint characters on the money order in an Optical Character Recognition (“OCR”) format to render it readable by a computer device. The five-part PMO form set used with this imprinter consisted of a customer receipt, followed by a sheet of carbon interleaf, the negotiable instrument in the center, a second sheet of carbon interleaf, and, finally, a voucher that the USPS would retain. A PMO, when tendered for payment at a bank, is treated as a cash item and instantly is redeemable for its face value.

Beginning in the late 1970s, the ASC began to experience a dramatic increase in altered PMOs, eventually peaking in the 1980s at 10,000 annually. Donald W. Crum, former Manager of the Money Order Branch of ASC, described the illegal alteration process. The criminal would purchase a PMO for \$1.00 and alter the PMO’s face value to the highest possible amount, initially \$500.00 and \$700.00. The ease with which the PMOs were altered was attributed to the carbon-imprinted PMOs, leading Richard Greene, Program Manager of USPS Money Order Systems, to remark in a March 12, 1985 transcribed conference, “Unfortunately, the criminal element has caught up with our carbons.”

The most prolific situs for PMO alteration was Parchman Prison, an 18,000-acre facility in Mississippi. Postal Inspector Ronald D. Waller explained that prisoners at Parchman would smuggle in \$1.00 PMOs, often with the help of poorly paid guards, who would be given up to \$100.00 for a \$1.00 PMO. Once the authentic, but low-value, PMO was inside the prison, an assembly line of skilled inmates incorporated it into their illicit assembly line. Experienced forgers would work at removing the dollar value from the PMO and then stencil in a higher amount. At first the forgers simply would cut digits from other

PMOs and then arrange the numbers to form high-value PMOs. Mr. Waller testified that, commencing in 1992, the forgers would alter the PMO chemically, referred to as “bleaching,” to remove the numbers and then stencil in higher values.

While PMOs were being altered, other enterprising inmates would make telephone calls or start pen-pal correspondence, often in response to personal ads, with both male and female lonely-hearts in the civilian world. The prisoners, most of whom were convicted of violent crimes, would claim to be in prison for tax-evasion or some other non-violent crime. Under the ruse of a sympathetic story regarding his incarceration, the inmate would cultivate a romantic relationship with promises of a future life with the victim and eventually inform the victim that he was to be released soon and that the misunderstanding regarding his imprisonment was being resolved.

Using this pretext, the inmate would send the altered PMOs to the victim for deposit in his or her bank account with the instruction to “hold” the money for the inmate pending his release. Once the proceeds of the altered PMOs were deposited into the victim’s bank account, the inmate would telephone the victim, tell the victim that he was being released, and ask the victim to send the proceeds via an overnight delivery of cash. After the victim sent the cash, he or she would not hear from the inmate again. Eventually the victim would learn from his or her bank that the PMOs had been altered and the victim was being held liable by the bank for the amount of the returned PMO. The court viewed a video of a television exposé of this nefarious practice, which caused one victim to lose her home. Inmates with time on their hands in a facility that was so large that it was impossible to police effectively had flummoxed the USPS.

Mr. Crum testified that the problem worsened to the extent that the nation’s banks threatened either to no longer accept PMOs or to treat PMOs as a clearance item, rather than cash, thereby forestalling redemption until payment was received from the USPS. He further explained that, if banks either stopped redeeming PMOs or treated them as hold items, the USPS would suffer negative consequences. Customers have the right to go to any USPS branch and redeem a PMO for cash. If PMOs were redeemable only at USPS branch offices, and not banks, USPS branches would require more cash on hand to redeem PMOs.

PMOs have proved to be a profitable line of business. The USPS has the benefit of the value of a PMO from the time that it is purchased until the time that it is redeemed for cash, which is termed “the float.” According to Mr. Crum, the float during the 1980s and 90s was between \$20 and \$30 million at any given time, an amount on which the USPS earned interest. Stocking its branches with more cash to redeem PMOs would reduce the USPS’s interest income generated by the float. This loss of income would greatly diminish the profit that the USPS generated through the issuance of PMOs.

In order to confront the problem, Mr. Crum met with private money-order issuers, American Express Company and Travelers Express Company, Inc. These commercial entities did not experience the same problem of altered money orders because they employed check-writer machines to produce money orders that were more difficult to alter. Conversely, however, the private money-order companies did not use electronic reconciliation, but, instead, manually reconciled all money orders and vouchers.

Richard W. French, Document Examiner for the USPS, made recommendations during the early 1980s on options to improve the security of the PMO, including using 24-pound cylinder-mould made paper and the use of original ink to imprint the PMO.

Paymaster Technologies, Inc. (“plaintiff”), is a manufacturer of negotiable instrument imprinters for banking and other commercial uses. Plaintiff is most well known for its manually operated check-writer, a device that can imprint a dollar amount on a negotiable instrument by serrating the fibers of the document, thus making the money order difficult to alter physically. Although plaintiff had been manufacturing its check-writers since 1922, prior to 1985 plaintiff never had entered into a contract with the Government, nor specifically with the USPS.

On March 12, 1985, plaintiff attended a meeting with USPS officials during which the current method of printing PMOs and their rampant alteration was discussed. Robert P. Koper, President of plaintiff, testified that prior to this initial meeting the managers of plaintiff “were very reluctant about entering into a government bid type contract. They hadn’t done it before. [They] [f]elt it was probably more than they wanted to get involved with.” Transcript of Proceedings, Paymaster Techs., Inc. v. United States, No. 01-33C, at 48 (Fed. Cl. May 3 - 12, 2004) (“Tr.”).

After being made aware of the serious security problem facing the PMO system, Mr. Koper, who at the time was plaintiff’s Vice President of Manufacturing, began development of a more secure printing system for the USPS. At a time when no check-writer in existence could produce OCR-readable documents, plaintiff undertook to develop a prototype.

In February 1986 plaintiff completed its first prototype and demonstrated it to USPS officials, including Mr. French, who at the time was a Forensic Document Analyst with the USPS Inspection Service. Plaintiff, however, was not completely satisfied with the performance of the first prototype and continued development of the imprinting system, resulting in a second prototype.

On November 5, 1986, the USPS issued a draft solicitation for a new imprinting system. The solicitation cited the increased incidence of PMO alteration, increasing from 974 in 1981 to 8,010 in 1985, and a dollar-value loss increase from \$327,135.00 in 1981 to \$3,066,688.00 in 1985. Mr. Koper attended a subsequent meeting with USPS officials on December 16, 1986, in an effort to help the USPS develop specifications for a bid solicitation, during which USPS officials expressed the urgency of solving the PMO alteration problem.

In accordance with the draft solicitation, a bidder was instructed to describe the form set that would be used with its imprinter, which Mr. Koper understood to mean that he was to develop and specify the form set to be used in plaintiff's imprinter. It was plaintiff's task to develop an imprinted form that was both secure and yet also OCR-readable. Through its development of a second prototype imprinter, plaintiff also began to experiment with dye-based inks and various types of paper that plaintiff had requested from Uarco, Inc., the current supplier of PMO paper. At that time the USPS contemplated a different size form set for its imprinter than what ultimately was patented by plaintiff. It was only later, after revisions and testing by plaintiff, that the accused form set was adopted.

In July 1987, responding to the USPS's bid solicitation for a new PMO imprinter, plaintiff included a description of the form set to be used with the imprinter, as well as several sample forms. The form set that plaintiff submitted was a three-part form, which included a top sheet money order and attached receipt, followed by a carbon interleaf, and an OCR voucher on the bottom. Responses to the imprinter solicitation were evaluated by Arthur D. Little, Inc., which issued a report in March 1988. By letter dated June 28, 1988, plaintiff was awarded a contract for 58,000 PMO imprinters.

After it was awarded the contract, plaintiff continued to develop the ink cartridge that was to be used in the imprinter. Mr. Koper testified that, soon after the contract was signed in June 1988, the contracting officer, Melvin Beller, requested that plaintiff modify its machine so that the customer receipt—which at the time was a stub attached to the first sheet of paper in the form set—could be imprinted by the machine. Plaintiff's submission contemplated that the customer receipt be completed manually, while the voucher and money order were imprinted by the machine. According to Mr. Koper, the requested change required a costly redesign of the machine, which would have greatly increased its costs and time to manufacture—as well as the ultimate cost to the USPS. Instead of changing the imprinter, plaintiff implemented a five-part form set, with the customer receipt on its own individual sheet of paper. The change from a three-part to a five-part form set inhibited the ink from penetrating the document, resulting in a failure to produce a crisp, OCR-readable image.

As part of the process to definitize the contract, plaintiff submitted a statement of work to the USPS on January 21, 1989. After the statement of work was approved and production began on the imprinter, Mr. Koper focused on developing a form set from various inks and paper that would render a crisp image with a controlled penetration that produced a mirror-image on the reverse side. By the time plaintiff filed its first patent application on October 10, 1989, it had created a system capable of producing a clear mirror image on the reverse side of the money order form.

During early 1990 plaintiff began producing PMO imprinters at the rate of 4,000 per month. For each imprinter manufactured by plaintiff, 12 PMOs were printed and sent to the ASC for testing to ensure that they were OCR-readable. The USPS tested the vouchers by processing them through a high-speed scanner, capable of processing 1,400 documents a minute. The specifications allowed for rejection of fewer than 2% of the documents after five passes through the scanner. The form sets initially used to test the imprinters were manufactured by Standard Register, and the rejection rate was from 0.5% to 0.7%, well below the 2% limitation specified by the USPS.

On August 25, 1989, the USPS issued a new solicitation for a PMO form set. Plaintiff, an imprinter manufacturer, did not bid on supplying the USPS with the form sets. The form set specifications did not describe any single type of form set, instead listing several different possible versions. Moore Business Forms, Inc. (“Moore”), was awarded the PMO form set contract on March 23, 1990, and its successor, Moore-Wallace, currently holds the contract. The USPS contract with Moore contains a clause indemnifying the USPS from a patent claim.

Larry G. McCartney, Product Support Manager for Moore, testified for defendant as an expert in security papers. According to Mr. McCartney, one of the primary security features of the PMO form set was the paper made by Portals Paper, specifically the ability of the paper fiber to break down when alteration is attempted.

By May 1990 plaintiff began testing its imprinters with the new Moore forms and sending them to ASC for processing. The Moore forms immediately experienced an increased rejection rate of 1.7% to 1.8%. Although this rate was still below the specification of 2%, it was high enough to cause the USPS concern. Each form that is rejected from the automated system is batched and sent to a separate facility where it is processed manually, thereby increasing the cost of reconciliation and reducing the benefit of the USPS’s automated system.

To remedy the problem of increased rejections, the USPS enlisted the help of plaintiff. Mr. French testified that the original specification was for an OCR-grade carbon interleaf and

a wax-grade carbon interleaf, the latter of which appeared to be the cause of machine-rejected PMOs. He explained that “Mr. Koper, in his testing, and I’m sure with some of his engineers, figured out that . . . the backing on the wax carbon was not stiff enough, and so by putting a second OCR carbon in place of the wax carbon it gave enough rebound stiffness for the character to be formed correctly, and he was right. It worked very well.” Tr. at 1141.

On August 20, 1990, Mr. Koper, then plaintiff’s Operations and Plant Manager, wrote a letter to USPS Contracting Officer Paul R. Courtemanche for the PMO form sets. Mr. Koper identified the use of a harder carbon for the second interleaf in the form set as a possible solution to the increased rejections. Although a softer carbon was being used for the second interleaf in order to save on costs, Mr. Koper had the insight that the softer second carbon was preventing the imprinter, which utilizes impact to print information on the PMO, from producing clear images. Once the harder second carbon was substituted, Mr. Crum confirmed that the rejection rate was reduced. The USPS modified Moore’s form set contract on December 19, 1990, to include the second sheet of OCR-grade carbon interleaf.

In April 1991 the USPS began issuing to the public PMOs in the form of the Moore form set produced by plaintiff’s imprinter. Within months Mr. French informed Mr. Koper, on August 22, 1991, that a new generation of enterprising criminals was altering the new PMOs by chemically removing the dollar amount and replacing it with a higher value. In response to this latest security threat, Mr. Koper worked with an ink chemist to add pigment to the imprinter’s ink, aiming to control the lateral migration, or separation, across the width of the paper. By this time plaintiff had almost completed its delivery of 58,000 PMO imprinters.

After the USPS introduced the new PMO system, the number of altered PMOs was reduced, although Mr. Waller, on behalf of the United States Postal Inspection Service, credits increased law enforcement as more important than changes in the PMO in halting alteration scams.

To protect its PMO imprinting system, plaintiff filed Patent Application Serial No. 418,670 (the “‘670 application”) on October 10, 1989. At the request of the United States Patent and Trademark Office (the “PTO”), plaintiff filed divisional applications, Serial No. 623,035 (the “‘035 application”) and Serial No. 622,928 (the “‘928 application”), on December 6, 1990. The remainder of the ‘670 application matured into United States Patent No. 4,995,315 (the “‘315 patent”) (issued February 26, 1991), which covered the PMO imprinter.

The ‘928 application matured into United States Patent No. 5,086,697 (the “‘697 patent”) (issued February 11, 1992) and covered the ink cartridge used in plaintiff’s

imprinter, the subject of the '315 patent. Plaintiff filed a continuation-in-part application to the '035 application, Serial No. 827,159 (the "'159 application"), on January 28, 1992. The '159 application matured into the patent-in-suit, United States Patent No. 5,292,283 (issued March 8, 1994) (the "'283 patent") and covers a PMO form set used in the imprinter and ink cartridge, the subject of the '315 and '697 patents.

Based on plaintiff's holding of the '697 patent, plaintiff was awarded a sole-source contract for the replacement ink cartridges. Although plaintiff manufactured the imprinter and ink cartridges, it was not a manufacturer of paper form sets. Consequently, while plaintiff held the patent-in-suit for PMO form sets, plaintiff was not awarded a sole-source contract for the form sets, similar to the contract for ink cartridges, nor did the USPS or Moore obtain a license for the use of the patent-in-suit. Mr. Koper informed Freddie Whited, Manufacturing Manager of Moore, on May 5, 1994, that plaintiff had been issued the patent-in-suit for the PMO form sets. Although in 1995 Dennis S. Renoll, Purchasing Supply Management Specialist for the USPS, expressed to Moore his concern as to whether plaintiff's patent would increase the cost of the form sets, he did not include a royalty cost in his estimate for PMO form sets.

In an effort to improve service efficiency, the USPS changed its PMO imprinting system with the introduction of Point of Service ("POS") PMOs. Rather than imprinting by plaintiff's imprinter, POS PMOs were imprinted by using an electronic printer manufactured by International Business Machines/National Cash Register. With the POS system, the dollar amount of the PMO is entered into a computer and then electronically printed onto the money order voucher. The form set used by the POS system is a single-ply paper consisting solely of the money order voucher. Unlike the five-part form set used with plaintiff's imprinter, the POS system does not produce a voucher that is retained by the USPS branch for processing; instead, processing of the PMO is accomplished electronically by computer with the information that is entered when the PMO is purchased and printed at the sales counter.

With the introduction of the POS system, plaintiff's contract to supply imprinters to the USPS was not renewed. The USPS also has an ample supply of ink cartridges for plaintiff's imprinter, obtained as part of plaintiff's sole-source contract, which was completed in mid-2001. It was after plaintiff's imprinter contract ended, but before completion of the contract for ink cartridges, that plaintiff sought to enforce its rights under the patent-in-suit.

Mr. Renoll testified that the USPS still uses plaintiff's printing system in some of its branches that have not yet converted to the POS system. From May 12, 1994, to February 29, 2004, the USPS purchased 1,521,149,560 five-part PMOs for a total price of \$27,787,193.44. In addition to the five-part form sets, the USPS purchased 785,328,262 one-part form sets for use in POS system, not plaintiff's imprinters, at a cost of \$28,136,776.03.

Plaintiff filed an administrative claim on July 15, 1998, claiming that both the Moore multi-ply and single-ply form sets infringe the patent-in-suit. The administrative claim was denied on March 22, 1999. On January 17, 2001, plaintiff filed the present action.

DISCUSSION

I. Claims at issue

The parties dispute whether the accused form sets infringe claims 1, 5, and 10 of the '283 patent. Claim 1 reads:

1. A form set for use with apparatus used for imprinting indicia on negotiable instruments, said form set comprising:
 - an upper negotiable instrument sheet having a printed front surface and a back surface and comprised of an absorbing type paper sheet material for absorbing dye-based ink to permit the permeation of dye-based ink through said sheet from its printed front surface to its back surface to provide on its back surface a mirror image of the image imprinted on said printed front surface,
 - a lower customer receipt sheet,
 - an intermediate voucher sheet positioned between said upper negotiable instrument sheet and said lower customer receipt,
 - a first transfer medium positioned between said upper negotiable instrument sheet and said intermediate voucher sheet, and
 - a second transfer medium positioned between said lower customer receipt sheet and said intermediate voucher sheet, said first transfer medium and second transfer medium each comprising an optical character recognition grade carbon sheet to provide optical character recognition indicia on said intermediate voucher sheet and said lower customer receipt sheet.

'283 patent, col. 16, ll. 25-50. Independent claim 5 of the patent-in-suit teaches:

5. A form set for use with an apparatus used for imprinting indicia with dye-based ink on negotiable instruments, said form set comprising:
 - an upper negotiable instrument sheet having a front printed surface and a back surface and comprised of an absorbing type paper sheet material for absorbing dye-based ink whereby when the form set is impacted by the imprinting mechanism of the

apparatus, the dye-based ink permeates through said upper sheet from said printed front surface to said back surface to provide the indicia in mirror image form on said back surface,
a lower customer receipt sheet,
an intermediate voucher sheet positioned between said upper negotiable instrument sheet and said lower customer receipt sheet,
a first transfer medium positioned between said upper negotiable sheet and said intermediate voucher sheet,
a second transfer medium positioned between said lower customer sheet and said intermediate voucher sheet, said first transfer medium and second transfer medium each comprising an optical character recognition grade carbon sheet,
said upper negotiable instrument sheet having at least first and second indicia receiving areas on its front surface, said first indicia receiving area including at least one field for receiving indicia indicative of the dollar and cents amount for which the negotiable instrument is drawn, and said second indicia receiving area including a field for receiving indicia indicative of the dollar and cents amount for which the negotiable instrument is drawn with said first indicia receiving area receiving indicia in a format readable by optical character recognition apparatus and said second indicia receiving area receiving indicia in conventional arabic format, said second area being aligned with said first are such that digits representing dollar and cents amount in said second field are aligned in the same plane as digits representing the corresponding dollar and cents amount in said first field to provide a tamper proof form set.

'283 patent, col. 16, ll. 60-69, col. 17, ll. 1-36. While claims 1 and 5 disclose a five-part form set, claim 10 of the patent-in-suit discloses a single-ply form set:

10. A form set for use with an apparatus having an imprinting mechanism including a ribbon bearing dye-based ink for imprinting negotiable instruments with characters indicative of the dollar and cents amount for which the negotiable instrument is drawn, each of said characters having a character perimeter surface, said form set comprising:

at least one negotiable instrument sheet comprised of an absorbing type paper sheet material for absorbing the dye-based ink whereby when the form set is impacted by the imprinting mechanism of the apparatus, the dye-based ink permeates through the sheet from said printed front surface to said back surface to provide the indicia in mirror image form on said back surface, the total character face lateral migration of the ink from any character perimeter surface on either surface of the sheet being no greater than about 0.012 inches.

'283 patent, col. 18, ll. 5-22.

II. Infringement

Plaintiff has brought suit against the United States under 28 U.S.C. § 1498 (2000), alleging that the USPS infringed the '283 patent by purchasing the form sets produced by Moore. The '283 patent arose out of the application of another patent, United States Patent No. 4,995,315 (issued February 26, 1991). A two-step inquiry is applied to determine whether a patent is infringed: “(1) ‘the scope and meaning of the patent claims asserted,’ and (2) how ‘the properly construed claims . . . compare[] to the allegedly infringing device.’” Golden Blount, Inc. v. Robert H. Peterson Co., 365 F.3d 1054, 1059 (Fed. Cir. 2004) (quoting Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1454 (Fed. Cir. 1998)).

The parties previously briefed the construction of claims, after which this court issued its claim construction in accordance with Markman v. Westview Instruments, Inc., 52 F.3d 967, 970-71 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370, 372 (1996). See Paymaster Techs., Inc. v. United States, 54 Fed. Cl. 579 (2002) (“Paymaster I”). The court construed the term “form set” to include single-ply and multiple-ply form sets, the term “negotiable instrument” to include money orders, and the term “character perimeter surface” to include both closed and broken plane figures. *Id.* at 590.

The claim construction is informed by the viewpoint of the person of ordinary skill in the art. Paymaster I, 54 Fed. Cl. at 581 (citing cases). Trial confirmed that the person of ordinary skill in the art is an amalgam of Mr. McCartney and Charles A. Steele, plaintiff’s expert in dye-based inks. The person of ordinary skill in the art is familiar with security papers, documents, and forms, as well as the methods used to alter such forms. In addition, the person is familiar with the interaction of imprinted inks onto security documents and forms and the role that these inks play, when combined with security papers, to produce a document that resists illicit modification. These familiarities combine in a person who grasps an understanding of the technology involved in designing and manufacturing a form set, as

well as the technology involved in imprinting indicia on the form set, all in an effort to thwart alteration.

Although claim construction is resolved by the court as a legal matter, it is significant that Mr. McCartney, the sole paper and form set expert to testify, referred to the single-ply form as a “form set.” Tr. at 362-63. Indeed, one of the patents that defendant sponsored as rendering the ‘283 patent obvious was a one-ply form, which Mr. McCartney referred to during his testimony as a “form set.” Id.

In the second step of the inquiry, plaintiff bears the burden of “proving by preponderant evidence” that every limitation set forth in the asserted claim is found in the accused product, either literally or by substantial evidence. LNP Eng’g Plastics, Inc. v. Miller Waste Mills, Inc., 275 F.3d 1347, 1356 (Fed. Cir. 2001). Plaintiff sought to prove literal infringement.

Plaintiff’s complaint accused the USPS PMO five-part form set of literally infringing claims 1-6, 8, 10, and 12-16 of the ‘283 patent and accused the one-part form set of literally infringing claims 10 and 12-16 of the ‘283 patent. Prior to trial the parties entered a stipulation agreeing that the five-part form set comports with certain limitations of claims 1 and 5 and that the five- and one-part form sets comport with another limitation of claim 5. List of Undisputed Issues, filed May 10, 2004, at 2-3.

Remaining in dispute at trial was whether the accused form sets possess the claim limitation “whereby when the form set is impacted by the imprinting mechanism of the apparatus, the dye-based ink permeates through said upper sheet from said printed front surface to said back surface to provide the indicia in mirror image form on said back surface.” List of Undisputed Issues at 1; ‘283 patent, col. 16, ll. 66-68, col. 17, ll. 1-3. In addition to disputing whether the accused form sets exhibit a mirror image on the reverse surface, the parties also disputed whether the “total character face lateral migration of the ink from any character perimeter surface on either surface of the sheet being no greater than about 0.012 inches.” List of Undisputed Issues at 1; ‘283 patent, col. 18, ll. 19-22.

1. Mirror image on the back surface

Mr. Steele, Product Chemist for Keystone Aniline Corporation, was admitted as an expert in the fields of dyes and interaction of dyes on papers; he also qualified to testify as one of ordinary skill in the art at the time of the claimed invention. In reading the claims as of ordinary skill in the art, Mr. Steele testified that the patent-in-suit limitation of producing “on its back surface a mirror image of the image imprinted on said front surface” requires the patented form set to produce an observable mirror image on the reverse of the PMO. To

observe the mirror image, Mr. Steele testified that one must examine it with the naked eye while the PMO lies flat on a surface, so that only reflective light, rather than light transmitted through the PMO from behind, would illuminate any ink on the reverse side. He analyzed sample PMOs, focusing specifically on the lateral migration and the migration of the ink through the form to produce a mirror image on the reverse.

If the trial court's credibility findings play a role in the fact-finding process, this witness's testimony merits the highest degree of confidence. Mr. Steele was able to parry defendant's every effort to diminish his analysis and opinion. Not only was he the one witness who was an expert in the performance of dye-based inks, he alone could explain the practical implications of their performance.

In 2003 Mr. Steele analyzed ten different PMOs produced by Moore for both a mirror image and lateral migration. A mirror image is distinguished from a "ghost image," which is a "faint image that doesn't appear actually at the back surface, but can be seen as though transmitted through a sample." Tr. at 220. To ensure that a mirror image was obtained, Mr. Steele analyzed the sample PMOs using only reflective light, verifying that the image appeared on the back surface. According to Mr. Steele, the mirror image was formed "by ink migrating from the front surface, through the paper, to the back surface." *Id.* at 225. Using this standard, Mr. Steele found that nine of the ten sample PMOs contained a mirror image on the back surface and therefore infringed that limitation of the patent-in-suit.

Lateral migration is the distance that the ink travels across an imprinted surface in excess of the width of imprinted characters. The patent-in-suit specifies that lateral migration of imprinted characters may not exceed 0.012 inches. Measuring the lateral migration on the ten sample PMOs, Mr. Steele found that all ten samples contained lateral migration of less than 0.012 inches and thereby infringed that limitation of the patent-in-suit.

After Mr. Steele completed his expert report, he was provided with scanned copies of an additional sixteen PMOs. Mr. Steele analyzed the sixteen PMO copies to determine if they infringed the patent-in-suit by exhibiting a mirror image observable on the back surface of the PMO. Fourteen of the sample PMOs displayed a mirror image on the back surface, which Mr. Steele testified was readily visible from the scanned copies. At trial Mr. Steele examined the originals of the two PMOs that did not contain mirror images and confirmed his findings from the scanned copies. Both PMOs contained one character that was faint, or "ghosting," and not a complete mirror image. *See* Tr. at 230. Mr. Steele explained that his findings may be different if he were to examine the PMOs with a microscope because he could then determine what amount of ink is on the back surface. However, applying the claim as a person of ordinary skill in the art, he agreed that the mirror image must be observable with the naked eye and without transmitted light.

Dr. Albert H. Lyter, III, defendant's expert in the examination of inks and papers, examined the PMOs to determine if they infringed the patent-in-suit by forming a mirror image. Dr. Lyter did so first by looking at them with the unaided eye; then he proceeded to scan the PMOs into digital computer images, which he magnified between 10x and 60x. Finally, Dr. Lyter examined the PMOs magnified 100x by a microscope, all to determine if a mirror image appeared on the reverse. According to Dr. Lyter, "there are circumstances under which you may visually be able to see an image and, yet, the ink is not penetrated completely to the back surface." Tr. at 1017-18.

Dr. Lyter's report examined fifty PMOs provided by defendant, as well as the ten PMOs examined by Mr. Steele before trial, and he placed each in one of five categories he devised:

- (a) Category 1 – The absence of any image on the back surface of the money order;
- (b) Category 2 – The absence of at least one complete character on the back surface of the money order;
- (c) Category 3 – Significant loss of detail (> 50%) on the back surface in at least 2 or more distinct portions of the characters;
- (d) Category 4 – Significant loss of detail (> 50%) on the back surface in at least 1 distinct portion of the characters; and
- (e) Category 5 – Significant loss of detail (> 50%) on the back surface in at least 1 non-distinct portion of the characters.

Expert Rebuttal Report of Dr. Albert H. Lyter, III, July 14, 2004, at 18. He found that some of the sample PMOs did infringe the patent-in-suit, although his report rendered his testimony more precise in that twenty-five of defendant's PMOs and two of plaintiff's PMOs were placed in category one, *i.e.*, they were determined to have "[t]he absence of any image on the back surface of the money order." The remaining twenty-five of defendant's PMOs and eight of plaintiff's PMOs were placed in one of the remaining categories. Id.

Mr. Steele testified that the fact that those PMOs in both plaintiff's and defendant's samples did not exhibit an intense mirror image on the reverse was most likely due to their being imprinted by a spent ink cartridge that had grown faint and needed replacing. Replacing the ink cartridge in the imprinter, and thus operating the imprinter correctly, would result in sharper imprints and intense mirror images on the back surface.

In addition, Mr. Steele identified a flaw in Dr. Lyter's categories in so far as they were not set on a proportional scale: Category one lacked any image on the back surface, whereas categories two through five showed varying degrees. The difference between categories one

and two was significant—the difference between no image at all and absence of only one character. The difference between categories two and three, however, was comparatively minimal—the absence of one character compared to the absence of detail on two portions of a character.

Dr. Lyter explained on cross-examination that, when he determined that a PMO lacked a character on the back surface, the analysis was not based on a mere visual examination. Dr. Lyter admitted that he could read characters on the back surface of a PMO with his naked eye, even though he declared those characters absent. Instead of limiting himself to a visual examination, Dr. Lyter subjected the PMOs to a microscope, under which he determined that some characters had “not penetrated to the back surface of the page.” Tr. at 1022. According to Dr. Lyter, “it requires a [micro]scopic examination to tell whether these are actually on the back surface.” Id. at 1023.

Although Dr. Lyter placed PMOs that exhibited a loss of detail in categories reflecting lack of penetration, they could be read easily upon visual examination. Despite the appearance of a mirror image to the naked eye, Dr. Lyter testified that microscopic examination did not reveal ink penetration, and thus those PMO samples did not infringe. Mr. Steele’s opinion was to the contrary—that the security feature of a mirror image is that it is readily visible with the naked eye, rather than under a microscope. This, of course, is how a money order is used in the real world. It is unlikely that a USPS counter clerk or bank teller would examine a PMO with a microscope before accepting it. Dr. Lyter’s view does not comport with the manner in which the person of ordinary skill in the art interprets the requirement. The USPS intended penetration of ink to cure a problem with detecting and impeding alteration; microscopic analysis in the field, *i.e.*, in the USPS branches upon presentation of a money order, would be out of the question. Rather, the confirmation is made on the basis of visual observation.

Defendant argues that the accused form sets do not infringe because many of the PMO form sets did not exhibit a mirror image on the back surface. To support this argument, defendant offered Dr. Lyter’s examination of sample PMOs to determine whether they exhibited a mirror image on the back surface. However, by defendant’s own definition, some PMOs, albeit only 4% of defendant’s sample, did exhibit a mirror image on the back surface and thus do infringe the patent-in-suit. Defendant further conceded that half of all PMOs examined exhibited some mirror image on the back surface, although degradation of some characters or parts of characters was present. It is plaintiff’s burden to prove infringement by a preponderance of evidence—specifically, to show that the accused form sets exhibit a mirror image on the back surface. SmithKline Beecham Corp. v. Apotex Corp., 365 F.3d 1306, 1325 (Fed. Cir. 2004).

Defendant postulates that “[t]he language of the claims is not satisfied by *some* visible mirror image at or on the back surface. It requires that the mirror image on said back surface be the result of the ink permeating *to* the back surface to form a mirror image on said back surface. Ink must be *on* the back surface.” Def.’s Br. filed June 15, 2004, at 3. To support this interpretation, defendant cites plaintiff’s continuation-in-part application, which sought to distinguish itself from United States Patent No. 1,727,912 (issued September 10, 1929) (the “Snyder patent”) by claiming an invention where “dye-based ink permeates through the sheet . . . to said back surface.” Defendant also relied on Dr. Lyter’s testimony that, under microscopic examination, PMOs that exhibited a mirror image on the back surface to the unaided eye in fact failed to exhibit ink that permeated into the fibers of the PMO.

Mr. Steele testified credibly and more persuasively that a person of ordinary skill in the art would read the patent requirement of a mirror image on the back surface as one that is visually recognizable without the aid of a microscope. Guided by this criterion, plaintiff has demonstrated that the accused form sets infringe the patent-in-suit. Furthermore, even by the definition of “mirror image” proffered by defendant, some number of the accused form sets infringes the patent-in-suit.

2. Sufficiency of plaintiff’s sample size

Although plaintiff has the burden to show that the accused form sets infringe the patent-in-suit, plaintiff, despite defendant’s assertions to the contrary, need not prove that every PMO issued by the USPS after the issuance of the patent-in-suit infringes. See Bell Communications Research, Inc. v. Vitalink Communications Corp., 55 F.3d 615, 622-23 (Fed. Cir. 1995) (acknowledging principle “that an accused product that sometimes, but not always, embodies a claimed method nonetheless infringes”).

Dr. Pierre-Yves B. Cremieux testified as defendant’s expert in statistics. He performed a statistical analysis of Dr. Lyter’s and Mr. Steele’s analyses of mirror images appearing on the back surface of PMOs. Dr. Cremieux concluded that Dr. Lyter’s analysis of fifty PMOs was statistically significant, while Mr. Steele’s analysis of ten PMOs was not. His conclusion was based on the categories used by Dr. Lyter, which plaintiff effectively called into question on his cross-examination. The court does not give weight to Dr. Cremieux’s testimony because plaintiff was not required to prove that every imprint of the accused form set revealed penetration to the back of the money order. Mr. Steele established that, when imprinted, the ink penetrated in the manner claimed—not that the penetration could take place on occasion, but that the form sets functioned as claimed.

In addition, the fifty PMOs analyzed by Dr. Lyter were purchased two at a time, which signifies that they were purchased at only twenty-five USPS branches as part of only twenty-

five separate transactions. Thus, accounting for the dual purchases and microscope-determined categories, the court was unimpressed with the statistical superiority of Dr. Lyter's sample to the sample of ten PMOs that Mr. Steele analyzed for his report and the sample of sixteen PMOs that he analyzed at trial.

Nonetheless, both experts agreed that some of the sample PMOs did not exhibit a mirror image on the back surface. Mr. Steele's first sample showed that one of the ten, or 10%, of the PMOs did not exhibit a mirror image and thus did not infringe. His second sample showed that two of the sixteen PMOs, or 12.5%, did not exhibit a mirror image and did not infringe. Thus, Mr. Steele's analysis found that 90% of one sample and 87.5% of another infringed the patent-in-suit.

Defendant's only attempt to rebut plaintiff's showing was an attack on its statistical significance, rather than the underlying findings. Dr. Cremieux, although obviously learned in the field of statistics, failed to rebut the significance of Mr. Steele's findings in two sample sets of PMOs. Plaintiff, however, successfully attacked Dr. Lyter's methods, specifically the categories that he devised and his use of a microscope to disprove what appeared, to the naked eye, to be a mirror image on the reverse of sample PMOs. The substance of Mr. Steele's findings was not undermined at trial.

3. Lateral migration less than 0.012 inches

_____ Mr. Steele testified that each of the sample of ten PMOs that he examined for his report contained imprinted ink lateral migration of less than 0.012 inches. Dr. Lyter did not testify regarding the lateral migration found in his sample of PMOs, nor did any of defendant's other witnesses. Mr. Steele was convincing that lateral migration was less than 0.012 inches on the front surface of ten PMOs and that, as a matter of chemistry and ink dynamics, the lateral migration on the back surface would be less than on the front and, hence, less than 0.012 inches. Therefore, plaintiff met its burden by showing that the accused form sets exhibited total character face lateral migration of less than 0.012 inches on either side of the PMO and thereby infringed the patent-in-suit.

4. Reading the claims on the accused Moore form sets

Plaintiff has established that claims 1, 5, and 10 read on the accused Moore form sets, specifically that (1) the accused form sets permit "the permeation of dye-based ink through said sheet from its printed front surface to its back surface to provide on its back surface a mirror image of the image imprinted on said printed front surface," '283 patent, col. 16, ll. 31-35; see also List of Undisputed Issues at 1-3 (stipulating to presence of remaining claim limitations for the five-part form set), and that (2):

when the form set is impacted by the imprinting mechanism of the apparatus, the dye-based ink permeates through the sheet from said printed front surface to said back surface to provide the indicia in mirror image form on said back surface, the total character face lateral migration of the ink from any character perimeter surface on either surface of the sheet being no greater than about 0.012 inches.

‘283 patent, col. 18, ll. 14-22; see also List of Undisputed Issues at 3 (stipulating to presence of remaining claim limitations for five-part and single-ply form sets).

Plaintiff offered the testimony of John L. Alex, Esq., to read the claims on the accused products. While accepting Mr. Alex’s qualifications to read the claims, his testimony was rendered cumulative by the ample evidence demonstrating how the five-part Moore form set and one-sheet form set possess every limitation of claims 1, 5, and 10. See Sartor v. Ark. Natural Gas Corp., 321 U.S. 620, 627 (1944) (recognizing that trier of fact not bound to follow testimony of expert witness). The testimony of plaintiff’s witnesses Messrs. Koper and Steele in this regard was not amplified in any meaningful way. In fact, the court was impressed at how levelly Mr. McCartney approached his mandate as a defense witness when he did not undermine plaintiff’s case on infringement.

Plaintiff has proved by a preponderance of evidence that the accused Moore form sets infringe the ‘283 patent.

III. Defenses

Although the court has found that the accused form sets infringe the patent-in-suit, defendant has raised several affirmative defenses. Defendant cites plaintiff’s encouragement of the USPS to use the five-part form set, along with a lack of non-infringing alternatives, to create an implied license for the patent-in-suit. Regarding the single-ply form set, defendant argues that claims 10-16 of the ‘283 patent are invalid for obviousness based on prior art. Defendant also contends that Mr. French is a joint inventor of claim 16 of the ‘283 patent. Finally, defendant raises the defense that the claimed invention was on-sale for more than one year prior to the patent application date, which would bar plaintiff’s claims of infringement.

Patents are presumed valid, and the burden of proving invalidity rests on the party asserting invalidity. 35 U.S.C. § 282; Elan Corp., PLC v. Andrx Pharms., Inc., 366 F.3d 1336, 1340 (Fed. Cir. 2004). To prevail defendant must meet the heavy burden of establishing invalidity by a showing of clear and convincing evidence. Intellectual Prop.

Dev., Inc. v. UA-Columbia Cablevision of Westchester, Inc., 336 F.3d 1308, 1319 (Fed. Cir. 2003).

1. Implied license

An “incident to the purchase of any article, whether patented or unpatented, is the right to use and sell it, and upon familiar principles the authorized sale of an article which is capable of use only in practicing the patent is a relinquishment of the patent monopoly with respect to the article sold.” Anton/Bauer, Inc. v. PAG, Ltd., 329 F.3d 1343, 1349-50 (Fed. Cir. 2003) (quoting United States v. Univis Lens Co., 316 U.S. 241, 249 (1942)). To establish an implied license, defendant must show that plaintiff’s imprinter and cartridges had no non-infringing uses. Jacobs v. Nintendo, Inc., 370 F.3d 1097, 1100 (Fed. Cir. 2004).

Defendant argues that the USPS is entitled to an implied license to practice the ‘283 patent because the imprinters and ink cartridges that it purchased from plaintiff have no use other than with the accused five-part form sets. An implied license may arise “by acquiescence, by conduct, by equitable estoppel (estoppel in pais), or by legal estoppel.” Wang Labs., Inc. v. Mitsubishi Elecs. Am., Inc., 103 F.3d 1571, 1580 (Fed. Cir. 1997). To find an implied license, a court looks for “an affirmative grant of consent or permission to make, use, or sell: i.e., a license.” Id. at 1581. According to defendant, Mr. Koper, on behalf of plaintiff, granted the USPS an implied license through his “active involvement in proposing and encouraging the use of the patented five-part form set in order not only to meet the USPS’ needs, but also to foster [plaintiff’s] sales of its imprinters and its inked ribbon cartridges.” Def.’s Br. filed June 15, 2004, at 8.

When plaintiff began designing its imprinter, it was not for use in the later-patented form set. It was only after plaintiff had been awarded the imprinter contract that, in response to a request from the USPS, it began to design a form set that imprinted the money order voucher and customer receipt at the same time. The imprinter originally was designed for the form set described as “Alternative 3” in the USPS solicitation, which contained only one sheet of OCR-grade carbon and did not have a separate sheet for the customer receipt. Thus, plaintiff’s imprinter and ink cartridge could be used with, and in fact were designed for, a non-infringing form set.

Mr. French stated that any “standard 24-pound cylinder mould made paper as made by that industry would function in the Paymaster imprinter.” Tr. at 1153. In addition to the form set for which the imprinter was designed, Mr. Steele testified that coating on the back surface of paper stock that would prevent a mirror image would constitute a non-infringing alternative. With uncontradicted testimony of the existence of non-infringing alternatives, defendant failed to prove an implied license for the patent-in-suit.

2. Obviousness

A patent is unavailable “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.” 35 U.S.C. § 103(a). In analyzing obviousness, the court inquires into “(1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations, if any, of non-obviousness.” Golight, Inc. v. Wal-Mart Stores, Inc., 355 F.3d 1327, 1336 (Fed. Cir. 2004) (citations omitted).

A *prima facie* case of obviousness is based on a combination of various references that show “some teaching, suggestion or motivation in the prior art to make the specific combination that was made by the applicant.” In re Dance, 160 F.3d 1339, 1343 (Fed. Cir. 1998). As part of the analysis, a hypothetical person of ordinary skill in the art is presumed to have knowledge of all prior art in the relevant field. Plaintiff may rebut a *prima facie* case of obviousness upon a showing of secondary factors, such as commercial success and long-felt need. WMS Gaming, Inc. v. Int’l Game Tech., 184 F.3d 1339, 1359 (Fed. Cir. 1999).

Defendant argues that claim 10 of the ‘283 patent is invalid for obviousness in light of United States Patent 3,677,887 (issued July 18, 1972) (“Rowsam”). Mr. McCartney compared the patent-in-suit, the ‘283 patent, with Rowsam. Rowsam teaches an anti-counterfeiting betting ticket that is imprinted with ink which “penetrates completely through the sheet and is readily visible from the reverse side.” Rowsam, col. 5, ll. 43-44.

Mr. McCartney testified that Rowsam “implies that indicia will be readily visible from either side” and thus appears to disclose a mirror image on the back. Tr. at 397. Unlike the patent-in-suit, Rowsam does not specifically disclose a mirror image on the reverse surface. Mr. McCartney therefore relies in part on the patent drawings. As a matter of law, reliance on the patent drawings is unacceptable. See Nystrom v. Trex Co., 374 F.3d 1105, 1117 (Fed. Cir. 2004) (applying precedent “that arguments based on drawings not explicitly made to scale in issued patents are unavailing”).

Rowsam also discloses indicia that are imprinted “without objectionable lateral bleeding” of the ink, but fails to disclose an actual dimension. By comparison, claim 10 of the ‘283 patent discloses a maximum lateral migration, or bleeding, of less than 0.012 inches.

The parties do not dispute that the USPS imprinted the accused form sets with a dye-based ink. List of Undisputed Issues at 3. To control lateral migration, Rowsam discusses the use of a mineral spirit printing ink. According to Mr. McCartney, the use of mineral ink

in Rowsam has a “terrific amount to do with” ink drying time. Tr. at 426. Mineral spirits mixed into an ink weaken paper and allow the ink to penetrate through the sheet, as well as control the amount of lateral migration.

Countering Mr. McCartney’s analysis, Mr. Steele, the expert in dye-based inks, observed that mineral spirits, in addition to being quick drying, also degrade plastics. Thus, a mineral spirit ink would not be appropriate for an ink cartridge or printer that uses plastic gearing, because it would cause the plastic to break down and fuse together, thus making it an unsuitable formulation for use with plaintiff’s PMO imprinter. For the same reason, mineral spirits could not be used with an ink-bearing ribbon, such as used in plaintiff’s imprinter: They would dry out the ribbon and shorten its life span. Thus, the effectiveness of Rowsam in controlling lateral migration is attributable to the use of mineral spirits, which, per Mr. Steele’s uncontroverted testimony, would degrade plastic machinery and dry out ink ribbons.

In addition to the use of mineral spirits, Rowsam calls for treatment of the paper, including sizing, thermosetting, resin, and wax, to facilitate ink penetration. Rowsam teaches an invention that produces a betting ticket with four times the stiffness of the money order produced in the ‘283 patent. The paper ticket has a measured stiffness of 900 milligrams, significantly higher than the 150 milligrams required of the PMO. In addition to using a specialized paper that is stiffer than a PMO, the betting ticket described by Rowsam has a paper weight of 45 to 120 pounds, whereas the PMO described by the patent-in-suit is 24 pounds, the industry standard for negotiable instruments.

These features of Rowsam combine to describe an invention that does not render obvious a much thinner, lighter document; is not subject to special paper treatment; and is imprinted using an impact printer with ink that does not include mineral spirits. Defendant has been unable to prove the *prima facie* case of obviousness. The ink formulation and difference in paper stiffness and thickness prevent Rowsam from anticipating an invention that would produce an acceptable money order.

Even if defendant were to have met its *prima facie* case, secondary factors would have rebutted the claim of obviousness: The patented form sets have enjoyed overwhelming commercial success, as the volume used by the USPS evidences. In addition, the introduction of the five-part form set met the USPS’s urgent need to develop a form that would operate in plaintiff’s printer, resist alteration, and be OCR-readable. Defendant cannot show that the patent-in-suit was rendered obvious by the prior art.

3. Joint invention

Patent issuance “creates a presumption that the named inventors are the true and only inventors.” Bd. of Educ. v. Am. Bioscience, Inc., 333 F.3d 1330, 1337 (Fed. Cir. 2003). While a patented invention may be the work of “two or more persons jointly,” 35 U.S.C. § 116 (2000), each inventor must “generally contribute to the conception of the invention[.]” Bd. of Educ., 333 F.3d at 1337. The conception required for inventorship is the “formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention as it is applied in practice.” BJ Servs. Co. v. Halliburton Energy Servs., Inc., 338 F.3d 1368, 1373 (Fed. Cir. 2003).

Defendant’s burden to establish joint inventorship is a heavy one and must be discharged with proof by clear and convincing evidence. Hess v. Advanced Cardiovascular Sys., Inc., 106 F.3d 976, 980 (Fed. Cir. 1997). The high level of proof is imposed because “the temptation for even honest witnesses to reconstruct, in a manner favorable to their own position, what their state of mind may have been years earlier, is simply too great to permit a lower standard.” Amax Fly Ash Corp. v. United States, 514 F.2d 1041, 1047 (Ct. Cl. 1975); see also Hess, 106 F.3d at 980 (explaining that “there is an equally strong temptation for persons who consulted with the inventor and provided him with materials and advice, to reconstruct, so as to further their own position, the extent of their contribution to the conception of the invention”).

A person does not qualify as a joint inventor for providing the patentee with well-known principles or explaining the state of the art, without having a “firm and definite idea” of the claimed combination as a whole. Bd. of Educ., 333 F.3d at 1338 (quoting Ethicon, Inc. v. United States Surgical Corp., 135 F.3d 1456, 1459-60 (Fed. Cir. 1998)). Joint inventors must actually collaborate, 35 U.S.C. § 116, and each inventor “must contribute to the joint arrival at a definite and permanent idea of the invention as it will be used in practice.” Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223, 1229 (Fed. Cir. 1994).

To qualify as a joint inventor, it is not sufficient merely to provide a detailed request or product specification to the patentee. See Morgan v. Hirsch, 728 F.2d 1449, 1451 (Fed. Cir. 1984). “The line between actual contributions to conception and the remaining, more prosaic contributions to the inventive process that do not render the contributor a co-inventor is sometimes a difficult one to draw.” Eli Lilly & Co. v. Aradigm Corp., No. 03-1336, 2004 U.S. App. LEXIS 15144, *13 (Fed. Cir. July 20, 2004).

Incident to trial the parties stipulated that defendant’s attribution to Mr. French of joint inventorship with respect to the ‘283 patent “is limited to the allegation that Mr. French is a co-inventor of claim 16, which incorporates by reference claim 10.” List of Undisputed

Issues at 3. The focus of proofs is the role that Mr. French played regarding the use of an absorbing type paper that exhibits “accelerated fiber structure breakdown upon abrasive attack.” ‘283 patent, col. 18, ll. 43-44.

Both Messrs. French and Koper testified that they discussed frangible paper manufactured by Portals during the spring of 1990. However, Mr. Koper was aware of frangible paper, or paper with accelerated fiber breakdown, from his earlier work on the imprinter contract bid solicitation. Mr. Koper’s notes from a 1986 meeting with Uarco, another security paper manufacturer, record that he discussed security paper that resisted abrasive attack. This common knowledge of frangible paper was supported by Mr. McCartney, who testified that such paper, which defendant claims was first suggested by Mr. French, has been known since the 1970s.

Even if defendant were persuasive in arguing that Mr. French informed Mr. Koper of paper with an accelerated fiber breakdown, the type that later was used in the money order portion of the PMO form set, this alone would not establish co-inventorship. As the Supreme Court stated when it held that Samuel Morse’s discussion with other scientists did not alter his status as sole inventor of the telegraph:

No invention can possibly be made, consisting of a combination of different elements . . . without a thorough knowledge of the properties of each of them, and the mode in which they operate on each other. And it can make no difference, in this respect, whether [the inventor] derives his information from books, or from conversation with men skilled in the science. If it were otherwise, no patent, in which a combination of different elements is used, could ever be obtained.

O’Rielly v. Morse, 56 U.S. 62, 111 (1853).

Mr. French’s contribution to the patented form set is akin to the specification set forth in Morgan. Simply informing Mr. Koper of the type of paper to be used in a form set would not satisfy defendant’s burden of proving that Mr. French was a joint inventor. Mr. French was candid regarding his view of the roles that plaintiff and he played in developing the PMO:

The development of the U.S. postal money order is owed entirely to the work of Bob Koper and his team at [plaintiff], the team at [Moore], the team at Portals Bathford, and there are other research facilities in England, and the U.S. Postal Service. On the surface it may appear to people who are not familiar with it, it seems to be a relatively simple thing, taking a piece of paper,

putting an image on it, and the[n] imprinting it. But in fact it's a very, very complex thing that involves extremely hard work on the part of Bob Koper and his staff, extremely diligent and excellent work, as well as on the part of Moore, on the part of Portals, and myself.

Tr. at 1149-50. Mr. French played the part of the reluctant co-inventor, who, rather than claiming that the invention was his, recognized the contributions of Mr. Koper and others to solving the USPS's problem of easily altered PMOs. In fact, when Mr. French learned about plaintiff's patent, he did not react like a slighted co-inventor: "I didn't care one way or another. Mr. Koper took the attitude that the [PMO form set] wasn't my business to why, when or how. As far as I was concerned, that's the Postal Service[']s business. And I'm not a patent attorney. Quite frankly, it all seemed like a lot of goobly-gook to me at the time." Id. at 1168.

At the conclusion of his testimony, Mr. French again praised plaintiff's efforts at solving the PMO problem: "Mr. Koper's company and the others were a very, very, very big part to that, and without dedicated people like Mr. Koper, none of it would have happened." Tr. at 1171. Mr. French was a dedicated USPS employee seeking to solve a problem with altered PMOs. He enlisted the help of plaintiff, which developed, in accordance with Mr. French's specifications, a PMO imprinting system and form set.

Trial revealed that Mr. Koper was involved with the real-world realization of the invention, whereas Mr. French was focused on implementing the new PMO form set. Defendant thus did not meet its burden to prove that Mr. French was an unnamed joint inventor.

4. On-sale bar

An inventor will not be entitled to a patent if the invention was "on sale in this country, more than one year prior to the date of the application for patent in the United States." 35 U.S.C. § 102(b). The on-sale bar cannot arise unless the invention was "(1) the subject of a commercial offer for sale and (2) 'ready for patenting' prior to the critical date." Honeywell Int'l v. Hamilton Sundstrand Corp., 370 F.3d 1131,1145 (Fed. Cir. 2004). "A sale is 'a contract between parties to give and pass rights of property for consideration which the buyer pays or promises to pay the seller for the thing bought or sold.'" Zacharin v. United States, 213 F.3d 1366, 1370 (Fed. Cir. 2000) (quoting In re Caveney, 761 F.2d 671, 676 (Fed. Cir. 1985)).

Defendant must show that the invention was ready for patenting with either "proof of reduction to practice before the critical date; or [with] proof that prior to the critical date the

inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention.” Pfaff v. Wells Elecs., Inc., 525 U.S. 55, 67-68 (1998).

A patent claim in a continuing application is to be awarded the filing date of an earlier application for all claims supported by the disclosure in the original application. 35 U.S.C. § 120. “In order to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier application must comply with the written description requirement of 35 U.S.C. § 112.” Lockwood v. Am. Airlines, Inc., 107 F.3d 1565, 1571 (Fed. Cir. 1997).

To satisfy the written description requirement, “the disclosure as originally filed need not provide in haec verba support for the claimed subject matter at issue.” Lampi Corp. v. Am. Power Prods., Inc., 228 F.3d 1365, 1378 (Fed. Cir. 2000). Thus, for a continuation-in-part application to be entitled to the priority date of its parent, the earlier application “does not have to describe exactly the subject matter claimed,” In re Gosteli, 872 F.2d 1008, 1012 (Fed. Cir. 1989), but the applicant must “convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of *the invention*[.]” Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563-64 (Fed. Cir. 1991). Entitlement to an earlier filing date does not extend to “subject matter which is not disclosed, but would be obvious over what is expressly disclosed.” Lockwood, 107 F.3d at 1571-72.

The parties stipulated that defendant has established an offer of sale prior to January 28, 1991, of a form set that possessed all limitations of claims 1 and 5 of the ‘283 patent—the five-part form set. List of Undisputed Issues at 3. The parent application, filed on October 10, 1989, discloses claims 1 and 5 of the ‘283 patent and disclosed “[a]t least the uppermost carbon paper sheet in OCR waxed paper.” The ‘283 patent, refined by the experiments of Mr. Koper, made a claim for a form set consisting of two sheets of OCR-grade carbon interleaf. ‘283 patent, col. 16, ll. 45-47. Consulting the Preferred Embodiment of plaintiff’s ‘670 application, Mr. Steele testified that one of ordinary skill in the art at the time would be familiar with OCR-grade carbon paper and would read the preferred embodiment to include two form sets: the first with one OCR-grade carbon and one non-OCR carbon and a second with two sheets of OCR-grade carbon. Defendant’s witness, Mr. McCartney, did not contradict Mr. Steele by taking the position that one skilled in the art would not have read “at least” to include both carbon interleaves. Because the parent application discloses what is later claims 1 and 5 of the ‘283 patent, the patent-in-suit is entitled to the filing date of the earlier application.

The parties have agreed that claim 10 of the patent-in-suit is to be given a date of invention of January 28, 1992. List of Undisputed Issues at 3. Thus, it was defendant’s

burden to show an invalidating offer or sale prior to the critical date of January 28, 1991. Because defendant was unable to produce evidence that PMO form sets encompassing claim 10 of the patent-in-suit were offered or sold prior to January 28, 1991, the patent-in-suit was not anticipated under the standards of 35 U.S.C. § 102(b).

IV. Reasonable royalty

When the United States uses a patented invention without a license, the inventor may recover in the Court of Federal Claims “his reasonable and entire compensation for such use and manufacture.” 28 U.S.C. § 1498(a) (2000). The United States takes a non-exclusive license for each individual infringing item when that item is first manufactured or used. Decca Ltd. v. United States, 225 Ct. Cl. 326, 334, 640 F.2d 1156, 1166 (1980). In awarding compensation, courts apply just compensation principles and treat the Government’s actions as an improper Fifth Amendment taking of a nonexclusive license under the patent. Leesona Corp. v. United States, 220 Ct. Cl. 234, 250, 599 F.2d 958, 968 (1979).

The value of the Government’s license is based on a reasonable royalty, which has been defined as

the amount that a person, desiring to manufacture [, use, or] sell a patented article, as a business proposition, would be willing to pay as a royalty and yet be able to make [, use, or] sell the patented article, in the market, at a reasonable profit. When an established royalty does not exist, a court may determine a reasonable royalty based on hypothetical negotiations between willing licensor and licensee.

Wang Labs., Inc. v. Toshiba Corp., 993 F.2d 858, 870 (Fed. Cir. 1993) (internal quotations and citations omitted).

In the hypothetical negotiation, it is assumed that the negotiators for the licensor and licensee have knowledge of all factors bearing on the value of the license. Fromson v. W. Litho Plate & Supply Co., 853 F.2d 1568, 1575 (Fed. Cir. 1988). The amount of compensation is determined only by the loss of property to the plaintiff and not based on some portion of the benefit conferred to the Government. United States v. Chandler-Dunbar Water Power Co., 229 U.S. 53, 69 (1913).

The factors that are considered in the hypothetical negotiation were set forth in Georgia-Pacific Corp. v. United States Plywood Corp., 318 F. Supp. 1116, 1120-21 (S.D.N.Y. 1970), modified and aff’d, 446 F.2d 295 (2d Cir. 1971). See Micro Chem., Inc. v. Lextron, Inc., 317 F.3d 1387, 1393 (Fed. Cir. 2003) (endorsing hypothetical negotiation

and Georgia-Pacific factors). The parties' experts undertook their valuations utilizing the factors that each deemed to apply.

Joseph Gemini, a certified public accountant and principal in the accounting firm of Duggan, Kenning, and Gemini, testified for plaintiff as an expert on the calculation of a reasonable royalty. After reviewing the facts of this case, as well as similar scenarios, he determined that a reasonable royalty would be between 5% and 6% of the cost of the forms purchased from Moore. This royalty would apply to a base of \$55,923,969.47, the cumulative purchase price of Moore form sets from May 12, 1994, to February 29, 2004. Testifying for defendant was Augville Jackson, Jr., an expert in patent licensing and patent licensing negotiations. In contrast to Mr. Gemini, whose experience in licensing negotiations has been in the capacity of an expert witness, Mr. Jackson has worked in licensing patents since 1954, notably as patent counsel for Reynolds Metals and Robert Shaw Controls. Mr. Jackson was a competent and methodical expert, who possessed a remarkable wealth of experience in conducting license negotiations. It is not impertinent to remark that Mr. Jackson, a gentleman of advanced years, belies the notion that professional relevance diminishes with age. According to Mr. Jackson, an appropriate royalty factor would be 1.5% of the purchase price of PMO form sets sold by Moore to the USPS.

Plaintiff has not licensed the '283 patent, so Messrs. Gemini and Jackson were unable to apply an established royalty; thus, the first of the Georgia-Pacific factors is inapplicable. Likewise, the experts agreed that the second factor, comparable license rates paid by the licensee, is inapplicable, although Mr. Gemini testified that royalties for paper products are in the range of 2% to 10%.

The third factor, the nature and scope of the license, favors a lower royalty because licenses with the Government are non-exclusive. Likewise, the experts agreed that the fourth factor, plaintiff's policy of maintaining the patent monopoly, would favor a lower royalty, considering that plaintiff is not a manufacturer of form sets and must license the '283 patent in order to profit from it. The fifth factor involves the relationship between the licensor and licensee. At the time of the hypothetical negotiation, the USPS was the only potential customer for the form sets, and the USPS does not compete with plaintiff. These factors favor a lower royalty.

For the sixth factor, the experts considered the effect of selling the patented specialty in promoting sales of other licenses, non-patented items, and any derivative sales. Both Messrs. Gemini and Jackson considered the sixth factor to be inapplicable to the case at bar.

The seventh factor, the remaining life of the patent, favors a higher royalty. At the time of the hypothetical negotiation, the '283 patent had a remaining life of seventeen years,

or until March 8, 2001. Mr. Jackson considered the remaining life irrelevant; however, Mr. Gemini explained that the length of time is relevant because it limits the USPS's ability simply to wait for the patent to expire. In addition, the fact that the patent-in-suit is used for the newer POS system further testifies as to its continuing value over time. The remaining life of the patent therefore favors a slight increase in the royalty.

The experts agreed that the eighth factor—the profitability of the product, commercial success, and current popularity—was largely neutral. The accused form sets have been substantially used by the USPS from the time the patent has been issued to the present; however, there was no showing that substantial profits accrued from the sale of accused form sets.

The ninth factor examines the utility and advantages of the patent property. The evidence presented at trial confirmed that, at least to some degree, the PMO system contributed to a reduction in altered money orders. Plaintiff's patented form sets have been in substantial use by the USPS, and this factor favors an increase in the royalty. Likewise, the tenth factor, the character of the commercial embodiment and benefits to those who use the invention, favors an increased royalty. Although plaintiff itself has not used the invention, Moore and the USPS received the benefit of a PMO that resists alteration and yet is also OCR-readable. This invention, along with plaintiff's imprinter and ink cartridge, solved the urgent problem of altered PMOs, a great benefit to the USPS.

Georgia-Pacific factor eleven considers the extent to which the infringer has made use of the invention. The USPS has used a large number of accused PMOs, issuing 1.838 billion PMOs from March 8, 1994, to September 20, 2002. Factor eleven strongly favors a higher royalty.

Factor twelve compares the portion of the profit or selling price that may be customary for the use of the invention or analogous inventions. The infringing five-part form set contains various types of paper that are subject to other patents, such as Portals' patent on its security paper that is used to make the money order voucher, the top sheet in the form set. The inclusion of various patented materials in an invention is referred to as a "stacked royalty." When considering the reasonable royalty of the accused device, the stacked royalty of other patents involved in the form set must also be considered.

Georgia-Pacific factor thirteen is the portion of the realizable profit that should be credited to the invention as distinguished from non-patented elements like the manufacturing process, business risks, or significant features or improvements added by the infringers. Mr. Jackson credited the USPS—and Moore—with making the accused form set successful and would thus lower the royalty to account for their contributions. Mr. Gemini, on the other

hand, testified that a higher royalty would be warranted considering the urgency that the USPS acknowledged in solving the problem of altered PMOs and the great utility of plaintiff's form sets in rectifying that problem.

Factor fourteen requires consideration of the opinion of qualified experts, which was accomplished through the testimony of Messrs. Gemini and Jackson. The fifteenth and final Georgia-Pacific factor directs the court to examine the amount that a licensor and licensee would have agreed upon at the time of infringement if both had been reasonable and had attempted to voluntarily reach an agreement, the so-called "hypothetical negotiation."

Mr. Gemini found guidance in a settlement agreement containing a negotiated royalty between Travelers Express Co., Inc. ("Travelers"), and American Express Integrated Payment Systems, Inc. ("American Express"), involving patents on a money order system. In their negotiations Travelers and American Express proposed royalties ranging from \$0.003 to \$0.050 per money order. To supply a rule based on the hypothetical negotiation, Mr. Gemini extrapolated the results from the Travelers/American Express settlement to determine the appropriate royalty for the accused form set. Assuming that the parties came to a consensus in the middle of their negotiated range, Mr. Gemini determined an approximate royalty for the Travelers settlement at \$0.025 per money order system. Furthermore, assuming that Travelers held ten patents for the money order and that each one was equally weighted, Mr. Gemini calculated that each of the ten patents would be worth a royalty of \$0.0025, which is 10% of the cost of a single money order. In deference to the Georgia-Pacific factors, which, he acknowledged, as applied in this case, favor a royalty lower than the Travelers situation, Mr. Gemini determined that a proper royalty for the accused form set would be between 5% to 6%.

Mr. Jackson countered that, considering all of the Georgia-Pacific factors, a hypothetical negotiation would result in a reasonable royalty of 1.5% of the cost of the accused form sets. He discounted as not relevant an extrapolation based on the Travelers settlement because it involved different technology—an entire system for imprinting and managing money order—rather than only the form set. Furthermore, Mr. Jackson could not ascertain the exact number of patents involved in Travelers' money order system, noting that reports ranged from seven to seventeen patents.

Mr. Gemini's testimony displayed a straightforward analysis and familiarity with numbers, prized skills for any accountant. However, his analysis was heavily reliant upon the Travelers settlement, which contributes little relevance to the current proceedings. In the Travelers settlement, the negotiated royalty was for an entire money order dispensing and imprinting system, unlike the form sets covered by the patent-in-suit. The Travelers settlement was motivated by ongoing litigation and designed to settle a lawsuit, conditions

which counsel against projecting it into a hypothetical negotiation between voluntary and willing licensee and licensor.

Although Mr. Jackson was a competent and methodical expert, who possessed experience in conducting license negotiations, his analysis failed to account for several of the relevant factors which would have increased the royalty. Cross-examination revealed that Mr. Jackson did not consider the alteration-resistant properties of the patented form sets. In considering the sixth Georgia-Pacific factor, Mr. Jackson determined that plaintiff would not have sold any of its patented imprinters or ink cartridges had the patented form sets not been available to the USPS. This assertion, however, was contradicted by evidence that plaintiff had been awarded the imprinter contract as part of a 1987 solicitation using a different form set, years prior to the development of the patented form sets. Furthermore, Mr. Jackson did not consider the benefit to the USPS of its PMO operation, including its income generated from the float, when considering factor eight, as well as the benefit to the USPS of a PMO form that resists alteration.

The analysis of the Georgia-Pacific factors, in the context of the experts' respective recommendations of 6% and 1.5% royalties, forms the basis for the court's determination. The court finds the royalty arrived at during the hypothetical negotiation would be closer to Mr. Jackson's 1.5%, in general agreement with this witness' more informed approach to applying the Georgia-Pacific factors. The rate must be increased by 2% to 3.5% to account for the omissions in Mr. Jackson's analysis. The 3.5% royalty is to be applied to the base of PMO sales, which the parties agree is \$55,923,969.47.

Defendant has shown, and plaintiff has conceded, that not all accused form sets in fact infringe—whether due to the problem of used ink cartridges or a vagary in manufacture that may account for the lack of universal penetration of ink to the reverse of the money order. Thus, defendant requests a reduction in the base for the number of sample PMOs that were shown to not infringe. Plaintiff has made a showing that the accused form sets infringe the patent-in-suit, and defendant has provided no legal authority for the proposition that plaintiff must also show, that, as practiced by the USPS, every single PMO infringes. Contra Paper Converting Machine Co. v. Magna-Graphics Corp., 745 F.2d 11, 20 (Fed. Cir. 1984) (holding “[t]hat the machine was not operated in its optimum mode is inconsequential: imperfect practice of an invention does not avoid infringement”). In calculating the reasonable royalty, the experts accounted for the relative utility and value of the patent-in-suit, and therefore a reduction in the base would be inappropriate.

5. Interest

Generally, interest on claims against the United States is allowed only under contract or if an Act of Congress specifically so provides. See 28 U.S.C. § 2516(a) (2000). An exception arises, however, when a claimant is due “just compensation” under the Fifth Amendment. Awards for unauthorized use of intellectual property must be “reasonable and entire.” 28 U.S.C. § 1498(a) (2000). This formulation has been construed as a congressional authorization of interest for patent infringement cases, which Fifth Amendment principles control. See Waite v. United States, 282 U.S. 508, 509 (1931); ITT Corp. v. United States, 17 Cl. Ct. 199, 232-33 (1989) (citing cases).

Determining the proper rate of interest is an exclusively judicial function based on fact. ITT, 17 Cl. Ct. at 233. Compound interest may be awarded where justice so dictates based on the facts of a particular case.

In ITT defendant argued for the use of simple interest for delay damages. ITT discussed a line of eminent domain cases traditionally applying simple interest awards but found well-reasoned authority applying compound interest, as well. 17 Cl. Ct. at 237. In patent infringement actions, precedent supported the award of either simple or compound interest. Apportioning interest is left to the “informed discretion of the fact finder.” Id. “Delay compensation is derived from [the principle of obtaining ‘complete justice’ between the litigant and the United States], so that the United States may be required under the fifth amendment to pay prejudgment interest in section 1498 actions, even in the absence of a statute authorizing such payment.” Id. at 238. The court found that full compensation would require a patent holder whose award was delayed to be reimbursed as well for the loss of the use of those funds, necessitating in such a case that delay compensation required by the Fifth Amendment in 28 U.S.C. § 1498 be measured by compound interest. On the facts and circumstances, this court in ITT granted plaintiff an award of delay damages with compound interest.

Subsequent Court of Federal Claims cases have adhered to these principles. See Petro v. United States, 47 Fed. Cl. 136, 155 (2000) (finding in takings case that plaintiff was due compounded interest because, had plaintiff’s mineral rights been available to him, he would have used them for income-producing commercial purposes and applying 52-week Treasury Bill rates); Standard Mfg. Co., Inc. v. United States, 42 Fed. Cl. 748, 782 (1999) (awarding plaintiff royalty damages and delay compensation for royalty damages for patent infringement at compound interest rates corresponding to 52-week Treasury Bill rates for the pertinent time frame); Hatter v. United States, 38 Fed. Cl. 166, 182-83 (1997) (finding federal judges whose compensation was delayed deserved interest because Article III

required the “compensation” and applying 52-week Treasury Bill rates compounded annually).

In the instant case, defendant admits that “[d]elay compensation takes the form of interest applied to a reasonable royalty in order to compensate for the delay between when royalties would have been paid under a hypothetical license, and when a judgment is paid,” Def.’s Br. filed June 15, 2004, at 14, and states that the yield on 52-week Treasury Bills, compounded annually, is commonly used. Here, though, defendant suggests the yield on 26-week Treasury Bills, compounded semi-annually, with the mid-point of procurement, July 24, 1999, as the date from which delay compensation should be calculated. Defendant also suggests that the court request such calculations from the parties subsequent to a liability determination, but prior to the entry of final judgment. Plaintiff neither responded to this suggestion in its briefing nor discussed interest rates at trial.

CONCLUSION

Based on the foregoing, the court finds and concludes that plaintiff has established infringement of the ‘283 patent and that defendant has not satisfied the requisite burden of proof on any of its defenses. Accordingly,

IT IS ORDERED, as follows:

By September 10, 2004, the parties shall file a Joint Stipulation as to the amount of damages, and the Clerk of the Court shall enter judgment consistent therewith, with interest compounded annually at the rate of the 52-week Treasury Bills to run from May 12, 1994.

/s Christine O. C. Miller

Christine Odell Cook Miller
Judge