Coachwork

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Abstract
The coachwork is the last step of manufacturing of motor-cars. It is the part more exposed to the judgement of the public and for this reason very important in commercial sense.
This article explains the chief points of evolution of technique and taste on this subject.

Riassunto
La carrozzeria
La carrozzeria rappresenta l'ultima fase della costruzione dell'automobile. Essa è la parte più esposta al giudizio del pubblico e perciò molto importante dal punto di vista commerciale.
Questo articolo richiama i punti principali della evoluzione della tecnica e del gusto a questo proposito.

The history of automobile coachwork is deeply rooted in that of the horsedrawn carriage.
Not to go too far back in time, let us begin with the " suspended cart " of Hungarian origin that appeared in the west in the fifteenth century. Chains, later replaced by straps, held the body on the chassis. Then the method was perfected, while roads also improved.

The real carriage had arrived; that is to say, an elegant conveyance which was also becoming luxurious, with a soft suspension, the fore-carriage pivoting and the windows glazed. This, in different variations, became the preferred transport of the aristocracy, the clergy, the middle classes and the very rich. Anne-Marie Louise d'Orléans, " la Grande Mademoiselle " (1627-1693) used to appear at Cours-la Reine in a carriage completely upholstered in crimson velvet attached with golden studs.

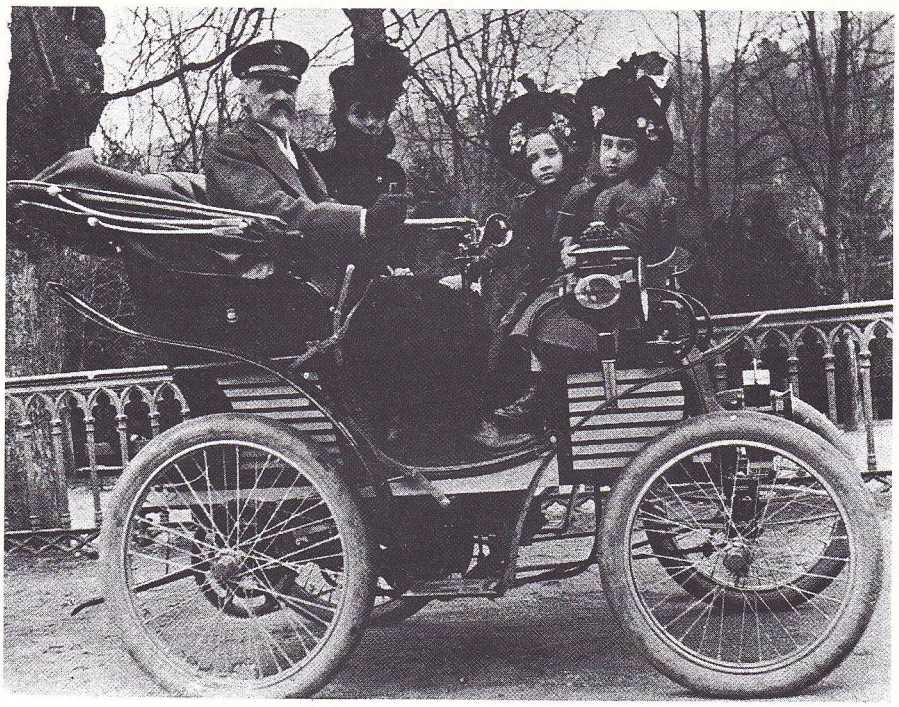


Fig. 1 - Welleyes-Fiat 3/2 HP (1899)

After the coach, very massive, was developed the extremely light " gig ". In the gig, the rear part is protected by a leather apron and by a leather hood, attached by means of adjustable fasteners.
In contrast to the six-horse gig, the faster " cabriolet " needs only two horses.

Friedrich Wilhelm, Elector of Brandeburg (1620-1688), had built in Berlin, according to a design by Piedmontese Filippo di Chiese, the " Berlina ", whick is comfortable to travel in, but very heavy. This carriage divided in two becomes the " coupé ".
With this abundance of types of conveyance came a powerful increase in travel. For the less prosperous the " diligence " (stage coach) was constructed.
In America the evolution of these means of transport followed the same direction as in Europe, but in more rapid pace. Notably, the " Conestoga wagon " appeard in

1750 and became famous as " Prairie schooner ".
Coming to the first motor cars, the chassis produced by the first constructors were passed for finishing and upholstery to the manufacturers of horse-drawn carriages.
It is difficult to establish a sharp classification of the types of automobile carriage resulting from this.

G. Kellner, a Parisian coachbuilder, in 1906 proposed the following classifications:
1) Owner driven cars (without chaffeur);
2) Double phaetons (light four-wheel carriages drawn by four horses);
3) Landaulets (small open cars with folding hood over rear seats);
4) Coupées and limousines;
5) Cars with engine under seats.

Always, according to Kellner, owner driven cars are very enjoyable, permitting of personal driving and are able to render great service to doctors and salesman called to turn out whatever the weather. These cars are provided at the front with a windscreen that rises up to head and, a curious thing because these cars are sideways open, does not let cold air into the car in winter, and the few currents of air during driving are light enough that you can keep a match alight.

In double phaetons mounted on a normal chassis it is also possible to place two seats with backs, and in this case the passengers are seated sideways as in a " bus ". These seats are movable and can be removed if need be.
Landaulets are the most difficult cars to construct. In effect, vibrations always cause some " play " in the demountable parts so that they rattle and make the car noisy. It is better, in two-seater landaulets, to leave the two forward columns fixed, and in landaulets-limousines not have the rear parts folding down.

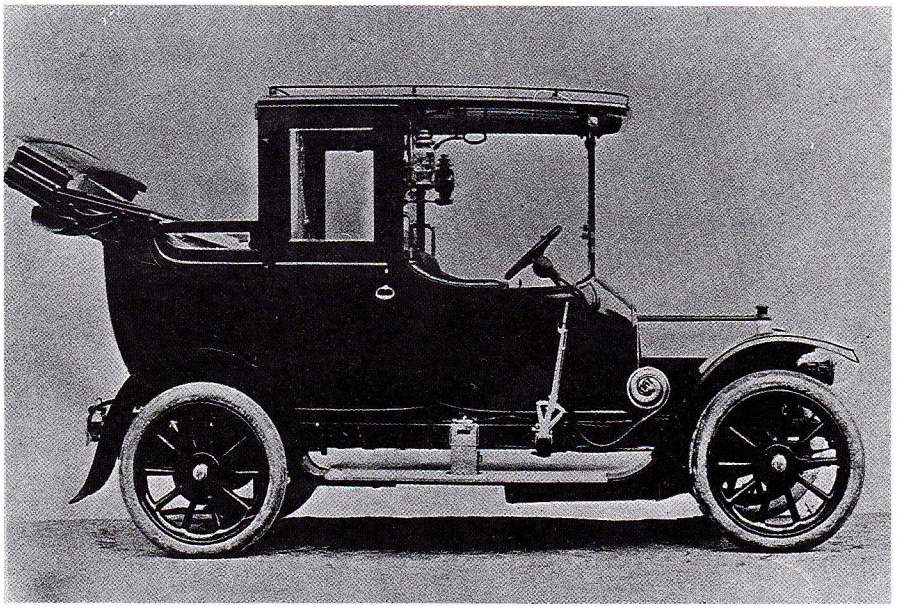
This type of car is extremely convenient as it enables you to have a closed car and an open one at the same time.
These cars must be strongly built to have two door openings. The half doors always tend to rattle.
Cars with engine under the seat are useful above all in cities. In the first years of the century the automotive industry was represented by a few firms that had a production of more than 1000 units per annum, and to these we add a multitude of constractors producing a few cars.

The growth of the new industry was maintained by those that were producing engines for sale to other contructors, because, for exemple, the casting of cylinder blocks was an undertaking beyond the resources of the majority of enterprises.
In the same period, the coachwork of the cars tended to resemble that of horse-drawn carriages, which demanded, beside a refined taste, first class materials and skilled craftsman.

The use of sheet aluminium and steel was considered, but results were poor and hardly satisfactory. The aluminium that was produced in these days used to break and easily fall to powder; the sheet steel for various reasons was restricted to the production of panel, ribs or trimming not able to be produced in wood.
To finish duly a car involved a time of at last three months, comprising a study of full-size drawing, construction of the body, painting, fitting out, finishing and sufficient time for storage to allow the paint to dry perfectly.

While in Europe automobiles were being built mainly for the more prosperous classes, not excluding the General Staffs that were preparing armies for the first World War, in America production was oriented towards a more modest but more numerous clientele.
Ford did not worry about the fickle taste of his clients but about a single model becoming gradually more perfect. Ford's ideas can be got from his writing: " The question is this: is it better to sacrifice artistry to

Fig. 2 - Fiat-Landaulet 12/15 HP TIPO 1 BIS (1910)



utility or utility to beauty? What, for exemple, would be the use of a teapot in which the spout, for artistic intrusion, did not allow for pouring tea? The automobile is a modern product and must be constructed not to represent something but to lend itself to service for which it is built".

Already, others were distinguishing between "function" and "representation" and in the case of incompatibility opted for the former. One can cite the Futurist Movement, Constructivism and the spirit of Le Corbusier.
Ford's merit lies in having tranlated Functionalism into tangible products. "It is my boast that every part, every article that I produce is both well made and robust and that nobody has to be faced with replacing. Every good automobile must be as dependable as a clock"

From 1908 to 1927 15 million exemples of the famous Model T were sold. With Ford ends the first period of the history of the motor car, which assumes from then on an "industrial" shape.
In 1923 A.P. Sloan became President of General Motors and proposed to reach and overtake Ford's sales.
General Motors took a great step forward in automobile styling, presenting in 1926 a new and very colourful Chevrolet in direct competition with the Model T, coloured black. In that year Chevrolet sold more cars than Ford. Ford's reply was immediate and within a year the Model A appeard on the market, more elegant, initiating the new sales tactic of changing the model every year and precise research into styling.

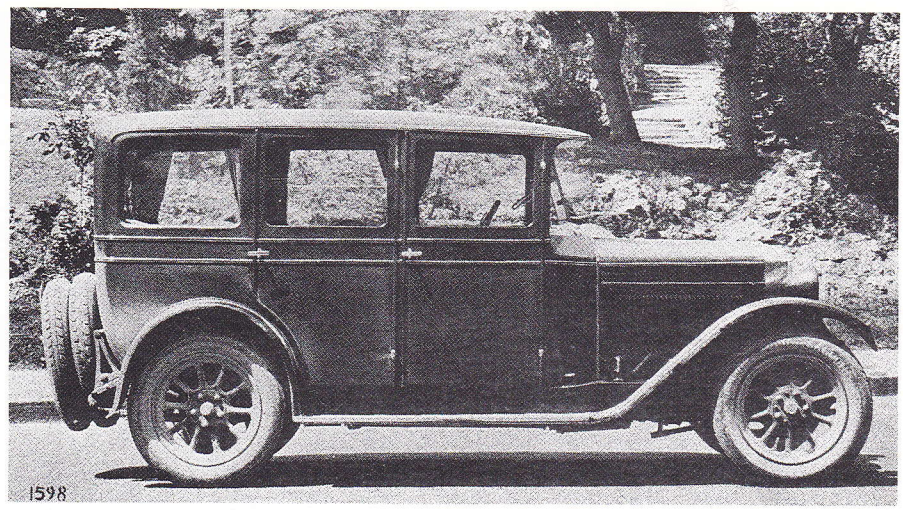
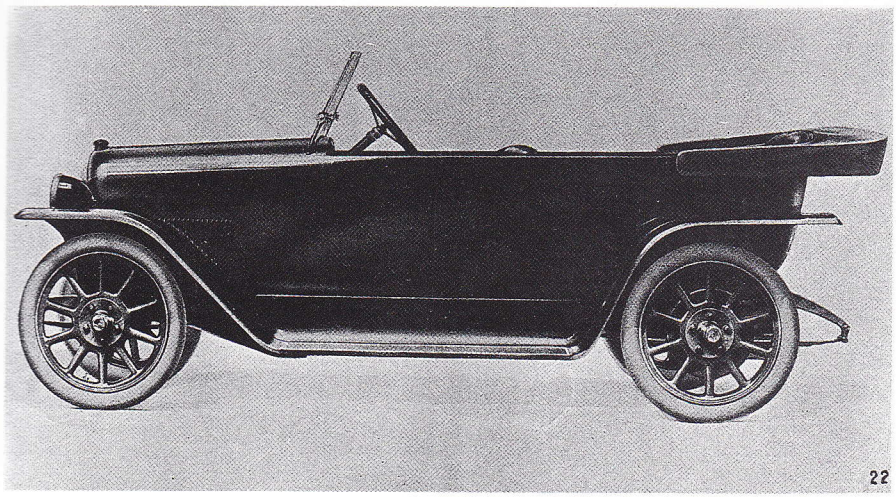


Fig. 4 - Fiat-Torpedo tipo 509 (1926)

With the outbreak of the first World War, the appearance of cars was becoming uniform and the period of the classic shape and maturity of the automobile had arrived.

One of the most interesting cars of these years was the Lancia Lambda, which went into production in 1922. Instead of the traditional pressed steel chassis, on which the body of wood and metal was fixed, the Lancia used a one-piece hull in pressed steel. In this way the chassis was combined with the lower half of the body, in which the backs of the seats served as transverse stiffeners of the structure.
The weight of the structure of the Lancia Lambda was less than that of the chassis of other cars of the time.

Fig. 3 - Fiat-Torpedo tipo 501 (1919)



The Lancia Lambda was built from 1922 up to 1931 and from 1927 was also available as a chassis only, to meet the demands of specialist coachbuilders. The Lancia Lambda was lower than its contemporaries, guaranteeing excellent roadholding. The next step in combining chassis and coachwork was completed in 1931 by the Budd Company of Philadelphia, who built a prototype berlina shell entirely of steel, in which door posts, the ceiling and the floor were integral parts of a complexe welded stucture. But it was André Citroën who in 1934 launched his "Traction avant" with chassis and coachwork built as one.

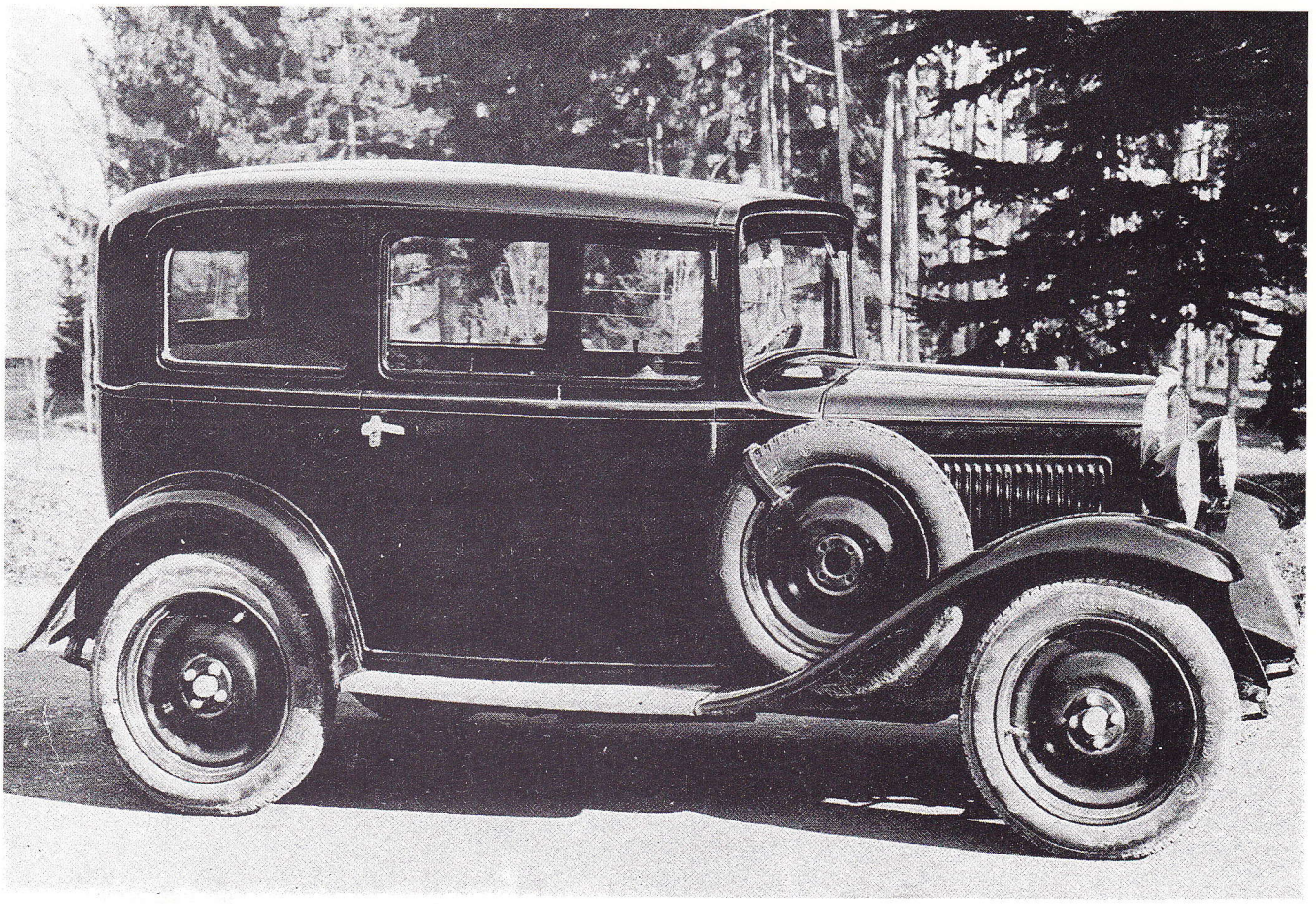


Fig. 5 - Fiat-Berlina Standard tipo 508 (1932)

This solution turned particularly suitable for mass production. The " Streamline " (aerodynamic shape) represented one of the important phenomena of the '30s that has interested car coachbuildners.
The new style was born both from aerodynamic study and from the introduction of new technology and in particular from the development of plastic materials and the pressing of sheets.

One notable contribution to the study of the internal motion of fluids was made by the invention of the wind tunnel, adopted for the first time in Germany in the Zeppelin works. Initially adopted for the shapes of aircraft, the wind tunnel was then widely utilised by the automobile industry.
In this last field we pass from the first empirical models such the Alfa Romeo of 1914 designed by Castagna and the studies for the " Tropfenrennwagen " of E. Rumpler to the scientific experiments of the Hungarian P. Jaray conducted in the wind tunnel and the successive car designs laid out in 1930 by Sir Dennison Burney.

In the '30s the Detroit industries utilised the wind tunnel for the design and mass production of streamlined cars. Among the most prestigious models the Airflow Chrysler is remembered and the Hupmobile, both of 1934.
A typically American phenomenon of the '30s, that applied to all industrial design and of course also to cars, was the so-called " styling ".

This consisted in an appropriate cosmetology of the product so as to give a new fascination and a new elegance to the object apart from every true and real technical and functional reason.
It was justified by the crisis of 1929. In those years there appeard in America powerful professional organisation whose main principle was a study of the best way to make already obsolete products

desiderable.
American styling was going to break into Europe as soon as the economic/social situation was ready for it.
In Europe, between the two World Wars, prestigious models proliferated, in response to various needs: political propaganda, company prestige, pure aesthetic taste, like Volkswagen by Porsche, the FIAT 500, 1100, 1500, the BMW and the creations of Pininfarina for FIAT, Lancia, Alfa Romeo, etc.

At the beginning of '50s, under American influence, the coachbuildners of Europe showed some stylistic disorientation.

Ornamentation started to prevail in the composition, linked with the structure of the vehicle and there was a tendency to abandon aerodynamic efficiency.
At the same time the industry took advantage of the tendency to massive and rounded shapes to define types of vehicle easily pressed and obtainable with ever

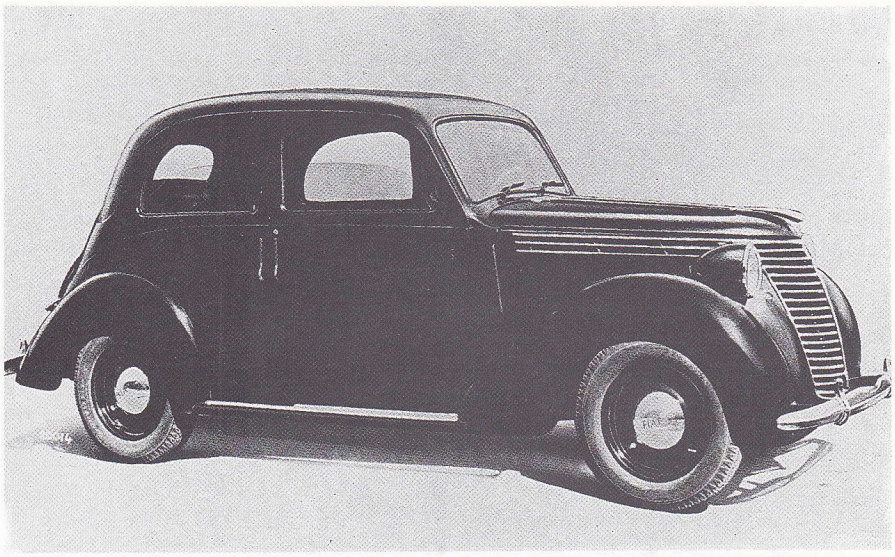
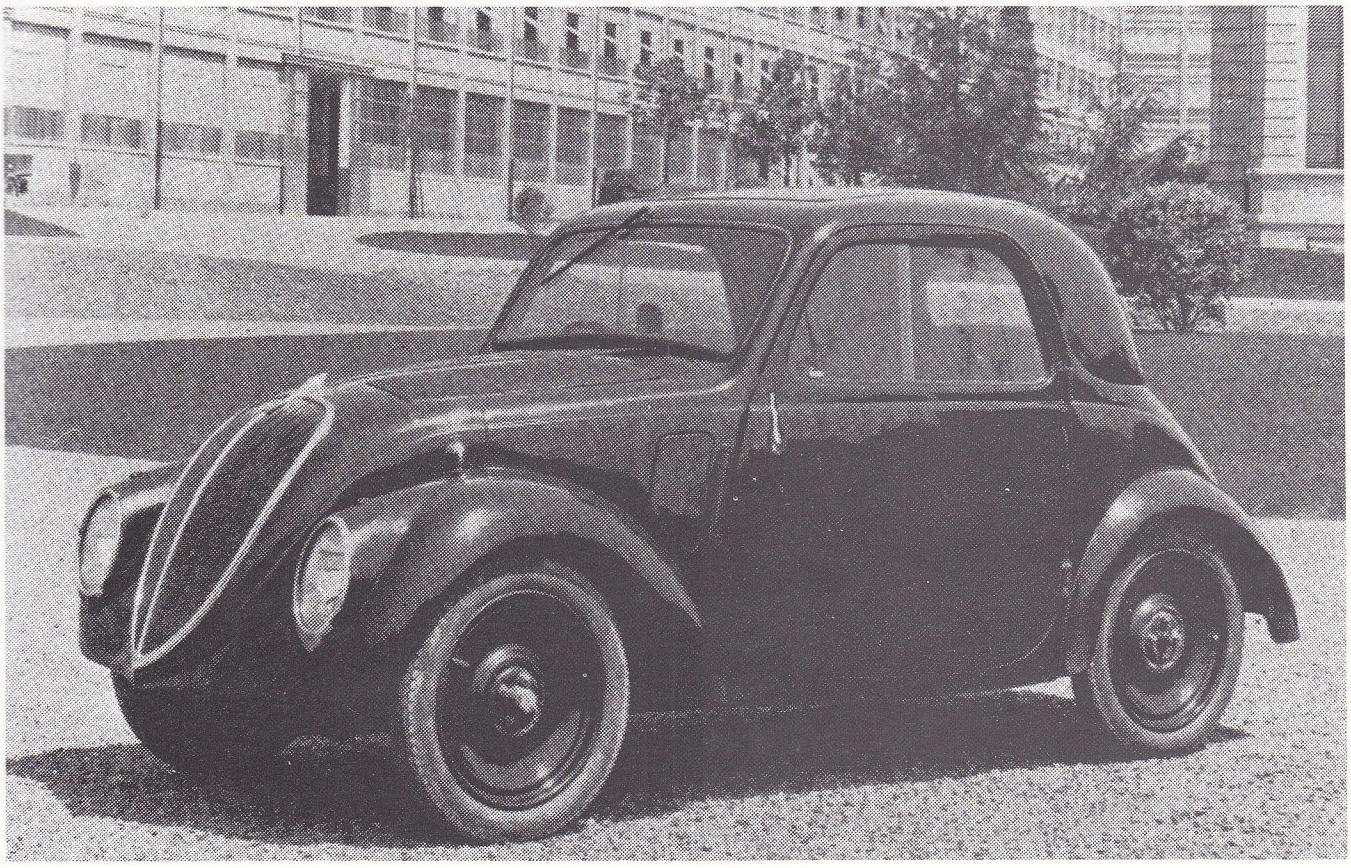


Fig. 7 - Fiat-Berlina Standard 1 100 B (1948)

Fig. 6 - Fiat-Berlina Standard tipo 500 (1936)



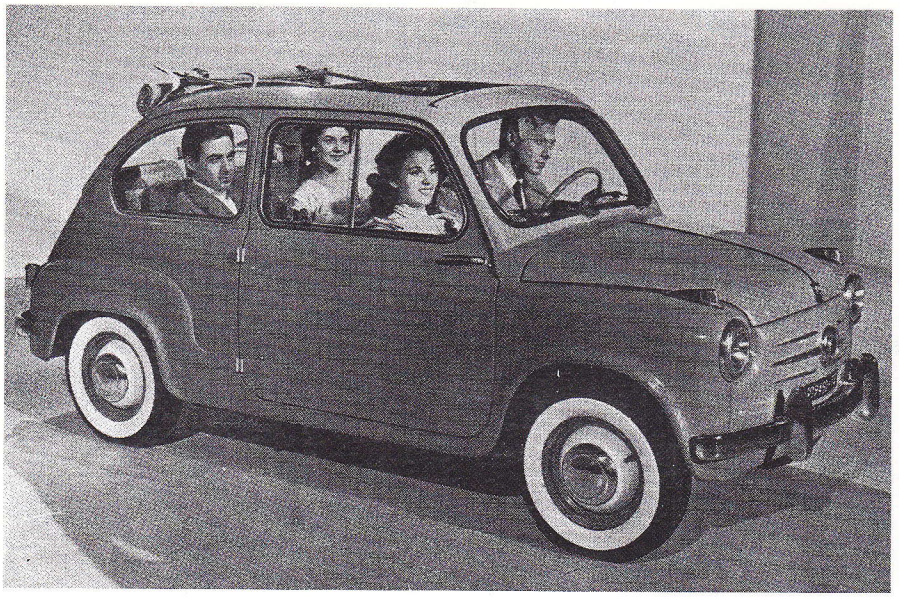


Fig. 8 - Fiat-Berlina Standard tipo 600 (1955)

more mechanised assembly processes.
In the second half of the '50s began a new trend of slimline coachwork that exploited angles and intersections, with flattened sections suspended on rectilinear uprights, slender and chrome plated. This new language spelled the end of Americanism.

About the end of the '60s appeard the wedge-shaped vehicle that is the new way to fulfill the dictates of aerodynamic theories.
An important model is presented by Pininfarina in 1977 in collaboration with the Consiglio Nazionale delle Ricerche taking into account the latest demande of automobilism with a view to energy saving, safety and the struggle against pollution.

But in these last ten years of the life of the motor industry in as far as it concerns coachwork, the most outstanding phenomenon is the achievement of Italians at the highest level all over the world. It is not easy to define the " Italian line " in the planning and design of coachwork because the creations of our coachbuildners have considered the whole gamut of vehicles from utilitarian to middle-of-the-road to deluxe cars and flagships of the different marques from various countries.

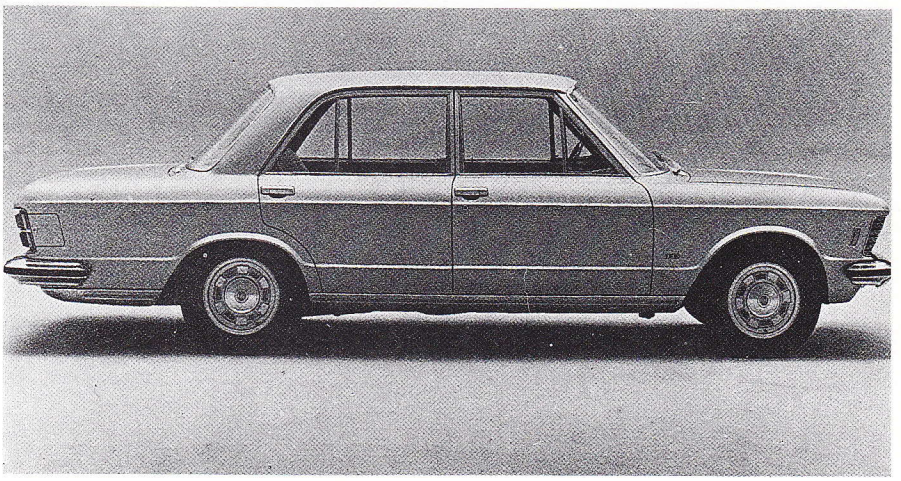
The most recent progress is recognisable in the research for ever more aerodynamic shapes and also in the use of new, lighter materials as well as in greater comfort and silence.
On the basis of industrial aesthetics of Italian Coachbuildners is a happy relationship between good taste and good sense that is a fundamental concept of design of the most varied products, already illustrated in 1757 at the start of the industrial revolution by the English Philosopher D. Hume in is treatise " Of the Standards of Taste ".

In 1960 Henry Ford II recognised this truth in the following statement: " Theoretically we can install an automobile factory in every country in the world and have the means and capacity to dominate any market. But one thing alone is not allowed to us: to design cars as beautiful as those of the Italians.

There are a dozen men with whom, sooner or later, not only we but all constructors will have to contend " Still remaining in Italy, we must draw attention to the activities of Centro Stile FIAT and the indipendent design centres (Ital Design, etc.).

Stylists work starting from basic data like the wheelbase, track, drive, seating capacity, engine cubic capacity and weight of the vehicle. In the framework of the division of labour, the moment of " vesting " intervenes when all the others departments have defined the characteristics of the prototype. The CAD technique allows to visualise

Fig. 9 - Fiat-Berlina tipo 130 (1969)



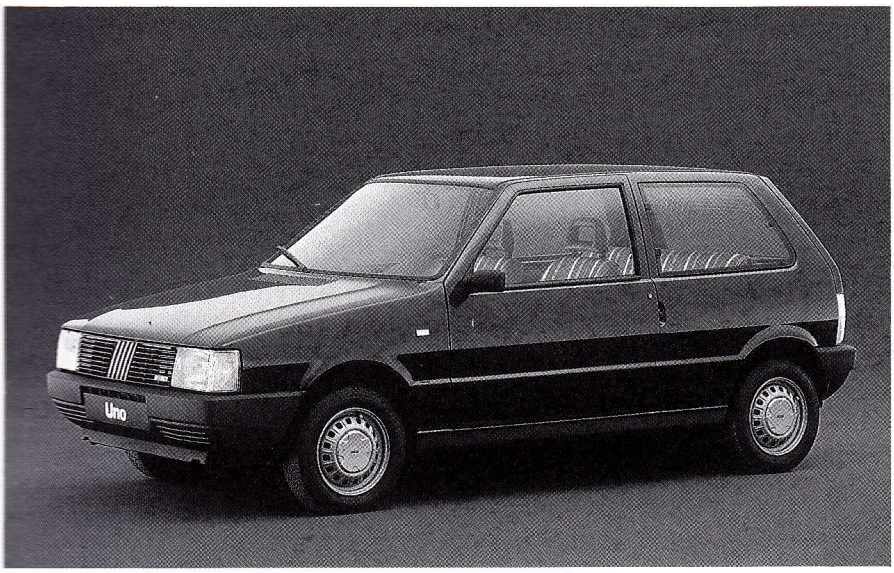


Fig. 10 - Fiat Uno (1983)

have also contributed to the spread of these steels.
The changes in prospect for the future are noteworthy and, perhaps in the next decade, will extend to modifying the relationship between passengers and cars and the manner of driving.

Technological victories over the years have repeatedly reached maturity in experimental prototypes, passing on to the assembly lines for everyday production.

But contemporaneously with these powerfully levelling tendencies there has always been in evidence a lively research into personalising the car, for which the coachbuildners of

on one screen the shape of the car or a parte of it, with the aim of attaining an optimum design both from the aesthetic viewpoint and that of performance.

A further step forward on the road to motor car design is represented by a simulating device already inspired by other, in use in aviation.

Simulation comes into aerodynamics too. The effect of the " electronic wind " simulated on an electronic model of the automobile are already being studied. Because it refers to materials used in coachwork, other than the traditional sheet metal, plastic materials must be cited, whose role is destined to become predominant in the near future.

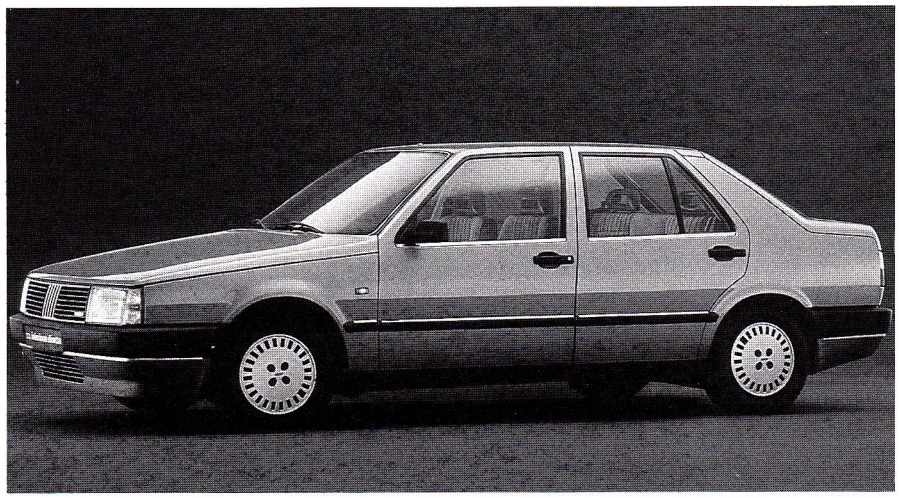


Fig. 11 - Fiat Croma (1985)

Aluminium represents an alternative to plastic materials, having among its characteristics that it is not attacked by rust.

Aluminium has already had widespread in the past, in sporting and " élite " cars. In specific cases the costs, still higher than versions in sheet steel, can be balanced against other factors such as prestige and weather resistance.

The reduction in car weights in the USA in recent years has come with the introduction into coachwork of HSLA steels (high strength low alloy steels).
The criterion for the substitution of parts has been primarily economic. Considerations relating to safety

different countries are working.

" Man would like everyone to be occupied with him and if it is not possible compell them with the display of his vertues, his wealth and power, will draw the attention of the skivvies of the inn with a long beard, a tattered cloak or a breached cask " wrote M. Gioia at the beginning of the nineteenth century.

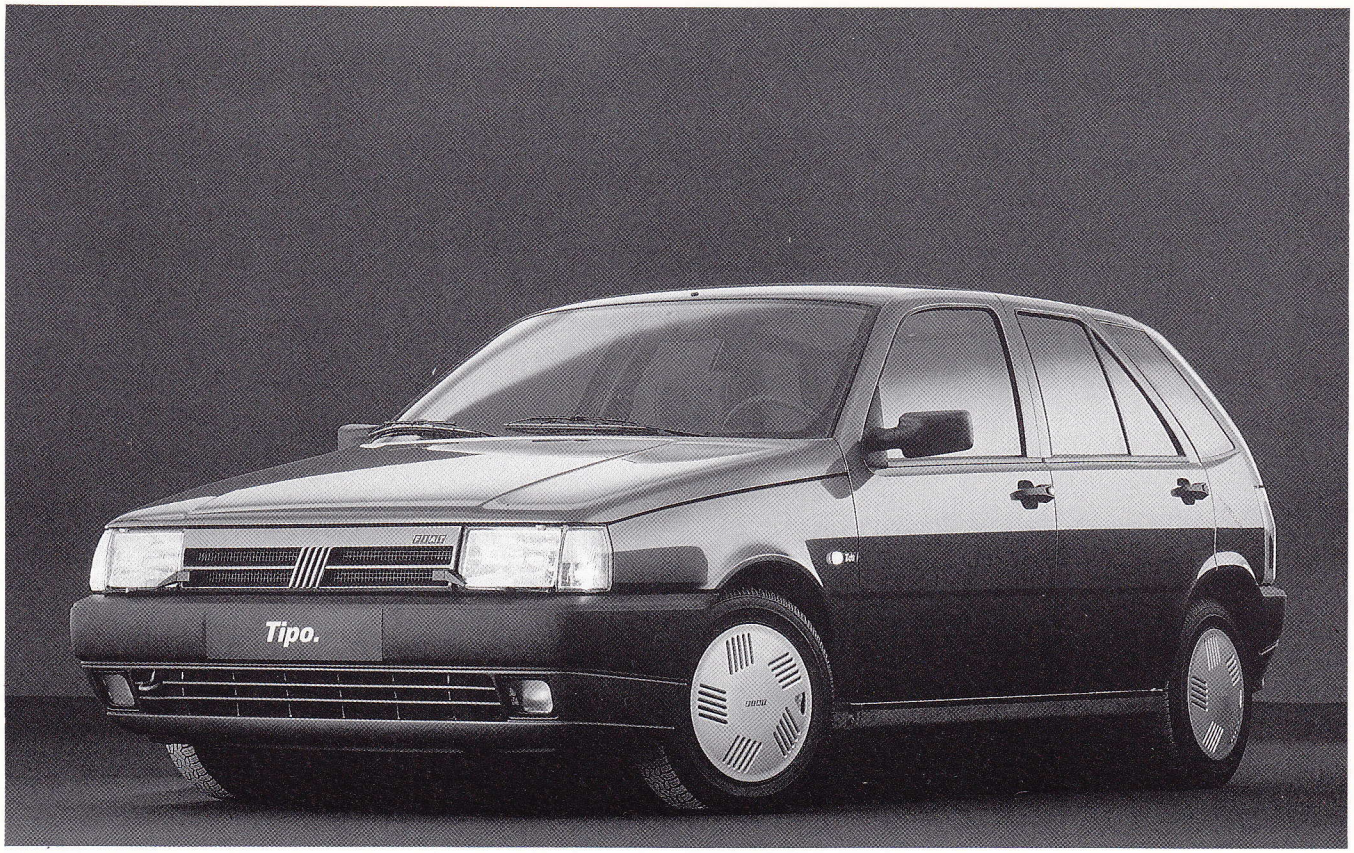


Fig. 12 - Fiat Tipo (1988)

And we can add " with a car more or less different from all others ".

G.R.

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