what eclipsed by wood-pulp papers for both wrapping and printing. About ninety per cent of the total quantity of fibrous raw material used in the manufacture of paper has been derived from wood. But there continues to be a comparatively large production of strawboard. Straw is likely to be more widely employed owing to the great draft upon wood by the growing demand for cellulose for the manufacture of rayon, cellophane, synthetic fibres, lacquers, plastics, and finishes. All these products are constantly increasing the demands for cellulose from the best softwoods. Manufacturers of these new products can outbid the paper industry, as their commodities command much higher prices than paper.

**PAPER FROM PEAT TURF**

About 1906 the American Peat Paper Company was incorporated in Maine with a capital stock, according to a contemporary prospectus, of $1,500,000. At its mill in Capac, Michigan, this company attempted to manufacture paper and board from peat, a carbonaceous substance formed by partial decomposition of various plants, more especially certain mosses. The mill was located near a peat bog of five hundred acres. This material had long been used for fuel. While Dr. Schäffer made paper of peat in the eighteenth century, this substance had not been used commercially for papermaking until Christian Esser, of Austria, conceived the idea of making use of the fibre for this purpose. The Esser process was brought to the United States in 1905. It was claimed that paper and board could be manufactured at the Capac, Michigan, mill for $12.50 a ton, the paper being composed of peat fibre mixed with waste paper.

**CORNSTALK PAPER**

The use of an annual crop in the nature of farm waste is exemplified by the once much-heralded cornstalk paper, which saw its greatest attempt at a boom in 1928-9. There appeared in 1928 a book with the title: *Farm Products in Industry*, by George M. Rommel, a technical chemist. The publication was announced as a book printed on cornstalk paper. An analysis of the paper proved that it was composed of twenty-five per cent cornstalk fibre, fifty-five per cent sulphite fibre, and twenty per cent flax fibre. The small percentage of cornstalk fibre might be considered as merely an admixture or a secondary stock. But where cornstalk paper was to afford the most relief was in the manufacture of newsprint. There were many press notices attesting the successful running of the new stock on newspaper presses, and a serviceable paper was made with sixty-five per cent cornstalk fibre and thirty-five per cent sulphite.

The advent of cornstalk paper was not so sudden as laster-day promoters might make it seem. Jacob Christian Schäffer had made paper in an experimental manner with cornhusks in 1766. As early as 1852 there was an American patent issued to Messrs. Allison and Hawkins for manufacturing paper from cornhusks, and in 1829 J. W. Cooper received a United States patent for making paper from rags, straw, and cornhusks. In 1828 William Cobbett had the title-page and contents leaf of his London-printed book *A Treatise on Corn* imprinted on paper made from the husks of corn that he had himself grown. Cornhusks being of much less density than wood, the transportation costs to the mill are a factor; to offset this there is the advantage of a rapid-growing crop that can be harvested six months after the seed is planted. While the cellulose content of the cornstalk is only about three fifths that of wood, it is a by-product of a necessary and valuable annual crop. The enthusiasm with which cornstalk paper was hailed about two decades ago seems to have waned somewhat. Interest will probably be revived again with some improvement in the processing which seems to be needed to put it on a better basis to compete with wood-pulp papers.

* In the fourth volume of the *Illustrated Catalogue of the Industrial Department of the International Exposition* (London, 1862), the section describing the Austrian exhibits is printed on "Indian-corn paper." This section was printed by the Imperial Royal Court and State Printing-Office, Vienna, and consists of 130 pages, including four pages devoted to an article entitled: "Utility of the Maize-plant," in which is outlined the use of cornhusks and stalks as papermaking material. The article was compiled by Dr. Alois Ritter Auer von Welsbach, chief director of the Imperial State Printing Establishment in Vienna, and director of the Imperial paper mill, Schögelmühl, near Cloggitz. The paper is in an excellent state of preservation and appears to have at least a small amount of rag fibre in its formation.
THE SOUTH SUPPLIES A NEW RAW MATERIAL

A new and hitherto unused source of paper pulp which has but recently emerged from the experimental stage is southern pine. While for some years past kraft wrapping paper and fibreboards have been made from the pulp of southern pine, it is only within recent years that a suitable white paper has been produced on a commercial basis. Newsprint of a good clear white colour, light in weight, and with good tensile strength for running on fast newspaper presses is now an actuality. This accomplishment promises to bring to the Southern states a new industry and contribute much to the welfare and industrial progress of the South, all due to the indefatigable work of Dr. Charles Holmes Herty (1867–1938), industrial chemist, whose inventiveness and resourcefulness achieved for him not only a technical success but a commercial one as well.

Southern pine had long been considered as of too resinous a composition to permit its pulpino without encountering difficulties from pitch. This notion resulted from a failure to observe that the older growth of trees contained a high resinous content while young trees were without it; that the heartwood, which is highly developed in the older trees, is the cause of the resin content, while sapwood, which is characteristic of the younger trees, is free from resin. In fact, from the sapwood of the yellow pine an almost pure white paper may be produced. Trees which have had as short a growth as six or seven years are usable, and at that age often reach a growth of six inches in diameter.

As long ago as 1931 Dr. Herty made a public statement that within five years from that time the making of newsprint from southern pine would be entirely feasible, and that a new industry of enormous proportions would arise in the South as the result. In 1933 nine Georgia newspapers printed their regular editions on newsprint made from southern pine. The wood from which the pulp was made was taken from trees fifteen years old. This pulp, consisting of seventy-five per cent ground wood and twenty-five per cent sulphite, was processed at a laboratory plant in Savannah. There being no mill in the South at the time equipped to run

newsprint, the pulp was shipped to Thorold, Canada, and converted into newsprint there. *

On January 17, 1940 the newly completed Southland Paper Mills at Lufkin, Texas, with a potential output of 150 tons daily, produced the first newsprint made from southern pine for continuous commercial consumption. This paper met every test of the fast-running newspaper presses and received high praise from the pressmen for its excellent running and printing qualities. Thus began a new phase of industrial development in the South.

* The following editorial regarding paper made from east Texas pine appeared in the Dallas Morning News, February 17, 1939: “Texas newspaper history is made with this edition of The News printed in small part on paper from the first roll of newsprint made from East Texas wood pulp. The pulp was shipped to Savannah from the same East Texas pine acreage that will serve the newsprint plant in Lufkin. The entire carload shipment was used in varied experiments by the Herty Foundation Laboratory and only part of it manufactured into newsprint. Of this, however, this first 17¾-inch roll rushed to Dallas from Savannah is a part. From a 17¾-inch wide roll of newsprint weighing 73 pounds approximately 2,500 pages can be printed. The News utilized the available supply to print as many copies of the editorial page as possible in the first run of today’s issue. So that for the first time in Texas newspaper publication, East Texas wood pulp has served the purpose for which in the course of the near future there is every reason to believe that it will be used daily. The News is proud of adding another historic ‘first’ to the many that have stressed this paper’s pioneering since its birth under the Republic of Texas. It is glad to give this convincing demonstration of the utility of the late Dr. Charles H. Herty’s experiments which with development will serve alike the pine wood producers of the state and the newspaper field.” Along with the article in the News there is a cartoon of a cowboy, on his horse, with outstretched hand holding a copy of the newspaper, on which appears: “Part of this paper is printed on paper made from East Texas pine.”
XIV

The Watermarking of Machine-Made Papers and the Use of Watermarks in Detecting Forgery

As stated in other parts of this book, the principle of the paper-machin was conceived in France in 1708, but it remained for English engineers to perfect the machine to a point where it was capable of producing usable paper on a commercial scale. The first commercially practical English-built machine was in use about the year 1812; the earliest paper-machine in America was put in operation in 1817.

The introduction of the continuous papermaking machine led to attempts to produce watermarks similar to the devices, symbols, and letters that had for more than five centuries been used in handmade papers. The problem of marking machine-made paper was finally solved by John Marshall with his invention of a wire-covered roll, with the designs upon it in wire, which rode over the tender sheet of paper just after it left the travelling wire-cloth of the machine. This invention took place in 1826 (Figure 275) or about fourteen years after the first commercially successful paper-machine was in operation in England. Therefore there was a short period when all paper produced by machine was totally unwatermarked, either with the "laid" pattern or with any emblems or lettering. The watermarking device became known almost immediately as the "dandy-roll." * Various types of these rolls are shown in Figures 276A, 276B, 277, 278, 279, 280. The construction of the dandy-rolls appears simple, but the manufacture of a workable roll involves considerable knowledge of metal and unlimited engineering skill.

The actual watermarking wires were originally bent by the use of pliers, as had long been the practice in forming the letters and watermarking roll was not patented by Marshall as no specifications are recorded under his name in the Great Seal Patent Office. Mr. Dudley Marshall thought that the unusual name of the roll originated when one of the workmen upon first seeing the skeleton roll expressed his delight by exclaiming: "Isn't that a dandy!" and from this casual remark the name was derived. During my several months' work in the Marshall establishment it was not my privilege to see the first dandy-roll made by Mr. Dudley Marshall's ancestor, but a short account of this device was given at a later date in a communication from Stoke Newington: "We have what we believe to be the first 'dandy-roll' that was ever made. It is partly of wood and is really copied from the hand-mould in which the wooden bars, or ribs, of the mould are fixed horizontally across the 'dandy-roll' making it round instead of flat, as is the case with the hand-mould. We look upon this roll as showing the change-over from handmade to machine-made paper. This wooden 'dandy-roll' was probably constructed about 1826."

The earliest English patent relative to the dandy-roll for marking paper on the paper-machine was granted to John and Christopher Flippes on January 11, 1825. An abridgment of this patent reads: "An improvement in machinery for making paper by employing a roller the cylindrical part of which is formed of 'laid' wire. The effect produced by the said cylindrical roller is that of making an impression upon the sheet of paper, or pulp, upon which the said roller passes, & thus the paper so made has the appearance of 'laid' paper (like that manufactured by hand). Therefore, the paper formed on the paper-machine before the year 1825 was of the "wove" type, so marked from the travelling wire of the machine.

* There has been considerable controversy relative to the origin of the so-called "dandy-roll" used in the watermarking of machine-made papers. The invention of this marking device is usually attributed to John Marshall, a member of the family firm of T. J. Marshall, London, paper mould-makers, established in 1792. When I was working in the Stoke Newington shop of this firm in 1912, Mr. Dudley Marshall, a direct descendant of the original inventor of the dandy-roll, was connected with the small office of the concern. Mr. Marshall told of the invention by his ancestor, but apparently the
Fig. 276A A dandy-roll, used in watermarking machine-made paper. After formation, the paper stock passes under the watermarking roll; in handmade paper the paper stock lies over the watermarking wires during the entire moulding of the sheet. The "laid" design of this roll had its origin in China over seventeen hundred years ago. See Figure 51. (Courtesy Joseph J. Plank)

Fig. 276B A dandy-roll of the "wooe" type used in watermarking machine-made paper. The "wooe" style of mould was used in China during the first years of papermaking. See Figure 47. In Europe handmade paper of the "wooe" design came into use about the year 1755 and was first conceived either by John Baskerville, the Birmingham printer, or by the James Whatman paper mill, Maidstone, Kent (Figure 101). The European invention was a rediscovery, as the Chinese originated the "wooe" mould.

Fig. 277 The construction of a dandy-roll used in the watermarking of machine-made papers. This picture gives a clear conception of the skeleton roll that supports the wire gauze upon which the watermarking devices are secured.

Fig. 278 A modern dandy-roll used in the manufacture of extremely light-weight papers, such as air-mail. A break in the "laid" wires causes a pattern to appear in the sheet of paper. The "chain" marks on this roll are made by disks, as seen by looking inside the dandy-roll. (Courtesy The Sinclair Company)
Fig. 279 A dandy-roll used in the manufacture of writing-paper. This is a journal-type roll, a model that is being replaced by the open-end roll as shown in Figures 278 and 280. (Courtesy The Sinclair Company)

Fig. 280 A dandy-roll used in the making of cigarette paper. The construction of this roll is similar to that shown in Figure 278. The “laid” lines in this particular roll are extremely fine, varying from 29 to 38 mesh, and the “chain” lines, as shown by the edges of the disks, are very shallow, protruding above the “laid” bars about .003”. Such rolls as this must be built with great accuracy. (Courtesy The Sinclair Company)

Fig. 281 The watermarking wires being bent by hand to form letters, emblems, and devices. Although this photograph was made in a modern dandy-roll factory, the same process was used in forming the watermarking wires for hand moulds. (Courtesy Joseph J. Plank)

designs that were sewed or laced with fine wire to the surface of hand-moulds (Figure 281). According to the Science Museum, South Kensington, London, the first use of solder in fastening the wire letters or designs to the rolls was the result of experiments made by Messrs. T. A. and C. D. Marshall, of the same firm responsible for the invention of the dandy-roll. The change from sewing to soldering took place in 1870 (Figure 282). In late years duplicate watermarking devices and designs have been made by the process of electrotyping. In applying the wire designs to modern hand-moulds the old sewing-on process is still used; with this method the watermarks may be changed from time to time and the same pair of moulds used for any number of different markings.

In dandy-roll watermarking, as with the hand-mould, it is possible to use the invention of William Henry Smith’s light-and-shade marks (Figure 283); or simple wire marks and the light-and-shade type may be used in combination (Figure 284). Naturally, the finest results in watermarking are to be found in papers
made on the hand-mould, or upon the cylinder of the mould-machine as described in Part XII, an imitation of the hand process. In both of these methods of forming watermarks the paper stock, or macerated fibre or pulp, is held upon, or over, the face of the embossed wire design during the entire formation of the sheet of paper, while in watermarking with a dandy-roll on a paper-machine the roll as well as the design upon its face passes above the newly formed web of paper after the fibres have been intertwined and felted. With the employment of the dandy-roll it is only natural that the finished paper will lack the clear-cut shading found in marks produced on the hand-mould. To achieve a distinct, well-defined watermark the paper pulp, or stock, should lie over the embossed wire during the complete process of paper formation. Also, much of the sharpness of a watermark, by hand or machine, depends greatly upon the kind of stock and upon its beating. As has been previously stated, the strength and endurance of handmade papers are often sacrificed in acquiring a brilliant and sharply modelled watermark; it is not to be expected that long, drawn-out fibre will produce a clear watermark in the paper.

The forming of the watermarking wire emblems and letters for use on a hand-mould does not involve any calculation as to the shrinkage or stretch of the paper, as the sheet is formed flat upon the mould. There are, to be sure, slight variations both ways, but these do not in any perceptible manner distort the mark in the finished paper. The same cannot be said in regard to the watermarking wires applied to a dandy-roll. As an example, in making a watermark of a four-inch circle to be used on a hand-mould, the wire circle would be made perfectly round, and in the paper formed on the mould the watermark would also be perfectly round. On a dandy-roll, however, a wire circle of this size would have to be distorted about three eighths of an inch. There is no definite scale upon which the amount of allowance for shrinkage and
stretch may be determined, as so much depends upon the weight and grade of paper being made. It is only through experience that the maker of dandy-rolls is able to arrive at the amount of distortion to place in the watermarking wires; no set formula for calculation is possible. To some extent the correctness of a circular watermark can be controlled by the operator of the paper-machine, by adjusting the “draws” on the machine, which may be set for normal stretch or to “pull” the sheet, which in turn causes excessive shrinkage.

**PAPER AND WATERMARKING IN DETECTING FORGERY**

In the seventeenth century within the old stone cloister of their Sicilian monastery the devout Camaldulians, a branch of the Benedictine monks, exhibited in a crystal case a much-worn letter bearing a printed label stating that the epistle had been written by the Virgin Mary, inscribed in her own hand. A most casual examination of the creased and folded letter, so carefully protected from the rays of the sun, would have revealed that it was written not upon parchment or papyrus, as it well could have been, but upon linen rag paper—a substance that did not come into existence until years after the death of the Virgin.

**THE SHAKESPEARE FORGERIES**

The eighteenth-century exploits of Thomas Chatterton (1752–70) and William Henry Ireland (1777–1835) will long remain the most interesting as well as the most incomprehensible of all literary forgeries. The work of Chatterton in producing spurious documents purporting to have been the writings of one Thomas Rowley, an imaginary fifteenth-century monk, were executed upon parchment and vellum, strips of which the young Bristol poet had rescued from the muniment room of the Church of St. Mary Redcliffe. Our primary interest in Chatterton, however, lies in the influence his forgeries may possibly have had upon Ireland rather than upon his actual counterfeits, inasmuch as Chatterton made use of the skins of animals for his forged calligraphic undertakings; he did not set down his fraudulent writing upon paper, and it is with paper that we are concerned.¹

William Henry Ireland was born in London, the son of Samuel Ireland, engraver, author, and occasional trader in rare books, manuscripts, and curios. In 1794 Samuel Ireland, accompanied by his son, journeyed to Stratford-on-Avon, where young Ireland became acquainted with John Jordan, a local poet of sorts, who had forged the last will and testament of Shakespeare’s father. This companionship and a knowledge of Chatterton’s work put ideas in young Ireland’s fertile mind. Knowing of his father’s deep interest in anything pertaining to Shakespeare, William Henry Ireland, seventeen years of age, undertook to produce forged manuscripts in imitation of Shakespeare’s unsteady hand, for no other purpose than to please and ingratiate his gullible father. Samuel Ireland incredulously accepted as authentic the forged leases, contracts with actors, letters, notes, and receipts, all supposedly in the calligraphy of William Shakespeare; the leading bibliophiles of London passed judgment upon the paper, ink, and writing of the documents and pronounced them genuine. Encouraged by the reception of his dexterity, young Ireland even forged a love letter of Anne Hathaway and enclosed a lock of hair with the note, all to the delight of his unsuspecting father and the deception of numerous experts of the day. Spurred by the success of his deceit, William Henry Ireland became so bold in his dubious undertaking that he compiled a complete new play which he attributed to Shakespeare’s pen, and the counterfeit production, *Vortigern and Rowena*, was given to a crowded audience in Drury Lane Theatre, London, on the night of April 2, 1796. All of these false documents supposedly unearthed by young Ireland were said by him to have been discovered in an old chest that had belonged to an ancestor, “William Henry Ireland,” who existed only in the imagination of the adolescent forger. According to the story told by the young man, the papers had been bequeathed to his ancestor in gratitude for having rescued Shakespeare from drowning in the Avon. It is needless to state that the forgeries were eventually discovered and the disgrace was no doubt responsible in hastening the death of the father, Samuel Ireland, who passed away in July 1800. Five years after his father’s death William Henry Ireland, filled with remorse, compiled his complete *Confessions*, which were published in London,² a book of 317 pages with a number of plates giving reproductions of the manuscripts he had so skilfully falsi-
fied. In reference to the paper and watermarks used by Ireland in his undertaking, the twenty-eight-year-old forger set down in his Confessions (pages 70–2) the following enlightening account:

... Being thus urged forward to the production of more manuscripts, it became necessary that I should possess a sufficient quantity of old paper to enable me to proceed: in consequence of which I applied to a bookseller named Verey, in Great May’s Buildings, St. Martin’s Lane, who, for the sum of five shillings, suffered me to take from all the folio and quarto volumes in his shop the fly-leaves which they contained. By this means I was amply stored with that commodity; nor did I fear any mention of the circumstance by Mr. Verey, whose quiet unsuspecting disposition I was well convinced would never lead him to make the transaction public; in addition to which, he was not likely even to know anything concerning the supposed Shakespearean discovery by myself; and even if he had, I do not imagine that my purchase of the old paper in question would have excited in him the smallest degree of suspicion. As I was fully aware, from the variety of watermarks which are in existence at the present day, that they must have constantly been altered since the period of Elizabeth, and being for some time wholly unacquainted with the watermarks of that age, I very carefully produced my first specimens of the writing on such sheets of old paper as had no watermark whatever. Having heard it frequently stated that such marks on paper would have greatly tended to establish their validity, I listened attentively to every remark which was made upon the subject, and from thence I at length gleaned the intelligence that a jug was the prevalent watermark of the reign of Elizabeth: in consequence of which I inspected all the sheets of old paper then in my possession; and having selected such as had the jug upon them, I produced the succeeding manuscripts upon these; being careful, however, to mingle with them a certain number of blank leaves, that the production on a sudden of so many watermarks might excite suspicion in the breasts of those persons who were most conversant with the manuscripts.

Much of Samuel Ireland’s correspondence in regard to his son’s forgeries, as well as numerous specimens of the Shakespeare counterfeits, are preserved in the British Museum.

THE CASE OF THE REVERSED WATERMARK

In more recent times a watermark in the paper of a will proved the deciding factor in a Tennessee court of law, the famous Cloth-
will was supposed to have been written. When the five attorneys employed by Koester, the claimant, were confronted with such deciding evidence, they immediately withdrew from the case. Probate Judge Henry Horner of the Chicago court was not long in dismissing Koester and his false will. It behooves the forger to look well to his paper, as there are many concealed factors continually lurking in the background over which the unwary swindler may stumble to his downfall.

THE CASE OF THE MISSING “B”

The Sudland case involved another forged will, which was said to have been found in an old trunk in 1923, “about 21 years after the death of the testator.” In so far as the testator was concerned, the will was properly dated, January 24, 1902, Shreveport, Louisiana, and to the casual untrained observer, the paper, watermarked “BERKSHIRE BOND U S A,” was apparently in order. The paper had been manufactured for Eaton, Crane and Pike, Pittsfield, Massachusetts, and, of course, the watermark should have been “BERKSHIRE BOND U S A,” a watermark that was not originally drawn until December 19, 1905. The paper bearing this mark was first placed on sale early in 1906. According to the records of the mill, between December 12, 1907 and October 11, 1909, the letter “B” in the word “Berkshire” accidentally became unsoldered from one of the individual markings on the dandy-roll; five different lots of paper were made before the missing “B” was discovered. The omission of the letter “B” would appear only in one sheet in a certain number, depending upon how many individual watermarking designs were on the dandy-roll. Regardless of the missing letter in the watermark, the paper used in writing this will was not made or marketed until four or five years after the death of the alleged testator and therefore it was obvious that the will was spurious.

SLIGHT CHANGES IN WATERMARKS

In innumerable instances watermarks have played their part in the detection of forged wills, documents, bills of sale, patents, and so on. Recently a will case involving millions of dollars hinged upon the changes in a watermark over a period of years. First the mark was of fairly large size; later it was reduced, but retained all of its former design; next a monogram was added; the monogram was then slightly changed; and still later the wording “MARK IN U S A” was added to the mark. All of these apparently minor changes had been carefully set down, with dates, in the records of the paper mill. In checking the watermark in the paper of the questioned will it was proved beyond doubt that the paper the forger had used had not been made until several years after the date of the document, and the fraud was immediately traced.

In another instance of a forged document the same watermarked paper had been made by four or five different mills, in various states of the Union. This involved considerable accurate measuring of the lettering and spacing, and through the slight curl of a single wire letter on the dandy-roll and the position of the design on the sheet of paper the date of manufacture was definitely established, and again the document was found to have been dated prior to the time the paper was actually made and in use. It is not unusual for letters and devices to come loose from dandy-rolls, or for letters and designs to become twisted and distorted, but such accidents are repaired as soon as possible. The paper already made, however, is sold and may in a few instances eventually lead to the discovery of fraud.

Several wills have been declared false through the forger’s premature use of paper bearing the well-known “Rag Content” watermark. In a disputed-will case in Texas a document dated in the twenties was written on paper bearing the legend “Rag Content.” This will was obviously detected as a forgery, as this mark was not registered with the United States Patent Office until December 23, 1930, and did not appear as a watermark in paper until January 15, 1930. The mark is the property of the Rag Content Manufacturers Association, and any paper so marked must contain at least twenty-five per cent rag fibre. The earliest use of the “Rag Content” watermark by the American Writing Paper Company was during October 1933. The term is fast becoming obsolete owing to the present-day use of linen and cotton fibres derived directly from the plants. For this reason the word “rag” has been deleted from fibre requirements in Federal specifications, and “linen and cotton” substituted. The term “linen” applies both
to the bast fibres from the flax plant from which linen cloth is made and to fibres derived from the cloth.

THE THOUSAND-DOLLAR-AN-HOUR CASE

Perhaps the greatest legal case of all time that hinged on paper and watermarking was that involving manufacturing rights on washing machines, and known in legal circles as "The thousand-dollar-an-hour case." This case centred on the Bendix Home Appliance Corporation, South Bend, Indiana, as plaintiffs, the Chamberlain-Bassett Corporation, Chicago, Illinois, as defendant, and the Boorg-Warner Corporation, Chicago, as intervening defendant. The case, tried in 1939, concerned a document that purported to have been drafted during December 1935, but through an examination of the paper used in writing the document the attorneys endeavoured to prove that this particular paper was not in existence at that date. The paper had been manufactured by the Southworth Paper Company, Mittineague, Massachusetts, and had been watermarked "GENUINE TRUSSELL." The case hung upon a broken letter "T" in the watermarking wires of the dandy-roll. In contemporary newspaper accounts of the lawsuit it was stated that the attorneys visited the paper mill and solicited the testimony of expert dandy-roll makers, papermakers, and chemists in an endeavour to prove through certain defects in the watermark and chemicals used in the paper that the document in question had not been written until 1939, or four years after the time it was dated. The master in this interesting case took testimony in the loft of the paper mill for several weeks, and an article in a local newspaper stated that $75,000 was expended on this case during the testimony carried on in the mill relative to the paper on which the allegedly forged document was written. Aside from the minute examination of the fifty-one slight variations of the watermarks, this case also involved the use of titanium dioxide, used by papermakers to give the paper more opacity. Apparently the earliest use of this chemical by the Southworth Paper Company was on November 26, 1935, but this particular paper was not shipped from the mill until February 21, 1936, or about two months after the date set down on the disputed document. In chemical tests the paper used in writing the document showed the presence of tita

num, which again gave convincing evidence that was introduced in court.

Almost every piece of paper, no matter when or where made, has its own peculiarities, and under the microscope and through chemical tests it may reveal many things that the layman never suspects. Therefore, it behooves the falsifier of documents, wills, letters, and the like to choose his writing material well; even the plainest and most harmless-appearing sheet of paper may hold elusive evidence that could readily be turned to the undoing of the most careful and painstaking forger.

For the modern plagiarist even to hope to succeed in perpetrating a series of perfect forgeries he would need to be a diligent student of paper and watermarking history, vegetable fibres and fibre formation, paper-sizing materials in all countries and periods, as well as a competent papermaker. He would necessarily be an ink-maker versed in the long history of ink, brushes, quills, pens, blotting sand, blotting paper, sealing wax, wafers, adhesives, stamps, seals, metal clips and pins; he would need to be experienced in the various printing processes, in printing inks and their application, with an expert knowledge of the characteristics and imperfections of all typewriters, type, spacing, and ribbons, to say nothing of years of study in the eccentricities of handwriting from all times, countries, and civilizations. Sooner or later the work of the most skilled and adept forger is detected by some slight detail inadvertently overlooked.

THE LANCASTER CASE

For the most part, the falsification of documents involving watermarks have been cases in which the malefactor has been apprehended through his unwitting use of paper that bore a watermark not in existence until after the date placed upon the spurious will, letter, or document; several such cases have been outlined.

It is indeed seldom that the counterfeiter is sufficiently versed in his "art" actually to have watermarked paper manufactured for the express purpose of carrying on his criminal practices. Individually watermarked paper is not easily obtained, and can only be had at great expense. The making of a watermark is an undertaking of complicated nature, involving the manufacture of a spe
cial dandy-roll; also the paper mills must be guaranteed the purchase of a great quantity of paper to justify a special run. In the so-called "Lancaster case" of almost fifty years ago we have an example of expert counterfeiting in both paper and printing. In 1899, in an old weather-beaten tobacco barn near Lancaster, Pennsylvania, two skilled workers, Taylor and Bredell, engaged in one of the most amazing forgeries in the annals of American crime. Every detail of the execution of this forgery was brazen in the extreme, embracing as it did the making of United States revenue stamps, a type of counterfeiting that any cautious and prudent forger would avoid with all his iniquitous will-power. Messrs. Taylor and Bredell, criminals extraordinary, engaged in the printing of false tobacco stamps, and as they were dextrous workers, they were not content with the use of any good, workaday bond paper that would have been acceptable to less skilled men of their particular calling. These two counterfeiters actually had a dandy-roll made to their order for the watermarking of the letters "U S I R," the initials used in the paper of all genuine stamps—United States Internal Revenue. Paper of the proper tint and weight with the correct watermark was procured by the forgers; both the dandy-roll and the paper were innocently made for these two arch counterfeiters by reputable American firms. The unsuspecting maker of the dandy-roll and the manager of the paper mill, both honest and upright manufacturers, were blindly led into the web of these clever counterfeiters through their explanation that the tinted paper with the "U S I R" watermark was desired by Messrs. Taylor and Bredell for wrapping bottles containing a special patent medicine of their own invention and concoction, which they blandly explained was called "Uncle Sol's Indian Remedy," hence the letters "U S I R." The famous Lancaster case is probably the only counterfeiting on record in which false revenue stamps were printed on watermarked paper bearing the proper initials.

COUNTERFEITING DURING PROHIBITION

In 1920, under the eighteenth amendment to the Constitution, the United States applied prohibition on a national scale. The Prohibition Act applied to such a tremendous and complex popu-

lation extending over such a large territory that this period is now known as the greatest social experiment of modern times. During this national experiment the Federal Prohibition Director issued various types of engraved "Permits to Purchase," "Withdrawal Permits," "Physicians' Prescriptions," and so forth. These handsomely engraved papers were used in the legitimate procurement of spirits for medical and other necessary purposes if properly endorsed and signed by a registered physician. Every year a newly designed prescription blank was introduced, each more elaborately engraved than its predecessor. All of these blanks from year to year, however, were printed on the same type of paper, bearing the watermark "Promarx" in outline letters, three eighths of an inch in height, distributed throughout the sheet in an all-over pattern. The complicated engraving and this watermark were intended to prevent counterfeiting of the blanks, which, it is needless to say, were in considerable demand, for only with one of these blanks, properly filled out and signed by a physician, could liquor be legally procured. The engraving could be duplicated by photographic methods and the endorsements and signatures would be only a routine matter for a forger, but to procure the "Promarx"-watermarked paper presented a real problem. At least half a dozen large-scale cases of falsely duplicate this watermark are recorded by the Treasury Enforcement Agencies of the United States Treasury Department. This series of forgeries in the manufacture of counterfeit liquor-withdrawal certificates represented an "investment" of thousands of dollars. During prohibition days there was probably more money involved in making feigned watermarked prohibition paper than in all previous counterfeiting in the United States combined. In but one instance $12,000 cash was paid for watermarked paper, a tidy sum that gives a little conception the part "big business" played in the liquor-permit forgeries that were perpetrated from 1920 throughout the period of prohibition. In recording these cases of counterfeiting, all names of dandy-roll makers, paper-manufacturers, and paper dealers have been omitted, as our interest lies in the method of accomplishing the forgeries and not in the manufacturers of the paper or the makers of devices used in its watermarking.
PHYSICIANS' PRESCRIPTIONS BY THE TON

The earliest case of attempting to counterfeit physicians' prescription certificates on a gigantic scale occurred in November 1921, when two men called at the office of a paper mill in Massachusetts and negotiated with the sales manager for one ton of sixteen-pound bond paper at thirty-six cents per pound. The paper was to be watermarked "VANCOUVER BRITISH COLUMBIA DOM. OF CANADA PROHIBITION INTERNAL REVENUE PROHIBITION" (Figure 285). The paper company, in all innocence, had a dandy-roll constructed with the watermarked letters as desired and the paper was manufactured. When completed, the cases of paper were shipped by express to the address given by the forgers: 150 Broadway, New York City. Later it was removed to a warehouse located at 265 West 117th Street, where the paper was deposited as household goods. On April 5, 1922, the cases of paper were moved to 232 Dumont Avenue, Brooklyn, and placed in a cellar under the pretext that the six cases contained sewing-machines. It is assumed that this particular lot of paper had apparently been ordered by the professional counterfeiters as a subterfuge, or per-
haps certain parts of the paper were to be cut and used in counterfeiting. In any event, the paper was seized by special agents of the Internal Revenue Bureau on May 9, 1922.

Not to be outdone, the counterfeiters, during July 1922, ordered another ton of sixteen-pound bond paper from the same Massachusetts paper mill that had furnished the previous two thousand pounds. With this second order, however, the watermark was to be changed on the dandy-roll to the regulation all-over pattern of the word “Prohibition” exactly as used on the legitimate withdrawal permits of the Prohibition Act. To this end the bold counterfeiters furnished an original drawing of the precise watermark they wished placed in the paper (Figure 286). Here again the wording “Vancouver B. C.” was introduced in such a manner that these lines could be cut from the sheets, and the balance of the watermarked paper used for false certificates. This paper was also actually manufactured and on September 27, 1922 was shipped by rail to 113 Lincoln Street, Boston, Massachusetts, where the band of counterfeiters had borrowed a chair and a table, rented a room for a period of one month, and set up an “office.” Just as the packing cases containing the paper were to be transferred to an address in Washington Street, Boston, the would-be forgers were arrested by internal revenue agents and the paper was returned to the Massachusetts paper mill where it had been made; here it was destroyed under the supervision of government agents. In the numerous cases of the counterfeiting of “prohibition” paper it is not difficult to perceive the gullibility of the papermakers; but in every instance mentioned the paper was actually manufactured by a reputable paper mill and apparently there was no suspicion of fraud. On the other hand, the apparent ease with which the internal revenue agents worked and in all cases caught the culprits deserves the greatest commendation.

THE CASE OF THE CHANGED WATERMARKS

In 1922 a paper-manufacturing company in Wisconsin received an order from a Chicago paper dealer, who in turn had received the order from a supposed printing firm, for 2,000 pounds of white bond paper to be watermarked with the lettering: “INTERNATIONAL NEWS Internal Revenue Prohibition.” The dandy-roll bearing this lettering in wire was made by a watermarking firm in the same state and eventually delivered to the paper mill. A few weeks later the paper mill received a communication from the paper dealer with instructions to change the wording on the dandy-roll to an all-over pattern of the word “Prohibition.” This was accomplished and the finished watermarked paper reached a Chicago storage company on June 28, 1922; two days later, on July 1, the cases containing the ton of paper were transferred to an address in Carpenter Street, Chicago. It was established by the United States Secret Service that two rum-runners and forgers were responsible for the attempt to defraud the United States by purchasing the dandy-roll and the “Prohibition”-watermarked paper. On December 13, 1922, when these men were arrested by Secret Service officials, one of them had in his possession a single sheet of the counterfeit watermarked paper, a complete book of false Physicians’ Prescriptions No. A-12944, and a check from a dentist for $225. At the Carpenter Street address the internal revenue agents seized fifteen cases containing 1,875 pounds of the original 2,000 pounds of counterfeit paper. One of the cases had been previously removed, so it is assumed that 125 pounds of this Wis-
cousin-made paper found its way into false certificates. A photograph of the paper made for these two forgers is shown in Figure 287. The International News Company, of course, had nothing to do with this case.

THE LEAGUE FOR THE ENFORCEMENT OF PROHIBITION

One of the few instances of counterfeiting the withdrawal certificates during prohibition days that were at least partially successful in so far as the counterfeitors themselves were concerned occurred during the autumn of 1922. Two men, representing themselves as officials of an Illinois organization known as the “League for the Enforcement of National Prohibition,” called at the office of one of the leading Chicago paper dealers and submitted an order calling for 11,000 pounds of watermarked paper. The sheets were to be 17 by 22 inches and were to be used, according to the self-styled representatives of the “League,” for diplomas for the members and also for a Frenchfold circular advancing the strict prohibition tendencies of the “organization.” Naively enough, the paper was to be watermarked with the heading “LEAGUE FOR THE ENFORCEMENT OF NATIONAL PROHIBITION,” followed underneath by an all-over pattern of the word “PROHIBITION” (Figure 288). The dandy-roll was constructed according to the instructions furnished, and the paper was manufactured by a well-known and highly regarded Wisconsin paper mill. The paper dealer, the dandy-roll maker, and the paper mill, all firms of integrity, did not question the authenticity of the order, and the work progressed without suspicion. Of course, the top line of the watermark, “LEAGUE FOR THE ENFORCEMENT OF NATIONAL PROHIBITION,” was trimmed off, and then the balance of each sheet was practically a counterpart of the genuine government prohibition paper such as was used for printing physicians’ prescription blanks. At least a portion of the paper was used by the counterfeitors in printing spurious withdrawal certificates, but it was not long before the Federal agents had uncovered this gigantic project of forgery, and the balance of the watermarked paper was immediately destroyed. Also the dandy-roll was totally demolished, although the paper dealer pleaded that at least the brass skeleton of the roll be preserved so it could again be used for more legitimate watermarking; but the Federal representatives were unmoved and insisted that the entire dandy-roll be completely and thoroughly destroyed.

THE MONTREAL CONSPIRACY

The most prodigious of all attempts to obtain watermarked paper for the printing of false physicians’ prescriptions occurred in Canada in 1926. As previously outlined, these certificates were used during the days of prohibition for the withdrawal of intoxicating liquor. The legally issued withdrawal blanks were in quintuplet, there being a copy for the distillery or bonded warehouse, a copy for the permittee, a copy for the director’s office, and two carriers’ copies. The so-called “Montreal conspiracy” constituted a greater attempt at fraud than any like counterfeiting committed in the United States. In this particular case, however, the forgers were not so clever as they thought and their plot was actually discovered almost before it began.
In the autumn of 1925 an executive of a Beauharnois paper mill was confidentially approached by the Royal Canadian Mounted Police, who told him that they had reason to believe the paper mill would shortly be tendered an order for watermarked paper that was intended for use in counterfeiting United States physicians' prescriptions. The police impressed upon the mill executive that if such an order was offered, it was their desire that it be accepted and filled. The United States Treasury Department also communicated with the mill executive expressing the same request, at the same time keeping the Royal Police advised as to the progress of the work. The plan was that the paper be manufactured and shipped, and when it eventually reached the United States, the cases of paper would be seized and the conspirators arrested.

In due course the Canadian paper mill was approached by a representative of the counterfeiters, and an order for more than seven tons of high-grade paper was accepted and $12,000 in cash paid. As requested by the unwary forgers, the paper was to be watermarked "Prohibition," but in a somewhat awkward effort to avoid any suspicion in the minds of the manufacturers of the dandy-roll, it was arranged that the roll should contain the words "Suffocation," "Prohibition," and "Application," each word occupying one third of the watermarked face of the roll. The counterfeiters were willing to discard two thirds of the paper in their effort to procure the "Prohibition" watermark on the remaining third. This subterfuge in itself was a clumsy attempt at deception.

From the time the completed dandy-roll reached the Beauharnois mill until the paper was manufactured and shipped, one or more United States prohibition-enforcement agents was always in the paper mill so that the watermarking roll and the paper would be under their constant observation and no paper could be removed from the mill without their knowledge. The executive with whom the Mounted Police and the United States Treasury Department had communicated was the only person connected with the mill who was aware of what was taking place. The paper was completed March 5, 1926, some of the watermarked sheets were shipped April 7, 1926, and a subsequent shipment was made April 26, 1926. Both shipments were eventually consigned to the Place Viger Station, Montreal, billed as cement to be forwarded to St. Johns, where the cases were to be placed aboard a rum-runner destined for the United States. The amount of paper would have been sufficient to allow the withdrawal of liquor to the value of from six to nine million dollars. The Royal Mounted Police seized the paper before it left Canada and arrested three men who were charged by the crown prosecutor at Montreal with conspiring with others in New York and New Jersey for the purpose of securing watermarked prohibition paper to print forged liquor permits. Bail was set at $3,000 each.

The case came to trial in Montreal on July 8, 1926, on a charge of conspiracy to defraud and to forge, and of forgery. The attorney for the defendants argued that the possession of such paper in Canada was no crime. He stated that the Quebec Liquor Commission had liquor valued at millions of dollars, which if shipped to the United States would be illegal, but it was not so in Canada. The same applied to the watermarked "Prohibition" paper, he maintained. The court took the matter under advisement and on November 16, 1926 handed down a decision in French that the defendants had violated no Canadian law, and they were immediately dismissed. It is assumed that the counterfeit paper was ultimately destroyed. Thus ended an attempted forgery of such proportions that it no doubt exceeded in the amount of paper and money involved any other case in the entire history of counterfeiting.

WATERMARKING AS A SAFEGUARD AGAINST ESPIONAGE

In the many great American plants manufacturing vital war equipment and materials it is absolutely essential to restrict entrance to authorized employees only, numbering hundreds of thousands of workers. Such caution calls for an identification card for each employee. These cards have to be so complicated in their entire formation that they are beyond the possibility of forgery — merely the photograph, fingerprint, and signature of the worker are not sufficient. It remained for Ned Whitehead, of Los Angeles, California, to originate a method of making identification cards that consist of watermarked paper enclosed between two sections of transparent seamless plastic. The individual cards measure 3% by 2% inches, each sheet of paper making thirty-two cards. The