HINGES OF EMPIRE: BUILDING HARDWARE AT THE
HALIFAX CITADEL - A PRELIMINARY STUDY
by Cameron W. Pulsifer
1980
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Preface

The following is the first installment of a series of reports to be written on the types of building hardware used at the Halifax Citadel. Though the types of hardware used in other areas of the fort have occasionally been mentioned for comparative purposes, this report has been primarily concerned with those mounted in the casemates on the fort's west front and in casemates 51 and 52, located in the Southwest Demi-Bastion, since these are the areas for which restoration deadlines are most pressing.

First, a word on the sources used. Parks Canada reports relating to other British military sites in Canada, of course, have been very helpful, especially Peter Priess' *Building Hardware from the fort at Coteau du Lac*. A particularly fruitful source of information was the *Bulletin of the Association for Preservation Technology*, especially a series of articles by Donald Streeter on early American wrought iron hardware. Naturally reference was also made to the surviving historical estimates and plans. The former, although descriptive detail is often extremely limited, at least usually identify the types of hardware which the Royal Engineers intended to mount; the latter, where they exist, are extremely useful guides to the designs of British military hardware used in Halifax. It should be noted, however, that the plans which show the most detail relating to building hardware are of British military sites other than the Citadel, dating usually from a period after the major construction work at the Citadel had been completed. None of the original plans for constructing the Citadel itself show in any detail the types of hardware intended to be mounted. The same holds true for most of the artifacts pictured in this report, which were probably the major source relied upon for the preparation of the report; they derive mostly from sites in Halifax other than the Citadel and most frequently from Fort Charlotte on George's Island. It is assumed that the designs of the hardware items required by the Royal Engineers would have changed little from the 1840s, when the
original Citadel hardware items were mounted, through the period when most of
the artifacts pictured here were produced.

The report which follows is divided into three sections. The first pro­
vides a brief history of the iron and steel industry generally, a listing of
the hardware items which the surviving estimates provided for installation at
the Halifax Citadel, a brief survey of the iron production and iron manufactur­
ing industries in Nova Scotia, and lastly an attempt is made to identify where
the Royal Engineers in Halifax obtained most of their iron and ironware products.
The second section contains short chapters on each of the hardware items
identified in the estimates as having been mounted on the Citadel's west and
south fronts such as the hook and eye hinge and slide bolt. Also, although
they are not mentioned in any of the Citadel estimates, an attempt is made to
identify two varieties of period door closers, since something of this descrip­
tion will have to be mounted on the doors to the "Tides of History" exhibit
in the West Curtain Wall. The third section consists mostly of photographs and
descriptions of iron hardware artifacts found at a variety of sites in the
Halifax Defence Complex, with a few from Fort Henry, Kingston Ontario, and a
few plans and period photographs. Although the artifacts of a certain type
often differ in some points of detail, they also usually have many features in
common. From these designs can be developed for certain items of hardware
to be mounted during the restoration of the Halifax Citadel. For a clearer
understanding of the various terms used in the text, the reader is referred to
J.P. Camus' excellent explanatory diagrams at the very end of this report.

In conclusion, a word of exculpation is needed. The author's training has
been solely as an historian; his training and experience as an artifact analyst
has been nil. The information concerning the nature of iron and ironware pro­
ducts is based solely upon reading the sources cited in the bibliography and
upon the helpful instruction of two Parks Canada employees currently working
in the Citadel - Deryk Jones of Historic Resource Conservation and Jack Speelman,
the Senior Restoration Officer of the Halifax Defence Complex. I am greatly
indebted to both these individuals. They are of course absolved of any respon­
sibility for any errors, all of which are mine. Two further liabilities should
be noted. Many of the artifacts pictured have been accumulated randomly over
the years, have not been catalogued, and their archaeological context was not
recorded. This makes precise dating impossible. Furthermore very few of the
artifacts have been conserved, which hampers precise inspection. Given the above limitations, however, it is hoped that the following report goes at least some distance towards elucidating the designs of certain types of British military hardware, which would have constituted small but omnipresent features of the material environment of the nineteenth century Citadel.
Introduction

I. **Wrought Iron, Cast Iron and Steel**

During the period when most of the significant construction work was carried out on the Halifax Citadel (i.e. 1828-1860) there were three main classes of iron in general use - wrought iron, cast iron and steel.¹ Basically each was distinguished by the amount of foreign properties, chiefly carbon, which it contained. Carbon was the principal substance used in converting the basic iron oxide, found in nature, into a usable metal. The greater the amount of carbon with which the iron combined, the harder, less malleable, and more brittle was the metal. Wrought iron (the oldest iron metallic compound known to man) contained the least amount of carbon - less than 0.3 per cent and was the most easily worked, and readily welded of the three. Cast iron, which was not produced for practical purposes in Europe until the 15th century, contained the greatest amount of carbon - from about 1.8 to 4.5 per cent and was harder and more brittle. It could be moulded only by melting and casting and could not be forged or welded. Steel, which in something approaching its modern form was first produced in the 18th century, contained more carbon than wrought and less than cast iron - between 0.3 % and about 2.2 %. In its finished form it was the hardest of the metals, but at the same time could be worked when heated, though with somewhat more difficulty than wrought iron.

Because it contained less carbon, hence requiring less charcoal in the smelting process, and could be produced at lower temperatures, wrought iron was the earliest type of iron metal produced. Simple charcoal furnaces, maintained at the proper temperature by manually operated bellows, served as the smelting devices. Thus produced, wrought iron remained the only type available for practical use in Europe until about the 15th century (the 16th in Britain). Sometimes, as a result of the ore having been left burning too long or too high a temperature having been produced, cast
iron was in fact made. Since it could not be worked in the forge, however, it could only be tossed aside as scrap.

With the introduction of the blast furnace in the 15th century (16th in Britain), not only was a use found for cast iron, but the production of wrought iron was revolutionized as well. The higher temperatures obtainable and the greater amount of charcoal used in the blast furnaces produced only cast iron. In its molten form it was run into a number of sand moulds, the configuration of which resulted in the hardened iron in the moulds being called 'pigs', hence the term 'pig iron'. Wrought iron was obtained by remelting the cast iron 'pigs' and subjecting them to a decarbonization process, the details of which will not be gone into here. Since the molten cast iron could so easily be formed into pigs in sand moulds, it became obvious that it could be formed into other shapes as well. Hence, a practical use was finally found for a material which for so many years had served only to symbolize the iron makers' miscalculations. The first cast-iron cannon in Britain was cast in 1543.²

The introduction of the blast furnace into Britain, and the subsequent development of mechanical means of production, resulted in a great increase in the total amount of iron, both cast and wrought, produced in that country. Indeed, certain technical developments which occurred in Britain, such as the substitution of coke for charcoal in the smelting process, the introduction of steam driven machinery, and Henry Cort's invention of the 'puddling' process for the improved production of wrought iron, in conjunction with certain social, economic, and geographic factors, led to the 'industrial revolution' originating there in the late 18th century. Although the numerous developments associated with this revolution necessitated the production of much cast iron, with its great solidity and resistance to compression (but great brittleness), it was in the field of wrought iron production that the greatest improvements were made. It was the production of this metal with its malleability, but great tensile strength, which formed the basis of British industrial pre-eminence during the first three quarters of the nineteenth century. Though the period (especially c 1840-1860) is notable particularly for the use of wrought iron in larger structural projects such as in railway and bridge building,
the metal's suitability for smaller items of building hardware, such as door hinges, bolts, locks, nails, etc., is obvious, given the ease with which it could be welded, and its inherent properties of malleability and ductility. Most of the hardware items installed at the Citadel appear to have been made of this metal.

Steel is an alloy of iron and carbon wherein the union of the two elements is much more intimate than in either wrought or cast iron. Until the eighteenth century what was called steel was basically only wrought iron with a hard outer shell of more intimately fused iron and carbon. In the 1730s, however, Benjamin Huntsman developed a process for fusing the two elements throughout the thickness of the metal, the result of which was known as crucible steel. This essentially was the type of steel available throughout the main construction period at the Citadel. Although it was a metal of high quality, its yield was small and costs high, and it was used mostly in tools and smaller precision parts. The invention of the Bessemer converter process in 1856 enabled steel to be produced much less expensively and in much greater quantities, such that it was eventually to replace wrought iron as the most commonly used structural metal. The Bessemer process did not become firmly established in Britain until the 1860s, however, and it was not until the 1870s that the use of steel began seriously to challenge wrought iron for structural purposes. It was not until the 1890s that steel clearly emerged the victor. Sometime during this period, probably during the 1880s, steel also began to supplant wrought iron in the manufacture of hardware items. The majority of the Citadel's hardware would have been installed by this time, however.

II Wrought Iron at the Citadel

Although the information they provide is of a very limited sort, the surviving estimates are, of course, an essential starting point for information on the Citadel's original hardware. Following is a listing of the ironwork items which a number of these estimates specify for mounting on the fort's casemate doors (omitting the Cavalier). These items will be analyzed with specific reference to the casemates in the west front and
casemates 51 and 52 in Section II of this report.

Colonel Nicolls' original estimate for the Citadel (one is tempted to write "typically") omitted reference to hardware items entirely. Those prepared by Colonel Boteler and his interim successor, Captain Peake, provided only for so many pounds "wrought iron in hinges, bars, bolts etc." 

Although he too specified simply so many pounds of "wrought iron in hinges, bolts, etc.", Boteler's and Peake's successor, Lt. Col. Rice Jones, did mention some specific items of hardware which are of interest. For example, Item 2, for the casemates in the Redan, in his revised estimates of 1836, provided for:

- 26 Iron rimmed knob locks for Officers' rooms.
- 26 pairs of Butt hinges do.
- 18 best large Padlocks for outside doors.
- 40 10 inch stock lock for Kitchen.
- 40 pairs HL Hinges do.
- 40 strong thumb latches do;

Item 3, Casemates of Defence, Casemated Guard Rooms, Sally Ports etc. for:

- 3278 lbs. wrought iron, hinges, bolts, etc.
- 5 Cwt of lead for the iron work.
- 3 iron rimmed locks [to privy].
- 4 Strong Padlocks for Cells [in Guardroom];

Item 4, Retaining Wall of Rampart, North, South, and West fronts, including Sallyports, ramp steps, Casemate seven well and Casemate for stores, etc. under Rampart, North front, for:

- 1400 lbs. wrought iron in hinges, bars, bolts, etc.
- 7 Stock locks.
- 2 Strong thumb latches;

Item 13, Three additional Casemates for Commissariat and Barrack Store, North front, for:

- 621 lb. of iron work in bars, bolts, hinges etc.
- 3 strong stock locks.

Probably the most detailed specifications for iron hardware at the Citadel were contained in the series of estimates drawn up by Lieutenant Colonel Calder between 1843 and 1846. The major provisions pertaining to ironwork
for casemate doors follow.

1843 Estimate:

Item 1, Fifteen additional Casemates in the East, North, West and South Fronts [ie. Nos. 24-30, 14 and 15, 6 and 7, 5 and 6]
120 lbs wrought iron in hinges
15 stock locks, 12 inch
15 thumb latches

Item 6, Two casemates in the re-entering angles
2 pairs 12 inch hook and eye hinges
2 12 inch stock locks

Item 7. Six Cellars for Officers' Barracks and Mess
3 pairs 18 inch hook and eye hinges
3 12 inch stock locks.

1844-45 Estimate:

Item 1. Seven Casemates, East Front [ie. Nos. 24-30]
80 lbs of wrought iron in studs and holdfasts
7 10 inch iron rimmed dead shot locks and fix
7 thumb latches, 2 screws, and fix
7 pairs 24 inch strong hook and eye hinges and screws for 2 inch door.
7 keys labelled and lettered.

Casemates in re-entering angle of Redan.
16 lbs wrought iron for holdfasts doors spuds etc.
2 10 inch iron rimmed dead shot lock and fixing
2 wrought iron latches and fixing
2 pairs 24 inch wrought iron Strong Hook and eye hinges with screws for 2 inch doors.

1846 Estimate:

Item 2. Four casemates of Defence, West Curtain, Taking down and rebuilding wall, renewal of floors, doors and sashes [ie. 9-12].
4 10 inch iron rimmed dead locks and fixing
80 lbs wrought iron hook and eye hinges with bolts and nuts.
18 lbs. wrought iron in bolts and nuts to secure door and window frames.
4 large thumb latches with screws and fixing.
1846-47 Estimate:

Item 1. Four additional Casemates West Front and two ditto South Front [ie. 7 and 8, 13 and 14, 5 and 6].

464 lbs. wrought iron for Window bars and Straps for door frames...

28 lbs. pig lead for fixing iron in door frames.

3 dozen 2 inch flat heat screws

6 10 inch iron rim dead locks and fixing

6 Strong Thumb latches

6 pairs 24 inch Hook and eye hinges (weight 20 lbs. each) and fixing.

Six Cellars for the Officers Barracks and Mess Establishment.

6 pairs 24 inch Hook and eye hinges (20 lbs. each pair) and fixing.

6 pairs 12 inch Stock Locks and fixing

6 Strong Thumb Latches and fixing.

Probably by the time Calder left Halifax in July 1848, or soon afterwards, most of the above items had been installed. Assuming the basic patterns did not change, and a War Office pattern book dated 1901 suggests that they did not, the types of ironware items listed above may have remained in place at the Citadel to the end of the British period. A more detailed description of these items will be attempted in Section II.

III The Iron Industry in Nova Scotia

At the time that most of the above items would have been installed at the Citadel (ie. in the 1830s and 40s) there was no locally produced iron. As the noted advocate of Nova Scotian industrialization (and inventor of kerosene), Abraham Gesner wrote in 1849:

Excellent castings are made at the iron foundries of Halifax, but all the iron employed is imported from Great Britain, notwithstanding the province abounds in the best varieties of the ore.

Actually the most successful attempt to tap Nova Scotia's plentiful iron ore deposits was made in Londonderry, Colchester County, in 1849 the
very year in which Gesner had written. There had been some previous attempts. Early in the nineteenth century, for example, some wrought iron had been produced in a forge at Nictaux in Annapolis County, but this was evidently a short lived experiment. Some years later, in 1825, a blast furnace began operation in nearby Clementsport, the product of which was cast into kettles, stoves, and some bar iron. The yield was too small to be competitive, however, and this project too was soon abandoned.  

Wrought iron was first produced at Londonderry in 1850 in six Catalan forges. These were replaced in 1853 by a large blast furnace, producing pig iron. Steam power was added in 1856, and a rolling mill in 1860. In the 1870s steel production was introduced here as well using methods devised by the German-British pioneer, William Siemens. The products of the Londonderry works were of excellent quality, and the enterprise prospered reaching its apogee, probably in the years ca. 1875 - 1898. However, with the onset of a worldwide depression, and increased competition from Upper Canada and America, in the early 1900s, the enterprise began to falter seriously. By the outbreaks of the first world war in 1914 it was virtually defunct. Although further attempts were made to resume iron production in the Nictaux area in the 1860s and 1870s, the Londonderry operation was the longest lived and most successful of the attempts in the nineteenth century to create an indigenous Nova Scotian iron and steel industry.

Thus, it can be seen that from the 1850s on, probably there would have been a supply of locally produced wrought and pig iron available for Nova Scotian forges and foundries, although foreign iron continued to be imported. Before then, all the iron used in the colony (except for some small quantities produced by the short-lived works at Nictaux and Clementsport, as noted above) would have been imported.

Probably some locally manufactured iron products were available if not from the start, at least soon after work began on the fourth Citadel. According to one authority, "one of the most significant changes in Nova Scotian industry during the years ca. 1830-1854 was the development of foundries and shops for the manufacture of metal products." Thus, a manufacturers' petition of 1838 listed iron and brass casting, stove and chain cable making, and wrought iron work of various kinds as being carried on here. Throughout most of the period, however, probably the work remained quite
small scale and localized. As late as 1847, for example, the Lieutenant Governor, Sir John Harvey, wrote in a "General Description" of the colony, Of Iron manufacturers, for exportation, except stoves to some of the colonies and chain cables to the United States, there are none. Forges, however, are found in the hills and hamlets and are numerous in the larger towns. These supply Iron work for mills, shipbuilding, agricultural carriages and implements, and shoes for Cattle. Stoves are imported from the Carron works of Canada and the United States, and Iron Manufactures of all kinds are largely imported from the Mother country....

Although Harvey's words were meant to portray the relatively underdeveloped state of iron manufacturing in Nova Scotia at that time, still they do show that some locally manufactured iron products were available. Although the greatest expansion in the years which followed occurred in the field of foundry produced cast iron products, presumably forges, for the production of wrought iron items, at least held their own.

Of course, whether or not the Royal Engineers in Halifax ever used locally produced ironware (and later, iron) is still not absolutely certain. Whenever they bought locally the REs would never contract directly with local forges and foundries, but rather with local hardware dealers. No systematic attempt has been made here to ascertain precisely where the latter obtained their ironware and iron, though it is known from their advertisements that they imported a great deal from Europe and the United States. It seems likely that they would have bought some products locally, but nothing more definite can be said at this point. The foregoing was intended merely to show what the local market could have supplied, should the need arise. However, since the iron hardware items used by the Ordnance Department adhered to certain specified patterns, and since the local contractors would not have imported these in the quantities sometimes ordered by local Ordnance authorities, the contractors may well have had them made locally. (See Appendix A for a description of one Nova Scotian iron manufacturing shop in 1865.)

IV. The Royal Engineers' Purchasing Practices

As far as the purchasing practices of the Royal Engineers were concerned,
According to Susan Buggey:

By the early years of the nineteenth century certain policies for obtaining authorizations in London and supplying building materials to the stations had gradually been established. At Halifax, specifications, plans and estimates were forwarded in advance for approval in London, and construction began, season permitting, as soon as authorization arrived. Thus, a large portion of the building materials were obtained by the Ordnance Storekeeper in Halifax from local builders and merchants; these included, in 1805-6, lumber stone, bricks, lime, paint and oil, ironmongery, and sundries.

When the storekeeper's accounts were examined in London in 1809, the Board objected to charges in the Engineer's Office at Halifax for articles which were usually exported from Great Britain rather than purchased on the spot, and noted that such purchases were contrary to existing, and oft repeated, Board orders. The officers at Halifax attempted to justify the local purchases on grounds that if work did not commence until stores could be obtained from England "the service would suffer much more than the difference of price in the articles purchased." The Board ordered, nevertheless, that the Inspector General of Fortifications arrange with the Commanding Royal Engineer at Halifax, as elsewhere to reduce as far as possible the local purchase of materials which the Board had directed be obtained from England. Thereafter, while timber products, stone, lime, and sand were agreed to be purchased in Halifax, lists of articles recommended to be sent out from England constantly included ironmongery of various sorts, paints and oils, and glass.

While the exigencies of war allowed the Royal Engineers in Halifax to circumvent the Board's intentions, and to continue to purchase quantities of ironmongery, glass, oil, etc. locally, after the return of peace in 1815 they probably felt increased pressure to import these articles from home. In recommending the acceptance of Nicolls' plans for the Citadel, for example, the Inspector General of Fortifications noted in 1828 that the
stone, sand, timber, and rope for the project were to be "procured on the spot and the remainder of the articles sent from England." The instructions concerning the purchase of stores in the 1831 edition of the Orders and Regulations for the Guidance of the Corps of Royal Engineers stated explicitly that:

No Stores or other Articles are to be purchased on the Station without the Board's sanction, except in consequence of some urgency of the service, which could not be foreseen;....

"Urgencies of the service" such as the non arrival, or damage in transit meant, of course, that some stores other than stone, sand, timber and rope continued to be bought in Halifax, frequently in quite large quantities. Indeed, by 1842 repeated problems of damage and delay in shipment caused the Inspector General of Fortifications to write to Lieutenant Colonel Calder in Halifax:

that he does not understand why the principal part of the Stores required in Nova Scotia cannot be purchased on the spot, as is done in Canada, it being very desirable to limit as much as possible the inconvenience and delay of sending Stores from England, if they can be purchased on the spot, if of good quality and not of unreasonable cost.

To which Calder replied:

Most of the articles required can be obtained on the spot, of good quality, and not at unreasonable cost. ...which includes freight insurance and all other costs.

Although he was himself not a member of the Board of Ordnance, sentiments such as those expressed by the Inspector General, as quoted above, may have played a part in convincing the Board to soften its attitude towards local purchases. The Orders and Regulations of 1851 on the subject read:

No stores or other Articles are to be purchased at the Station without the Board's sanction, except under authority of the Respective Officers and Commanding Officers of Troops, for Incidental Services (which are to be procured as necessity may arise from the Contractor on the spot or by Competition upon written Tenders publicly called for) in consequence of some urgency of the Service, which could not be foreseen, ....
Commanding Royal Engineers on Foreign Stations, should be extremely careful to mark in the Demands of Stores, etc. such Articles as cannot be procured at, or within reach of the Station; in order that the delay and inconvenience of obtaining Articles from England, may be obviated as much as possible. And on all occasions of it being indispensably necessary, that the Supply of any Articles should be sent from England, such Demands should be accompanied by Diagrams, sufficiently descriptive of the required Articles, so that reference from the store Branch may be obtained.22

An explanation of the apparent contradiction between these two paragraphs will not be attempted here. Perhaps, though, the first referred only to Engineering stations close to home. Whatever the case, however, it is clear that considerable scope was left for the local purchase of goods at foreign stations.

In Halifax, from the early 1850s on Royal Engineers' Tenders for supplies appeared on a more regular basis in the local newspapers (instead of only sporadically as in earlier decades). This may indicate that the local purchase of goods had at last became the accepted mode of procedure. Probably, however, depending upon availability and costs on the local market, some supplies would have continued to arrive from England.

Unfortunately very few requisitions for stores specifically for the Citadel survive, and its not certain whether more general requisitions, such as "For Work and Repairs Halifax," were meant to include it. Whatever the case, however, the types of stores used in the Citadel were most likely similar to those provided for in these general requisitions. Following are the hardware provisions extracted from a number of requisitions for stores to be sent from England and some tenders and contracts for others to be bought locally. These should provide a general overview of the types of items obtained from both places. As can be seen, there is very little distinction, if any, between them.

Fifteen Cwt. Square [iron]
Fourteen Cwt. Flat [local]
Thirty Cwt. Round [local]
One Cwt. Iron wire gauge No. 21 ...
Six dozen 3/4 inch flat head strong screws. [local]

2. Contract for John Albro and Co. Ironmongery, Tools etc. for the Engineer's Department, 31 August 1837. 24

- 200 lbs. Rose Nails 16 lb. per [?]
- 400 lbs. Rose Nails 20 lb. per [?]
- 200 lbs. Rose Nails 70 lb. per [?]
- 100 lbs. Clasp Nails 10 lb. per [?]
- 100 lbs. Clasp Nails 14 lb. per [?]
- 100 lbs. Spikes Nails 6 inch

- 12 cwt. Round Iron 1 3/4 inch
- 8 cwt. Round Iron 1 1/2 inch
- 8 cwt. Round Iron 1 inch
- 4 cwt. Round Iron 3/4 inch
- 6 cwt. Square Iron 1 inch
- 6 cwt. Flat Iron 3 by 5/8 inch
- 8 cwt. Flat Iron 2 1/4 by 1/2 inch
- 3 cwt. Cast Steel inch square
- 1 cwt. Sheet Lead 6 lbs. per foot. [local]

3. List of articles included in the Demand of Stores for 1837-38 and ordered to be sent from England which have not been received here. - viz. (17 March 1838). 25

For Works and Repairs Halifax
Flat Iron 2 x 3/8 inch cwt.
Spikes No. 2
Rose Nails No. 14
Sheaves Metal
Planes (Trying [?])
   Smoothing
Rule 2 feet

For Barracks Halifax
Steel Blister
Iron { flat
   { round [from Britain]

Note: An entry is red ink beside each of the above items indicates that they had since been received.

5. List of Articles included in the Demands for Stores for 1840-41 and 1841-42 which have not been received 3 March 1841.27

For Works and Repairs Halifax
Bolts shutter No. 15
Iron wire No. 16
Iron square { Cwt. 6
   round Cwt. 16.0
   railroad Cwt. 1
Chisels, socket 1 1/2 inch No. 6
Chisels, formed 1 1/2 inch No. 12
   1 1/4 inch No. 5
   1 inch No. 18
Nails, rose No. 20
Saws, turning
Planes (trying double No. 4
   smoothing No. 7
Rules { folding No. 6
   common No. 12
Iron Wire
- No. 1 lbs. 4
- No. 14 lbs. 4

Chisels, ratchets 2 inch No. 6
Turning Saws No. 3
Files, tenon Bar [?] doz. 2

For Barracks at Halifax
Spikes No. 4 lb. 112
Iron Flat 2 x 3/8 inch
Iron Wire No. 16 lbs. 20
- No. 10 lbs. 6
Thumb latches strong 24
Drawer handles brass 6
Bolts flush
Lock fastenings screw
Racks for blinds
Screw rings for shutters
Lock handles (brass knob)
Planes smoothing [from Britain]

Note: an entry beside all the above items indicates that they had since been received.

4. List of Articles included in the Demands for Stores for 1838 and ordered to be sent from England which have not been received.

For Works and Repairs Halifax
Iron flat
- 3 x 1/2 inch
- 2 1/2 x 1/2 inch
Iron round
- 1 inch
- 1 1/2 inch
Steel cast 1 inch square
- blister 2 1/2 x 1/2 inch
- 2 x 3/8 inch
Plates for boilers No. 20
Hoppers Large No. 20
Citadel Small No. 20
Boilers No. 20
Grates No. 20
Ribs and fixtures No. 20
Dampers No. 40
Sheet iron covers for boilers No. 20 [from Britain]

Note: an entry in red ink indicates that the above items have since been received.


New Works and Repairs Halifax
Latches French
Lathing Nails
Thrums [?]
Turning Saws
Franklin Stoves
Copper Stock Lock 12 inch
Plane Iron 2 3/8 inch

Barracks Halifax
Bolts brass 5 inch pins [?]
flush 9 inch pins [?]
Hinges Butt 2 1/2 inch pins
HL 10 inch pins [from Britain]

7. Army Contract: Ordnance Halifax [August 1845].  

Sealed Tenders, the rates to be stated in Sterling will be received by
the Deputy Commissary General, at his Office Until 12 O'clock on Monday the 11th inst. for the supply of the undermentioned articles for the service of the Royal Engineer Department in Halifax to be delivered at the Citadel, the Ordnance or Engineer Wharves or the Harbour Posts, as may be required ....

Ironmongery, Glass, Oil Tools etc.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Quantity/Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brass, scrap</td>
<td>lbs. 20</td>
</tr>
<tr>
<td>Hinges Hook &amp; eye</td>
<td>18 inch pair 2</td>
</tr>
<tr>
<td></td>
<td>24 inch pair 10</td>
</tr>
<tr>
<td>butt</td>
<td>4 do pair 2</td>
</tr>
<tr>
<td>Ironwork, castings in such quantities as may be required.</td>
<td></td>
</tr>
<tr>
<td>Lead Sheet, 8 lbs. per foot</td>
<td>No. 280</td>
</tr>
<tr>
<td>Latches, thumb</td>
<td>No. 13</td>
</tr>
<tr>
<td>Locks, pad (spring and tumbles)</td>
<td></td>
</tr>
<tr>
<td>4 inch</td>
<td>No. 6</td>
</tr>
<tr>
<td>Keys, blank</td>
<td>No. 3</td>
</tr>
<tr>
<td>spikes 5 inch</td>
<td>No. 1</td>
</tr>
<tr>
<td>6 inch</td>
<td>No. 2</td>
</tr>
<tr>
<td>10 inch prM 14</td>
<td>lbs. 190</td>
</tr>
<tr>
<td>rose 16 inch</td>
<td>15</td>
</tr>
<tr>
<td>20 inch</td>
<td>lbs. 800</td>
</tr>
<tr>
<td>Nails</td>
<td></td>
</tr>
<tr>
<td>50 inch</td>
<td>19</td>
</tr>
<tr>
<td>70 inch</td>
<td>20</td>
</tr>
<tr>
<td>40 inch fine</td>
<td>22</td>
</tr>
<tr>
<td>10 inch fine</td>
<td>31</td>
</tr>
<tr>
<td>clasp 18 inch fine</td>
<td>34</td>
</tr>
<tr>
<td>42 inch fine</td>
<td>40</td>
</tr>
<tr>
<td>shingling, fine 3 1/2 lb. pr M</td>
<td>lbs. 1350</td>
</tr>
<tr>
<td>Lathing, 1 1/4 inch long</td>
<td>lbs. 50</td>
</tr>
<tr>
<td>Brads 14 ounce per M</td>
<td>No. 93</td>
</tr>
<tr>
<td>2 3/4 lbs. per M</td>
<td>No. 95</td>
</tr>
<tr>
<td>Steel cord patent</td>
<td>yds. 54</td>
</tr>
<tr>
<td>fasteners, spring</td>
<td>No. 14</td>
</tr>
<tr>
<td>Steel Pully boxes, brass faced</td>
<td>5 1/2 in. No. 14</td>
</tr>
<tr>
<td>Item</td>
<td>Quantity/Description</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Weights, cast iron, 7 lbs. each</td>
<td></td>
</tr>
<tr>
<td>Steel, cast, 1 inch square</td>
<td></td>
</tr>
<tr>
<td>Wire, copper for bells</td>
<td>lbs. 1/2</td>
</tr>
<tr>
<td>Iron for stove pipes, No. 17</td>
<td>lbs. 10</td>
</tr>
<tr>
<td>Adzes</td>
<td></td>
</tr>
<tr>
<td>Axes, shingling</td>
<td></td>
</tr>
<tr>
<td>Drawing knives</td>
<td></td>
</tr>
<tr>
<td>Files, hansaws</td>
<td></td>
</tr>
<tr>
<td>Tenons</td>
<td></td>
</tr>
<tr>
<td>Filletfas, sash side</td>
<td></td>
</tr>
<tr>
<td>Gimblets, assorted sizes</td>
<td></td>
</tr>
<tr>
<td>Hammers, clawed of sizes</td>
<td></td>
</tr>
<tr>
<td>Jointers, clawed of sizes</td>
<td></td>
</tr>
<tr>
<td>Pincers, of sizes</td>
<td></td>
</tr>
<tr>
<td>Planes, beard 3/8 (?) inch</td>
<td></td>
</tr>
<tr>
<td>Plough, with 8 irons</td>
<td></td>
</tr>
<tr>
<td>Rules, box 2 feet</td>
<td></td>
</tr>
<tr>
<td>Saws, turning 24 in. by 3/8 (?) in. wide</td>
<td></td>
</tr>
<tr>
<td>Spokeshaves (small)</td>
<td></td>
</tr>
<tr>
<td>Stones, turkey oil (2 lb. each)</td>
<td></td>
</tr>
<tr>
<td>Squares with steel blades, 9 inch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 inch</td>
</tr>
<tr>
<td>Axes, felling</td>
<td></td>
</tr>
<tr>
<td>Hammers, lathing</td>
<td></td>
</tr>
<tr>
<td>Shovels, coal heavers (helved) with steel points</td>
<td></td>
</tr>
<tr>
<td>ditto, miners' with short handles</td>
<td></td>
</tr>
<tr>
<td>Spades, helved</td>
<td></td>
</tr>
<tr>
<td>Scythes blades</td>
<td></td>
</tr>
<tr>
<td>Scythe stones</td>
<td></td>
</tr>
<tr>
<td>Smith, vice standing (weight 45 lbs.)</td>
<td></td>
</tr>
<tr>
<td>Bellows, 36 inches across board</td>
<td></td>
</tr>
<tr>
<td>Anvil, weight 2 1/2 cwt.</td>
<td></td>
</tr>
<tr>
<td>Sieves, fine brass wire</td>
<td></td>
</tr>
</tbody>
</table>
8. Ordnance Contract [May 1848]

The Deputy Commissary General will receive separate Tenders at his office ... for the following materials.

Ironmongery, Tools etc.

...  
Hinges butt 2 ins. pairs 18  
Iron flat  
round  
square

Castings, in such quantities and of such kinds as may be required.

| Keys, blank | - of size | No. 6 |
| Locks, Dead, iron rim | 10 inch | No. 6 |
| Pad, strong | 4 inch | No. 4 |
| Rose No. 16, 20 lbs. p.m. |  | lbs. 425 |
| Nails Clasp No. 32 | 6 lbs. p.m. | lbs. 112 |
| No. 33 | 10 lbs. p.m. | lbs. 112 |
| Brads | 93 1 inch | lbs. 1 |
| 95 1 1/2 inch | | lbs. 1 | [local] |

9. Commissariat Tenders [31 May 1852]

...  
4. Ironmongery, Paint, Oil, Tools, etc.

Schedules of the articles required to be furnished under the above heads, and their descriptions may be seen and copied at the Royal Engineers Office where every requisite information will be afforded. [local]

10. Engineer Service [July 1869]

The Deputy Controller will receive Tenders in duplicate, upon printed forms, until noon, on Tuesday the 12 inst. for the supply of the undermentioned Building materials for the service of the Royal Engineer Department, for three years, from the 15th July 1869 to 15th July 1872,
both days inclusive, viz.

...  

2. Ironmongery

... [local]
Calder's estimate for constructing four new casemates on the west front (7, 8, 13 and 14), and for reconstructing the retaining wall of the four casemates of defence (9, 10, 11 and 12) in the 1840s, stipulated that their doors were to be hung on 24 inch hook and eye hinges. Unfortunately no other information is supplied concerning these hinges, except that they were to be of wrought iron and one pair weighed 20 pounds. (See Introduction, "Wrought Iron at the Citadel"). The following is based upon information gained through general background reading on the subject, upon an examination of a number of surviving hook and eye hinges (of various sizes) found at different locations within the Halifax Defence Complex, and upon comparative material from other historic sites.

The standard hook and eye hinge consisted of two parts. One (the strap) for attachment to the door, was an elongated strip of metal, with one end curled back forming a hollow cylinder open at both ends (the eye). The other (the pintle), for attachment to the door frame, usually consisted of a short bar or rod of iron with a solid cylindrical iron pin rising vertically at the shoulder end (the hook). The shape of the pintle's other end (the point), and the method of attachment to the frame varied somewhat and shall be discussed later. Naturally, the door was hung using two complete hinges, each consisting of a strap with an eye, and a pintle, with a hook. Upon installation the hollow cylinders or eyes of the straps were fitted over the pins or hooks of the pintles.

The hook and eye hinge was one of the simplest made, and according to one authority, "Probably no other form...was so generally used over so long a period...." It dates back at least to the mediaeval era,
and is still used today in some barns and other buildings of a similar nature.

The strap portion of the hook and eye hinge would have been formed from a strip of sheet metal with the eye formed by heating one end and wrapping it round the pin or hook of the pintle (which was then removed). The portion wrapped around the pin often had a projecting flap or tongue which was then forge welded (i.e. heated and hammered repeatedly) so that it formed a single piece with the strap. This evidently was a particular characteristic of British hinges. All the hook and eye hinges found in the Halifax Defence Complex which have been examined by the author appear to have been forge welded in this manner. After this process was completed holes would have been punched for the reception of screws, bolts or rivets - those for the screws being countersunk. For additional security the last hole before the eye portion of the hinge usually contained a bolt or a rivet. Square bolts (necessitating a square hole in the hinge) were used in all the hinges examined from the Halifax Defence Complex.

Of the strap portions of hook and eye hinges examined, four measured 20 inches in length, one 18 inches, one 22 inches, and one 33 inches. The 20, 18, and 22 inch hinges were held by one bolt and three screws each. The 33 inch hinge was held by three bolts. The distance between the shoulder of the eye and the bolt hole in those measuring 20 inches in length ranged from three to four and a half inches; between the bolt and the first screw from four to five and a half inches; between the first screw and the second screw, about five and a half inches; and between the second and third screws from five to five and a half inches. Thus it can be seen that the spacings of the screws and bolts in hook and eye hinges, while approximately consistent, were by no means exact. The respective spacing of the bolts and screws for the other size hinges are:

<table>
<thead>
<tr>
<th></th>
<th>22&quot;</th>
<th>18&quot;</th>
<th>33&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>From shoulder of eye to bolt</td>
<td>5 1/4&quot;</td>
<td>3 1/4&quot;</td>
<td>5 1/4&quot;</td>
</tr>
<tr>
<td>From bolt to 1st screw</td>
<td>5&quot;</td>
<td>5&quot;</td>
<td></td>
</tr>
<tr>
<td>From 1st screw to 2nd screw</td>
<td>5 1/2&quot;</td>
<td>4 1/2&quot;</td>
<td></td>
</tr>
</tbody>
</table>
From 2nd screw to 3rd screw
22" 18" 33"

From 1st bolt to 2nd bolt
5" 4 1/2"

From 2nd bolt to 3rd bolt
11" 14 1/4"

All the screws used in hook and eye hinges were the flat head variety. On brass hook and eye hinges, the screws were always staggered from one side of the strap to the other (See Figures 8 and 11). This was because brass required extra security. Iron was stronger, and the screws in hook and eye hinges made from it were always in a straight line (See Figure 1).

Amongst the British military hook and eye hinges examined by the author, both in reality and on plans, there are some variations in the shape of the strap portion. For example, some are tapered running from the eye towards the terminal end, while others run straight across. Some have their edges bevelled while others do not. To some extent, probably the inclinations of individual smiths and/or foundries have to be taken into account, for the origins of the hardware used by the Royal Engineers seems to have been quite diverse (See "The Royal Engineers' Purchasing Practices"). As a general rule, however, it might be stated that the type of hinge without a taper was generally used for a heavier type of door, such as a gate, and spanned most, if not all the door's width. The example found at Georges' Island contains bolts and no screws, doubtlessly for additional strength (See Figure 6). Whether or not the edge was bevelled may also have been due to the preferences of individual smiths or (in the case of bronze hinges for magazines) foundries. Since the representation of some hinges in a War Office pattern book of 1901 show their edges as bevelled, Royal Engineer authorities may, by that time, have preferred them to be made this way. Nevertheless, none of the iron hinges found in the Halifax Defence Complex have their edges bevelled. It is true that the edges are bevelled on the bronze hinges mounted on the doors of the Citadel's South Magazine, but this was not a universal characteristic, since photographs of a number of bronze hinges at Fort Henry, Kingston, Ontario show that these were not bevelled (See Figure 11).

In the eighteenth century the terminal or end treatment of the strap portions of hook and eye hinges was often quite ornate. Even in the
military they were forged into tulip or globular shapes. By at least the mid-nineteenth century, however, military hinges had become much more simplified. By then, for the most part, the ends were simply cut off straight. When exactly this design was introduced is not known, but all the plans of buildings to be built in the Halifax Defence Complex which delineate hinges (dating mostly from the 1860s) show their terminals or ends as cut off in this manner. Also, this is the terminal or end treatment of all the hinges which have been found in the Halifax Defence Complex. Again there is the occasional minor variation which will be described in the captions accompanying the illustrations.

The pintle portion of the hinge was made of two parts. A short strip of heated bar iron forming the shank was wrapped around and welded to a short piece of rod iron forming the pin or hook. There were a variety of designs for the other end or point of the pintle, depending upon the manner in which it was to be attached to the wood or masonry of the door frame. Three designs found in the Halifax Defence Complex are:

1. A **driven pintle**, where the point was drawn out to a narrow point. This type of pintle was simply driven into the wooden door frame like a spike, probably into a hole of slightly narrower dimensions, which had first been bored out by an auger. *(See Figure 13)*.

2. A **bolted pintle**, where the end was rounded as a bolt, with threads for the reception of a nut. It too was run through the wooden frame, but secured on the inside by the nut. The threads on the specimens found at the Halifax Defence Complex appear to be quite course. The nuts are a hexagonal shape. It was probably this type of pintle which was used on the doors of the Citadel's west front. *(See Figure 12)*.

3. A **dovetail pintle**, where the shank expands somewhat towards the point roughly in the shape of a dovetail. This type of pintle would have been morticed into the masonry of the door frames and probably run with lead. *(See Figure 12)*.
Locks

Locks are, of course, devices for securing doors and/or other openings. There were a number of types in use in the mid-nineteenth century. A type provided for frequently in the estimates for the Citadel was the iron rim lock. According to a Handbook for Military Artificers published in 1877:

Rim Locks are made of iron and are from 5" to 12"; they may be fitted with one or two brass knobs on a spindle, and may have a drawback bolt. They are right or left, and are used for common doors.¹

Calder's estimates of the 1840's provided for 10 inch "iron rim dead locks" to be installed on the casemate doors of the Citadel's west front.²

All locks consist basically of two main parts - the case, containing the bolt or "locking" portion of the lock, attached to the door, and the "keeper" into which the bolt was projected when the door was locked, attached to the door frame. In an iron rim lock, the main plate and back plate plus the four edges (or rim) of the case portion were made of iron. A "dead bolt" was one which could be operated only by a key - that is it was "shot home dead without a spring."³ As the above quotation from the Artificers Handbook indicates, some locks contained a second type of bolt, or "latch bolt," which was held in a "closed" position by a spring. The projecting edge of this type of bolt was bevelled so that it could easily slip over the lip of the keeper as the door was being shut. This type of bolt could be operated either by a knob or handle, from either side of the door. Some locks contained yet a third type of bolt, called a "night bolt" for additional security. It could be slid into position by a small knob, but only from the inside of the door. A "dead lock", according to a reputable mid-nineteenth century authority, contained only the first type of bolt, or "dead bolt." It was also called a "closet lock."⁴ This
was the type, it would seem, which Colonel Calder intended to be mounted on the west front doors of the Citadel.

Locks are operated by keys whose bits are cut in such a fashion as to avoid certain wards, and/or to raise certain tumblers inside the lock case, access to which is obtained through the keyhole. The standard iron rim lock used in Britain and its North American colonies throughout most of the eighteenth and early nineteenth centuries depended upon a system of wards, and a simplified tumbler mechanism for its security. This type of lock was easily picked, however, and towards the end of the eighteenth century a number of patented locks had begun to appear, with more complicated tumbler arrangements designed to frustrate the intention of the most persevering would-be pickers. One of the first of these was the Barron lock, which came onto the market in 1778. In 1818 Jeremiah Chubb obtained a patent for an improved design which, besides making use of a complicated system of tumblers and levers, had a mechanism which left evidence if any attempt had been made to open it with another key. Hence it was called the Chubb detector lock. In external appearance these locks looked much like ordinary iron rim locks, except that the name of the patentee was inscribed directly into some part of the lock itself, or onto a plate which was attached.

The 1831 edition of the Orders and Regulations for the Corps of Royal Engineers stated the "The Chubb Patent Lock is to be adopted where additional security may be required." The 1851 edition of this work stated that the Chubb "or some other Lock equally secure" was to be used. No surviving Chubb locks have been found in the Halifax Defence Complex. However, another type of patented lock, bearing a small round plate inscribed "Carpenter and Tildersley Manufacturers" was rescued from the Ordnance Storehouse on Lower Water Street before it was demolished in 1937, and is now in the Nova Scotia Museum. The patent for this type of lock was taken out by its inventor, James Carpenter of Willenhall, Staffordshire, in 1830. After his death in 1844, his son-in-law James Tildersley, took over the business; hence the name "Carpenter and Tildersley." The firm continued to manufacture locks under this name until bought out late in the nineteenth century. The lock in the Nova Scotia Museum, then, probably dates from between 1844 and c. 1890. It is a
dead lock - ie. containing only a dead bolt, and measures 10 inches in length, 6.6 inches in width and is 1.1 inches thick. The end of the dead bolt measures 2.5 inches by .75 inches. There is a brass key escutcheon. (See Figure 15).

Whether or not a Carpenter lock, or a Chubb lock, or a simpler type iron rim lock was used on the doors of the west front depended on the degree of security required. Since casemate 7 was used continuously as an artillery store from at least 1854 on it may well have been equipped with a patented lock of some variety. The other casemates here had more varied uses and contained, for the most part, less militarily important and less expensive materials. Possibly they would have been equipped with the more standard type of iron rim dead lock.

Using surviving artifacts, original estimates, and a number of rough drawings from old plans, a number of tentative conclusions can be drawn concerning iron rim locks employed by the British military in Halifax. The most common sizes, for example, seem to have been 6, 8, 10 and 12 inches. However, one measuring 7 inches (or more accurately 6 7/8 inches) was found here. (See Figure 14) The 10 inch locks, which saw much use at the Citadel, seem to have measured about 6 inches in width, by about 1 1/2 in thickness; the 8 inch, about 5 inches in width, by about 1 1/4 in thickness; and the 7 inch, 4 1/2 inches in width by 7/8 in thickness. The widths and thicknesses of the other size locks are not known. For the most part these locks were attached to the doors by means of four screws, one through each corner of the lock, though the 7 inch was held by two screws, and one 10 inch lock shown on an 1868 plan for a set of gates on Georges' Island is secured by only three. (See Figure 13 25). In general round head screws seem to have been preferred, though flat headed ones evidently were used occasionally (See Figure 14). Some locks had key hole escutcheons, some did not. There is no readily apparent reason why this was so. One further distinction should be noted. It would appear that the dead bolts in the locks which contained only this type of bolt (ie. "dead locks") were generally of larger dimensions than the corresponding bolts in those locks which also contained one or two other types of bolts (ie. latch bolts and night bolts). (Compare, for example, the dead bolts in Figures 14 and Figure 17).
No keepers for iron rim locks have survived in the Halifax Defence Complex. The bolts in the two apparently authentic 8 inch iron locks on the cell doors in casemate 50, Halifax Citadel, are let into holes morticed into the door frame. Perhaps the most common type of keeper for iron rim locks was simply an elongated rectangular iron box with one side and the back plate removed (the door frame actually formed the back of the keeper). The bolt projected through the open side of the keeper and struck against the closed front plate if anyone tried to open the door while the bolt was thrown. The leading edge of the front plate was frequently raised to provide a striker plate. Presumably, however, this would only have been desirable for locks with a latch bolt, and would have been unnecessary for dead locks - i.e. those containing only a dead bolt. Such keepers were attached to the door frame by screws driven through two holes, one at the top of the front plate, the other at the bottom (See Figures 26 and 27). Another type of keeper used in Halifax, shown on the 1868 plan referred to earlier, was the box staple variety - i.e. basically an inverted capital U with the lips extended somewhat to receive screws. (See Figure 25).

The hand forging of keys would practically have ceased by the time that the locks were mounted at the Citadel. By then they would have been drop forged in dies. 

The manufacture of locks would have been beyond the expertise of the ordinary blacksmith. Their production required an artisan with specialized skills called a locksmith. By the period that we are concerned with at the Citadel, English locksmithing had become heavily centralized in the midland district of South Staffordshire - especially in the two towns of Willenhall and Wolverhampton. Probably many of the locks used by the British military in Halifax originated here.

Writing in 1868 the famous American locksmith A.C. Hobbs, who had by then settled in England, described the techniques used in the manufacture of locks and keys thus:

In the process as carried on at Willenhall, they are applied chiefly to the manufacture of mortice, box, trunk, rim, cabinet, case, bright, dead, closet, and padlocks. Except some of the brass-work, which are cast, these locks are made by forging.
pressing, and filing. The forging is a light kind of smith's work, aided by a light hammer and a small pair of bellows. Pressing is a kind of work by which certain parts of the lock are pressed or stamped out. There is of course a die or cutter, attached to the press, to cut the metal in the proper form. The last process, filing, is that by which the separate pieces are shaped and smoothed for adjustment in their proper places.

The key making process may be said to comprise forging, stamping, piercing, and filing. The forging differs very little from that required in making the pieces of a lock. The stamping is effected by placing the end of the iron wire, taken red hot from the forge, into one half a key mold, made in a block or a hand anvil. [The other half of the mold then being dropped into it]. The filing of the key is important; for not only is the whole key made bright, but the wards are cut by the file and chisel.

From at least the late 1840's, however, there were locksmiths operating in Halifax. Probably they did some work for the British military. One who definitely did was Thomas W. Bateman, since two, and probably three, of his locks were recovered from the main magazine in George's Island, which was built in the late 1860s. (These are now in the Army Museum.) Thomas Wallace Bateman was born in Halifax in 1818, but went to London England at the age of 14, where he learned the trade of general machinist. He subsequently worked in New York and Boston before returning to his native city to settle in 1861. He first set up in business with one John Forbes as a machinist, locksmith and bell hanger, but the partnership did not last long. By 1864, Bateman had gone into business on his own, operating out of a shop on Duke Street. By 1869 he had moved to Sackville Street where he remained until his death in September 1901 at the age of 83. According to his obituary in the Morning Chronicle, "He took up the locksmith branch and safework and was regarded as one of the most expert safe machinists in Lower Canada. When keys or combinations of vaults or safes were lost Mr. Bateman was the man usually sent for to open the doors and he was always
successful."\(^{17}\) Two of the locks from George's Island are inscribed "T.W. Bateman Halifax," while one is also inscribed with the number "530" and the other with "531." The third lock from George's Island contains no inscription at all, but it is exactly the same design as the others and could well be Bateman's also. These locks, since they were mounted on a magazine, are made of brass. They measure 8 1/8 inches long by 5 3/4 inches wide, by 1 1/4 inches thick. The end of the dead bolt measures 1 7/8 inches in length by 11/16 inches in width. They were attached to their doors by means of four bolts and are equipped on both sides with brass keyhole escutcheons. Their keepers, also of brass, are the box staple variety. To this untrained eye at least, the interior mechanism of these locks looks similar to that used in some high security patented locks (such as Barron or Chubb), which may suggest that at some point in his career Bateman had worked with an English or American patent lock firm.\(^ {18}\) (See Figures 19 to 21).

Following are a number of Bateman's advertisements extracted from a number of nineteenth century Halifax business directories. For comparative purposes, one from another local locksmith is included.

(1863) Forbes and Bateman

Machinists Locksmiths, Bell Hangers etc. Arcade Buildings, Hollis Street, Halifax, N.S. Manufacturers and Dealers in every description of Locks, Knobs, and House Trimmings, Bell Hanging Materials etc. Burglar and Powder Proof Bank Locks Best Quality Easy Spring Mortice Locks; Superior Flush Bolts, Thumb latches, Bell Hanging executed in a superior manner. Lock Repairing, Light Smith Work and Jobbing of all kinds in Brass and Steel Sewing Machines of all kinds properly repaired and adjusted Skates made to Order, ground and repaired.\(^ {19}\)

(1864) T.W. Bateman

35 Duke Street, Halifax

Locksmith, Bellhanger manufacturers of Bank and Safe Locks and House Trimmings After having had 8 years experience in some of the best Workshops in London and the United States, he feels assured that his work will give the utmost satisfaction.\(^ {20}\)
(1874) T.W. Bateman
54 Sackville Street
Locksmith and Bell Hanger Bank and Safe Locks made to order. All kinds of Weights and Scales repaired and adjusted; Patent Spring Hinges All kinds of jobbing in Brass or Iron executed in the most Workmanlike manner. 21

(1863) James B. Smithers
Bell Hanger and Locksmith
(Established 1848)
No. 52 Barrington Street
House Bells, Steamboat Gongs and Speaking Tubes fitted up at the shortest notice.
Lock and Job Smithing in all Branches punctually attended to. 22
Colonel Calder's estimates provided for the doors on the west front to be equipped with "large" or "strong" wrought iron thumb latches. No further information is supplied.

A thumb latch is a device for holding a door firmly in place when closed. As the name implies, it could be operated by pressing the thumb downwards on a thumb press attached to the end of a lift bar which pierced the door. This action lifted a latch bar, mounted horizontally on the inside of the door, from a catch attached to the door frame, thereby enabling the door to be opened. The thumb latch was also equipped with a hand grasp mounted on the outside of the door for pulling it open. If the two ends of the hand grasp were flattened out into cusps or escutcheons (which were screwed to the door) it was called a "Suffolk" latch; if they were attached to a single rectangular plate (which was screwed to the door) it was called a "Norfolk" latch. The origins of the two names are not known.

The Suffolk type thumb latch has been identified as primarily a product of the eighteenth century, the Norfolk of the nineteenth. Writing of colonial America, one authority noted that Norfolk latches began to appear about 1800, and had superseded Suffolk type latches by the 1830's. Possibly the changes had occurred somewhat earlier in England as the designs and in many cases the latches themselves, were derived from that country.

By the middle of the nineteenth century in the United States cheaper cast iron thumb latches began to supplement wrought iron ones. In England, however, the manufacture of forged wrought iron thumb latches lasted much longer. As has been seen those provided for in Lieutenant Colonel Calder's estimates for the doors on the Citadel's west front, which were drawn up in the mid to late 1840s, were to be of wrought iron.

The three thumb latches actually found in the Halifax Defence Complex...
seem to be of mild steel, which would give them a somewhat later date - i.e. post c.1855. The basic design of all three of these latches is similar, though there are some minor variations. These shall be noted in the captions beside the photographs. One notable feature that the three have in common is that the upper leg of the hand grasp is considerably elongated and bent perpendicular. The end is formed into a cusp or escutcheon as in the Suffolk latch, though slightly smaller. This in turn is rivetted to a rectangular back plate characteristic of the Norfolk latch. The lift bar of the thumb press penetrates a strip of metal connecting the small cusp or esctcheon with the top leg of the hand grasp (See Figures 22 and 23). Whether or not the wrought iron thumb latches used at the Citadel were of the same design is not known. All that can be said here is that such a thumb latch design was known in the wrought iron era.6
Slide Bolts

A sliding bolt was another device for securing a door, usually from the inside. It consisted of an elongated bar or rod of iron attached to the door, which slid into a keeper of some sort attached to, or morticed into, the door frame. Unlike the thumb latch, this device was used to lock a door, but only from the side on which it was mounted.

All the bolts which survive in, or are pictured in old photographs of, the Halifax Defence Complex are rod or barrel bolts. In this type the bolt itself was a length of round or rod iron with a short perpendicular leg at its rear end. It slid along a rectangular back plate, and was held in position there by an elongated metal tube or barrel, or by a series of staples attached to the back plate. When driven "shut" the bolt was held in position by lowering the perpendicular leg (which terminated in a knob) so that it lay flush against the back plate between a bar of some sort or an open staple, and the barrel or a closed staple. (See Figure 29) Although bolts of this type had existed earlier, they evidently first began to appear in large numbers around the end of the 18th century, since rolled bar iron, for making the bolts, first became available to blacksmiths in quantity at that time.¹

Some information on types of slide bolts used by the British military in Halifax can be obtained from two sources: surviving artifacts and a photograph of the Submarine Mining shed on George's Island, C. 1877, which shows three such bolts.

Three slide bolts which apparently are authentic, are mounted on doors of casemates 49 and 50, Halifax Citadel: one on the door leading to the cell area in these casemates, and one on each of the cell doors. Their form and dimensions are identical to such an extent as to perhaps indicate factory manufacture. The back plates all measure about 14 3/4 inches in length by 2 1/4 inches in width, and the bolts themselves are
are 14 inches in length. The bolts are held in place by 3 staples, measuring 1 1/2 inches in length, the ends of which penetrate the back plate. When driven "shut" the bolts protrude beyond the end of the back plates by 2 1/8 inches. Each bolt contains a reverse stop measuring 3/4 inch in height and 5/8 inch in width, to prevent the bolt sliding off the end of the back plate when pulled back. The two sides of the open staple through which the bolts slide to an open or closed position measures 1 3/4 inches in length. The back plates of all three bolts are attached to the door by four pairs of round headed screws. The bolts slide into holes morticed into the door frame. (See Figures 29 to 30).

Another style of slide bolt used in Halifax is in the artifact collection of the Halifax Defence Complex. It is much larger than those mounted in casemates 49 and 50, and those pictured in the photographs of the Submarine Mining Store on George's Island. The back plate of this bolt measures 18 inches in length, by 4 inches in width. The bolt measures about 16 inches in length by about one inch in diameter. The bolt is held in place against the back plate by two staples measuring one inch in width. They are rivetted to the back plate. The back plate is secured to the door by 7 pairs of flat headed screws. In the illustration (See Figure 31) note the terminal or end headment of the back plate, the reverse stop post, and the side post for securing the bolt when closed.

It is impossible to provide exact descriptions of the bolts shown in the photograph of the Submarine Mining Store on George's Island, as the bolts themselves are quite indistinct. As far as can be discerned, however, there seem to be two types of bolts here, all about 10 inches long. The bolts mounted at the top and bottom of the door seem to be what one authority refers to as neck bolts, ie. the end of the bolts which protrude beyond the back plates into the receptacles on the door frame are shaped in such a fashion that they seem to have a captial L hanging off the end. This design was evidently one means of preventing the bolt from sliding out of its staples when pulled open. (This type of bolt evidently had no reverse stop part). (See Figure 32.) The bolt in the middle of the door is a straight rod or barrel bolt. The bolt itself is held in place by three staples, all rivetted to the back plate. It is
driven home into a keeper which consists of a single staple rivetted onto a short rectangular back plate (See Figure 32 ).
The 1971 Guide for the Description of Building Hardware defines a padlock as "a portable type of lock with a pivoted or sliding bow which can be opened to pass through a staple or ring and then secured within the housing."\(^1\) According to the Handbook for Military Artificers of 1877, British military varieties were "made of brass or iron from 2 1/2" to 4"."\(^2\)

The one described here was found in the guard room on George's Island, which may date it as early as the 1860s. From the top of its bow, when closed, to the bottom of its housing, this lock measures 4 inches. From the top of the housing to its bottom, it measures 2 3/4 inches. Its width, at its greatest point, is 2 7/8 inches. The bow portion of the lock is a curved length of wrought rod iron, attached to the housing by, and pivoting on, a rivet. The front and back plates of the housing appear to be of rolled wrought iron. The rim is a strip of metal measuring 5/8 inches in width, bent to conform to the shape of the lock. There is an oval keyhole escutcheon measuring 3/4 inches in width by 1 inch in height. There is a metal pin protruding slightly from the keyhole to act as a key guide. The key, which operated this lock would have had a hole bored in the end of its shaft in order to fit over the guide pin. (See Figure 14).

Since this lock was probably used in the guard room on George's Island, a lock similar to this could have been used in the Citadel's garrison cells.
Window Bars

The gun port openings and the retaining wall windows of casemates 51 and 52 contain a number of vertical iron bars, the shafts of which are about an inch and a half square. Their ends, which are morticed into the sills and lintles of these openings, are rounded. According to T.D. MacLean, these bars were installed during restoration work in 1956-57. It is virtually certain, however, that there were bars in place here dating back at least to the appropriation of these casemates as garrison cells in the late 1850's, and probably earlier than this. Furthermore, the original bars were probably similar in design to their replacements. This is suggested by an examination of the bars in the windows of casemates 57 and 58, which were also used as garrison cells for a time in the 1850s. The bars here are probably original - if not those in the gun port, than certainly those in the retaining wall windows, which are partially covered by ground fill put in when the area way of these casemates was covered over in the 1930s. The bars here have square shafts with their ends rounded and morticed into the window sills and lintles, like those in the openings of casemates 51 and 52. They appear to be of wrought iron. (See Figure 33).
Two possible period door closers were examined by the author. One, found in the basement of a local locksmith's shop, is an Eclipse, model no. 1253, the patent for which was taken out in 1887. It is spring operated and is made of bronzed iron. It weighs 4 1/2 pounds and according to a 1904 hardware catalogue was used "for wide inside doors or narrow outside doors."  
(See Figure 34 ). Another model (no. 1251) weighed 3 1/2 pounds and was used for inside doors, while a third (no. 1254), weighing 7 pounds, was used for wide outside doors.  

There is another style of door closer on one of the doors of the Citadel brick building (formerly north magazine). It may date from the period when this building was converted, i.e. c. 1902. It consists simply of a coiled metal spring with a metal escutcheon plate attached to either end. One of these plates is attached to the door and the other to the door frame. Its overall length is about 7 1/2 inches while the diameter of the spring is about 1 inch. Each escutcheon is held in place by three flat headed screws. It probably would have been japanned originally, but is now painted grey. This type of door spring served simply to push the door closed after it was opened. (See Figure 36 ). This design appears so basic that it seems likely to the author that similar devices would have been used much earlier than the turn of the century, but as yet no evidence has appeared to support this speculation.
Pivot Eye and Tackle Rings

Situated about a foot below the sills of the gun ports in casemates 51 and 52 is an iron pivot eye, on either side of which is an iron tackle ring. These are the last surviving artifacts directly associated with the armament which these casemates once contained. The pivot eye was meant to receive a pintle of some sort attached to the weapon's carriage, while the tackle rings had the carriage's tackling ropes run through them. These implements may have been originally installed for 24 pounder carronades, which were the type of armament slated to be mounted in these casemates at the time they were built in the 1830s. Doubtlessly the tackle rings would have been used with the short 24 pounder cannon which were actually mounted in the defence casemates when the Citadel was finally armed in the 1850s. All the defence casemates at the Citadel contain similar devices. They all appear to be of hand forged wrought iron. (See Figure 37).
Appendix A: Dartmouth Iron Foundry

The following article from the Halifax Morning Chronicle of 22 August 1865, came to light sometime after the main body of this report was completed. It has been appended because it provides some idea of the techniques and processes available for the manufacture of iron products in the mid-nineteenth century and, more specifically, available in Nova Scotia. Note that this particular firm had obtained a contract to manufacture a number of cranes for the imperial government. Probably from a concern similar to this, whether located in Great Britain or Nova Scotia, came many of the smaller items of building hardware used at the Citadel and the other works of the Halifax Defence Complex, as well.

Dartmouth Iron Foundry
W.S. Symonds and Co. Proprietors
This establishment, which is pleasantly and conveniently situated on the harbour edge, in the pretty town of Dartmouth, about four minute walk from the steam ferry landing, came into the possession of the present proprietors, Messrs. W.S. Symonds & Co. about eighteen months ago, since which date they have effected improvements on the premises of an extensive and important character. The property has a frontage, on the water, of two hundred feet, and runs back from the shore considerably more than that distance. Besides the dwelling house, the establishment comprises five buildings designed to suit the requirements of the various branches of productive industry prescribed on the premises. Some of these buildings were erected within the past year, and are characterized by all the modern improvements in the construction of workshops. The proprietors of the establishment are engaged in building a deep water wharf, to which, when completed, vessels of large tonnage will be enabled to approach and receive or discharge cargo. ... Close by the foundry is a never-failing stream of water, from which the supply required in the establishment is conducted through pipes...
laid for the purpose, and deposited in a reservoir adjacent to the main building. The first department we visited was

The Foundry,

which was then in full blast. A view of the operations in this branch is sufficient to convince one of the truth of the remark of a writer of eminence "that iron is not only the soul of every other manufacture, but the mainspring, perhaps, of civilized society." Certain it is that without the knowledge of the use of this metal the present condition of the now civilized portion of the human race would be which the Indians were found by the first white settlers in this country. Iron is not only the material of which a very large number of the appliances of civilization are manufactured, but that by which almost every article used by man is produced, directly or indirectly because from this substance is made nearly all the implements and machines employed in every art of any importance whatever. In the foundry department are cast stove plate in great quantities and almost endless variety, home heating apparatus, ornamental iron railing, winches, crane and windlass gear and all other descriptions of work normally turned out in a well appointed establishment. In this building is a huge crane, constructed on the most approved principle, by means of which the vessels of molten iron are conveyed to the moulds, and the heavy castings removed from their sandy beds. The cupulo, in which the iron is melted, stands near the centre of the shop, and is of a capacity suited to the extent of the operations on the premises. The fires are blown by a fan of different construction than those commonly in use, but of a very efficient character. We next pass to the

Machine Shop.

One building is almost exclusively devoted to the machinery employed in the manufacture of the various articles produced by the concern. The motive power is supplied by a steam engine of small capacity, but the proprietors intend to soon supply its place with one of much greater power. The machines embrace iron planers and lathes, boring, punching and drilling apparatus, together with approved appliances for the manufacture of screw bolts and working brass and other metals besides iron. In the department are made augers, used in searching for coal, pumps, iron blocks and other hoisting apparatus, gear for cranes, bolts, and a variety of other kinds of articles usually turned out in a machine shop of this description. Messrs. Symonds have recently filled several orders
for the Imperial Government, embracing a number of huge cranes, capable of lifting fifteen tons, besides several iron blocks, with composition metal sieves, and steel pins. Each of these blocks will contain a weight of ten tons, and are very impressive articles. The machine used for bolt making and thread cutting, as well as some others, was manufactured on the premises. It is the intention of the proprietors to add to the number and variety of the machines in this department. The adjoining building is used for a

Blacksmith's Shop

in which all the wrought iron work required for the production of the various articles there manufactured is shaped. Here are made ship's pump gear, large and small bolts and nuts, iron block frames, windlass cranks, stove bolts, besides a great variety of other articles pertaining to the business in which the proprietors are engaged. The present shop being too small for the increasing business of the firm, the erection of a new one has been commenced. The shop will be large well ventilated, and supplied with five forges. Passing from this building into the

Pattern Shop

one finds a number of men actively engaged in shaping wood into all manner of designs. Here patterns for all the castings produced on the premises are designed executed by skilful workmen. Systematically arranged on racks provided for the purpose, are an immense quantity of stove and other patterns, all ready for use whenever required. We next proceed to the

Fitting Shop

where the stoves are put together in an expeditious manner. Here thousands of plates representing various parts of all sizes, patterns and descriptions of stoves were arranged along the walls, and in huge piles elsewhere throughout the building. Men were at work "setting up" the stoves, and bolting them together, preparatory to transferring them to the

Wareroom

in the adjoining buildings. In this structure stoves, large and small, plain and ornamental, besides grates and franklins, in various styles and patterns, all beautifully polished and ready for use, may be counted by the hundreds. The proprietors estimate that in this wareroom they have finished stock of the market value of $20,000. In extending their premises and prosecuting this branch of domestic manufacture, the Messrs. Symonds have manifested much com-
mendable enterprise, and they well deserve to succeed in the business to which they have devoted a great deal of attention.

Halifax Morning Chronicle, 22 August 1865, p. 2.
Introduction


9. Ibid., "Report and Estimate of Work to be carried on at the Citadel for the year 1846-47".
10. War Office Pattern Book No. 2. Drawings and Specifications of Pattern Articles to be adopted in War Department Works and Buildings, 1892-1901 (Chatham: School of Military Engineering, 1901).
18. PANS, MG 12, RE 24, unpaginated, Sir A. Bryce (for IGF) to the Board of Ordnance, 18 Nov. 1828.
24. Ibid., fols. 1058-59.
25. PANS, MG 12, RE 9, p. 289, Rice Jones to the IGF, 17 March 1838.
27. PANS, MG 12, RE 10, pp. 80-81.
31. The Nova Scotian, Ibid., p. 175, 31 May 1852.
32. Morning Chronicle, (Halifax), 6 July 1869, p. 2.

Hook and Eye Hinge

2. Ibid., p. 16.
3. The same holds true for all the hinges found at the site of the British fort at Coteau du Lac in Quebec. See Peter Priess, Building Hardware from the Fort at Coteau du Loc, Manuscript Report Series No. 93 (Ottawa: Parks Canada, 1972), pp. 57-67.

Locks


2. PANS, MG 12, RE 56, "Supplementary Report and Estimate of Work to be carried on at the Citadel ... 1846-47," Item 1.


8. Ibid., 1851 edition, p. 92.


12. See the numerous "Demands for Stores and Materials for the Service of the Royal Engineer Department in Nova Scotia, New Brunswick ..., in PAC, RG 8, I, (See Vol. 1444, passim.)


17. The Morning Chronicle (Halifax), Sept. 21, 1901, p. 8. See also The Acadian Recorder, Sept. 21, 1901, p. 3 and McAlpine's Halifax City Directory, 1869-70 to 1902-3, passim.


**Thumb Latches**


3. Ibid., pp. 140-141.


6. Ibid., p. 28.

**Slide bolts**


2. Ibid., p. 120.

**Window Bars**


**Padlocks**


Door Closers
2. Ibid.
3. Ibid., p. 321.
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Figure 1

Item No. 1, top view (See also Figure 2). A 22 inch hook and eye hinge, found near the forge building on George's Island in 1973. Material - mild steel. Period - probably the 1860's or 70's. Although the head of the bolt is round, the hole in the hinge through which it projects is square (as in the case in all the hinges discussed below). This may indicate that the bolt's shaft (now considerably eroded) was originally similar in shape to the bolt pictured in Figure 9. Note the two flat headed screws which measure 5/8 inches in diameter, and the countersunk hole for the reception of a third screw. The terminal of this hinge is beaded, a characteristic it shares with only one other hinge found in the Halifax Defence Complex. (See Figure 6)

Parks Canada Photo by J.P. Camus.
Figure 2

Item No. 1, side view (See also Figure 1). Note particularly the eye (left hand) portion of the hinge. Note how it has been lapped over (round the pintle portion of the hinge, which then would have been removed) and the extending flap forges welded to the top surface of the hinge. This is a characteristic of all the forged hinges discussed below. The bolt is 3 inches long. Originally its shaft was square with round threads at the end. The nut measures 1 inch square, by 3/8 inches thick. The screws are 1 3/4 inches long. Note the beaded terminal treatment.

Parks Canada Photo by J.P. Camus.
Item No. 34, top view (See also Figure 4). An 18 inch hook and eye hinge found near the cookhouse on George's Island in 1973. Material - probably mild steel. Period - probably 1860's or 70's. It was held by a single bolt, the head of which measures 1 1/4 inches in diameter, and three screws, whose heads measured about 3/8 inches in diameter. Note the countersunk hole for the reception of the third screw. Note also the abruptly squared finial treatment.

Item No. 6, top view (See also Figure 4). A 20 inch hook and eye hinge found in the northeast caponier, George's Island, in 1973. Material and period the same as Item 34. The bolt head measures 3/4 inches in diameter, the screw heads 5/8 inches. The mitred corners of the finial are a characteristic of three of the hinges pictured here. (See below hinge No. 73; and Figure 5, hinge no. 74.)

Item No. 73, top view (See also Figure 4). A 20 inch hook and eye hinge. Material - possibly wrought iron. Period - 1860's or 70's or possibly earlier. Deterioration has occurred to such an extent that bolt and screw head cannot be discussed. The countersunk hole for the third screw measures about 1/2 inch in diameter.

Parks Canada Photo by J.P. Camus.
GEORGE'S ISLAND
FOUND NEAR COOKHOUSE.
JULY 10, 1973
HINGE NO. 4

GEORGE'S ISLAND
FOUND IN N.E. CORNER, JULY 23, 1973
HINGE NO. 5

DROWNED 8-07-73

34

6

73
Items No. 34, 6, and 73, side views (See also Figure 3). To be noted in all these hinges are the eyes, which are wrapped round and forged welded to the upper surfaces of the hinges, as with hinge no. 1, Figure 1. The bolt in item no. 34 is 3 1/2 inches long. The nut is 7/8 inches square by about 5/16 of an inch thick. The screws were probably originally about 2 inches long. Those in item no. 73 were also about 2 inches long.

Parks Canada Photo by J.P. Camus.
Item No. 22, top view. A 20 inch hook and eye hinge found near the east entrance on George's Island in 1973. Material - probably mild steel. Period - probably 1860's or 70's. The bolt is somewhat deteriorated, but probably originally measured 1 1/4 inches in diameter. The screws are virtually indistinguishable.

Item No. 74, top view. Again, a 20 inch hook and eye hinge found near west entrance on George's Island in 1973. The bolt head is not concentric, but measures about 1 1/4 inches in diameter; the screw head (barely distinguishable) about 3/4 inches. Note the two countersunk screw holes, and the mitred finial treatment.

Parks Canada Photo by J.P. Camus.
Figure 6

Item No. 59, top view (See also Figure 7). A 33 inch hook and eye hinge found in the northeast caponier on George's Island in 1973. Material - probably mild steel. Period - probably 1860's or 70's. This hinge is unique among those pictured here because it is not tapered from the eye towards the terminal end. As stated in the text, this type of hinge probably was used on heavier doors, such as gates, and spanned most, if not all, their widths. The bolt heads measure about 1 3/8 inches in diameter. The beaded terminal is a feature it has in common with only one other hinge in this collection - hinge no. 1 (See Figure 1).

Parks Canada Photo by J.P. Camus.
Figure 7

Item no. 59, side view (See also Figure 6). Note the forge weld at the eye end of the hinge. It is similar to all the others pictured here. The bolt shafts are about 3 3/4 inches long. The nuts are 1 1/8 inches square, by 1/2 inch thick. Note also the beaded terminal.

Parks Canada Photo by J.P. Camus.
Figure 8

Item No. 72, top view (See also Figure 9). A 24 inch bronze hook and eye hinge, from the South Magazine, Halifax Citadel. Period - probably late 1840's early 1850's. Note the square hole for the bolt and the staggered, countersunk round holes for the screws. The initials B.O. and the broad arrow insignia can be seen inscribed (upside down) to the left of the furthest left screw hole. Note also the bevelled edges. The bolt head, also of bronze, is 1 1/8 inches square.

Parks Canada Photo by J.P. Camus
Figure 9

Item No. 72, side view (See also Figure 8). Note the shape of the bolt's shaft. It is square at the top and becomes rounded as it approaches the threads. It is 3 3/4 inches long. The nut is 5/8 inches thick (the top edge being bevelled) and 1 1/8 inches square.

Parks Canada Photo by J.P. Camus.
Figure 10

Inside of Magazine door, Old Fort Henry, Kingston, Ontario. This photograph is included for comparative purposes. The hinges are brass or bronze and have been painted. Note that they are tapered only slightly, if at all, and that their edges are not bevelled. Compare this with the hinge from the South Magazine, Halifax Citadel (See Figure 8). Note that the Fort Henry hinges are held entirely by round headed bolts, whereas that from the Halifax Citadel is held by a single (square leaded) bolt, and by four screws. The staggered arrangement is common to both. The lock is presumably of brass or bronze, which has been painted or japanned. Note the box staple variety of keeper attached to the door frame. Note also the interior portion of the thumb latch mechanism, with the protruding lift bar, the latch bar, the latch bar guide attached to the door, and the catch attached to the door frame. Compare with those pictured in Figures 22 and 23.

Photo courtesy of St. Lawrence Parks Commission, Old Fort Henry.
Figure 11

A bronze or brass magazine hook and eye hinge at Fort Henry, Kingston, Ontario. Note that it, like those in Figure 10, is secured entirely by bolts. Note also that it too is tapered only slightly if at all, and that its edges are not bevelled. Broad arrow marks can be discerned just to the left of the right hand bolt, and (more clearly) to the left of the middle bolt.

Photo courtesy of the St. Lawrence Parks Commission, Old Fort Henry.
Figure 12

Item 84. A bolted pintle. Material - probably mild steel. Period - possibly late nineteenth century. This type of pintle was run through a wooden frame and secured by a nut, clearly visible here. The shank measures 9 inches in length. The pin extends 2 3/4 inches above the shank. It is about 5/8 inches in diameter. The nut is 6 sided.

Item 83. Another bolted pintle. Material - probably wrought iron. Period - possibly mid nineteenth century. Its dimensions are the same as pintle 84. Although the nut is considerably eroded, it appears to have been a 6 sided one too.

Item 162. A dovetail pintle. Material - probably wrought iron. Period - possibly mid nineteenth century. This type of pintle was morticed into masonry door frames. Its shank is 9 1/2 inches long. The pin stands about 3 inches above the shank. It is approximately 1 inch in diameter.

Parks Canada photo by J.P. Camus
Figure 13

Top view of a driven pintle, probably made of wrought iron in the early or mid nineteenth century. The shaft, of course, is considerably bent. This type of pintle was simply hammered into a wooden door frame. Artifact collection, Halifax Defence Complex.

Parks Canada photo by J.P. Camus
Item No. 81 and 79. Two 10 inch iron rim locks. Since the external design of iron rim locks remains fairly consistent throughout the 18th and 19th centuries, it is difficult to date these two locks precisely. Furthermore, their archaeological context is unknown. Rough guesses might ascribe both locks to the mid to late nineteenth century. Lock no. 81 is a "dead" lock and its width is 6 inches. It is a left hand lock. Lock no. 79 was a two bolt lock, and its latch bolt and the knob for operating it are missing. The part protruding from the top of the case (all three rim locks in the photograph are upside down) is the back end of the dead bolt, which has come loose. The front end of this bolt measures 1 13/16 inches long by 11/16 inches wide (Compare with the dimensions of that in Figure 17). The lock is 6 inches wide and is a right hand lock.

Item 77. A 7 inch iron rim dead lock. Period - possibly the same as the above. Note that it is held by only 3 (flat headed) screws, and that there is no keyhole escutcheon. It is 4 1/2 inches wide and is a right hand lock.

Item 80. A pad lock found in the Guard room on George's Island. It may date from the 1860's. Note the guide pin in the keyhole.

Item 76. A latch bar from a thumb latch assembly removed from the brick building (formerly north magazine), Halifax Citadel. It is 7 3/4 inches long, by 7/8 inches wide. Note the knob for lifting, which none of the other thumb latches pictured in the Report have. (See Figures 10, 22 and 23). Note also that it is pivotted on a short metal plate which is attached to the door. (See also Figures 22 and 23).

Parks Canada Photo by J.P. Camus.
Figure 15

A Carpenter and Tildersley patented iron rim dead lock. This item was removed from a storehouse in the Ordnance Yard, Upper Water Street, Halifax, when the building was demolished in 1937. It measures 10 inches in length by 6 1/2 inches in width. Note the brass patent seal (See Figure 16) and the brass keyhole escutcheon. The case has been japanned. Nova Scotia Museum Acc. No. 30.10 (9316).

Parks Canada Photo by George Quigley.
A close-up of the brass patent seal on the Carpenter and Tildersley lock reading "Carpenter & Tildersley. Manufacturers" (See also Figure 15). The patent for this type of lock was taken out by its inventor, James Carpenter, in 1830. Upon his death in 1844 the firm was taken over by his son-in-law, James Tildersley. The seal also contains the British coat of arms of Queen Victoria's reign.

Parks Canada Photo by George Quigley.
Figure 17

Carpenter and Tildersley lock, side view (See also Figure 15). The end of the dead bolt measures 2 1/2 inches in length by 3/4 of an inch in width. Note the modified U design of the iron rim. The rim of all the locks in this collection conform to this general shape.

Parks Canada Photo by George Quigley.
Figure 18

Carpenter and Tildersley lock, back view. Note the four screws, which penetrate the back plate. Their tips can be seen protruding through the front plate in Figure 15. Since the lock could not be dismantled their function is not clear. Note also the iron rim enclosing the top, right hand, and bottom side of the lock. For a side view of this rim see Figure 17.

Parks Canada photo by George Quigley.
Figure 19

Close-up showing the key hole, escutcheon, and the inscription of one of Thomas Wallace Bateman's locks which was mounted on the magazine at George's Island. Bateman practised locksmithing in Halifax between 1861 and his death in 1901. Lock in possession of Army Museum, Halifax Citadel.

Parks Canada photo by J. Speelman
Figure 20

An alternate position for the inscription of one of Bateman's locks was at the end of the dead bolt. This brass lock was also mounted on the magazine on George's Island. Lock in possession of Army Museum, Halifax Citadel.

Parks Canada photo by J. Speelman
Figure 21

Close-up of the tumbler mechanism of one of Bateman's locks. This could indicate that Bateman had received some training in the shops of some of the patented lock makers of England or America. Lock in possession of Army Museum, Halifax Citadel.

Parks Canada photo by J. Speelman
Three "Norfolk" thumb latches. Material - Latch 13 and 30 probably mild steel; latch 75 uncertain. Period - Latches 13 and 30 probably late nineteenth century; latch 75 uncertain. (See also Figure 23). Note the small tulip shaped cusps or escutcheons which are rivetted to the back plate just above the thumb press on all three latches. As noted in the text these are in fact a characteristic of "Suffolk" type thumb latches - but instead of being attached directly to the door they are rivetted to a rectangular metal backplate characteristic of the "Norfolk" type of thumb latch. Note that the lift bar penetrates a strip of metal connecting the cusp or escutcheons with the top leg of the hand grasp. The back plate of latch no. 75 measures 8 7/8 inches long by 2 inches wide; that of latch no. 13 9 inches long by 2 3/16 inches wide; and that of latch no. 30 7 1/2 inches long. The back plate of the latter was attached to its door by round leaded bolts with nuts. Presumably the other two back plates would have been attached in the same manner, although latch no. 75 would have had four pairs of such bolts. It should be noted here that, to the author, the historical authenticity of latch no. 75 remains highly suspect. Probably latches 13 and 30 are the most reliable guides to period thumb latches used by the British military in Halifax. See also Figure 20.

Parks Canada Photo by J.P. Camus.
Figure 23

Three "Norfolk" thumb latches, side view. (See also Figure 22). Note the different shapes of the left bars.

Parks Canada Photo by J.P. Camus.
Figure 24

Entrance to Fort Charlotte, George's Island, 1870's. Note the Norfolk thumb latch mounted on the right hand door. For a plan of the reverse side of this door See Figure 25.

Parks Canada Photo
Figure 25

Sketch of Gates for Fort Charlotte, detail 1868. This is the reverse side of the door pictured in Figure 24. Note that here the 10 inch rim lock is held by only 3 screws. The keeper is the box staple variety. Note also the internal parts of the thumb latch. The design is basically the same as that shown in Figure 23, except that the short metal plate upon which the latch bar pivots is shorter and the latch bar catch is different.

Public Archives of Nova Scotia.
Figure 26

Proposed RA Store for Field Forge, George's Island, 1877. To be noted here especially is the 10 inch iron rim lock, mounted with an ordinary box variety of keeper.

Public Archives of Canada
Figure 27

Magazine thumb latch, Old Fort Henry, Kingston, Ontario. This shows clearly the latch bar, the plate on which it pivots, the latch bar guide, and the protruding end of the lift bar. Presumably, since it is in a magazine, the latch is of brass or bronze. These have evidently been japanned or painted black. Note the design of the latch bar catch, which is markedly different from that shown in Figure 25. No information is available on the lock. It is evidently a two bolt lock. Note the design of the keeper with its raised strike plate.

Photo courtesy of St. Lawrence Parks Commission, Old Fort Henry.
Figure 28

Side view of a Suffolk type thumb latch found on the ramparts of the Southwest Demi-Bastion, Halifax Citadel, after the bulk of this report was written. Since all the thumb latches found in the Halifax Defence Complex before this were of the Norfolk variety, and since the Suffolk latch is normally held to be a product of the eighteenth century (see text), the discovery does give rise to some problems. Given the area where it was found, the latch obviously could not predate the present Citadel, and probably dates no earlier than the early 1830s, when the first structures in this area which would have required thumb latches (casemates 51 and 52) were built. This latch does have certain characteristics in common with the Norfolk latches found in the HDC, however. The design of the hand grip and lift bar are basically similar. Most significantly, the placement and manner of attachment of the left bar is exactly identical. It penetrates a short bar of metal which connects the top of the hand grip with the upper cusp or escutcheon, and is held in place there by two small rivets, exactly as on all the Norfolk latches found here. In this case, however, the top cusp or escutcheon would have been attached directly to the door rather than to a rectangular metal backplate as on the Norfolk latches. Since this seems to have been a rather unique design (see text), very possibly the Suffolk latch pictured here is an early variant of the design used later for the Norfolk latches pictured in figures 22 to 23. It may well have been one of the first thumb latches mounted on the door to either casemate 51 or 52. Artifact collection, Halifax Defence Complex.

Parks Canada photo by J.P. Camus
Figure 29

Slide bolt from the entrance door to the cell area in casemate 49/50, identical to that in Figure 30. To be especially noted here are the knob on the perpendicular leg at the end of the bolt, the open staple through which the bolt slides, and the reverse stop against which the bolt rests when "open" (as it is here). Note that the last staple at the other end of the bolt is missing. The hinge protruding from the right is a misplaced brass 24 inch hook and eye hinge.

Parks Canada Photo by J.P. Camus.
Figure 30

Slide bolt and lock on one of the cell doors in casemate 50. (See Figure 29). Material of slide bolt - possibly wrought iron. Period - possibly late 1840's early 50's. The back plate measures 14 3/4 inches in length by 2 1/4 inches in width. Note the three staples which hold the bolt in place, the four pairs of round headed screws, and the nipple at the back plate's top end. The lock is 8 inches in length by 5 inches in width. It too may date from the late 1840's or early 1850's. It is a two bolt lock. The knob to operate the bevelled latch bolt (protruding on the right) is missing. Since this was a cell, it is unlikely that there was ever a knob on the other side. The bolts entered holes morticed into the masonry door frame.

Parks Canada Photo by J.P. Camus.
Figure 31

A large slide bolt found on George's Island. Material - probably mild steel. Period - probably 1860's or 70's. The back plate measures 18 inches in length by 4 inches in width. The slide bolt in this photograph is in fact upside down. Moreover, when "shut" (as this bolt is) the knobbed perpendicular leg would be secured in the gap between the staple to the farthest right, and the small metal post, rising to its right. When "open" it would be secured in the gap between this post and the reverse stop post. Note that there are only two staples, which are rivetted to the back plate. The back plate is attached to the door by means of 7 (staggered) pairs of flat headed screws.

Parks Canada Photo by J.P. Camus.
Submarine mining store, George's Island, 1870's. A number of hardware items can be seen in this photograph. The two slide bolts at the top and the bottom of the door on the left are neck bolts as described in the text. Presumably, they would have been let into holes morticed into the top and bottom of the door frame. The slide bolt in the middle of the door is much like those in Figures 24 and 25, except that the staples are rivetted to the top of the back plate, instead of being let through it and secured on the back. Note also the rim lock on the right hand door, and its box staple type of keeper on the left hand door.

Public Archives of Nova Scotia Photo Collection.
Figure 33

Window bars in casemate 58, Halifax Citadel. These could well be the original window bars, since this casemate seems to have been virtually abandoned during the latter decades of the nineteenth century, and its area way filled in during the 1930's. The bars are about 1 1/2 inches square, and appear to be of wrought iron.

Parks Canada Photo by J.P. Camus.
Figure 34

An Eclipse Model 1253 door closer, top view. (See Figure 35). The patent for this model of door closer was taken out in 1887. It is spring operated and is made of bronzed iron or steel. It was made for narrow outside doors and wide inside doors.

Parks Canada Photo by J.P. Camus.
Figure 35

An Eclipse model 1253 door closer (patented 1887) - side view (See also Figure 34).

Parks Canada photo by J.P. Camus.
Figure 36

Close-up of spring operated door closer mounted on one of the original doors on the 1902 North Magazine/Canteen building. This type forces the door closed. The exact date of this particular artifact is unknown. Door closers similar to this are still sold in hardware stores, but the design seems so basic that it may well have been used earlier.

Parks Canada photo by J.P. Camus
Figure 37

Pivot eye and tackle rings, casemates 51 and 52, Halifax Citadel. The pivot eye in the middle was meant to receive a pintle of some sort, while the tackle rings would have had tackling ropes run through them. If, as had been suggested, these were intended to serve the 24 pounder carronades originally intended for these casemates, they may date back to the 1830's. They appear to be of wrought iron.

Parks Canada Photo by J.P. Camus.
Figure 38

Drawing showing a hook and eye hinge, a bolted pintle, an iron rim lock, an ordinary box keeper and a box staple keeper. This, together with Figure 39, shows some of the basic hardware designs developed for use at the Citadel.

Parks Canada drawing by J.P. Camus.
HOOK AND EYE HINGE

- EYE-STRAP PORTION -
  (FOR ATTACHMENT TO DOOR)

- TERMINAL OR FINIAL

- STRAP

- FORGED WELD

POINT

BOLT

-PINTLE-

-HOOK PORTION

-BOLTED-

PIN OR HOOK

PIN LOCK

- KEY HOLE AND ESCUTCHEON

- CASE-

- KEEPER-
  (ORDINARY BOX VARIETY)

- KEEPER-
  (BOX STAPLE VARIETY)

DEAD BOLT
Figure 39

A thumb latch and its latch bar mechanism, and a slide bolt as proposed to be mounted on some of the doors of the Halifax Citadel.

Parks Canada drawing by J.P. Camus.
THUMB LATCH

CUSPOR ESCUTCHEON WITH RIVET

LATCH BAR GUIDE

LIFT BAR PENETRATING THROUGH DOOR

~INTERNAL MECHANISM~

HAND GRASP

EXTERNAL MECHANISM

LATCH BAR

Pivot plate

BACK PLATE

SLIDE BOLT

REVERSE STOP POST

BOLT

PERPENDICULAR LEG WITH KNOB

OPEN STAPLE

CLOSED STAPLE

BACK PLATE