

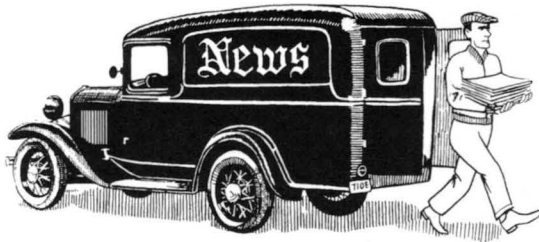
SAH JOURNAL

The Newsletter of the Society of Automotive Historians, Inc.

July-August 1999

Issue Number 181

STUDENT PAPER AWARD



ANOTHER MODEL BITES THE DUST

Oldsmobile, the oldest brand of automobiles in the United States, has closed another chapter in its history. Last December, the final Eight-Eight, at that point the longest-running nameplate in continuous use in the U.S., rolled off of the assembly line in Michigan. This time, history is made in Oklahoma.

The Oklahoma City assembly plant has been producing the Chevrolet Malibu and Oldsmobile Cutlass mid-sized sedans for the past few years. On July 2, the final Cutlass was built. According to *Automotive News*, more than 12 million Cutlass-badged Oldsmobiles were produced between 1961 and 1999. In the late 1970s, the Cutlass was the top-selling car in the United States. Cutlass models included Cutlass Supreme, Cutlass Cruiser, Cutlass Ciera, Cutlass Calais, Cutlass Salon, and the plain old Cutlass.

HERE COMES HERSHEY

Once again, the time approaches for the annual SAH Banquet. Every year, this event coincides with the once-a-year mudbath we call Fall Hershey, this October 5-9. While it may not have the bonfires and loud music of Woodstock, it does have plenty of excitement for the automotive hobbyist and more food for your money.

At the time of this printing, mailings for the banquet were being sent out. If you did not receive yours, please notify Kit Foster and he will make sure you have all the proper information. The banquet is, once again, at the Country Club of Hershey and the SAH tent is situated on White field WAY 11-12.

If you have not been to Hershey, and I have met a few folks (SAH members!!) who have not, it's worth seeing what all the fuss is about. Bring your walking shoes, another pair of walking shoes (preferably boots....don't say I didn't warn you), and a high credit limit on your Visa as well as some cash. While Hershey is the mecca for automotive enthusiasts, some vendors still don't take American Express (or any credit card for that matter). See you October 8 in Hershey.

An initial meeting of SAH's Student Paper Award Committee was held in East Lansing, Michigan, on Thursday, June 17, 1999. Attending the meeting were SAH members *Charles Blackman* (who serves as interim chair of the committee), *Richard Scharchburg*, *David Lewis*, and *Sinclair Powell*.

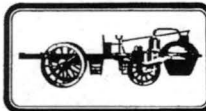
Following a luncheon at Kellogg Center on the MSU campus hosted by interim chair Blackman, members of the committee discussed a number of issues involved in SAH establishing a student paper award. These included: means to be utilized in bringing the award to the attention of students in educational institutions in America and perhaps throughout the world; establishing group rules for acceptance of papers; collecting and judging the papers submitted; and presenting the award. The question of whether SAH should alone underwrite the cost of such an award, or invite a limited group of outside entities to join in such sponsorship was considered.

The committee decided that at least one additional meeting would be needed to review the proposed award program. The date of September 8, 1999, was established for such a follow-up session.

- Sinclair Powell

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SAMUEL V. FIORANI, EDITOR
307 Kingston Drive
Douglassville, Pennsylvania 19518 USA
Email: SAHJournal@AOL.COM

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EDITORIAL COMMENT

MAKE THAT THREE

I have been proud to be the editor of this fine publication for the past four years. I have met many outstanding automotive historians through letter, email, fax, phone conversation and in person....some people have even been kind enough to compliment my work with this newsletter. When ever those compliments have come through, I have insisted that the people who write for the *Journal* are the ones who should get all the recognition. It is for this outstanding work, I write this editorial.

Once again, *Old Cars Weekly* has awarded the *SAH Journal* with a Golden Quill. This honor, the third consecutive for the *Journal*, was given in the category of black and white newsletters from National Clubs. While SAH is an international organization, we greatly appreciate the accolade granted to this publication.

I would like to take this space to give credit to the people who made such an award possible: the contributors. The six issues honored by this award were No. 172 through No. 177. Those who contributed to the 1998 *SAH Journals* were (in alphabetical order): *Noland Adams, Jeff Allison, Ralph Atkinson, Charles W. Bishop, Larry Blatt, Gary Bricken, Fred T. Buffington, B. Mitchell Carlson, Dean Case, Pat Chappell, Bob Cunningham, Chris David, Dennis David, Ralph Dunwoodie, Jarvis Erickson, Ugo Fadini, Gavin Farmer, Nicholas Fintzelberg, James Flammang, Kit Foster, Patrick Foster, George Green, Max Gregory, Ferdinand Hediger, Arthur Lee Homan, Elliot Kahn, Raymond Katzell, Beverly Rae Kimes, Edwin Krampitz, Tom Krill, Michael Lamm, David L. Lewis, John Lloyd, Darwyn Lumley, Peter Marshall, Nan Martin, Keith Marvin, Randy Mason, Curt McConnell, Gregg D. Merksamer, Allan G.Y. Meyer, William L. Millard, Rick Montague, John Montville, Albert Mroz, G.M. Naul, Pal Negyesi, Jan P. Norbye, Graham J. Orme-Bannister, James F. Petrik, David Pilpa-Augustyn, Sinclair Powell, Sue Powell, Jed Rapoport, John Reynolds, Fred Roe, Asbjørn Rolseth, Todd Ruel, John Satterthwaite, Robert Scoon, E.A. Tom Siebers, Singer, Thomas T. Solley, Ken Stauffer, Raymond Vaes, Taylor Vinson, Fred Whittier, F.D. Wilson, Ken Yerama, Bob Youngberg, and Bob Zimmerman.*

I am proud to be the editor of such a publication and to be associated with these fine people, as well as being a proud member of this organization. As always, the invitation is open to all SAH members to contribute to the *Journal*. This newsletter is at an unfair advantage when it comes to awards such as the Golden Quill as SAH is a group of the finest automotive minds in the world. This does not prevent me, as editor, from accepting this award on behalf of the entire membership. Please, keep the contributions coming. Let's keep the streak alive.

-Sam Fiorani

All organizations mature, and the Society of Automotive Historians is no exception. We shortly will celebrate our thirtieth birthday! It hardly seems possible that nearly thirty years ago, in October, 1969, our Society was formally organized at an initial meeting held at Hershey, Pennsylvania. Informal steps had been taken earlier that year to 'test the water' and determine the degree of interest on the part of persons involved in automotive history in the establishment of a new association. The responses were generally affirmative; thus the background was laid for the opening session.

If the nineteen persons listed in an early Society newsletter as attendees at this historic first meeting had concerns about the potential viability of the new organization, they need not have worried. The fledgling body soon expanded into a hundred or more members, and ultimately reached the over-800 level of today. A glance at the geographical index of current membership indicates clearly the widely-based nature of our organization. While the preponderance of membership is from the United States, we have nearly thirty members in another major North American nation, Canada, some forty in the United Kingdom, and smaller numbers in countries ranging from Australia to Uruguay. Our Society clearly has assumed an international dimension, as further demonstrated by the overseas dinner held in Paris each February at the Automobile Club of France. Typically, members from six or more countries attend this interesting activity. In North America the biennial History Conference now is well established, and attracts to its sessions a number of members from the United States and Canada.

A vigorous publication program is of course the lifeblood of any historically-oriented organization, and our Society moved quickly at an early date to meet such a need. The earlier *Newsletter* gave way at the beginning of 1982 to the *SAH Journal*, now published six times a year. It continues to be the medium through which members can keep current in the general area of automotive history, as well as learn about each others' activities. In the winter of 1973-74 the initial issue of the *Automotive History Review* appeared. This publication from the beginning sought to examine in some depth specific aspects of automotive history, with its articles based on comprehensive research. The SAH Press was organized in late 1997, and now has published and placed on the market its first book.

Because of the previously mentioned wide dispersion of membership geographically, it was anticipated at an early date that SAH members in specific states, regions or nations might wish to form chapters. Six of these exist at the present time, five based in the United States and one in the United Kingdom. It should be noted that these groups occasionally undertake ambitious programs relating to automotive history - the Wisconsin Chapter in the United States has recently published a book entitled *Wisconsin Cars and Trucks, a Centenary*.

All members are aware of the annual awards presented by our Society in recognition of solid achievements in automotive history—the Cugnot, Benz, Brigham, Ingersoll

and Bradley, plus the Friend of Automotive History Award. In addition, a committee is now at work examining the possibility of our Society sponsoring an award for the best paper produced annually by a student at an educational institution.

Where does our well-established organization go from here? There are various avenues which justify exploration.. The possibility of the Society establishing a website is now being examined in depth, and a report on feasibility and cost should be forthcoming in the near future. Clearly such a step would aid us in becoming better known throughout the world, and also make possible broad dissemination of various facets of automotive history. Along with this SAH may undertake a program which seeks to identify and record sources of automotive history in libraries, museums, historical societies and private archives in a variety of nations.

Some initial steps have been taken to make our organization better known in the automobile industry, but much remains to be done in this area. Also being explored is the possibility of SAH presenting certificates of recognition to automotive and related firms as they celebrate their centennials.

In summary, our society may well face fully as many challenges in the decades to come as it has in the past thirty years!



Your president has enjoyed various trips to Canada over the years, and one taken this summer was no exception. The journey provided an opportunity to communicate with an occasional SAH member, and to visit two museums. Highlight of the trip was a guided tour of the National Museum of Science and Technology in Ottawa (a long-time SAH member). Museum official Antony Pacey provided the guidance, conducting me through the library and archives plus the vintage car collection (due to a major construction project we were not able to visit the large additional group of vehicles kept in storage). The visit was extremely worthwhile, and I wish to express my thanks to both the Museum and Mr. Pacey

Personal thanks also are due SAH member *Eugene Weiss* of the DaimlerChrysler Corporation archives, who, noting my interest in the Franklin automobile, forwarded a very interesting research item from the company archives. This type of industry-historian cooperation is highly commendable.

Best wishes to all.

- Sinclair Powell

25 YEARS AGO AT SAH

There will be no "25 Years Ago" this month because there was no July or August issue. "25 Years Ago" will return in the next issue.

AUTOMOBILES B.C. (BEFORE CUGNOT)

July-August 1999

by Charles W. Bishop

This article originally appeared in the March-April 1984 (Volume 48, Number 2) of Antique Automobile. It is reprinted here by kind permission of Charles Bishop and AACA's Antique Automobile magazine.

Although it is now generally agreed that the work of Nicholas-Joseph Cugnot gave the world the first automobile, many efforts prior to his limited success deserve a place in history of the movement. Unfortunately their story is somewhat garbled, sometimes purposefully. Once the progress of the pioneers reached the point that industrialization was feasible, history began to be rewritten by the successful survivors, against a background of protest, in which the claims of the Duryeas, Haynes, the Appersons, and Winton are familiar. Distortions in the prehistory of the automobile also led to some important disinformation in some cases, as will be seen.

This essay is not intended to take away in the slightest from the fame or glory of Nicolas-Joseph Cugnot, but the

effort to produce a vehicle that could move itself began centuries before Cugnot attained that end more than 200 years ago.

In the early 1900s, a few reckless authors held that the first record of an automobile dates back 2500 years, to the prophet Nahum (2:iii): "The chariots shall rage in the streets, they shall justle against one another in the broad ways; they shall seem like torches, they shall run like the lightnings." Apt as this description may be to some modern traffic, we shall be content to start with an event several hundred years later.

Heron of Alexandria has probably disappeared from today's texts, but in the unsophisticated 1920s, elementary physics books showed an aeolipile, either with or without wheels.

Those who lack the advantages of that earlier education may note a globe on pivots with elbows at right angles to the rotational axis and provision for a fire beneath. When water in the globe reached the boiling point the emitted steam caused the globe to spin. Among the propagators of the cult of the aeolipile were Philo of Byzantium, Vitruvius Pollo, Pappus of Alexandria, Gerbert of Aurillac (Pope Sylvester II), Roger



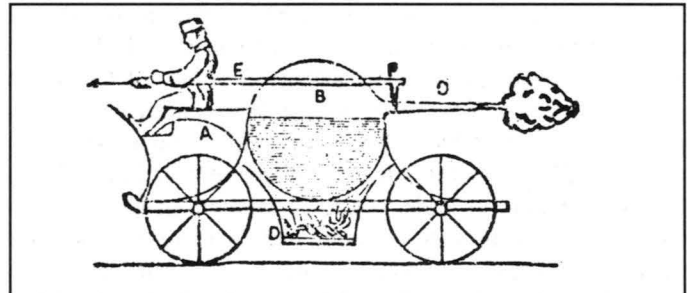
Heron demonstrates his aeolipile to the sages of the Alexandrian School.

- Figurier: Merveilles de la Science, 1875

Bacon, unknown builders of a Korean iron-clad warship in 1592, Branca in Spain, Ramsay in England, the Jesuits Verbiest and Grimaldi in China (1678), and Somerset and Newton in England, to cite the most frequently mentioned. The geographic distribution is impressive.

Heron had also mentioned a weight-driven auto, and this was re-invented by the Chinese Chu Chhi Thu Shwo in 1627. As medieval Europe progressed from the water clocks of the ancients to the spring-driven type, it was inevitable that spring power (however inadequate) would be tried for autos. Jean Thésou patented a little four wheeler in 1645 that was able to make a round trip from Paris to Fountainbleau in a day, and Jean Hautsch of Nuremberg made one capable of 2000 paces an hour but sold to the king of Denmark another attaining 3000 p/h, in which he abandoned the springs in favor of two men cranking. In this latter category is the Augsburg carriage, which stands as a monument to the incomprehension of the mechanical limitation of muscular power.

Undue attention has fixed on the Newton invention (1660). He used a steam jet, without any transmission, but this



The often cited jet propelled carriage of Isaac Newton. This was a project, unrealized, that was invented by several others. Dated 1680.

- the author

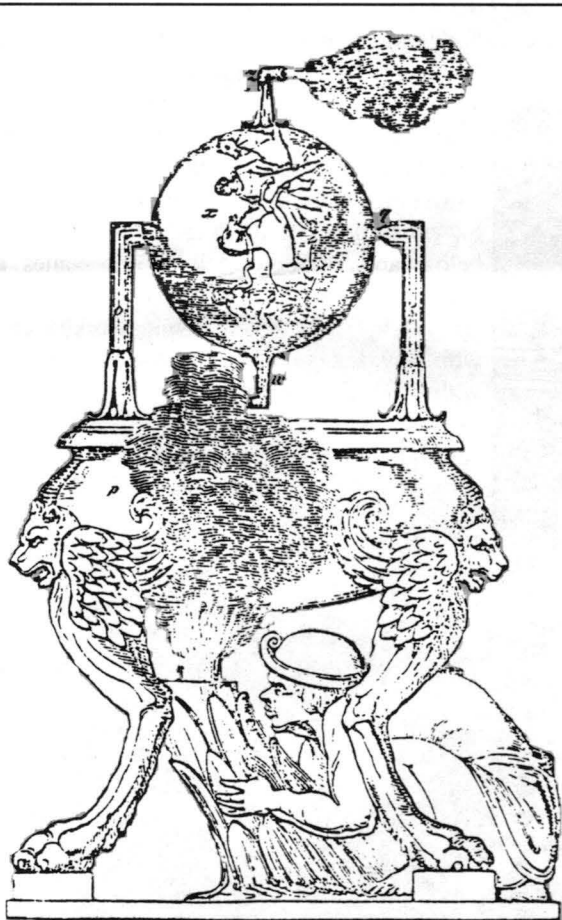
toy was cited by every 19th century historian of the automobile, usually with an artist's impression. It is true that no full-sized system was ever produced for public use, but Fritz Opel utilized this reaction principle in an automobile driven by rockets, experiments that bore bitter fruits for the British in World War II but have since opened the universe to space travel.

In this study, the important thing is that the Heron concept came back again and again, in many lands, down the centuries.

The aeolipile as a motor is best exemplified in the work of Grimaldi and Verbiest, described in detail in Needham's *Science and Civilisation in China*. A model of the Grimaldi vehicle was constructed by Canestrini, with three wheels, whereas the text of J.B. DuHalde's *Description géographique, historique, etc.* [1770, vol 3, p.270] describes a four-wheeled construction with a wagon pole terminating in a wheel (in ground contact) to guide the model in a circle. The same principle was later used by Gurney for one of his steam omnibuses of the late 1820s. Grimaldi and Verbiest also made a model steamboat with the same propulsion system.

Some scholars believe these two Jesuits were influenced by the steamboat experiments of Branca (ca. 1629), a speculation outside the scope of this study. The important fact for us is that steam turbine propulsion of land vehicles was still 260 years away, and then was reserved for railroad application. The 1678 experiments had no real effect on the automobile's development although many subsequent authors have exaggerated the importance of their work for other reasons.

The reader may perceive Otto de Guericke as unrelated to the story, in the absence of any vehicular inventions; however, it may be recalled that one of Verbiest's publications included a chapter, *Pneumatica*. Guericke captured the attention of the scientific community of the 17th century with his invention of a suction pump and his subsequent experiments with the vacuum, of which the "Magdeburg spheres" were a dramatic demonstration. Pneumatics became the major field of physics. Huygens' gunpowder engine was a variant method of producing vacuum. Beyond the conceptual aids supplied by the illustrations, it is enough to state that the early focus on atmospheric engines, which was due to the Guericke work, had an inhibiting effect on auto development, as such, engines were too bulky.

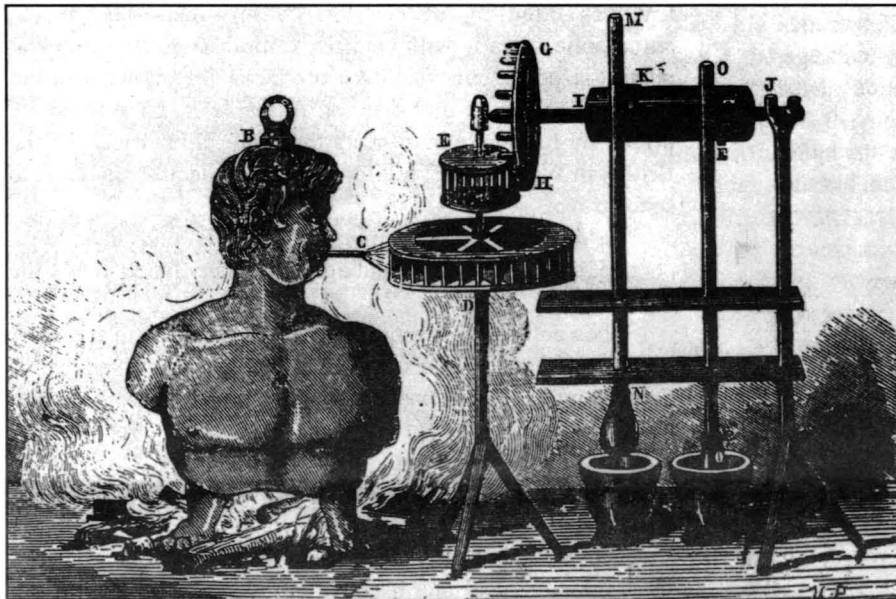


This 19th century engraving portrays an elaborated version of the aeolipile of Heron of Alexandria. Heat is directed to a boiler in the supporting structure, then through the arms and pivots into the rotary globe and exhausting through orifices to react against the air, setting the globe in motion.

- Robert Stuart's History of the Steam Engine, 1824

The next figure on the scene is the man whose contribution is unquestionably the least understood, the least appreciated, and yet the most advanced of any of Cugnot's predecessors. The lines of distinction between medicine, the profession for which Denis Papin was trained, and physics was almost negligible in 1669, the year Papin obtained his MD at Angers. He went to Paris, where he became associated with Christian Huygens. One of their joint experiments was the gunpowder engine, sometimes cited as a forerunner of the internal combustion engine. As a result of the Guericke experiments with horses and spheres at Magdeburg, one of the buzz words of the day was "vacuum," so it was natural to apply this new principle, employing atmospheric pressure.

alleviate it by a process that softened bones and what a dog food label euphemistically calls "meat by-products"—meat too tough to eat. The relevance of the digester to our story requires an explanation. In 1680, the only advance on the aeolipile of Heron, by now centuries old, had been the publication in 1601 by Battista, and 62 years later by the Marquis of Worcester, of methods of raising water by steam. Battista's was an anticipation of Savery, and neither device has ever figured in automotive development. However, in Papin's digester, two elements of transcendental importance to the steam automobile are present: a high-pressure steam boiler and its essential accessory, a safety valve. With the digester, steam technology moved out of the steaming kettle phase and into pressures measured in so many atmospheres. In short, Papin introduced high-pressure steam to the world at a time when there was *not a single steam engine* in existence, except for a possible aeolipile for turning a spit or some similar light-duty. Papin's engine had not yet arrived, of course, nor would it without obstacles and detours, as will be seen, but the generator or boiler was now a fact. Because Papin is so little known today, a quotation from the *Encyclopedia Britannica* (1948) article on the steam engine is justified: "The labours of Watt stand in natural sequence to those of Newcomen, and Newcomen's to those of Papin and Savery." Savery's place in the saga will be discussed below and chronologically, Watt comes after Cugnot.



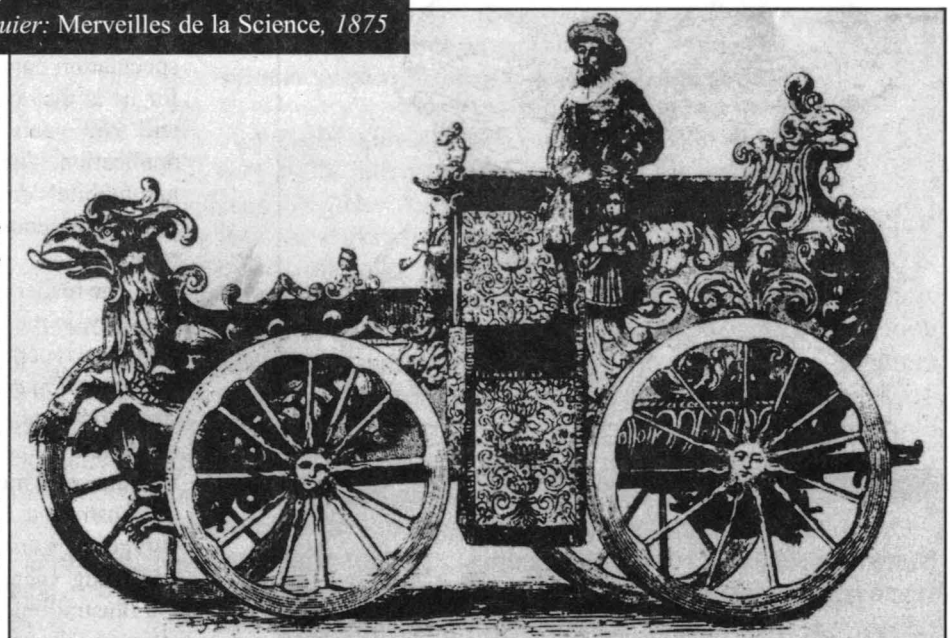
Branca's improved aeolipile. The turbine drives a fulling mill through a lantern gear train. He modestly disclaimed invention. Its significance lies in its harnessing of steam to perform useful work.

- Figuiet: Merveilles de la Science, 1875

Their device was a cylinder in which gunpowder was exploded: the resulting vacuum caused a downward pressure and movement of a piston. A rope attached to the piston and passed over a pulley hoisted a workman off the floor to the amazement of the unsophisticated courtiers. This notion of the vacuum as a way to obtain a power source would hang on for many years to come, even in automotive applications, to which it was singularly ill-adapted. It was eventually abandoned. Papin early discerned its uselessness.

At this juncture, a wave of intolerance in France forced Papin, a Calvinist, to leave Paris in 1675, when it was the world's leading center of scientific activity. He went to London, collaborating with Boyle in other vacuum work, and he invented the pressure cooker, which he called the "digester." Famine was ever present and Papin sought to

As in Paris, where Papin worked closely with Huygens, so too in London he collaborated with top flight men—Boyle and Hooke. He worked on pneumatics with the former, supplying a vacuum pump, and the latter



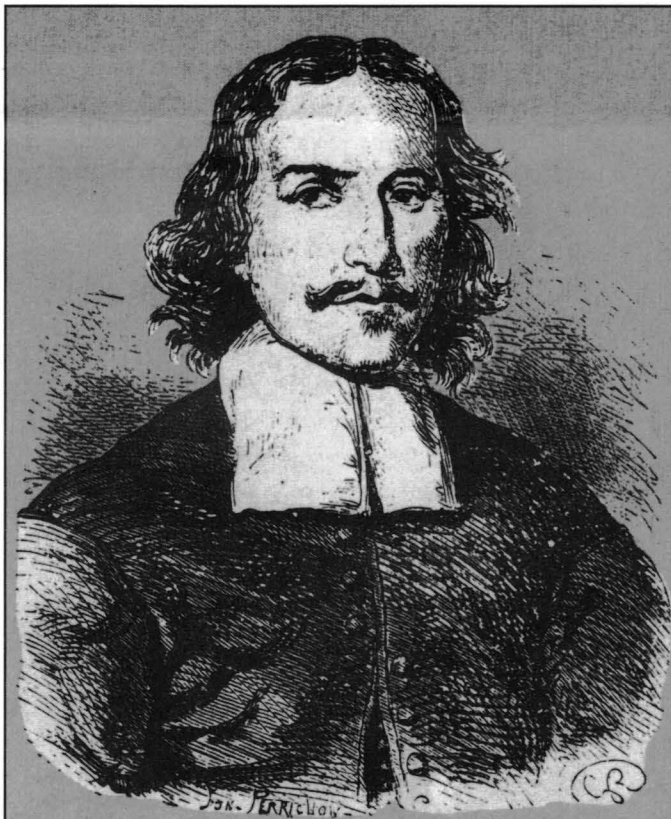
Another frequently cited pre-Cugnot vehicle was that built by Jean Hautsch and operated in Nuremburg around 1649. This vehicle was man-powered.

- Journal de voyages de M. de Monconys, 1663

sponsored the demonstration of his digester to the Royal Society in 1679, leading to his election to that body the following year.

At this point, Papin made what was probably the greatest mistake of his career, accepting an invitation from an Italian diplomat to accompany him to the Republic of Venice, there to found a scientific society that would rival the one in London. Three years later (1684), he returned to London and in April was appointed Temporary Curator of Experiments, less secure than his previous post. Boyle's interests had shifted, and Hooke was now working with Savery. The Society seemed less receptive to foreigners, and Papin, perhaps discouraged, was less productive.

Charles Landgrave of Hesse, renewed his invitation to Papin to become professor of mathematics at the 150-year-old Protestant University of Marburg, a position which he had briefly held before going to London for the first time, and where he had invented the four-way cock, a most useful device for control of fluids (including steam). (This Charles was the ruler who discovered the income possibilities of renting out soldiers, but it was a successor who supplied those used by the British in America.) Papin left London late in 1678, and the next 8 years were among his most productive, both in experiments and inventions and publications as well. Among the 17 noted by Gerland, the most important for this study is the

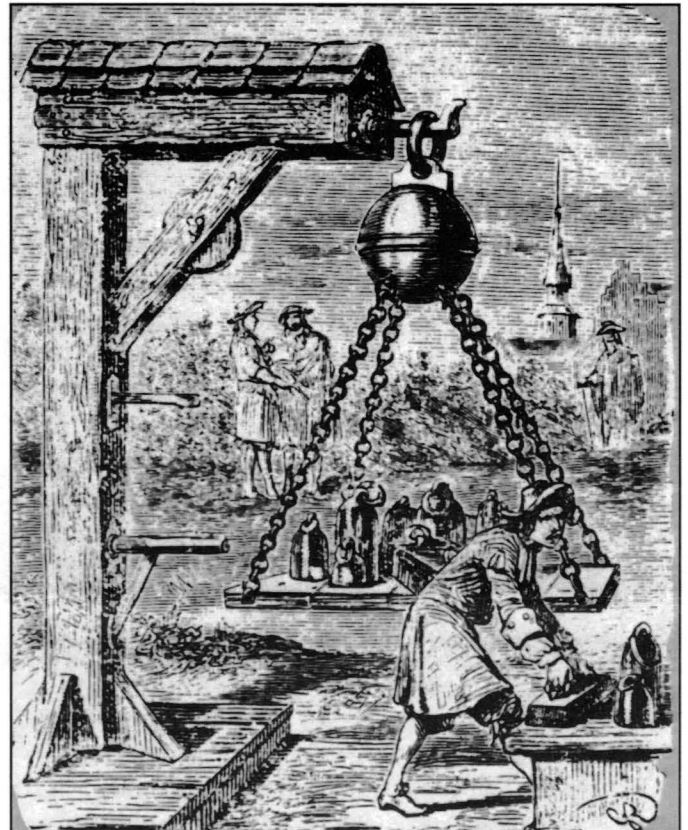


Otto de Guericke discovered the mechanical effects of atmospheric pressure and opened the way for the philosophy of the atmospheric engine, both the gunpowder engine of Huygens and Papin and the multitude of condensing steam engines, which for so long delayed the advent of practical high-pressure steam engines.

- Figuer; *Merveilles de la Science*, 1898

description of the model steam carriage described in a letter to Leibnitz in 1698. Rhys Jenkins, engineer and pioneer chronicler of the steam car movement in England, summarized the event: "Papin, at Cassel, constructed a small model of a steam car, the first with piston and cylinder, described in a letter to Leibnitz, dated July 25, 1698."

Jenkins' book *Power Locomotion on the Highways* (1896), coming 200 years after the event, was widely circulated among pioneers of the renaissance of the automobile. It not only was packed with useful data on steam developments but also had the



The hemispheres of Magdeburg, supporting a dead weight of 2686 pounds.

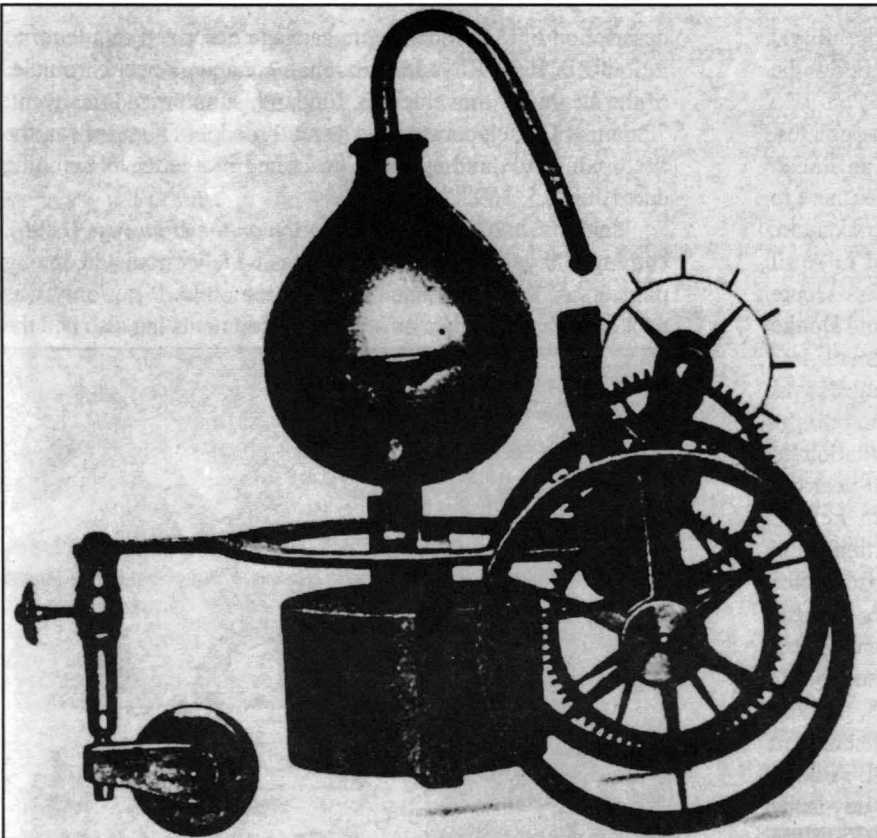
- *Experimenta nova Magdeburgica de vacuo spatio*, 1672

most extensive bibliography of writings on the subject.

The letter to Leibnitz cited above is not without irony: the wretched state of the Hessian roads thwarted Papin's desire to pursue the development of a steam carriage based on his successful model. France even then had some roads good enough to permit further vehicular progress, but Papin was an exile because of Louis XIV's implacable stance against Protestantism, which precipitated two wars during this period of Papin's greatest fecundity—Nine Years War (1689-1697) and War of the Spanish Succession (1701-1714) (political data from Times' *Atlas of World History*, 1979).

The following letter was an important element in Charles Dollfus' chapter in the monumental *Histoire de la Locomotion Terrestre*, but he chose to stop short of a very telling part:

The way in which I now employ fire to raise water is always on the principle of rarifying the water [i.e., making steam]. I now do this in a way far simpler than



This model was constructed around 1934 to show the principle of the model steam carriage built by Fr. Grimaldi and usually ascribed to his associate, Fr. Verbiest. Its primary importance here is that it is the most frequently cited as preceding Cugnot.

- Charles W. Bishop

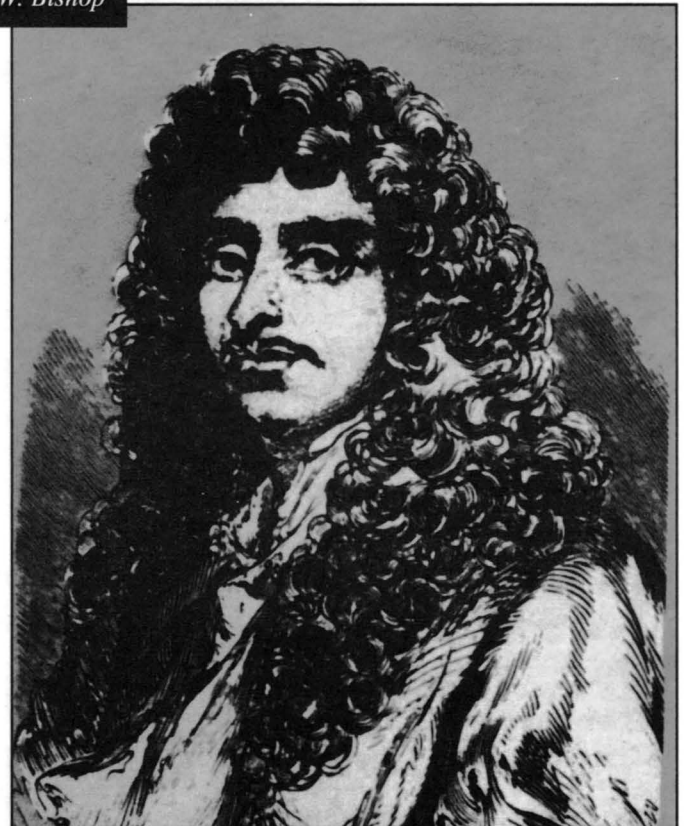
in my previous publication: moreover, besides the suction I have also made use of the pressure which the steam exercises on the other parts in expanding, effects not limited as are those of suction. So I believe that this invention, if followed up as it must be, will yield very considerable results. While Monsignor [Carl, Elector or Landgrave of Hesse-Cassel] appears quite satisfied with what I have done, I do not know why S.A.S. [His Serene Highness] did not do me the honor of allowing me to design the pumps to raise the water of the Fulda River to the tower of the castle; and yet I can say, without vanity, that it is nothing compared to what I would be able to do. I can, with this invention, do many things other than raise water. I made a little model of a chariot which is propelled by steam. It produced, on my stove,* the effect which I expected, but I believe that the inequalities and detours of the main roads will render the perfection of these vehicles on land very difficult...

Dollfus stopped at this point. The rest of the letter opens a new vista for experiment:

but for water vessels I flatter myself that success will be mine soon if I have more [financial] help than I have had. I have reason to hope that His Serene Highness will resolve to help me more than he has up till now.

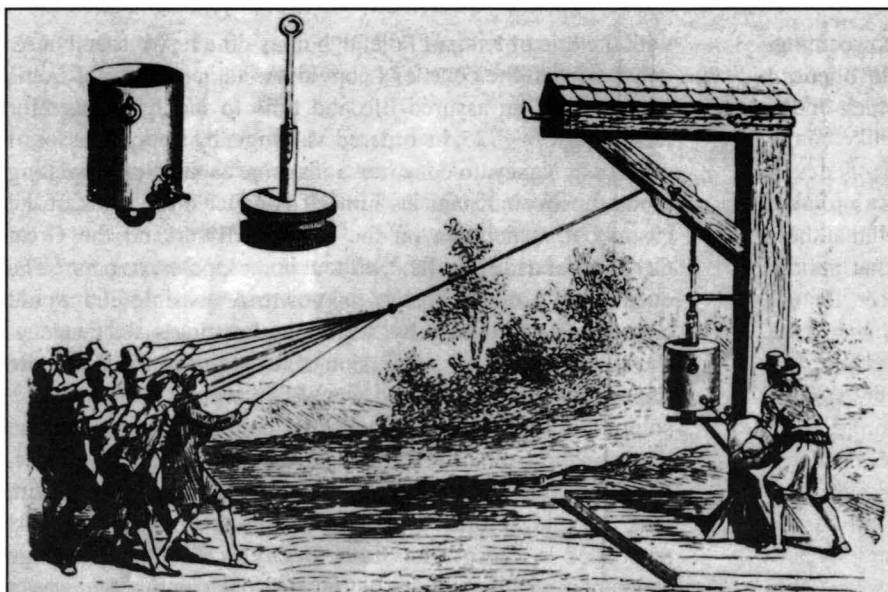
For the next several years the Elector imposed a variety of projects on the inventor, including a humiliating order that he build a pump on the Savery principle rather than his own. There were also his teaching duties at the University of Marburg. Marital problems and quarrels with a number of the court sycophants took their toll, but eventually Papin completed his steamboat. By this time he was very unhappy with his situation because of these personality clashes and petitioned his patron for permission to leave for England, where he hoped to demonstrate his steamboat in the great port of London. The ability of his boat to proceed upstream under its own power was demonstrated before the Landgrave and the whole court, and he was granted permission to leave.

The vessel was perhaps 10 meters long and Papin embarked with his family and all his goods and chattels, making his way down the Fulda to Münden, where the Fulda joined the Werra to become the Weser. Unfortunately, navigation on the latter was a guild privilege. Papin had applied, through his friend Leibnitz, for the necessary clearances. When they were not forthcoming he went ahead on the naive assumption that the boatmen's union would not deprive the world of this great advance in navigation, totally ignoring their self-interest, which told them that this invention could destroy their livelihood. So, while Papin was at the town hall, trying to secure safe



Christian Huygens, Papin's mentor at Paris.

- Figuiet: Les Grands Inventions, 1867



Guericke's demonstration for the Prince of Auerburg at Ratisbonne in 1654. Twenty men were unable to overcome the atmospheric pressure. Remarkable is the use of cylinder and piston, opening the way to engine technology.

- Guericke: *Experimenta nova Magdeburgica de vacuo, spatia* 1672

passage, the boatmen removed his family and their belongings and then systematically destroyed the world's first operative steamboat.

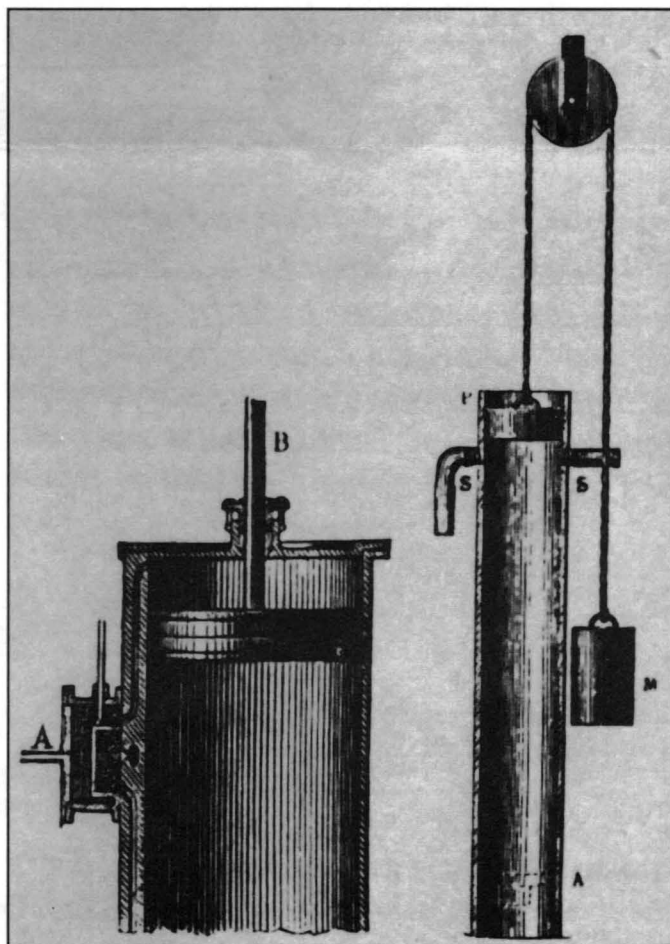
To those who raise question—why so much emphasis on a boat as an antecedent of the automobile—there is a parade of automotive pioneers who played both sides: Lenoir, Daimler, Napier, Panhard and Levassor, and Fiat, to name a few. American roads were fair in fair weather, but who has not heard the horror stories of our muddy roads? Henry Crane placed some of his boat motors in luxury cars, later merging with Simplex. The boat became one of the means of developing the motive systems that eventually provided us with automobiles for the public highways, shaving years off the developmental process.

To conclude the story of this most worthy pioneer, the destruction of his steamboat seems to have left him a broken man. He did make it back to London and resumed his ties with the Royal Society, made up for the most part of unfamiliar faces. His family remained on the Continent. He had lost his drive, and there seems to have been no effort by his associates to make use of his historic breakthrough. He was the first man to use the expansive force of steam to impart motion to a machine. Of course, the technology of the time imposed great limitations on what he could achieve, but the inescapable fact is that he did build a boat capable of proceeding against the current, not dependent on the limited possibilities of atmospheric pressure, the common solution for another hundred years. To sum up, he did make an operative model automobile powered by piston and cylinder and he did demonstrate to the world a steamboat that worked and carried passengers and freight. He influenced others before and after Cugnot. The great James Watt acknowledged his debt to Papin in these words reported by Ernouf: "...in 1761 or 1762 he [Watt] made some experiments with a Papin digester, transformed into a sort of steam engine by adding a syringe."

9

The two elements of a syringe are cylinder and piston. In reading these early writings there are pitfalls, as the language was not yet standardized. Steam engines were long called fire engines, and this was confusing as there were also pumps adapted to extinguishing fires. The requisitions for the cylinders for Cugnot's wagons called them "pumps." We have seen above that steam was described as the rarifying of water.

This writer has long sought a link between the work of Papin and that of Cugnot. Although separated by 60 or 70 years, they each employed high-pressure steam when no one else had; consequently, the connection seems to me inescapable. In preparing a paper to be delivered at the Free University of Brussels, I came in contact with a scholar in the Royal Library, Mme. Lemoine-Isabeau, to whom questions I had put to the library were referred, as she had also studied Cugnot. She sent copies of research, made by others over a long period, that had appeared in regional publications, most of which no longer exist, but which were based on the region whence Cugnot had come—Lorraine. These had escaped attention, as



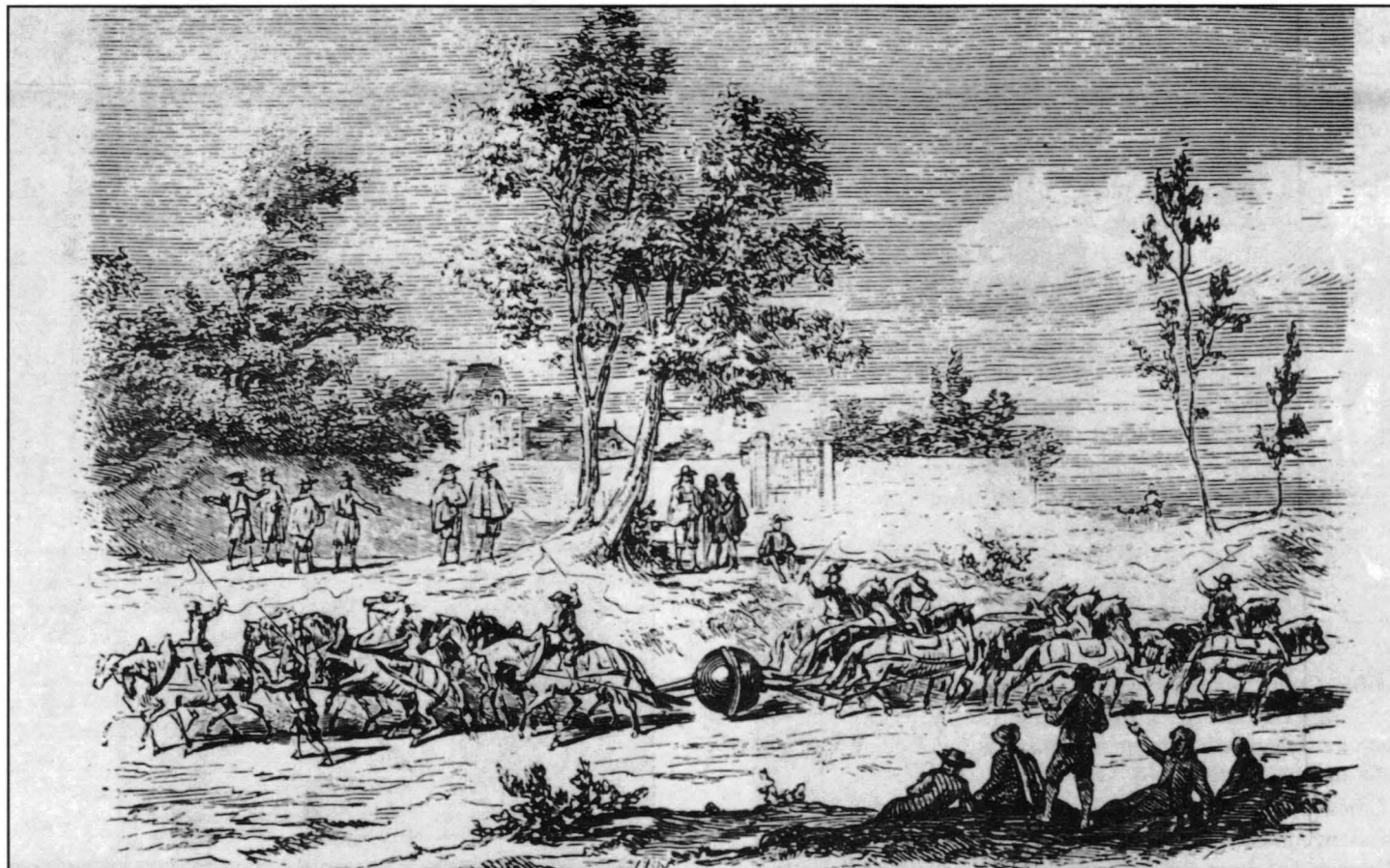
Schematic illustration of the gunpowder machine, and a detail of how the principle may be modified to create a steam engine by adding a slide valve.

- Figuiet: *Les Grands Inventions*, 1867

the French have a tendency to consider anything not coming from Paris as not worth the time of day. One article filled in missing facts as to Cugnot's early education, which most biographers and encyclopedias dismiss with phrases like "little is known" or "in Germany." Another article told of steam progress in Lorraine in the 18th century, which was totally ignored in France. The several bits fit together so well that they are offered here as a reasonable reconstruction of that period and the evidence of a link between the great pioneer, Papin, and the inventor of the first land vehicle to carry man and freight under its own power, Cugnot. Each claim is unique: Papin on water, Cugnot on land, both by high-pressure steam.

The first of these Lorrainers was Philippe Vayringe, who was sent to England by Léopold, Duke of Lorraine, to glean useful skills and technologies. This wise ruler sought means of improving industry and commerce, and the mission of 13 months began in 1720, 6 years after Papin's death and 5 years before Cugnot's birth. One of Vayringe's mentors was the scientist Désaguilliers, and the contact was significant, as the latter improved a Savery engine by adding a Papin safety valve. Details on Savery-Désaguilliers collaboration are lacking, but this information does establish a bridge of the geographical gap Marburg-London-Nancy in steam technology. Political influences on the story are unavoidable: Stanislas, King of Poland, driven from his throne (by Poles), is established in the principality of Zweibrücken in Lorraine, still

with the title of King of Poland, but residing in Weissembourg, convenient to the court of Léopold. As father-in-law of Louis XIV, he had an assured life and time to indulge a bent for technology. In 1725, he ordered Vayringe, by now professor of physics at Nancy, to construct a machine capable of propelling a boat upstream. Stanislas himself conducted the trials of the steamboat, which ran on the Vezouse River and the Great Canal as far as Lunéville, "without horses, poles, or oars." The eventual fate of the boat is unknown. A possible end would have been continuing by water to the king's residence at Weissembourg and the diversion of its engine to the task more important to the household, supplying water to the castle, a solution offered by several "experts" consulted about practical uses for the Cugnot machine a few years later. In any case, Stanislas went off again in quest of his throne, failed again, and, on his return, took over from Léopold, who was persuaded to accept the Grand Duchy of Tuscany. Vayringe accompanied Léopold to Florence. In the entourage was a young cadet of 12, who presumably took instruction from the professor of physics. His name was Nicholas-Joseph Cugnot. The cadet served in the armies of Maria Theresa, Queen of Hungary, Empress of the Holy Roman Empire, and gained the rank of engineer at the age of 18 (1743). The authors of the study of the Cugnot family from which most of these facts are drawn express doubt, thinking it necessary to add 10 years. Their conclusion is debatable on two points: it was quite

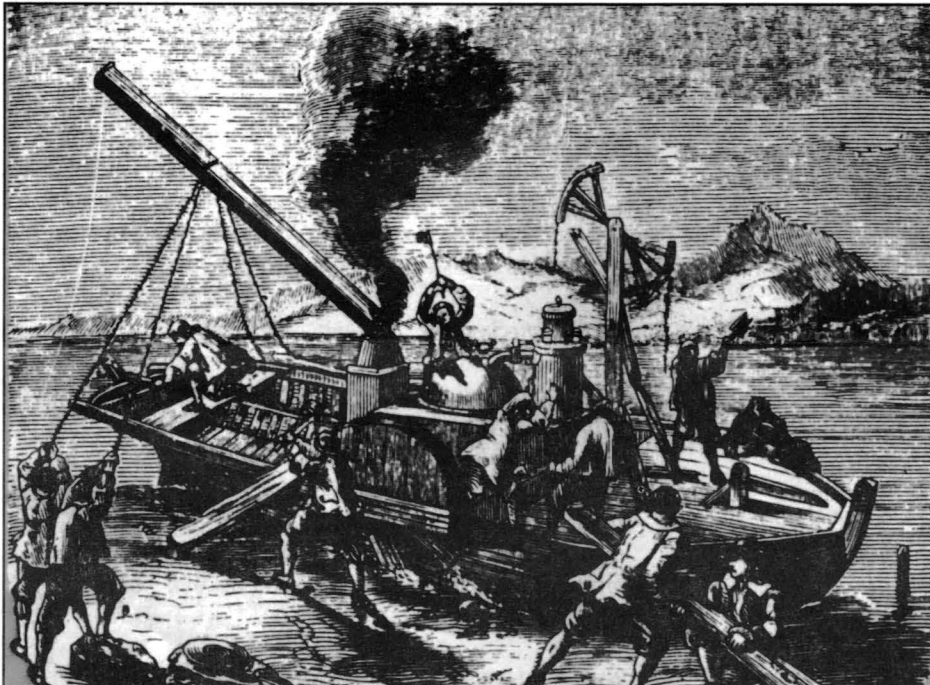


The Ratisbonne sphere's diameter was 3/4 aune (0.9 meter) and it also resisted the efforts of two eight-horse teams vainly trying to pull them apart. A new sphere, diameter 1 aune (1.19 meter) successfully resisted 24 horses, as seen in this illustration. The spheres were constructed of copper, with a soft leather gasket.

- Guericke: *Experimenta nova Magdeburgica de vacuo, spatio* 1672

normal for youths in the 18th century to enter military service at 12 or younger and emerge with a rank higher than Cugnot's; and, at 28, Cugnot was in or near Brussels, the war was over, and he seems to have established contact with Marshal Maurice, Count de Saxe, nemesis of the Austrian forces. To wrap it up, the chameleon-like political changes during the period of Cugnot's youth go a long way to explain why his pre-automobile life has remained a mystery, as each of these political entities had its own history and only by jumping from one to another can a continuity be established. In his first book (on fortification), Cugnot used the title "Former engineer of Her Royal and Imperial Majesty." For those confused by the multiple titles, France refused to recognize Maria Theresa as Holy Roman Empress: to them she was Queen of Hungary.

While we do not know Cugnot's whereabouts year by year, he was in Lorraine from time to time until his army's defeat by Saxe in 1750. He invented a carbine that Saxe liked and adopted for his famed hard-hitting cavalry, the Uhlans.



An artist's conception of the destruction of Papin's steamboat. Interestingly, a walking-beam engine is shown here. This derivative of the Newcomen type would have been familiar to the artist, who probably never saw Papin's crankshaft arrangements.

- Hachette: *Historie de machines à vapeur*, 1830

Money from the carbine may have been the source of funding for his experiments with a steam cart in Brussels in 1763, probably a model of restricted size. He seems to have been in or near Brussels at the time of Saxe's triumph, which had the effect of releasing him from military service, although there are records placing him in the Netherlands as a lieutenant of engineers in the 1760s.

The second of the Lorrainers who may have served as mentor to Cugnot was the abbé Gauthier, who presented a paper to the Academy of Nancy in 1755 on a means of supplying by "fire oars" (oars propelled by steam) power supplementing sails. As the galleys he spoke of required 400 oarsmen (two shifts), the advantages were obvious. One may

reasonably expect that Cugnot may have been stimulated by this project and encouraged to pursue his own dreams in Brussels, but admittedly the connection is less direct than that with Vayringe.

One final word on Lorraine: the experimental activity at Lunéville, Nancy, Pont-à-Mousson, and other focal points of technological learning were all easily accessible from Cugnot's birthplace and family seat at Void, on the Meuse River, and also on early lines of communication down the Lahn River from Marburg to the Rhine, and up the Moselle to the Lorraine centers. Hence, communication, whether directly by Cugnot or through intermediaries, is quite plausible. One must also consider the students who were at Marburg when Papin worked out his steam problems. There seems to be no known trace of them, but it is hard to conceive that his young students could remain indifferent to the challenge of steam.

In maintaining the continuity of the Papin to Cugnot saga, we should not omit Edward Somerset, Marquis of Worcester, who published his *Century of Inventions* in 1663. Among the 100 inventions was a device for raising water by steam, described by *Encyclopedia Britannica* as "obscure...no drawings." The parade of inventors wrestling with the problem before Cugnot ends at this point.

In closing, it is worth mentioning that there was a great burst of activity in the search for an automobile in the four decades immediately following the abandonment by the French government of the Cugnot effort. William Murdock's model ran on the road in 1786. Sadler was stopped by Watt's Obstructive patent, which he admitted was solely to keep others from "wasting their time on such folly (1784)." Symington built a steamboat that worked and went on to a steam carriage that ran in Edinburgh in 1786. Captain Trevithick ran about in Cornwall with a steam carriage and followed it with a demonstration railway in London in 1803. (His carriage travelled the 90 miles from Camborne to London under its own power on public roads.) Dallery built an amphibious steam car in 1788. In Hartford, Connecticut, Apollon Kinsley appeared on his city's streets

with his steam car. Evans realized his frustrated dreams of 20 years with his "Oruktor Amphibolos." Jouffroy operated a steamboat near Lyons in 1785. Robert Fulton observed both Symington's and Jouffroy's (and possibly Dallery's) steamboats during his travels in Europe, before returning to build his famous "Clermont" for use on the Hudson. The tangled web continued; Symington seems to have known of Evan's work through the latter's book.

The common denominator of all these later attempts was the use of high-pressure steam, the gift of Papin and Cugnot to the world, which the publisher of the first auto magazine (1832) called "elemental locomotion." Theirs is another story.

EARLY EXPERIMENTS WITH THE INTERNAL COMBUSTION ENGINE IN THE U.S.

by John M. Peckham

July-August 1999

This article first appeared in the Society of Automotive Historians Newsletter, in Issue No. 35, June 1974.

Now, when there is talk of doing away with the internal combustion engine, it seems appropriate to look into the origins of this infernal machine.

In France, about 1680, a gentleman named Denis Papin and the Abbé Hautefeuille used gunpowder to create motive power. A century later, an Englishman named John Barber ignited a mixture of coal gas and air in a retort. The force of the explosion was directed through an opening in the retort at a paddle wheel which was turned by the pressure. In 1794, Robert Sweet, another Englishman, exploded gases in a cylinder and actually drove a piston. It was about this time that a rather famous American began toying with the idea, too.

Col. John Stevens, best known for his experiments with steamboats and railways, and for his plans to tunnel under and to bridge over the Hudson River, had conceived the idea of an internal combustion engine about 1798. He had working for him at the time a young Norman who had studied to become a priest but gave up the idea and joined the French Navy instead. Forced to flee from France during the period of reprisals against the Royalists, he came to the United States and, because of his mechanical bent, found employment with Stevens. The young man's name was Marc Isambard Brunel, father of the builder of the steamship "Great Western," Isambard Kingdom Brunel.

Some of the elder Brunel's letters to Col. Stevens still exist in the extensive Stevens Collection at the New Jersey Historical Society in Newark, N.J. If it weren't for these letters, it is doubtful that we would ever have known of Stevens' experiments with internal combustion engines. One of Brunel's letters, dated January 30, 1798 and written from New York City, starts as follows:

I do hereby certify that the machinery for propelling boats, a draft of which Mr. Stevens has put into my hands for the purpose of constructing a working model, is not in any part my invention but, as far as I know, altogether an invention of his own.

This introduction was, without doubt, requested by Stevens for his own protection, in case he should apply for a patent at a later date. It was followed by a description of the operation of the machine. Very little technical information is included, but several things can be deduced with the help of later letters.

In this internal combustion engine, a cylinder, enclosed at both ends, contained a piston with piston rod which protruded through a bushing at the top of the cylinder. Below the piston, fixed in the lower end of the cylinder, was a brass cup. Through the wall of the cylinder were two holes, one small and one large one. The small hole must have been near the brass cup, but the location of the other one is not given. It seems likely, however, that it was about opposite the small one.

A wooden plug was removed from the small hole and a syringe was used to inject a portion of "distilled spirit" into the

brass cup which was already partly filled with water. At this point, the hole was plugged and a flame placed under the cup. Before the water would come to a boil, the alcohol would vaporize and expand. The plug was removed from the small hole and a candle (lighted) held near the opening. As the gas escaped, it was ignited by the flame and flashed back into the cylinder where, in turn, it ignited the gas still inside. With the explosion, the piston was forced up and the air in the upper part of the cylinder was compressed. Thus, according to Brunel, "...the motion of the piston is gradually retarded, and must finally be arrested, without violence or injury; let the force of the explosion be what it may." Then, the compressed air above the piston, and the vacuum created below it, caused the piston to return to its original position.

This experiment could be worked twice before Brunel found the combustion chamber too full of smoke to allow a third attempt. When this happened, the large plug was removed and the tip of a bellows was applied to the small hole. After the bellows had blown the unburned fuel out of the cylinder, the process could be repeated.

Brunel said that his workmen were "...terrified when at the first explosion, Smith, who had set the candle to the aperture, was watered by the blowing out of the water."

Needless to say, the plan was crude, but the principle was right. Stevens planned to develop a better method of carburetion but made no mention of any improvement in the type of ignition. He stated:

...after mixing the (inflammable gas) with a due portion of atmospherical air, my invention consists in introducing inflammable matter...into each end of the cylinder of a steam engine. When the piston in the cylinder shall have moved one-third of the way (or such distance as may be found most advantageous) from the top to the bottom or from the bottom to the top, I set fire to the same, (i.e., the inflammable mixture) thus causing an explosion in each end of the cylinder at each stroke of the piston, up and down."

Apparently, Stevens' other projects took him away from his work on the internal combustion engine. He was involved with supplying New York City with a steam engine and pump for its waterworks; steamboat experimentation with Robert Livingston, Nicholas Roosevelt, and Robert Fulton; plans to build a tunnel under the Hudson River from Hoboken to New York City, or build a bridge in the same area; and his own railroad experiments.

Brunel returned to France in the mid-1820s, but the thought of the internal combustion engine never left him. In spite of such diverse projects as shoemaking machines and trying to dig a tunnel under the Thames, he devoted much of his spare time to the theoretical aspects of the gas engine. Unfortunately, neither he nor Stevens seem to have done any more actual experimentation, and it was not until December 11, 1824, that Maximin Isnard received the first U.S. patent for a gas engine. However, the disastrous fire at the U.S. Patent Office in 1837 destroyed all record of Isnard's machine.



BENTLEY FACTORY CARS: 1919-1931, by Michael Hay. Hardbound with dust jacket, 352 pages, Profusely illustrated by black and white photos, diagrams, literature, ads, etc., plus 40 in color. 8 x 10-1/2 inches. ISBN 1-85532-883-6. Published by Motorbooks International, P.O. Box 2, Osceola, WI 54020-0002. Price: \$75.00 plus \$4.95 shipping and handling.

This is a revised edition of a book initially published six years ago containing the all new color section and specially commissioned color artwork cutaway of the Blower Bentley. The new material is a welcome addition to the earlier volume and as such will be a welcome addition to the bookshelves of Bentley lovers plus those whose predilections include sporting automobiles, classic cars, custom coachwork enthusiasts and all admirers of Rolls-Royce, the company which took over this superb car in 1931.

The author, an acknowledged authority on Bentley cars and their history, is the writer of numerous articles for *The Bentley Driver's Club Review* and *Motor Sport*, in addition to his earlier book, "Bentley: The Vintage Years" (see review in *The Journal* No. 110, September-October 1987).

I avoid using the word "complete" in a review because the word is so frequently misused. If, however, any coverage of a car for a given time frame approaches the proper meaning, this is it. Michael Hay has sifted the chaff from the wheat here resulting in an excellent presentation of what Bentley was all about from its inception in 1919 through its final days and last offerings, explicitly the magnificent 8-litre driving machines of 1930 and 1931.

This is a book I can't fault in any way and recommend to all comers and who will recognize it as both a showpiece in any automotive library as well as a beau ideal of what a good reference source can be!

- Keith Marvin

AMERICAN BEER TRUCKS, by Donald F. Wood. Softbound, 144 pages, 303 black and white illustrations. 8-1/2 x 10-1/2 inches. ISBN 0-7603-0440-8. Published by Classic Motorbooks, P.O. Box 1, Osceola, WI 54020-0001. Price: \$21.95 plus \$4.95 shipping and handling.

This is an excellent record of trucks which, over the years, carried barrels of foaming delight to a thirsty and demanding public. It is the third book on beer trucks which has come to my attention over the last seven years and in many ways is the best of them. Its coverage is wide and its photos both unusually clear and well chosen covering every

sort of truck imaginable which have carried beer and ale since the turn of the century. Here one will find both heavy duty and light types as well as tractors pulling trailers or double trailers. Both the text and captions are educational and well thought out. Virtually every standard make of truck lent themselves to this field and will be found in these pages; some uncommon brands also may be found. What I found of special interest are those so adored by the Canadian breweries...not just the well known ones such as Labatt's, Molson's, and O'Keefe's, but the offbeat (to us) ones, among them those used by Brading's plus Taylor & Bate. Why these exotic teardrop designs don't show up in these pages by their counterpart companies South of the Border beats me...but maybe there weren't any. Nor should it be forgotten that the Peerless car was reborn as Canada's Carling beer. One mustn't overlook the fact that between 1920 and 1933, the U.S. was in the throes of 'The Great Experiment' or prohibition. As beer and ale were nonos then, breweries had to expand their expertise and, in one photo, this is shown by a Ford panel delivery which peddled Anheuser-Busch's yeast and barley malt syrup!

But whether the times were fair or foul for commercial enterprise, it was business as usual for those trucks which had carried beer....and would carry it again.

This is but a window on the truck industry. But as such, it represents an integral segment of the truck market and its by-product, a corner of automotive history.

A good book with a glimpse of a time that was? You bet it is.

- Keith Marvin



LETTERS

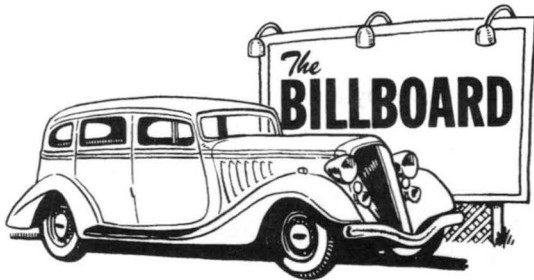
ADDITION TO PARIS NOTES

Re: "SAH at Retromobile/Berliet Foundation '99" and "President's Perspective" in No. 179 (March-April 1999), no account of the SAH dinner in Paris would be complete without noting that three of our members provided an after-dinner program by enlightening us on the aviation activities of the automobile companies in which they are most interested. *Jules Heumann* (Hispano-Suiza), *Grahame Orme-Bannister* (Armstrong-Siddeley), and *Sinclair Powell* (Franklin) were pinch hitters at the last moment for our original invitee, who declined. If there were an SAH Good Spirit award, these gentlemen would be the winners for 1999. **Taylor Vinson, 1314 Trinity Drive, Alexandria, VA 22314.**

EARLY AMERICAN BOXERS

I am writing a history of cars with horizontally opposed four-cylinder engines - so-called "boxer" engines. Three makes of American cars from the early part of the century had boxer engines - Winton in 1904, Santos-Dumont also in 1904, and Apperson from 1902-04.

Can any SAH members please help me with details of the engines (photos?) and the engineers behind these cars? **Gavin Farmer, 116 Onkaparinga Rd., Bridgewater, S. Australia 5155, Australia. Phone/fax +61 8 8339 3645; Email roadkill@eisa.net.au**



WANTED: New York auto show photographs taken at Madison Square Garden, the Grand Central Palace, or the New York Coliseum for an upcoming book on the event's 100-year history. Also seeking photos from the March 1948, VMCCA new/old car show at New York's 71st Regiment Armory the February 1949, International Auto Show at the 69th Regiment Armory; the April 1950, British auto show; the 1952-54 Electric Auto-Lite Parade of Stars at the Waldorf Astoria; and the 1952-55 International and World Motor Sports Shows staged by Herb Shriner and Fred Pittera. The New York hotel salons are beyond the scope of this book. Willing to borrow, buy, or reimburse for duplicates. The older, the wierder, or the more evocative, the better! **Gregg Merksamer, 29 Old Oak Road, Warwick, NY 10990. Phone: (914)986-6857. Fax: (914)986-6858. Email: MERKS62@WARWICK.NET.**

WANTED: Artwork illustrated items, for Mercedes-Benz vehicles. Prints, posters, postcards, calendars, greeting cards, sales brochures, books, other?, with particular interest in 50's and earlier. **David Barber, Jr., POBox 2098, Banner Elk, NC 28604-2098. Phone: 828-898-6375, email: dbarbsta@aol.com.**

WANTED: "Carlore," the surprisingly neglected lore of the automobile—a topic so vast I should probably send an explanatory questionnaire. Includes Do's & Don't's (which often cause arguments on "Car Talk"), Handy Hints, Rumors & Tales, Slang, Jokes, even Superstitions. **Michael Bell, Campus Box 226, Boulder, Colorado 80309. Phone: (303) 492-6059. Email: mbell@colorado.edu.**

\$750.

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WANTED: Contributions to the *SAH Journal*. Short studies, book reviews, first-person historical perspectives, nearly anything automotive. Please send, email, or fax all contributions to: **SAH Journal, 307 Kingston Drive, Douglassville, PA 19518. Fax: (610)277-2505. Email: SAHJOURNAL@AOL.COM.**

IT HAPPENED YEARS AGO

One hundred and five years ago...

July 4, 1894 - Elwood Haynes' vehicle was demonstrated on Pumpkinvine Pike in Kokomo, Indiana. The vehicle, built by Elmer and Edgar Apperson, attained a speed of six miles per hour.

July 20, 1894 - Errett Lobban Cord was born.

One hundred years ago...

July 11, 1899 - Giovanni Agnelli purchased the Welleyes bicycle and automobile firm, which became the firm known as FIAT of Turin.

August 28, 1899 - The Pittsburgh Motor Vehicle Company became the Autocar Company.

Ninety years ago...

1909 - Rapid Motor Vehicle Company joined General Motors.

July 4, 1909 - The first concrete pavement rural road was opened. This mile of road was built on Woodward Avenue (now U.S. Route 10) in Wayne County, Michigan. Between Six Mile and Seven Mile Roads, the paved road cost \$13,534.59.

July 14, 1909 - General Motors purchased the Cadillac Motor Car Company for \$5 million.

Eighty-five years ago...

July 15, 1914 - Horace E. and John F. Dodge incorporated the Dodge Brothers in Lansing, Michigan. The company stock was worth \$5 million.

Seventy-five years ago...

1924 - Kenworth introduced its first truck, the KS-255.

Sixty-five years ago...

1934 - Chevrolet produced its 10,000,000th car.

Fifty years ago...

1939 - Ford produced its 27,000,000th car.

1939 - Chevrolet produced its 15,000,000th car.

Forty-five years ago...

1954 - General Motors produced its 50,000,000th car.

July 1, 1954 - The Facel Vega was introduced at the Paris Auto Salon.

August 1, 1954 - The Nash-Healey sports car ceased production after only 504 cars.

Thirty years ago...

August 21, 1969 - Audi and NSU merged to form Audi NSU Auto Union AG.

Twenty-five years ago...

1974 - Vanden Plas became part of Jaguar.

August 1, 1974 - The first Bricklin rolls off the assembly line.

Twenty years ago...

July 24, 1979 - Chrysler Corporation petitions the US government for \$1 billion in loan guarantees.

Fifteen years ago...

July 1, 1984 - Jaguar became independent of British Leyland

July 11, 1984 - New York establishes American's first mandatory seat belt law.

Northern Automobiles

\$800

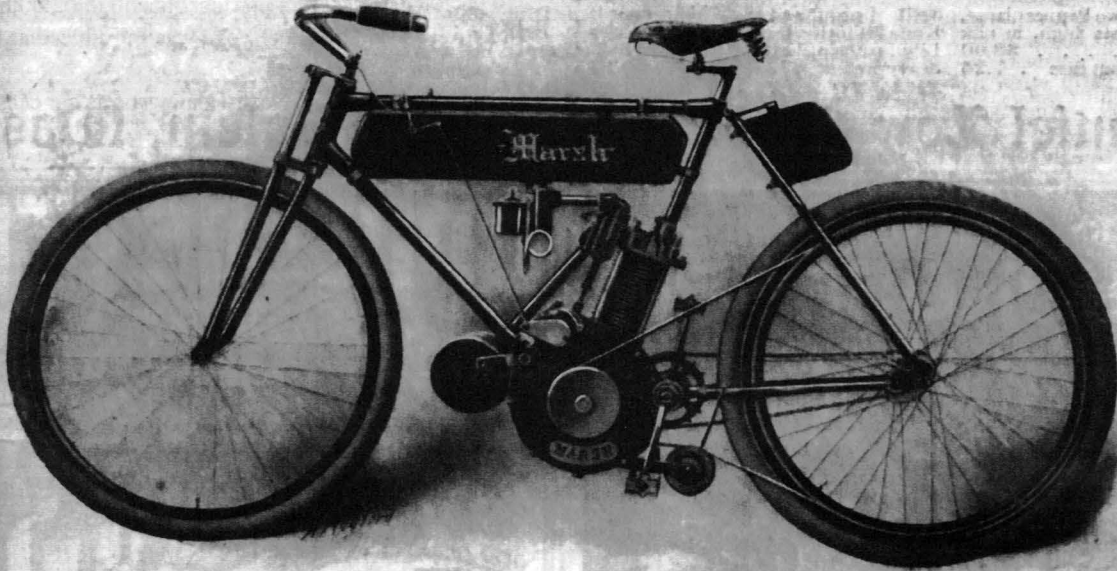
FOR speed, safety and solid strength the **Northern** surpasses all other gasoline runabouts. The crowning triumph of twelve years of automobile building by a master mechanic. Perfectly constructed of the best materials, of beautiful design, superbly finished; odorless and noiseless; easy to start and operator has absolute control. There is every provision for comfort; big luxurious cushions; pivotal body bearings that insure a motion independent of the motor and combine with the springs to absorb all vibration. The sturdy **Northern Automobile** is a substantial product of a substantial company and has records for speed and endurance. Write for Catalog and name of nearest agent.

NORTHERN MANUFACTURING COMPANY, Detroit, Mich.

This advertisement, and the others located in this publication, was found in the May 1903 issue of The Munsey magazine. This particular issue of this general topic magazine featured automobiles. Articles such as "The Future of the Automobile" took a look at the automobile in 1903 society and trends that could be foreseen at that time. Other ads appear on pages 14 and 16.

- from the editor's collection

Marsh Motor Cycle,



1903 Model.

PRICE \$125⁰⁰

***N**OW is the time to place your order for the
1903 model Marsh Motor Cycle.*

This machine is guaranteed to renew the old pleasure of cycling one hundred fold. Your money back if it does not travel at the rate of forty miles an hour when required. Can be regulated to any speed from three miles an hour up. Can be converted into a two-seater in five minutes' time by the use of our rear seat attachment. It is the most powerful and durable road machine in existence. Write for circular giving full information or inquire of your local bicycle dealer.

Motor Cycle Mfg. Co. Brockton, Mass.