NOMINATION OF HISTORIC BUILDING, STRUCTURE, SITE, OR OBJECT PHILADELPHIA REGISTER OF HISTORIC PLACES PHILADELPHIA HISTORICAL COMMISSION Submit all attached materials on paper and in electronic form (cd, email, flash drive) Electronic files must be Word or Word compatible		
1. Address of Historic Resource (must comply with an Office of Property Assessment address) Street address: 721 W GRANGE AVE, Philadelphia PA Postal code: 19120-2230		
2. NAME OF HISTORIC RESOURCE Historic Name: Fox Motor Car Company, Thomas M. Royal & Co., Honeywell Industries Current/Common Name: Mutual Industries Inc.		
3. TYPE OF HISTORIC RESOURCE		
4. PROPERTY INFORMATION Condition: □ excellent □ good ☑ fair □ poor □ ruins Occupancy: ☑ occupied □ vacant □ under construction □ unknown Current use: factory		
5. BOUNDARY DESCRIPTION Please attach a narrative description and site/plot plan of the resource's boundaries.		
6. DESCRIPTION Please attach a narrative description and photographs of the resource's physical appearance, site, setting, and surroundings.		
 7. SIGNIFICANCE Please attach a narrative Statement of Significance citing the Criteria for Designation the resource satisfies. Period of Significance (from year to year): from <u>1919</u> to <u>1923</u> Date(s) of construction and/or alteration: <u>September 1920 - April 1921</u> Architect, engineer, and/or designer: <u>Day & Zimmermann</u> Builder, contractor, and/or artisan: <u>J. S. Rogers Company</u> Original owner: <u>Fox Motor Car Company, Ansley H. Fox</u> Other significant persons: <u>Thomas M. Royal</u> 		

CRITERIA FOR DESIGNATION:				
The historic resource satisfies the following criteria for (a) Has significant character, interest or value characteristics of the City, Commonwealth or significant in the past; or	or designation (check all that apply): e as part of the development, heritage or cultural [.] Nation or is associated with the life of a person			
(b) Is associated with an event of importance	to the history of the City, Commonwealth or Nation;			
 (c) Reflects the environment in an era characteristics of (d) Embodies distinguishing characteristics of (e) Is the work of a designer, architect, lands has significantly influenced the historical, arc the City. Commonwealth or Nation: or 	cterized by a distinctive architectural style; or, f an architectural style or engineering specimen; or, cape architect or designer, or engineer whose work hitectural, economic, social, or cultural development of			
(f) Contains elements of design, detail, mater	rials or craftsmanship which represent a significant			
(g) Is part of or related to a square, park or of	ther distinctive area which should be preserved			
(h) Owing to its unique location or singular ph	ral motif; or, nysical characteristic, represents an established and			
 familiar visual feature of the neighborhood, constant (i) Has yielded, or may be likely to yield, infor (j) Exemplifies the cultural, political, economic 	ommunity or City; or, mation important in pre-history or history; or c, social or historical heritage of the community.			
8. MAJOR BIBLIOGRAPHICAL REFERENCES Please attach a bibliography.				
9. Nominator				
Organization	Date January 4, 2021			
Name with Title Adrian Trevisan	Email AThistpres@outlook.com			
Street Address 2 Hamilton Ave	Telephone_609-334-6143			
City, State, and Postal Code Princeton, NJ 08542-3	3808			
Nominator \Box is \checkmark is not the property ow	/ner.			
PHC Use	ONLY			
Date of Receipt: Original submission on October 28	3, 2021; final version received January 27, 2021			
X Correct-Complete I Incorrect-Incomplete	Date: January 27, 2021			
Date of Notice Issuance: April 30, 2021 Property Owner at Time of Notice:				
Name: Edward M Dunn				
Address: 707 W Grange Avenue				
City: Philadelphia	State: PA Postal Code: 19120			
Date(s) Reviewed by the Committee on Historic Des	ignation: June 2, 2021			
Date(s) Reviewed by the Historical Commission:	July 9, 2021			
Date of Final Action: July 9, 2021, designated ur	nder Criteria A, D, and J*			
Criterion D was not set in the set of t	or accepted for Turner's mushroom structural system but did as representative of "red and white" factory architecture. 12/7/18			



5. Boundary Description

Figure 1 The boundary identifying the parcel at 721 West Grange Avenue. (Source: Atlas)

Beginning at a point on the Northerly side of Grange Avenue at the distance of 120 feet westwardly from the Westerly side of 7th Street; thence extending along the Northerly side of Grange Avenue North 78 degrees 39 Minutes West 171 feet 6-3/8 inches to a point; thence extending on a line parallel with the center line of the North Pennsylvania Railroad and 60 feet East therefrom North 02 degrees 03 minutes 10 seconds East 537 feet 5/8 of an inch to a point; thence extending south 78 degrees 39 minutes East 256 feet 5-3/8 inches to a point; thence extending on a line parallel with the Westerly side of 7th Street and 120 feet West therefrom South 11 degrees 022 minutes West 530 feet to the Northerly side of Grange Avenue the first mentioned point and place of beginning.

6. Description

The building at 721 West Grange Avenue is a narrow, rectangular, three story, brick, concrete, and glass factory bordering the Fern Rock Transportation center in North Philadelphia.



Figure 2 Aerial view of 721 West Grange Avenue. (Source: Google Maps)



Figure 3 Street view of 721 West Grange Avenue. (Source: Author)

Constructed in 1921 as a manufacturing site for an air-cooled luxury automobile, the building is a rectangle measuring 60 by 400 feet, maximizing the exterior surface. It is formed by a series of slender, rectangular reinforced concrete pillars, placed 20 feet apart. The narrow side of the building is four pillars across, the long side 20. The pillars are connected by the ends of the reinforced concrete slabs that form the floor of each story. This combination of pillars and slabs creates a façade made up of a grid of rectangular wall modules 14 feet high by 20 feet wide. In most of these modules a narrow brick spandrel spans the gap between the pillars and support large windows that fill the rest of the space. This arrangement was intended to provide ventilation and the maximum amount of sunlight possible to illuminate the work inside. Over time many of these windows have been filled, leaving the building with an uneven, patched appearance.



Figure 4 Detail of 721 West Grange Avenue showing modular format of exterior walls. (Source: Author)



Figure 5 South elevation of 721 West Grange Avenue. (Source: Author)

The front or south elevation of the building is 60 feet wide by approximately 48 feet tall. Two corner pillars flank two internal ones, creating a 3 by 3 grid. The bottom of the slab forming the first floor is flush with the tops of the basement windows below it and is approximately six feet above grade. On the first floor, the two lateral wall modules in the grid have been filled with concrete masonry units which have been painted white. There is some damage to the end of the cement slab which forms the ceiling of the first floor/floor of the second. The central module holds the former entrance door to the building, which sits at the top of a double staircase with each side adjacent to the wall. The door is set in a limestone frame which tapers slightly as it rises from the landing of the stairs to a triangular lintel. The words "Fox Motor Car Co" are chiseled into the lintel above the door. Remnants of lanterns flank the doorway, which has been filled with concrete masonry units. The brick portion of the wall is laid in common bond, with every seventh course laid in Flemish bond.



Figure 6 Entrance door of South elevation of 721 West Grange Avenue. (Source: Author)

Each wall module of the second floor contains two rows of windows, divided into three, three-panel sets. Based on comparison to period photographs, these appear to be the original windows. As with the floor blow, the ends of the floor slab displays some damage. The windows on the third floor have been filled with unpainted concrete masonry units. It appears that each panel had at some point contained a small window, but these, too, have been filled. The wall is topped by a low parapet wall which has a shallow arched parapet filling the center section. Period photographs show the company logo attached to the façade here. The parapet is capped with limestone or concrete slabs.

Moving from south to north, the first ten columns of the west elevation form a rectangular grid pattern as described above. The basement and first floor windows of the first two wall modules have been filled with concrete masonry units. The remaining modules on all floor appear to retain the original windows.



Figure 7 View of 721 West Grange Avenue from the southwest. (Source: Author)

A two-story shed in the shape of a right trapezoid has been attached to the main building. A period photograph shows this to originally have been the loading dock connecting the second floor of the main building to the railroad siding. A one-story shed in turn rests on the south side of this attachment; with three vehicle doors giving access to the interior. The wall above the shed has four rectangular windows. The west wall of this shed appears to have windows at regular intervals, but is obscured by vegetation which covers the wall. The north wall of the shed is also obscured by vegetation. A narrow peaked roof runs along the three exterior sides of the shed. The remainder of the roof is flat with two rows of projecting skylights. The row adjacent to the main building has five skylights, the other has two.



Figure 8 West elevation of 721 West Grange Avenue showing former loading dock. (Source: Author)



Figure 9 West elevation of 721 West Grange Avenue showing former loading dock. (Source: Author)



Figure 10 Skylights on roof of former loading dock. (Source: Author)

A large rectangular tower is attached to the wall of the main building between the tenth and eleventh pillars. This tower projects approximately 20 feet above the roof, and may house an elevator. Two small rectangular boxes are attached to the exterior wall of the main building next to the tower. The next five wall modules are unobstructed. The first, fourth and fifth retain their windows, the second and

third have been filled. As the former loading dock meets the main building there is another tower with adjacent box. This tower also project above the roofline, and may also be an elevator. The remaining two modules retain their glass on all three floors.

The north elevation of the building is a three by three gird. The first floor wall modules have been filled in with concrete masonry units, as has the rightmost module on the second floor. The remaining five appear to retain their original glass. In contrast to the south elevation, there is no parapet wall at the roofline; it is flush.



Figure 11 North elevation of 721 West Grange Avenue. (Source: Author)

The east elevation is composed of a grid three high by twenty long. As on the south elevation the bottom of the first floor is initially flush with the top of the short basement windows below it. Two rectangular stairwells faced in brick are attached to the outside of the structure, the first obscures the windows between pillars five and six (counting from left to right), the second obscures the windows between pillars thirteen and fourteen. A small shed is attached to the first stairwell, obscuring the basement windows. Period photographs show exterior doors and landings on the two stairwells, these have been covered in green, corrugated metal. The second and third modules on the first floor and the third module on the second floor have been filled. The first and fourth module on the first floor retain

the original three, three-panel sets of windows. The remaining modules on the second and third floors retain their original glass as well.

Figure 12 East elevation of 721 West Grange Avenue. (Source: Author)



Figure 13 East elevation of 721 West Grange Avenue. (Source: Author)



Figure 14 East elevation of 721 West Grange Avenue. (Source: Author)

With the exception of the central unit on the first floor, the wall modules between the two stairwells all appear to have retained their original glass. The exception module has been filled with concrete masonry units. The basement modules are filled; they are not visible in period photographs, making it difficult to determine if this is original or an alteration. The basement window modules in the fifth module is open, with a driveway leading to the basement. This is not visible in period photographs. The remaining seven modules all appear to have retained their original glass.



Figure 15 Roof of 721 West Grange Avenue. Note tops of pillars protruding through roof surface, and former water tower. (Source: Google Maps)

The roof of the building is flat, meeting the wall flush, with the exception of the south elevation, as noted above. The tops of the interior and exterior pillars protrude slightly through the roof, providing an indication of the structure below, and, according to a period newspaper, preparing for the potential addition of a fourth floor.¹ A platform supported by four pillars which used to support a water tank displaying Fox Motor Car Company logo remains, but the water tank has been removed. The pillars are continuations of, or rest upon, the two central pillars and the fourteenth and fifteenth lateral ones.

7. Significance

The property at 721 West Grange Avenue is significant as an historic resource in Philadelphia and merits listing on the Philadelphia Register of Historic Places. Pursuant to Section 14-1004(1) of the Philadelphia Code, the property satisfies Criteria for Designation A, D, and J.

Criteria A and J

Satisfying Criterion A, the building at 721 West Grange Avenue has value as part of the heritage of the city as a rare (possibly the only) surviving automotive manufacturing plant in Philadelphia. During the initial years of America's automotive industry, when ideas were plentiful, barriers to entry were low, and failure was common, fifty-one auto manufacturers were registered in the City of Philadelphia. The Fox Motor Car Company factory, built to manufacture air-cooled luxury cars, remains as an example of that aspect of Philadelphia's history.

Satisfying Criterion J, the building at 721 West Grange Avenue exemplifies the changing industrial character of the city during the 20th century. It was constructed during the post-World War I speculative equivalent of the dot-com era by a startup manufacturing luxury automobiles of "revolutionary" design. After this venture failed, the building passed through the hands of companies producing more mundane products such as paper bags and industrial controls, until being acquired by the Philadelphia Industrial Development Corporation as part of the city's effort to stem the flood of industries fleeing the city. Reflecting the resurgence of the city, the building rebounded from this nadir, and for more than 30 years has been occupied by a company manufacturing construction, safety, and surveying materials.

Growth of the Automobile Industry in the United States

The dawn of the twentieth century saw the birth of a new mode of transportation for the masses. Early automobiles were expensive, noisy, slow, unreliable, and uncomfortable. Great strides were made in the first decade of the century—not only in the machines, but in the roads and service infrastructure that enabled them. This was especially true in the United States where initial opposition to roads decreased as the benefit of getting produce from farms to rail lines gradually became apparent.²

The Federal Aid Road Act of 1916 provided \$75 million over five years as matching grants to states as they built roads outside of urban areas. Although entry into World War I delayed implementation of this program, when the war ended progress resumed. In 1918, the Bureau of Public Roads released \$5.7 million for 218 projects. The following year this grew to \$18 million released to the states for 454 projects. In 1920, almost \$86 million was released for 1,286 projects. By the end of 1920, construction had started in 1,835 projects covering 14,940 miles of road; 1,677 miles were completed. Although this was a small fraction of the roads outside of cities, it continued to grow, and provided the foundation for the automobile to supplant the railroad as the principal means in extra-urban travel in the United States.³

Within the industry, one of the major factor in the growth of the automobile was Henry Ford. After being introduced to the twin concepts of interchangeability and mass production by Walter Flanders, Ford and his manufacturing team developed a system that allowed them to cost-effectively manufacture large numbers of reliable, inexpensive automobiles. In 1909, the first full year of production for the Model T, Ford sold 13,840 cars for \$950 each. Seven years later, in 1916, sales had grown to 585,388 cars while the price had dropped to \$360. Competitors followed suit, and from its beginning as plaything for the rich, the automobile became an affordable necessity for the middle class.⁴

By 1919, the industry had entered the growth phase of its lifecycle and was consolidating. Due to the cost advantages that it enjoyed, Ford was the major manufacturer in the United States, but it still faced more than 100 competitors. While Ford and his team developed the technology to manufacture large numbers of cars, innovation in the industry resulted in the machines becoming easier to use. Most cars had three speeds forward and one in reverse with the gearshift in the center. Engines had gotten more powerful, and while in 1910 four cylinder engines had accounted for 80% of the market, by 1919 this had dropped to 29%, with 56% having six; the remaining 15% were luxury cars offering eight or twelve cylinders. Replacing the hand-crank, the electric starter had been introduced in 1912 and by 1919, 99.4% of cars had them. And while 90% of cars manufactured in 1919 were open, customers were demanding closed cars due to ease of cleaning and driving comfort—the market would respond quickly in the next few years.⁵

Much of this innovation grew from the fierce competition from many startups. Some, such as Studebaker, Chrysler, and Duesenberg survived long enough to be remembered today. Other such as Maytag, Dunbar, and Woonsocket came and went quickly. While many of these startups sought only to take advantage of growing demand and offered unexceptional models or even near-copies of existing cars, others introduced new features that they presented as improvements over existing technologies. New engines, brakes, gear shifts all appeared and either disappeared, or were accepted and became readily available. In a way this period was a precursor to the dot-com era at the end of the century, but instead of having an algorithm that would allow users to access information in a better way, these inventors offered a machine that they promised would allow users to travel in a better way. Speed, comfort, reliability, efficiency, price—sales pitches mixed and matched features and benefits in a wide variety of ways, each striving to stand out from the competition.⁶

On the macro level, the United States had come out of World War I with its economy booming. Rapid and severe cuts in government purchasing had been offset by an explosion of pent-up consumer demand. According to one history of the period, "By the fall of 1919 plants were operating at full capacity, raw materials were unobtainable except at exorbitant prices, and delivery dates were being pushed out by as much as a year."⁷ Initially car sales boomed as well, hampered only by the difficulty of obtaining sheet steel, which was exacerbated by strikes in the steel and coal industries. But by the spring of 1920 demand for cars softened, and by September sales had almost disappeared. Other industries saw similar cycles, with pricing for farm products collapsing and banks closing. Roughly a year later the economy hit bottom, and the recovery which would lead to the decade later being known as The Roaring Twenties slowly began.⁸

Philadelphia's Automobile Manufacturing Industry

According to Kimes and Clark's authoritative *Standard Catalog of America Cars*, Philadelphia has a long history in automobile manufacturing. This first automobile in the world was manufactured here in 1805, when Oliver Evans added wheels to the steam dredge he had manufactured to clean the city docks and

drove it around Centre Square. The first automobile accident also occurred here, when the Johnson brothers lost control of their experimental steam carriage while turning on to Brown Street during a test drive in 1828 and, after hopping the curb and flattening awning posts, ran it into the corner of a house on the southwest corner of Brown and Oak Streets. Following these pioneers, 67 other companies were founded within city limits with the intention of manufacturing and selling automobiles.⁹

These 67 entrepreneurs varied in experience and product offering and enjoyed different levels of success. Thirty-two of them never progressed far enough to establish a manufacturing plant, whether due to their experimental vehicle proving not to be successful, such as the carbonic-acid powered Carroll of 1908, or due to their own lack of business acumen, such as the Static of 1923. The remaining thirty-five saw varying level of success, many, such as the Schwarz and the Adelphia, producing only one prototype or a few score of cars before quickly going out of business, while others, such as the Meteor and the Touraine, managed to produce hundreds of cars.¹⁰

Examining the locations of the thirty-five manufacturing plants on Google Maps it becomes clear that only two still stand. One, the Touraine Motor Company's building at 2532-2534 North Broad Street, is described as an "auto-service building" in the April 28, 1914 *Inquirer*, implying that the Touraine manufacturing plant was located elsewhere. This leaves the other, the Fox Motor Car Company at 721 West Grange Street, as the only automobile factory building extant in Philadelphia.¹¹

The Fox Motor Car Company

Ansley H. Fox was born in Decatur, Georgia in 1875 and moved with his family to Baltimore while still a baby. (Figure 16) He filed his first patent—for a shotgun—in 1893, and followed it with several others in

subsequent years, including one for an automotive brake in 1896. In 1897 he founded his first shotgun manufacturer, the National Arms Company, which he quickly sold to investors in 1898. He used the proceeds to found the Fox Gun Company, which he ran until 1900, at which point he devoted himself to competitive, professional trap shooting. Tiring of this he returned to manufacturing with new patents, and founded a third gun company, and then quickly a fourth. In the words of his biographer, "Ansley Fox may well have been one of those gifted people who can throw off brilliant ideas like sparks from a grinding wheel but who quickly grow bored with the day-today business of nurturing the results."¹²

The A. H. Fox Gun Company designed and manufactured of a series of expensive, high-quality, double-barrel shotguns that were considered sophisticated and reliable. Owners at the time included former President Theodore Roosevelt, who wrote to Fox saying, "The double-barrel shotgun has come and I really think it is most beautiful gun I have ever seen."¹³ Fox offered



Figure 16 Ansley H. Fox, undated, probably around 1900. (Source: A.H. Fox, the Finest Gun in the World)

the guns in grades ranging from A to F with prices ranging from \$50 for the A, to \$500 for F at a time when a utility shotgun could be purchased for between \$10 and \$20. Collectors today prize them, and for a modest fee can learn their gun's history from the original factory records.¹⁴

The high-end shotgun market was apparently not as remunerative as Fox hoped and after reorganizing in 1908, the company went into receivership in 1912 and he was forced out. Fox appears to have turned

his attention back to automobiles almost immediately, developing a shock-absorber (patent filed in December 1913, granted August 1915) and a vehicle spring (filing date unknown, granted August 1914), followed by another shock absorber patent which was granted in February 1916. By this time, World War I was in full swing, and American industry was gearing up to support it. After initially founding the Fox Pneumatic Shock Absorber Company, he converted it into the Fox Motor Company in 1917, pivoting into manufacturing precision machine parts.¹⁵

In a letter describing Fox's wartime work, the commander of the Frankford Arsenal in Philadelphia wrote that "the work that they did for us required a very high degree of mechanical skill, the dimensions frequently being as close as 1/10,000 of an inch." Given the general quality of suppliers, the Arsenal was very pleased to have found Fox as a supplier. "Their deliveries were prompt, the percentage of rejections was almost nil, considerably lower than any of their competitors, and we cannot speak too highly of their fair and honorable business dealings."¹⁶

Shortly after the war ended Fox registered The Fox Motor Car Company (FMCC) in Delaware with the intention of producing an air-cooled luxury car. FMCC adopted an unusual approach to raising money— direct mail. It sent out letters touting the company, accompanied by postcards that the recipient could return in order to receive more information. After describing the car in glowing terms in which air cooling featured prominently, the letters offered the recipient the opportunity to become one of only 2,000 owners of the company, for a mere \$500. It is not clear where FMCC got the addresses, but since existing material went to individuals in places such as Kalispell, Montana and LaCenter, Washington, it seems safe to assume that they were sent widely across the United States.¹⁷

The postcard included illustrations to support the letter's glowing prose. Two cards were obtained from the archives of the Simeone Foundation Automotive Museum, and while of later vintage, provide an idea of its content. The earlier one has an illustration of an automobile on one side and a photograph of "the first unit of our new plant" in Philadelphia on the other, dating it after May 1921. (Figures 17 and 18) The later one has a photograph of the automobile with Fox at the wheel, and a similar photo of the factory, with the description expanded to include "which we own clear of all debt or mortgage." (Figures 19 and 20) In both cases, the factory was presented along with the car as an indicator of the company's progress and solidity.¹⁸





Figure 18 Post card 1, rear. (Source: Simeone Foundation Automotive Museum)



"PRESS "-Pittsburgh ", . . In it have been combined the demanded lines and ample power of water-cooled cars-with the admitted economies and absence of freezing and overheating troubles of the air-cooled car."

"INQUIRER "--Philadelphia "It is a fact that the Por car created more interest and has attracted larger crowds than any other car shown in either the Philadelphia or New York shows."

"TRIBUNE" Minneapolis "DAILY JOURNAL "-Chicago" "Four Fox cars have been busy demonstrating all week, and motorists who have ridden in them say they are equal in power is automized world with its attractive aircooled car, embodying a multitude of features that stamp it as a wonder car in its class."

"TELEGRAPH "-- New York "Tremendous crowds have been around the Fox exhibits day and night, and no car has altracted more genuine interest or admi-ration at the 1922 show."

FOX MOTOR CAR COMPANY, Manufacturers, PHILADELPHIA, PA.



Figure 20 Post card 2, rear. (Source: Simeone Foundation Automotive Museum)

Reflecting the economic boom, initial appeals were apparently successful and the company quickly gathered the money necessary to begin operations. The Philadelphia firm of Day and Zimmermann was engaged and by September 15, 1920 the Philadelphia *Builder's Guide* noted that preliminary plans were in progress for a factory of brick and reinforced concrete on the Philadelphia and Reading Railroad, "near Tabor street, Philadelphia." A week later, the *Builder's Guide* noted that the J. S. Rogers Company had been awarded the \$500,000 contract to build the factory and loading platform. By December 1920 FMCC had raised nearly \$1 million.¹⁹ (Figure 21)



Figure 21 Detail from the 1910 Bromley Atlas of the City of Philadelphia showing the future location of the FMCC factory. (Source: Greater Philadelphia GeoHistory Network)

Existing records do not specify why this property was selected, or if others were considered, but presumably after the amount of land available and the price, the primary requirement was easy access to a rail line, both for receiving raw materials and for shipping finished cars. North Philadelphia was growing rapidly, so availability of affordable workers housing and public transportation nearby may also have been a consideration.²⁰

Individuals who returned the post card received *A Book of Unusual Interest about the Automobile Industry*, a 44-page booklet that provided an overview of the automobile industry, explained that "The Demand For Air-Cooled Automobiles Is Practically Unlimited," described how the technologically advanced Fox car satisfied that demand, provided industry testimonials, and then explained how the company was organized, how investors would recoup their investment (and more!), and the investment process. As a bonus, investors qualified for a "DISCOUNT OF FIVE PER CENT" [sic] if they bought a car for themselves—with a limit of one car per investor.²¹

This was followed by a description of the FMCC plant, "One of the Most Modern Automobile Factories in the World." This began with a description of the city, "Philadelphia is one of the best locations for an automobile factory in the United States. It has a large and varied supply of skilled labor, and is splendidly located for shipping by either rail or water." Then the building itself, which "is a modern, fire-proof building, constructed of concrete and steel," which was "now being equipped with the most up-to-date machinery and tools for manufacturing automobiles in large quantities." There was also space for two additional, larger buildings as demand increased.²²

The building had been designed "by experienced automobile designers," and was "scientifically designed for the progressive plan of manufacture." The prose helpfully explained that "raw materials will enter by our own private railroad siding at one end of the building, and then move progressively through the various departments and processes, until they come out the at the other end, completed and ready for shipment."²³

The factory would be equipped with "the most modern automatic machinery and labor-saving devices," and as a result, "working conditions will be healthful, safe and pleasant." The entire operation was engineered to provide "the greatest encouragement to loyalty, co-operation and efficiency." Mindful of the FMCC's status as a startup, employees would receive "bonuses of both stock and cash," enabling them to "share in the profits and management of the business, in such manner as cannot fail to assure the Company of their best efforts."²⁴

Seven months later, on May 3, 1921, the *Evening Public Ledger* published the photograph from the second postcard under the headline "The New Building of The Fox Motor Car Company," accompanied by a description that repeated the promotional prose above with a few additional items. There was now the option for a fourth floor to be added, an "up-to-date sprinkler system supplied from a 50,000 gal. tank on a tower above the roof," and a description of the loading dock. This was now on the side of the building, "designed so that ten freight cars can be handled at one time...elevated so as to connect with the second floor of the building." (Figure 22) Interestingly, this description, too, stressed the employment plan, "which provides maximum accommodation, protection, and reward for the employees, and the combination will result in a plant which will be second to none in efficiency of operation and the high grade of the finished product."²⁵



Figure 22 West elevation of FMCC factory from 1924 Receivers' Sale book, showing loading dock. (Source: Simeone Foundation Automotive Museum)

Photographs of the interior of the factory, contained in the auctioneer's booklet following bankruptcy, show well-lit, clean spaces containing large machines operated by neatly dressed men. (Figure 23) A September 30, 1921 balance sheet included with a stockholders' report valued "Real Estate and Buildings" at \$450,000, "Machinery, Tools and Plant Equipment" at \$105,000, "Motors, Power Transmission and Electrical Equipment" at \$27,000, and "Office Furniture and Miscellaneous Effects" at \$12,000. Setting up a modern automobile factory was not cheap.²⁶



Figure 23 Machine shop of FMCC factory from 1924 Receivers' Sale book. (Source: Simeone Foundation Automotive Museum)

Heralded by an announcement from Fox, the plant had started operations on March 1, 1921, intending to have cars ready to sell by autumn. Cars are more complicated than shotguns, however, and difficulties immediately arose. As was frequently done during this period, Fox had opted to manufacture only the engine, transmission and chassis, while purchasing the remaining components from external suppliers in order to limit design and development costs. The most significant of these were the bodies, with aluminum panels, which were manufactured by Derham and Fleetwood.²⁷

The heart of the car was the innovative air-cooled engine designed by Fox, possibly with collaboration of Harry Stutz of the Stutz Motor Car Company. In 1919, all automobile brands sold except one were water-cooled. Water-cooling had its disadvantages—inefficiency, freezing up in the cold, over-heating in the summer, balky handling when started, and low fuel efficiency—but it was also well understood and widely adopted. In comparison, the Fox engine promised more power, better fuel efficiency, and easier maintenance (150 fewer parts), due to a combination of the "revolutionary" air-cooling system, and a high-end design incorporating overhead cams and valves.²⁸ (Figure 24)



Figure 24 Illustration showing water cooling parts unneeded by the Fox air cooled auto. (Source: A Book of Unusual Interest)

According to the Fox promotional literature, Fox's engine had several innovative features which its aircooled "competitors" (actually, only one car, the Franklin) lacked. While the Franklin placed the fan at the rear of the engine, the Fox placed it at the front. (Figures 25 and 26) This, according to Fox, meant that the fan was moving cooler air, which made it more efficient. The fan forced the air through an aluminum air jacket to the cylinders. While the Franklin had sheet steel fins set in the cylinder wall when it was cast, the Fox had fins milled from solid blocks of aluminum, improving strength, heat conduction, and resistance to warping. Detachable cylinder head enabled easy cleaning (gasoline in the 1920s was of very poor quality compared to today), and a "bell-shaped enlargement" at the top of the cylinder allowed use of exhaust valves 60% larger than the Franklin.²⁹



Figure 25 The aluminum Fox air-cooled engine. (Source: The Finest Car in the World, promotional piece, Simeone Foundation Automotive Museum)



Figure 26 Illustration of Fox air-cooling system. (Source: The Finest Car in the World, promotional piece, Simeone Foundation Automotive Museum)

The resulting engine produced 50 horsepower, double that of the Franklin engine, which coupled with light-weight aluminum bodies provided exceptional performance. Unfortunately for Fox, it required FMCC to cast a massive aluminum block assembly, which proved more complicated than anticipated. In the words of a former employee, the casting department had to pour "a boat-load of castings" before they were finally able to cast a useable one.³⁰

As if the challenges of casting the engine block weren't enough, according to a report to stockholders covering the months of April and May 1921, a nationwide printers' strike at the beginning of May had delayed the printing of the second edition of the *Books of Unusual Interest*, preventing the company from responding to post cards and raising more money. Although the strike dragged on through the summer, the books were received after a month's delay and were sent out, and the company expected the inflow of money to resume. The financial health of the company was sound, said a stockholders' report. "The building has been completely paid for and all other bills have been met promptly." ³¹

The company issued a new forecast, saying that "We now expect to be able to manufacture a limited number of Fox Cars this year and to be in full production early in the coming year." ³² In the meantime the company would work on setting up a network of dealers and begin advertising. ³³

The first car was finally ready to test on the streets of Center City in September. According to Fox, it was very well received:

Frankly, we do not believe any other new car ever excited as much genuine interest and admiration. When it was stopped on the streets in the center of the City, crowds of admiring spectators would voluntarily stop to look at the car until the pavements were actually blocked, and in one instance the traffic policeman requested us to move the car so the crowds would not obstruct the street.³⁴

The report went on to describe the car in great detail—not only the air-cooled engine, but also the "long low hung body," the instrument board of "handsome Circassian walnut," and the six nickel-plated rods decorating the rear of the car. The report closed by saying that FMCC was building open and closed cars to take to automobile shows—certainly a sign of impending mass production.³⁵

The show cars were completed and displayed at shows in Philadelphia, New York, Boston, Chicago, Atlanta, and Utica. Fox offered three models, a five passenger touring car (open bodied), a three passenger coupe (closed body), and a five passenger sedan (closed body), priced at \$3,900, 4,900, and \$4,900 respectively. With a Ford Model T going for \$360 before the war, this pricing placed the Fox firmly in luxury car category, comparable to the newly introduced Duesenberg and to custom-bodied cars. Press coverage was favorable, although some of the text in the articles seems quite similar to the company's promotional literature.³⁶

However confident Fox might about the company's future, this view was not shared by others. As an example, in the *New York Tribune's* "Investment Information" column in November, the response to a question from a reader who was considering investing was pessimistic: "The stock of the Fox Motor Car Company is not an investment at all, but a simon-pure speculation, and, in view of the condition of some of the established car companies, we do not think it a very attractive one. We certainly cannot advise its purchase at this time."³⁷ Unfortunately, no list of investors has survived which would allow us to see if the reader took this advice.

The company struggled to take advantage of the momentum it gained at the shows. Stockholders were offered the opportunity to test drive the cars, reassuring them about their quality and creating a base of experienced drivers, and the Board approved the moved to full production in April 1922. By November, however, production had just started "on a comparatively small basis." 38 Ominously, adjacent to a glowing report about the Fox cars' appearance at the Philadelphia and New York auto shows, the January 22, 1922 issue of the *Inquirer* printed an article entitled, "Economy Wave Sweeps Through Auto World." In it, Harry Jewitt, president of a competing luxury brand, the Paige-Detroit Motor Car Company, opined, "We have just passed through two distinct and totally different periods, one of high prices, over-prosperity and reckless spending, and one of extreme depression, the latter the natural result of the other. With the return of the buying habit and the ability to buy, which we look for this year, there will be no reckless purchasing of motor cars."³⁹ He went on to say that in response, Paige-Detroit had improved its cars for 1922, and was also reducing their price.⁴⁰

By the beginning of 1923, Fox had enough cars produced to begin selling, but as Jewitt had foreseen demand was soft, despite a decision to reduce prices on all three models by \$925 (24% on the touring car, 19% of the coupe and sedan). (Figure 27) In a January 1923 stockholders' report Fox wrote, "We are now at a turning point in our business, and whatever we do will probably determine definitely whether this company shall be a big



Figure 27 Detail from 1923 sales pamphlet showing models and reduced prices. (Source: Simeone Foundation Automotive Museum)

success that we all hoped for, or whether it shall fail."⁴¹ Most creditors had been paid, but FMCC owed the two companies that supplied the car bodies \$166,000. Fleetwood extended the terms, Derham did not, and then both stopped supplying bodies. The production line soon shut down.⁴²

After estimating that the company would need an additional \$500,000 to resume production, FMCC issued a bond for \$1 million in March. Interest was scant, and after creditors petitioned to have company declared bankrupt in October, the courts did so on November 5, 1923. Receivers hoped briefly to restructure and resume production, but they were not successful, and in March 1924 the factory and its contents were sold at auction. Interestingly, Fox chartered the Fox Holding Company, on April 5, 1924, and used this entity to purchase all of the FMCC patents.⁴³



Figure 28 The surviving Fox Motor Car. (Source: Kidd)

Lacking factory production documentation, the total number of Fox cars manufactured is subject to some speculation. According to one author's interviews with two former employees, only 24 cars were produced—17 touring cars six sedans, and one coupe. Kimes and Clark discount estimates of 3,000 cars, and while acknowledging the 24-car figure, conclude that "certainly no more than 500-800 cars were

built, under the rosiest scenario."⁴⁴ Whatever the truth, only one has survived, a 1923 sedan, with body by Derham, currently located in Zionsville, Pa. (Figure 28) Ansley Fox's decision to launch a luxury car with an innovative design might have worked if the post-war economic boom had continued, but excessively high development and production costs for a product aimed at a tiny market segment, plus a national depression doomed it to failure.⁴⁵

FMCC was not alone in its troubles. By 1929, the Big Three—General Motors and Chrysler had joined Ford at the top of the industry—produced three-quarters of the automobiles sold in the United States. 108 manufacturers had begun the decade, but only 44 remained, and the Great Depression would soon eliminate many of them.⁴⁶

Thomas M. Royal & Co., Honeywell Industries, and Subsequent Owners

On June 27, 1924, the receivers completed the sale of the factory, which had cost \$500,000 to build, to the Thomas M. Royal & Co. for \$285,000. Royal and his partner, Benjamin C. Betner, had started in the paper manufacturing and printing business at the beginning of the century,



Figure 29 Thomas M. Royal. (Source: The Tea and Coffee Trade Journal)

making products such as manila wrapping paper and paper bags. At that time, it was only possible to make bags with printed surfaces by gluing printed pages on to plain bags. Royal's partner discovered that a German company had invented a machine that printed directly on bags, went to Germany, located the company, and purchased several machines. Armed with this technology, Thomas M. Royal & Co. quickly became a major supplier of paper bags in the United States.⁴⁷

Royal's company rapidly outgrew its first plant on Cherry Street, and moved to a larger building in Bryn Mawr (ironically, the former factory of the Pennsylvania Auto-Motor Company) in 1913. By 1924 this building, described as a 56,000 square foot "modern brick, glass and concrete factory," "200 yards from Bryn Mawr station," with a "three car siding to the Pennsylvania Railroad"⁴⁸ had grown too small. The Fox Motor Car Company plant, with its ten-car loading dock and 96,000 square feet of floor space fit the bill. An article in the October 30, 1924 issue of *Paper Trade Journal* describing the purchase said that Royal had begun to transfer existing machinery to the new building, had purchased additional new machinery for the production of printed papers bags, and had agreed to become the U. S. distributor for bags manufactured by a British company.⁴⁹



Figure 30 "New Plant of Thomas M. Royal & Co." 1924. (Source: Paper Trade Journal)

The article described Royal as "one of the largest bag concerns in this State, producing all grades and types of bags including glassine, confectioners, grocers, flour and others, from the smallest to the largest sizes."⁵⁰ While company headquarters were in Philadelphia, the company established a sales office in New York City, and a plant in Toronto. Much of its sales seem to have been in specialty fields, where Royal received a patent for a process to manufacture paper bags coated with "wax, paraffin, and other like substances" in 1930.⁵¹ An example of this is coffee, where Royal ran frequent advertisements in *The Tea and Coffee Trade Journal*, and had a booth at the annual coffee trade show. Both Royal and Betner attended the 1922 meeting in New Orleans, where Royal was described as "the popular paper-bag manufacturer, [who] is always welcome wherever coffee men meet."⁵² Many of the articles and advertisements in the *Journal* focus on freshness, and Royal's multilayer bags were apparently among

the best, requiring Royal "to operate his plant night and day to keep up with the demand for containers." ⁵³

The Thomas M. Royal & Co. continued to occupy the Fox Motor Car Company factory for the next twenty-five years. By this time the company operations had expanded to include a manufacturing plant in Beaumont, Texas, as well as the re-opened plant in Bryn Mawr. Royal himself retired in 1945, at age 78, and after a short illness died in 1947. Three years later, while they were on vacation during contact renewal negotiations, the 500 employees were surprised to receive layoff notices by mail. The accompanying letter said that the company had operated at a loss for three years, "'met opposition and failure' in in its efforts to right the condition,"⁵⁴ and had no other option.55



Figure 31 Thomas M. Royal & Co. advertisement, 1922. (Source: The Tea and Coffee Trade Journal)

Despite efforts by the unions, Royal management closed the factory, and by December 1950 sold it to the Brown Instruments Division of Honeywell Industries—Brown's second expansion in less than two years. Like Royal, Brown manufactured unglamorous, but necessary products. To quote a Honeywell advertisement, these were "instruments that record, indicate, and/ or control temperatures, pressures, humidity, fluid flow, liquid level, moisture content, acidity—practically any variable element of production, research, design, testing and accounting functions."⁵⁶ Honeywell manufactured products in the Fox building until 1965 when, as part of American industry's flight to the suburbs, it consolidated its operations from four locations in the city to one large office park in Fort Washington. A faded Honeywell sign remains on the roof, facing commuters at the Fern Rock Transportation Center.⁵⁷ (Figure 32)



Figure 32 Honeywell sign on roof of 721 West Grange Avenue. (Source: Author)

The Honeywell move was only one of many, resulting in the "cratering" of Philadelphia's industrial economy—"threatening to steal jobs, attack the tax base, and make crushing additions to the city's unwanted inventory of decaying buildings."⁵⁸ In response, city government established the Philadelphia Industrial Development Corporation (PIDC) in partnership with the Greater Philadelphia Chamber of Commerce. PIDC's objective was clear, to "keep as much industry as possible in Philadelphia."⁵⁹

PIDC purchased the building from Honeywell and quickly filled it with swimwear manufacturer, M&M Knitting Mills, which entered into a twenty-year installment purchase plan. In 1977, however, PIDC sold the building to the Philadelphia Authority for Industrial Development (PAID), so that entity could enter into an installment sales plan with three brothers, Edmund, Larry, and Herman Dunn. The Dunns immediately leased the building, keeping the first floor for their own company, Mutual Industries Inc., while a company named Flossie Inc., occupied the basement, Myer Manufacturing the second floor, and Stanton Berger the third. By 1991, Mutual Industries had grown enough to occupy the entire building, and Edmund Dunn purchased it outright from PAID. Mutual continues to occupy the building today, a PIDC success story.⁶⁰

Criterion D

Satisfying Criterion D, the building at 721 West Grange Avenue embodies distinguishing characteristics of an architectural style or engineering specimen, C.A.P. Turner's flat-slab, or, as it was better known, the "mushroom system" factory building, which combining poured concrete with steel reinforcement to produce well-lit, fireproof buildings with abundant floor space.

As the United States became more industrialized following the Civil War, new demands were placed on factories. In addition to providing space for machinery and workers, factories needed to be well-lit so workers could see, and strong enough to support the weight of machinery and materials and resist the vibrations that they produced. Factories also needed to be safe, which meant fire-resistant, if not actually fireproof. By the late 1800s, the construction limitations imposed by making walls and floors from brick and wood were being overcome by use of metal, initially cast and wrought iron frames, later replaced by riveted and then welded steel, and by steel-framed windows. These enabled the construction of buildings with large interior spaces, and walls that were mostly glass. Fire-resistance, however, remained a concern.⁶¹

In the 1890s builders began to answer this concern by combining poured concrete, which had come to dominate the construction of floors and foundations because of its fireproof characteristics, with steel reinforcement. Various systems were developed as reinforced concrete construction moved from experimental to accepted. In 1905 C.A.P. Turner invented the flat-slab, or, as it was better known, the "mushroom system" design, due to its unmistakable profile (Figures 33, 34). As one article describes it, "The economic advantages of flat-slab floors were real and compelling: form work was minimized, floor-framing depths were reduced, and lighting and finishing were simplified." ⁶² As Turner himself noted, in addition to the visual similarity to the mushroom, "Another fancied resemblance is the rapidity of erection, comparable to the over-night growth of the mushroom. Here the resemblance ceases, since the construction, once erected, is enduring and permanent."⁶³ By 1910 flat-slab, "mushroom system" concrete buildings had become the modern standard.⁶⁴



Figure 33 Example of C.A.P. Turner's "Mushroom System" (with drop panels above the column heads) at the Union Switch & Signal Co. in Swissvale, PA. (Source: Bradley)



Figure 34 Mushroom slab load test, 1912. (Source: Eddy and Turner)

As the adoption of flat-slab construction moved the weight-bearing function of the building from its external walls to internal pillars, window technology advanced as well. Wooden, double hung windows, which were limited in size by their materials and provided no resistance to fire, were replaced by a variety of steel framed windows and wire glass. The greater strength of steel meant that much more of

the exterior walls—50% to 80%—could be glass, providing much more illumination inside. And wires embedded in that glass meant that it would not shatter in case of fire, diminishing air flow to the fire.⁶⁵

The Fox Motor Car Company positioned itself as an ultra-modern concern which used cutting-edge technology to manufacture a revolutionary product. Rather than go against that image by occupying an existing building, Fox engaged the Philadelphia engineering firm of Day and Zimmermann to design and build a new one. Reinforcing the marketing positioning of the car, Fox promotional materials described this factory as "one of the most up-to-date plants in the country,"⁶⁶ and "One of the Most Modern Automobile Factories in the World."⁶⁷

Day and Zimmermann embraced modern technology fully in their design of the FMCC building. Walls are modular, with each module filled with a low band of brick which supports six windows: two pairs of 5x3 pane windows adjacent to the pillars and one pair of 4x3 pane windows in the center. Glass accounts for approximately 65% of the wall surface, 80% of each module if pillars and slab are not included. Window frames are of metal, providing fire-resistance while minimizing light obstruction.⁶⁸

Inside, mushroom columns support high ceilings, providing light, air circulation, space for machinery, and a layout that enabled cars to be moved from station to station as they were manufactured. (Figure 34) As noted above, text in FMCC shareholder reports describe materials arriving on the loading dock and progressing through the factory until emerging fully assembled. Several interior photos show windows opened to improve circulation, and interestingly it appears that only the central part of each window were hinged. (Figures 35, 36, 37)



Figure 35 Interior of FMCC factory showing "Mushroom System" with drop panels above the column heads. (Source: 1924 Receivers' Sale Book, Simeone Foundation Automotive Museum)



Figure 36 Machine shop of FMCC factory showing windows and column heads along exterior walls. (Source: 1924 Receivers' Sale Book, Simeone Foundation Automotive Museum)



Figure 37 Interior of FMCC factory showing windows, with radiators lining the interior of the spandrel. (Source: 1924 Receivers' Sale Book, Simeone Foundation Automotive Museum)

Conclusion

The building at 721 West Grange Avenue satisfies Criteria A, D, and J. Of 35 factories built by Philadelphia's 51 automobile companies during the industry's growth phase, the Fox Motor Car Company's factory is one of the very few, if not the only one, which remains as a reminder of Philadelphia's three-decade history of speculative automotive ventures. The history of the building after the Fox Motor Car Company exemplifies the changing industrial character of the city during the 20th century. Moving from housing an exotic start-up to prosaic manufacturers of paper bags and industrial controls, the building was rescued from vacancy by a city-owned agency and today contains a light industrial company with a 30 year history. And finally, Day and Zimmermann's design exemplifies the mushroom column factory system introduced by C.A.P. Turner earlier in the century.

Appendix A Chain of Title: 721 W Grange Ave.

1 October 1909, George Fox et ux, et al to Harry Schmidt

Property: portion of a large farm previously owned by Fox's mother, Mary (deceased) Price: \$199,989

Source: Deed Book WSV No. 1221, p. 77 and following

Note: George was one of several Fox children who shared ownership of the farm. There may be some relation between one of them, Joseph M., who was from Loudon County, Virginia, and Addison Fox, Ansley's father, who was born in Leesburg, Loudon County, Virginia, but this has not been established, and may be coincidence.⁶⁹

22 May 1920, Harry Schmidt et ux to Fox Motor Car Company of Philadelphia

Property: portion of the above in the shape of a right trapezoid bounded by 7th Avenue, West Grange St, the North Pennsylvania Railroad, and a line parallel to and south of Nedro Ave. Price: \$1 Source: Deed Book IMH No. 829, p. 31 and following

Source: Deed Book JMH No. 829, p. 31 and following

27 June 1924, Charles A. Rockey et al, Receivers, and Fox Motor Car Company of Philadelphia to Thomas M. Royal and Company

Property: as above with buildings and improvements Price: \$285,000 Source: Deed Book JMH No. 1856, p. 571 and following

15 December 1950, Thomas M. Royal and Company to Honeywell Inc.

Property: deed is illegible. The 1942 Philadelphia Land Use Map shows the 120 feet deep piece of the property facing 7th Street has been separated from the property and divided into lots for residential housing. A second lot trapezoidal lot to the south, between Chew St, the railroad and Grange St. has been added.

Price: deed is illegible Source: Deed Book CJP No. 2884, p. 317 and following

16 August 1965, Honeywell Inc. to Philadelphia Industrial Development Corporation

Property: as above Price: \$465,000 Source: Deed Book CAD No. 547, p. 394 and following

11 May 1977, Philadelphia Industrial Development Corporation to Philadelphia Authority for Industrial Development

Property: as above Price: \$250,000 Source: Deed Book DCC No. 1335, p. 542 and following

17 May 1981, Philadelphia Authority for Industrial Development to Edmund Dunn

Property: as above Price: \$1 Source: Deed Book EFP No. 1884, p. 464 and following

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Name	Year Begun	Year Ended	Factory/ Production?	Manufacturer	Address	Factory Building Still Standing?	Production Run	Notes
Evans Steam Amphibian	1805	1805	No			No	1	steam dredge to clean city docks; fitted with wheels
nosnhol	1828	1828	No				1	steam carriage, accident at Brown and Oak
Pyott Steam	1876	1876	N				1	manufactured by three foreman at the Baldwin Locomotive works and displayed at the Centennial Exposition
Praull	1895	1895	No				1	powered by rotary engine
Lengert	1896	1896	N					licensed to assemble and sell the Barrows Electric; no record of having done so
Kelsey	1897	1902	No	Cadwallader "Carl" Washburn Kelsey			4	prototype is in the Smithsonian Museum
Kennedy Electric	1898	1903	No				small numbers	

Appendix B Philadelphia Automobile Manufacturers

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Pocock	1899	1899	°Z				prototype?	electric car design sold to Electric Power Development Company
Roach	1899	1899	No				1	
Schwarz	1899	1900	Yes	Schwarz Automobile & Carriage Company	317 N. Broad St.	No	"minimal"	
Fulton & Walker	1899	1901	No		20th and Filbert*	NO		wagon manufacturer w/prototype autos
Hunter Electric	1899	1903	No					
Konollman	1900	1900	No					
Imperial	1900	1901	Yes	Philadelphia Motor Vehicle Company	204 N. Broad	No	a "big batch"	
Standard	1900	1901	oZ	Standard Motor Vehicle Company	Camden		small	incorporated in Philadelphia, subsequently moved to Camden
Searchmont (ex-Keystone)	1900	1903	Yes	Searchmont Motor Company			hundreds	cars sold at Wanamaker Department Stores after bankruptcy
Thomson	1900	1903	Yes	Thomson Automobile Company of Philadelphia	2132 Market St.	No	hundreds?	
Wall	1900	1903	Yes	R.C. Wall Manufacturing Company	1334 Race St.	No		

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Parkin	1903	1908	No	Oxford Manufacturing Company				race cars
Chadwick	1904	1916	Yes	Fairmount Engineering Works	2652 Callowhill St.*	N	307	
La Roche	1905	1905	No					
Wilmot	1906	1906	No					
Autocycle	1906	1907	Yes	Vandegrift Automobile Company	13th and Cumberland	oN	very few	https://libwww.fre elibrary.org/digital /item/29346
Dragon	1906	1908	Yes	The Dragon Automobile Company	J. G. Brill Company Factory	No	hundreds	
Carroll	1908	1908	N					engine run on carbonic acid, installed in Oldsmobile test car
Remington Dart	1909	1910	Yes	Remington Automobile Company	1351-53 Ridge Ave. (office?)	د.	very few	
Standard GE	1909	1910	Yes	Standard Gas Electric Power Company				
Kendel	1910	1911	No					
Otto	1910	1912	Yes	The Otto Gas Engine Works	33d and Walnut*	No	hundreds	
Bergdoll (Erwin)	1910	1913	Yes	Louis J. Bergdoll Motor Company	16th and Callowhill	No		roadster model named "Louis J"
W.F.S.	1911	1912	Yes	W.F.S. Motor Car Company	4224 Ludlow St.*	No	hundreds?	

Touraine (ex- Nance)	1912	1916	Yes	Touraine Motor Company	2532-2534 North Broad*	Yes?	sustained production	continued to produce trucks under the Vim brand until 1923
Baker-Bell (Hummingbird)	1913	1913	Yes	Baker-Bell Motor Company	665-9 N. Broad St.*	0 N		
Victor	1913	1913	Yes	Victor Motor Car Company	271 Diamond St.	Q	hundreds?	
Albertson	1913	1913	No					
Bigelow	1913	1913	N	Bigelow-Willey Motor Company			not documente d	"to buy, sell and deal in and with electric vehicles of all kinds"
Allen	1914	1914	Yes	Allen Iron & Steel Co.	3d and Venango	No	very few	
Automobile Construction	1914	1914	Yes	Automobile Construction and Engineering Co.	3322 Ludlow St*	0 Z	very few	sold in parts for dealer to assemble and badge
Carlson- Westrom	1914	1914	Yes	Carlson-Westrom Manufacturing Company, Inc.	Richmond and Erie		Ч	cyclecar
Duryea	1914	1915	Yes		Cresson-Morris	Q	very few	one of seven com- panies in various cities founded by Duryea between 1893 and 1917
S.S.E.	1914	1917	Yes	S.S.E. Company	B St and Erie Ave	No	1	
Bartlett	1915	1915	No					

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Peters-Walton/ Peters Tricar	1915	1916	Yes	Ludlow Auto Engineering Company	3435 Ludlow St.*	N		
Biddle	1915	1922	Yes	Biddle Motor Car Company	Germantown and Sedgley Ave.*	۰.	ca. 1750	
Rush	1916	1918	Yes	Rush Motor Truck Company	1007 North Front St*	No		
Renno-Leslie	1917	1917	No					
Automotive	1918	1918	No	The Automotive Company of Philadelphia				
Meteor	1919	1922	Yes	Meteor Motors Inc.	36th and Lancaster	No	hundreds	
Adelphia	1920	1920	Yes	Winfield Barnes Company of Philadelphia	20th and Eire*	oN	very few	for export only
Fox	1921	1923	Yes	Fox Motor Car Company	721 W Grange St.	Yes	25?	
Frankford	1922	1922	No	Frankford Motors Company of Philadelphia			prototype	
Land Yacht/ Schermerhorn	1922	1922	No	custom made for Dale Fitler		No	1	
Corinthian	1922	1923	Yes	Corinthian Motors, Inc.	2035 Washington Ave.*	No	very few	
Static	1923	1923	No	Static Motor Company of Philadelphia			0	
Asprooth-Leoni Electric	1926	1927	No				prototype	

	purchased by Moon Motor Car Company, St. Louis
prototype	prototype
No	
Mitten Management	
No	ON
1928	1929
1928	1929
Gas-Electric	Muller (Ruxton)

Source: Kimes and Clark, supplemented where necessary by search of the *Philadelphia Inquirer* for address of the Manufacturer; noted with an asterisk.

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⁴ David Allen Hounshell, *From the American System to Mass Production: The Development of Manufacturing Technology in the United States, 1850-1920* (Baltimore: The Johns Hopkins University Press, 1984), 223–25; Nicholson, *The Antique Car, 1919-1930.*, 24–28.

⁵ T. R. Nicholson, *The Antique Car, 1919-1930.* (Cambridge, Mass.: Robert Bentley, Inc., 1966), 29–37; Alan K. Binder, "Automotive Industry - History," Encyclopedia Britannica, accessed January 27, 2021,

https://www.britannica.com/technology/automotive-industry; Investopedia Staff, "Industry Life Cycle Definition," Investopedia, accessed December 28, 2020, https://www.investopedia.com/terms/i/industrylifecycle.asp. "Growth Phase: Consumers in the new industry have come to understand the value of the new offering, and demand grows rapidly. A handful of important players usually become apparent, and they compete to establish a share of the new market. Immediate profits usually are not a top priority as companies spend on research and development or marketing. Business processes are improved, and geographical expansion is common. Once the new product has demonstrated viability, larger companies in adjacent industries tend to enter the market through acquisitions or internal development."

⁶ Beverly Rae Kimes and Henry Austin Clark, *Standard Catalogue of American Cars 1805-1942*, 3d ed. (Iola, WI: Krause Publications, Inc., 1996).

⁷ James Grant, *The Forgotten Depression: 1921: The Crash That Cured Itself* (New York: Simon and Schuster Paperbacks, 2014), 15.

⁸ Grant, 13–21, 72–91, 192–201.

⁹ Kimes and Clark, *Standard Catalogue of American Cars* 1805-1942, 552, 785, 1610.

¹⁰ See Appendix

¹¹ Analysis of companies listed in Kimes and Clark as having Philadelphia addresses, supplemented by period newspaper search to identify addresses not listed, followed by Google Maps examination of building exteriors. The building at 2532-2534 North Broad Street occupied by the Touraine Motor Company is still standing, but is described in *The Philadelphia Inquirer* as "auto service building" rather than factory. "1916 Spruce St. Sold to Physician," *Philadelphia Inquirer*, Apr 28, 1914, 16.

¹² Michael McIntosh, *A. H. Fox - The Finest Gun in the World* (Lanham, MD: The Derrydale Press, 2016), 21– 73. Quotation p. 34.

¹³ Dave Campbell, "A Look Back at the A.H. Fox Shotguns," American Rifleman, April 13, 2017,

https://www.americanrifleman.org/articles/2017/4/13/a-look-back-at-the-ah-fox-shotguns/.

¹⁴ Campbell; McIntosh, A. H. Fox - The Finest Gun in the World, 100, 338, 379.

¹⁵ McIntosh, 77, 84–86, 95, 127–28, 135, 191–96.

¹⁶ McIntosh, 197.

¹⁷ McIntosh, 200--201. McIntosh reproduces the entire contents of a letter from December 1920. Kalispell, MT is cited in McIntosh; LaCenter, WA is a follow-up letter owned by the author.

¹⁸ "Post Card 1" (Fox Motor Car Company, n.d.), Archives, Simeone Foundation Automotive Museum; "Post Card 2" (Fox Motor Car Company, n.d.), Archives, Simeone Foundation Automotive Museum; "Fox Air-Cooled Car," *Pittsburgh Post-Gazette*, March 19, 1922. The Pittsburgh Post-Gazette contains the same photo as Post Card 2, with the caption identifying Fox as the driver.

¹⁹ McIntosh, 200; "Advance Construction News," *Philadelphia Real Estate Record and Builders' Guide*, September 15, 1920; "Contracts Awarded," *Philadelphia Real Estate Record and Builders' Guide*, September 22, 1920.
 ²⁰ See also Chain of Title.

²¹ "A Book of Unusual Interest about the Automobile Industry" (Fox Motor Car Company, 1921), 1–33.

²² "A Book of Unusual Interest about the Automobile Industry," 34.

²³ "A Book of Unusual Interest about the Automobile Industry," 34.

²⁴ "A Book of Unusual Interest about the Automobile Industry," 35.

²⁵ "The New Building of The Fox Motor Car Company."

¹ "The New Building of The Fox Motor Car Company," *Evening Public Ledger*, May 3, 1921.

² T. R. Nicholson, *The Antique Car, 1919-1930.* (Cambridge, Mass.: Robert Bentley, Inc., 1966), 21–23.

³ Bruce Edsall Seely, *Building the American Highway System: Engineers as Policy Makers* (Philadelphia, PA: Temple University Press, 1987), 66–74.

²⁶ "Receiver's Sale - Modern Plant" (Samuel T Freeman & Co, Auctioneers, 1924), 12a, 16a, 20a, 24a, 28a, 32a, 36a, 40a, Archives. Simeone Foundation Automotive Museum; "Stockholders' Report - Covering Operations from August 1st to Sep 30th, 1921" (Fox Motor Car Company, September 30, 1921), 10, Archives, Simeone Foundation Automotive Museum.

²⁷ McIntosh, A. H. Fox - The Finest Gun in the World, 202–3; Thomas Kidd, "The Finest Car In The World," n.d., 2.
 ²⁸ Kidd, "The Finest Car In The World," 3; Nicholson, *The Antique Car, 1919-1930.*, 86; "A Book of Unusual Interest about the Automobile Industry," 13–14, 42.

²⁹ "The Beautiful, Powerful, Air-Cooled Fox (Sales Brochure)" (Fox Motor Car Company, 1923), 16–18, Archives, Simeone Foundation Automotive Museum.

³⁰ Kidd, "The Finest Car In The World"; McIntosh, A. H. Fox - The Finest Gun in the World, 202–3.

³¹ "Stockholders' Report - Covering Operations from April 1, 1921 to May 31, 1921" (Fox Motor Car Company, May 31, 1921), 2–3, Archives, Simeone Foundation Automotive Museum; "Printers On Strike Estimated at 8,000," *New York Times*, May 4, 1921, 5; "Pressmen to Ballot," *Philadelphia Inquirer*, July 12, 1921, 16.

³² "Stockholders' Report - Covering Operations from April 1, 1921 to May 31, 1921," 2.

³³ "Stockholders' Report - Covering Operations from April 1, 1921 to May 31, 1921," 2.

³⁴ "Stockholders' Report - Covering Operations from August 1st to Sep 30th, 1921," 2. McIntosh, Kidd, and Printz all state the first car was not ready until December, but since the Stockholders' Report for August 1 to September 30 describes the reaction of the public I have gone with the earlier date.

³⁵ "Stockholders' Report - Covering Operations from August 1st to Sep 30th, 1921," 2–9.

³⁶ "Fox-Air Cooled Car Attracts Much Attention," *Philadelphia Inquirer*, January 22, 1922; "Fox Air Cooled Is Well Built Car," *Boston Globe*, March 12, 1922; Kidd, "The Finest Car In The World."

³⁷ "Investment Information," New York Tribune, November 1, 1921.

³⁸ Larry Printz, "Investing in Tesla? History Suggests It Could Be a Bumpy Ride," *Hagerty Media* (blog), October 10, 2014, https://www.hagerty.com/media/news/investing-in-tesla/.

³⁹ "Economy Wave Sweeps Through Auto World," *Philadelphia Inquirer*, January 22, 1922.

⁴⁰ Printz, "Investing in Tesla?"; "Economy Wave Sweeps Through Auto World."

⁴¹ Printz, "Investing in Tesla?"

⁴² "The Beautiful, Powerful, Air-Cooled Fox (Sales Brochure)"; Printz, "Investing in Tesla?"

⁴³ Printz, "Investing in Tesla?"; "Plan Reorganization," *Philadelphia Inquirer*, November 7, 1923; "Receiver's Sale - Modern Plant"; McIntosh, *A. H. Fox - The Finest Gun in the World*, 209.

⁴⁴ Kimes and Clark, *Standard Catalogue of American Cars* 1805-1942, 603.

⁴⁵ Kidd, "The Finest Car In The World"; Kimes and Clark, *Standard Catalogue of American Cars 1805-1942*, 603.
 ⁴⁶ Binder, "Automotive Industry - History."

⁴⁷ "Deed - Fox to Royal," June 27, 1924, Archives, Philadelphia Department of Records; Herb Fry, "The Story of The Benjamin C. Betner Company and Its Origins and Successors," *Tredyffrin Easttown History Club Quarterly*, July 1993, 89.

⁴⁸ "Modern Manufacturing Plant in Bryn Mawr For Sale!," *Philadelphia Inquirer*, May 3, 1925.

⁴⁹ "Modern Manufacturing Plant in Bryn Mawr For Sale!"; Kimes and Clark, *Standard Catalogue of American Cars 1805-1942*, 1169; "Thomas M. Royal & Co. Move to New Plant," *Paper Trade Journal*, October 30, 1924.

⁵⁰ "Thomas M. Royal & Co. Move to New Plant."

⁵¹ Thomas M. Royal, Method of Making Paper Bags, USPO 1,782,884 (Philadelphia, PA, filed February 7, 1929, and issued November 30, 1930).

⁵² "Convention Sidelights," *The Tea and Coffee Trade Journal*, December 1922, 868.

⁵³ "Mainly About People," *The Tea and Coffee Trade Journal*, February 1922, 197; "The Coffee Convention Exhibits," *The Tea and Coffee Trade Journal*, December 1922, 905.

⁵⁴ "500 on Vacation Find Jobs Gone," *Philadelphia Inquirer*, August 4, 1950.

⁵⁵ "Thomas M. Royal Funeral Today," *Philadelphia Inquirer*, October 23, 1947, 12; "Paper Plant to Close," *New York Times*, August 4, 1950, sec. Business and Finance; Fry, "The Story of The Benjamin C. Betner Company and Its Origins and Successors," 95.

⁵⁶ "Industrial Society of America, Sarnia Section, Monthly Bulletin" (Industrial Society of America, Sarnia Section, September 1952), 9; "Financial Shorts," *Philadelphia Inquirer*, December 8, 1950; "Uptown Plant Sold," *Philadelphia Inquirer*, December 24, 1950.

⁵⁷ "PIDC Deal Set For Factory at 7th and Grange," *Philadelphia Inquirer*, July 9, 1965.

⁵⁸ 60 Years of Driving Growth to Every Corner of Philadelphia (Philadelphia, PA: Philadelphia Industrial Development Corporation, 2018), 10.

⁵⁹ 60 Years of Driving Growth to Every Corner of Philadelphia, 10.

⁶⁰ "PIDC Deal Set For Factory at 7th and Grange"; "Deed - Honeywell to PIDC," August 16, 1965, Archives,

Philadelphia Department of Records; "Deed - PIDC to PIAD," March 11, 1977, Archives, Philadelphia Department of Records; "Deed - PIAD to Dunn," May 17, 1991, Archives, Philadelphia Department of Records.

⁶¹ Betsy Hunter Bradley, *The Works - The Industrial Architecture of the United States* (New York, NY: Oxford University Press, 1999), 133–54.

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⁶³ Henry Eddy and Claude A. Turner, *Concrete -Steel Construction Part 1 - Buildings* (Minneapolis, 1914), 158.

⁶⁴ Bradley, *The Works - The Industrial Architecture of the United States*, 155–60; Gasparini, "Contributions of C. A. P. Turner to Development of Reinforced Concrete Flat Slabs 1905–1909," 1248.

⁶⁵ Bradley, *The Works - The Industrial Architecture of the United States*, 161–83.

⁶⁶ "The Finest Car in the World (Brochure)" (Fox Motor Car Company, January 10, 1923), 15.

⁶⁷ "A Book of Unusual Interest about the Automobile Industry," 33.

⁶⁸ Approximate measurement from the centers of the surrounding cement vertical pillar and slabs, and excluding the steel sashes.

⁶⁹ McIntosh, A. H. Fox - The Finest Gun in the World, 25.

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