NPS Form 10-900a
(8-86)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

NATIONAL REGISTER OF HISTORIC PLACES CONTINUATION SHEET

Section _____ Page ___

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SUPPLEMENTARY LISTING RECORD

NRIS Reference Number: 13001059 **Date Listed: 1/8/2014**

Mechanical Fabric Company	Providence	RI
Property Name	County	State

N/A
Multiple Name

This property is listed in the National Register of Historic Places in accordance with the attached nomination documentation subject to the following exceptions, exclusions, or amendments, notwithstanding the National Park Service certification included in the nomination documentation.

Signature of the Keeper	Date of Action
	1/8/14

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Amended Items in Nomination:

SHPO Certification:
This confirms that the documentation was submitted as a *nomination* for a property that *meets* the National Register Criteria, as per the SHPO cover letter. [The SHPO certification block was initially left blank.]

Significance:
The appropriate level of significance is: *local*.
[The nomination largely focuses on the significance of the property as a reflection of Providence's prominent role in late-nineteenth century industrial development.]

These clarifications were confirmed with the RI SHPO office.

DISTRIBUTION:
National Register property file
Nominating Authority (without nomination attachment)

NPS Form 10-900
United States Department of the Interior
National Park Service

OMB No. 1024-0018

1059

National Register of Historic Places Registration Form

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NATIONAL PARK SERVICE

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in National Register Bulletin, *How to Complete the National Register of Historic Places Registration Form.* If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions.

1. Name of Property

Historic name: Mechanical Fabric Company
Other names/site number: _____
Name of related multiple property listing: **N/A**

(Enter "N/A" if property is not part of a multiple property listing

2. Location

Street & number: 55 Cromwell Street, 40, 40R, 50, 50R Sprague Street
City or town: Providence State: RI County: Providence
Not For Publication: ☐ Vicinity: ☐

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended,

I hereby certify that this ✔ nomination ___ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60.

In my opinion, the property ✔ meets ___ does not meet the National Register Criteria. I recommend that this property be considered significant at the following level(s) of significance:

___national ___statewide _x_local

Applicable National Register Criteria:

_x_A ___B _x_C ___D

Signature of certifying official/Title: SHPO **Date** 11-15-13

RI Historical Preservation & Heritage Commission

State or Federal agency/bureau or Tribal Government

In my opinion, the property ___ meets ___ does not meet the National Register criteria.

Signature of commenting official: **Date**

Title : **State or Federal agency/bureau or Tribal Government**

4. National Park Service Certification

I hereby certify that this property is:

✓ entered in the National Register

___ determined eligible for the National Register

___ determined not eligible for the National Register

___ removed from the National Register

___ other (explain:) _____

Signature of the Keeper — Date of Action: 1/3/2014

5. Classification

Ownership of Property

(Check as many boxes as apply.)

Private:	X
Public – Local	
Public – State	
Public – Federal	

Category of Property

(Check only **one** box.)

Building(s)	X
District	
Site	
Structure	
Object	

Mechanical Fabric Company Complex
Name of Property

Providence, RI
County and State

Number of Resources within Property

(Do not include previously listed resources in the count)

Contributing	Noncontributing	
6	0	buildings
		sites
	1	structures
		objects
6	1	Total

Number of contributing resources previously listed in the National Register _____

6. Function or Use

Historic Functions

(Enter categories from instructions.)

INDUSTRY/manufacturing facility

Current Functions

(Enter categories from instructions.)

INDUSTRY/manufacturing facility

VACANT/not in use

7. Description

Architectural Classification
(Enter categories from instructions.)

OTHER/late 19th- and early 20th-century industrial buildings

Materials: (enter categories from instructions.)
Principal exterior materials of the property: brick

Narrative Description
(Describe the historic and current physical appearance and condition of the property. Describe contributing and noncontributing resources if applicable. Begin with **a summary paragraph** that briefly describes the general characteristics of the property, such as its location, type, style, method of construction, setting, size, and significant features. Indicate whether the property has historic integrity.)

Summary Paragraph

The Mechanical Fabric Company Complex, built between 1891 and ca. 1925, occupies slightly less than two acres in the densely-settled Elmwood section of Providence, RI. The plant comprises six brick, closely-sited industrial buildings, one to four stories in height, arranged in three parallel rows along two internal alleyways in the center of a long block bounded by Sprague Street on the north, Cromwell Street on the south, Dexter Street on the west and Elmwood Avenue on the east. The neighborhood character is mixed, as it has been since the complex was established, with late-19th and early-20th century housing prevalent along Cromwell Street and late-19th century and early 20th century industrial lofts and smaller shops to the north and west. There are a number of vacant lots interspersed as well, many of which are paved for parking. The grounds around the complex building are presently paved with asphalt.

As first built in 1890, the Mechanical Fabric Company plant comprised a three-story brick factory building fronting on Sprague Street (Building 1) and a one-story building that combined the functions of boiler house and vulcanizing room (Building 2) behind it. Shortly after, the company erected the largest building of the complex (Building 3) for the manufacture of bicycle tires and rubber thread. Originally a three-story building, the company expanded the footprint of this building three bays to the west between 1904 and 1908 and added a fourth floor by 1920. The company also erected a single-story chalking/spreading/drying building (Building 4) ca. 1892. By 1897 a second floor was added to this building. The next addition to the complex (ca. 1897) was a single-story, ironclad warehouse (Building 5) that was rebuilt in brick and raised a

story ca. 1918. Building 6, a single-story brick building, was built and reconfigured in three phases. The first phase (sharing a party wall with Building 5) comprised a ca. 1918 single-bay garage that was doubled in size soon after. To this enlarged garage was added a 70-ft. extension between 1921 and 1925. Despite some exterior alterations, the present complex occupies essentially the same footprint as existed in the late 1920s.

After U.S. Rubber dissolved the Mechanical Fabric Company division in 1939, the six-building plant, which occupied the full width of the block between Sprague and Cromwell Streets, was subdivided with individual buildings occupying separate lots. The original orientation of Building 3 (northerly, into the complex) was modified to reflect its new status as an independent property. A new orientation toward Cromwell Street was established ca. 1955 with the creation of a new entrance in the center of the south facade. The remaining five buildings passed through several owners in various combinations through the 20th century. At present Buildings 3, 5, 6 and the boiler room (part of Building 2) are collectively owned and are the subject of an adaptive reuse plan. The east part of Building 2 as well as Buildings 1 and 4 are under separate ownership.

Inventory

Unless otherwise noted, all building foundations are granite ashlar. All roofs are covered with rubber membrane.

Building 1
Mechanical Fabric Company Main Building (1890)
40 Sprague Street (Plat 30, Lot 392)

This is a three-story, brick, 5-bay by 12-bay, 48' x 100' building set on a raised basement. The shallow-gable roof has open eaves and a molded fascia over projecting rafter ends. The roof is framed with timber trusswork exposed in the attic. Windows have segmental arch openings and quarry-faced granite sills. They are presently filled with plywood inserts with a single horizontal aluminum hopper sash, replacements for the original 12/12 double-hung wood sash. On the north façade there are two entrances. At the east end is a raised recessed entry with granite steps, paneled ceiling and transom and a modern door and hood. At the west end, a more recent doorway with a pair of steel doors provides entry at street level. On the east façade there is a central freight doorway with a segmental arch opening and granite sill on each floor, now filled with plywood, except the ground floor which has a steel overhead door. This building is connected to Building 4 on its west end by a second floor passageway enclosed in corrugated steel panels. Some time after 1996 the western half of the original first floor of Building 1 was removed, the basement below was filled and an at-grade concrete floor was installed to create better equipment access between Building 1 and Building 4. The original configuration of the first floor and basement is retained at the east end of the building. Framing in the altered section consists of modern, square-section steel columns supporting the original timber floor beams, now sistered with wooden joists. On the upper floors the original square-section timber columns support heavy timber beams and slow-burning plank flooring. A full-height brick toilet tower

occupies the southwest corner of the building. There are iron fire escapes on the west and south sides of the building.

A Barlow and Bancroft insurance survey conducted in February 1893 (see *Additional Information,* Figure 2) described the use of this building as follows: first floor, finishing, shipping and offices; 2nd floor, warp room (for preparation of specialty fabrics) and offices; third floor, cementing room (both oil and rubber cement were used). The basement was used originally for vulcanization of tires and mixing of oil cement (a mix of linseed oil, water and glue). By 1900 the second floor served as a "tire room." By 1920, this building was used by for office space and as a machine shop (first floor) with storage on the upper stories. In the post-Mechanical Fabric Co. period, it served for a number of years as a cabinet shop and was acquired in 1988 by current owner L.K. Goodwin, a materials handling equipment distributor/ manufacturer and structural steel fabricator. An alleyway formed between this building and Building 2 is partially enclosed under a corrugated metal roof supported by steel beams strung between the two buildings. This roof is of relatively recent construction.

Building 2
Mechanical Fabric Company
Boiler House, Scouring, Vulcanizing and Drying Rooms (1890)
40 Sprague Street (Plat 30, Lot 390 and part of Lot 411)

This is a tall single-story, brick, 40' x 132' building with a gable roof. The shallow-pitched roof, which is framed with timber trusswork, has open eaves and a molded fascia over projecting rafter ends. Window openings are segmental arch with quarry-faced bluestone sills; an upper tier of shorter windows serves as a clerestory. All ground-level window openings have been filled with plywood; the upper windows are also plywood-filled with a few original 8-light, wood sash surviving. From this physical evidence and a study of historical photographs, it appears that original ground-level windows had 12/12 double-hung wood sash with fixed three-light transoms. There are two freight or equipment doorways on the north façade of the Boiler House. These doorways, which feature steel lintels and granite wheel curbs, are filled with paneled wooden sliding doors. In the larger western opening, half of the doorway is occupied by a modern steel overhead door. The eastern end of the building, which is separated from the boiler room at the west end by an interior brick wall, was originally divided into two separate rooms, but those partitions were removed in the 1940s. Other alterations include the pre-1997 reconfiguration of the northeast corner with an angled wall that accommodates an overhead freight door. (See Photo 5.) A surviving overhead crane was installed in the eastern section before 1988 by a previous owner. On the western end, the original clerestory monitor on the Boiler House section of the roof has been removed. On the south façade, the Boiler House retains a small shed-roofed brick extension and its 145 foot-high, octagonal brick chimney. This chimney measures approximately 12' in diameter at the base and rises to a corbeled top. In the last decade several telecommunications panel antennae have been mounted on the chimney's vertical surfaces. Shielded conduits lead to an equipment room at the rear of Building 3 (see Non-contributing structure below).

In the early years of the Mechanical Fabric Company this building served four functions. The roughly 42'-square Boiler House on the west end, separated from the rest of the building by an internal brick wall, contained three boilers, providing steam for the plant's two steam engines as well as for heating. Between 1893 and 1900, the company added a fourth boiler. This expansion of the steam plant was likely anticipated by the company at the time of construction as the new boiler was installed without altering the existing floor plan. Attached to the south wall of the Boiler House was the 145'-high brick smokestack. The easternmost room (35' x 40') was used for scouring and vulcanizing. To the immediate west of this was an 11' x 40' room for vulcanizing and drying. The 8' x 40' room adjoining the Boiler House was used for pickling rubber goods. The small shed-roofed brick room attached to the south facade housed a well and an extension of the Pickling Room. This general delineation of functions served until the company was dissolved in 1939.

After subdivision of the property in the 1940s, the Boiler House was used solely for heating Building 3; two boilers remain and a metal canopy extending from the Boiler House still carries steam for heating Building 3. The two easternmost rooms (combined into one and under separate ownership from that of the boiler room) were converted for auto repair and are now occupied by L.K. Goodwin, a structural steel fabricator.

Building 3
Mechanical Fabric Company
Thread and Bicycle Tire Building (1892)
55 Cromwell Street (Plat 30, Lot 411)

This is a four-story, 5-bay by 19-bay, brick, pier and spandrel building measuring 50' x 275'. The recessed spandrels are capped with a four-course corbel table, a typical feature of pier and spandrel buildings of this era. The building has a shallow-pitched gable roof with open eaves and a molded fascia over projecting rafter ends. Windows are set in two sizes of segmental arch openings with granite sills. Along the long sides of the building, window openings are larger, accommodating tripartite windows; on the ends, they are narrower, accommodating single window units. Although most sash have been changed, altered, or plywood-filled, some early windows remain. A south-facing, second floor window on the Cromwell Street elevation appears to be original: a central, fixed, 12-pane wood sash with a 3-light transom, flanked by two narrower 8-light sash, topped by 2-light transoms. Ground floor windows openings have been filled with concrete block with a central aluminum hopper sash. Many third- and fourth floor windows have metal-faced plywood infill with a similar central hopper sash. The framing is mill construction - square-section timber columns supporting timber floor beams and slow-burning plank floors - except the ground floor, which is now poured concrete. Throughout the building round-section iron columns have been added in alternate bays. There is a small one-story shed-roofed brick storeroom attached on the north façade.

As built in 1892, Building 3 was three stories and occupied a smaller, 50' x 236' footprint. Between 1908 and 1920, the Mechanical Fabric Company added three bays (approximately 40')

to the west (which included a new stairwell) and a fourth story. A stairwell located near the west end of the original building was removed at this time.

The main (south) entrance to Building 3 is a result of the subdivision of the property in the mid-1940s and the reorientation of the building toward Cromwell Street. The original central bay of the south elevation was altered by 1951 with the creation of a recessed entrance now filled with an aluminum and plexiglass doorway at street level. The entrance opens onto a shallow vestibule containing a passenger elevator, flanked by a steel and concrete stairwell. The windows above were narrowed to a single large opening filled by a 15-light steel sash with a five-light hopper below and a fixed five-light transom above. At the fourth floor, the wall plane was raised to form a flat-topped parapet. The George Klein Company, the costume jewelry manufacturer that carried out the modification, also added the *Klein Building* in bronze letters on the wall above the doorway.[1]

The 1893 Barlow's Survey describes the principal function of the building as "Cutting, Drying and Making Bicycle Tires." The first floor housed cutting, calendering, and drying operations. Interior brick walls enclosed a 30' x 37' interior engine room on the north wall drawing its steam from the boilers in Building 2. The third story was unused at that time. By 1900 the functions had changed, likely reflecting a reduction in bicycle tire manufacture: washing, ironing and cutting were carried out on the ground floor; the second floor housed drying and cutting operations; and the third floor housed thread manufacture as well as storage. The addition of the fourth floor (by 1920) permitted an expansion of the company's rubber thread operation.

When jewelry manufacturer G. Klein purchased Building 3 in 1945, they occupied a portion of it, leasing space to electronics manufacturer Cornell-Dubilier. After Mechanical Fabric Co., the second-longest occupant of the building was Josef Creations, a jewelry manufacturer.[2] The company relocated from another location in Providence to Building 3 in 1965, eventually purchasing it, and remained there as one of the last costume jewelry manufacturers in Providence until 2013.

Building 4
Mechanical Fabric Company
Chalking, Spreading, Drying and Engine/Dynamo Rooms (ca. 1892)
50 Sprague Street (Plat 30, Lot 389)

This is a brick, two-story, 50' x 106', 5-bay by 12-bay building with a shallow-pitched gable roof with open eaves and a molded fascia over projecting rafter ends. A clerestory monitor runs much of the length of the roof. Windows are set in segmental arch openings; sills are quarry-faced bluestone. Several of the ground floor windows along the Sprague Street elevation appear to be original: fixed 12-light wood sash with three-light transoms. Upper story windows are modern, metal 1/1 replacements. The west elevation provides the main freight access to the

[1] The first reference to 55 Cromwell Street as the Klein Building appears in the 1955 Providence City Directory.
[2] This company was formed in 1941 by Josef Impagliazzo. The company has remained family-owned until the present time.

building. In the original configuration, an oversized, segmental-arch door occupied the center bay. By 1920 Mechanical Fabric Co. added a one-bay-wide projecting bay with double-leaf freight doors on both floors providing access to a full-height elevator shaft to the center of the 5-bay elevation. At that time, two ground floor windows south of the center bay were opened up to create a large freight door. The remaining two windows were brick-filled. A steel-framed exterior staircase, clad with corrugated steel, was added on the south façade by 1921, as was the second-story passageway to Building 1. By 1951, an exterior transformer pad had been added on the north side of the projecting bay on the west end, enclosed on the north side by a brick wall and sheltered by a flat concrete roof.

This building was originally a single-story structure from 1892 to ca.1897, housing operations related to card clothing manufacture, most importantly, the application of rubber membrane or cement to textile substrates. A second engine room occupied a chamber at the east end of the building, closest to the boiler house (Building 2). By 1897, the company added a second floor for the manufacture of its new line of "air goods," cloth-covered, inflatable rubber products that the company produced until ca. 1915. The original roof had a clerestory monitor like that on the roof today.[3] By 1900 the first floor was subdivided to provide a machine shop and a grinding room and a dynamo was added in the engine room for generation of direct current for lighting. By 1920 the function of this building was limited to processes related to the manufacture of card clothing foundation. Although the company had ceased the generation of electricity by this time, the steam engine was still in use for power transmission.[4]

After subdivision of the property, this building was converted for the storage and repair of large contracting equipment (first floor) and the manufacture of paper boxes (likely for the jewelry trade) on the second. At present, this building houses one of the L.K. Goodwin companies.

Building 5
Mechanical Fabric Company
Store House (ca. 1918)
50 (Rear) Sprague Street (Plat 30, Lot 391)

This is a brick, two-story, 38' x 66' building with a shallow-pitched gable roof with open eaves and a molded fascia over projecting rafter ends. Window openings are segmental arch with quarry-faced bluestone sills. Ground floor windows are typically filled with concrete block; upper story windows have modern replacement sash. A brick elevator machinery room rises above the roofline at the northeast corner. The main entrance to the building is an oversized segmental arch opening; this has been filled and a modern door has been inserted. The roof trusswork is slow-burning timber construction.

[3] The physical similarity of the monitor as picture in a ca. 1894 photo and a photo taken after the addition of the second story suggests that the original roof structure was raised, supported on new framing and bricked-in.
[4] By the second decade of the 20th century, industrial plants commonly were phasing out steam plants, either generating their own direct current or tying in to the emergent electrical grid and substituting individual motors for the earlier system of overhead shafting and belting. One of the earliest area factories to make this transition was Providence Steel and Iron ca. 1904 (NR-listed).

The first Mechanical Fabric Co. building in this location was a frame, iron-clad, single-story warehouse built ca. 1897. This utilitarian structure stood until the mid-1920s, when it was replaced with the two-story building now standing. Used for storage throughout the years of Mechanical Fabric Co. occupancy, this building continued to be used for commercial storage space in the years following subdivision of the factory parcel. It was most recently owned and occupied by Austin Metal Finishing.[5]

Building 6
Mechanical Fabric Company
Laboratory/Pump House/Garage (between 1908 and 1918, et seq.)
68 Sprague Street (Plat 30, Lot 412)

This narrow, 110' x 38', single-story, clear span, brick building shares a wall with Building 5. The roof is shallow-pitched gable with a wooden cornice. Window openings are segmental arch, filled completely or partially with concrete block. It is the only building of the complex with a concrete foundation. A small monitor roof is now enclosed in vinyl siding.

This building emerged in three distinct phases. The first phase was a one-bay, single-story garage built between 1908 and 1918 as an extension to Building 5 (which was also one story at the time). Around the same time, a small, freestanding, square-plan Laboratory/Pump House was built west of Building 5. By 1926 the space between these two buildings was filled in, providing an additional garage bay. Between 1930 and 1951, the easternmost bay, built originally as a garage, was raised a story. This second story was removed after 1982, returning the building to its earlier configuration. A basement, which originally housed a large vat (now removed) used for unspecified rubber processes until 1939, underlies the west half of the building.

In the post-Mechanical Fabric Co. years, the building was used as a pattern shop. It was acquired by Stearns Tool Co., a tool and die maker, in 1979.

Non-Contributing Structure

Telecommunications Equipment Room
Attached to rear of Building 3
55 Cromwell Street

A 10' x 20' single-story, plywood and steel structure of recent construction housing telecommunications equipment related to the panel antennae mounted on the Mechanical Fabric Co. chimney.

[5] This company is vacating Building 5 as part of a planned rehabilitation and reuse project that includes Building 3.

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- [X] A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- [ ] B. Property is associated with the lives of persons significant in our past.
- [X] C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- [ ] D. Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

- [ ] A. Owned by a religious institution or used for religious purposes
- [ ] B. Removed from its original location
- [ ] C. A birthplace or grave
- [ ] D. A cemetery
- [ ] E. A reconstructed building, object, or structure
- [ ] F. A commemorative property
- [ ] G. Less than 50 years old or achieving significance within the past 50 years

Areas of Significance
(Enter categories from instructions.)

INDUSTRY
COMMUNITY PLANNING AND DEVELOPMENT

Period of Significance
1890-1939

Significant Dates
1890, 1939

Significant Person
(Complete only if Criterion B is marked above.)
N/A

Cultural Affiliation
N/A

Architect/Builder

Statement of Significance Summary Paragraph (Provide a summary paragraph that includes level of significance, applicable criteria, justification for the period of significance, and any applicable criteria considerations.)

The Mechanical Fabric Company complex is significant under **Criterion A** on the state level for its associations with the industrialization of Providence in the period from the late 19th century through the 1920s and, in particular, with the diversification and success of the city's rubber industry in the years after Charles Goodyear's original vulcanization patents expired ca. 1865. While rubber footwear, blankets, raincoats and medical supplies had been manufactured in the state since the mid-19th century, the Mechanical Fabric Company developed important innovations in the production of rubber- and textile-based foundation for the card clothing used on carding machines for both cotton and woolen manufacture. The plant was also the site of national innovations in pneumatic bicycle tire manufacture.

The Mechanical Fabric Company complex is also significant under **Criterion C** as a fine example of the design and building layout of brick, steam-powered industrial complexes of the late 19th century. Despite changes and adaptations made through the 20th century, the plant of six buildings retains all the buildings that housed the separate departments of a rubber manufacturing operation and maintains the characteristic appearance of a late-19th-century industrial complex.

Narrative Statement of Significance (Provide at least **one** paragraph for each area of significance.)

History

The manufacture of rubber goods in Providence began in the early years of the industry with Isaac Hartshorn's and George O. Bourn's production of rubber footwear in the 1850s. Upon the expiration of Charles Goodyear's patent protection for the vulcanization process in 1865, Rhode Island industrial entrepreneurs expanded their efforts in the manufacture of a range of rubber and rubber-related products. Joseph Banigan began the manufacture of rubber blankets and rollers in Woonsocket (1864), dramatically expanding his product line in 1889 with the manufacture of rubber boots and shoes.[6] In 1874 Joseph Davol set up a plant on the Providence waterfront south of downtown for the manufacture of rubber medical and pharmacological supplies. Banigan also began the large-scale manufacture of rubber footwear in Providence with the conversion of a former textile mill along the Woonasquatucket River in 1896, a move that would set the stage for a decades-long presence in the city of the United States Rubber Company combine.[7]

The Mechanical Fabric Company's history, a vital part of this larger story of Rhode Island rubber manufacture, draws from several threads, embracing not only innovations in industrial applications of rubber, but the advantages offered by Providence's standing as a place for capitalization and manufacturing innovation in fields related to textile and base metals. This history begins with innovations in the mechanization of carding, a critical phase in the preparation of cotton or woolen fiber for spinning.

In order for cotton or wool fibers to be drawn and twisted into thread, these fibers, tangled as found in nature, must be straightened and separated so as to lay parallel to one another. This carding stage, historically performed through hand processes, was mechanized in stages beginning in the late 18th century, as was the manufacture of carding equipment. Pliny Earle, an early innovator in textile carding, began the manufacture of hand cards in Leicester, Massachusetts, in 1786. His successes in the mechanization of carding brought Earle to Pawtucket to assist Samuel Slater in his mechanized cotton spinning as early as 1790.[8]

The production of cards required the setting of a network of hooked metal pins into a base material of leather. This combination of leather and metal "card clothing" was, in turn, mounted on wooden paddles for hand use in the transformation of tangled, natural cotton or wool fibers to "sliver," a narrow strand or rope, the individual fibers of which are aligned in the same direction. After carding the loose sliver is drawn and twisted in the subsequent processes that render strong and uniform yarn and thread for weaving. Pliny Earle's early innovations and those of his successor companies established the Leicester/ Worcester area and Lawrence, Massachusetts as centers for the manufacture of card clothing, an important adjunct to the massive, mid-19th century regional expansion of cotton manufacture in southern New England. By the post-Civil War years, the progressive mechanization of the carding process had yielded sophisticated

[6] The Alice Mill, built by Banigan's Woonsocket Rubber Company in 1889, was at the time the largest manufacturer of rubber footwear in the world.
[7] Banigan acquired the Saxon Worsted Mill north of the city and converted it for rubber footwear manufacture in 1896. This plant was eventually absorbed into the United States Rubber combine. It is a contributing resource in the United States Rubber Company Complex (NR-listed, 2005).
[8] Source: Kittredge, Henry G. and A.C. Gould. *History of the American Card Clothing Industry,* T.K. Earle Manufacturing Co., 1886.

machinery in which large rotating iron cylinders (as well as static or opposed-motion surfaces) were covered with card clothing, producing a standardized product.

One of the important card clothing companies established in Lawrence in 1850 was the firm of Warren and Bryant. Two employees of that firm, Samuel Stedman and George A. Fuller (1827-1899), purchased a half interest in the company in 1856, renaming it Stedman and Fuller. This company relocated to Providence in 1885, erecting a steam mill for the manufacture of card clothing on Warren Street south of the city center.[9] They chose to build in a former agricultural area that had been developed by the A. and W. Sprague textile firm for a range of steam-powered industrial enterprises prior to its collapse in the Panic of 1873. Industrial entrepreneurs subsequently developed or leased several properties in the area for a variety of metalworking, and other industrial enterprises.[10] This area of the city was well-suited for steam-powered industry, with access to maritime and train transport as well as a growing pool of available labor.

Trade literature of the period describes Stedman and Fuller's original product line as "oak-tanned leather belting…and card clothing set in leather, linen and woolen cloth, cotton and rubber."[11] One of the many innovations in the manufacture of card clothing was the eventual elimination of leather as a foundation material and its replacement with a fabric-based foundation into which were inserted tempered steel staples, configured and bent to form the fine but sturdy wire teeth necessary to perform the precise, high-speed carding of a massively expanded and standardized textile industry. By the late 19th century, this foundation material was typically comprised of alternating layers of cotton and linen fabric. (See *Additional Information*, Figure 1.) This material was found to be more dimensionally stable, offering the requisite mix of rigidity and pliability to yield a uniform product.[12] It is likely that the company enjoyed the availability of the city's diverse metalworking industries as well as ready access to the manufacture of specialty fabric such as that required for card clothing foundation.

Another important factor contributing to the success of this company was the enactment of the McKinley Tariff. This 1890 law imposed a substantial duty on a wide range of imported goods, among them English-made card clothing which, until that time, had competed favorably with the American product. Stedman and Fuller benefited substantially from this tariff.[13] Under the management of George A. Fuller, the company conducted business in Providence as an independent card clothing manufacturer from 1885 until it was absorbed into the American Card Clothing Company combine in 1890. This combine (of which Fuller became a director)

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[9] As first chartered in May 1884, the company was named Fulton Manufacturing Company. A year later the corporate name was changed to Stedman and Fuller. *Acts and Resolves of the R.I. General Assembly*, May Session, 1884.

[10] E.g., Beaman and Smith, fabricators of large-scale milling and boring machines, Providence Lithograph, commercial printing, and A.T. Cross Company, manufacturers of mechanical pens and pencils, all located here.

[11] Source: *The Industrial Advantages of Providence* (1891), p. 101. The 1885 corporate charter described a business established "for the purpose of manufacturing and selling card clothing, leather belting, machinery, tools, and other articles of iron…" Source: *Acts and Resolves of the R.I. General Assembly*, January Session 1885, p. 189. Stedman and Fuller had intended to be chartered as the "Fulton Manufacturing Company." Soon after, the charter was amended to rename the corporation the Stedman and Fuller Manufacturing Company.

[12] The weight of cotton sliver per linear foot was calculated and measured in order to yield varying gauges of manufactured thread.

[13] Source: "Mechanical Fabric Company," *Providence Journal of Commerce* 2 (April 1894): 41.

effectively controlled American card clothing manufacture. Stedman and Fuller became the local branch of this manufacturing combine, continuing its operations in South Providence.

Mechanical Fabric Company

In the same year that the Stedman and Fuller operation was absorbed into the American Card Clothing Company, George A. Fuller and his son-in-law Arthur L. Kelley[14] (1858-1915) received a charter from the Rhode Island General Assembly for a corporation to be named the Mechanical Fabric Company. This company, capitalized at $150,000 and established "for the manufacture and sale of all kinds of cotton and woolen fabrics," was set up primarily to exploit a U.S. patent, "Foundation for Cards," secured in 1889 by Joseph Moseley of Manchester, England. [15] Moseley patented a process of manufacturing card clothing foundation in which multiple layers of heavy fabric were laminated together with rubber cement.[16] These laminates, which could measure up to ½" in thickness, were often finished with a thin membrane of vulcanized rubber. This was one of many innovations in the manufacture of rubber goods in the years following the expiration of the Goodyear vulcanization patents. Moseley's chief argument for the novelty and purpose of this process was that it eliminated the stretching of the clothing on carding machine cylinders and the consequent diminution of cloth quality that had bedeviled the industry for decades.[17]

With its historical and professional links to card clothing manufacture and its specialization in rubber, the Mechanical Fabric Company was well-positioned to manufacture this innovation in card clothing. Although the company saw as its primary venture the manufacture of this new type of card clothing foundation, the enterprise was conceived early on to produce a range of vulcanized rubber products, some of these combining rubber and textile. An amendment to the company's corporate charter in 1892 added "...including rubber goods and machinery" to the original charter language.[18] Within the first few years of incorporation, these were to include the manufacture of bicycle tires and rubber thread.

Sited on a two-acre lot on Sprague Street, two blocks south of the Stedman and Fuller factory, the new Mechanical Fabric Company plant comprised **Building 1,**[19] a main, three-story building fronting on Sprague Street that provided space for the manufacture of specialized fabric, finishing and office space on the ground floor, a warp room on the 2nd floor, and rubber cement mixing on the 3rd floor. The basement served for vulcanizing of rubber tires. **Building 2**, a smaller, rear, single-story building provided separate chambers for (a) scouring and vulcanizing, (b) drying, and (c) pickling. This rear building also served as a boiler house. Further west along Sprague Street in line with the main building was **Building 4**, a single-story brick building for chalking, spreading and drying. This latter building also provided an engine room. An 1893

[14] Kelley came to work for Stedman and Fuller in Massachusetts shortly after his graduation from Philips Academy (Andover) in 1876. Two years later he married Lotta Persis Fuller, daughter of George A. Fuller. He came to Providence when Stedman and Fuller relocated there, and served as treasurer and general manager of Mechanical Fabric Co.mpany until Fuller's death in 1899. He remained as president of the company until his death in 1915.
[15] *Acts and Resolves of the R.I. General Assembly*, May Session 1890, p. 70.
[16] Rubber cement is a solution of latex in liquid form and naptha.
[17] "Foundation for Cards," United States Patent No. 415,118, issued November 12, 1889.
[18] *Acts and Resolves of the R.I. General Assembly*, June Session 1892, p. 69.
[19] This numbering convention is based on that found in the 1893 Barlow and Bancroft insurance survey.

Barlow's insurance drawing (see *Additional Information*, Figure 2) indicates that steam was piped from the boiler house to engine rooms located in Buildings 3 and 4. Power was transmitted to Buildings 1, 2 and 3 by means of shafting or belting.[20] The earliest workforce figures, available for the year 1900, described a plant employing 90 men, 54 women, and two boys under 16.[21]

Bicycle tire innovation and manufacture

The 1890s saw the widespread use and popularity of the "safety" bicycle, incorporating chain drive and pneumatic tires. Providence became a regional center of both bicycle and tire innovation and manufacture. One noteworthy Providence bicycle enthusiast was Pardon W. Tillinghast (d. 1906), a draftsman employed at the Gorham Manufacturing Company. An inventor in his spare time, Tillinghast developed a variation of the "double-tube" tire patented by Scottish inventor John Dunlop, for which he received a U.S. patent in April 1891.[22] In September 1892 Tillinghast applied for a patent for a new type of tire, consisting of a single rubber tube in which the outer, rugged wearing surface combined fabric and vulcanized rubber and the inner surface provided a sealed pneumatic chamber. This innovation, nicknamed the "hose pipe" tire because of its circular section, became, for a period, a national standard for bicycle tire manufacture.[23] (See *Additional Information*, Figure 5.)

According to Henry C. Pearson, editor of the trade magazine *India Rubber World*, Tillinghast conducted the experiments leading to the patenting of his "single-tube" tire at the facilities of the Mechanical Fabric Company.[24] The importance of this invention to cycling as well as the history of the pneumatic tire was described by the B.F. Goodrich Company in 1918:

> The tire invention which proved to be the most fruitful and accordingly most important in the history of the American bicycle industry was that of the "Single Tube" or, as it was termed, "hose pipe" tire, invented and patented by Pardon W. Tillinghast of Providence, Rhode Island, early in the year 1893.[25]

Although pneumatic bicycle tire manufacture was envisioned from the beginning of operations in 1890-1, the construction of **Building 3** in 1892 appears to have represented a greatly expanded effort on the part of the company to manufacture and market tires based on the Tillinghast patents and secure a foothold in what was at the time a burgeoning tire trade. This three-story (later, four-story) building was labeled in the 1893 Barlow's Insurance Survey: "cutting, drying, and making bicycle tires."

---

[20] This assessment of power transmission within the plant was based on information found in the 1893 Barlow's survey supplemented by information in the 1899 Sanborn Fire Insurance Map. Neither survey noted the make or horsepower of the steam engine.

[21] *Annual Report of the Factory Inspectors*, 1896.

[22] U.S. Patent No. 450,952.*Tire for Vehicle Wheels*. Issued April 21, 1891. Tillinghast went on to receive nine more patents for improvements related to tires and bicycles through 1906.

[23] 50,000 sets of these tires were sold in the first two years of their manufacture. Source: Carroll, *Rhode Island: Three Centuries of Democracy*, Vol. II," p. 880.

[24] Pearson contributed an authoritative article, "The India-Rubber Industry in New England," to *The New England States* (1897), William T. Davis, ed. (See Volume 1, p. 350). According to Pearson, Tillinghast was never in the employ of Mechanical Fabric Company. Upon carrying out the experiments necessary for the mass manufacture of his tire designs at their facilities, he contracted with Mechanical Fabric Co. for their manufacture because of the company's ability to "build" the tire in unvulcanized form and then perform the vulcanization, highly-specialized operations.

[25] *Best in the Long Run: Goodrich Pneumatic Tires*. Akron: B.F. Goodrich Co., 1918.

Acquisition and Expansion (1901-1920)

Tillinghast sold the manufacturing rights for his single-tube tire to the Hartford Rubber Works in 1893.[26] Despite this, the Mechanical Fabric Company continued to manufacture various types of bicycle tires until ca. 1900. (See *Additional Information,* Figure 6.) Along with its innovations in tire manufacture, the company began producing rubber thread in 1892.[27] While continuing to produce and expand its extensive line of card clothing foundation, the company also expanded into the field of inflatable rubber "air goods," notably cloth-covered pneumatic cushions. These were manufactured for a wide range of uses, mostly for use in ocean liners. (See *Additional Information* Figure 7.) The company added a second floor to Building 3 for this purpose by 1897. Although the company abandoned that product line ca. 1915, they continued to manufacture fabric for this purpose, which was sold to finishers.[28]

As was occurring widely in the last decade of the 19th century, the Rubber Goods Manufacturing Company, a combine formed in 1899, acquired the Mechanical Fabric Company in 1901, retaining Arthur L. Kelley as president. Between 1904 and 1908, Building 3 was expanded three bays to the west and a fourth floor was added by 1920. This addition housed an expansion of the rubber thread operation.[29] The United States Rubber Company purchased the assets of the Rubber Goods Manufacturing combine in 1917,[30] adding the Mechanical Fabric Company complex to its significant holdings throughout Rhode Island. During World War I about 85% of the company's production capacity was devoted to war production. This included the manufacture of gas mask cloth, rubber cord for aeronautic uses, as well as card clothing for war-related textile manufacture. A statement of United States Rubber holdings published in 1928 listed the products of its Mechanical Fabric Company subsidiary as rubber thread, card cloth, coated and piled stockinet (a stretchy, knitted fabric incorporating rubber thread), and rubber insulating tape.

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[26] Pearson pointed out that although Tillinghast had formed a corporation for marketing and distribution, the company "had no great success in marketing" his patented tires (Vol. I, p. 350). Tillinghast's first company, the Tillinghast Pneumatic Tire Company (1891-1893), jobbed out the manufacture of his patented tires to the Mechanical Fabric Company until 1893, at which time he sold important patents to the Hartford Rubber Works. He later set up the Tillinghast Manufacturing Company (1893-1896). By 1898 he was listed as the proprietor of the "Cycle Invention Company" and was listed in 1903 as a patent attorney.

[27] Manufacture of rubber thread as carried out at the Mechanical Fabric Company required the production of thin membrane rubber sheeting which was then vulcanized and sliced into thread. Not only did this produce a thread prone to tearing because of its square section, the prior manufacture of sheeting limited the potential length of the thread. In the late 1920s, United States Rubber Company developed a method of extruding liquid latex through circular orifices into a bath of acetic acid, which congealed the latex into thread. Important experimentation and early development of this process was carried out in the Valley Street United States Rubber plant. Mechanical Fabric Co. continued to produce cut rubber thread using the older technology. Source: Glenn Babcock, *History of the United States Rubber Company*, p. 240.

[28] Source: "Card Foundation Concern Bases Growth on Quality." *Providence Evening Bulletin* (27 February 1930): 24. The article states that the company abandoned this line because of its distance from major ports.

[29] Before this time, the thread department had occupied the third floor; after the expansion, it occupied both the third and the fourth floors. This expansion also permitted a new stairwell at the southwest corner of the building, and the elimination of an original stairwell that had occupied manufacturing space in the middle of the building.

[30] United States Rubber Company had held a controlling interest in the Rubber Goods Manufacturing Company since 1905.

The final decade: 1930-1939

The Depression years saw a significant restructuring and consolidation of the many divisions of the United States Rubber Company. In 1930 the Mechanical Fabric division employed 175 operatives, producing over 100 different types of card clothing foundation (including weaving of the base material), various gages of rubber thread, and specialty items. New technologies in the manufacture of rubber thread developed by the parent company in the 1920s weakened the market for the cut thread that had been manufactured by Mechanical Fabric Co. since 1892. By 1937 staffing had been reduced by two-thirds to 57 operatives. Difficult economic conditions, an aging plant, changing technologies, and shifting corporate priorities led to United States Rubber Co.'s dissolution of the Mechanical Fabric Company in 1939.

Recent History

Between 1940 and 1946 the original two-acre Mechanical Fabric Company parcel was subdivided, eventually comprising six parcels. (See *Additional Information*, Figure 8.) The complex has housed various small- and medium-scale industrial tenants since that time. Building 1, a portion of Building 2 and Building 4 are presently occupied by L.K. Goodwin, manufacturers of structural steel assemblies, as well as subsidiaries FS Industries and Gilmore-Kramer. Building 3 was occupied for a time during World War II by neighboring metal goods manufacturer Rau Fastener. In 1945, the George Klein Company, a costume jewelry manufacturer, acquired the building, leasing part of their space to electronics manufacturer Cornell-Dubilier. Josef Creations, a costume jewelry manufacturer, subsequently occupied Building 3 from 1965 to 2013. One floor of Building 5 housed Austin Metal Finishing for a number of years until they relocated in 2013. Stearns Tool Company, tool and die makers, occupies part of Building 5 and all of Building 6.

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United States Patent Office:

415,118 *Foundation for Cards*. Joseph Moseley. Issued November 12, 1889.
444,258 *Bicycle.* Pardon W. Tillinghast. Issued January 6, 1891.
450,952 *Tire for Vehicle Wheels*. Pardon W. Tillinghast. Issued April 21, 1891.
477,316 *Pneumatic Tire and Means for Inflating the Same*. Pardon W. Tillinghast. Issued June 21, 1892.
486,915 *Pneumatic Tire.* Pardon W. Tillinghast. Issued November 29, 1892.
497,971 *Pneumatic Tire.* Pardon W. Tillinghast. Issued May 23, 1893.
528,451 *Pneumatic Tire and Wheel Rim.* Pardon W. Tillinghast. Issued October 30, 1894.
670,413 *Fabric for Tires*. Pardon W. Tillinghast. Issued March 19, 1901.
677,290 *Pneumatic Tire*. Pardon W. Tillinghast. Issued June 25, 1901.
809,409 *Pneumatic Tire*. Pardon W. Tillinghast. Issued January 9, 1906.

Maps consulted (listed chronologically):

1893 Barlow and Bancroft Insurance Survey. *Mechanical Fabric Company* Survey No. 10,844.

1889 Sanborn Fire Insurance Map (also, 1899, 1904, 1921, and 1951).

1895 Everts and Richards. *New Topographical Atlas of Surveys, Providence County, RI.*

1908 *Plat Book of the City of Providence, Rhode Island* (also 1918 and 1926).

1937 G.M. Hopkins. *City of Providence Plat Map.*

Previous documentation on file (NPS):

____ preliminary determination of individual listing (36 CFR 67) has been requested
____ previously listed in the National Register
____previously determined eligible by the National Register
____designated a National Historic Landmark
____ recorded by Historic American Buildings Survey #_____
____recorded by Historic American Engineering Record # _____
____ recorded by Historic American Landscape Survey # _____

Primary location of additional data:

____ State Historic Preservation Office
____ Other State agency
____ Federal agency
____ Local government
____ University
____ Other
Name of repository: _____

Historic Resources Survey Number (if assigned): _____

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10. Geographical Data

Acreage of Property 1.86 acres

Use either the UTM system or latitude/longitude coordinates

Latitude/Longitude Coordinates
Datum if other than WGS84:_____
(enter coordinates to 6 decimal places)

1. Latitude: Longitude:
2. Latitude: Longitude:
3. Latitude: Longitude:
4. Latitude: Longitude:

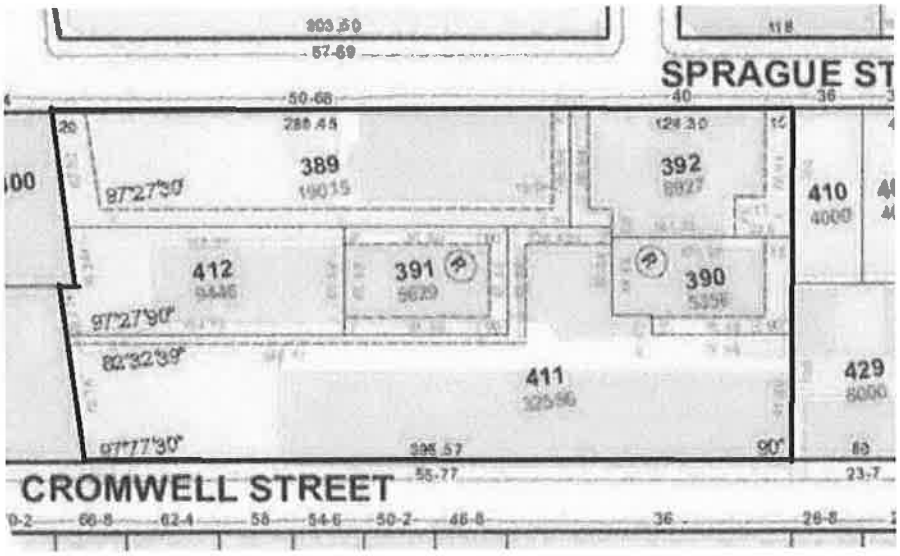
Or
UTM References
Datum (indicated on USGS map):

[ ] NAD 1927 or [X] NAD 1983

1. Zone: 19	Easting: 294440	Northing: 4631420
2. Zone:	Easting:	Northing:
3. Zone:	Easting:	Northing:
4. Zone:	Easting :	Northing:

Verbal Boundary Description (Describe the boundaries of the property.)

The boundaries of the Mechanical Fabric Co. Complex are coterminous with those of Providence, RI Tax Assessor's Plat 30, lots 389, 390, 391, 392, 411 and 412.



Boundary Justification (Explain why the boundaries were selected.)

These parcels represent the original land purchased for the construction of the Mechanical Fabric Company in 1890 and the location of continued operation of this company until its dissolution in 1939. Although the property was subdivided into smaller lots beginning in the 1940s, the complex retains the unity of scale, materials and siting that characterized it during its years as a single-owner manufacturing complex.

Form Prepared By

name/title: Edward Connors
organization: Edward Connors and Associates
street & number: 39 Dyer Avenue
city or town: Riverside state: RI zip code: 02915
e-mail: nconnors@cox.net
telephone: 401 595-0699
date: August 2013

Submit the following items with the completed form:

- **Maps:** A **USGS map** or equivalent (7.5 or 15 minute series) indicating the property's location.
- **Sketch map** for historic districts and properties having large acreage or numerous resources. Key all photographs to this map.
- **Additional items:** (Check with the SHPO, TPO, or FPO for any additional items.)

Photographs

Submit clear and descriptive photographs. The size of each image must be 1600x1200 pixels (minimum), 3000x2000 preferred, at 300 ppi (pixels per inch) or larger. Key all photographs to the sketch map. Each photograph must be numbered and that number must correspond to the photograph number on the photo log. For simplicity, the name of the photographer, photo date, etc. may be listed once on the photograph log and doesn't need to be labeled on every photograph.

Photo Log

Name of Property: Mechanical Fabric Company

City or Vicinity: Providence

County: Providence State: Rhode Island

Photographer: Edward Connors

Date Photographed: June and October, 2013

Description of Photograph(s) and number, include description of view indicating direction of camera:

1 of 15. (RI_Providence County_Mechanical Fabric Company_0001)
General view, camera facing southeast.

2 of 15. (RI_Providence County_Mechanical Fabric Company_0002)
Buildings 1 and 4, camera facing west.

3 of 15. (RI_Providence County_Mechanical Fabric Company_0003)
Building 1, framing (basement), camera facing southeast.

4 of 15. (RI_Providence County_Mechanical Fabric Company_0004)
Building 1, timber roof truss, camera facing west.

5 of 15. (RI_Providence County_Mechanical Fabric Company_0005)
East end of Building 2 (Building 3 at left, Building 4 at right), camera facing southwest.

6 of 15. (RI_Providence County_Mechanical Fabric Company_0006)
West end of Building 2, camera facing southeast.

7 of 15. (RI_Providence County_Mechanical Fabric Company_0007)
Building 2 interior, camera facing southeast.

8 of 15. (RI_Providence County_Mechanical Fabric Company_0008)
Building 3, west and south elevations, camera facing east.

9 of 15. (RI_Providence County_Mechanical Fabric Company_0009)
Building 3 entryway, camera facing north.

10 of 15. (RI_Providence County_Mechanical Fabric Company_0010)
Building 3, original window on south façade, camera facing north.

11 of 15. (RI_Providence County_Mechanical Fabric Company_0011)
Building 3, interior framing, camera facing west.

12 of 15. (RI_Providence County_Mechanical Fabric Company_0012)
Building 4, west elevation, camera facing east.

13 of 15. (RI_Providence County_Mechanical Fabric Company_0013)
Building 4, piers and beam seats in main fabrication room, camera facing south.

14 of 15 (RI_Providence County_Mechanical Fabric Company_0014)
Building 5, north and east elevations, camera facing west.

15 of 15 (RI_Providence County_Mechanical Fabric Company_0015)
Building 5, timber roof truss, camera facing west.

Paperwork Reduction Act Statement: This information is being collected for applications to the National Register of Historic Places to nominate properties for listing or determine eligibility for listing, to list properties, and to amend existing listings. Response to this request is required to obtain a benefit in accordance with the National Historic Preservation Act, as amended (16 U.S.C.460 et seq.).
Estimated Burden Statement: Public reporting burden for this form is estimated to average 100 hours per response including time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding this burden estimate or any aspect of this form to the Office of Planning and Performance Management. U.S. Dept. of the Interior, 1849 C. Street, NW, Washington, DC.

Additional Documentation

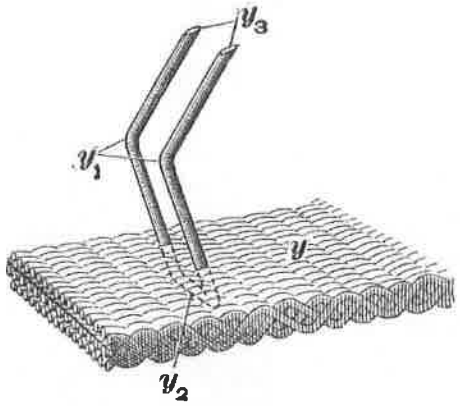


Figure 1

Phantom view of fabric-based card clothing
Showing foundation (y) and inserted wire staple (y_1-y_3)
International Library of Technology, Vol. 76

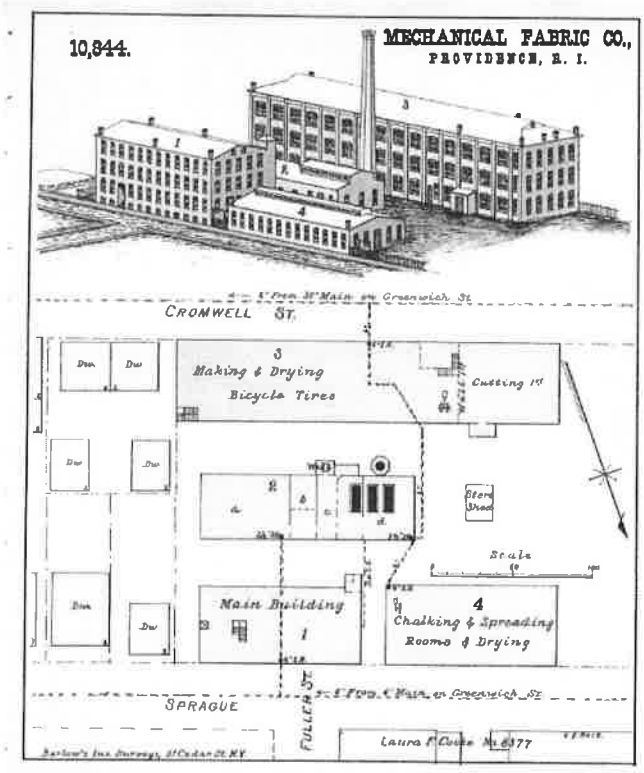


Figure 2

Isometric and plan views of the Mechanical Fabric Company plant
Detail from Barlow and Bancroft Insurance Survey No. 10,844 (February 1893)
Warshaw Collection, Smithsonian Institution

Figure 3
Plant of the Mechanical Fabric Company
Halftone published in *Board of Trade Journal* (1894)
showing Building 3 as original 3-story building, Building 4 as a 1-story building,
and the Boiler House (Building 2) with original clerestory monitor.

Figure 4
Plant of the Mechanical Fabric Company
Halftone published in *Board of Trade Journal* (1897)
showing expansion of Building 4 to two stories
and the first iteration of Building 5 as a steel-clad, single-story storehouse
Note gable-on-hip roof of Building 3 at right.

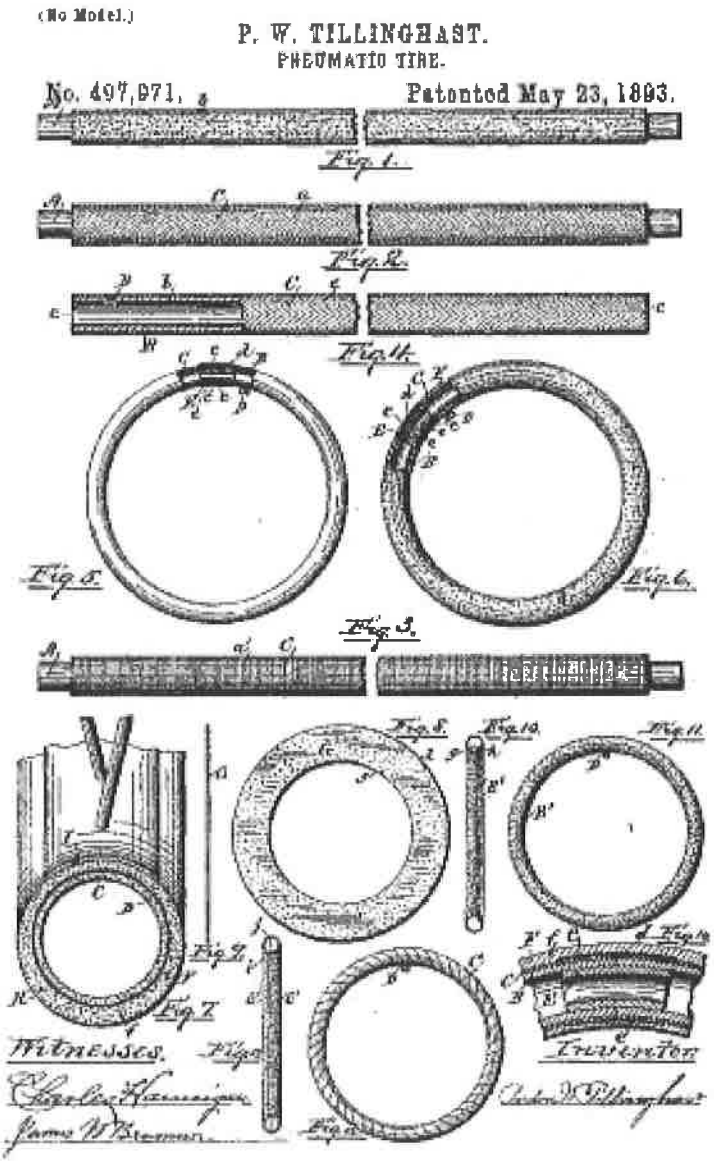
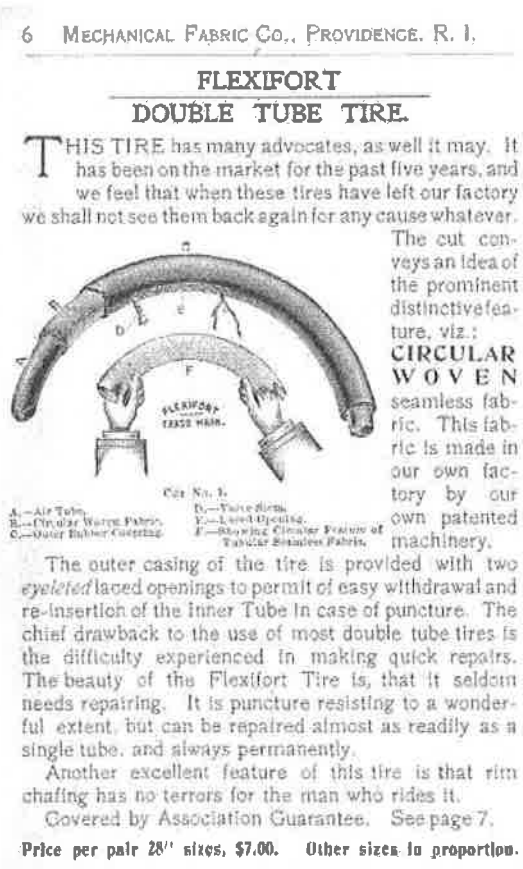


Figure 5
"Pneumatic Tire"
Drawings submitted for U.S. Patent 497,971
issued May 23, 1893 to Pardon W. Tillinghast, Providence, RI

Note: This is the "single-tube" or "hose-pipe" tire perfected and manufactured at the Mechanical Fabric Company plant from 1891 to 1893.



6 MECHANICAL FABRIC CO., PROVIDENCE, R. I.

FLEXIFORT
DOUBLE TUBE TIRE.

THIS TIRE has many advocates, as well it may. It has been on the market for the past five years, and we feel that when these tires have left our factory we shall not see them back again for any cause whatever. The cut conveys an idea of the prominent distinctive feature, viz.: CIRCULAR WOVEN seamless fabric. This fabric is made in our own factory by our own patented machinery.

Cut No. 1.
A.—Air Tube. D.—Tire Form.
B.—Circular Woven Fabric. E.—Lapped Opening.
C.—Outer Rubber Covering. F.—Showing Circular Feature of Tubular Seamless Fabric.

The outer casing of the tire is provided with two *eyeleted* laced openings to permit of easy withdrawal and re-insertion of the inner Tube in case of puncture. The chief drawback to the use of most double tube tires is the difficulty experienced in making quick repairs. The beauty of the Flexifort Tire is, that it seldom needs repairing. It is puncture resisting to a wonderful extent, but can be repaired almost as readily as a single tube, and always permanently.

Another excellent feature of this tire is that rim chafing has no terrors for the man who rides it.

Covered by Association Guarantee. See page 7.

Price per pair 28" sizes, $7.00. Other sizes in proportion.

Figure 6

Deatil from the Mechanical Fabric Company "Bicycle Tire and Tire Sundries" 1900 catalog showing "Flexifort" tire, a Mechanical Fabric Company trade name carried over from card clothing manufacture. The term evoked the strength of the base fabric and the flexibility imparted to it the addition of rubber.

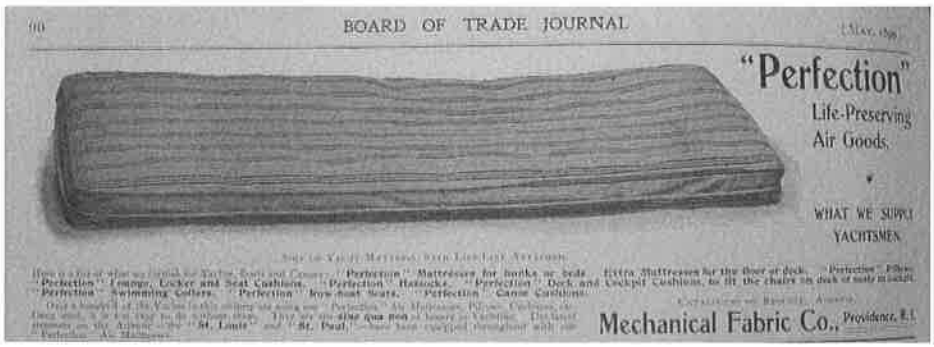


Figure 7

Advertisement for "Perfection" life-preserving boat cushion
Board of Trade Journal, May 1899

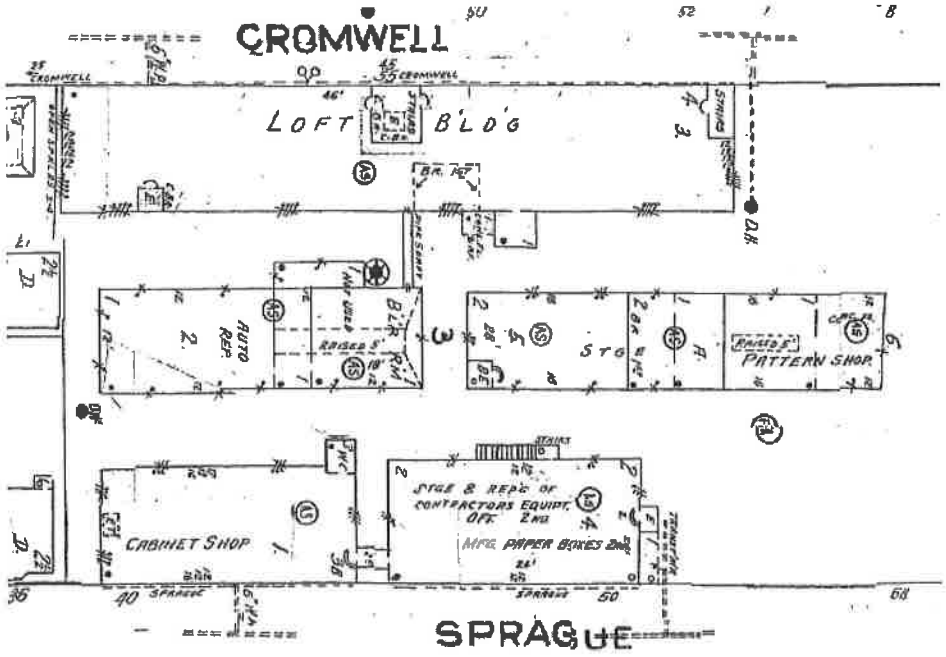


Figure 8
Plant of the Mechanical Fabric Company after subdivision of property
Detail from 1951 Sanborn Fire Insurance Company drawing
representing the complex in its current configuration.

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PROVIDENCE QUADRANGLE
RHODE ISLAND
7.5-MINUTE SERIES (TOPOGRAPHIC)

MECHANICAL FABRIC CO,
COMPLEX
PROVIDENCE
PROVIDENCE CTY.

UTM REFERENCE
19/298440/4631420

Produced by the United States Geological Survey

Topography taken from 1:31,680 scale map of Providence 7.5 minute quadrangle, surveyed 1934-1935.

Planimetry derived from imagery taken 1996 and other sources.

Hydrography compiled from NOAA charts 278(1954) and 352(1957)

North American Datum of 1983 (NAD 83). Projection and 1,000-meter grid: Universal Transverse Mercator, zone 19
10,000-foot ticks based on Rhode Island Coordinate System of 1983

North American Datum of 1927 (NAD 27) is shown by dashed corner ticks. The values of the shift between NAD 83 and NAD 27 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software

Survey control current as of 1957.

Landmark buildings verified 1957

UTM GRID AND 2000 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

20% TOTAL RECOVERED FIBER

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
TO CONVERT FROM FEET TO METERS, MULTIPLY BY 0.3048
DEPTH CURVES AND SOUNDINGS IN FEET — DATUM IS MEAN LOW WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 4.6 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

INTERIOR - GEOLOGICAL SURVEY, RESTON, VIRGINIA - 2000

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 GEORGIAVILLE
2 PAWTUCKET
3 ATTLEBORO
4 NORTH SCITUATE
5 EAST PROVIDENCE
6 CROMPTON
7 EAST GREENWICH
8 BRISTOL

ADJOINING 7.5' QUADRANGLE NAMES

ROAD CLASSIFICATION

Primary highway hard surface
Secondary highway hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route
U.S. Route
State Route

PROVIDENCE, RI
1996

NIMA 6767 IV SW-SERIES V815

ISBN 0-607-91643-0
9 780607 916430

fsIndustries

EXIT

fsIndustries SERVICE DEPT

3059

NISSAN

NO
PARKING
ANY
TIME

BUILDING

fsTindustries
50 SPRAGUE ST.
bondor
WH

DECIMAL EQUIVALENTS