Queen Elizabeth examines Rex Hays' 1894 Panhard et Lavassor (the first gasoline-engined car to run on British roads) presented during the Royal Automobile Club's Diamond Jubilee.

COUNTERFEITER BY *Royal Command*

BY DENNIS MAY

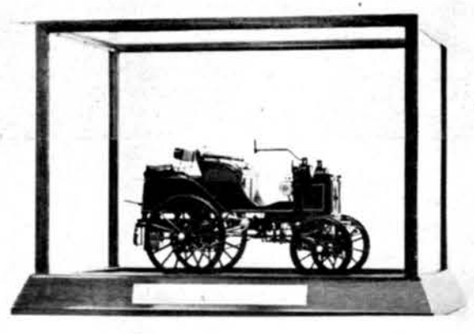
Perfection is the only standard that goes where Rex Hays, model-maker extraordinary, is concerned. Whether you want a twenty-fourth scale Stutz or a complete Grand Prix layout in miniature, replete with cars that run, Rex is the man to see.

Working from the real thing, Hays fine-touches the D-type model, made for presentation to Prince Charles. Rex gets extreme realism by working from the actual car.

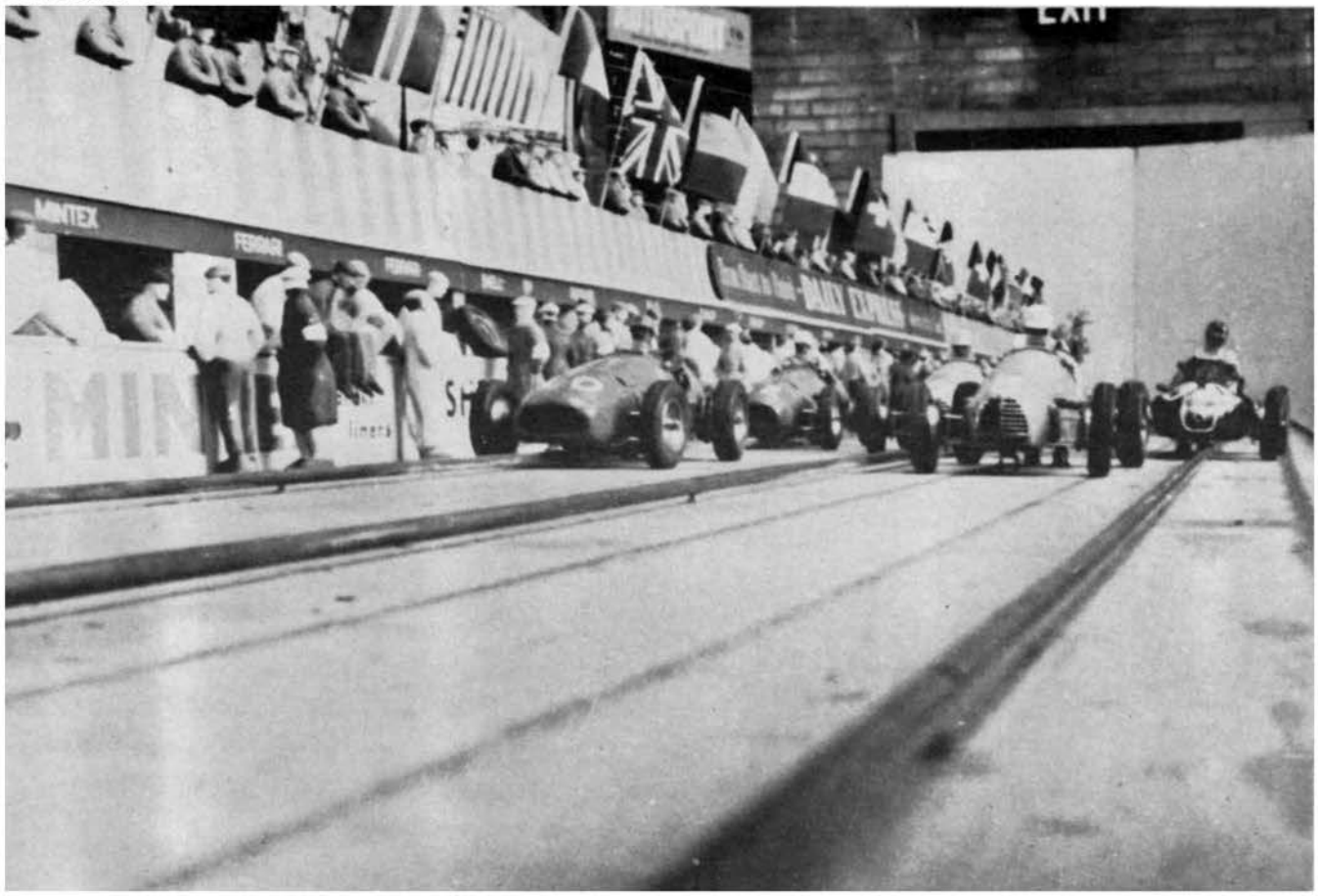
IN a public tribute to Rex Hays, maker of scale model cars, a speaker recently remarked that Hayses were as rare as archbishops. This, although kindly meant, was an understatement. In England alone, the great miniaturist's native land, there are *two* archbishops, whereas the whole world hasn't cradled another automobile modeler to compare with Rex. Presently, most of his output is earmarked for monarchs or millionaires, and he won't rush an assignment to please either. "Perfection", as Voltaire mused, "walks slowly — she requires the hand of time."

Hays, fifty-two years old, tall, athletic, bald-pated and a terrific talker (I'm the world's biggest gasbag"), has been staying in step with perfection's loping stride for more than four decades. At the age of eleven he conned his way onto a footing of friendship with the great Count Louis Vorow Zborowski, whose British estates happened to neighbor Rex's boarding school. Zborowski repaid the boy's hero-worship by taking him on rides in his then-current Hispano Suiza. He didn't quite go as far as saying "You too can have an Hispano like mine" but he did hint at the fun and creative satisfaction that might be gotten from counterfeiting the big bolide *in parvo*. Rex took him at rather more than his word, whittling a whole raft of tiny cars, each one true to a celebrated original, from offcuts of hardwood. Then, to give them a fitting background, he fashioned a scale-true replica of Brooklands track, later to be the scene of some of Zborowski's greatest triumphs.

And there began a lifelong career as a decimal decimator that climaxed in March of this year with the presentation



Close up of the Panhard et Lavassor model (hermetically sealed in its case) presented to the Queen. It took Rex five weeks to make this model, which is on display in London's Science Museum.



In 1952, Rex completed a full field of contemporary G.P. cars, and built and erected a 400 foot track for them to race on. It included pits, grandstand, billboards, safety fences, trees, officials, and 600 spectators — all accurately reproduced at one tenth scale. The cars, powered by 1.5 cc engines, appeared to be controlled by the drivers.

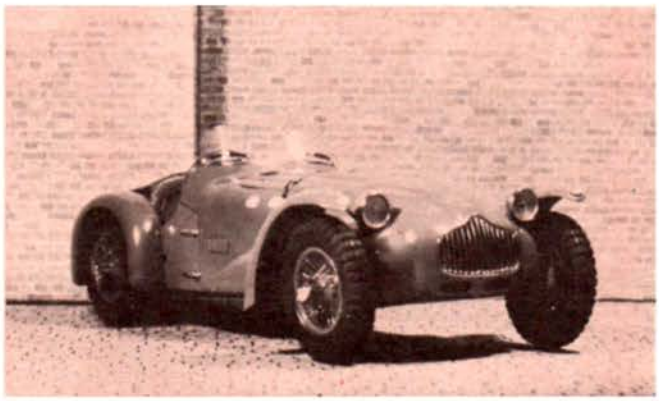
to Queen Elizabeth II, during ceremonies marking the Diamond Jubilee of the Royal Automobile Club, of the supreme masterpiece of Hayscraft — an inch-to-the-foot miniature of an 1894 Panhard et Lavassor. The sitter for this 3-D portrait was the first gasoline-engined car to run on the roads of Britain, and is an exhibit in London's Science Museum. Not counting the time he spent studying, sketching and measuring the Panhard in the museum, it took Hays five weeks to make the model which, fissile missiles permitting, will likely still be delighting connoisseurs a millenium hence. (To safeguard it from the horsing proclivities of kid princes yet unborn, and thereby improve its chances of achieving this impressive longevity, the model is garaged in a hermetically-sealed glass case).

Antique cars like the Panhard, with a minimum of plain surfaces and largely exposed running gear, are naturally far more exacting than modern smoothies. Nonetheless, Hays adopts the same accuracy test for his miniatures of all eras and types. On completion, they are photographed at close range against an appropriately-scaled backdrop. If the resulting pictures are indistinguishable from similarly-angled likenesses of the full scale counterparts, he's satisfied; if not, he goes to work on a rectification job that may itself take anything up to a couple of weeks, or sometimes he simply tosses the thing out of the window.

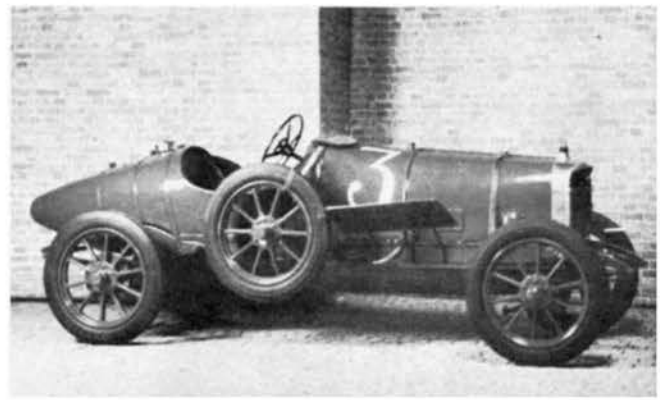
When perfection is the only standard that goes, even a clean-shaven ensemble takes Rex a hell of a time. Paradoxically, for instance, he was two weeks longer on the D-Jaguar that Sir William Lyons commissioned as a present for Prince Charles than it later took him to create the complex Panhard. Normally he wouldn't have accepted the Panhard commission on a five-weeks basis (in the preparatory roundup he filled 56 pages of a 7x9 notebook with sketches and notes), but limited advance notice for once obliged him to work with a calendar tied to his tail. Complaisant through they were, the R.A.C. couldn't very well *postpone* their Diamond Jubilee.

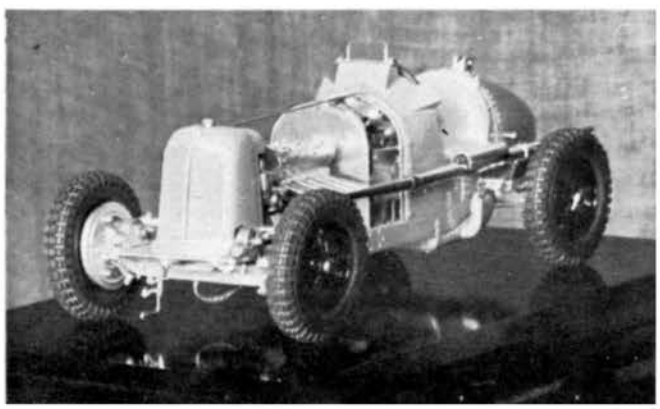
The D-Jag assignment made slightly more allowance for perfection's measured tempo. Coventry's civic authorities, planning marks of love and loyalty for the Queen during a visit she was slated to pay their city in 1955, quizzed Lyons of Jaguar for suggestions about a gift to be relayed via Her Majesty to young Prince Charles. Understandably proud of the Hawthorn-Bueb victory at Le Mans a few weeks earlier, Sir William hit on the idea of a boy-size effigy of his D-wagon. He instructed that Hays, the master, be propositioned in this respect. Rex at first was doubtful, objecting that the timetable might prove too tight for him. Finally, though, he relented on condition that a lifesized D be delivered to his home by breakfast time the next morning and left there until the job was done. So eager were Jaguar that they did even better—they delivered it the same evening. By deliberately omitting all the legal formalities pertaining to motoring in Britain (the car arrived without even a set of transporter plates), they made sure that Rex devoted the seven available weeks exclusively to modeling, rather than personally re-enacting the Le Mans drama in England's green and pleasant land.

Early post-war Allard, in the Hays manner. Rex plans a complete collection of great sports cars.

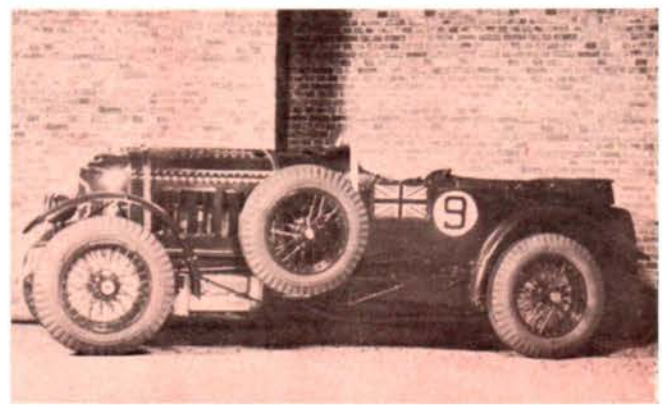


Hays' tenth-scale reproduction of Rigal's winning Coupe de l'Auto Sunbeam, vintage 1912.





ERA, with 4000 parts, goes to best performing British driver of British car in Foreign event.



Tenth-scale 4.5 liter Le Mans Bentley of the early 30's. Hays once owned one of these.

So far as materials and construction methods, the royal Jaguar was pretty well representative of Hay's technique in the field of static (i.e., nonpowered) models. When making a reproduction of this type, either without a chassis or with its skeleton totally enveloped in bodywork, the basic problem is that of shaping the hull with hair-splitting accuracy. Material for the hull is wood—usually French lime. Why? "Because I believe", says Rex, "that the complicated and subtle contours of a modern sports-racing or Grand Prix car can be reproduced better by carving than any other way." In this context, metal is an unforgiving medium: goof just once and you can't cover up or ungoof. Some purists disdain wood for parts which are of mineral rather than vegetable extraction on real cars; but Hays figures this as "phoney realism" on the grounds that if you're going that far it would be logical, almost morally obligatory, to reproduce not only the original species of metal, but also its exact specification. This, in Euclid's words, is absurd.

The contours of the hull, or body, are taken from cardboard templates that are "translated" in advance from scaled elevation and plan drawings executed by Hays. You'd naturally suppose that his own drawings would be based on manufacturers' blueprints; but experience shows that the latter are themselves inaccurate in most cases. To be more explicit, the lifesize cars practically never conform to the makers' portrayals. The modeler's function is to reproduce the *cars* that his public sees and knows, rather than a set of off-beat blueprints that it doesn't see and can't know. The case for his *modus operandi* is unanswerable.

Rex works with chisels to arrive at what he calls the shaped oversize of the hull/body aggregate, using a surgeon's scalpel with a rubber handle for the final stages. The rubber grip acts as a shock absorber if he accidentally flubs a cut and knocks the handle against a delicately-hollowed section (such as the back edge of the hood where it shelves back over the dash.)

Finishing is a vital and longdrawn operation. First, two coats of shellac are brush applied, allowed to dry, then rubbed down with almost satin-smooth sandpaper. This process, shellacking alternating with rubbing down, is repeated anywhere up to twelve times, and results in a surface so flawless as to be indistinguishable from metal. Then, and only then, the model is ready for its paint job. No undercoat is necessary; in fact, it would blurr the razoredge detail of such minutiae as louvers. Six or more coats of cellulose are finally sprayed on; the first very thinly and the others a degree thicker.

In the case of a contemporary car like the D-Jaguar, color matching naturally presents no problem. But antiques, and especially those of which no fullsize examples survive, can be something else entirely. This is one of Rex's many reasons to be thankful for the possession of a photographic memory. Since 1921, when he was at Le Mans to see Jimmy Murphy and his Duesenberg win the first of the interwars Grand Prix, his travels around the circuits of Britain and continental Europe have been literally on an A to Z scale—Aintree to Zandvoort. He carries in his mindseye an indelible

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that may occur in actual service. This type of test applies a very localized load to the shell of the helmet by means of a 16 pound weight suspended from four steel wires. The weight can be made to move at speeds of from 8 to 22 feet per second, depending on the height from which it is released. At the bottom of its arc of travel it strikes its target: a helmet placed over a metal head-form. This head contains an acceleration-measuring device whose responses are registered by an oscilloscope and simultaneously photographed. The weight has a round striking surface which serves to localize the force on the shell and establish the shell's ability to spread the load over a larger area of the liner. It makes for a more severe test than a flat weight would.

The ability of the shell-liner system to cope with forces of impact is indicated by the amount of acceleration transmitted to the head and acceleration and deceleration are extremely important factors in the mechanics of brain injury. The lower or gentler these factors are, the less strain, obviously, will be imposed on the brain. Accelerations become most violent when the helmet "bottoms" — when the liner is totally compressed and there is no more shock-absorbing action between the head and the helmet shell. Acceleration in these tests is measured in gravities or "g's," and a normal curve of "g vs time" looks like a low hill. As the g's increase and the liner begins to lose its "give," a small peak appears on the curve. But when the impact-absorbing action of the liner is gone, the curve abruptly shoots up to a very high peak "g" reading. The speed of the head itself has no special relation to brain damage, but *changes* in speed — acceleration — do, and the sudden, violent change that occurs when a helmet bottoms against the skull is downright intolerable.

It can, in fact, be lethal. On the test rig there is a sort of metal-to-metal sound when the weight strikes with enough force to compress the liner totally. When this happens, the liner, harness and internal webbings of the helmet often disintegrate in the area where pressure is greatest. And this can happen, with some helmets, under surprisingly light loads.

The highest speed of the Protection Inc. pendulum, 22 feet per second, gives impact equivalent to a case where the head is moving at 15 mph in relation to an unrestrained 16 pound object like the test-rig weight. This is not much impact. Even so, it is more than most helmets can stand without bottoming. It is a more severe test than it may seem because the helmet's physical strength is tested by confining the blow to a very small area, and the data it provides compares well with much flight-helmet data.

The second tests consisted of blows of increasing force to the sides and backs of the helmets. The results, in the case of all the helmets tested, showed that the g's rise rapidly as the liner or sling approaches 100 percent compression. In helmets having "soft" liners or slings, the sudden upsurge of g's is most pronounced. A blow just short of bottoming will have a reasonable peak g, while one at a slightly higher energy level will bottom and apply a very high force to the head.

It was found that achieving low peak g's under low-energy blows, on the one hand, and non-bottoming action under high-energy blows, on the other, is impossible in a single helmet. The hats with the best, "most comfortable," low-energy performance bottomed early. Low acceleration requires considerable movement of the striking object in relation to the head. This movement or displacement is provided by the liner or sling, and is limited by considerations of helmet size. The tests indicated that low-acceleration "comfort" qualities have to be sacrificed for maximum protection against lethal-range blows. Dr. Snively says, "Actually, the performance throughout the energy range need only be at or below reasonable tolerance levels. In this regard, all the helmets tested could be modified with very probable increase in high energy level protection, but with an increase in low energy peak acceleration."

Almost without exception the helmet *shells* performed satisfactorily. Although fractures developed in most shells they are not considered too detrimental. During repeated blows some helmets showed better performance after the shells had begun to crack or flex, and this extra cushioning effect made for a lower average force. But the improvement applied only to low and medium force blows, and the ability to handle high-energy blows decreased.

Snively and Nichols sum up the test results to date as follows. Both the accelerometer tests and the massive compression tests show the importance of non-resilient liners. This importance increases as impact force increases, and becomes greatest at those energy levels where protection is against death rather than headache or bruises.

Protection against the several effects of impact is the prime objective of the crash helmet. At present it's felt that such protection has been scientifically demonstrated only with the use of non-resilient lining material. Sling suspensions, resilient liners and slow rebound liners have been shown to be inadequate.

Several problems exist with non-resilient liner materials. The best thickness depends upon the particular material used; non-resilience by itself is no guarantee of good helmet performance. And because these materials are permanently crushed when they absorb severe impacts, users must be educated to replace them, and safety regulations should be passed to make their replacement compulsory.

Many of the partial head-coverage helmets tested do not provide adequate area protection, although very deep shells of the partial coverage type can be considered acceptable. Better is the full-face type, which not only protects the vital parts of the head but also protects the upper jaw region. The ideal would be a helmet tailored to the user's own head.

The Snell Foundation's crash helmet test program will continue, and when it's complete it should provide the first set of scientifically derived specifications for the design and construction of protective headgear. And these we need—badly. As the Snell tests are proving, an upholstered shell is *not* a racing helmet.

Griff Borgeson

Rex Hays

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picture of every important racing car — most American types unfortunately excepted — that has hit the circuits since the first World War, plus many of earlier vintage. With this shadowy dossier to draw on, he would be about as likely to commit hari-kari on his own scalpel as to dress a G.P. Delage in Monsieur Bugatti's exclusive shade of French Blue, or vice versa.

But back from the general to the particular, detail features that were exactly simulated on the Prince Charles Jaguar included the green upholstery hide, which was specially tanned for Hays; the foam-rubber seat interiors; and a full array of minutely calibrated instruments. There was only one thing that really fashed the Jaguar officials: they wanted it implied, if not actually stated, that the model was representative of Coventry craftsmanship. Hays, however, is a prideful burgher of the little Sussex community of Steyning, said to be the oldest town in England (its recorded history starts from a three figure date). Steyning, pronounced Stenning, is nowhere near Coventry, and Rex was unwilling to adopt honorary citizenship of the place even for the edification of TV viewers and newspaper readers. In the end they compromised by having him photographed at work in the Jag plant, omitting to say he wasn't a Jag employe, and hoping people would think he was.

From the fact that it has taken Hays himself, in his sideline journalistic capacity, tens of thousands of words merely to outline his craft and mystery in the model makers' shoptalk magazines, it can be appreciated that the subject hugely outruns the scope of this rundown. Here, the most you'll get for your 35 cents is a random handout of vignettes, picked to mirror the greatness of a real-life Gulliver and the mechanical Lilliput that his brains and hands have created.

One of the surprising and engaging things about Hays is that although a perfectionist in the limited human sense, he is no pedant. *Talis certitudo certitudinem* —punctilious exactitude destroys exactness. On the one hand he is a stickler for fidelity in three-dimensional portraiture and scaling: on the other, since his customers and audiences don't spend their lives with watchmakers' glasses stuck in their right eyes, he draws a line between the minute and the miniscule. For instance, on models as small as one-twenty fourth scale — which is the smallest he normally essays—he doesn't claim that his wire wheels will necessarily have the right number of spokes. Another example of his acceptance of compromise concerns the hood catches for a Tipo 158 Alfa Romeo (powered by a 1.48 cc Frog motor) that he made to one-twelfth scale some years back. The authentic hood fastening consisted of four spring-loaded clips; but Rex knew that these, if reproduced in full

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Rex Hays

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detail, would be so frail as to break the first time the model was handled or cleaned. They were, therefore, represented by four screws with their heads severed, and annealed so that they would bend at right angles and press into the body panels. For a finishing touch, he had the screws dull plated to match the genuine catches.

Even on a powered model that ordinarily will only be seen by the public at grandstand range he never omits any exterior feature on the pretext that its location makes it invisible. The 158 Alfa, by this token, had louvers in the base of its tail, a detail of which the keenest amateur student of design would probably be ignorant unless he happened to have had a ringside view of a real-life wreck involving total inversion of the car. Rex, nevertheless, incorporated these vents in his miniature, and was repaid for his trouble when, during model races before an audience that included the Duke of Edinburgh, his Tom Thumb 158 looped and landed upside-down.

Powered models, built to operate at high speeds, are, of course, fitted with rubber tires. These, on some of Hays' earlier products, were a bit unconvincing because he couldn't make his own casings *ab initio*, and so had to accept ones of an apocryphal pattern. His static "solids," on the other hand, are so faithfully shod that I doubt if a Dunlop-Firestone-Avon-Goodyear panel could fault them. Using wood as his material, Hays turns up these tires on a small lathe that is the only power tool he possesses. The tread and buttress affects on the sidewalls are sculpted with very fine files, and near-matt gray paint is finally sprayed on.

The Hays armament of hand tools, apart from the chisels, scalpels and files already mentioned, includes all the stock items that you'd expect — drills, saws, gouges as delicate as toothpicks, knives, etcetera — nothing startlingly unorthodox. His materials, in addition to a wide variety of woods, include practically every common substance and amalgam of substances known to metalurgy, plus Perspex (British equivalent to Plexiglass), leather, plastics (in moderation) and some members of the paper family.

Rex has a gift for turning unlikely-seeming objects to good use, a flair that was exampled during the building of a pre-WWI touring car. This car featured fenders of a peculiar and elusive cross section. After vainly kicking this problem around for hours, he noticed that a neighbor's puppy, which had dropped by for a game, had brought along and was playfully savaging a tin clasp that a wellknown maker of potted meats uses to seal his lids. Measurement showed that the thing was right, to half a hundredth of an inch, for the job in hand, and only needed a few minutes' rolling to give it the correct longitudinal contours.

Incidentally, Rex is a fool for animals and birds and attracts them in an extraordinary way. As he works, drawing at his desk or plying tools at his bench, fauna ranging from retrievers to robins enter and leave at intervals through the always-open door, and, according to their natures, either nuzzle his trouser cuffs or perch at his elbow.

Outside of his royal commissions, which have included models for Siam's Prince Chula (B. Bira's cousin and onetime sponsor) and Mister Grace Kelly of Monaco, the finest "static" Hays ever made was the fabulous E.R.C. Club Trophy. This tenth-scale gem commemorates the extinct marque E.R.A., and was paid for out of the residual funds of the club when it discontinued about nine years ago. With its hood removed to expose the watchmaker workmanship within, it is on permanent exhibition at the Steering Wheel Club, Brick St., London W.1., where visiting Americans will no doubt be welcome to inspect it without getting stuck for an annual subscription.

The trophy is an exquisite miniature of R.I.A., the first E.R.A. ever built, and incorporates about 4000 parts, 80 percent of them metal. The body is separate from the chassis and the whole car can be dismantled in three hours. Individually fashioned and fitted components include springs and shackles (the latter complete with grease nipples), axles, shocks, drop-arm and drag link, Girling brake gear, brake drums, instrument rims, oil pipes, air pressure and thermometer lines, engine with such auxiliaries as blower and magneto, flywheel housing, gearbox and so forth. An engraved plate on top of the gearbox reproduces the correct patent numbers and the chromium plated exhaust pipe is heat-dulled where it leaves the manifold.

R.I.A. itself had been broken up and its main elements distributed between three owners living in widely scattered parts of Britain when Hays was asked to undertake this wonderwork. Moreover, the makers' own drawings had long since perished. When approached on the project, his reaction was that it couldn't be done: or, if it could, the research involved would make the price prohibitive. Egged on, he quoted 500 pounds — around $1400 at present rates and the biggest fee he'd ever drawn for a single job. To his astonishment, the club agreed. It took him 500 working hours to make the trophy. Awarded annually for the best performance by a British driver of a British car in foreign races, it is one of the most coveted prizes in U.K. motoring sport.

The minting of trophies in the likeness of famous automobiles has been something of a Hays specialty. Another celebrated miniature of his is the Pomeroy Trophy, which the *Motor's* learned Laurence Pomeroy commissioned as a memorial to his even more erudite father. It simulates the 1914 T.T. Vauxhall, which was one of the elder Pomeroy's masterpiece designs, and is aptly contested among members of the Vintage Sports Car Club. But the one of which Rex is privately proudest has a purely parochial standing and didn't put a shilling in the bank for him. This is the Peter Henderson Trophy, superbly representing a Cooper-Bristol at one-twentieth scale.

Henderson, of whom Hays had never heard until he was dead, was a member of the small and unsung K.L.G. Motor Club, privy to employes of the K.L.G. spark plug company. Also, he was one of the tens of thousands of regular race spectators who form the backbone of speed-sport in England or any other country. When he died in his prime, his widow came to Rex and asked what it'd cost her to commission a fractional Cooper for a club prize in Peter's memory. Judging that the girl wouldn't be in a position to raise a tithe of the normal price, he insisted on making the model gratis.

In a rather different category, though commemorative nonetheless, was the perfect effigy of a 1938 G.P. Mercedes that Hays built to the order of a lifelong friend of Dick Seaman's mother, after Dick's tragic death. This model, complete with driver wearing a helmet of the same green linen that Seaman always wore, was presented to Mrs. Seaman, who placed it in the family chapel at her home at Pull Court, Gloucestershire.

As a broadcaster, TV personality and occasional public address verbalist at races, Rex Hays gives that supple larynx of his plenty of exercise. But the talking assignment he probably enjoyed most was announcing his own miniature Grand Prix at two indoor exhibitions staged in London during 1952. Prior to the first of these, sponsored by *Model Engineer* magazine, the organizers petitioned the Duke of Edinburgh to find out if there was anything he'd like specially featured. There was. He wanted Hays' work.

With this royal compliment for a spur, Rex went to work and not only created a full field of contemporary G.P. cars — Ferraris, Alfas, Maseratis, Gordinis, H.W.M.s — but also built and erected a 400 foot track for them to race around. Every conceivable appurtenance of the Grand Prix scene, including pits, grandstands, safety fences, trees, armletted officials, spectators (600 of them) and ad boardings, was accurately produced at one-tenth scale.

The cars were powered by 1.5 cc engines and ran on guide rails. Hays, as the presiding Gulliver, talked solidly to a packed and entranced audience, both during and between races, for ten hours per day, ten days in a row with just one Sabbath interval. The organizers only had one quibble to make: when the serial Grand Prix went on, the resulting unholy din instantly drew the full attention of 95 percent of the exhibition's clientele, leaving the rest of the show to fall flat on its face. At the second of these events, the Schoolboys' Exhibition, the ten days had a total of 62,000 kids watching the tiny *carerra* agape with fascination and covetousness.

Two six-ton trucks were needed to transport the dismantled track and its accessories. As neither *Model Engineer* nor the Schoolboys' Exhibition could afford to mount his eggcup *epreuves*, and he didn't want to pass up a lifetime's chance of demonstrating his gab potential, he made a preliminary tour of the British automobile industry and newspaper world. He

offered to sell advertising space on the traditionally-sited boardings and banners. Every prospect on his list came across, with the result that the ventures turned gratifying profits.

Hays, and other miniaturists of his way of thinking, make no attempt to endow their powered models with the sensational maximum speeds achieved by what may be called the *vitesse pure* school, which is mainly, I believe, an American phenomenon. The typical car developed by this cult is essentially an engine tightly surrounded by a metal or plastic foundation garment (alias the body) with a wheel at each corner. Little or no attempt is made to simulate a real automobile, so streamlining can be carried to any extreme and frontal area cut to an "uninhabitable" minimum. Rex, while holding a strong respect for these bomblets and their constructors, puts the accent always on realism. He not only builds his models for manning, but also, in the case of power jobs, mans them. The driver's clothes and personal accoutrements are ten-tenths comprehensive and correct, with one pair of goggles and a spare pair around his neck. An Alfa or Ferrari handler, for instance, wears bright blue overalls with the appropriate Pirelli facsimile on the chest. Drivers in Hays's exhibition Grands Prix had articulated arms, with the hands fastened to the steering wheel. Thus, by means of an ingenious mechanism that transmitted motion back from the guide rail to the wheel, the illusion was created that the driver had volition and was exerting steering force.

High-speed pileups provided an unrehearsed highlight of the schoolboys' midgetfest. Once, by a thousands to one chance, when an H.W.M. and a Ferrari were racing neck to neck down the main straight, the front roller guides of both cars failed simultaneously. Ripping free from their back rollers with a force that actually bent the eighth-inch steel guide plates, they angled apart, the H.W.M. looping four times and tossing its driver out; the Ferrari went head-on into a stone wall close to the trackside. Another time, an H.W.M. that had shed its tethers smashed through the chestnut fencing and tore into a cluster of dwarf spectators, scattering casualties to right and left; finally it hacked down two saplings, capsized, and plowed a deep weal in the grassed public enclosure. The grass, incidentally, like the trees, was real and growing. The spectators had been modeled in clay and produced in commercial porcelain. Hays, who studies humankind around the circuits as closely as he studies cars, showed real talent in painting his extras' faces in the likeness of recognized motor sport types.

As an author in addition to his other crafts and professions (*The Vanishing Litres*, a book he published last spring, has been well received) Hays never finds quite as much time as he needs for modeling. If and when he discovers an alchemic formula for a 25-hour day, he hopes to complete an ambitious series of twentieth-scale solids that will tell the all-time story of Grand Prix racing in 3-D. Extant items in this collection to date are:

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Rex Hays

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1906 Renault, winner of that year's French G.P. at Le Mans; Nazarro's 1907 F.I.A.T.; Lautenschlager's 1908 Mercedes; the same homeric German's 1914 Mercedes; Murphy's 1921 Dusenberg; Segrave's 1923 Sunbeam; Segrave's 1924 2 litre Sunbeam (San Sebastian G.P. winner); 1924/25 P2 Alfa; 1926 1.5 litre Delage; 1935 P3 monoposto Alfa (Nuvolari's winning car in the German G.P.); 1934/35 750 kg. Merc; C-type Auto Union; 1939 3 litre Mercedes; 2 litre Ferrari and Gordini (old Formula 2); 4.5 litre Ferrari; 158 Alfa; 250F Maserati; W196 Mercedes, 1955. Presently under construction are the 1912 Peugeot (Georges Boillot's car, French G.P. victor at Dieppe) and the 1934 3.3 litre Bugatti. When these two are completed, Rex aims to go back over the years and start filling in the gaps. Bids for the entire collection from both British and U. S. sources are under consideration at this writing. And, in addition, Hays has plans for making a kindred series of historic sports cars.

Obviously, making a replica of a *particular* antique racing car, as distinct from one that merely typifies a greater or lesser batch, contronts an historically-exacting modeler with special difficulties. The actual characters in which the original race numbers were painted and their precise location on the body and hood, for example, have to be faithfully counterfeited.

Hays' devotion to his craft is rooted in a deep and dedicated love of cars. After serving his apprenticeship in a truck and bus factory, he joined the late Cecil Kimber's staff at the birth of MG. As an MG employe he raced a few times at Brooklands, although without any memorable success, and also handled early Kimberware in English trials and other competitions. His forte as a driver apparently lay in demonstrating cars to prospective buyers, a fact which, when it became bruited abroad, led to his being borrowed from MG by such famous figures as Segrave and Campbell. The only trouble with so persuasive a demonstrator and talker, as Campbell once remarked, was that if you let him chauffeur you a mile or two in the car you planned to sell, you probably wound up deciding you wanted to keep it after all.

Hays' personal taste in lifesize automobiles, in contrast with his professional predilection for the miniature, has a strong lean towards the rumbleguts Bentleys of the vintage era. He has owned five at various times, including the original of the majestic Le Mans 4.5 litre. Equipped by nature with about as much commercial instinct as a snowman, he doesn't presently make the sort of income, he says, that is compatible with a 4.5 Bentley's thirst for gas, or its insurers' thirst for premiums. But someday soon, Steyning's bald-pated Gulliver may find himself back with the big-banger classics that have inspired some of his gouges' noblest sculpture.

Dennis May.

Lancia D-50

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on vertically placed tubular shocks. These units are here — instead of outboard — only because this is the best place to feed stress into the chassis without adding more weighty bracing.

The back wheels are overworked to begin with, so needed special attention from Jano. A de Dion tube, small and light, of course, curves behind the differential and is located in one plane by parallel trailing arms mounted well inboard on each side. We've seen sliding blocks for lateral guiding before, but seldom with the block bolted to the frame and the guide hung below the de Dion tube as is done here. This was done to get a low roll center without excess downward curvature of the axle tube. Springing is again by transverse leaf, clamped in the center and working on rollers below the hubs, with nine thin leaves this time. Though it looks stiff, this is more flexible in operation than the roller-mounted leaves used in the rear by Ferrari and Maserati.

To make sure the tubular shocks had no effect on roll stiffness at all, Jano mounted them vertically about a foot apart in the center of the car. Links and rocker arms actuated them from the top and a third rocker joined them at the bottom so that when the car rolled the whole shock absorber assembly rolled with it. The shocks only worked when both wheels jolted up and down in unison.

When all this was worked out, there just wasn't any room left in the chassis for inboard brakes, as had been used in the sports cars. Outboard brakes, conventional except for the use of four shoes per wheel, filled the insides of the 16-inch wire wheels. Drums were exceptionally wide, with several types of finning, and the backing plates had no scoops and were only moderately drilled.

The cockpit was stark, even for a race car, with a big 10,000 rpm tach hung from the cowl and a small cover over the even-smaller two-piece prop shaft. A handsome drilled-spoke wheel had a short shaft to a steering box just behind the dash. The pitman arm pushed a long drag link down the center of the engine vee which rotated a bell crank vertically pivoted to the upper front crossmember. Bottom arm of the bell crank turns the wheels through a split track rod and drilled I-section steering arms. The rear brakes could be hand-applied through cables and a small lever at the left of the seat.

You can see that the general layout of Jano's brainchild was conventional, in terms of modern racing design, but the details were extremely imaginative. With a prototype constructed in early '54 Gianni Lancia and his team had a lot of gremlins to evict from the premises. In the meantime they went on with sports car racing to keep up with the times and try out equipment for the GP car — not to mention keeping their star-driver team in shape. After a poor weekend in Florida they snapped back to win the Tour of Sicily, the Mille Miglia, the Portugese GP and the Targa Florio. Nothing but 4.9 Ferraris could get even close to the 3.3 liter B24 Lancias.

The high point of the sports car's career was Ascari's single-handed Mille Miglia victory, for in September the Grand Prix preparations were soaking up most of the team energy. Only highlights of their four-car Tourist Trophy entry were two new 3750 cc engined cars with outboard front brakes — undoubtedly the same units as were about to appear on the GP car.

In the meantime Ascari and Villoresi spent their work week flogging the D50 prototypes around Monza and San Remo, as well as the private Turin course. They bent up at least one car apiece while trying to get below the Mercedes time of 1:59 at Monza, but even in early October they could only touch 2:04. Most of the work so far had been on chassis, though, and when the latest items were transferred from the engine dynos to the cars it was announced that Ascari was down to 1:56, which was really fast. Then followed a solid entry for the Barcelona Grand Prix.

Dramatically late three cherry-red cars appeared: two for go and one for practice. The two went in a big way, setting fastest laps before and during the race and pulling out before ten laps were run. Villoresi had brake and bearing trouble while a defect in the gearbox casting had doused Ascari's clutch with oil, but when they were in they outcornered and outaccelerated Ferrari, Maserati and Mercedes. There was a twitch to the handling and they were hard to hold out of corners, but the prospects looked good.

A KLM plane flew the cars, in practically identical trim, down to Buenos Aires in January. On this twisty course Castellotti was nowhere in his first GP start, but the two aces travelled very fast. While watching them the public realized what the drivers had known for some time: that Jano's concept had given the cars better sheet road adhesion than any competing machine, but when the limit was passed there was no turning back. Front and rear cornering powers were so well matched that they couldn't predict which end would break away first — sometimes both at once — and when they broke it was like lightning.

The theory employed was excellent, and is still being recommended today by many blue-sky designers. Trouble was that the cars couldn't be tossed around with a little margin to play with at the breakaway verge; Italy's best drivers weren't equal to it. This layout could still be good for courses with tight corners and long straights, like Barcelona and Sebring or the second Watkins Glen course, or even for straight drag racing where the excellent rear wheel bite would pay off in lowered elapsed times. Keep this in mind!

Jano and staff worked hard on these matters in early '55, altering many details. Removal of the oil cooler from the left hand pontoon allowed an increase of nine gallons in fuel capacity, and the new tanks were riveted instead of welded. Both single and multiple oil cooling pipes were tried, running between the right hand tank and