FORENSIC EXAMINATION OF RUBBER STAMPS

ABOUT THE AUTHOR

Jan Seaman Kelly received her training as a forensic document examiner from George Lewis at the U.S. Postal Crime Laboratory in San Bruno, California. In 1993, she received her certification as a forensic document examiner from the American Board of Forensic Document Examiners (ABFDE).

Ms. Seaman Kelly has authored several published articles in professional journals such as the *Journal of the American Society of Questioned Document Examiners* and the *Journal of Forensic Sciences.* Her monograph, *Significant Dates of Typing Methods,* was published by American Board of Forensic Document Examiners in 1994.

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FORENSIC EXAMINATION OF RUBBER STAMPS

A Practical Guide

By

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James Green began his career in forensic document examination in 1988. He was the document examiner for the Eugene Police Department until his retirement in 2000. Mr. Green is a member of the American Society of Questioned Document Examiners (ASQDE), the Questioned Document Section in the American Academy of Forensic Sciences (AAFS), and the Southwest Association of Forensic Document Examiners (SWAFDE). Mr. Green operates a full-time private practice in Oregon.

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Tobin A. Tanaka received his B.Sc. Degree in physics in 1990 and a diploma in meteorology in 1992 from the University of British Columbia, Vancouver, British Columbia, Canada. Mr. Tanaka was trained as a forensic document examiner by the Solicitor General Canada in Ottawa, Ontario from

1993 to 2000. Since 2000, he has been employed by the Canada Customs and Revenue Agency. Mr. Tanaka is a member of the Canadian Society of Forensic Science and the Society for Imaging Science and Technology.

To my husband David and my daughters Katie and Becca.

PREFACE

THE PURPOSE

Three years ago I embarked on a journey to research the manufacturing processes of seals and stamps. This research was spurred by the lack of contemporary literature to inform a forensic document examiner as to the manufacturing processes of rubber stamps, the types of normal and defect characteristics one could encounter when examining a stamp or its impression, and the recommended steps to be taken in the examination itself. Past literature included research papers by David Purtell, Maureen Casey Owens, A. Herkt, and Jay Levinson. Even though these works provide good information and are sound in research methodology, they are antiquated, ranging in age from 10 to 40 years from this writing.

The computer has been an integral part of stamp and seal manufacturing since 1985. With graphics software making it easier to duplicate artwork, the computer was a godsend for the local stamp makers because it made the various manufacturing processes of stamps using different materials affordable. For the forensic document examiner, the continued advancement of computer technology and its increasing use in stamp manufacturing opens a Pandora's box. The computer and scanner allow a stamp maker to scan a stamp impression for use as the artwork to produce a duplicate stamp. In the examination process, the forensic document examiner must be cognizant of the possibility of a duplicate stamp. As with all examinations, attributing proper weight to the defects in light of considering their source will allow the examiner to determine the likelihood that a duplicate stamp exists.

Technology has introduced new manufacturing processes and materials for use by the stamp manufacturer and maker in the production of stamps and seals. The purpose of this book is to inform the forensic document examiner of the various processes and how these processes can be identified and differentiated from each other in a forensic document examination. To insure accuracy in the information disseminated, the chapters were reviewed by the appropriate information sources. For example, Chapter 1 was reviewed by

seal manufacturers Sal and Janet Cannizzaro and Ned Gibbons. Six stamp manufacturers and makers reviewed Chapters 2, 3, and 4 to ensure accuracy of information in describing the classifications, manufacturing processes, and characteristics of rubber stamps. Chapter 5, The Examination Process, was peer reviewed by forensic document examiner Brian Lindblom. Photographer Don Risi reviewed the information discussed by Lamar Miller in Chapter 6, and Chapter 7's discussion of inks was reviewed by Gary Werwa of Specialty Inks, Inc.

THE SCOPE

In our modern society, the seal will be found primarily on legal or government documents. A notarized signature, for example, is usually accepted as an authentic signature due to the presence of a notary stamp impression or seal. The rubber stamp's use spans the government and business aspects of our society. The industrial business setting uses stamp impressions for marking cartons as to contents or warnings such as "Fragile" or "This Side Up." Repetitive notices, such as "Past Due" or "Rush," are typically created with stamps in the office setting. Whether used in industrial or office settings, the rubber stamp assists the employee or owner in communicating a message in such a way that it allows for better time management and reduces business costs.

The scope of this book covers seals and rubber stamps for personal or office business use. Stamp making kits sold as novelty items or toys and minor manufacturing processes (past or present) that reflect a small percentage of the seal and stamp manufacturing market are not discussed. The majority of marking device cases (rubber stamp or seal) will involve a stamp or seal produced by one of the primary manufacturing processes. Therefore, the focus of this work is on the primary classifications of stamps and the mainstream manufacturing processes.

Rubber stamps used in the industrial setting are briefly discussed in Chapters 3 and 4. Stamps used in the industrial setting may be made of materials and ink formulas different from the more mainstream stamps due to the type of hosting surface and temperature conditions. The information disseminated in this brief discussion will let the examiner know that even though the same manufacturing process is involved as that used for the more mainstream stamps, the materials may differ and part of their examination may require further research into the specific purpose of the stamp.

The authors of the chapters have discussed in detail the history, manufacturing processes, and materials used in seals, stamps, and inks. Even though our objective was to be thorough in the discussion of these specific areas in the

marking industry, the primary or mainstream processes are the focus. The photographs in this book reflect a realistic presentation of stamp shops and used stamp dies. The author did not clean any stamp die, but chose to leave the debris. The purpose of doing this was to give the reader a greater understanding of the appearance of a used stamp or seal die. Photographs also depict the position of the mold, die, or impression (right or wrong reading position) as viewed by the examiner in his or her analysis. My goal was to write a book that could be used as an instructional guide and reference by the forensic document examiner when confronted with a case involving a stamp, stamp impression, seal, or seal embossment.

THE PLAN

A firm foundation of knowledge has to be in place before the forensic scientist can conduct an objective examination. The book is divided by chapters in such a way as to guide the forensic document examiner through the manufacturing processes of seals and stamps. Chapter 1, authored by Christine Cusack, discusses the history and manufacturing processes of seals. Even though knowing the history of seals or stamps is not a requirement for the examination process, it provides information on the evolution of the seal or stamp from ancient history to its contemporary form and usage. The history also provides a time line of when certain manufacturing processes or materials became available. This information is worth its weight in gold if the case involves a disputed date.

I authored the next four chapters covering rubber stamps. Chapter 2 introduces the document examiner to the primary classifications of stamps and describes the characteristics that will assist the examiner in classifying a stamp submitted for examination. Chapter 3 is an in-depth study of the various manufacturing processes (mainstream) of hand, self-inking, and pre-inked stamps. Each manufacturing process is described in detail in an effort to assist the examiner in visualizing the process. Through visualization, the examiner can gain a better understanding of the normal characteristics and possible defects that provide clues in determining the specific process used to produce the submitted stamp or a questioned impression. Chapter 4 describes in detail the characteristics commonly observed on stamp dies categorized by materials in each manufacturing process as well as the listing of possible defects. Chapter 5 provides guidance to the forensic document examiner by suggesting an appropriate methodology of the examination process in a case involving a stamp to an impression comparison or an impression to impression comparison.

Chapter 6 discusses photography and the various techniques the forensic document examiner can use in photographing the stamp die or the impression. Lamar Miller discusses basic photography and offers suggestions as to its use in a stamp case.

James Green provides a general discussion of stamp inks and pigments in Chapter 7. Several stamp manufacturers who currently use stamp inks are changing to pigments. The Stampcreator Pro™ by Brother International, for example, uses pigments instead of inks. This chapter explains the difference between inks and pigments to assist the examiner in gaining a better understanding of stamp inks.

To assist the examiner in finding specific information quickly, several quick reference aids can be found in the Appendix. The first reference aid in the Appendix is derived from information discussed in Chapters 2, 3, and 4. From this data, Kimberly Kreuz created two reference tables that will assist the reader in determining the location of the desired information in this book. The charts are a quick reference using stamp classification and die material as the focal points in determining the type of manufacturing process. The second quick reference in the Appendix is a chronological listing of the significant dates in the history of seals and stamps. The Human Resource section is a complete listing of individuals in the stamp industry who contributed their knowledge to this book and can be found as the third quick reference in the Appendix. The purpose of this latter listing is to provide names of individuals who can provide information regarding seal or stamp manufacturing that may be of assistance to the inquiring document examiner. The fourth and final quick reference found in the Appendix is the Glossary that contains the terminology as defined by the marking industry. A great deal of miscommunication can be avoided if the forensic document examiner understands the marking industry terminology and uses it when seeking information about seals or rubber stamps from a manufacturer or maker.

J.S.K.

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To my husband David and my two daughters, Katie and Becca, I publicly thank you for the support, love, and encouragement you have given me during the last three years as I have worked on this book. The research and writing processes required to complete this work commanded a great deal of time and mental energy. I am fortunate to have had my family's support and I appreciate their patience and understanding.

David Kelly prepared several of the illustrations in this book as well as scanned all the photographs. His gift of time and computer wizardry made it possible for me to achieve my goal in making this book a complete guidebook for the forensic document examiner.

In addition to being blessed with a wonderful family, I am blessed with creative and gifted friends who offered their talent to assist me in achieving my goals. Special thanks to Karen Tucker Dunn and Cindy Risi for their contributions. Karen is another computer wizard who prepared some of the illustrations used in this book. Cindy accepted the responsibility of editor and critically reviewed the last few drafts. Both ladies have used their talents to assist me in past research and I am truly appreciative of their time and assistance.

Appreciation goes to those individuals who were gracious in the giving of their time to assist Christine Cusack during the research phase of the information gathering process for her chapter on seals. Those individuals are James Baturin of The Baumgarden Company of Washington, Michael Beaulieu of the Corporation Connection, Joseph Byrne of Ideal Seal Company, Janet and Sal Cannizzaro of Cannizzaro Seal and Engraving, John Delano of Make Your Mark, Ned Gibbons of A & A Marking Systems, Bruce Hale of Granite State Stamps, Inc., William Ryan of Millennium Marking Company, and Rex Tubbs of Engraving Connection.

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A note of appreciation to Jane Lewis, forensic document examiner in Wisconsin, and Heather Carlson, Oregon State Crime Laboratory, for their con-

tributions to this work. Ms. Lewis conducted the thin layer chromatography tests and photographs on the ink samples discussed in Chapter 7. Ms. Carlson prepared the VSC 2000 images of the same inks tested by Ms. Lewis. Their contributions assisted Mr. Green in providing information discussing different aspects of stamp inks.

James Green conducted numerous interviews in his quest to obtain and verify information regarding stamp inks. Mr. Green and I would like to offer our appreciation to Charles Doty, Sue Fortunato, Larry Olson, Mike Suo, Thomas Sweet, Art Tracton, and Gary Werwa. These individuals graciously gave of their time and knowledge of inks to assist Mr. Green in his research.

Special thanks to Kimberly Kreuz, forensic document examiner in California, for her contribution in creating the two quick reference charts found in the Appendix. These two charts will be of great assistance to the document examiner in the initial stage of the rubber stamp examination.

Brian Lindblom, forensic document examiner with Document Examination Consultants in Ottawa, Canada, graciously gave his time to peer review the Examination Process chapter. A research project is not complete until it has undergone peer review. I felt Brian was perfect to conduct the peer review due to his experience in rubber stamp examinations. His input was of great assistance and I offer my deepest appreciation for his participation.

There are over 300 photographs in this work. I wish to express my gratitude to Sugar Knight and Michelle Garduno, photo processing technicians, who took the time to process the negatives to produce the highest quality print. I also extend my gratitude to Don Risi for his review of Chapter 6 on photography.

A project of this magnitude would not be possible without the contributions of those in the marking industry. A listing of all information contributors can be found in the Appendix. I also extend my appreciation to those individuals listed in the Human Resources section of the Appendix. However, there were a few individuals in the marking industry who took me under their wing and assisted with this project from the very beginning. Mollie Miller, owner of A-1 Rubber Stamp & Engraving, allowed unlimited access to her business and her wonderful stamp makers, Cliff Hughson and Kim Rowan. The information garnered from numerous interviews and repeated visits to the shop to observe the manufacturing processes provided the foundation for additional information gathering. William Collins of United RIBtype in Indiana; Cindy Thomas of U.S. Stamp/Identity Group, Inc. in Tennessee; Gene Griffiths of MDAI in Illinois; Eiji Yuki of Brother International in New Jersey; and Mike Mauro of M & R Marking Systems in Illinois were instrumental throughout this research project in assisting the authors in gathering information and reviewing the final drafts. My gratitude is extended to these individ-

uals who gave their time toward this work and have made a significant contribution to forensic science.

I wish to extend my deepest gratitude to my contributing authors, Christine Cusack, Tobin Tanaka, Lamar Miller, and James Green. These document examiners displayed courage in agreeing to be contributing authors. Their contributions expanded the research and allowed more information to be disseminated to the forensic document examiner.

CONTENTS

FORENSIC EXAMINATION OF RUBBER STAMPS

Chapter 1

SEALS

CHRISTINE CUSACK

WHAT IS A SEAL? A seal is an impression, a mark, or a device with a cut or raised emblem, symbol, or word which can be impressed in relief upon a soft tenacious substance, such as clay, wax, or paper to certify a signature or authenticate a document. Historically, seals preceded the invention of writing and once served as the standard in lieu of a signature. The principal purposes of a seal were (1) identification of the owner, (2) recording the nature of the object with which it was associated, and (3) prevention of unwarranted access to a container or document.[1] Today, the primary purpose of a seal is to convey the mark of authority and authenticate documents of some value or significance.

A HISTORICAL OVERVIEW

The history of seals has significance to forensic document examiners because it illustrates the impact of not only the importance but also the various incarnations of seals upon many a civilization. Equipped with a historical backdrop, the forensic document examiner brings not only a present-day fund of knowledge but a depth of understanding that otherwise would be vacuous.

Throughout the ages, seals have taken many shapes and forms; and the production, types, and function of early seals are found in most modern marking devices. To illustrate the historical progression, excerpts from *The Marking Story,* written by Karen Rivard and Thomas H. Brinkman, have been chosen.

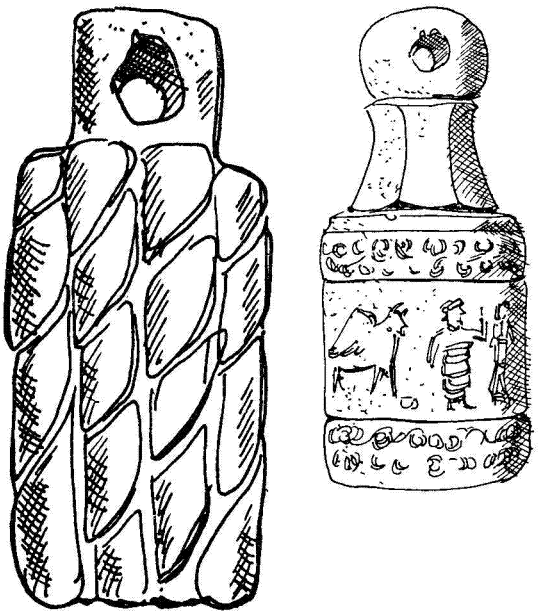
"Some of the earliest seals date from the fourth millennium B.C. in Mesopotamia. One such ancient and popular seal was the cylinder. Cylinder seals were cut with metal implements known as gravers and generally were

carved from stone and at times either gold, silver or glazed pottery. The size of cylinder seals ranged from 1/2 inch to 4 inches in length and the diameter was customarily one-fourth to one-third of its height. Cylinders were generally strung from a thong or a string and worn as either a wristband or a necklace" (Figs. 1.1A & 1.1B). "Their primary purpose was to safeguard and identify possessions or merchandise. Typically, small objects were placed in a jar, covered at the opening with a piece of cloth or animal skin and then bound at the neck with string. Thereafter, moist clay was packed around the neck of the jar and the cylinder seal was rolled over the clay. Larger objects were packed in mats and tied with a rope. The knot was covered with a thick layer of clay and rolled over with a cylinder seal" (Fig. 1.2).

"Ancient seals took other forms besides the cylinder. For example, the earliest Egyptian seals, dating from approximately 3000 B.C., were stamps in the form of a sacred beetle known as a scarab. The scarab was made of schist, soapstone or other soft material, engraved with hieroglyphics, and finished with a green or yellow tint. Scarabs were fitted with a string or wire to be worn on the finger or the wrist. Not unlike the cylinder seal, the scarab served as a model for seal design in other ancient societies. The scarab also served as the prototype for Greek and Roman seals known as signets. The first purely Greek signet seals are from 400 B.C. Many of these seals typically had the owners' portrait engraved on them. Because the signets were engraved in precious stones they became collectors items and today can be found in museums and private collections" (Figs. 1.3A, 1.3B, & 1.3C).

"Approximately 1730 B.C., new engraving methods began to emerge. Small cutting disks of various sizes and tubes with circular cutting edges were used with the bow-drill borer. The tube was used to cut circles and, when applied at an angle, crescents. The disks were used in an effort to execute the same intricate designs that had been carved by hand, but required the designs be reduced to combinations of straight lines. The new tool innovations, however, seem to have brought about a reduction in the quality of the carving. For example, the lines cut by a disk are wider and deeper in the middle than they are at either end. Another type of seal carving was created on an appliance similar to the potter's wheel. It was operated by foot and the iron cutting tools were kept in rapid rotation. This method produced results similar to those of the bow-drill.

"Approximately 350 B.C. lead, gold or silver bullae became prominent. With the introduction of the leaden bullae came a two-part matrix for making the seal impression. The device was a hinged tool with two flat, engraved circular impressions, one on each appendage and when pressed together would create a two-sided seal impression in the wax of lead. The term "Papal Bull" refers to the leaden bulla used by popes for hundreds of years. Sealing wax



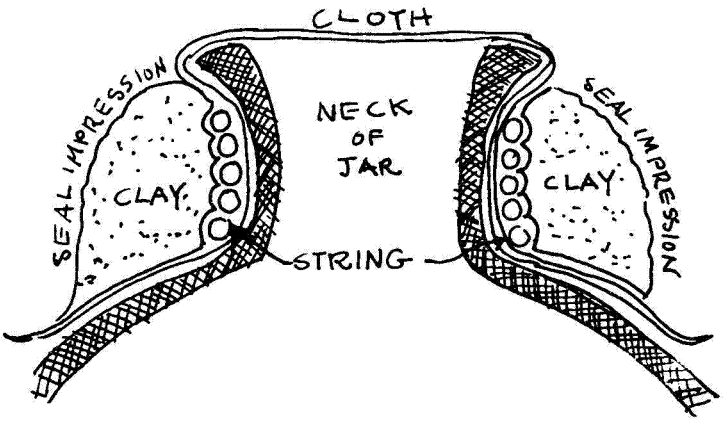


Figure 1.1A–B. (A) *Top left.* This cylinder seal is dated approximately 7th century B.C. (B) *Top right.* This cylinder seal is dated approximately 2750 B.C. These type of seals were the most popular in ancient times (Courtesy of Karen Rivard, Thomas Brinkman, and David Kelly).
Figure 1.2. *Lower center.* A section of the neck of a sealed storage jar is shown. The opening of the jar was covered with a piece of cloth or animal skin and then bound at the neck with string. Moist Clay was packed around the neck or the jar and the cylinder seal was rolled over the clay (Courtesy of Karen Rivard, Thomas Brinkman, and David Kelly).

became popular in the seventeenth century, and with it, personal seals for all who wrote letters.

"Historically, royalty, clergy, national and local government agencies and its officers as well as private citizens possessed seals. By the time the United States was formed, an official governmental seal had become a necessity. By