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<td>ANN HILLARY GILLESPIE</td>
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DECORATIVE SHEET-METAL BUILDING COMPONENTS IN CANADA, 1870-1930:
TIM-SHOP METHODS OF FABRICATION AND ERECTION

by

Ann H. Gillespie, B.E.S., Hon. B.A.

A Thesis submitted to the Faculty of
Graduate Studies and Research in partial fulfillment
of the requirements for the degree of
Master of Arts
Institute of Canadian Studies

Carleton University
OTTAWA, Ontario
April, 1985
ABSTRACT

Sheet metal was first widely used as a building material in the nineteenth century. This new material had a very significant architectural impact in North America during the late Victorian period. Various types of sheet metal were used for a wide range of decorative components, the most popular being the galvanized iron cornice and the pressed steel ceiling. This thesis examines the architectural and technical development of decorative sheet-metal components in Canada between 1870 and 1930, and is primarily concerned with the technical aspects of their development: the businesses which supplied these components and the techniques employed to fabricate and erect them. It focuses on the early methods used by small tinsmithing businesses before 1890 and the continued use of tin-shop methods after 1890, following the establishment of several large companies specializing in the manufacture and mail-order marketing of sheet-metal building products.
ACKNOWLEDGEMENTS

I wish to thank all the people who assisted me in various ways. My advisor, Dr. Norman Ball, patiently oversaw several successive drafts and provided valuable advice and criticism throughout the progress of research and writing. My second reader, Professor Charles Gordon, suggested useful sources at the early stages of research and provided helpful commentary on the last two drafts. The Directorate of the Institute of Canadian Studies proved to be most understanding over the issue of deadlines.

I was aided in my research by many other individuals and institutions to whom I express my sincere appreciation. I should like to extend special thanks to all those connected in some way with businesses formerly or presently engaged in architectural sheet-metalwork, who generously gave their time and careful consideration to my many questions, often on more than one occasion. I was also loaned trade catalogues and other valuable documents and shown around a number of sheet-metal shops and plants. The personal contact which I had with many of these people was one of the greatest rewards of my research. As well as these and other individuals to whom acknowledgement is made in the notes and figure captions, I am indebted to many more people who helped me to locate, and provided copies of, information and photographs in various files: Dr. Harold Kalman (Commonwealth Historic Resource Management Ltd.), Rolph Latté and Michael Newton from the National
Capital Commission, and too numerous to name, staff members of the Public Archives of Canada, Parks Canada, the Toronto Public Library and the Heritage Canada Foundation.

I would also like to thank those who assisted, both directly and indirectly, in the writing and presentation of this thesis. Dr. Jeanne Beck kindly read and provided valuable critical and editorial comments on the first three chapters and Robin Beck also made helpful suggestions for Chapter 3. Amongst my close friends and colleagues, I am especially grateful to Brigid Higgins, who edited and typed one draft of Chapter 3 and Karen Friedl, who gave editorial assistance and advice. Both provided encouragement and moral support throughout the long duration of this endeavour. In addition, I express thanks to Carol Dada for typing one of the early drafts, Jack Whorwood for advice on the illustrations and for photographic copy work (in particular for figure 2.22), and Edith Denham for speedily, expertly and most cheerfully preparing the final manuscript. Finally, I could not sufficiently thank my parents, Ron and Madge Gillespie. My father willingly and carefully read numerous drafts of every chapter and suggested many improvements. My mother most generously devoted considerable time and energy to preparing the illustrations and proof-reading the final manuscript. Above all, they both provided the constant support and understanding, without which this thesis could never have been completed.
# TABLE OF CONTENTS

LIST OF ABBREVIATIONS

LIST OF ILLUSTRATIONS

CHAPTER

1. INTRODUCTION 1

2. THE DEVELOPMENT OF FACTORY-PRODUCED, DECORATIVE BUILDING COMPONENTS IN BRITAIN AND NORTH AMERICA, 1850-1930. 12

   2.1 Catalogue-Ordered Decorative Building Components in Victorian Architecture 13

   2.2 The Manufacturers of Decorative Building Components
       The Large Companies 16
       The Small Local Businesses

   2.3 Factory-Processed and New Building Materials 20

   2.4 Advances in the Fabrication and Erection of Building Parts
       Mass Production 23
       Prefabrication

   2.5 Centralized and Decentralized Production 31

3. THE FABRICATION AND ERECTION OF DECORATIVE SHEET-METAL COMPONENTS IN THE EARLY PERIOD, 1870-1890 38

   3.1 The Utilitarian and Decorative Uses of Sheet Metal 39

   3.2 The Small Enterprises Engaged in Architectural Sheet-Metalwork 46

   3.3 Tin-Shop Methods of Fabricating and Erecting Decorative Sheet-Metal Components
       General Characteristics
       The Parts of a Sheet-Metal Cornice
       Types and Gauges of Sheet Metal Used for Decorative Exterior Elements
       The Fabrication and Erection of a Sheet-Metal Cornice
       Analysis of Tin-Shop Methods

   3.4 The Introduction of Stamped Ornaments 60
4. THE LATER PERIOD, 1890-1930

4.1 The Decorative Uses of Sheet Metal
   The Use of Sheet Metal for Cornices and Similar Components
   The Pressed-Metal Components and their Exterior Applications

4.2 The Businesses Engaged in Architectural Sheet-Metalwork
   The Large Companies
   The Small Enterprises

4.3 Advances in Methods of Fabricating and Erecting Cornices
   The Pressed-Metal Components: Stamping-Plant Methods and Prefabrication
   Catalogue-Ordered Cornices
   The Continuation and Modification of Tin-Shop Methods

5. CONCLUSION

BIBLIOGRAPHY

ILLUSTRATIONS
LIST OF ABBREVIATIONS

Abbreviations used in notes and credit lines for the following institutions, collections and organizations:

<table>
<thead>
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<td>PAC, Pedlar</td>
<td>The Pedlar People Ltd. (MG 28 III 70)</td>
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<td>PAC, Westeel</td>
<td>Westeel-Rosco Ltd. (MG 28 III 78)</td>
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<td>PAC, Barnett</td>
<td>John Davis Barnett Engineering Collection (MG 30 B 86)</td>
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<td>HPL, Brown-Boggs</td>
<td>Hamilton Public Library, Special Collections, Brown-Boggs Foundry &amp; Machine Co. Ltd.</td>
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<td>MTCL</td>
<td>Metropolitan Toronto Central Library</td>
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<td>MTCL, Canadian Trade Catalogue Collection</td>
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<tr>
<td>NCC</td>
<td>National Capital Commission</td>
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<td>NCC, ADB</td>
<td>NCC, Interpretation and Heritage Division, Architectural Data Bank</td>
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<tr>
<td>APT</td>
<td>Association for Preservation Technology</td>
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<td>LACAC</td>
<td>Local Architectural Conservation Advisory Committee</td>
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LIST OF ILLUSTRATIONS

The illustrations are grouped together at the end of the thesis but are numbered by chapter: e.g. 1.1 (chap. 1, fig. 1).

Individuals who supplied photographs are identified by name only in the credit lines but are fully identified in the bibliography. See PRIMARY SOURCES: Interviews and Correspondence.

Figure

1.1 Galvanized iron cornices on two Ottawa buildings.
1.2 Metal tiles.
1.3 Typical metal ceiling design.
1.4 Metal store fronts.
1.5 Metal ceilings in two Ottawa buildings.
1.6 Miller's Tin Shop, 453 Wentworth Street N., Hamilton.
1.7 Factory of the Metallic Roofing Co., corner of King and Dufferin Streets, Toronto.
2.1 The Crystal Palace, London.
2.2 "San Francisco Stick" house, 2527 Washington Street, Pacific Heights.
2.3 Iron-and-glass conservatory.
2.4 The Arcade, Johannesburg, South Africa.
2.5 J. McGregor's cast-iron front, Newark, New Jersey.
2.6 Methodist Church, Osgoode, Ontario.
2.7 Macfarlane's ornamental cast-iron columns.
2.8 The Buffalo Eagle Ironworks' cast-iron window caps.
2.9 Sheet-metal building components made by Marshall Lefferts & Brother in New York.
2.10 The Philadelphia Architectural Iron Co.'s decorative sheet-metal building components.
2.11 The Philadelphia Architectural Iron Co.'s stamped zinc ornaments.
2.12 Wooden brackets made by H. B. Rathbun & Son, Mill Point, Ontario.
2.13 The Metallic Roofing Co.'s sheet-metal cornices.
2.14 The Pedlar People's sheet-metal window and door caps.
2.15 The Metallic Roofing Co.'s stamped zinc ornaments.
2.16 A Pedlar metal ceiling.
2.17 A Pedlar metal storefront.
2.18 Richard Gerlich's carpentry shop and gingerbread trim, New Braunfels, Texas.
2.19 Advertisement for Ives & Allen's City Foundry, Montreal.
2.20 Ornamental bricks and tiles.
2.21 Velocipede scroll saw.
2.22 Large power press, Shanker Steel Corp., Glendale, N.Y.
2.23 John Manning's "Portable Colonial Cottage."
2.24 Bolling & Lowe's prefabricated corrugated iron buildings.
3.1 Nineteenth century sheet-metal roofs in Quebec.
3.2 Government House, Simcoe Street at King Street W, Toronto.
3.3 Ottawa's second City Hall.
3.4 The Kittredge Cornice & Ornament Co.'s Sheet Metal Pavilion.
3.5 The Empire Hotel, 171 Main Street Winnipeg.
3.6 The Gerrie Block, Princess Street, Winnipeg.
3.7 Treble Hall, 6-10 John Street N., Hamilton.
3.8 The Laing Apartments, 13-17 King Street W., Dundas, Ontario.
3.9 The Copp Block, 165-205 King Street E., Hamilton.
3.11 The parts of a sheet-metal cornice.
3.12 Sheet-metal cornice, featuring brackets, modillions and dentils.
3.13 Sheet-metal cornice with end blocks and urns.
3.14 Drawings for a sheet-metal cornice.
3.15 Sheet-metal cornice patterns.
3.16 Modern squaring shears.
3.17 Brown, Boggs & Co.'s "Cornice Makers' Squaring Shears."
3.18 Sheet-metal stakes.
3.19 A modern hand brake.
3.20 Forming moulds for making circular bends.
3.21 Brown, Boggs & Co.'s "Four Leaf Cornice Brake."
3.22 Common seams used in sheet-metal work.
3.23 Seams used in cornice work.
3.24 Wood and metal lookouts for cornices.
3.25 Small cornice supported on wooden lookouts.
3.26 Large cornice supported on metal lookouts.
3.27 Rope drop hammers.
3.28 The Petrie Building, 15 Wyndham Street, Guelph, Ontario.
4.1 The Stanley Mills & Co. Department Store, 11 King Street E.,
     Hamilton.
4.2 First Avenue Public School, 73 First Avenue, Ottawa.
4.3 Galvanized iron bay windows and spandrel panels.
4.4 Commercial building with galvanized iron cornice, 21 Bridge Street,
     Carleton Place, Ontario.
4.5 The Tin House, 136 Guigues Street, Ottawa.
4.6 The Metallic Roofing Co.'s "Eastlake" Steel Shingles.
4.7  The Pedlar Metal Roofing Co.'s rock-faced and pressed brick siding.

4.8  Metal roofing and siding in rural Ontario.


4.10 The Pedlar People's stamped ornaments.

4.11 The Metal Shingle & Siding Co.'s catalogue-ordered cornices.

4.12 Galvanized iron cornices on houses in Ottawa's Lower Town.

4.13 Metal ceiling tiles.

4.14 The Pedlar Metal Roofing Co.'s prefabricated cornices.

4.15 The Brown-Boggs Co.'s no. 500 Power Brake.

4.16 Galvanized iron cornice of the Rosemill Apartments, 234 Rideau Street, Ottawa.
CHAPTER 1
INTRODUCTION

During the Victorian period, the Industrial Revolution made its mark on many fields of human endeavour: transportation, communication, agriculture, manufacturing and also building. The most revolutionary advances in building which occurred as a result of industrialization may be identified as the development of new structural techniques and fire-proof methods of construction based on the use of iron and later steel, and the greatly increased use of glass. Less apparent, but nevertheless extremely important, were the application of factory methods of production to the manufacture of a wide range of building materials and components, the mail-order marketing of building products and the accelerated development of prefabrication. The manifestations of these changes in Victorian architecture assumed many different forms, ranging from the monumental Crystal Palace erected to house London's Great Exhibition of 1851 to the much less dramatic presence of catalogue-ordered ornamentation on late nineteenth century vernacular buildings.

The subject of this thesis may be broadly defined as the stylistic and technical development of decorative sheet-metal components. Sheet metal became a common building material in the nineteenth century and had a very significant architectural impact in North America during the late Victorian period. Decorative building components made of sheet metal were introduced in the United States as early as the 1830s but were not a common feature of both American and Canadian buildings before 1870.
Between 1870 and 1930 sheet metal was shaped into a variety of exterior architectural elements, including window caps, dormers, bay windows and most important, cornices (fig. 1.1). After 1890, it was also mechanically stamped with embossed designs to form pressed-metal components that were used as an ornamental cladding for roofs, walls and ceilings (figs. 1.2, 1.3). Pressed-metal shingles and tiles, siding plates, and ceiling and wall components were all ordered by number from manufacturers' catalogues. Metal ceilings and walls were offered in a wide variety of designs and were assembled from pressed-metal pieces made in various shapes and patterns (fig. 1.3). By the 1890s highly ornate store fronts featuring pedimented cornices, stamped frieze panels, columns and rock face pattern siding were also available through catalogues (fig. 1.4).

Decorative sheet-metal components reached their peak of popularity throughout North America in the first decade of this century. They were used on many different types of buildings -- both architect-designed and vernacular, and were a particularly common feature of commercial buildings (figs. 1.1 and 1.5). These components were popular because they satisfied the prevailing taste for rich ornamentation and were durable, lightweight and fire-resistant. However, their use declined steadily from the 1920s with advances in fire-proofing methods and the rise of the Modern Movement, whose proponents rejected architectural ornamentation.

Decorative sheet-metal components were initially all made by small tinsmithing businesses (fig. 1.6), but were later also supplied by large companies which specialized in the manufacture and mail-order
This thesis takes an opposing view and argues that industrial building materials and techniques had a very significant impact on Victorian architecture as a whole, if not on costly buildings designed by prominent architects, then certainly on the lower ranks of public, commercial and even residential building. Sheet metal, for example, was widely used in North America for the cornices of buildings in the latter category, but was often disguised to look like stone. The fact that this new material commonly assumed imitative forms, however, should not imply that its use was unimportant and therefore not worth the serious consideration of architectural historians. In the Victorian period, all buildings which made any pretense to being architecture were characterized by ornamental, Revivalist forms. The main difference in this regard between the monumental works and the bulk of Victorian architecture lay in the extent to which industrial technology was exploited to achieve this end. In contrast to the more prestigious architect-designed buildings, the styling of ordinary Victorian buildings was, to a large extent, a by-product of the advances in building techniques which accompanied industrialization.
techniques was employed to fabricate and erect decorative sheet-metal components.

This thesis represents the first attempt to document any aspect of the architectural or technical development of decorative sheet-metal components in Canada. Moreover, very little research by Americans on the manufacture and use of sheet-metal building components in the United States has been published. To date, only two articles by the same author deal specifically with decorative elements; both focus on a particular form of pressed metal, one on the metal ceiling and the other on metal shingles.²

The decision to focus on tin-shop methods in this thesis was based on the following considerations. There are no published sources which describe the early stages of the development of decorative sheet-metal components. Moreover, a good understanding of tin-shop methods is needed to properly assess the impact of the more advanced methods introduced by the large companies in the later period. Furthermore, by focusing on tin-shop methods, it was possible to examine the entire period from 1870 to 1930, thereby establishing the chronological framework for a more comprehensive Canadian study of the fabrication and erection of decorative sheet-metal building components.

Because this thesis breaks new ground in the history of Canadian architecture and building technology and examines an aspect of the development of decorative sheet-metal components which has not yet been studied within an American context, the research material was necessarily drawn almost entirely from primary sources. A wide range of Canadian and also a number of American sources were consulted. These included trade
catalogues, newspapers, city directories and by-laws, trade journals and sheet-metalworking manuals (both historical and modern). Much valuable information on the techniques of fabricating and erecting decorative sheet-metal components was supplied by individuals who have worked in the sheet-metal trade, in many instances for the particular firms discussed in this thesis. Photographs of buildings featuring ornamental sheet-metalwork and documentation on these buildings were obtained from archives, government department files, as well as individual historians, preservation consultants, architects and building owners. Finally, mention should be made of three important archival collections of corporate records: the Pedlar People and the Westeel-Rosco collections at the Public Archives of Canada and the Brown-Boggs Foundry & Machine Co. collection at the Hamilton Public Library. The first two contain a large number of trade catalogues issued by the two main manufacturers of decorative sheet-metal components in Canada during the period 1890-1930, namely, the Pedlar People in Oshawa and the Metallic Roofing Co. in Toronto. The third collection largely comprises catalogues issued by the Brown-Boggs Co. in Hamilton, the principal Canadian manufacturer of sheet-metalworking tools and machines during this period.

The organization of the main body of this thesis reflects the chronological framework previously outlined. The first part (Chapter 3) covers the period from 1870 to 1890 and the second part (Chapter 4) covers the period from 1890 to 1930. The main body of each chapter examines the businesses engaged in architectural sheet-metalwork and the techniques employed to fabricate and erect their decorative components.
Each chapter begins with a brief discussion of the architectural applications of sheet metal.

In order to place the development of decorative sheet-metal components in a broader historical perspective, and to introduce the themes explored in Chapter 3 and 4, Chapter 2 surveys the overall development of factory-produced, decorative building components in Britain and North America between 1850 and 1930. This topic is examined in relation to the Victorian taste for ornamental forms of construction and the technological advances which culminated in the introduction of catalogue-ordered architectural elements and ornamentation. As no such survey has previously been published, Chapter 2 is based on varied evidence culled from a wide range of secondary source material. Two publications should, however, be singled out as particularly important in that they provided a springboard for this background chapter. The first is Julian Barnard's *The Decorative Tradition* (1973). Barnard examines the function of decoration in Victorian architecture within a British context, establishing a clear link between this decorative tradition and the application of industrial methods of production to the manufacture of ornament. He devotes a full chapter to the various natural and artificial materials that were commonly used in Britain for architectural enrichments, touching upon particular processes involved in the manufacture of ornamental pressed bricks, terra cotta sculpture, ceramic tile and decorative cast-ironwork.

The second noteworthy publication is Diana Waite's *Architectural Elements: The Technological Revolution* (1972), in which six American trade catalogues dating from the 1850s to the 1870s are reprinted with an
historical introduction. These catalogues offered plain and decorative components in cast iron, wood, slate and sheet metal. Waite provides useful background on each company, on the methods employed to manufacture the materials and components offered in their catalogues, and more generally, on the advances in building techniques which these catalogues document. Although this book only covers the types of components which were available through American catalogues over a period of three decades and does not deal exclusively with architectural elements of an ornamental nature, it nevertheless constitutes the best general introduction to the Victorian phenomenon of catalogue-ordered ornamentation.

While Barnard and Waite have quite a different focus, they are both concerned with the technological advances underlying the proliferation of decorative detail on Victorian buildings. The development of industrial building materials and techniques that were widely used for both practical and stylistic reasons is an important aspect of the history of Victorian architecture and building technology, but one which has not yet been thoroughly investigated.

Architectural history is only just emerging from the stage of writing about heroes and monuments. Thus, until very recently, this aspect of Victorian building would not have been considered a proper subject for scholarly study. In the past, architectural historians have largely restricted their field of vision to stylistic innovations in architecture, focusing on the work of well-known architects, and have only concerned themselves with technological innovations which made a strong visual impact because they were clearly expressed in new architectural forms. During the Victorian period, however, new building
technology was very often embodied in stylistically derivative forms, and
was even rendered invisible in the guise of traditional materials and
methods of construction. Moreover, industrial materials and techniques
were most widely exploited for architectural effect in buildings designed
by lesser-known architects and in vernacular buildings.

Historians of building technology, for their part, have been
primarily interested in new structural techniques. In surveying the
nineteenth century, they have devoted their attention to engineering
work, focusing on the major achievements, such as the steel frame, and
the minor innovations leading up to these breakthroughs.\textsuperscript{9} The specific
 technological advances associated with the development of various types
 of factory-produced decorative components, however, rarely constituted
 major breakthroughs or even contributed to the main line of technical
development. As a result, many of the advances which had the most
far-reaching influence on Victorian building have been overlooked by
historians of architecture and technology alike.

There has been a marked tendency in writing about Victorian
building to separate style and technology into two isolated streams of
development, and hence, two separate avenues of research. It has been
commonly thought that the Victorian era suffered from a cultural
schizophrenia whereby science and technology were divorced from art.\textsuperscript{10}
This school of thought argues that industrial building materials and
techniques had no significant impact on the art of architecture until the
1890s when the steel-framed skyscrapers built in Chicago marked the first
instance that an original and appropriate aesthetic form had been created
for an important new structural technique in any major architect-designed
building.\textsuperscript{11}
This thesis takes an opposing view and argues that industrial building materials and techniques had a very significant impact on Victorian architecture as a whole, if not on costly buildings designed by prominent architects, then certainly on the lower ranks of public, commercial and even residential building. Sheet metal, for example, was widely used in North America for the cornices of buildings in the latter category, but was often disguised to look like stone. The fact that this new material commonly assumed imitative forms, however, should not imply that its use was unimportant and therefore not worth the serious consideration of architectural historians. In the Victorian period, all buildings which made any pretense to being architecture were characterized by ornamental, Revivalist forms. The main difference in this regard between the monumental works and the bulk of Victorian architecture lay in the extent to which industrial technology was exploited to achieve this end. In contrast to the more prestigious architect-designed buildings, the styling of ordinary Victorian buildings was, to a large extent, a by-product of the advances in building techniques which accompanied industrialization.
NOTES

1. The term vernacular is used in this thesis to designate those buildings which were effectively designed by contractors, craftsmen and manufacturers of building components, and did not involve the services of an architect or engineer, that is, a professional design specialist.


3. Public Archives of Canada, Pedlar People Ltd., MG 28 III 70 (hereafter cited as PAC, Pedlar); Westeel-Rosco Ltd., MG 28 III 78 (hereafter cited as PAC, Westeel).


6. Ibid., chap. 5, "Materials." Barnard is also the author of Victorian Ceramic Tile (London: Studio Vista, 1972), an important study of the popularization, design and manufacture of decorative ceramic tile in the nineteenth century which examines both craft and industrial processes.


8. Henry Russell Hitchcock, for example, in Architecture: Nineteenth and Twentieth Centuries (Hammondsworth, Middlesex, England: Penguin Books, 1977), traces the development of the various Revivals, as manifest in individually significant buildings, deviating from this stylistic approach in only two chapters. Chapter 7, "Building with Iron and Glass: 1790-1855," examines the two most important technical innovations in this period: the structural use of iron and the combined use of iron and glass, as manifest in bridges, greenhouses, train sheds and finally the Crystal Palace. Chapter 14, "The Rise of Commercial Architecture in England and America," examines the stylistic and technical development of the commercial building and its culmination in the steel-framed skyscrapers designed by Chicago architects in the 1890s.


11. For example, Peter Collins in *Changing Ideals in Modern Architecture* (Montreal: McGill University Press, 1965), p. 196, asserts that "metal construction had a very small role to play in architectural design before the commercial exploitation of rolled steel in the 1880s."
CHAPTER 2

THE DEVELOPMENT OF FACTORY-PRODUCED DECORATIVE BUILDING COMPONENTS IN BRITAIN AND NORTH AMERICA, 1850-1930.

The greatly increased use of architectural ornamentation in the Victorian period coincided with the development of industrial building techniques. The advances which contributed most significantly to the widespread use of decorative building components in Victorian architecture may be identified as the availability of factory-processed building materials, advances in the fabrication and erection of building parts which involved the adoption of mass-production, mail-order marketing and prefabrication techniques, and closely tied to these changes, the general trend towards the centralization of production in large factory operations.

The following survey of the development of factory-produced decorative building components in Britain and North America between 1850 and 1930 focuses on the businesses which manufactured decorative building components during this period and the advances outlined above. Because of the emphasis on small tinsmithing businesses and their tin-shop methods and components, this discussion is not confined to the advanced stages of development represented by factory-produced, catalogue-ordered decorative building components and the large companies which supplied them. The small businesses engaged in the manufacture of building components and the less advanced techniques associated primarily with small-scale production are also examined. In order to provide some
architectural background for this discussion, the ornamental character of Victorian architecture and the appearance of catalogue-ordered decorative building components are first briefly considered.

2.1 Catalogue-Ordered Decorative Building Components in Victorian Architecture

To gain some historical perspective on the use of catalogue-ordered, decorative building components in Victorian architecture, one must go back to the building of London's Crystal Palace (fig. 2.1). When the Great Exhibition opened in 1851, the vast iron-and-glass structure designed by Joseph Paxton to accommodate the world's first international industrial exposition was greeted with both admiration and disdain. Designed at a time when the general enthusiasm for iron construction was at its peak, Paxton's proposed building was bestowed by Punch with the felicitous title: "The Crystal Palace."¹ This awe-inspiring edifice was highly praised by most visitors, receiving the highest acclaim from The Times: "An entirely novel order of architecture, producing by means of unrivalled mechanical ingenuity, the most marvellous and beautiful effects, sprang into existence to provide a building."² Yet, at the other extreme, some of England's most prominent architects and critics outrightly condemned it. John Ruskin, for example, viewed the Crystal Palace as an oversized greenhouse which gave final proof that higher beauty was "eternally impossible" in iron.³

The Crystal Palace was almost universally acknowledged to be a brilliant technical solution to an unprecedented design problem, but it did not satisfy the aesthetic predilections of the Victorian age. The
austere, repetitive forms of the Crystal Palace and its antecedents -- the greenhouses and iron-and-glass covered market halls and railway stations built in the first half of the century -- had little appeal to a cultural élit with preconceived ideas about architecture. From the beginning of the Victorian era, buildings of any architectural pretension had reflected both the influence of Revivalism and the taste for varied and ornamented forms of construction. Ruskin's view that ornamentation was the principal part of architecture came to be shared by virtually all Victorians. A structure without decoration was not considered to be architecture at all; it was mere building, or at best good engineering. For the nouveau riche and new middle class ornament was a status symbol, and they judged the architectural merit of a building more by the quantity than the quality of its ornamentation (fig. 2.2).

The Crystal Palace marked a turning point in the attitudes of the Victorian public to the innovative forms characteristic of the new industrial building materials and techniques. Its bold, simple forms came to be widely perceived as utilitarian, monotonous and style-less. Thus, after mid-century the iron-and-glass structures of such new building types as exhibition halls, conservatories and shopping arcades were quietly assimilated into the mainstream of Victorian architecture (fig. 2.3), becoming progressively more ornate and reaching great heights of exuberance by the end of the century (fig. 2.4).

Between 1850 and 1930 industrial building materials such as cast iron and sheet metal were exploited as much for stylistic as practical reasons. They provided a ready means of cheaply reproducing a wide variety of traditional architectural elements and ornamental details
which had previously been made on the building site by skilled craftsmen using natural materials, such as wood, stone and marble. The early cast-iron fronts erected in the commercial districts of American cities during the 1850s and sixties (fig. 2.5), for example, were modeled on the arcaded masonry facades of British commercial buildings, which had been derived from the Italian Renaissance palazzo. Accordingly, these fronts imitated stone in their detailing and paint finishes. Moreover, because ornamental forms could be cast in iron much more cheaply than they could be carved out of stone, the typical cast-iron front tended to be even more richly ornamented than its stone prototype.  

It was during the second half of the nineteenth century that new materials and manufacturing processes combined with improvements in transportation and communication to bring ornamented construction within reach of the Victorian populace. Lavish ornamentation was no longer the prerogative of a wealthy aristocracy, as it had been in pre-industrial times. The hand-carved stonework revered by Victorian architects was still restricted to prestige buildings. On the other hand, architectural enrichments and so-called sham materials which could be manufactured cheaply in large factories increasingly adorned buildings erected for the middle and lower classes of Victorian society. By the late nineteenth century even the most modest vernacular buildings were overlaid with expensive looking materials and an abundance of decorative detail. Metal siding and concrete block simulating the appearance of rock-faced stone (fig. 2.6), grained wood and marbleized slate were all popular imitation materials. Cast-iron fences, balconies and classical columns, and ornamental pressed brick gained widespread popularity throughout
Britain and North America, and on this continent, gingerbread trim and decorative sheet-metalwork became equally if not more popular.

These decorative building components could be ordered by architects, builders and tradesmen from manufacturers' catalogues (fig. 2.7). Available in a variety of designs, catalogue-ordered architectural elements had a wide appeal in the Victorian period. They satisfied the prevailing taste in architecture and interior decoration for highly ornate, individual and historically-derived forms; and they were also practical and inexpensive. Ornamental cast-iron columns, for example, were strong, durable, incombustible and considerably cheaper than similar columns made of stone.

2.2 The Manufacturers of Decorative Building Components

The Large Companies

Building product catalogues were issued by large companies which were exclusively or chiefly engaged in the manufacture of basic construction materials, components of both a utilitarian and ornamental character, and prefabricated buildings. These companies operated centralized factories where mass-production techniques were exploited and marketed their products on a regional, national or even international basis by means of mail-order catalogues.

The earliest catalogue-ordered decorative components were most probably supplied by British foundries engaged in the production of iron buildings for export. Around the mid-nineteenth century, a number of ironfounders began to market ornamental cast-iron building components and
sub-systems which could be incorporated into buildings of traditional masonry construction.¹⁰ One of the largest and most successful of these ironfounders was the Glasgow-based firm of Walter Macfarlane & Co., established in 1850. In addition to such utilitarian components as pipes, gutters and dustbins, Macfarlane's voluminous and lavishly illustrated catalogues offered an extensive line of ornamental cast iron which ran the gamut from complete bandstands, verandahs and arcades (fig. 2.4) to railings, arches, brackets, lamp standards and columns (fig. 2.7). During the 1880s and 1890s Macfarlane's "artistic foundings" were shipped around the world to Australia, South Africa and other British colonies.¹¹

Ornamental cast-iron components could be ordered from American catalogues by the 1850s. The annual catalogue of the Buffalo Eagle Ironworks Co., established in 1854, included window and door caps (fig. 2.8), archés, brackets, capitals, columns and store fronts.¹² One New York firm, Daniel D. Badger's Architectural Iron Works, even made a specialty of full cast-iron fronts (fig. 2.5).¹³

The earliest catalogue-ordered sheet-metal building products were strictly utilitarian in nature, and mainly comprised galvanized iron gutters, downspouts, ridge cap and corrugated sheets for roofing and siding. The first American catalogue to offer such components was most probably the 1854 catalogue of Marshall Jefferts & Brothers in New York, importers and manufacturers of "patent galvanized iron" (fig. 2.9).¹⁴ It was not until after 1870, however, that American firms began to issue catalogues offering a selection of decorative sheet-metal components.
The 1872 catalogue of the Philadelphia Architectural Iron Co. included cornices, window caps, mansard roofs, as well as moulding enrichments, capitals and various other stamped ornaments (figs. 2.10, 2.11).15

After 1870 a wide range of plain and decorative building components fabricated of such materials as cast iron, slate, wood and sheet metal could be ordered from American trade catalogues. But very few building product catalogues appear to have been brought out by Canadian manufacturers before 1880.16 One of the earliest must have been an 1878 millwork catalogue issued by H. B. Rathbun & Son, an Ontario lumber company at Mill Point in Prince Edward County which then owned one of the largest sash, door and blind factories in the country. The architectural millwork offered in this catalogue ranged from doors and windows to moulding profiles, bargeboard, balusters, newels and brackets (fig. 2.12). Rathbun's products were distributed throughout Ontario, and by the 1890s certain components, notably doors, were also being shipped overseas to Britain, Australia, New Zealand and South Africa.17

It was not until the 1890s that sheet-metal components first became available through Canadian catalogues. However, by the early 1900s the Metallic Roofing Co. in Toronto and the Pedlar People in Oshawa had both published large and copiously illustrated catalogues offering a wide range of sheet-metal building products. Their selection of ornamental components was very similar in type and design to that offered by American companies at this time, and included cornices (fig. 2.13), window and door caps (fig. 2.14), stamped ornaments (fig. 2.15), ceilings (fig. 2.16) and complete store fronts (fig. 2.17).18
These large companies supplied many of the decorative components erected on Victorian buildings but inexpensive architectural ornamentation was by no means all ordered from catalogues. A significant proportion was obtained from local businesses.

The Local Businesses

Before the emergence of large companies specializing in the manufacture and mail-order marketing of building products, decorative building components were commonly made in craft shops and small factories serving local markets. Some were supplied by small diversified businesses which combined manufacturing, service and retail functions. Much of the late nineteenth century jig-sawn gingerbread found on the houses in New Braunfels, Texas, for example, has been attributed to local entrepreneur Richard Gerlich, a jack-of-all-trades who advertised at various times as a wheelwright, a carpenter and woodworker, a gunsmith and an automobile, engine and bicycle repairman (fig. 2.18). Others were made locally in factories where a variety of products were manufactured. Most of the ornamental castings made for buildings erected in Canadian towns and cities during the second half of the nineteenth century, for example, appear to have been supplied by local foundries which mainly produced such articles as steam engines, pumps, mill machinery and stoves (fig. 2.19). Even after the turn of the century, when large companies had made an appearance in most building related industries, smaller and more diversified businesses catering to local customers continued to play an important role in the production of decorative building components.
2.3 Factory-Processed and New Building Materials

The industrialization of the building process involved some major changes in the nature and range of materials available for general building purposes. In pre-industrial times, basic building materials were, for the most part, obtained from the site or from a local source but as industrialization progressed, they were increasingly manufactured or partly processed in centralized factories and distributed over wide areas. With the mechanization of brickmaking and its centralization in large factory operations, for example, machine-made pressed bricks that were mass produced and mass marketed progressively replaced hand-made bricks manufactured in local brick works.21

The number of different materials available to architects and builders increased dramatically in the course of the nineteenth century. A wide range of both traditional and new materials were used for building components made in craft shops and factories. These included wood, slate, clay (which was made into bricks, tiles and terra cotta ornament) and a number of new materials. The latter comprised cast-iron, wrought iron, steel, glass, concrete and various types of sheet metal. These materials can be regarded as new only in the sense that they had become more readily available because larger quantities were being produced at much lower costs. Few of these so-called new materials were introduced after the beginning of the Industrial Revolution.

Indeed, cast iron, wrought iron and steel had been produced on a limited scale for centuries but were not developed as structural materials until advances in manufacturing technology had significantly reduced their cost and increased supplies. Cheap cast and wrought iron
were available by the end of the eighteenth century. Steel, however, remained a costly material before the Bessemer process was developed in England in 1856; and it was not until 1885 that the first rolled steel joists were manufactured. The use of glass for windows was likewise restricted by the high cost and limited size of the panes which could be made before the early nineteenth century.

Of particular interest are the different types of sheet metal used for plain and decorative building components during the Victorian era. These included sheet copper, tinplate, terneplate, sheet zinc and painted or galvanized sheet iron and steel, all of which may be considered new in that their widespread application for building purposes was made possible by the development of industrial processes for rolling metals into sheets. Copper was first rolled in England in the 1600s, followed by iron in the early 1700s. The exterior use of sheet iron was, however, hindered by its vulnerability to corrosion. Paint was found to provide some measure of protection but a better protective surface was achieved by dipping the sheets in molten tin to make tinplate, or in tin and lead to make terneplate. Galvanizing, that is, coating the iron with zinc, was later introduced, and proved to be superior to any other method of rust-proofing.

Hammered iron sheets had been coated with tin before the twelfth century but it was not until after 1730 when rolled iron sheets were available that tinplating was developed into a thriving British industry. Terneplate became available much later, and appears to have been first manufactured in the United States around 1830. Pure metallic zinc, though manufactured in commercial quantities before the mid-1700s, was
not employed in building until the early 1800s when it was first cast into decorative elements, rolled into sheets and used for galvanizing iron. Sheet zinc was introduced in England in 1805 when a process for hot rolling the metal was patented but the industry was subsequently developed in Belgium where the first rolling mills were established. Zinc-coated iron was not produced commercially until the process of hot-dip galvanizing was developed in 1837, the year in which both French and English patents were taken out. Galvanized, corrugated sheets were first manufactured on a large scale in 1844 when a new method of corrugating iron by passing it between rollers was patented in Britain. Finally, sheet steel came into general use in the 1880s and progressively replaced sheet iron for many purposes.

Many of these factory-processed materials were particularly well suited to the ornamental forms which appealed to Victorian taste. The popularity of cast iron must be largely attributed to the ease with which it could be cast into ornate sculptural forms. Moreover, once the necessary moulds had been prepared, these forms could be cheaply reproduced. As the Victorians themselves were quick to recognize, "the finest ornaments cost little more than plain castings." Concrete block and pressed brick could be moulded with low-relief face designs at little extra cost (fig. 2.20), and sheet metal gained widespread popularity as a decorative building material after mechanized techniques for die-stamping embossed designs had been introduced.
2.4 Advances in the Fabrication and Erection of Building Parts

The increased use of factory-processed building materials in the course of the nineteenth century was accompanied by important advances in methods of fabricating and erecting the component parts of a building. At the pre-industrial or craft stage, basic building units like bricks and sawn timber were produced off site but assembled components like doors and window frames were almost always custom-made on the job, as was most ornamentation. At this stage, fabrication and erection procedures constituted inseparable parts of the total building process, a complicated and lengthy process which involved many labour-intensive and skill-demanding operations.

With the development of manufacturing techniques dependent on the use of machinery and inanimate sources of power, the fabrication of many building components shifted from the building site to the factory. With the establishment of the large companies, mass-production techniques were introduced and factory-made components became available through trade catalogues. The mail-order marketing of building components, in turn, influenced the type and amount of labour required for erection work. Catalogue-ordered components were often designed to be easily and speedily erected by building workers with no specialized craft skills. Moreover, complete buildings and large building units were entirely fabricated in the factory and supplied as kits of readily assembled parts. Catalogue-ordered, prefabricated building systems comprising various mass-produced parts represent an advanced stage in the development of industrial building techniques between 1850 and 1930. At this stage, fabrication and erection procedures constituted two distinct sets
of operations, and handicraft skills were entirely or largely eliminated from both fabrication and erection work.  

The most important technological advances underlying these changes in the manufacture and erection of building parts were the development of mass-production and prefabrication techniques.

**Mass Production**

Mass production may be broadly defined as the "volume production of a standardized product for mass consumption."  

John B. Rae, in his article "The Rationalization of Production," identifies its key elements:

Mass production is a technique for producing large quantities of goods at low unit cost. The achievement of this objective requires an elaborate and systematic organization of the manufacturing process, designed to eliminate waste effort and motion and to maintain a smooth and efficient flow of materials through the plant. It must be a mechanized process in order to attain the requisite volume of output. Furthermore, mass production called for highly specialized machines and tools and a minute division of labour, and since large numbers of units are being worked on, standardization and interchangeability are indispensable.

The term mass production, as applied to the manufacturing methods of the large companies specializing in building products between 1850 and 1930, must be qualified. These companies were all engaged in mass production in the broadest sense of producing large quantities of standardized components at a low unit cost. But only some of the constituent elements of modern mass production, as defined by Rae, were present in their methods. For example, building components were not always mass produced by highly mechanized techniques. In fact, iron-founding techniques were largely unmechanized and the mass production of
certain decorative sheet-metal elements involved a considerable amount of skilled hand work.

The most important prerequisite to mass production was standardization. Before any building component could be mass produced, its size and design first had to be standardized. Components made by a moulding process from cast iron, clay or concrete were standardized in the sense that any number of identical castings, bricks or concrete blocks could be made from the same mould. These components could be readily mass produced by hand processes or by techniques which were not highly mechanized. Sheet-metal components that were entirely formed by die-stamping techniques may also be regarded as standardized; but although the principle of duplication was extremely simple, mass production was dependent on an advanced level of mechanization.

The mechanization of production involved a division of labour accompanied by a transition from hand to machine operations. Several stages in the transfer of skills from men to machines may be identified. First, the diversified skills of the craftman are gradually replaced by more specialized machine-operating skills. Then, as mechanization progresses, correspondingly lower levels of skill and supervision are required to operate these machines. At the stage of mechanization represented by assembly-line production, skilled labour is effectively eliminated, the worker's job being reduced to a simple repetitive task. Finally, at the stage of fully automated production, all manual labour is eliminated.

The mechanization of the techniques employed to fabricate decorative building components during the period 1850-1930 must be
represented as a gradual process, not a single technological leap from handicraft to mechanized production. For discussion purposes, two stages of mechanization may be identified: an early and an advanced stage.

At the early stage, the machine may be compared to a hand tool in the sense that it was still "an adjunct to the skill of the worker." Small, man-powered machines served primarily as mechanical aids within a system of production geared to custom fabrication and based largely on hand workmanship. These machines generally required a high level of skill to operate as the results were not predetermined by invariable constraints; in other words, the quality of the final product depended to a large extent on the judgement, manual dexterity and care exercised by the operator. Because they could be purchased and operated for a relatively low cost, these machines were profitably employed in the workshops of small businesses. This class of machinery is well illustrated by the foot and hand-powered lathes, morticing machines and scroll (or jig) saws used by North American carpenters and cabinetmakers in the nineteenth century (fig. 2.21).

Characteristic of the advanced stage were larger and technically more sophisticated machines driven by an external power source. Less skill was required to operate these machines as the results were entirely or largely predetermined by built-in precision controls. Thus, the worker was, in effect, an adjunct to the machine. Geared to mass production, these machines were relatively expensive to purchase and to run, and consequently, their use was restricted to large factory operations. This class of machinery is exemplified by the heavy power presses which were used by some of the large American and Canadian
companies engaged in the manufacture of sheet-metal building products during the early twentieth century to mass produce metal ceiling and wall components (fig. 2.22).

Of course, the machines used in the various building-related industries during the period 1850-1930 do not all fit neatly into these two categories. Many small, manually-operated machines, for example, could be adapted to an external power source. Mechanization, moreover, cannot be represented as a simple progression whereby the earlier stages were superseded by the more advanced stages. Even after mechanized techniques had been introduced in industries formerly dependent on craft methods of production and the use of man-powered machines, these methods and machines continued to be used in small shops and to some extent also in the large factories. As will be later shown, this was certainly the case with respect to the production of decorative sheet-metal components.

Some degree of mechanization was a necessary prerequisite to the production of decorative components made of most materials, including clay in the form of bricks and tiles, wood and sheet metal. Simple, hand-operated presses, for example, were used to make ornamental bricks and tiles in both small and relatively large quantities (fig. 2.20). With certain type of components, however, mass production entailed a high level of mechanization and low volume production, a low level of mechanization or non-mechanized techniques. In the case of wooden mouldings, small quantities of identical mouldings could be turned out by a skilled joiner using hand planes but the production of large quantities at a low unit cost was contingent upon the development of power-driven moulding
machinery. The techniques used to fabricate decorative sheet-metal components were characterized by two distinct stages of mechanization. Foot-operated machines for cutting and bending sheet metal were introduced almost as soon as galvanized iron was adopted for cornices. However, the methods later employed to mass produce stamped ornaments and pressed-metal elements involved the use of powered cutting and stamping machinery. In summary, the level of mechanization varied according to the type of material and component and the quantities being produced, while mass production often involved the use of highly mechanized techniques.

Mass production was essential to the mail-order marketing of building components. Only in this way could the large companies readily supply customers with the standard designs offered in their catalogues, and compete with local businesses. The successful mail-order marketing of complete buildings and any components which could not be shipped to the site as whole units, in turn, very often entailed the adoption or innovation of prefabrication techniques.

Prefabrication

The term prefabricated is generally used to describe any building unit whose parts have been completely fabricated in a workshop or factory before arriving at the building site and that can be readily assembled, in other words, fitted together with little or no adjustment. A prefabricated building is supplied as a kit of parts which can be assembled and erected with a minimum amount of on-site work and skilled labour.
The prefabricated cottage so successfully marketed in Canada over the past twenty years is certainly not a new idea. Industrial prefabrication originated in the early nineteenth century as a response of British manufacturers to the new building problems created by colonial expansion. Shortages of skilled labour and conventional materials, combined with the emigrants' immediate need for temporary housing, provided the initial impetus for them to turn to the production of "portable colonial cottages" in the 1830s (fig. 2.23). These modest wooden structures were progressively replaced from the 1840s on by portable corrugated iron buildings (fig. 2.24), large numbers of which were exported to Australia, New Zealand and South Africa. Beginning in the 1850s, the decorative potential of cast iron was exploited by British ironfounders to prefabricate conservatories (fig. 2.3), open-air markets, arcades (fig. 2.4), churches and even gentlemen's residences for the colonial market.38

The prefabricated building system had to meet several basic criteria: it had to be readily transportable, speedily erected and in some instances easily dismantled. John Manning's "Portable Colonial Cottage for Emigrants" (fig. 2.23) was specifically tailored to building conditions characterized by limited resources of skills and tools. Manning claimed that his wooden cottage, which essentially comprised a modular frame of bolted, interlocking elements and various interchangeable wall panels, could be erected by anyone capable of using a common bedwrench. It required no fashioning of joints, no cutting of timber and no nailing.39
The basic design principles underlying any good system of prefabrication may be identified as standardization, interchangeability and dimensional co-ordination, all of which were present in the Manning cottage. As was clearly understood by its designer, there is a direct correlation between the ease and speed with which a prefabricated building can be assembled and erected and the degree to which it embodies these concepts. This was forcibly demonstrated on a grand scale by Joseph Paxton in his design for the Crystal Palace. Paxton's ingeneous solution to the problem of designing a huge temporary building which could be speedily erected at Hyde Park and just as quickly removed from its site after the closing of the Great Exhibition was directly inspired by his recently completed Lily House at Chatsworth. The Crystal Palace was conceived as a prefabricated modular structure assembled from standardized iron and timber framing elements and infill panels of glass and wood (fig. 2.1). Although the initial concept was far simpler than the actual construction, the building was nevertheless erected in the miraculously short time of sixteen weeks, and was subsequently dismantled and re-erected at Sydenham.\(^{40}\)

Catalogue-ordered building fronts and other components which had to be assembled on the job shared at least some of the design characteristics of the Crystal Palace and the Manning cottage. "Facility of Erection" was one of the principal advantages claimed by Daniel D. Badger for "Iron Architecture," and hence, for the cast-iron fronts illustrated in his catalogue (fig. 2.5).\(^{41}\) The modular nature of their design clearly reveals that these fronts were largely assembled from a number of standardized, interchangeable elements. Cast-iron staircases and
verandahs, pressed-metal ceilings (fig. 2.16) and galvanized iron fronts (fig. 2.17) were also supplied as prefabricated units, and accordingly embodied the concepts of standardization and interchangeability of parts.

2.5 Centralized and Decentralized Production

The development of mass-production and prefabrication techniques in various sectors of the building industry, combined with the innovation of the mail-order catalogue, formed the technological foundations for the growth of large companies specializing in the manufacture of building products. The emergence of these companies also paralleled the centralizing trend which affected all branches of manufacturing in the period of industrialization.

The simplest model of centralization may be described as follows: production is progressively concentrated in a decreasing number of larger and more specialized operations; at the same time, the smaller and more diversified enterprises decline and eventually disappear. Actual situations were, however, rarely this simple.

The production of building components made in standard sizes and designs naturally followed the general trend towards concentration in large factory operations because of the lower unit costs which could be achieved through mass production. On the other hand, the production of components made in unique designs and sizes was, generally speaking, better suited to small-scale operations, as was any fabrication dependent to a large extent on handicraft skills. Thus, single
production and skilled hand work tended to remain scattered in the smaller manufacturing centres.

A cursory survey of the development of factory-produced decorative building components during the period 1850-1930 reveals that there was only a partial transition from decentralized to centralized production. Initially, their production was scattered in craft shops and small factories manufacturing a variety of goods for local markets. With the establishment of the large companies, a more centralized pattern of production emerged but because these companies did not necessarily displace the smaller businesses, the later stages of development were often characterized by widely divergent scales of operation. This pattern is particularly well illustrated by the fabrication and erection of decorative sheet-metal components in Canada during the period from 1870 to 1930.

In summary, after 1850 decorative building components were mostly produced off the building site and were manufactured by varying types and scales of businesses -- from small diversified enterprises serving local markets to large specialized companies using trade catalogues to market their products over wide areas. Accordingly, fabrication techniques ranged from skilled craft methods which frequently involved the use of human-powered machinery to highly mechanized methods of production; and erection techniques ranged from methods dependent on traditional craft skills to prefabrication methods which required no special skills. In the course of the period 1850-1930 decorative building components were
increasingly mass produced in large factory operations and marketed by trade catalogue. Nevertheless, a significant proportion continued to be made in craft shops and small factories. Thus the revolutionary advances represented by the mass-produced and prefabricated building components offered in manufacturers' catalogues were accompanied by the more gradual changes associated with components produced on a small scale for local buildings.
NOTES


9. See fig. 2.18 (bottom). According to Anthony Adamson, The Gaiety of Gables: Ontario's Architectural Folk Art (Toronto: McClelland & Stewart, 1974), the word "gingerbread" was derisively used by Victorian critics to describe the fanciful exterior woodwork characteristic of American and Canadian domestic architecture.


16. This time lag reflected the slower pace of industrialization in Canada. The centralization of manufacturing in large factory operations did not gain momentum in this country until after the National Policy came into effect in 1878.


18. These two companies are discussed more fully in sec. 4.2. The Pedlar People's store fronts (fig. 2.17) are very similar to those offered by Geo. L. Mesker & Co. in Evansville, Ind. (fig. 1.4) and were most probably inspired by the galvanized iron fronts manufactured from the mid-1880s by this firm and also Mesker Bros. in St. Louis, Mo. See "The 1905 Catalogue of Iron Store Fronts Designed and Manufactured by Geo. L. Mesker & Co., Architectural Ironworks, Evansville, Indiana," APT Bulletin 9 (no. 4, 1977): 3-40; catalogue reprint with an introduction by Lee H. Nelson.


20. Evidence of this is provided by Montreal Foundry advertisements, e.g.: the City Foundry of Ives & Allen (fig. 2.19), William Roden & Co.'s Montreal Foundry and the Mechanics' Foundry of Day & Deblois. Mackay's Montreal Directory (John Lovell, 1861-62 to 1870-71).

21. It is worth noting in this regard that the Don Valley Pressed Brick Works in Toronto claimed in the early 1890s to have "the largest and most complete plant of any individual yard in America" and to have shipped their pressed bricks to almost every part of Canada and also some points south of the border. Taylor Brothers' Don Valley Pressed Brick Works, [1894 Catalogue], pp. 14 and 25; reprinted with an introduction by Jean Basco, APT Bulletin 9 (no. 1, 1977): 30-73.

23. Ibid., pp. 149-150.


25. It is known that as early as 1830 the N. & G. Taylor Co. of Philadelphia purchased British-made tin-plate and coated it with molten lead for use as a roofing material. The first patent for terneplate was, however, awarded in England in 1844. Waite, *Nineteenth Century Tin Roofing*, p. 6.

26. Zinc must be rolled between 212°F and 300°F because it is brittle at lower temperatures.

27. Mild steel could be rolled into thinner, tougher sheets than iron.


29. The two basic methods of moulding ornamental bricks are discussed in Barnard, *The Decorative Tradition*, pp. 76-77. On the manufacture of ornamental concrete blocks, see Gillespie, "Early Development of the 'Artistic' Concrete Block: The Case of the Boyd Brothers."

30. A very brief but useful explanation of the fundamental changes in building techniques brought about by the factory system of production was found in J. M. Richards, *An Introduction to Modern Architecture* (Harmondsworth, Middlesex: Penguin Books, 1948), pp. 35-36.


36. Richard Gerlich's jigsaw, for example, was powered by a one horsepower steam engine. Rumsey, "Jigsaw Patterns in New Braunfels, Texas," p. 42.


38. For a detailed history of the origin and development of industrial prefabrication in Britain, see Herbert, Pioneers of Prefabrication.


40. For an assessment of the prefabricated nature of the Crystal Palace, see Herbert, Pioneers of Prefabrication, pp. 155-159. For a detailed account of its design, construction, dismantling and re-erection, see Bird, Paxton's Palace.

CHAPTER 3

THE FABRICATION AND ERECTION OF DECORATIVE SHEET-METAL
COMPONENTS IN THE EARLY PERIOD, 1870-1890.

In the course of the 1870s and 1880s, sheet metal came to be
widely used by Canadian architects for such exterior elements as
cornices, window caps and mansard roof embellishments. These decorative
sheet-metal components were custom-made for local architects and builders
by small enterprises engaged in tinsmithing and other related activities,
and were accordingly fabricated and erected by tin-shop methods. The
main body of this chapter (sections 2 and 3) examines these small
enterprises and their techniques of fabricating and erecting cornices.

While the decorative sheet-metal components made in Canada
between 1870 and 1890 were all fabricated in the tin-shops of small
businesses, this was not the case in the United States where the first
large companies engaged in architectural sheet-metalwork had been
established by the early 1870s. These companies introduced machine-
stamped ornaments which were mass-produced and marketed by catalogue.
Section 4 looks at this important advance and investigates its impact on
the work of Canadian enterprises during the early period.

In order to provide some architectural background, the first
section examines the utilitarian and decorative uses of sheet metal
between 1800 and 1890. The discussion of utilitarian uses focuses on
sheet metal as a roofing material in Canada. The subsequent discussion
of its decorative uses focuses on the practical and stylistic
considerations which favoured the adoption of sheet metal for cornices and other exterior elements and the types and styles of buildings on which these components commonly appeared.

3.1 The Utilitarian and Decorative Uses of Sheet Metal, 1800-1890

Throughout the nineteenth century, in Europe, North America and the British Colonies, sheet metal was extensively used for building components of a utilitarian nature -- most often for downspouts, eavestrough, flashings, and flat or corrugated roofing and siding. In Canada, for example, sheet-metal roofing often assumed the form of long, flat sheets laid with standing seams, or plain squares laid in a diagonal pattern (fig. 3.1).

Sheet copper, sheet zinc, tinplate, terneplate and galvanized iron were all good roofing materials because they combined the advantages of incombustibility, light weight and durability.¹ With the possible exception of sheet zinc,² they were all commonly used for roofing Canadian buildings.³ Sheet copper was, and still is, an excellent roofing material because of its high corrosive resistance, its attractive green patina³ and its malleability. Sheet copper did, however, have one drawback: it was considerably more expensive than any of the other sheet metals used for roofing. Consequently, its use was mainly restricted to major buildings where length of service more than compensated for the high initial cost of copper. By the 1880s, copper roofing was frequently specified by Canadian architects for government edifices and important public and commercial buildings which would otherwise have been roofed in slate.⁴ Though less durable and workable than sheet copper, tin or terne
plate, and galvanized iron were more widely used because of their relatively low cost. Tin roofs, as they were commonly called, were introduced in French Canada in the late eighteenth century and by the early nineteenth century, a significant proportion of the buildings in Montreal and Quebec City had roofs covered with tinplate. Galvanized iron roofs made an appearance in Canada during the 1850s but did not immediately gain widespread popularity as galvanized iron was more expensive than tinplate. However, because it was more durable than tinplate and was also made in larger sheets, galvanized iron proved to be the more practical roofing material. Its popularity therefore increased significantly as the cost difference diminished.

Fire-resistant sheet metal had a very important advantage over wood in cities, where wooden shingles were a considerable fire hazard. From the 1850s on, city by-laws concerned with the prevention of fires legislated the use of tin, iron, zinc, copper, slate or other incombustible materials for the roofs of buildings within designated "fire limits," central areas whose boundaries were defined in the by-law.

In Canada, as in Britain and the United States, corrugated galvanized iron was mainly used for cladding warehouses, mills, train sheds and other structures of an industrial character. The Victorian attitude to this new material can only be described as ambivalent. Corrugated iron was very widely used because it was cheap, strong and durable; but it was also considered to be ugly. The corrugated iron church built in Cheltenham, England, in the 1850s, for example, was derisively compared by one British architect to a "galvanized iron
cokeshed." But, as North American architects were quick to recognize, galvanized iron did not need to have such a utilitarian appearance.

While there is no evidence that the architectural possibilities of sheet metal were developed to any significant extent in Great Britain during the Victorian period, decorative sheet-metal components were extremely popular in North America, perhaps more so than in any other part of the world. However, the widespread use of sheet metal for architectural purposes originated not on this continent but in Europe, notably in France and Belgium where sheet zinc was first adopted in the early nineteenth century for stamped ornaments and larger decorative components. The best examples of pressed zinc architectural ornaments were found in Paris where sheet zinc was also typically used for the ornamental marquises of shop fronts and cafés.

In North America, the use of sheet metal for decorative purposes may be traced back to the 1830s when sheet iron was first used to fabricate a cornice. The first sheet-iron cornice was reputedly made by an American tinsmith in 1834 after witnessing an accident in which a heavy cornice stone being hoisted to the top of a tall building fell and killed two workers. But, it was not until the 1850s or 1860s that cornices and other decorative facade and roof elements were commonly made of sheet metal in the United States. This coincided with the wide availability of galvanized iron.

The earliest recorded example of the decorative use of sheet metal in a Canadian building was for Government House in Toronto, built in 1866-70 (fig. 3.2). Designed by the Toronto firm of Gundry and Langley, this Italianate villa featured "galvanized iron strings and
cornices painted and sanded to imitate stone.\textsuperscript{14} By the 1870s, Canadian architects were specifying sheet metal for a wide range of decorative elements, including cornices, window caps, dormers and mansard roof trimmings. However, there is evidence to suggest that even by 1875, such components were still regarded by the Canadian public as somewhat of a novelty. An article on "Ottawa's Progress" which appeared in the \textit{Daily Citizen} in 1875\textsuperscript{15} made specific reference to the use of galvanized iron for the cornices, dormers and mansard roof ornaments of two important Second Empire buildings, both designed by Ottawa architects Horsey and Sheard: the National Bank on Wellington Street built in 1875 and the new City Hall completed in 1877 (fig. 3.3). Yet by the early 1880s, architectural elements made of galvanized iron had become so commonplace in some Canadian cities that their ubiquity was a cause for alarm. As the prominent Winnipeg architect, William Harris, noted with much consternation: "This rickety galvanized iron construction is becoming a regular feature of our street architecture, and on some buildings we have it by the quarter section."\textsuperscript{16}

Galvanized iron work from the 1870s and 1880s was generally finished to look like stone and when viewed from a distance was indistinguishable from the real material. Although many architects would have agreed in principle with Harris's indictment of such construction as "a useless sham,"\textsuperscript{17} pragmatism almost always prevailed over idealism in practice. For most architects, the practical advantages and stylistic versatility of galvanized iron far outweighed any concern for architectural integrity.
The rapid rise in popularity of sheet-metal architectural elements at this time must be attributed, first of all, to their practical advantages over similar components made of stone, cast iron or wood. Economy was certainly an important consideration in the choice of galvanized iron. The cost of a galvanized iron cornice, for example, was about one-third that of a stone one. A sheet-metal cornice could also be erected much more easily and safely than either a stone or cast-iron cornice because it was much lighter in weight. Moreover, the various types of sheet-metal suitable for exterior work had two distinct advantages over wood: they were more durable and they were nonflammable.18

Beginning in the 1870s, amendments to building by-laws provided considerable incentive to use sheet metal in place of wood for cornices and other decorative elements. Ottawa’s By-Law no. 447, passed in 1878, for example, specified that within certain fire limits, no window sills or caps, string courses, eavestrough, cornices and other details or ornaments projecting from the face of, or surmounting, external walls were to be erected on a building front unless constructed of stone, brick or iron, or completely covered with iron, tin, zinc, copper or other materials of an incombustible nature.19

Sheet metal had a particularly strong appeal for North Americans at a time when architectural design was dominated by the High Victorian taste for ornate, Revivalist forms. Like cast iron, it was initially made to assume imitative and often profusely ornamented forms. Perhaps no better illustration of this tendency may be found than the Sheet Metal Pavilion erected by the Kittredge Cornice and Ornament Co. of Salem, Ohio, for the 1876 Centennial Exhibition held in Philadelphia (fig. 3.4).20
The basic forms and decorative details of early sheet-metal facades were not only borrowed directly from the original stone prototype; they were also influenced by the modified palazzo formula developed for the cast-iron front. This is clearly shown by the double galvanized iron front of Winnipeg's Cauchon Block, later the Empire Hotel, which was designed by architect L. A. Desey and built in 1882-83 (fig. 3.5). With its repetitive window bays, separated only by pilasters, this facade (now demolished) bore a striking resemblance to a cast-iron front, and in fact, was often mistaken for one.21

The two styles in vogue for public and commercial buildings in Canada during the 1870s and 1880s, Second Empire and Renaissance Revival, provided considerable impetus to the use of sheet metal for a variety of architectural elements. The flamboyant Second Empire mode, the prevailing style for major public buildings and the more prestigious banks and hotels, gave architects plenty of scope to exploit the decorative possibilities of sheet metal for mansard roof embellishments, in particular, for dormers and crowning cornices (figs. 2.10, 3.2).22 A simplified version of Second Empire was even adapted to more modest commercial buildings, like the Gerrie Block in Winnipeg (fig. 3.6). Built in 1881, this imitation stone-fronted brick warehouse had an elaborate mansard roof featuring two cornices joined by ribs, semi-circular dormers and prominent finials that were almost certainly made of galvanized iron.23

The Renaissance modes more commonly adopted for commercial buildings at this time definitely favoured the use of sheet metal for such decorative elements as cornices, roof pediments and balustrades, and
window caps and surrounds, all of which had traditionally been executed in wood or stone. An outstanding example is Hamilton's Treble Hall, a three-story commercial block design by local architect James Balfour and built in 1879 (fig. 3.7). Its bold Renaissance detailing must originally have presented the appearance of hand-carved stonework, but for reasons of economy, these sculptural elements -- a bracketed cornice surmounted by a pediment and two rows of pilastered window surrounds -- were all made of galvanized iron. Typical of the commercial facades erected in the 1880s was the much less restrained front of the Laing Apartments in Dundas, Ontario, with its highly ornate, galvanized iron window surrounds and heavily bracketed Italianate cornice that was also largely fabricated of sheet metal (fig. 3.8).

Of all the various building types in which sheet metal was used for its practical and decorative value, commercial buildings most often featured ornamental sheet-metalwork. By the early 1880s, galvanized iron cornices and window caps were a characteristic feature of the smaller commercial blocks designed by Canadian architects, and from the mid-eighties on, these components increasingly appeared on vernacular buildings (fig. 3.9).

The imposing and often ostentatious facades of many of the commercial buildings erected in Canadian towns and cities from the 1880s through the first decade of this century must be attributed not only to stylistic trends of the period but also to the availability of galvanized iron. Like cast iron, this new material both fulfilled the requirement for inexpensive, durable, and fire-resistant construction and satisfied the tastes of entrepreneurs for the exuberant forms and abundant
ornamentation which gave the impression of wealth, status and power.

Galvanized iron, moreover, being lighter in weight and cheaper than cast iron was a more practical material for any non-loadbearing elements, such as cornices, pediments, window caps and ornamental balustrades (fig. 2.13).²⁸

The rise in popularity of galvanized iron cornices and other components made of sheet metal during the 1870s and eighties was clearly reflected in the growing number of tinsmithing businesses engaged in their production. The following section examines the origin and nature of these small enterprises.

3.2 The Small Enterprises Engaged in Architectural Sheet-Metalwork

The production of decorative sheet-metal building components originated in small diversified businesses which typically combined the manufacture of tin, sheet-iron and copper ware, with the sale of stoves and hardware, and such building work as roofing, plumbing and steam and gas-fitting. A survey of business advertisements appearing in city directories for Hamilton and Ottawa²⁹ revealed that by the 1860s numerous small enterprises "made and fitted up" gutters and galvanized and tin roofing, but only one Ottawa entrepreneur also advertised galvanized iron cornices.³⁰ By the 1870s, however, several businesses in both cities were also advertising cornices, window caps and roof cretings.³¹ Typical of the small enterprises of the 1870s and 1880s was the Hamilton Galvanized Iron Works of Thos. Irwin & Son. In addition to manufacturing all kinds of galvanized iron, tin and copper ware, this firm fabricated
and installed iron, tin and gravel roofing, conductor pipe, eavestrough, cornices and window caps.32

The small enterprises which supplied decorative sheet-metal components during the early period varied somewhat in size but the majority probably employed no more than about ten men.33 Nevertheless, several larger-scale operations did emerge in the 1880s. For example, Douglas Brothers' Toronto Galvanized Iron Cornice Works, established in 1872, rapidly grew to become the leading manufacturer of cornices and window caps in Toronto during the 1880s, giving "steady employment to thirty hands."34 Another relatively large and important enterprise was the Winnipeg firm of Linklater & Deslauriers, which fabricated and erected the galvanized iron fronts of the Cauchon Block (fig. 3.5).35

These small enterprises catered mainly to local customers. Accordingly, their products were advertised in local newspapers and city or county directories; business was conducted on a person-to-person basis; and most building work was done under a contract arrangement whereby the firm contracted to fabricate and to erect the components which they supplied.36

3.3 Tin-Shop Methods of Fabricating and Erecting Decorative Sheet-Metal Components

A tinsmith's shop was commonly known as a tin-shop. In this thesis, the term tin-shop is applied to both fabrication and erection procedures as tinsmithing techniques were used both in the tin-shop and on the building site. Throughout the period 1870-1930 tin-shop methods
were employed by small enterprises to fabricate and erect cornices and other decorative exterior elements.

The following discussion of tin-shop methods is set within the time frame of the entire study period from 1870 to 1930. It draws upon a wide range of sources, both historical and modern: sheet-metalworking manuals dating from the 1870s to the 1940s, modern textbooks, catalogues of the Brown-Boggs Co. in Hamilton, and conversations with individuals who owned or worked for small enterprises engaged in architectural sheet-metalwork. Valuable insight into the methods of the tin-shop was also gained from visits to Miller's Tin Shop in Hamilton (fig. 1.6), a travelling tin-shop display (fig. 3.10) and several modern sheet-metal shops. Although there are now very few sheet-metalworkers with the requisite skills to fabricate the types of decorative components formerly made in tin-shops, present-day methods of fabricating such custom-built components as heating and ventilating ducts are not fundamentally different from the techniques once used in cornice work.

In this section, the general characteristics of tin-shop methods of fabricating and erecting decorative sheet-metal components are first identified. These methods are then described in detail with respect to a particular type of component -- the cornice.

General Characteristics

Tin-shop methods represent an early stage in the development of industrialized techniques of fabricating and erecting decorative sheet-metal components. At this stage, there was no clear separation between the processes of fabrication and erection; nor was there any clear
division of labour between shop and site work. Only small components, such as window and door caps, which could be supplied as completely finished units, were ever erected by masons or carpenters. Any components which had to be transported to the building site in parts, such as cornices and eavestroughing, were always put up by workers with tinsmithing skills because many of the individual members had to be joined on the job. These components, then, were only partly fabricated in the tin-shop.

Tin-shop methods were geared to custom fabrication rather than quantity production. Decorative sheet-metal components were generally made-to-order in unique designs for each customer and although certain components, such as window caps and dormers, were almost always produced in quantities of two or more for any given building, the same techniques were employed to fabricate a number of identical components as were used to make a single component. This work, though partially mechanized, was both labour-intensive and skill-demanding.

Both shop and site work required traditional tinsmithing skills. Shop work, however, also involved the use of machines characteristic of the early stages of mechanization identified in the previous chapter. Tin-shops were equipped with relatively inexpensive, man-powered machines which facilitated certain operations but did not replace to any significant extent the hand skills of the sheet-metalworker.

Of all the various types of decorative sheet-metal components which were at least partly made by tin-shop methods during the period 1870-1930, the most common, but also the most complex in design and construction, was the cornice. Before examining the methods of
fabricating and erecting a sheet-metal cornice, the parts of the cornice and the types and gauges of sheet-metal used for cornices and other decorative exterior elements are briefly described.

The Parts of a Sheet-Metal Cornice

The various parts of a cornice and the names by which they were commonly known to architects, builders and sheet-metal workers are shown in figure 3.11. Being modelled on stone or wood cornices, the earliest sheet-metal cornices comprised a number of fixed elements established by convention. Thus, any sheet-metal cornice deemed to be architecturally correct featured such decorative elements as brackets, modillions and dentils (fig. 3.12).42

Some cornices went around two or more sides of a building while others only extended across its face. In the former case, the horizontal mouldings of the cornice were mitred at the corners.43 In the latter case, each end was terminated by a large bracket (fig. 3.12) or an end block which was often crowned with a finial or an urn (fig. 3.13). In addition, the basic parts of the cornice may have been embellished with stamped moulding and frieze enrichments, leaves, rosettes and other ornaments (figs. 2.10, 2.11, 2.15).

Types and Gauges of Sheet Metal Used for Decorative Exterior Elements

Cornices and other exterior architectural elements were generally made of sheet copper, sheet zinc or galvanized iron. Sheet copper was an ideal material for all types of ornamental work but was only used for the cornices and other large components of major buildings because of its
high cost. However, it was extensively used in small quantities for finials, weather vanes, lions' heads and other decorative details. Soft tempered copper was an excellent material for such ornamentation because it could be readily bent or hammered. Galvanized iron was by far the most practical material for cornice work. It not only combined the advantages of strength, durability and low cost but, in contrast to tinplate, was available in long sheets. Sheet zinc, though used to some extent for window caps, lacked sufficient strength and rigidity for mouldings and other long horizontal members. It was, however, often used in conjunction with galvanized iron for small cornice members and was also commonly used for stamped ornaments, moulding enrichments and bracket pieces because it was softer than galvanized iron and therefore easier to form between dies.

The thickness of sheet iron and steel is designated by a series of numbers called gauges. These gauge numbers are inversely proportional to the thickness of the sheets; hence, no. 26 gauge is thinner and lighter than no. 24. The gauge most commonly used for architectural work, and the one used for the principal members of most cornices, was 26 gauge (.0217 in.). Number 24 gauge or heavier was used for parts with large unbroken surfaces and for the main mouldings of large cornices while 27 gauge was used for small mouldings, dentils and modillions. Copper sheets are usually specified by their weight in ounces per square foot. Sixteen oz. copper, the equivalent of 26 gauge iron or steel, was the standard weight for cornice work.
The Fabrication and Erection of a Sheet-Metal Cornice

The fabrication of a cornice began in the tin-shop (fig. 3.10). Here the various parts were drafted and laid out, the sheet metal cut and formed, and some of the parts joined. The remaining fabrication work was completed on the building site where the rest of the parts were joined, either on the ground or on the building. The cornice was erected by carrying the various members or large sections to the top of the building and fastening them to wall supports.

Shop drawings and pattern layout. If the cornice was to be erected on an architect-designed building, the sheet-metal contractor was furnished with scale drawings prepared by the architect which showed the cornice in plan, elevation and profile. These drawings were used to make the shop drawing, or working detail, as it was also called. This drawing comprised a larger scale or full-scale sectional view of the cornice showing the supports to which it was attached and possibly also certain construction details (fig. 3.14).47

In order to fabricate a sheet-metal cornice, patterns first had to be made to the exact shape and size of the flat material required for all its various members: the mouldings, dentils, brackets and so forth.48 The pattern for a dentil was essentially just a flattened box. The pattern for a straight moulding was made by stretching its profile and marking the bending lines. Stretchouts for straight mouldings and simple rectangular or cylindrical shapes could be laid out directly on the metal but the patterns for complex geometrical shapes and mouldings with mitred corners first had to be developed on paper and then transferred to the metal (fig. 3.15). The development of patterns for
cornices and other architectural elements was in many instances a very complicated procedure. Consequently this work was usually only assigned to sheet-metalworkers with special skills, known in the trade as layout men.\textsuperscript{49}

\textbf{Cutting the sheet metal.} Once the patterns had been laid out, the sheet metal could then be cut. This was either done by hand or by machine. Curved edges, notches, and intricate profiles were cut with hand shears or tin snips, as they are still commonly called (fig. 3.10).\textsuperscript{50} Straight edges, however, could be cut more quickly and accurately with squaring shears. The squaring shears used in tin-shops were similar to the foot-operated models found in sheet-metal shops today. As shown in figure 3.16, foot squaring shears have two cutting blades: a fixed lower blade and a movable upper blade which is operated by a foot treadle. Squaring shears are specifically designed for making right angle cuts and are therefore primarily used for cutting rectangular shapes and squaring edges, but they can also be used for making cuts at any other angle.\textsuperscript{51}

The squaring shears used in tin-shops varied in size from a 21 inch to a 120 inch length of cut. The larger 6, 8 and 10 foot models served to cut the long sheets which were formed into the horizontal members of a cornice, and for this reason were often called "cornice makers' squaring shears" (fig. 3.17).\textsuperscript{52} Because squaring shears were essential to cornice work, they would certainly have been found in some Canadian shops by the 1870s. However, it is unlikely that they were manufactured in Canada before 1890 when Brown, Boggs & Co. in Hamilton was established.\textsuperscript{53} During the 1870s and 1880s, many if not all of the
squearing shears used in this country would have been imported from the United States.54

**Forming the sheet metal.** After cutting the flat shapes for the various cornice members, the next step was to form the sheet metal. Three basic processes may be identified. Geometrical shapes and moulding profiles can be formed by bending the sheet metal in a single direction, by hand or machine. Contoured surfaces can be formed by beating the sheet metal into shape with a hammer against a solid backing or by stamping it between metal dies in a drop hammer or press. Finally, discs of metal can be spun on a lathe to produce circular shapes. The latter technique was used in architectural sheet-metalwork to form balls, urns, finials and balusters. However, most tin-shops were not equipped with metal spinning lathes. These ornamental elements were therefore usually made by the hand method of hammer forming, as was also the case with embossed ornaments. For reasons explained later in this chapter, die-stamping techniques were not commonly used by small enterprises. The first process, then, was the predominant method of forming sheet metal in any tin-shop and the one used to form all of the principal members of cornices, window caps and other similar components. The following discussion is therefore confined to bending techniques.55

The standard method of making angular and curved bends in sheet metal by hand is to bend it over a stake, a wrought iron or steel anvil which is supported in a bench plate. Stakes are made in a variety of shapes and sizes, each being designed to form a particular shape in the metal (fig. 3.18).56 Every tin-shop was equipped with various stakes which were used to form the square, cylindrical and conical shapes of
boxes, lanterns, buckets, funnels and all kinds of other tin, copper and sheet-iron ware (fig. 3.10). While small building component parts could have been formed in this manner, it would have been extremely laborious to bend the longer sheets used for cornice mouldings, stove pipe and eavestroughing by hand over stakes. For such purposes, various hand or foot-operated machines were used, the single most important for cornice work being the cornice brake.

Still employed in sheet-metal shops today, the cornice brake, or hand brake, as it is now more commonly known, is a simple hand-operated machine for making sharp and round bends and for folding edges. As shown in figure 3.19, sharp bends are made by inserting the sheet under the top leaf, positioning it so that the bending line is flush with the edge of the clamping bar, then clamping it down, and finally, raising the bending lead to the desired angle. Rounded bends are made by pressing the metal by hand over a wooden forming mould attached to the bending leaf (fig. 3.20). With the aid of this machine, the sheet-metalworker is able to bend larger and heavier sheets of metal than can be readily formed over stakes and also to bend both short and long pieces more rapidly and more precisely.

The cornice brake was an indispensable piece of equipment in any tin-shop where cornices and other decorative sheet-metal components were being made. Although very little is known about the cornice brakes used in Canadian shops before 1890, after this date they were obtained from both American and Canadian manufacturers. Three known suppliers were the Double Truss Cornice Brake Co. in Buffalo, N.Y., J. M. Robinson & Co. in Cincinnati, Ohio, and Brown, Boggs & Co. in Hamilton. Around 1890,
the latter firm patented a "Four Leaf Cornice Brake" which immediately gained the approval of cornice makers throughout Ontario (fig. 3.21). The innovation of a fourth leaf made it possible for cornice mouldings to be easily and rapidly formed in a sequence of operations involving the use of the bending leaf or the extra leaf and one of the various moulds. These brakes were made in several sizes, ranging from 3 to 8 (and later 10) feet in length, for bending different widths and gauges of sheet metal.

Joining the parts. The various parts of a cornice were joined by some combination of the following techniques: seaming, riveting, and soldering. The simplest way of joining two flat pieces is to lap one edge over the other and permanently fasten them together by riveting or soldering the seam. In the tin-shop, riveting was done by hand using small flat-headed metal pins known as tinner's rivets. Hand riveting is done by inserting a rivet through a common hole in two or more pieces and pounding the opposite end with a hammer to form another head. Soldering may be defined as the joining of two or more pieces of metal with solder, an alloy which melts at a lower temperature than the metal to which it is applied. Sheet metal is joined with soft solder, an alloy of tin and lead.

Some of the more common seams employed in sheet-metalwork are illustrated in figure 3.22. Except for the flat lap seam, most of these seams are made by folding or flanging the edges of the two pieces to be joined and then hooking the folded edge (often called a lock) of one piece onto the flange or into the lock of the other piece. Edges can be bent in a hand brake or in a bar folder, a smaller bench machine designed
to make narrow bends and folds on pieces measuring up to about 3 feet in width.  

The flanges and locks for the different seams used in cornice work were formed in the manner described above. While some cornice parts were joined in the shop and others on the site, the same techniques were used for making both shop and field joints. The sides of the box-like dentils were lapped, riveted and soldered, as were the side and face pieces of brackets, modillions and end blocks. Stamped enrichments were soldered and riveted to the appropriate members. All this work could generally be done in the shop. Vertical joints between the long cornice members were made with riveted lap seams. Horizontal joints between the various mouldings, frieze panels and planceer could also be lap seamed but were more often lock seamed (fig. 3.23).

Some cornices were put together in long sections with dentils and modillions attached, leaving little assembly work to be done on the site — apart from attaching any large brackets and making vertical joints between each section, and between the long sections and the end blocks or mitres. However, in many instances, most of the individual members were fitted together on the site, either before or after being put up on the building. Although as much joining work as possible was done in the shop, the proportion of shop to site work varied with each job and was also dependent to some extent on the supports used.

Erecting the cornice. A sheet-metal cornice was attached to the wall of a building by means of wood or metal supports known as lookout (fig. 3.24). Throughout the period 1870-1930 small cornices were most commonly mounted on wooden lookout (figs. 3.24, 3.25). However, a
sheet-metal cornice was not considered to be fireproof unless it was erected on wrought iron or steel lookouts. In some cities, by-laws prohibited the use of wooden supports within specified fire limits, and by the 1920s (at least in the United States), steel lookouts were a standard feature of large cornices, many of which were erected on buildings located in such zones (fig. 3.26).

The methods of putting up cornices on wood and metal supports differed somewhat. The recommended procedure for erecting a cornice on a brick building using wooden lookouts, as set forth in manuals and journal articles dating back to the 1870s and eighties, may be summarized as follows (fig. 3.24): The masonry was stopped at the level of the foot moulding and the first lookouts were placed in position and securely fastened to the brick. The brickwork was then carried up progressively as the lookouts were set into the wall. At the same time, the cornice was put up in parts, beginning with the foot moulding and ending with the crown moulding. The various members were placed and joined and some were also nailed to the lookouts. Certain members were first joined together on the ground: dentils and modillions, for example, were attached to their respective courses.

Erecting a cornice in the manner described above was a complicated procedure involving the co-ordinated efforts of the bricklayer, carpenter and sheet-metalworker. Not surprisingly, simpler and more practical methods came to be adopted on the construction site. Certainly by the early decades of this century, it was standard practice for the masonry, carpentry and sheet-metalwork to be done in three consecutive stages. Wooden bricks to which the lookouts could be attached
(fig. 3.25) were set into the wall by the mason, the lookouts were then put up by the carpenter; and finally, the sheet-metal cornice was erected.\textsuperscript{71}

If the cornice was to be erected on metal supports (figs. 3.24, 3.26), the various members were joined in the usual manner but were bolted to band iron or steel braces formed to the general contour of the cornice. The cornice was put together in sections of convenient length for handling (18-20 feet), either in the shop or on the ground. These sections were then hoisted onto the building and bolted to band metal or angle iron braces.\textsuperscript{72}

Analysis of Tin-Shop Methods

The fabrication and erection of a cornice by tin-shop methods may be conceived as two overlapping sets of operations. Fabrication work included cutting, forming and joining operations. However, because at least some cornice parts had to be joined after being carried onto the building, it is impossible to clearly distinguish fabrication work done on the site from erection work. Moreover, there was no clear division of labour between work done in the shop and on the site. Because site work demanded joining skills, a cornice could not be erected by a general building mechanic; it had to be erected by a sheet-metalworker. For this reason, cornices were almost always supplied under a contract agreement whereby they were erected by workers from the tin-shop where the parts were made.

All the various operations involved in fabricating and erecting a cornice by tin-shop methods constituted skilled work. However, shop work
demanded a wider range of tinsmithing skills than site work and also certain machine-operating skills. Mechanization in the tin-shop was restricted to the use of hand or foot-operated machines to cut and form sheet-metal, the two most important for cornice work being the squaring shears and the cornice brake. These machines were better suited to custom fabrication than quantity production because they were designed for single rather than repetitive operations. The cornice brake, for example, only made one bend at a time; hence, most individual members, notably cornice mouldings, had to be formed in a sequence of distinct bending operations.

3.4 The Introduction of Stamped Ornaments

An important step towards the development of more highly mechanized methods of fabricating decorative sheet-metal components was made in the 1870s with the emergence of the first large American companies specializing in sheet-metal building products. Most significantly, these companies introduced stamped ornaments for embellishing cornices and other exterior elements. By the mid-1870s, moulding, frieze and keystone enrichments, as well as capitals and a wide variety of small ornaments made of sheet zinc or copper could be ordered from the catalogues of such companies as the Philadelphia Architectural Iron Co. (figs. 2.10, 2.11), the Zinc Roofing and Ornamenting Co. in Chicago and the Kittredge Cornice and Ornament Co. in Salem, Ohio.

The techniques used by these companies to mass produce their catalogue-ordered ornaments was a logical extension of the tin-smith's method of producing small quantities of embossed ornaments. In the
tin-shop, standardized ornaments were made by beating the sheet metal into a wooden form with a moulded depression. This female mould may be compared to the bottom half of a die set, which comprises an upper male die and a lower female die that are exact counterparts of each other. An easier and faster way of making a number of identical ornaments was to hammer the sheet metal between these two matching dies. When large quantities were required it was even more expedient to mechanically stamp the sheet metal in a press or drop hammer fitted with a movable top die and a stationary bottom die. The stamped ornaments offered in the catalogues of the large American companies from the 1870s were stamped in rope drop hammers driven by a water or steam power source (fig. 3.27).

Although drop presses were certainly available in Canada by the 1870s, it is unlikely that rope drop hammers of the type being used by large American companies at this time were used by many, if any, Canadian enterprises for stamping architectural ornaments during the early period. In most cases, sheet-metal ornaments were not being produced on a sufficiently large scale to justify the cost of purchasing and operating such machinery and making the necessary dies. Thus, it may be assumed that most of the embossed ornaments produced in Canada before the 1890s, when the first large Canadian companies were established, were hammered by hand.

This assumption raises an interesting question: what was the source of the large quantity of embossed brackets, keystones and capitals which embellished the galvanized iron fronts of the Cauchon Block in Winnipeg (fig. 3.5)? They could only have been made by Linklater &
Deslauriers, the local firm which supplied the galvanized iron work, if their plant had been equipped with a rope drop hammer, or alternatively if these ornaments had been cast in zinc\textsuperscript{79} rather than stamped out of sheet zinc. On the other hand, they might have been ordered from an American catalogue.

Stamped ornaments ordered from American catalogues probably were not used to any significant extent on Canadian buildings during the early period.\textsuperscript{80} However, it is worth noting that the Petrie Building in Guelph, built in 1882 for the city's most prominent druggist, A. B. Petrie, has an elaborate galvanized iron facade which is embellished with a variety of stamped ornaments, including lions' heads, leaves, rosettes, festoons and capitals (fig. 3.28).\textsuperscript{81} According to one of Petrie's grandsons, the sheet-metalwork was supplied by Bakewell & Mullins in Salem, Ohio.\textsuperscript{82} While this remains to be confirmed, it is known that Bakewell and Mullins made a speciality of sheet zinc and copper statuary and stamped ornaments, and around 1884 issued an entire catalogue devoted to architectural ornamentation.\textsuperscript{83}

In summary, during the period 1870-90 virtually all the decorative sheet-metal components which appeared on Canadian buildings were made locally by small tinsmithing businesses and were fabricated and erected by tin-shop methods. The most important characteristic of these methods was that all procedures involved skilled work, whether they were carried out in the shop or on the building site or whether the
traditional tools of the tinsmith or machines such as the cornice brake were used.

In the tin-shop, sheet metal was primarily formed by bending techniques and embossed ornaments made to embellish cornices and other exterior elements were hand-beaten rather than machine-stamped. The drop-stamping techniques introduced by the large American companies to mass produce stamped ornaments marked a considerable advance over tin-shop methods of forming sheet metal. However, this technology was not fully exploited for architectural sheet-metalwork until the mid-1890s, by which time drop hammers had been adopted by both American and Canadian companies for stamping the pressed-metal cladding materials.
NOTES

1. The use of all these various types of sheet metal for roofing is discussed in the following: Gayle et al., Metals in America's Historic Buildings, part 1; Dierickx, "Decorative Metal Roofing in the United States," pp. 153-187; and Diana S. Waite, "Roofing for Early America," in Building Early America, ed. Charles E. Peterson (Radnor, Pa.: Chilton Book Co., 1976), pp. 136-149. For a more detailed account of the history of tinplate and terneplate roofing, see Waite, Nineteenth Century Tin Roofing and its Use at Hyde Hall.

2. Sheet zinc became a popular roofing material on the Continent, especially in Belgium, France and Germany. It was also adopted in America but never gained the same widespread acceptance as tinplate, terneplate or galvanized iron. (Waite, "Roofing in Early America," pp. 141-143.) No evidence has been found that sheet zinc was used to any great extent in Canada for roofing purposes. A probable explanation is that sheet zinc was not well suited to the Canadian climate with its extremes of temperature. Zinc roofs had a strong tendency to buckle and crack when subjected to low temperatures or to large or sudden changes in temperature because of zinc's brittleness at low temperatures and its high co-efficient of expansion.

3. The characteristic green patina is actually copper carbonate that forms on the surface and acts as a protective coating against further corrosion.

4. The Langevin Block, designed by Thomas Fuller and built in 1884-86, for example, had a copper-clad mansard roof.


6. By the mid 1850s, galvanized iron was available in sheets 24 in. wide by 72 in. long, whereas the standard size of tinplate available at this time was only 14 by 20 inches. Gayle et al., Metals in America's Historic Buildings, pp. 12, 15.

7. See, for example, Ottawa City Archives, City of Ottawa By-Laws, By-Law no. 147a (1858). This by-law also prohibited the erection of wooden buildings within limits defined as 90 ft of either side of Wellington, Sparks and Sussex Streets and Rideau Street from Sappers Bridge to Cumberland.

8. Few of the "portable iron buildings" manufactured in Britain for exportation to the colonies (fig. 2.24) appear to have found their way to Canada. One notable exception was the "Iron Church" shipped to the Colony of Vancouver Island in 1860. This prefabricated (and supposedly temporary) corrugated iron structure stood as St. John's Anglican Church in Victoria until 1912 when it was finally demolished. Martin Segger et al., The Crystal Palace: West Coast Pleasure Palace (Victoria, B.C.: Crystal Gardens Preservation Society, 1977), p. 104.

10. Prior to 1890 the use of decorative sheet-metal components appears to have been largely restricted to the United States, Canada and certain European countries. However, their use was extended to other parts of the world in the 1890s, following the introduction of the metal ceiling. It is known, for example, that the Pedlar People and the Metallic Roofing Co., both exported metal ceilings and other pressed-metal components to such countries as Australia, New Zealand and South Africa. See sec. 4.2.


12. According to the sixtieth anniversary issue of Sheet Metal Worker (January 1834), as described by Gayle et al., Metals in America's Historic Buildings, p. 18.

13. For an historical overview of the decorative uses of the various types of sheet metal in American architecture, see Gayle et al., Metals in America's Historic Buildings, part I, pp. 13-14 [tinplate]; pp. 15-21 [zinc and galvanized iron]; and pp. 24-25 [copper].


17. Ibid.


20. This pavilion was described by the editors of the American Architect and Building News 1 (June 1876): 187, as "perhaps the most offensive building on the grounds . . . , a small French-roofed house of galvanized iron, loaded with coarse ornament of the most pretentious kind."

21. As described by W. P. Thompson in Winnipeg Architecture -- 100 Years (Winnipeg: Queenston House, 1975), p. 11. For example, the facade of the Cauchon Block was "assembled from cast iron details ordered from a catalogue."
Built for Lieutenant-Governor Joseph Cauchon, the Cauchon Block was designed to accommodate stores and offices but failing to bring in sufficient revenue was converted into an apartment house in 1884. For a detailed account of the history and construction of this building, see Randy R. Rostecki, "The Early History of the Cauchon Block, later the Empire Hotel," Manitoba Pageant 21 (Spring 1976): 10-17.

22. According to Christina Cameron and Janet Wright, Second Empire Style in Canadian Architecture, Canadian Historic Sites: Occasional Papers in Archeology and History, no. 24 (Ottawa: Parks Canada, 1980), p. 8, "The Second Empire style is most readily identified by the mansard or broken roof (the 'French' ingredient noted by contemporary writers) combined with a rich classicizing treatment of the facade, often with superimposed columns and sculptural decoration (the 'Renaissance' factor)."

23. The Gerrie Block, built for R. Gerrie & Co., was designed by Winnipeg architect Charles A. Barber. Cameron and Wright, Second Empire Style in Canadian Architecture, caption to fig. 59, p. 118. The authors do not identify the materials used for the decorative roof elements but according to Randy Rostecki (Architectural Historian, Department of Cultural Affairs and Historical Resources, City of Winnipeg), the architect relied heavily on the use of galvanized iron for architectural ornamentation, as did many other Winnipeg architects.

24. The earliest manifestation of the Renaissance Revival in Canada was modeled on the stone palaces of High Renaissance Rome. This prototype was characterized by a symmetrical facade, windows surmounted by flat architraves or pedimental lintels (and possibly framed by pilasters), and a bold projecting cornice. Another prototype was the sixteenth century Venetian Palace. Commercial facades designed in this Italianate or palazzo mode were characterized by rows of closely spaced, round-headed windows (sometimes surmounted by round-arched window caps) and heavily bracketed cornices. For a summary of the origin and distinguishing features of these two Renaissance modes, see Marcus Whiffen, American Architecture Since 1780: A Guide to the Styles (Cambridge, Mass.: M.I.T. Press, 1969), pp. 75-82. It should be noted that many of the commercial facades erected in North America before 1890 combined elements of both modes.


27. The Copp Block (fig. 3.9) was built for Anthony Copp, iron-founder and tinware manufacturer. Interview with Nina Chaple, Architectural Historian, Culture and Recreation Department, City of Hamilton.


31. These include: John B. Higman and Blythe & Kerr, both listed in the City of Ottawa Directory for 1873-74 (Ottawa: Irwin & Co., 1873), pp. 5 and 10, and John Farley, advertised in the City of Hamilton Directory for 1878-79 (Hamilton: W. H. Irwin & Co., 1878), p. 149.


33. Young & Bros., for example, the largest of five plumbing and steam and gas-fitting businesses described under "Hamilton Manufactures" in Sutherland's City of Hamilton and County of Wentworth Directory for 1868-69 (Hamilton: John Eastwood & Co., 1868), p. 306, employed only ten hands.


35. Established in 1881, this firm employed forty men in the plant built in 1882 to manufacture galvanized iron wares. Rostecki, "The Early History of the Cauchoon Block," p. 11.

36. Cornices and other decorative sheet-metal components were sometimes supplied as part of a contract which included steam-heating, plumbing and/or gas-fitting. In the case of the Cauchoon Block, both the galvanized ironwork and the steam-heating were sub-contracted to Linklater & Deslauriers. Ibid.

International Correspondence Schools, A Textbook on Sheet-Metal Pattern Drafting (Scranton, Pa.: International Textbook Co., 1901).


38. Sheet-metalworking textbooks:


General texts on metalworking which include sheet-metalwork:


39. HPL, Brown-Boggs. Information on the history of the Brown-Boggs Co. (initially Brown, Boggs & Co.) was supplied by Jack Watts, who has been with the firm since 1945.

40. Wilbert Foster, W. J. R. Foster Sheet Metal Works, Ottawa. Worked for J. D. Sanders & Co. Ltd. in Ottawa from 1940 to 1982. (Sanderson's was established in 1895 as a roofing enterprise but later expanded into cornice and other architectural sheet-metalwork.)

Alfred Barnett, chairman of the Board of Directors, London Metal Service Ltd., London, Ont. Worked with Ridsdale & McPherson in Galt from 1926 to 1932; in 1932 established a furnace and sheet-metalworking business in St. Thomas with Bill Ronald; Barnett & Ronald relocated to London in 1936 and in 1945 formed a limited company with the London Metal Service.
Oliver Ridsdale, former owner of Ridsdale Steel Fabricators, Inc.; retired since 1984. Began working for Ridsdale & McPherson in 1937 and took over the business in 1953. (This tinsmithing enterprise was established by Oliver Ridsdale's grandfather in 1906.)

John E. Riddell, former owner of John E. Riddell & Son Ltd., in Hamilton; retired since 1973 (now 95). Began working for father's business, John E. Riddell Sheet Metal Works, around 1905 and became a partner in 1914; business taken over from Mr. Riddell in 1962 and established under the present name, Riddell Sheet Metal & Roofing Ltd.

Lloyd Hacon, president of Riddell Sheet Metal & Roofing Ltd. Began working for John E. Riddell & Son in 1930.

Thomas Miller, owner of Miller's Tin Shop on Wentworth St. N. in Hamilton (fig. 1.6); now 83 and close to retirement. Entered the sheet-metal trade in Saskatchewan during the First World War and opened shop at the present location in 1952.

41. Miller's Tin Shop (see note 40); travelling tin-shop display set up by Alfred Barnett at, London Metal Service Ltd. (see note 40); J. D. Sanderson & Co. Ltd. and W. J. R. Foster Sheet Metal Works, Ottawa (see note 40); sheet-metalworking shop, Mohawk College, Hamilton (instructor, Adam Hubert).


43. The term "mitre" (also spelled miter) designates a joint between two pieces of moulding having the same profile. A square return mitre (the most common in cornice work) is a mitred joint in which the two arms of the cornice intersect at right angles to each other. See fig. 2.10 or 3.11.

44. Copper sheets are made in varying degrees of temper or hardness. The two used in building construction are known as soft or hot-rolled and hard or cold-rolled. The soft sheets are best suited to roofing and ornamentation while the hard sheets, being more rigid, were used for the principal members of cornices and other large components.

45. Cast rather than stamped zinc ornaments were often used when the quantity of a particular design did not justify the expense of dies. On the decorative uses of cast zinc see Gayle et al., Metals in America's Historic Buildings, pp. 15-18.

46. These gauges and weights were recommended in various articles and manuals published between 1870 and 1930. See, for instance, "Specification of Workmanship, Materials and Construction, as applied to Sheet-Metal Architectural Work," Sheet-Metal Builder 1 (September 1874): 86; or National Association of Sheet Metal Contractors (U.S.), "Specifications for the Fabrication and Setting of Sheet-Metal Cornices," Standard Practice in Sheet-Metal Work, p. 221. These specifications recommended that cornices of less than 18 inches in height be made of no. 26 gauge U.S. standard galvanized steel or
16 oz. cold rolled copper; cornices of 18 to 36 inches in height were to be made of no. 24 gauge steel or 18 oz. copper and cornices over 36 inches in height of no. 22 gauge steel or 22 oz. copper.

47. See Neubecker, "Preparing the Working Details of the Main Cornices," *Universal Sheet Metal Pattern Cutter,* 2: 48-50.

48. The following sheet-metalworking or sheet-metal pattern drafting manuals dating from the 19th or early 20th century include sections of patternmaking for architectural work. A. O. Kittredge, The Metal Worker Pattern Book; International Correspondence School, *A Textbook on Sheet-Metal Pattern Drafting,* sec. 21, "The Development of Mouldings"; Neubecker, *The Universal Sheet Metal Pattern Cutter,* vol. 2, part 4, "Patterns for Sheet Metal Cornices, [etc.]"; O'Rourke, *Sheet-Metal Pattern Drafting,* chap. 4, "Cornices." The basic techniques of pattern layout are also covered in most of the modern textbooks listed in note 38.

49. In the small enterprises engaged in cornice work, the layout man (or chief layout man) was the most experienced sheet-metalworker in the shop, and was usually either the shop foreman or the owner of the business. Interviews with Alfred Barnett and Wilbert Foster (see note 40).

50. The various types of snips used in sheet-metal shops today are described and illustrated in Meyer, *Sheet Metal Shop Practice,* pp. 19-22; and Zinggrabe, *Sheet Metal Hand Processes,* unit 11.

51. For a more detailed explanation of the construction and operation of squaring shears, see Meyer, *Sheet Metal Shop Practice,* pp. 106-107; Zinggrabe, *Sheet Metal Machine Processes,* unit 2; or Kratfel, *Introduction to Modern Sheet Metal,* sec. 5.2.

52. In addition to the 6 or 8 ft model illustrated in figure 3.17, Brown, Boggs & Co. also manufactured smaller squaring shears which were available in three lengths: 21, 31 and 37 inches. HPL, Brown-Boggs, 1895 Catalogue and Price List, p. 54.

53. It is conceivable that squaring shears were made before 1890 by Samuel S. Moore in Hamilton, apparently the first Canadian manufacturer of tinsmiths' tools and the small machines used in tin-shops. Established in 1867, Moore's business was bought out by Brown, Boggs & Co. around 1892. Interview with Jack Watts (see note 39).

54. One American firm which could have supplied squaring shears for the Canadian market was the Stiles and Parker Press Co. established in the 1880s or earlier and bought out in the 1890s by the E. W. Bliss Co. in Brooklyn, N.Y. (advertisements from American Machinist, 1884, 1896, 1899). The latter firm is known to have supplied some of the large Canadian companies with mechanical presses during the later period.
55. Hammer forming and die-stamping techniques are briefly discussed in sec. 3.4. For an explanation of spinning techniques, see Fraser and Bedell, General Metal, chap. 9 or Kratofil, Introduction to Modern Sheet Metal, sec. 10.4.

56. For a description of the more common stakes and their different uses, see Meyer, Sheet Metal Shop Practice, pp. 26-30 or Zinngrabe, Sheet Metal Hand Processes, unit 18.

57. Hems and folded edges for seams are made by forming a sharp bend and then flattening the bent edge by inserting it between the clamping blades and closing the upper jaw. For a more detailed description of the construction and operation of a hand brake, see Meyer, Sheet Metal Shop Practice, pp. 128-136; Zinngrabe, Sheet Metal Machine Processes, unit 7; or Kratofil, Introduction to Modern Sheet Metal, sec. 8.2.

58. It is known that John E. Riddell in Hamilton (see note 40) purchased an 8 ft. "Canadian Brake (Robinson pattern)" in the late 1880s which was replaced in 1891 by a Brown-Boggs Four Leaf Cornice Brake. Metropolitan Toronto Central Library, Canadian Trade Catalogue Collection (hereafter cited as MTCL, CTC), Brown, Boggs & Co., 1892-93 Catalogue and Price List, "Testimonials," John E. Riddell to Brown, Boggs & Co., 10 December 1891.

59. This company specialized in wooden cornice brakes. The travelling tin-shop display set up by Alfred Barnett at London Metal Service includes a model patented in 1893 which was acquired from a local firm (see fig. 3.10).

60. According to the sixtieth anniversary issue of Sheet-Metal Worker (January 1934), as documented in Gayle et al., Metals in America's Historic Buildings, p. 18, the first cornice brake was designed by the "predecessors" of J. M. Robinson & Co. One Canadian firm which is known to have used hand brakes manufactured by this firm was the Pedlar People. In 1914 the cornice department of their Oshawa plant included a 10 ft and a 51 in. model. PAC, Pedlar, vol. 4, file 7, Canadian Appraisal Invoice Co. Ltd., "Appraisal Invoice of the Pedlar People Ltd., Oshawa, Ont. and Montreal, Quebec," vol. 1 (Montreal: 1914), p. 323.

61. Evidence of this is provided by testimonials in Brown, Boggs & Co., 1892-93 Catalogue (MTCL, CTC), letters from John E. Riddell, Thos. Irwin & Son in Hamilton and Elliot Bros. in Kingston.

62. During the 1890s, Brown, Boggs & Co. offered, in addition to the 6 or 8 ft. model shown in fig. 3.21, a 3 ft brake suitable for making square pipe, eavestroughing, short sections of cornice and mitres, which was capable of bending 20 gauge iron. HPL, Brown-Boggs, 1895 Catalogue and Price List, p. 63; MTCL, CTC, 1892-93 Catalogue and Price List, p. 4.
63. For illustrations and descriptions of tinner's rivets and hand riveting, see Meyer, Sheet Metal Shop Practice, pp. 76, 117-123 or Kratfel, Introduction to Modern Sheet Metal, sec. 7.4.

64. The best soft solder for most sheet-metalwork is half-and-half (50% tin and 50% lead) which melts at about 418°F. In the sheet-metal trade solder is generally used in bar or wire form. To solder a joint, the solder is fed to the top of a heated soldering iron (a tool with a pointed copper head, also known as a soldering copper) which serves to melt the solder and spread it over the joint area. For a more detailed explanation of soldering, see Meyer, Sheet Metal Shop Practice, chap. 12; Zinngabe, Sheet Metal Hand Processes, unit 7; or Kratfel, Introduction to Modern Sheet Metal, secs. 8.5 and 8.6.

65. The method of making hems and folds in a hand brake is described in note 57. The bar folder differs from the hand brake in that the width of the fold is limited to about one inch, and it will only bend sheets of 22 gauge and lighter. For this purpose, however, it has a distinct advantage over the hand brake in that the width of the fold can be precisely regulated by means of a gauge at the front of the machine. See Meyer, Sheet Metal Shop Practice, pp. 125-128 or Zinngabe, Sheet Metal Machine Processes, unit 4.

66. The standard methods of joining the various parts of a cornice are described and illustrated in: Neubecker, The Universal Sheet Metal Pattern Cutter, 2: 80-82; Williams, The New Tinsmith's Helper and Pattern Book, pp. 216-217; and National Association of Sheet-Metal Contractors, Standard Practice in Sheet-Metal Work, sec. 3, "Metal Cornices: Specifications for the Fabrication and Setting of Sheet-Metal Cornices" (pp. 218-221) and the following cornice details (pp. 222-232).

67. Metal cornices backed by wood construction came to be regarded as a considerable fire hazard by city authorities. If the wooden lookouts ignited as a result of intense heat build-up, as could happen in a serious urban fire, the metal covering actually impeded fire extinguishment.

68. As early as 1881 in some American cities, galvanized iron work was prohibited unless erected on metal supports. PAC, John Davis Barnett Engineering Collection, MG 30 B 86 (hereafter cited as PAC, Barnett), vol. 18, loose clipping: portion of article ["Putting up Galvanized Iron Cornices"]. Scientific Canadian, December 1881, p. 375.

69. See National Association of Sheet Metal Contractors (U.S.), Standard Practice in Sheet-Metal Work, sec. 3, "Metal Cornices." According to their specifications, no combustible material was to be used in cornices over 36 inches in height (p. 221).

70. For more detailed instructions, see: Kittredge, Clark & Co., Manual of Sheet Metal Architectural Work, pp. 9-10; "Putting up a Galvanized Iron Cornice," Sheet-Metal Builder 1 (July 1874): 56-57; and PAC, Barnett, vol. 18, ["Putting up Galvanized Iron Cornices"].
According to Wilbert Foster and Lloyd Hacon, this was the standard method of putting up cornices in the 1930s.


Most tin-shops were equipped with a variety of hand-operated machines that were used for architectural and other sheet-metal work. These included circular shears for cutting discs of varying diameters, double seaming machines and various rotary machines for forming cylindrical objects and for crimping and beading their edges (see fig. 3.10). These machines were all manufactured by Brown, Boggs & Co. See, for example, their 1895 Catalogue and Price List.

An example of the work of the Kittredge Cornice and Ornament Co. (originally Kittredge, Clark & Co.) is shown in fig. 3.4. A page of designs for zinc brackets, scrolls and column capitals from the Zinc Roofing and Ornamenting Co.'s 1871 Catalogue of Ornamental Designs is illustrated in Gayle et al., Metals in America's Historic Buildings, fig. 16, p. 19.

Commonly known to sheet-metalworkers as bumping blocks, the hardwood blocks used in the tin-shop for hammer forming were usually just up-ended tree trunks, the top of which had a slightly concave surface. (Interview with Alfred Barnett.) If more than one hand-beaten form had to be produced, a hardwood block with the required shape carved out of the top was used. For a more detailed discussion of hammer forming, see Kratfel, Introduction to Modern Sheet Metal, sec. II.4.

According to Kenneth Lynch & Sons, "Historical Data about 'Rope Drop' Stampings and Repoussé Work," foreword to Catalogue 7474: Architectural and Decorative Sheet-Metal Ornaments (Wilton, Conn.: 1972), the rope drop method of stamping architectural ornaments apparently originated in France in the late 17th century. For a more detailed explanation of this technique than is given in the caption to fig. 3.27, see George Sachs, Principles and Methods of Sheet-Metal Fabricating, 2nd ed. (New York: Reinhold Publishing Corp., 1966), chap. 21.

Northey's Steam Engine Works in Hamilton, for example, were manufacturing "drops for stamping sheet metals" as early as 1875. Advertisement in McAlpine's Hamilton City and County of Wentworth Directory, 1875 (Montreal: McAlpine, Everett & Co., n.d.), p. 9.

According to Alfred Barnett, any architectural ornaments made in Ridsdale & McPherson's shop (see note 40) were hand hammered but by the late 1920s there was very little demand for such work.

See note 45.
80. No concrete evidence that small Canadian enterprises were ordering stamped ornaments from American catalogues has yet been found. It would be interesting to know in this regard if there was a sizeable Canadian market for any of the sheet-metal products manufactured by the large American companies during the 1870s and 1880s.


82. Ibid., p. 5.

CHAPTER 4

THE LATER PERIOD, 1890-1930.

The period 1890-1930 was distinguished from the early period by large companies specializing in the manufacture and mail-order marketing of sheet-metal building products, stamping-plant methods of production and the new pressed-metal components. By 1890 pressed-metal shingles, siding and ceilings were all available in the United States and by the mid-1890s were also being manufactured by two Canadian companies: the Pedlar Metal Roofing Co. in Oshawa and the Metallic Roofing Co. in Toronto. Thus, within the space of a few years, the production of decorative sheet-metal components in Canada seemingly leapt from the tin-shops of small enterprises to the stamping plants of large companies. This revolution must, however, be viewed in proper perspective. The large companies did not supersede the small enterprises; nor were the methods of the tin-shop displaced by those of the stamping plant. Nevertheless, the mail-order components and more advanced manufacturing techniques of the large companies did have some important repercussions on the tin-shop methods of the small enterprises and the types of components which had previously been entirely fabricated in local tin-shops.

The main focus of this chapter is on the small enterprises, the nature and scope of their activities and the types of components which were at least partly made in local tin-shops. The large companies, their catalogue-ordered components and the fabrication and erection techniques
associated with these components are therefore treated in a subsidiary manner. Sections 2 and 3 respectively examine the two scales of operation engaged in architectural sheet-metalwork during the later period and the advances made in fabricating and erecting cornices. Tin-shop methods were fully analyzed in the previous chapter; in this chapter they are only examined in relation to the more advanced techniques introduced by the large companies. Section 3 begins with a discussion of the stamping-plant methods of production and prefabrication techniques characteristic of the pressed-metal components, proceeds to an analysis of their application to catalogue-ordered cornices, and ends with an assessment of the impact of these advanced techniques on tin-shop methods of fabricating and erecting cornices.

The first section of this chapter provides some background on the introduction of pressed-metal components and the use of sheet metal for all the various types of decorative exterior elements erected on Canadian buildings during the later period.

4.1 The Decorative Uses of Sheet Metal

The decorative exterior elements made of sheet metal between 1890 and 1930 fall into two categories: cornices and other components that were entirely or partly fabricated by tin-shop methods and the pressed-metal roofing and siding materials. The discussion of tin-shop components covers the types characteristic of the later period and their application to various building types. The influence of architectural trends and of both professional and popular taste on their use is also considered. The subsequent discussion of the pressed-metal components
covers their introduction in North America, the Canadian companies engaged in their production, their practical advantages and the exterior uses of pressed metal.¹

The Use of Sheet Metal for Cornices and Similar Components

During the period 1890-1930 the cornices of the buildings designed by Canadian architects were more often fabricated of sheet metal than any other building material. Galvanized iron and, to a lesser extent, sheet copper were both specified for the cornices of commercial blocks, department stores (fig. 4.1), tall office buildings, hotels, apartment buildings and public schools (fig. 4.2).² The general trend towards Modernism which gained momentum in the 1920s,³ however, spelt the demise of the sheet-metal cornice. Doomed to obsolescence, its forms were progressively simplified and by 1930 it was no longer an architectural feature of any significance.

This modernist trend also influenced the types of facade elements made of sheet metal during the later period. The use of sheet metal for window caps and mansard roof trimmings declined steadily with the waning popularity of the Renaissance Revival and Second Empire styles in vogue during the early period. At the same time, the rise of the Commercial Style,⁴ led to the introduction of two new facade elements, the bay window and the spandrel panel, both of which were commonly fabricated of sheet metal. Galvanized iron bay windows and spandrel panels frequently appeared on the two to five-story commercial buildings erected in Canadian cities during the early twentieth century (fig. 4.3).⁵
Another important development was the demotion of galvanized iron to the rank of a second-rate building material in the eyes of professional architects. With the emergence of a Canadian architectural profession in the late 1880s and early 1890s, Canadian architects, following the lead of their British and American colleagues, began to show a greater concern for treating all materials in an honest manner, particularly new materials like cast iron and sheet metal which had previously been made to imitate the forms of cut and carved stonework and even the texture of stone. From the 1890s on, they increasingly protested the use of sheet metal for "tin battlements" and "fake stone cornices." Though often denounced as a "hollow sham," the galvanized iron cornice nevertheless remained a standard feature of certain types of architect-designed buildings, notably public schools and small commercial blocks for which there was usually no viable alternative.

What galvanized iron lost in respectability during the later period it certainly gained in mass appeal. Its use on vernacular buildings increased significantly with the popular trend towards more ornate architectural forms which reached a peak in Canada around the turn of the century. The cornices of small commercial blocks built after 1890 were typically made of galvanized iron, and in some cities sheet-metal cornices were also a common feature of flat-roofed residential units. Galvanized iron was still used to some extent for window caps up to about 1910, and after 1900 was quite commonly used on urban commercial buildings for bay windows.

The galvanized iron cornices which may still be seen on many of the "Main Street" commercial buildings erected in Ontario towns during
the 1890s and 1900s epitomize late Victorian popular taste. Most of
these buildings have relatively plain brick fronts but often boast
elaborate cornices with brackets and dentils, decorative frieze panels,
stamped enrichments and prominent end blocks with urns or finials
(fig. 4.4).

The outstanding surviving example of vernacular galvanized iron
work in Ontario, if not in Canada, is surely Ottawa's "Tin House" facade
(fig. 4.5). This architectural tour-de-force was the unique creation of
a tinsmith by the name of Honoré Foisy, who in 1905 dressed up the front
of his modest Lower Town dwelling with a flamboyant facade made entirely
of sheet metal. A pot-pourri of Revivalist features, this highly ornate
front comprised various individual elements: a cornice with a roof
balustrade and a pediment of Baroque derivation, an Eastlake inspired
balcony, window caps and imitation stone cladding.9

The Pressed-Metal Components and their Exterior Applications

The pressed-metal components were introduced in North America
over a period of about ten years. Stamped metal shingles were being made
in the United States by the 1870s but did not become popular until the
1880s.10 They were first manufactured in Canada in 1885 when the
Metallic Roofing Co. introduced their "Eastlake" shingle (fig. 4.6).11
By the 1890s metal shingles were being manufactured by several other
Canadian firms including the Pedlar Metal Roofing Co., and by the turn of
the century metal tiles could also be ordered from Canadian catalogues
(fig. 1.2). It is not known exactly when metal siding which simulated
the appearance of pressed brick and rock-faced brick or stone first
became available but by the early 1890s it was being manufactured in this country by both the Metallic Roofing Co. and the Pedlar Metal Roofing Co. (fig. 4.7). Ornamental ceilings assembled from a variety of pressed-metal components appear to have been introduced in the United States in 1888 by W. R. Kinnear & Co. in Columbus, Ohio, and were first manufactured in Canada by the Pedlar Metal Roofing Co. in 1892.

Because the machinery and dies necessary for stamping these pressed-metal components represented a substantial capital investment, their production rapidly centralized in large factory operations. By 1910, the manufacture of metal shingles, siding and ceilings in Canada was concentrated in seven large companies. The five Ontario firms included the Metallic Roofing Co., the Pedlar People, the Metal Shingle & Siding Co. in Preston, the Galt Art Metal Co. and the Macfarlane-Douglas Co. in Ottawa. The two western firms were the Winnipeg Ceiling & Roofing Co. and the British Columbia Ceiling & Roofing Co. in Vancouver, the last to be established in 1910.

The rapid rise in popularity of the new pressed-metal components may be attributed to their ornamental character, low cost, ease of installation, fire-resisting properties and many other practical advantages. In advertising their metal shingles, for example, manufacturers called attention to the fact that a metal-shingled roof was fire and lightning proof; it was more durable and less likely to leak than a wood one but still comparable in cost; it was light in weight and considerably cheaper than a slate roof; and finally, it would be easily laid by anyone accustomed to shingling or slating.
By the mid-1890s metal shingles were being used across the country for covering the roofs of foundries, mills, railway stations, churches, schools, theaters and exhibition buildings. Metal tiles appeared on roof towers (fig. 1.2) and were quite widely used as a practical substitute for terra cotta tiles on houses and other buildings designed in the Spanish Revival styles popular around the turn of the century.

During the early twentieth century, both plain and decorative sheet-metal roofing and siding were a common feature of buildings in the Canadian countryside. The components used for cladding—barns, farmhouses and other farm buildings ranged from utilitarian corrugated and ribbed sheets to the more ornamental shingles and imitation brick and stone siding plates (fig. 4.8).

While manufacturers recommended their rock-faced metal siding for commercial buildings and urban residences (fig. 4.5), it does not appear to have been widely used for such purposes in town and cities where solid brick masonry or brick veneer was the standard form of construction, as was the case in southern Ontario. Moreover, most architects scorned this base imitation and rarely specified it, except occasionally for buildings which were not intended to make a serious architectural statement. The Free Press Office in Acton, Ontario, for example, had a full sheet-metal front designed by Toronto architect J. A. Ellis featuring rock-faced siding and a top-heavy pedimented cornice which appears to have been a standard catalogue design (fig. 4.9). Yet despite its playful character, this facade must still have had quite an imposing presence in such a small town.16
The Acton Free Press Office may be compared to the Tin House in that both buildings had complete fronts which combined pressed-metal cladding with a galvanized iron cornice and various other decorative elements. In contrast to the Tin House facade, however, the Free Press Office front was entirely fabricated by a large company.

4.2 The Businesses Engaged in Architectural Sheet-Metalwork

The Large Companies

The large companies shared a number of features which distinguished them from the small enterprises. First and foremost, they all manufactured the pressed-metal components. Second, they were exclusively or primarily engaged in the production of sheet-metal building materials and offered a complete line of plain and decorative components. Third, their products were marketed by trade catalogue and were therefore widely distributed over large regions or throughout the country, and in some cases outside the country. Fourth, they concentrated on quantity production rather than custom fabrication, and hence, on the production of standardized elements formed by machine-stamping techniques. Thus, while their factories all had tin-shops, the main manufacturing facility was the stamping plant. Finally, the large companies, in contrast to the small enterprises, did more fabrication than erection work.

The first of these large companies was the Metallic Roofing Company of Canada Ltd., established in Toronto in 1884 and incorporated the following year. Up to 1890 this firm manufactured only a limited selection of sheet-metal building products -- metal shingles and siding
and several types of small galvanized iron components, such as eaves-troughing and roof cresting. But by 1900, the year in which its first large general catalogue was issued, the Metallic Roofing Co. was offering the full range of building components available at the time, including such decorative elements as metal ceilings, cornices (fig. 2.13) and stamped ornaments (fig. 2.15). In addition a new factory had been built (fig. 1.7) and the company had established an excellent reputation for its metal shingles and ceilings. "Metallic" ceilings and walls were even being ordered for buildings in England, Scotland, India and several other countries.

The Metallic Roofing Co.'s first and only competitor before the late 1890s was the Pedlar Metal Roofing Co. By the early 1900s, however, the Pedlar People, as they were by then known, were already claiming to have "the largest plant in the world for the exclusive production of sheet-metal building materials." Whether this was true or not remains to be determined but of the seven large companies previously identified, the Pedlar People certainly had the greatest market impact at home and abroad between 1890 and 1930. For this reason, and also to illustrate the chief characteristics of the large companies and the development of their product lines, a brief history of this firm is given below.

According to their own trade literature, the Pedlar People were officially founded in 1860, the year in which George Henry Pedlar and his father set up a plant behind their hardware store and tin-shop to manufacture sheet-metal roofing. However, the history of their business, as a large company, only dates back to 1892 when it was
relocated to a new factory and established under the name, Pedlar Metal Roofing Co. The firm then rapidly expanded its operation. Several catalogues were issued in the course of the 1890s and offices and warehouses were opened in cities across the country. The company's name was changed to the Pedlar People in 1900 and about two years later, a large comprehensive catalogue offering a complete line of sheet-metal building materials was issued. The components in this catalogue ranged from the strictly utilitarian, such as corrugated iron cladding, metal lath and fireproof doors and shutters, to ornamental roofing tiles (fig. 1.2), metal ceilings (fig. 2.16), and highly ornate window caps (fig. 2.14) and store fronts (fig. 2.17). At the time of their incorporation in 1911, the Pedlar People had offices and warehouses in fourteen Canadian cities as well as Australia, New Zealand, South Africa and Japan.

The death of George Henry Pedlar Sr. in 1913 coincided with a change in product line. Up to this time, decorative sheet-metal components had made up the largest part of the company's overall production. However, with the decline in popularity of the ornamental styles of architecture and interior decoration favoured in the late Victorian period, decorative components were progressively replaced by more utilitarian building products and by other types of sheet-metal products, such as culvert pipe, steel shelving, and barn and stable equipment. The demand for cornices, ceilings and other decorative sheet-metalwork declined sharply after 1930 and by the outbreak of the Second World War, only the pressed-metal components were still being manufactured. These too were subsequently discontinued.
While large companies all shared certain features which clearly set them apart from the small enterprises, their activities did overlap in certain areas, notably, in erection work. The Pedlar People, the Metallic Roofing Co. and the Galt Art Metal Co. did very little work on a contract basis, and therefore were not involved to any great extent in erecting the components which they supplied. The other four companies, on the other hand, quite often contracted to put up their own roofing, cornices and even ceilings, particularly for architect-designed buildings.\(^{27}\)

The Small Enterprises

After 1890 the small enterprises continued to do the same type of architectural sheet-metal work as before but there were some important changes in the nature of their work and the scope of their activities.\(^{28}\) Geared to custom fabrication, their decorative sheet-metal components were mostly made up in unique designs and sizes. These components encompassed all the types formerly made in tin-shops and any new types fabricated by the same techniques, such as bay windows and spandrel panels. However, they differed in one important respect from those supplied by small enterprises in the early period: as a general rule, the parts were not all manufactured locally. Cornices, for example, frequently incorporated stamped ornaments, moulding enrichments and brackets (figs. 4.1, 4.4), all of which could be ordered from Canadian catalogues by the early 1900s (figs. 2.15, 4.10).

As sheet-metal contractors, the small enterprises had always erected most of the components fabricated in their own shops. From the
1890s, however, there was a new emphasis on erection work resulting from a shift of certain fabrication work from local tin-shops to the stamping plants of the large companies. Thus, the small enterprises also contracted to erect metal ceilings and country tinsmiths whose shops were not equipped for cornice work were now able to supply customers with mail-order cornices which they could erect from a complete kit of parts (fig. 4.11).

During the later period, there was a considerable range in the size and activities of the small enterprises. This range is well illustrated by the businesses of Honorable Foisy of Ottawa and John E. Riddell in Hamilton.

Honorable Foisy's business in Ottawa's Lower Town was typical of the smallest-scale operations. In 1904 Foisy opened a tin-shop on Dalhousie Street and moved into an adjacent house on Guigues Street, which he subsequently transformed into the celebrated Tin House (fig. 4.5). He ran an extremely diversified business at this location for about ten years, advertising as a plumber, general tinsmith, tin and iron roofer, contractor, hardware merchant, house decorator and cornice manufacturer. Aside from Foisy's own house, there is no surviving record of his architectural sheet-metalwork. Nevertheless, he almost certainly fabricated and erected numerous galvanized iron cornices for vernacular residential and commercial buildings being constructed in Lower Town (fig. 4.12). As a "house decorator," he must also have put up a number of metal ceilings in this part of the city. In fact, his own Tin House had a complete pressed-metal interior finish.
Except for its rock-faced siding, Foisy's Tin House front was entirely fabricated in his own tin-shop using techniques which relied heavily on traditional tinsmithing skills. By the early twentieth century, the highly skilled tinsmith was rapidly becoming an endangered species in North America, a trend which was accelerated by the First World War. This was reflected only too clearly in Honoré Foisy's ill-fated career. After moving his business to Britannia in 1913, Foisy went bankrupt during the war and died several years later.²⁹

By comparison, the roofing and sheet-metalworking enterprise established by John E. Riddell in 1877 was a relatively large and specialized operation. Moreover, this Hamilton firm survived both wars and is still in business today under the name, Riddell Sheet Metal & Roofing Ltd.³⁰

During the period 1890-1930, John E. Riddell was engaged in all kinds of roofing work, and by 1910, just after moving to new premises, was offering a fairly wide selection of sheet-metal building products which included copper, galvanized iron and tin roofing; corrugated iron; metal doors, windows and skylights; copper and galvanized iron cornices; and finally, metal ceilings. Riddell's installed metal ceilings throughout the city and did a considerable amount of custom sheet-metalwork for local architects. Hamilton's first department store, designed by Charles Mills for Stanley Mills & Co. and built in 1903, for example, had metal ceilings and a sheet-copper cornice (fig. 4.1), both supplied by John E. Riddell.³¹

The cornice of the Stanley Mills department store was distinguished by its wealth of stamped ornamentation. It clearly
reflects the general tendency in the later period for small enterprises to substitute pressed-metal enrichments purchased from the large companies for ornaments made in their own tin-shops by methods which demanded much labour and skill. With the increasing cost of labour and the rapidly decreasing number of highly skilled tinsmiths like Foisy, it was no longer economically feasible to fabricate decorative sheet-metal components characterized by a high degree of ornateness without resorting to the use of catalogue-ordered ornaments. It must be acknowledged that Foisy's richly ornamented house front was unique, even in the context of his own work. Although the Tin House was certainly a good advertisement for his business, the cost of furnishing any other Lower Town residence with a comparable front would have been prohibitive.

The cornice of the Stanley Mills store, though just as ornate as that of the Tin House, embodied a more advanced level of sheet-metalworking technology. Whereas Foisy hand-crafted his own ornaments, Riddell's took full advantage of the inexpensive, machine-stamped ornaments offered in catalogues.

4.3 Advances in Methods of Fabricating and Erecting Cornices

Before discussing the advances made by the large companies in fabricating and erecting cornices, the techniques associated with the pressed-metal components will first be considered. These techniques represent a culminating point in the development of methods of fabricating and erecting decorative sheet-metal components during the period 1870-1930. At this advanced stage, mail-order marketing, mass-production and prefabrication were exploited to the fullest possible extent.
The Pressed-Metal Components: Stamping-Plant Methods and Prefabrication

The methods of fabricating and erecting pressed-metal components may be regarded as considerably more advanced than tin-shop methods. First, there was a clear separation between fabrication and erection procedures and a clear division of labour between factory and site work. These components were prefabricated in the sense that they were entirely manufactured in the factory and their erection was not dependent on the specialized skills of the tinsmith: in fact, traditional tinsmithing skills were eliminated from both sets of operations.

The pressed-metal components were fabricated by stamping-plant methods; that is, they were mass produced or produced in some quantity by mechanized techniques in a stamping plant. This manufacturing facility, in contrast to the tin-shop was geared to multiple production, and was therefore much more highly mechanized. Skilled hand work was replaced by machine work and hand-operated machines by power-driven ones. The sheet-metalworkers needed for tin-shop work were displaced in the stamping plant by a few skilled machine operators and many semi-skilled workers.

Unlike components made by tin-shop methods, the pressed-metal components were standardized by the nature of the manufacturing process; in other words, many identical elements could be made from a single die set. For this reason, pressed-metal components were exceptionally well suited to a catalogue system of marketing. Moreover, the standard catalogue designs could be produced in large quantities at a low unit cost whereas special designs made in limited quantities for a particular building or client were expensive to manufacture because of the high initial cost of fabricating the necessary dies.
Aside from the preliminary work of setting up the stamping machinery, the fabrication of the pressed-metal components entailed only two different types of operations: cutting and forming. The sheet metal (usually sheet steel) was first cut into standard-sized squares, strips or panels using power squaring shears. These pieces were then stamped with an embossed pattern in a rope drop hammer (fig. 3.27) or a mechanical press (fig. 2.22). In the case of metal shingles, a final step was to form the side locks in a power folder. None of these cutting and forming operations required any tinsmithing skills. Moreover, hand joining work played no part in the production of pressed-metal shingles, siding or ceilings; the individual components did not need to be joined together by riveting or soldering techniques, either in the factory or on the building site.

The pressed-metal components were shipped to customers in crates containing either a number of identical components comprising metal shingles or siding plates or a set of components for a metal ceiling or complete interior finish. These components could be easily and quickly erected by a carpenter or other general building mechanic. Ceiling tiles, for example, were formed with beaded edges so that they could be lapped and nailed to wooden sheathing or furring strips (fig. 4.13). While some metal ceilings were in fact put up by sheet-metalworkers, the standard catalogue-ordered ceiling was supplied as a carpenter's kit. The only skills required for its installation were basic layout and carpentry skills, and the only tools needed for the job were a hammer and tin snips.32
Catalogue-Ordered Cornices

The advanced methods associated with the pressed-metal components were also applied by the large companies to the older types of decorative sheet-metal components, the most important of which was the cornice. The prefabricated, catalogue-ordered cornice represents the most advanced stage in the development of techniques for fabricating and erecting cornices during the period 1870-1930. Prefabricated cornices appear to have been introduced in Canada by the Pedlar Metal Roofing Co. and were first offered in their catalogue of *Modern Building Fronts*, issued around 1895 (fig. 4.14)\(^{33}\).

Catalogue-ordered cornices were available in standard designs but not standard sizes. Although certain dimensions could be standardized (figs. 3.12, 4.14), cornices were always made-to-order in lengths specified by the customer. However, they could still be entirely or largely assembled from die-formed parts, many of which could also be made in standard sizes, and hence, mass-produced. The mass-produced parts included brackets, the various stamped enrichments and also embossed frieze panels which were made in the same way as metal ceiling and wall components. Even the moulded cornice sections, though made in non-standard lengths, could be die-formed in a power-driven press brake (fig. 4.15\(^{34}\)).

In that catalogue-ordered cornices mainly comprised die-formed parts, they were technically more sophisticated than any cornices whose principal members were formed in a hand brake. Nevertheless, even if all the parts were mechanically stamped, certain parts still had to be joined in the company's own sheet-metal shop. Thus, in contrast to a metal
ceiling, a catalogue-ordered cornice was a product of both the tin-shop and the stamping plant. For this reason, and also because cornice members could not all be made in standard sizes, and hence, produced in quantity, the catalogue-ordered cornice represents a less advanced stage of development than the metal ceiling.

Though not advertised as such, the catalogue-ordered cornices manufactured by the Pedlar Metal Roofing Co. were prefabricated. They were largely assembled in the factory and were shipped in eight-foot sections with separate end blocks and brackets. The Pedlar kits even included wooden lookouts. Site work involved only a few simple operations: first, the brackets were bolted to the long sections; the wooden supports were then attached to the face of the building; and finally the various cornice parts were nailed to the lookouts. As claimed by the company, these cornices could be "put up by any mechanic without difficulty."

It may be recalled from Chapter 3 that the fabrication and erection of a cornice by tin-shop methods entailed a considerable amount of joining work, some of which was done on the building site. If a cornice was to be supplied as a prefabricated unit, however, all joining operations had to be eliminated from site work. With the Pedlar cornices, this was achieved in two ways: by providing brackets and modillions which were bolted to the main cornice members and by joining the rest of the parts which made up the long sections and end blocks in their own tin-shop.

Two other large companies, the Metallic Roofing Co. and the Winnipeg Ceiling & Roofing Co., are known to have offered prefabricated
cornices (fig. 3.12). However, most catalogue-ordered cornices do not appear to have been supplied in this form. Given the availability of local tinsmiths (as was generally the case in southern Ontario), the prefabricated cornice was not a viable alternative to one erected by tin-shop methods. In the first place, a cornice with bolted parts was not as soundly constructed or as watertight, and hence rust-proof, as one in which such members as brackets and modillions were firmly riveted and soldered in place. Secondly, the prefabricated cornice supplied with all members attached had certain drawbacks. It was more cumbersome to transport and therefore more likely to get damaged in shipment.

Moreover, the proper joining of all parts in the factory imposed an even heavier work load on the company's own sheet-metalworkers. A greater profit was clearly to be made from mechanized work done in the stamping plant than hand work done in the tin-shop. In short, prefabricated cornices had a number of disadvantages over cornices erected in the traditional way, and as a result, catalogue-ordered cornices were more often supplied as tinner's kits. In other words, the various members were packed as separate parts to be joined by a tinsmith, either in his shop or on the building site. This practice not only provided work for local tinsmithing businesses but also freed the large companies from the skilled, labour-intensive work involved in prefabricating cornices.

Catalogue-ordered cornices, then, were available in two forms: the tinner's kit and the prefabricated unit. The former appears to have been mainly sold to tinsmiths who were not otherwise engaged in cornice works. The latter was a good solution to the problem of fabricating and erecting cornices in newly settled areas where there was a general
shortage of skilled labour, but cornices would not normally have been prefabricated for buildings in areas where tinsmiths were to be found in most villages. Moreover, in places where tinsmithing businesses were already engaged in cornice work, most cornices would have been at least partly made in local tin-shops.

The Continuation and Modification of Tin-Shop Methods

As previously established, the small enterprises continued to supply cornices and any other components which could be made by tin-shop methods throughout the later period. However, although the principal cornice members could be easily and cheaply fabricated in local tin-shops, standardized ornaments and ornamental parts could be manufactured more cheaply by the large companies. It therefore became increasingly common practice for these elements to be ordered from catalogues. Cornices which incorporated catalogue-ordered stamped parts were put together in the same way as cornices whose parts were entirely made in the tin-shop, ready-made ornaments and brackets being riveted and/or soldered to the appropriate members (fig. 3.26). Nevertheless, tin-shop methods were influenced, at least indirectly, by the adoption of catalogue-ordered parts. While tin-shop procedures were not fundamentally changed, the level of skill and the amount of labour required to fabricate highly ornate components was substantially reduced. Thus, it may be said that tin-shop methods were modified by the more advanced manufacturing techniques of the large companies.

A large proportion of the cornices erected on buildings in southern Ontario during the later period appear to have been entirely or
largely fabricated by tin-shop methods, and were therefore most probably supplied by small businesses. Although it is not always possible to tell from the appearance of a cornice whether it was made locally or ordered from a catalogue, the former tended to be much simpler in design, even when stamped ornaments were used (fig. 4.16). A close inspection of the galvanized iron cornices along the main street of Carleton Place suggested that the majority were supplied by one or more tinsmithing businesses in that town.³⁹ This must surely have been the case with the cornice of the building adjacent to 21 Bridge Street (fig. 4.4), which has a very simple curved profile with no brackets or stamped ornamentation. Even the much more elaborate cornice of its neighbour could have been partly the work of a local tinsmith, although the festooned frieze enrichment was clearly ordered from a catalogue and the end blocks, or just the ball finials, may also have been obtained from the same company.⁴⁰

There are many reasons why cornice work remained to a large extent decentralized in local tin-shops. First and foremost, it was better suited to small than large businesses. The fabrication of a cornice entailed numerous joining operations, which constituted labour-intensive, skilled hand work. Moreover, as suggested in Chapter 2, custom fabrication was, on the whole, less well suited to large than small-scale operations. Architects continued to demand cornices made up to their own designs, and whether made in unique or standard designs, all cornices were supplied in non-standard lengths. Furthermore, unless a cornice was prefabricated, it had to be erected by a sheet-metalworker. Although some of the large companies did do erection work, erecting
cornices was a more profitable activity for the small enterprises. Tradition was yet another factor which favoured the decentralized production of cornices. The old way of doing business in person was still preferred by many customers to ordering from a catalogue. And finally, many builders must have found it more convenient to go to a local tin-shop and arrange to have a custom-made cornice supplied on a contract basis. In any case, hardware and tinsmithing businesses very often carried the catalogues of one or more of the large companies, from which stamped ornaments could be selected.

In summary, the most practical and expedient methods of fabricating and erecting cornices in the period 1890-1930 proved to be a compromise between the early tin-shop methods employed by highly skilled tinsmiths like Honoré Foisy (fig. 4.5) and the most advanced methods represented by the prefabricated cornices offered in the Pedlar Metal Roofing Co.'s catalogue of Modern Building Fronts (fig. 4.14). Between these two extremes were cornices which were partly fabricated in local tin-shops and catalogue-ordered cornices erected by local tinsmiths. Most typical were the cornices whose principal members were custom-made locally and embellished with catalogue-ordered stamped ornaments (figs. 4.1, 4.4, 4.16). The most common methods thus combined the old techniques of the small enterprises with the new techniques of the large companies.

During the later period, cornice work was shared by the small enterprises and the large companies in accordance with the type of work best suited to each, and therefore, economically advantageous to both. The fabrication of cornice parts made in unique designs and sizes and the
joining of various cornice members was mainly done in local tin-shops or on the building site. On the other hand, the fabrication of ornamental parts which could be made in standard sizes and designs, and hence, mass-produced shifted to the factories of the large companies. Fabrication work was probably shared more or less equally by the two scales of operation. Most erection work, however, was done by the small enterprises. This distribution of work suggests that the small enterprises played a somewhat more important role in the overall fabrication and erection of cornices than the large companies. Thus, it may be concluded that a very large proportion of the sheet-metal cornices erected on Canadian buildings after 1890 were supplied by local businesses, and while some were ordered as complete units from catalogues, the majority were at least partly fabricated in their own tin-shops.
NOTES


2. Sources on the use of sheet metal for cornices and similar components during the period 1890-1930:
   a) photographs of surviving examples.
   b) documentation on specific buildings in the following repositories: National Capital Commission, Interpretation and Heritage Division, Architectural Data Bank (hereafter NCC, ADB); Public Archives of Canada, National Photography Collection; and City of Hamilton LACAC files.
   c) descriptions and illustrations of buildings in Construction, 1907-1934.


   fig. 4.2, First Avenue Public School, Ottawa: NCC, ADB, H12-576.

3. Buildings described at this time as modern in style were characterized by a complete or more often only a relative freedom from ornament and Revivalist forms.

4. The stylistic label "Commercial Style" appears to have been first adopted in 1891 to describe the new forms of the steel-framed Chicago skyscrapers. In these buildings, the internal skeleton was expressed as a grid of intersecting piers and horizontal spandrels to which all ornament was subordinated. Bay windows are also associated with this style. For a summary of the origin and characteristics of this style, see Marcus Whiffen, American Architecture Since 1780: A Guide to the Styles (Cambridge, Mass.: M.I.T. Press, 1969), pp. 183-190.

5. In skeleton-frame Commercial Style buildings, the spandrel was the panel of wall between adjacent structural columns and between the sill of one window and the head of the window below, but in small commercial buildings designed in this style (fig. 4.3 [bottom]), the spandrel panel was simply a decorative motif.

   fig. 4.3 (top), Building for Geo. Mathews Co. Ltd.: Commonwealth Historic Resource Management Ltd. (Ottawa), W. E. Noffke Project File, C-24, Job no. 279.

6. The first architectural journal to be published in Canada was the Canadian Architect and Builder which ran from 1888 to 1908. The first professional association was the Ontario Association of Architects, incorporated in 1890 and the first school of architecture was opened at the University of Toronto in 1891.
7. This concern for architectural honesty had its roots in an elitist reaction against the so-called artistic shams proliferated by British industrial manufacturers in the Early Victorian period. The question of the imitative versus the honest use of new materials was a recurring theme in British and American journals during the second half of the nineteenth century. Evidence of its influence on Canadian architects is provided by William Harris's indictment of Winnipeg's galvanized iron cornices (see sec. 3.1) and by similar statements published in Canadian journals between 1890 and 1930. See, for example, "Truth in Architecture," Canadian Architect and Builder 9 (June 1896): 86-87; and "Shams and Fundamentals," Construction 16 (December 1923): 448-449.


9. NCC, ADB, M12-013 (Tin House file): various newspaper clippings. See, in particular, Barbara Lambert, "Saga of the Tin House," Ottawa Citizen, 8 September 1973, pp. 4-5. Interview with Stan White (Architect, Public Works Canada, Ottawa), originator of idea for the Tin House Court and collaborator in its implementation by the NCC.

10. For a detailed account of the history, design, manufacture, distribution and installation of metal shingles, see Dierickx, "Decorative Metal Roofing in the United States," pp. 154-187.


14. Note on the installation of machinery for stamping metal ceilings in the new addition to the Pedlar plant built in 1892, Canadian Manufacturer 22 (June 1892): 306; advertisements in the Canadian Architect and Builder, 1892.

15. Manufacturers' catalogues (see fig. 4.7); advertisements in such journals as the Canadian Architect and Builder and Construction. On the advantages of metal shingles, see also Dierickx, "Decorative Metal Roofing in the United States," pp. 177-178.

16. Main sources on the use of metal shingles and siding on Canadian buildings: manufacturers' catalogues (see fig. 1.2) and the documentation of specific buildings (see figs. 4.5, 4.8 and 4.9). Information on the Acton Free Press Office was derived from the 100th anniversary issue of the Acton Free Press, 2 July 1975, p. 5 (copy from Kay Dills, present owner of the building).
17. Main sources on the large Canadian companies:
   a) two collections of company records at the Public Archives of Canada: the Pedlar People Ltd. (PAC, Pedlar) and Westeel-Rosco Ltd. (PAC, Westeel). Include catalogues issued by the Pedlar People, the Metallic Roofing Co., the Winnipeg Ceiling & Roofing Co. (forerunner of Westeel Products) and the Metal Shingle & Siding Co. as well as various other company records.
   b) Metropolitan Toronto Central Library, Canadian Trade Catalogue Collection (hereinafter MTCL, CTC). Includes catalogues issued by the Pedlar People, the Metallic Roofing Co. and the Metal Shingle & Siding Co.
   c) interviews with former employees of six of the seven large companies: Sam Bailey (Metal Shingle & Siding Co. and the Metallic Roofing Co.); Jack Kellington, Eric Pim, Jack George and Murray Sparks (Pedlar People); Ross Calder, Ab Beaver, Gordon Graham and Alex Brenner (Metal Shingle & Siding Co.); Gren Yuill and Normal Lowe (Winnipeg Ceiling & Roofing Co.); Leslie Mason and John Reilly (Galt Art Metal Co.); and Doug Irving (Macfarlane-Douglas Co.).

18. The tin-shop was also called the cornice, contract or sheet-metal shop while the stamping plant was also known as the press room or department. Interviews with former employees of six of the large companies (see note 17).

19. Specific sources on the history of the Metallic Roofing Co.:
   b) Manufacturing notes in the Canadian Manufacturer, 1888-1898.


21. The third large company, the Metal Shingle & Siding Co. in Preston, was established in 1897. Interview with Ab Beaver.


23. Specific sources on the history of the Pedlar People:
   a) a brief historical sketch, "In Retrospect," in several later catalogues. See, for example, PAC, Pedlar, vol. 3, file 5, Pedlar People, Reference Book no. 26R, June 1926, p. 6.
   b) M. McIntyre Hood, Oshawa: A History of "Canada's Motor City" and Oshawa Public Library (Oshawa: Oshawa Public Library, 1978), pp. 100-105 ["The Pedlar People's Contribution"].

24. The earliest catalogue in the Pedlar collection is the Pedlar Metal Roofing Co.'s 1894 Catalogue (PAC, Pedlar, 1:1).

26. Pedlar products continued to have an important market impact in the post-war period but the company went into receivership in 1977 and in 1982 its Oshawa plant was closed down.

27. Interviews with former employees of six of the large companies (see note 17) and various catalogues.

28. Main sources on the small enterprises in the later period:
   a) advertisements in various city directories and business publications.
   b) interviews with former employees or owners of small businesses engaged in architectural sheet-metalwork (see chap. 3, note 40).

29. Main source on Foisy's business: NCC, ADB, M12 013 (Tin House file).

30. Main sources on John E. Riddell's business:
   b) advertisement in the Hamilton Manufacturer (Made in Hamilton Number), 1910-11, p. 52.
   c) interviews with Lloyd Hacon and John Riddell. According to Lloyd Hacon, John E. Riddell & Son employed from 35 to 40 men (including two roofing crews) just before the Second World War.

31. The metal ceilings in this store were manufactured by the Metal Single & Siding Co. (illustrated in Catalogue no. 18 [MTCL, CTC], p. 96) but according to Lloyd Hacon, most of the ceilings installed by Riddell's were obtained from the Pedlar People, as were the stamped ornaments used in their cornice work.

32. Main sources on the techniques of fabricating and erecting the pressed-metal components:
   a) manufacturers' trade catalogues.
   c) Sachs, Principles and Methods of Sheet-Metal Fabricating, chap. 16 [mechanical presses] and chap. 21 [drop hammers].
   d) interviews with former employees of the large Canadian companies (see note 17) and individuals with three American firms presently engaged in the production of metal ceilings, shingles and stamped ornaments: Kenneth Lynch & Sons, Wilton, Conn.; the Shanker Steel Corp., Glendale, N.Y.; and the W. F. Norman Corp., Nevada, Mo.


36. The Metallic Roofing Co. supplied cornices which were "furnished complete in as large sections as convenient for transportation, with all brackets, mouldings and ornaments attached, thereby making it possible for any mechanic to put up work." PAC, Westeel, 1:3, Catalogue "S", p. 287. The Winnipeg Ceiling & Roofing Co. also prefabricated cornices which were put together in 16-foot sections with all ornaments, brackets, etc. riveted and soldered in place ready for erection. PAC, Pedlar, vol. 4, file 11, Winnipeg Ceiling & Roofing Co., General Catalogue no. 15 [ca. 1913], p. 87.

37. The Winnipeg Ceiling & Roofing Co.'s "knocked down" cornices, for example, were shipped in 8-foot sections with brackets, modillions and ornaments detached and packed separately. Ibid.

38. See, for example, the Metal Shingle & Siding Co., Catalogue no. 18 (MTCL, CTC), p. 150 (page reproduced in fig. 4.11).

39. One such business was run by the Taylor Brothers, who operated a hardware store and tin-shop from the late 1880s to the 1930s in the Taylor Building, a three-story commercial block built in 1888. It had a galvanized iron cornice which was possibly the first to be erected on a Carleton Place building. According to William Findlay, the Taylor Bros. did do some cornice work in the town. Interviews with William F. Findlay, former owner of Findlay Foundry Ltd., Carleton Place, and Howard M. Brown, Carleton Place historian.

40. Stamped ornaments and ornamental cornice parts were most probably obtained from the Pedlar People as most of the metal ceilings found in the stores along Bridge Street were manufactured by this company. Moreover, the Leslie Building at 43 Bridge St., a three-story commercial building erected for George Leslie in 1895, has a complete sheet-metal front which appears to have been ordered from the Pedlar Metal Roofing Co.'s catalogue of Modern Building Fronts (PAC, Barnett, 18:7b).
The fabrication and erection of decorative sheet-metal components in Canada between 1870 and 1930 was characterized by a number of important features and changes. Before 1890 these components were supplied by small diversified businesses engaged in tinsmithing and were fabricated and erected by tin-shop methods. After 1890 they were supplied by many small enterprises and also several large companies specializing in the manufacture and mail-order marketing of sheet-metal building products. While the large companies also employed tin-shop methods their techniques were, on the whole, considerably more advanced. Their catalogue-ordered components were largely fabricated by stamping-plant methods, and the pressed-metal components and various other standardized elements were mass produced. Moreover, the pressed-metal components as well as some cornices and complete fronts were prefabricated. These new techniques did not, however, supersede the old; nor did the large companies displace the small enterprises. During the later period, there co-existed two widely divergent scales of operation; and as a result, decorative sheet-metal components were fabricated and erected by a wide range of techniques.

This thesis has focused on the tin-shop methods employed by small Canadian enterprises to fabricate and erect decorative sheet-metal components throughout the period 1870-1930, and the impact of the more advanced methods introduced by the large companies after 1890. This
topic was examined in the broader context of the development of industrialized techniques of fabricating and erecting decorative building components between 1850 and 1930. The main theme introduced in Chapter 2 was the progressive separation of fabrication and erection procedures and the particular technological advances which accompanied this change. The two most important advances were identified as the development of mass-production and prefabrication techniques. Closely allied to these advances was the adoption of the trade catalogue as a marketing tool. The tin-shop methods analyzed in Chapter 3 represent an early stage in the industrialization of the building process. These methods were more advanced than the traditional handicraft methods used by skilled craftsmen to fabricate and erect building parts on the site but they were less advanced than the methods of fabricating and erecting catalogue-ordered buildings and components. At the tin-shop stage, the processes of fabrication and erection were not distinct operations, and there was no clear division of labour between shop and site work. Moreover, all procedures demanded certain tinsmithing skills.

The decorative sheet-metal components supplied by small tinsmithing businesses were custom-made for each building and were both fabricated and erected by sheet-metalworkers from the same shop. Large components, such as cornices, were only partly fabricated in the tin-shop and were then transported to the building site where the joining work was completed. While shop work was partially mechanized, the machines typically used in the tin-shop were manually-operated machines, like the cornice brake, which were geared to the fabrication of single components.
These machines served only as mechanical aids; they did not replace the hand skills of the tinsmith.

Although the methods associated with the pressed-metal components were not analyzed in the same depth as tin-shop methods, it was nevertheless established that these methods represented an advanced stage in the development of techniques of fabricating and erecting decorative sheet-metal components during the period 1870-1930. This stage, in contrast to the tin-shop stage, was marked by the clear separation of fabrication and erection procedures. Embossed shingles, ceilings and walls all comprised standardized machine-stamped elements which were entirely manufactured in the stamping plants of large companies. They were ordered by number from catalogues and could be put up by any building mechanic. Neither the fabrication nor the erection of the pressed-metal components involved any tinsmithing skills. Compared to tin-shop work, stamping-plant work was highly mechanized, the principal machine being the power-driven rope drop hammer or mechanical press.

Tin-shop and stamping-plant methods of production correspond to the two stages of mechanization identified in Chapter 2. The transition from the early to the advanced stage began with the application of machine-stamping technology to the manufacture of embossed ornaments in the United States during the 1870s and was completed in the 1890s with the introduction throughout North America of pressed-metal cladding. The fabrication of cornices and similar components of a three-dimensional nature, however, depended to some extent on hand workmanship because of the joining operations involved. Consequently stamping-plant methods did not entirely replace the craft methods of the tin-shop.
The continuation of an old technique following the introduction of a new technique, and the gradual modification of the early technique is an important and recurring theme in the history of technology. It is particularly well illustrated by the advances in methods of fabricating and erecting cornices during the period 1890-1930. As established in Chapter 4, the most advanced methods were manifest in the catalogue-ordered cornices which were prefabricated and largely assembled from machine-stamped parts. However, prefabricated cornices did not take the place of cornices erected in the traditional manner. In fact, because their disadvantages usually outweighed their advantages wherever cornices could be erected by tinsmiths, catalogue-ordered cornices were more often supplied as tinners' kits. Moreover, many cornices were not obtained through catalogues but continued to be made locally by small tinsmithing businesses. The tin-shop methods of the small enterprises thus retained their viability throughout the period 1870-1930. After 1890, however, these methods underwent some modification as a result of the mass-production and mail-order marketing techniques introduced by the large companies. This was evident from the extent to which stamped ornamental parts ordered from the catalogues of these companies were used in local tin-shops during the later period.

In this thesis, the development of techniques for fabricating and erecting decorative sheet-metal components in Canada during the period 1870-1930 has been depicted as a complex process of technological change in which the more dramatic advances were accompanied by much less apparent, incremental changes. The introduction of pressed-metal components certainly marked a revolutionary change. But this revolution
must be viewed against the background of evolution represented by
advances in techniques of fabricating and erecting cornices and other
types of components which initially had all been supplied by small
enterprises.

This thesis has emphasized particularly the evolutionary aspects
of the advances in architectural sheet-metal working techniques which
took place in Canada between 1870 and 1930. However, the framework for a
more comprehensive study of the fabrication and erection of decorative
sheet-metal components in Canada during this period has been established.
Such a study would give equal weight to the work of the small enterprises
and the large companies, to tin-shop and stamping-plant methods and to
locally-made and catalogue-ordered components. Accordingly, it would
include a fuller description of the seven large companies, their
marketing and distribution methods, the various types of components
offered in their catalogues, and the methods of fabricating and erecting
the pressed-metal components. Although such a study would present a more
complete picture of the technical development of decorative sheet-metal
components in Canada, it would not treat their architectural development
in any greater depth than this thesis.

The first sections of Chapters 3 and 4 respectively surveyed the
use of decorative sheet-metal components in Canadian architecture during
the early and the later periods. A comprehensive study would cover all
the various decorative applications of sheet metal in both architect-
designed and vernacular buildings, and in buildings of different types
and styles during the period 1870-1930. Such a study would also examine
stylistic trends in Canadian architecture, general advances in building
technology and various other factors which influenced the use and design of decorative sheet-metal components. Two specific factors should be mentioned here because of their importance in the context of this study and also because of their wider research potential.

First, the so-called fire-proof qualities of the different types of decorative sheet-metal building components need to be thoroughly investigated. A better understanding of the real and assumed fire-resisting properties of cornices, metal shingles and siding, and metal ceilings would provide more insight into the rapid rise in popularity of these components and also their eventual decline. Such a study, in turn, might also contribute to our general knowledge of the development of fire-resistant materials and fireproof construction in the nineteenth and early twentieth centuries.

The second factor, a much less tangible one, may be loosely defined as the concern for architectural honesty. This factor influenced the attitudes of Canadian architects towards sheet metal as a decorative material, and hence, the extent to which it was used and the manner in which it was treated in architect-designed buildings. The problem of "conscious imitations" in architecture and the need to apply the principle of "truthfulness" to the treatment of new materials was an issue of some concern to professional architects from the mid-nineteenth century on. In tracing the architectural development of new materials that were widely used in the Victorian period for components of an ornamental nature, some consideration must be given to the question of the imitative versus the honest use of materials. A general study of this theme, examined in relation to various new building materials, would
not only provide a thematic link between studies of particular materials but would contribute to our general understanding of the architectural ideals which helped to shape Victorian architecture.²

The broad subject area in which this thesis is situated has been defined as the technical and architectural development of decorative sheet-metal components. Implied in this definition is a two-theme approach to the subject. However, the ultimate goal of such an approach would, of course, be to create a unified picture in which the two aspects are seen as interrelated streams of development. The decision to concentrate first on the technical line of development stemmed not from a strong personal interest in technology, but rather the conviction that before any major study of the architectural development of decorative sheet-metal components could be undertaken, a solid technical foundation had to be laid.

In the first place, some understanding of the techniques used in architectural sheet-metalwork is needed in order to analyze the stylistic characteristics of the various types of decorative components produced before and after 1890. The design of a metal ceiling, for example, cannot be explained solely in terms of popular trends in interior decoration. The embossed surfaces—and repeating patterns typical of the metal ceiling arose directly from the fact that it was assembled from standardized machine-stamped parts (figs. 1.3, 2.16).

A second important consideration was the need to provide architectural researchers in this country with basic information on the range of techniques employed to fabricate and erect decorative sheet-metal components, the types of sheet metal used and the businesses which
supplied these components. The Canadian Inventory of Historic Building undoubtedly contains many examples of buildings featuring galvanized iron cornices, window caps and other exterior elements made of sheet metal but not enough has been known about these components to properly instruct field recorders in their identification. Galvanized iron cornices can be difficult to recognize even for the trained eye because they were often so well disguised as stone. Nevertheless, some familiarity with the material and the techniques by which it was formed, is a definite asset. In many instances, only signs of deterioration, such as rusting, peeling paint and dents, betray these "hollow shams" (fig. 3.9).

Finally, it was apparent that Canadian researchers not only required a basic guide for field work; they also needed a precise vocabulary of terms for description and analysis. Ornamental sheet-metalwork found on building exteriors, when identified at all, has almost invariably been referred to as "pressed metal." In fact, this poorly understood, and hence, much abused term has often been unknowingly applied to components that were entirely made by tin-shop methods.

This thesis has mapped out previously uncharted territory in the history of Canadian architecture and building technology. Perhaps it will inspire other researchers to look more closely at a very rich segment of our architectural heritage and also provide preservationists with some new criteria for designating architecturally significant buildings. Continued research on decorative sheet-metal components would make a valuable contribution to the history of Canadian building and to the preservation movement in this country.
Finally, some broader implications of this research should be pointed out. The publication of information on tin-shop methods should stimulate American interest in this early stage of the development of techniques of fabricating and erecting decorative sheet-metal components. Future studies by Canadian or American researchers on decorative sheet-metal components would provide valuable insight into the Victorian phenomenon of factory-produced architectural elements and would further illustrate the importance of studying Victorian architecture in relation to, rather than in isolation from, the technological advances of the period.
NOTES

1. This principle, as expressed by one British architect, dictated that "the forms of ornamentation appropriate to one material must not be imitated in any other, the characteristics and capabilities of which are different." G. Richards Julian, A.R.I.B.A., "The Appropriate Ornamentation of Works in Iron," Van Nostrand's Engineering Magazine 32 (January-June 1885): 300.

2. This theme has been touched upon in this thesis (see secs. 2.1, 3.1, 4.1 and note 7 of chap. 4) and has recently come to the attention of other historians (see, for example, Lee, "Cast Iron in America: A Synoptic View," p. 107) but it has yet to be thoroughly investigated.
BIBLIOGRAPHY

PRIMARY SOURCES

Primary source material is divided into five categories: a) archival collections and building data files, b) trade catalogues, c) journals and articles, d) sheet-metalworking manuals and textbooks, e) miscellaneous printed sources, and f) interviews and correspondence.

a) Archival Collections and Building Data Files

Canadian Inventory of Historic Building, Parks Canada, Ottawa.


Local Architectural Conservation Advisory Committee (LACAC) files:
City of Hamilton (City Hall).
City of Guelph (City Hall).
Town of Dundas (Dundas Public Library).

National Capital Commission (Ottawa), Interpretation and Heritage Division, Architectural Data Bank.

Public Archives of Canada. Manuscript Collections.
John Davis Barnett Engineering Collection. MG 30 B 86. Vols. 11, 18, 28.
The Pedlar People Ltd. MG 28 III 70. Vols. 1, 3, 4, 5, 6.
Westeel-Rosco Ltd. MG 28 III 78. Vols. 1, 2, 3.


b) Trade Catalogues

Many trade catalogues were consulted in the course of research but only the key catalogues and any others from which illustrations were taken are included in this bibliography. Catalogue reprints are listed under secondary sources by the name of the editor or author of introduction.


1895 Catalogue and Price List. (HPL, Brown-Boggs)
Brown-Boggs Co. [1913 Catalogue] -- Section "B". (HPL, Brown-Boggs)


——. Catalogue "C": Metallic Ceiling and Wall Materials. 1916. (PAC, Pedlar, vol. 6, file 5)

——. Catalogue "Z": Cornices, Skylights, Ventilators ... n.d. (PAC, Westeel, vol. 1, file 5)

Pedlar Metal Roofing Co., Oshawa, Ontario. 1894 Catalogue. (PAC, Pedlar, vol. 1, file 1)

——. Modern Building Fronts. n.d. [ca. 1895]. (PAC, Barnett, vol. 18, cat. 7b)


——. Reference Book no. 26R. 1926. (PAC, Pedlar, vol. 3, file 5)


Shanker Steel Corp., Glendale, N.Y. Current brochure.

c) Journals and Articles

Includes the principal building, manufacturing and sheet-metalworking trade journals consulted, the years examined and important articles.

**American Architect and Building News.** Boston. 1876 (vol. 1) to 1900.

**American Machinist.** New York. 1877 (vol. 1) to 1900. Available issues.

"Iron Churches." Vol. 6 (30 November 1860), pp. 440-441.

**Canadian Architect and Builder.** Toronto. 1888 (vol. 1) to 1908 (last volume).

**Canadian Manufacturer and Industrial World.** Toronto. 1887 to 1908. Available issues.

**Carpentry and Building.** New York. 1879 (vol. 1) to 1908. Available issues.

**Construction.** Toronto. 1907 (vol. 1) to 1934 (last volume).


**Sheet-Metal Builder.** Toledo, Ohio. 1874 (vol. 1) to 1876 (last volume).
Selected articles.

d) Sheet-Metalworking Manuals and Textbooks


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e) **Miscellaneous Printed Sources**

Books and Journals

Hamilton Manufacturer, 1910-1911. Made in Hamilton Number:
An Illustrated Exposition of Hamilton's Many Important Industries and

Industries of Canada: Historical and Commercial Sketches of Hamilton,
St. Catharines, Dundas, Waterloo, Guelph, Berlin and Environs.
Toronto: M. G. Bixby & Co., 1886.

Industries of Canada: Historical and Commercial Sketches of Toronto and

Magazine of Industry and Daily Times. Hamilton -- The Electric City of

City and County Directories

Hamilton and Wentworth County: 1853-1880, 1883.

Ottawa: 1861-1878.

Montreal: 1861-1871.

City By-Laws

Ottawa City Archives. City of Ottawa By-Laws.
By-law no. 147a (1858).
By-law no. 447 (1878).

Newspaper Articles

"Ottawa's Progress -- Improvements and Growth in 1875."
Ottawa Daily Citizen, 6 December 1875, p. 5.

f) Interviews and Correspondence

Individuals associated with the sheet-metal trade are grouped according
to their affiliation with one of the small enterprises formerly engaged
in architectural sheet-metalwork, one of the seven large companies
(identified on p. 80) and other Canadian or American firms and
institutions.

Small Enterprises

Wilbert Foster, Alfred Barnett, Oliver Ridsdale, John Riddell,
Lloyd Hacon and Thomas Miller. (These individuals are fully identified
in chap. 3, note 40.)
Large Companies

Sam Bailey, Jack Kellington, Eric Pim, Jack George, Murray Sparks, Ross Calder, Ab Beaver, Gordon Graham, Alex Brenner, Gren Yuill, Norman Lowe, Leslie Mason, John Reilly and Doug Irving. (The particular companies for which these men worked are identified in chap. 4, note 17.)

Other Firms and Institutions


Other Individuals

Nina Chapple, Architectural Historian, Culture and Recreation Department, City of Hamilton.
Margaret Archibald, Architectural Historian, Canadian Inventory of Historic Building, Parks Canada, Ottawa.
Randy Rostecki, Architectural Historian, Department of Cultural Affairs and Historical Resources, City of Winnipeg.
Steve Barber, Historic Projects Co-ordinator, City of Winnipeg.
Christopher Borgal, Architect, Blythe, Ontario.
Kay Dills, owner of building formerly occupied by the Acton Free Press, Acton, Ontario.
Howard M. Brown, historian for Carleton Place, Ottawa.
William F. Findlay, former owner of Findlay Foundry Ltd., Carleton Place.
SECONDARY SOURCES

Secondary source material is divided into three categories: a) books, b) articles, and c) unpublished papers and reports.

a) Books

Includes works specifically referred to and other important background sources.


Brown, Howard M. *Founded Upon a Rock: Carleton Place Recollections*. Carleton Place, Ont.: 150th Year Festival Committee of Carleton Place, 1969.


Segger, Martin; Berton, Pierre; Smyly, Carolyn; Reksten, Terry; Kerr, Alastair; Stark, Stuart; and Knowlton, Reynolds. The Crystal Gardens: West Coast Pleasure Palace. Victoria, B.C.: Crystal Gardens Preservation Society, 1977.


b) Articles


Cullen, Mary K. "Highlights of Domestic Building in Pre-Confederation Quebec and Ontario as seen through Travel Literature from 1763 to 1860." APT Bulletin 13 (no. 1, 1981): 17-34.


c) Unpublished Papers and Reports


Ferguson, Barbara and Sterling. "The Generations of a Building By-Law (City of Ottawa)." Course paper, Department of Sociology, Carleton University, Ottawa, n.d.
Galvanized iron

T  The Gaulin Block, 325 upper facade and details (Ann Gillespie)

B  The Daly Building, corner first department store. Photograph of cornice in building in 1964. (NCC, ADB, H12-35)
two Ottawa buildings.

Street, Lower Town. View of painted cornice.

Ottawa Street between Metcalfe and Rideau Streets, Ottawa's 1905 for the T. Lindsay Co. shortly before its removal from the
ILLUSTRATIONS
Figure 1.2

Metal tiles.

Page from the Pedlar People's Catalogue no. 10 (ca. 1902) showing their Pacific shell tile and the use of their graduated metal tiles on the circular roof tower of a house in Chatham, Ontario. (PAC, Pedlar, 1:6, p. 209, C 123003)
METAL TILES

No. 743—Shows a sheet of Pacific shell tile.

No. 744—Pacific shell tile.
Cut illustrates finished appearance of roof with hip, ridge and terminal complete.

No. 745—Shown as a corner view of a building. On a tiled roof, when finished, it gives a graceful effect.

Pedlar People
Oshawa, Canada
Figure 1.3

Typical metal ceiling design.

Part of a ceiling composed of square tiles and various border elements. From the Metallic Roofing Co.'s 1916 catalogue of "Metallic" ceiling and wall materials.

(PAC, Pedlar, 6:4, Catalogue "C", p. 103, C 100789)
COMPLETE CEILING SUGGESTION

DESIGN No. 2751  Code word: Adalia

Can be used on ceilings 10 feet or larger. Section illustrated in about 4 1/2 feet.

Ornamental and handsome, but in perfect good taste for a great variety of rooms. The plate shown in this design is one of our best. Another moulding or centre may be substituted if desired.

"METALLIC" CEILINGS NEVER CRACK AND FALL DOWN

"QUALITY FIRST"
Figure 1.4

Metal store fronts.

Four designs from the 1905 catalogue of Geo L. Mesker & Co. in Evansville, Indiana. These store fronts have cast-iron lower stories (columns, sills and lintels) and galvanized iron upper stories. 

(APT Bulletin 9:4, catalogue reprint, p. 16)
No. 4043

A popular arrangement for a wide store, making well lighted rooms both above and below. The ornamental work is new, attractive and very handsome, and presents a pleasing appearance. Our price for the cast iron sills, columns and galvanized iron upper front, 28 ft. wide, is $115.50, 30 ft. front, $140.75, 32 ft. front, $162.00.

No. 4044

This is a new and striking design, very showy and attractive, and generally adapted for fronts of medium width. Our price for the cast iron sills, columns and galvanized iron upper front, 19 ft. wide, is $527.50, 21 ft. wide, $599.50.

No. 4045

This is the most popular arrangement for a two story front. The combination of stamped work is very handsome, and makes a store front to be proud of. Our price for the cast iron sills, columns and galvanized iron upper front, 25 ft. wide, is $203.00, 27 ft. wide, $234.45. These designs can be made for buildings of different sizes.

No. 4046

A handsome stamped rock face and ornamental galvanized iron front. Can be arranged with or without stairway entrance. Our price for the cast iron sills and columns in first story, and the galvanized iron upper front for a 22 ft. front, $384.00, 24 ft. front, $427.50.

Send measurements of building for special prices.
Figure 1.5

Metal ceilings in two Ottawa Buildings.

T Shoe department of the A. E. Rae store, now the Daly Building. A. E. Rae's department store occupied the building from 1909 to 1918. Photograph taken in July 1912. (PAC, PA 42768)

B Blythe & Watt's Hardware Store, 189 Bank Street. Photograph taken in 1901. (PAC, PA 28249)
Miller's Tin Shop, 453 Wentworth Street N., Hamilton.

Several views of shop front showing conductor pipe elbows, furnace fittings and other tinware displayed in the windows. Propped up against the outside are lengths of eavestroughing. This tinsmith's shop, owned by Thomas Miller, may be one of the last remaining in Canada.

(Ann Gillespie)
Figure 1.7

Factory of the Metallic Roofing Co., corner of King and Dufferin Streets, Toronto.

Artistic rendering of the new factory built in 1896. Frontispiece to the company's 1900 catalogue of "architectural sheet-metal building materials."

(MTCL, CT6, Catalogue "S")
Figure 2.1

The Crystal Palace, London.


Portion of south elevation drawn by engineers Fox & Henderson. (Downes, The Building Erected in Hyde Park for the Great Exhibition . . . [1852])
"San Francisco Stick" house, 2527 Washington Street, Pacific Heights.

Rowhouse designed by San Francisco architects Huerne & Everett and built in 1887. (Waldhorne & Woodbridge, Victoria's Legacy, p. 6 [drawing by Wendy Wheeler])
Figure 2.3

Iron-and-glass conservatory.

Example of the "better class of Iron and Glass conservatories" designed by Andrew Handyside & Co. in Derby, England. Illustration from their 1874 catalogue of ironwork.
(PAC, Barnett, 11:12, Catalogue "A", p. 42)
The Arcade, Johannesburg, South Africa.

Two-story cast-iron shopping mall which was prefabricated by Walter Macfarlane & Co. in Glasgow and erected in 1893. Photograph taken ca. 1895.  
(Herbert, Pioneers of Prefabrication, fig. 8.19)
Figure 2.6

Methodist Church, Osgoode, Ontario.

Small church built in 1910 of rock-faced concrete block made by the Boyd Brothers of Osgoode. This village is located about 20 miles south of Ottawa. Photograph of church (now demolished) taken just after it was completed.

(PAC, Boyd Brothers Collection)
Macfarlane's ornamental cast-iron columns.

Several designs from an Illustrated Price List ..., issued by Walter Macfarlane & Co. in Glasgow, ca. 1875.
(PAC, Barnett, 18:5a, sec. 7, p. 43, C 122686)
Figure 2.8

The Buffalo Eagle Ironworks' cast-iron window caps.

Several designs from their 1859 Catalogue of Architectural Designs.
(Waite, Architectural Elements, catalogue reprint, p. 9)
Figure 2.9


T Corrugated iron warehouse illustrated in their 1854 catalogue. (Waite, Architectural Elements, catalogue reprint, plate 5)

B Galvanized iron eavestroughing. (From the same catalogue, plate 7)
SHOWING CORRUGATED IRON WAREHOUSE.

This style of building is constructed of any length and of breadth up to 30 feet, and designed as a cheap and easy structure. They are just the thing for Rail Road Scales, and may be finished with or without sides. No frame work is used except tie rods which are fastened to the flange on a cast iron gutter, to which the sheets are riveted.

T Design for a galvanized iron cornice and pressed zinc capital from their 1872 catalogue. (Waite, Architectural Elements, catalogue reprint, plate 8)

B Design for a slate-covered mansard roof trimmed with galvanized iron dormers, cornices and balustrade. (From the same catalogue, plate 18)
Figure 2.11

The Philadelphia Architectural Iron Co.'s stamped zinc ornaments
Various designs for leaves, rosettes and brackets from their 1872 catalogue.
(Waite, Architectural Elements, catalogue reprint, plate 15)
Figure 2.12

Wooden brackets made by H. B. Rathbun & Son, Mill Point, Ontario.

Several designs from their 1878 catalogue.
BRACKETS.

Brackets made any size and thickness desired.
Figure 2.13

The Metallic Roofing Co.'s sheet-metal cornices.

Three designs from their 1900 catalogue.
(MTCL, CTC, Catalogue "S", p. 303)
Metallic Cornices.

No. 1195.
Height, 52 inches; projection, 23 inches.

No. 1196.
Height, 36 inches; projection, 24 inches.

No. 1197.
Height, 30 inches; projection, 13 inches. Balustrade, 22 inches high.
Figure 2.14

The Pedlar People's sheet-metal window and door caps.

Page of designs from their Catalogue no. 10 (ca. 1902).

(PAC, Pedlar, 1:6, p. 272, C 123002)
WINDOW AND DOOR CAPS

No. 1153—$2.15.
No. 1156—$4.80.
No. 1157—$2.50.
No. 1158—$3.00.
No. 1159—$4.00.
No. 1160—$5.75.
No. 1161—$6.75.
No. 1162—$1.30.
No. 1163—$1.60.
No. 1164—$1.75.
No. 1165—$2.50.
No. 1166—$3.00.
No. 1167—$3.50.
No. 1168—$4.00.
No. 1169—$4.50.
No. 1170—$5.00.
No. 1171—$5.25.
No. 1172—$5.50.
No. 1173—$6.00.
No. 1174—$5.00.
No. 1175—$6.00.
No. 1176—$6.00.
No. 1177—$5.50.
No. 1178—$5.00.
No. 1179—$3.50.
No. 1180—$1.50.
No. 1181—$3.50.
No. 1182—$3.50.
No. 1183—$4.00.
No. 1184—$5.00.
No. 1185—$7.00.

Window sills. No. 1187—$1.00.
No. 1188—$1.50.
No. 1189—$2.50.
No. 1190—$2.00.

The above prices for window and door caps are for openings up to 36 inches in width between brick work. Other sizes will be charged extra. The square head window and door caps illustrated above can be changed to segment head caps at an expense of 25 cents additional each.

DIRECTIONS FOR ORDERING WINDOW AND DOOR CAPS—Orders should specify if caps are wanted for square, segment or circular head openings. For segment or circular head openings, give radius. Always give width of opening between brick work in inches, and give the distance that the frame is recessed from face of wall. State if caps are to be built in brick work, or put on building already erected, and a difference in construction of cap is necessary. Accurate directions will assure prompt shipment.
The Metallic Roofing Co.'s stamped zinc ornaments. Designs for fleur-de-lis, shells and various other stamped ornaments from their 1900 catalogue. (MTCL, CTC, Catalogue "S", p. 338)
Fleur-de-lis, Shells and Ornaments.

No. 5500. 11 1/2 x 9 1/2 inches.
No. 5502. 5 x 4 inches.
No. 5504. 9 x 5 inches.
No. 5503. 7 x 8 inches.
No. 5501. 7 1/2 x 5 inches.
No. 5506. 4 1/2 x 4 1/2 inches.
No. 5507. 13 x 13 1/2 inches.
No. 5508. 6 x 10 1/2 inches.
No. 5509. 7 x 16 inches.
No. 5510. 7 1/2 x 18 inches.
No. 5511. RIGHT. 4 x 8 inches.
No. 5512. 3 x 9 inches.
No. 5513. 12 1/2 x 17 inches.
No. 5514. 15 1/2 x 24 inches.
Figure 2.16

A Pedlar metal ceiling.

Suggested design from the Pedlar People's Catalogue no. 10.  
(PAC, Pedlar, 1:6, p. 39, C 123000)
STEEL CEILINGS

No. 50 Arranged as above, 41 1/2 cents per square foot. Very artistic. Suitable for use in any kind of room where such effect is desired. Composed of field panels No. 231, mould No. 316, with a double run of panels Nos. 216 and 217 for border.
Figure 2.17

A Pedlar metal store front.

Design for a double front with corner pediment from the Pedlar People's Catalogue no. 10, section entitled "Modern Building Fronts."

(PAC, Pedlar 1:6, p. 248, C 122977)
Modern Building Fronts

Manufactured from Galvanized Sheet Steel
Figure 2.18

Richard Gerlich's carpentry shop and gingerbread trim,
New Braunfels, Texas.

T Gerlich's shop around the turn of the century. Photograph shows Gerlich standing behind his jigsaw and various templates for brackets, balustrades and soffit trim hung on the walls. (Rumsey, "Jigsaw Patterns in New Braunfels, Texas," fig. 1)

B Jigsaw bracket made by Gerlich for a house in New Braunfels. (Rumsey, fig. 9)
Figure 2.19

Advertisement for Ives & Allen's City Foundry, Montreal.

1864 advertisement showing an ornate design for a cast-iron railing and gate.
(Mackay's Montreal Directory for 1864-65, p. 496)
IVES & ALLEN,
HARDWARE MANUFACTURERS,
IRON RAILING

Of every description, put up in any part of Canada. Particular attention paid to

Cemetery Railing,
AND A LARGE VARIETY OF NEW AND ELEGANT PATTERNS

STOVES,
COOKING & BOX STOVES, COAL HEATERS, &C., at Wholesale Only.
Ornamental bricks and tiles.

(Barnard, The Decorative Tradition, fig. 70)

B. Four designs for ornamental pressed bricks from the 1894 catalogue of the Taylor Bros.' Don Valley Pressed Brick Works in Toronto.
(APT Bulletin 9:1, catalogue reprint, pp. 30-31 [part])
Figure 2.21

Velocipede scroll saw.

Illustration from Patent Foot and Hand Power Woodworking Machinery (Rockford, Ill.: 1904).
(Earl, "Craftsmen and Machines . . .," fig. 3)
Figure 2.22

Large power press, Shanker Steel Corp., Glendale, N.Y.

Mechanical press used since 1928 for stamping metal ceiling and wall components. This photograph, taken ca. 1940, appears on the cover page of the company's current advertising brochure.
ALL SHANKO CEILINGS are made on Mammoth power presses, as illustrated above. Weighs 65 tons and delivers 800 tons pressure at every blow, thus assuring accuracy and sharpness of design. Perfection is a SHANKO ideal.
Figure 2.23

John Manning's "Portable Colonial Cottage."

T Drawing of frame.  
(Herbert, Pioneers of Prefabrication, fig. 2.4A)

B La Trobe's Cottage, Joli Mont, Victoria, Australia. Designed by  
John Manning and erected in 1839.  
(Herbert, fig. 2.5)
Bolling & Lowe's prefabricated corrugated iron buildings.

Page of designs for "portable iron buildings" from the 1884 catalogue of Bolling & Lowe in London, manufacturers of "iron roofs, galvanized iron houses, railway stations, warehouses, & c."

(PAC, Barnett, 28:4, Section no. 2, p. 6)
PORTABLE IRON BUILDINGS.

No. 12. PORTABLE IRON BOATHOUSE.

12 feet long, 8 feet wide
£12 0 0

The framework is of wood, and is painted and covered with best galvanized corrugated iron.

No. 13. PORTABLE IRON STABLE AND COACH HOUSE.

20 feet long, 14 feet wide
£45 0 0

The framework is of wood, painted, covered with galvanized corrugated iron. The inside is lined with matchboarding, but no floor or fittings.

No. 14. GALVANIZED IRON BILLIARD OR SMOKING ROOM.

21 feet long, 18 feet wide
£65 to £80 0 0

The framework is of wood, painted, and covered with galvanized corrugated iron. The inside is lined with matchboarding. The necessary gutters, down-pipes, etc., are supplied. Strong wood flooring.

No. 15. STUDY OR GARDEN SUMMER-HOUSE.

18 feet long, 12 feet wide
£50 0 0

The framework is of wood, the back and ends are covered with galvanized iron sheets. The lining is of matchboarding. The front is of wood painted three coats, and finished in the best manner. The necessary gutters, down-pipes, etc., are included, but no floor.

No. 16. PORTABLE IRON COACH-HOUSE.

18 feet long, 12 feet wide
£27 10 0

The framework is of wood, painted, and covered with best galvanized corrugated iron. Floor not supplied.

If lined with matchboarding £10 extra.

No. 17. PORTABLE GALVANIZED IRON HOUSE.

The framework is of wood, painted, and covered with galvanized corrugated iron. Floor not supplied.

12 feet long, 8 feet wide, 6 feet high at eaves, 9 feet high at ridge
£18 10 0

If lined inside with matchboarding £7 0 0 extra.
Figure 3.1

Nineteenth century sheet-metal roofs in Quebec.

T Diagonally laid tinplate roof on a house near Lavaltrie, north of Montreal. 
(Ann Gillespie)

B Standing seam, galvanized iron roof on a house near Beauport, north of Montreal. 
(Ann Gillespie)
Government House, Simcoe Street at King Street W, Toronto.

Photograph taken ca. 1905. The galvanized iron string course and cornice had by then been repainted in two contrasting colours. The building was demolished in 1912. (MTCL, T 11876)
Ottawa's second City Hall.

Photograph taken ca. 1910. Located east of Elgin between Queen and Albert Street, this city hall was destroyed by fire in 1931.
(Ottawa City Archives, CA0157)
Figure 3.4

The Kittredge Cornice & Ornament Co.'s Sheet Metal Pavilion.

(American Architect and Building News 1 [11 November 1876])
SHEET METAL PAVILION, CENTENNIAL EXHIBITION.
THE KITTREDGE CORNICE AND ORNAMENT COMPANY.
SALEM, OHIO.
Figure 3.5

The Empire Hotel, 171 Main Street, Winnipeg.

Photographs taken ca. 1905, the year in which the Cauchon Block was converted into a luxury hotel named "The Empire." (Manitoba Archives)

Details of the galvanized iron facade: at left, a third story window bay; at right, a corner section of cornice and two pilasters with stamped capitals. Photographs taken in 1982 just before the facade was removed and the building demolished. (Steve Barber)
Figure 3.6

The Gerrie Block, Princess Street, Winnipeg.

Photograph taken in 1883. The building was demolished in 1956. (Manitoba Archives)
Figure 3.7

Treble Hall, 6-10 John Street N., Hamilton.

View of upper facade and details of galvanized iron cornice, pediment and window surrounds. This building is still standing, its galvanized ironwork badly in need of a coat of paint.
(Nina Chapple)
Figure 3.8

The Laing Apartments, 13-17 King Street W., Dundas, Ontario.

T View of complete facade and detail of central window bay. The lower portion of the cornice, including the scalloped trim, is actually wood but the rest is galvanized iron.
(Nina Chapple)

B Photograph taken shortly after the galvanized ironwork was repainted in the spring of 1984.
(Ann Gillespie)
The Copp Block, 165-205 King Street E., Hamilton.

View of complete facade and detail of Renaissance Revival window caps. Built in 1881, this building has a wooden cornice but the window caps are all galvanized iron.

(Nina Chapple)
Figure 3.10

Travelling tin-shop display at London Metal Service Ltd.,
London, Ontario.

Includes examples of most of the tools and machines typically found
in tin-shops:

T View towards entrance of trailer shows a wooden cornice brake on
the right, across from which (but not visible in the photograph)
is a small Brown-Boggs foot squaring shear. On the bench in the
foreground is an eavestrough forming machine and on the wall
above are various layout tools, pliers and tin snips.
(John Barnett)

B View towards back of trailer shows a roll forming machine on the
bench at left, a number of different types of stakes on the back
bench and on the long bench at right, a row of small hand-
operated rotary machines used for making edges and seams on
circular objects.
(John Barnett)
The parts of a sheet-metal cornice.

Strictly speaking, the term cornice designates only the uppermost part of a classical entablature, the horizontal group of members immediately above the column capitals, but in common usage it has always referred to the whole entablature.

(PAC, Pedlar, 4:9, Metallic Roofing Co., Catalogue "A" [1904], p. 340)
The Several Parts of a Cornice.

The illustration shows the names given to the different parts of a cornice, as generally understood by architects and cornice makers.
Sheet-metal cornice, featuring brackets, modillions and dentils.

A bracket in sheet metal is an ornamental member which simulates a support to the projecting part of a cornice. A modillion is similar to a bracket but has more depth than height. Brackets are usually spaced at wider intervals than modillions and extend from the planceer (the underside of the projecting part) to the foot moulding. A dentil is a small cornice ornament of rectangular shape. Dentils are placed below the modillions in a single row known as the dentil course.
(PAC, Westeel, 1:5, Metallic Roofing Co., Catalogue "Z" [n.d.], p. 53)
Metallic Cornice

Three Standard Sizes

No. 1215—Height 24 inches; projection 15 inches.
No. 1216—Height 30 inches; projection 18 inches.
No. 1217—Height 36 inches; projection 22 inches.

Modillions spaced about
No. 1215—18-inch centres.
No. 1216—24-inch centres.
No. 1217—28-inch centres.

Brackets

As these Brackets will be soldered to the Cornice by us it will be necessary for the purchaser to give the location on the Cornice of the Brackets and the number required.

Code Words

<table>
<thead>
<tr>
<th>Cornice</th>
<th>Inside Meters</th>
<th>Outside Meters</th>
<th>Brackets</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1215—SOTTRAENDO</td>
<td>SOTTRAGGIO</td>
<td>SOUBASSIS</td>
<td>SOUCHEVER</td>
</tr>
<tr>
<td>No. 1216—SOTTRAENTE</td>
<td>SOTTRATTO</td>
<td>SOUBATRE</td>
<td>SOUCOUPE</td>
</tr>
<tr>
<td>No. 1217—SOTTRAENA</td>
<td>SOUBARDIER</td>
<td>SOUBREDENT</td>
<td>SOUDAINETE</td>
</tr>
</tbody>
</table>
Sheet-metal cornice with end blocks and urns.

T (PAC, Westeel, 1:5, Metallic Roofing Co., Catalogue "Z" [n.d.], p. 44)

B Three designs for finials and urns. The term finial generally refers to a terminal ornament at the top of a spire, pediment or gable. It was also applied to the ornaments surmounting the end blocks of a sheet-metal cornice. Sheet-metal finials frequently assumed the form of urns. In fact, the terms finial and urn were used interchangeably in the sheet-metal trade. (Catalogue "Z", p. 66 [part])
No. 1196. Height 30 inches; projection 24 inches.

End Blocks 13½ inches wide. Mullions and Fans spaced about 36-inch centres.

No. 0126
30 in. high. 15½-inch base.

No. 0137
24 inches high. 21½-inch base.
Figure 3.14

Drawings for a sheet-metal cornice.

BL One inch scale drawing.
(Neubecker, The Universal Sheet Metal Pattern Cutter, vol. 2, fig. 107)

TR Working detail showing horizontal joints and band iron lookouts.
(Neubecker, fig. 108)
Figure 3.15

Sheet-metal cornice patterns.

L  Developing the pattern for a square return mitre.  
   (Neubecker, The Universal Sheet Metal Pattern Cutter, vol. 2,  
   figs. 114, 116)

R  Developing the patterns for face mitres in a square panel.  
   (Neubecker, figs. 125, 126)
Figure 3.16

Modern squaring shears.

Foot squaring shears have two main working parts, a fixed lower blade that is flush with the work surface and an upper shear blade attached to a treadle-operated cross-head. The upper blade is set at a slight angle to the lower blade so that the metal is smoothly and effortlessly sheared. To make a cut, a sharp downward force is applied to the foot treadle. The shear blade in then raised for the next cut by releasing the foot pressure. Squaring shears are equipped with gauges which are used as stops for the sheets when more than one piece of the same size is required.

(Zinigrabe, Sheet Metal Machine Processes, fig. 2.1)
Squaring shears (Courtesy of The Pack, Stow & Wilcox Co.)
Brown, Boggs & Co.'s "Cornice Makers' Squaring Shears."

This model was available in two sizes, 6 ft and 8 ft, both capable of cutting 18 gauge iron.
(HPL, Brown-Boggs, 1895 Catalogue and Price List, p. 53)
SPECIAL attention is directed to our Cornice Makers' Foqt Squaring and Cutting Shears. It will cut No 18 guage iron and lighter, the entire length of a 6 or 8 ft. sheet at a single cut.
Sheet-metal stakes.

Some of the more commonly used stakes and stakeholder or bench plate. The hatchet stake has a sharp, straight edge and is used for making sharp angle bends. To make a bend, the metal is clamped onto the stake, then forced down over its edge. Finally, the metal is struck near the bend line with a wooden mallet to create a sharp edge. The conductor stake is used to form pipes and other cylindrical objects while the blowhorn stake is used to form tapered or conical objects.

(Meyer, *Sheet Metal Shop Practice*, figs. 2.24 [part], 2.26)
A modern hand brake.

The main working parts of a standard hand brake comprise an upper jaw (or top leaf) which serves to clamp the metal down and a lower bending leaf which is raised to the angle required to make a particular bend. When making a number of identical bends, an adjustable stop gauge can be set to regulate the angle of each bend.

T (Zinigrabe, Sheet Metal Machine Processes, fig. 7.1)

B Two photographs showing how the sheet is clamped down and then bent by raising the bending leaf.
(Zinigrabe, figs. 7.8, 7.9)
Standard hand brake (Courtesy of Drei & Krump Manufacturing Co.)

Clamping the right side of the sheet

Making the bend
Figure 3.20

Forming moulds for making circular bends.

T Diagram showing several different sizes of forming moulds and the method of attaching them to the bending leaf. (Meyer, *Sheet Metal Shop Practice*, fig. 9.9).

B Various circular bends made with these forming moulds. (Meyer, fig. 9.10)
Attaching forming molds to bending leaf bar.

Types of bends made using forming molds.
Brown, Boggs & Co.'s "Four Leaf Cornice Brake."

This cornice brake was available in two sizes -- no. 2 (6 ft) and no. 3 (8 ft) -- with an optional fourth leaf. The former was guaranteed to bend 20 gauge iron and the latter 18 gauge iron. (HPL, Brown-Boggs, 1895 Catalogue and Price List, p. 62)
Four Leaf Cornice Brakes—Patented.
Figure 3.22

Common seams used in sheet-metal work.

(Meyer, Sheet Metal Shop Practice, fig. 9.18)
LAP SEAM  
REVERSED OR SOLDERED SEAM  
GROOVED SEAM  
CAP STRIP SEAM  
STANDING SEAM  
LAP BOTTOM SEAM  
INSERT BOTTOM SEAM  
SINGLE BOTTOM SEAM  
BOTTOM DOUBLE SEAM  
PITTSBURGH LOCK  
CORNER DOUBLE SEAM  
ELBOW SEAM  
REVERSIBLE ELBOW SEAM  
PLANGE DOVETAIL SEAM  
PLAIN DOVETAIL SEAM  
BEADED DOVETAIL SEAM  
SLIP "S" HOOKS FOR CROSS SEAM

Common seams used in sheet metal work.
Figure 3.23

Seams used in cornice work.

Two methods of constructing locked seams.
(Noebecker, The Universal Sheet Metal Pattern Cutter, vol. 2, figs. 171, 259)
Another Method of Locking the Seams

Construction of Locked Seams in Sheet Metal
Cornice Construction
Figure 3.24

Wood and metal lookouts for cornices.

Drawing from the 1880s which shows the methods then recommended for attaching galvanized iron cornices to wood and iron lookouts. (PAC, Barnett, 18, clipping from the Scientific Canadian [December 1881], p. 376)
Small cornice supported on wooden lookout.

Detail drawing showing an elevation of the cornice, a vertical section, the lookout assembly and the construction of various horizontal seams.

(Standard Practice in Sheet Metal Work, sec. 3, drawing no. 28)
ITEM I
PART FRONT ELEVATION
SCALE 1" = 1'-0"

ITEM V
DRIP LOCK AT B OF ITEM II

ITEM VI
ALTERNATE FLASHING

ITEM II
SECTION SCALE 1" = 1'-0"

ITEM III
ISOMETRIC DRAWING OF 2" x 4" WOODEN LOOKOUT ASSEMBLY
SCALE 1" = 1'-0"

ITEM IV
LOOK AT A OF ITEM II

DETAILS OF SMALL CORNICE SUPPORTED ON WOODEN LOOKOUTS
Large cornice supported on metal lookout.

Detail drawing showing a partial front elevation, a vertical section and the design and placement of stamped enrichments.

(Standard Practice in Sheet Metal Work, sec. 3, drawing no. 35)
Figure 3.27

Rope drop hammers.

The force required to form the sheet metal is supplied by the fall of a heavy weight or ram which is raised and dropped by means of a rope pulley system, the rope being coiled around a power-driven drum. The hammer is tripped by releasing the rope and lifted by pulling on the rope. The ram catch serves to hold the ram in a stationary position above the die bed and is activated by depressing the foot treadle while raising the hammer.

A modern rope drop hammer. (Sachs, Principles and Methods of Sheet-Metal Fabricating, fig. 5.1)

The rope drop hammers being used today in the plant of Kenneth Lynch & Sons in Wilton, Connecticut, for stamping architectural ornaments. While these drop hammers are now built with steel rather than timber frames and are driven by electric motors, the mechanical system has remained unchanged since the 1870s when drop hammers were first adopted for such work in the United States.

(Kenneth Lynch & Sons, Inc., Price List [to] Catalogue #7474 [1980], p. 16)
Rope hammer. (Courtesy International Nickel Co.)
The Petrie Building, 15 Wyndham Street, Guelph, Ontario.

This galvanized iron facade is distinguished by its stamped ornamentation, its attenuated columns resembling cast-iron ones and a bold cornice with a broken pediment enframing the pharmacist's symbol: a mortar and pestle.

L  The facade as it originally appeared.
    (Industries of Canada . . ., Guelph, Berlin and Environs [1886], p. 101)

R  Details of the pedimented cornice and arch above third story showing the various stamped ornaments.
    (Canadian Inventory of Historic Building)
The Stanley Mills & Co. Department Store, 11 King Street E.,
Hamilton.

Originally three bays wide, only the western bay, occupied by
Herbert S. Mills China Store from 1924 to 1984, remains
substantially unchanged.

TL Photograph taken between 1910 and 1919 shows the original three
bays and the sheet-copper cornice surmounted by a balustrade and
four finials.
(HPL, Special Collections)

TR Upper facade of remaining bay as it appears today.
(Ann Gillespie)

B Detail of cornice showing its stamped moulding enrichments,
brackets, modillions and lions' heads.
(Mike Chapple)
First Avenue Public School, 73 First Avenue, Ottawa.  

Built in 1898, this school building has a galvanized iron cornice designed in a simple bracketed style. Photographs taken in 1978, before major renovations were undertaken.  

(NCC, ADB, H12-576)
Galvanized iron bay windows and spandrel panels.

A Two-story commercial block, 581-585 Bank Street, Ottawa, designed by W. E. Noffke and built for Geo. Mathews Co. Ltd. in 1909. The cornice and three bay windows were all fabricated of galvanized iron.
(Ann Gillespie)

B Three-story commercial building, 129-131 Bank Street, Ottawa. The cornice and spandrel panel between the upper story windows are made of galvanized iron, and the spandrel panels are embellished with stamped metal wreaths.
(Ann Gillespie)
Commercial building with galvanized iron cornice, 21 Bridge Street, Carleton Place, Ontario.

Both the main cornice and the lintel cornice above the shop entrance are fabricated of galvanized iron. The main cornice has a decorative frieze embellished with stamped festoons and tall end blocks surmounted by ball finials.
(Ann Gillespie)
Slated for demolition, in 1962 the Tin House was moved by the National Capital Commission to a vacant lot where the facade was dismantled. It was subsequently stored at the Museum of Science and Technology but was eventually reconstructed. Finally, in 1973, it was mounted on the side wall of a stone building at 459 Sussex Drive overlooking the courtyard at the corner of Clarence Street, which was named "The Tin House Court." This photograph first appeared in the Journal of the Royal Architectural Institute of Canada, November 1960.
(Malak Photographs Ltd., Ottawa)
The Metallic Roofing Co.'s "Eastlake" Steel Shingles.

Figure 4.6

(MTC, 1903, Catalogue "S", p. 21)
THE METALLIC ROOFING COMPANY OF CANADA, LIMITED, TORONTO, CANADA.

"Eastlake" Steel Shingles.

Fig. 8.

Above cut illustrates one single sheet of the Galvanized "Eastlake" Steel Shingle.
Covering size, 22 x 15 inches, 44 sheets to a square, covering 100 square feet.
Made in three grades of galvanized steel, the difference being in the thickness of the metal; otherwise the quality and finish are the same throughout.

<table>
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<th>Grade</th>
<th>Weights per Sheet (average)</th>
<th>Notes</th>
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</thead>
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<tr>
<td>No. 1</td>
<td>95 pounds</td>
<td></td>
</tr>
<tr>
<td>No. 2</td>
<td>90 pounds</td>
<td></td>
</tr>
<tr>
<td>No. 3</td>
<td>85 pounds</td>
<td></td>
</tr>
</tbody>
</table>

Weights given are the approximate average of the different grades, and are exclusive of the packages. Shipping weight about fifteen pounds to the square additional in each case.

Our galvanized "Eastlake" shingles are made from sheets of steel, cut to the proper size first, and then galvanized. Thus all the exposed edges of every shingle are properly protected with the galvanized coating, while shingles made from plates cut out of large sheets have sheared edges exposed to the elements, which, not being coated, must necessarily soon corrode. (See page 17, "Galvanizing.")

Fig. 9.

Illustration showing one single sheet of the Painted "Eastlake" Steel Shingle.
Covering size, 22 x 15 inches, 44 sheets to a square, covering 100 square feet.
Made in three different weights of painted steel; quality of material, workmanship and finish the same on all grades.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Weights per Sheet (average)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>93 pounds</td>
<td></td>
</tr>
<tr>
<td>No. 2</td>
<td>89 pounds</td>
<td></td>
</tr>
<tr>
<td>No. 3</td>
<td>85 pounds</td>
<td></td>
</tr>
</tbody>
</table>

Weights given are exclusive of the packages and are the approximate average. Shipping weight about fifteen pounds per square additional in each case.

Painted shingles are all thoroughly coated on both sides with the most expensive, purest and best preservative known for metal work, viz., the celebrated Sherwin-Williams manganic oxide of iron paint, made specially for us. (See page 10, "Painting.")
Figure 4.7

The Pedlar Metal Roofing Co.'s rock-faced and pressed brick siding.

(PAC, Pedlar, 1:1 1894 Catalogue, p. 18)
PEDLAR'S PATENT STEEL SIDING PLATES.

Painted Sheet Steel Pressed Brick.

Especially adapted for covering sides of dwellings and other buildings. Covering size of sheets 13 x 22 inches, 37 sheets to the square of 100 square feet. Pack ed two squares in a box.

3 GRADES

| XXX Heavy |
| X X Medium |
| X Light |

Prices vary according to weight.

It can be applied by any mechanic; lays perfectly smooth, and after painting cannot be distinguished from finest Philadelphia Pressed Brick. Costs no more than best wood siding and about one fourth that of brick. In beauty of appearance, durability, cheapness and as a protection against fire, we claim this siding has no equal. Most insurance underwriters give this style of covering same rating as brick or stone.

PEDLAR'S ROCK FACE BRICK SIDING.

(Same size as plain brick.)

ARTISTIC, DURABLE, CHEAP.

Entirely new in Sheet Metal Siding, lately placed on the market by our Company. On a building the counterpart of a finely finished Rock Face Brick; making the most attractive and desirable facing yet produced or offered to the building trade.
Figure 4.8

Metal roofing and siding in rural Ontario.

T Unidentified barn which is being clad with the Pedlar People's corrugated iron siding. Its roof has already been covered with Pedlar Metal shingles. Photograph taken in the early 1900s. (PAC, Pedlar, PA 138884)

B House in Alderton, Ontario, with a standing seam metal roof and rock-faced metal siding. (Christopher Borgal)
Figure 4.9


Originally a tin-shop, this building was converted in 1904 into a newspaper office for the Free Press editor H. P. Moore. It was then extended at the front and a sheet-metal facade made by the Metal Shingle & Siding Co. in Preston, was erected. This photograph appeared in the company's first general catalogue, where the cornice, but not the pediment, was illustrated as a standard design (see fig. 4.11).
(MTCL, CTC, Metal Shingle & Siding Co., Catalogue no. 18 [ca. 1905])
Figure 4.10

The Pedlar People's stamped ornaments.

Various designs for pressed zinc animal heads from Catalogue no. 10 [ca. 1902].
(PAC, Pedlar, 1:6, p. 155, C 122999)
The Brown-Boggs Co.'s no. 500 Power Brake.

The press brake, also commonly called a power brake, is a mechanical press with a long, narrow bed which is used for bending, cutting and forming long sheets and strips of metal. Equipped with various die forms this brake will produce simple bends, radius bends, corrugations, flanges and seams. It will also make certain bends which cannot be made in a hand brake and is much better suited to repetitive operations. The Brown-Boggs no. 500 - 10 ft brake was recommended for cornices, skylights, window and door frames, ridge cap and corrugated iron.

T (HPL, Brown-Boggs [1913 Catalogue] -- Section "B", p. 89)

B Shown in section are some of the skylight bars, ridge rolls, cornices and window bars that could be made with this machine. (Section "B", p. 90 [part])
We have recently enlarged our Cornice Department and have added the latest and best machinery, which gives us unequaled facilities for handling any business in this line. We employ only expert Cornice men and are prepared to manufacture any design which may be required.

Lintel Cornices.

No. 1040
Height 4 1/2 inches, Projection 3 1/2 inches, Girth 12 inches.

No. 1041
Height 7 inches, Projection 4 1/2 inches, Girth 16 inches.

No. 1044
Height 12 inches, Projection 7 1/2 inches, Girth 20 inches.

No. 1045
Height 7 inches, Projection 3 inches, Girth 16 inches.

No. 1047
Height 12 inches, Projection 8 1/2 inches, Girth 20 inches.

Fig. 1050
Height 10 inches, Projection 12 inches, End Blocks 11 1/2 inches.

Fig. 1051
Height 12 inches, Projection 16 inches, End Blocks 11 1/2 inches.

Fig. 1052
Height 20 inches, Projection 10 inches, End Blocks 11 1/2 inches.

When selection of design has been left to us, we have never had any difficulty in satisfying customers.
Figure 4.12

Galvanized iron cornices on houses in Ottawa's Lower Town.

Typical examples of the galvanized iron cornices found on many of the flat-roofed residential units built in Lower Town during the first two decades of this century. Their simple designs and hand-crafted ornamentation strongly suggest that they were fabricated in a local tin-shop, and may well have been made by Honoré Foisy.

T Details of two identical cornices on adjacent houses at 103 and 105 Guigues Avenue.
   (Ann Gillespie)

B Detail of the cornice on a semi-detached house at 241-243 York Street.
   (Ann Gillespie)
Figure 4.13

Metal ceiling tiles.

Standard two-foot square plates with beaded edges and buttons provided every six inches for nailing the tiles to the wooden backing.

(MTCL, CTC, Metallic Roofing Co., Catalogue "S", p. 152)
The Pedlar Metal Roofing Co.'s prefabricated cornices.

Several designs from their catalogue, Modern Building Fronts.
(PAC, Barnett, 18:7b, p. 24, C 122685)
SEND FOR DISCOUNTS.

No. 681. Height, 12 inches; Proj., 28 inches. Pediment, $8.95. Urns, $1.25 each.
Price per foot, $1.15. Letters, 75c each.

No. 683. Height, 24 inches; Proj., 24 inches. Pediment, $6.10. Letters, 50c each.
Price per foot, $1.15. Urns, $1.00 each.

No. 686. Height, 28 inches; Proj., 24 inches. Price per foot, $1.35. Urns, $1.00 each.

No. 688. Height, 22 inches; Proj., 26 inches. Price per foot, $1.35. Urns, $1.00 each.

Our Cornices are shipped in 8-foot sections; the brackets which bolt to Cornice are shipped separately.

No. 689. Height, 26 inches; Proj., 24 inches. Price per foot, $1.25 Urns, 30c each.

Our Cornices are shipped in 8-foot sections; the brackets which bolt to Cornice are shipped separately.

DIRECTIONS FOR ORDERING.

In ordering Cornices, always give total length from end to end. Cornices have no covering on top, they are to be covered with some material as roof. We furnish covering for Lintel Cornices when ordered, at 15 cents per foot extra.

Our Cornices are thoroughly fire-proof. The brackets and moldings are bolted to the Cornice, and the moldings are run through solid. Our Cornices are fully complete, including wood lockets for joints every eight feet apart, and are so constructed that they can be put up by any mechanic without difficulty. The cost of putting up our Cornices, owing to their simple construction, is a mere trifle.
The Brown-Boggs Co.'s no. 500 Power Brake.

The press brake, also commonly called a power brake, is a mechanical press with a long, narrow bed which is used for bending, cutting and forming long sheets and strips of metal. Equipped with various die forms this brake will produce simple bends, radius bends, corrugations, flanges and seams. It will also make certain bends which cannot be made in a hand brake and is much better suited to repetitive operations. The Brown-Boggs no. 500 - 10 ft brake was recommended for cornices, skylights, window and door frames, ridge cap and corrugated iron.

T (HPL, Brown-Boggs [1913 Catalogue] -- Section "B", p. 89)

B Shown in section are some of the skylight bars, ridge rolls, cornices and window bars that could be made with this machine. (Section "B", p. 90 [part])
No. 500 - 10 ft. Power Brake or Press
Figure 4.16

Galvanized iron cornice of the Rosemill Appartments, 234 Rideau Street, Ottawa.

Detail of end block with stamped rosette.
(NCC, ADB, H12-507)
END

21-02-86

FIN