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### Auto Racers Near Limit of Speed

#### Nerves of the Drivers, Air Resistance and Other Conditions Stand in the Way of a Much Higher Velocity

To drive an automobile, an earth-bound vehicle, at the unprecedented rate of 206.95602 miles an hour, as Captain Malcolm Campbell did on the sands of Daytona Beach last week, involves more than engine power. His Bluebird Special had a twelve-cylinder engine of 450 horsepower. Yet he broke the record of 203.792 miles an hour made by Major H. O. D. Segrave last year in the Mystery S, an automobile fitted with two 500 horsepower engines. Had Frank Lockhart not swerved as he was roaring over the beach at 225 miles an hour and injured himself and his machine by plunging into the ocean, it is probable that the world's record for the fastest mile on land would now be his.

If Segrave and Campbell had traveled in a vacuum and over an ideally smooth road, they would have made their records with perhaps as little as a hundred horsepower. Both sped along in storms of their own making. Few winds attain velocities of 200 miles an hour, and long before they do trees are uprooted and roofs are ripped off like sheets of paper. Air resistance increases as the cube of the speed. To make 120 miles an hour a car must have engines not merely twice but eight times as powerful as those required to make sixty miles an hour. Every additional mile is paid for heavily.

Probably one-half the horsepower at Campbell's disposal was used in overcoming air resistance. At a speed of 220 miles an hour, which he says he attained at one time, the resistance must have been over half a ton to the square foot. Segrave has stated that the pressure on his forehead was over 100 pounds to the square foot. When Campbell was tossed up for a moment above the windshield after he struck a bump in the sand his goggles were nearly torn off by the wind.

To cut down this terrific wind resistance elaborate investigations and experiments in wind tunnels must be carried out. What are called parasite surfaces—surfaces which offer extra resistance—must be suppressed. The designer strives for a form without projections; for it is easier to drive a smooth, correctly designed bulk through the air than to rake it with many excrescences. The details of Campbell's Bluebird Special have not been published. Hence it is impossible to compare her lines with those of Segrave's Mystery S.

#### High Marks in Doubt

Neither the Bluebird nor the Mystery S traveled at maximum speed, so that, despite the records, no one can maintain that the lines of the one are finer than those of the other. Campbell's exposed wheels must have retarded him. On the other hand, the fin at the tail of his machine made it easier to control the Bluebird laterally in the face of the stiff wind that blew across the course. If Segrave carries out his intention of trying to beat Campbell's record, the lines of his Mystery S plus her power may set a new mark.

As a high-speed machine rushes along it creates a suction behind it—what the engineer calls "negative pressure." Any one who has ever stood on the platform of an observation car has seen stones sucked up from the tracks and dropped. A little cyclone is created. Bicycle riders are aided by the suction of motorcycle pacers. This suction tends to push the rear end of an incorrectly designed machine upward. Hence there is a tendency at high speed for the machine to capsize.

Because the pressure of the air from every angle must be considered, the designers of Segrave's and Campbell's machines had to depart from the rules established by airplane builders. It is the practice to test the air resistance of every part of an airplane in a wind tunnel and thus to discover the shape which can be driven through the air with the least amount of energy. Wind-tunnel research proved that the traditional sharp prow of a ship is scientifically wrong. Fast swimming birds and fish are correctly designed. Nature discovered—long ago that the prow must have a rounded, rather blunt form and that the tail must be fine if speed is to be attained with little effort.

This is what is meant by "streamlining." No eddies must be stirred up, if possible, and no wake should be left behind. Foaming bow waves and wakes may gladden the eye of the marine painter, but they are the visible evidences of inefficiency to the engineer. The truth is that our locomotives and steamships pay too high a price for speed in the form of engine power and therefore fuel. Probably the Mauretania and the Twentieth Century Limited could attain their present speeds with half the fuel that they now consume if they were streamlined.

#### Airplanes and Automobiles

If the lessons of the wind tunnel had been followed strictly the Mystery S of Segrave and the Bluebird of Campbell would resemble airplane fuselages more than they do. They would have egg-shaped fronts and fine tails. As it is, their forms are almost

scowlike, except for the easy curves. Whatever the wind tunnel may teach about airplanes it teaches something very different for automobiles.

The pressure downward on the nose of a high-speed automobile and upward on the tail is terrific. Besides, air is spilled over the sides in ways that tend to cut down speed. In order to equalize the downward pressure in front and the upward or negative pressure behind, the surfaces are curved in forms that must seem strange to an air racer. The object of the curves is to let the air slip over the machine rather than to let it batter the sides and bottom. Thus it is to be explained the squat look of both Segrave's and Campbell's machines.

#### Florida's Unique Course

Florida has the only beach in any civilized country on which Mystery S and Bluebirds can be tested at top speed. A runway of at least twenty miles is required, and it must be straight and as free from inequalities as possible. There is no question of taking curves. Moreover, the runway must be without trees or flanking ditches. A beach of hard sand alone fulfills the conditions. In Europe no twenty-mile beach free from sand dunes can be found. Even Daytona's beach, on which many motorcycle and automobile records have been made and broken, is not all that a Segrave or a Campbell can wish. Twenty miles of billiard table would be better, inasmuch as every pebble and shell has its effect at high speed.

Campbell allowed himself four miles in which to get a rolling start, and then found that he had not picked up what he deemed to be sufficient speed when he crossed the line. Clutching the wheel he exerted every effort to keep on a straight course. Such was his inertia as he was flying along at what must have been 220 miles at times that the slightest swerve assumed alarming proportions in the fraction of a second. Hence the fear of running into the crowd.

Such is the centrifugal force of wheels spinning around at the rate of about 2,000 revolutions a minute, or over 32 a second, that ordinary tires are practically useless. The slightest inequality—a mere pebble, for example—is enough to make the machine hop, so that it seems almost to flutter along if it is watched closely. Thirty times a second each part of the tire strikes a hammer blow on the road.

We know what happens when a wire is bent back and forth or when cold steel is hammered. Heat is developed. Both the wire and the steel become too hot to hold. The wire eventually breaks. Rubber is a particularly sensitive substance. If it were not it could not be vulcanized. The tire maker tries to make an internal mass out of cotton fabric and rubber, but at about 490 degrees Fahrenheit the two disintegrate. At the end of an automobile race tires are found to be internally ruined because of the heat that has been generated.

Campbell's tires were produced by a manufacturer who had spent months in conducting experiments to discover how they could be made more resistant to heat and centrifugal force than those with which stock cars are provided. Flywheels explode if a certain critical speed is exceeded, and Campbell's tires had to withstand centrifugal force as great as that of many flywheels. When he was traveling at top speed they were no longer circular, but oval in cross-section. No records are available to judge the condition of Segrave's or Campbell's tires, but it is safe to conclude that, despite the best efforts of the manufacturer, rubber had parted from fabric after the race against time was over. It is highly improbable that Campbell will use his old tires again if he decides to beat his own record.

#### The Limit of Speed

After having traveled in an earth-bound vehicle faster than any man before him Campbell is reported to have said: "There is no limit to speed." Perhaps not from the viewpoint of the engineer. The racing automobiles of Segrave and Campbell may not be the last word in power and ground speed, but is the human brain and hand capable of controlling machines even faster? Isn't the difficulty to be overcome in the future psychological rather than mechanical?

As one walks along one stubs one's toe. How long does it take the nervous system to signal the fact to the brain? The great German physicist von Helmholtz made the first trustworthy measurements. He found that the speed at which a nervous excitation, such as pain, is transmitted varies from 147.6 to 130.4 feet a second, although it seems to us that the prick of a pin is felt instantly.

But Campbell's racer flashed over the sands at the rate of 303 feet a second. Man has attained a speed on the ground—greater than that of sensation! Campbell's roaring engine drove him on faster than his brain could order a muscle to move, faster than he could wink or shift an eye. Suppose that it took him two seconds to read a speedometer on the instrument board. In that brief interval he rushed over 606 feet of ground—three city blocks! No wonder that he was terror-stricken when he thought for a brief moment that he had lost control of his car and was about to plunge into the crowd half a mile away.

Reasoning is out of the question even when danger seems fairly distant. There is no time for the logical processes of thought. Man becomes an animal, relying on what we might call "instinct" for lack of a better

### An Exceedingly Chilly Thrill



BUFFALO "SNOW-BIRDS" PLAY HOCKEY IN BATHING SUITS

word. As he guides a vehicle rushing over the sands at more than 200 miles an hour he is scarcely conscious of his acts. "Just before I finished the mile I glanced at my instruments and was making 220 miles an hour. Before I could look up I had crossed the final wire and was headed for the soft sand dunes," Campbell said. Five thousand hearts stood still during that tense moment. How he managed to right his car he himself cannot explain. He knows only that his feet left the accelerator and brake completely.

#### Lockart's Experience

Lockart probably does not know exactly what happened to him. He was seen to swerve first this way and then that. Perhaps a bump in the sand threw him momentarily off the straight course that he was trying to maintain. Such was his inertia at 225 miles an hour that his machine tended to keep on the swerving course that had been assumed. He landed in the ocean, providentially escaping death.

The craving for speed is in itself a primordial instinct, the reason for which we see in all other creatures. Fleetness is many an animal's salvation in the struggle for existence. An evolutionist probably would hold that when they are seated in their high-powered racers men like Segrave, Campbell and Lockart slip back a million years or more partly because they are striving to satisfy an old but persisting instinct to flee from something, partly because they must rely on the cave man's instinctive coordination of brain, nerve and muscle to guide themselves.

So it seems as if we must turn to the air if distances are to be covered at velocities higher than 250 miles an hour. The Frenchman Bonnet has already made 275.48 miles an hour in an airplane. When Lieutenant Jas. H. Doolittle of the United States Army succeeded in performing an hour-side loop he probably traveled at the rate of more than 300 miles an hour. And at what risk! Such was the centrifugal force generated as he whirled around that it seemed to him as if his eyeballs would be torn out of their sockets.

To prevent their necks from being snapped by centrifugal force the performers who "loop-the-loop" before circus crowds see to it that their heads are rigidly strapped in place. Yet their speeds never approach that of Bonnet or Doolittle. Even in racing motor boats pilots have been hurled out by centrifugal force as they whirled around the marking buoys of a course. Hence even in the air the "stunt" maniac is restrained by his nerves and his soft tissues. There can be no short, sudden turns in a future voyage to Europe in a 300-mile-an-hour machine. Even if heads are strapped in place, who knows what the effect of centrifugal force may be on the heart and the comparatively soft brain?

The question also arises whether a machine any faster than that built for Campbell or Lockhart can stay on the ground—whether it may not become a kind of airplane and soar into the air or whether it will not turn turtle. As he rushed along Campbell created a veritable hurricane. Air pressed on his machine. That pressure could not be ignored. In a machine designed solely for traveling at the highest possible speed the pressure on the under surface might well lift the entire weight into the air. Wilbur Wright once said

that a kitchen table could be made to fly if there were power enough to drive it.

Campbell's record may be beaten by a slight margin—a fraction of a per cent, perhaps—but there is no likelihood that there will be a sudden jump from his 207 miles an hour to 230 or 250. Because of the slowness with which the brain telegraphs its orders through the nervous system to foot and hand there is some reason to believe that the highest speed attainable over the ground lies somewhere between 240 and 250 miles an hour.

Undoubtedly the engineer can design and build a car that will go much faster. But what's the use if human nerves are unequal to the task of controlling it? There is good reason to believe that Segrave's Mystery S, which held the record until Campbell's Bluebird broke it, can skim over the sand at 225 miles an hour, but the iron-nerved Segrave himself doubts if he will ever reach that speed. It is a pity if human endurance has reached the breaking point, for the engineer has not said his last word.



Should Hide It.

"Say, don't walk around all day with such a rye look on your face. You look just like an undertaker."  
"Well, confound it! That's just what I am."

### Sedan Chairs Slow Traffic

#### Chinese Veterans Still Retain Old-Time Transport

Shanghai—Shanghai foreign settlement has many curious anomalies in dealing with its traffic problem. Two sedan chairs, relics of a picturesque past, with their 12-foot poles, green curtained windows and spare collie bearers, continue to find use as the property of two Chinese veterans who refuse to bow before the customs of the age. Fifteen years ago there were hundreds of sedan chairs in use; a year ago there were still eight on the streets, but they are now reduced to two.

These chairs require almost as much space as a motortruck. Their passage exacts a great degree of condensation on the part of the traffic police. Shanghai's traffic is the most diverse in the world, ranging from rickshaws and wheelbarrows to the latest models of motortrucks and limousines.

Double jeopardy is when the wearer suddenly realizes that both pairs belonging to the two-pants suit have seen better days.

### A Doleful Tune

I know a man who is, I think,  
Peculiarly athletic.  
When winter blasts are far from tender,  
My feet are first upon the fender  
And I feel most pathetic.  
But he puts on a leather coat,  
Runs down the drawbridge 'cross the moat.  
And when I to the window go  
He beams me with a ball of snow.  
This morning he vouchsaf'd, "Let's take  
Our supper up beside the lake."  
I did not know quite what he meant,  
I do not know just why I went.

The day was cold, the air was raw,  
Which ought to be against the law.  
The lake was on a mountain steep  
Where beavers are too cold to sleep.  
I sat within my cotte racoon,  
And up above my hat the moon,  
And through my teeth the wind did play  
A doleful tune.

My friend said much to him it meant  
To lamp the starchy firmament.  
And he was glad he did not know  
What then was on my radio.

And there I sat in pitchy dark  
Without electric lights to mark  
Just what I was so coldly eating;  
And I said much I'm not repeating.

He had some hard boiled eggs in shells,  
I think he gave me nothing else.  
I ate the shells mixed up in eggs  
And rapt a rug about my legs.

He pointed out three little stars  
That make up Mister Orion;  
And what I said was rather tryin'  
He said they made Orion's belt.  
I told him how my ankles felt.

We travel'd home in painful ruts  
And those we passed said: "Pipe the nuts."  
I wonder if it's ever best  
To try to be a willing guest,  
When what you eat you don't digest.

When goofy guys on ice cavort,  
Oh, do not try to be a sport.  
Sit fast at home and let 'em go.  
And then you won't cadge such a co'  
As I have got, and don't go out  
Unless it's hot. —Hall Pegz.

### Boosting Business

The All-British Flight advertising campaign has made its bow to the Argentine public. The flight is to be over some 20,000 kilometers and calls are being made at some 160 towns where over 3,000,000 leaflets will be distributed. The machine circles over the towns, and leaflets are thrown down, after which a landing is made, the wings are folded back and the machine is towed into some suitable place for exhibition, where it remains some five or six hours in order to give everyone a chance of seeing it. The names of the firms, all of which are British, their addresses and the articles that they wish to advertise, are painted on the machine, as well as printed on the leaflets. The scheme, which is refreshingly novel, has received the support of the British Ambassador, and success should attend this new venture to push British goods.

### Every Boy and Girl Would Like One



TRIP ON A TINY TOOT-TOOT

A young machinist in Vienna has built what is claimed to be the smallest locomotive in the world, complete in every detail. Here it is working.

### Scientists Told Effect on Radio Of Air Stratum

#### Physicist Says Heat Layer Tops Frigid Regions Nine Miles Above Toronto

#### Addresses Montreal Group

#### Height of "Interference Area" Put at 50 Miles in Day

Montreal—"If we went straight upward from Toronto for seven or eight miles, we would pass through an excessively cold layer of atmosphere, and the ninth, a layer that has about the same temperature as a warm summer's day," said Professor J. C. McLennan, director of the physical laboratory, University of Toronto, in addressing the Wireless Association of Ontario in the Physics Building at Montreal.

This stratum of air, the speaker said, is but one of a series of layers that enshroud the earth, starting with air of the lower levels, with a colder sphere next and layer on layer piled one on top of another, to a height of about 500 miles. These several layers have an effect on radio transmission. Professor McLennan said, but the height of the "interference area" varies from an area about forty-five or fifty miles up in the daytime, to about 90 to 130 miles above the surface of the earth at night.

Ozone also came in for considerable comment from Professor McLennan. He said that if all the ozone contained in the atmosphere were compressed to atmospheric pressure at sea level, the layer would be less than one and a half inches thick. The Aurora borealis, or Northern Lights, were also spoken of at length, and two experiments performed by Professors McLeod and Wilhelm, co-workers of Professor McLennan, in showing how various scientific discoveries would be made in reference to the lights, to come through stations being established in northern parts of Canada and through apparatus being installed in Western Canadian universities.

### Irish Poteen Gets Rude Jolt

#### Excise Duty on Whiskey Tempts Small Farmers to Make Their Own, But Heavy Penalties Are Having Effect; Many Stills Found Set Up in Bogs

Dublin—Forty persons were imprisoned and ninety fined for poteen-making in the Free State in 1927. The number of detections and seizures of illicit "stills" and the number of persons prosecuted were greater than in 1926. This does not denote an extension of the manufacture and sale of illicit spirits, but more intense activity on the part of the police and a better knowledge of the haunts and methods and devices of the poteen makers. The poteen makers are quick-witted and ingenious, but they are being beaten in the battle of wits by the police, who are making it dangerous and unprofitable either to make or sell illicit whiskey.

The excise duty on whiskey is a great temptation to the small farmers and others in the mountains and glens of the west and northwest of Ireland and the islands off the coast to try their hand at whiskey-making. The heavy fines and imprisonment are now beginning to tell against that temptation. Under the licensing act of 1924 certain areas are scheduled, and the sale of materials that could be used in the manufacture of poteen has to take place under license from the police. Nevertheless, the peasants manage to fit up new stills, and more their equipment is making their task ever more difficult. Experience has shown the police that christenings and weddings are often preceded by a "run" of poteen for the celebration, and they are on the watch when any such event is expected in the scheduled areas.

By watching the traveling tinkers they also find out replacement of equipment and make seizures. The fact that the number of seizures is much greater than the number of detections is due to the ingenuity of the poteen makers, who select bogs or other common property for their operations so that ownership cannot be established. They are as ingenious as bootleggers, but their occupation is becoming more and more difficult with Church and State against them. Curiously enough, the first discovery of poteen in County Louth, in Leinster, within living memory was made recently. The seizure took place in the Ravensdale Park district, which is just off the main road to Dublin and Belfast. A man has been arrested and remanded in connection with the seizure.

Ple-eyed.  
Judge—"What is the charge, officer?"  
Officer—"Driving while in a state of extreme infatuation."

### The Vanishing Elephant

It must be a fascinating experience to think in millions of years. Henry Fairfield Osborn, president of the American Museum of Natural History, looks at the vanishing wild life of Africa and remarks that "a million years ago that entire world, including every continent, was filled with these glorious animals which it had taken millions of years to create." Most of us, when we see an elephant, see only a towering beast. Mr. Osborn, apparently, looks upon an elephant and sees a panorama of ten million years. A little animal, barely a yard high, without as yet the tusks or the proboscis which spells elephant to most of us, browses in his vision along the river sides of North Africa, and a whole train of its descendants marching across the continents through the millenniums, connect that little animal with the pachyderms of today.

Photographs of elephant herds seem to give reassurance that there will always be plenty of elephants to delight the children at the zoo. But it does not require even a paleontological mind to doubt it. Africa is changing in our generation. Despite the great Parc National Albert which the Belgian government has established in equatorial Africa, it will not be many decades before the fat gorilla is as extinct as the little quagga that once trotted in vast herds across South Africa. Carl Akeley, collecting specimens for the magnificent African Hall of the American Hall of the American Museum, noted in 1926 that the abundance of animal life which had delighted him two decades earlier was already a thing of the past. Areas once rich in game were becoming lifeless deserts or half-cultivated pastures. Never since the first spark of life, not even in the millennia when glaciers were crushing out life or when the giant dinosaurs were being extinguished from the face of the earth, have whole species been wiped out with the ruthless speed of this transforming age. "In Africa alone," as Mr. Osborn points out in the current issue of "Natural History," organ of his museum, "there survive the offspring of 30,000,000 years of mammalian evolution." And in Africa they are disappearing. A few more decades, and unless foresight prevails, the motion pictures and the museums will have all that is left.

### Advertising Britain

John Bull has a reputation for progressing slowly and surely. It is reported that the Association of Municipal Corporations in sponsoring a bill to confer powers on local authorities for promoting "the publicity throughout the world of Britain's amenities and advantages." This, of course, does not mean that an act of Parliament is needed to awaken Britons to the dollars and cents value of advertising.

The necessity for Parliamentary action proceeds from the fact that a municipality's present powers of publicity are limited to an infinitesimal tax levy which is altogether inadequate for the business of attracting tourists from abroad. For instance, at present a borough may advertise itself as a health resort but may apply to this purpose only such moneys as it gets by renting chairs, bathing machines or stalls for beach vendors and by charging for admissions to parks. Few towns have specific powers of self-advertisement.

The handicap thus imposed on places of great historic interest is scarcely realized by Englishmen themselves, so accustomed have they become to Kipling's viewpoint as expressed in the lines:

"What do they know of England  
Who only England know?"  
Yet it will be greatly to the advantage of the Empire if dwellers in outlying parts can have brought to their notice the special charms and amenities of the Old Country that they may be led to visit and explore its countryside, obtain first-hand contact with its traditions and exchange ideas with the people of the Shires, where, after all, the heart of England is to be found.

The human touch counts for much in all the affairs of life and in none more than the promotion of a proper Empire spirit.—Montreal Star.

### Higher Education

Victoria Colonist (Cons.): (By the end of the next financial year the University of British Columbia will have cost the people of the province \$11,000,000 since its inception). Higher education by the State is desirable in many respects, but it is accompanied by a wastage of funds that is deplorable. British Columbia will have done excellently in providing up-to-date buildings and all modern equipment for University purposes and in liquidating the capital charges for these. It is unnecessary that it should do any more. Now that the buildings are provided the students should be self-supporting in their studies, and, for the students of the poorer families, there should be scholarships available, as there undoubtedly would be through private donations once the taxpayers are relieved of an annual burden of upwards of half a million dollars.

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