MOTORING ON RUNNERS.

An interesting new field for experiment by the ingenious amateur seems to be opened by the application of mechanical power to bob-sleds or sleighs. The automobile for ordinary roads has practically reached a stage of development at which no new problems are likely to be encountered. Many difficulties have been overcome, and those remaining are so well understood that their ultimate elimination is unlikely to be achieved, except by development and perfection of present methods.

Entirely new problems arise, however, in an unexpected manner where an attempt is made to produce corresponding speed from the same power by the mounting of engines upon runners for use on ice or snow.

The advantages of runners over wheels, especially for travel in snow, are the same for automobiles as for horse-propelled vehicles, the long bearing surface preventing the drops into comparatively small irregularities of the road, to which wheels are liable. Every automobile driver knows the great loss of speed which follows the drop of his wheels into any considerable hole, quite apart from the discomfort and danger of breakage due to jar, and the consequent necessity of slow travel on rough roads. Automobile wheels being generally much smaller than those of older road vehicles, their substitution by sleigh runners should give greater proportionate speed possibilities, and the high speeds attained with small power by some of the machines here illustrated seems to support this theory.

The most obvious difficulty of design is that of applying engine power to propulsion when rotatable wheels bearing the weight are removed. As will be seen from our illustration, a number of attempts to overcome this have been made, varying from reciprocating pushers to retention of automobile wheels carrying no weight and applicable to the snow surface as required.

A less obvious difficulty is the tendency of iron or steel runners to adhere to snow or ice, causing much more power in proportion to be required for starting a sleigh than for starting a wheeled vehicle.

The center of motor-sled activity in this country seems to be Huntington, Long Island, or rather Halesite on Huntington Harbor. If there has been as much emulation in other parts of the country, news of it has failed to reach the SCIENTIFIC AMERICAN. Halesite produced no less than three rival motor-sleds, and of these the most elaborate, of which the fullest particulars are obtainable, is that built by the Atkin-Wheeler Company.

This professedly experimental craft was intended principally to accumulate data for improved design, and for that purpose seems to have been successful. The three-runner type of suspension common to most ice yachts was adopted, engine and driving mechanism being carried between two parallel runners forward, and a rear central runner pivoted at its forward end, operating exactly like a rudder. The sled is driven by means of a spiked wheel, the teeth of which engage the snow. The entire motive mechanism is sustained upon a frame separate from the chassis and hinged at the forward end. The after end of the motor frame contains the drive wheel, an 18-inch pressed-steel wheel shod with peculiarly designed snow spikes. At first casehardened steel spikes were used, but it was soon perceived that the adhesiveness between the steel and snow quickly clogged the spaces between the spikes; this was overcome by using spikes made from a special bronze alloy.

The entire frame and chassis is constructed of California redwood, reinforced throughout with steel gussets. Under the forward part of the chassis, between the forward runners, crossed steel buckle-rods are used, to prevent spreading of the runners when negotiating sharp turns.

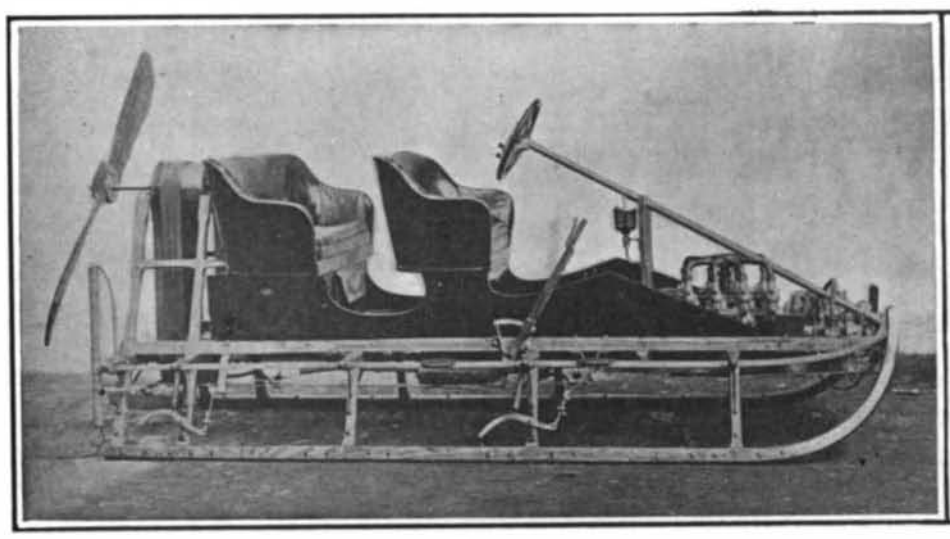
Double chain drive was first used, the after end of the motor frame being elevated sufficiently to allow the drive wheel to clear the ground, upon starting up the motor, and then lowered as headway was gained. On account of the apparent "sticking" of the steel runners, when the sled rested on one spot for more than a minute, the power required to overcome the accentuated inertia caused stripping of the driver spikes. As the space between the motor and drive shaft was too limited to allow the use of a clutch, a shifting belt drive was resorted to, which proved successful. Upon slowly throwing in the belt on to full load, and the inertia being overcome, a start was made with extreme rapidity.

A second quite elaborate machine, of which fewer particulars are available, was driven in a similar manner, but the builder had made no allowance for overload in starting, and stripped the teeth of his gears. He is now introducing a change-speed gear, such as is used on wheeled automobiles, and given favorable weather will make further trials later.

As sometimes happens, however, the apparatus simplest in construction gave the best results in practice. This was the "Freak" of Messrs. Diefendorf and Robbin, built at a total cost, so the owners claim, of eighty cents. This, of course, does not include the engine, shafting, and wheels, which were "borrowed" from an automobile, nor the lumber, which the builders had. Two sleds from an old "bob" were used, connected by two long pieces of 2-inch by 6-inch plank, placed 18 inches apart. The engine was placed over the rear sled with the jackshaft slightly forward, a friction wheel on the flywheel allowing two speeds ahead and one reverse. The jackshaft drove by chain and sprockets an ordinary automobile rear axle and wheels, the axle being so mounted as to be raised and lowered at will. It lifts the wheels clear of the snow, when coasting, and is pressed down by means of a foot lever when driving. The builders consider this the best form of drive for snow that has appeared, the automobile tires adjusting themselves to irregularities in the surface, and keeping their chains engaging the snow as uniformly as possible. They have, however, plans for an improved drive wheel for use next season. The forward sled is pivoted, and carries an automobile steering gear, handled by one man, while another tends the gear lever. The "Freak" was the only machine to appear in a competition arranged for the three motor sleds. It traveled at the rate of 30 miles an hour on open road, negotiating steep hills with ease, and covered a measured three-quarters of a mile in 37 seconds on a prepared track.

One of the most successful of foreign automobile sleighs is that most similar in principle to the "Freak," namely, the "Labesse," illustrated herewith, which is, however, a more elaborately constructed vehicle. The application of power to propulsion is also made by means of wheels, and, as in the "Freak," the latter are adjustably mounted. By means of the vertical screw visible at the driver's right, and a corresponding screw attached to it by gear and chain on the other side of the sleigh, the bottom member of the frame supporting the wheels, which is hinged to the upper part of the frame at its rear end, may be raised or lowered as desired, maintaining engagement of the wheel teeth with the snow or lifting them clear of it in coasting. The front runners are independently mounted, exactly as automobile wheels are, and are steered by a similar gear.

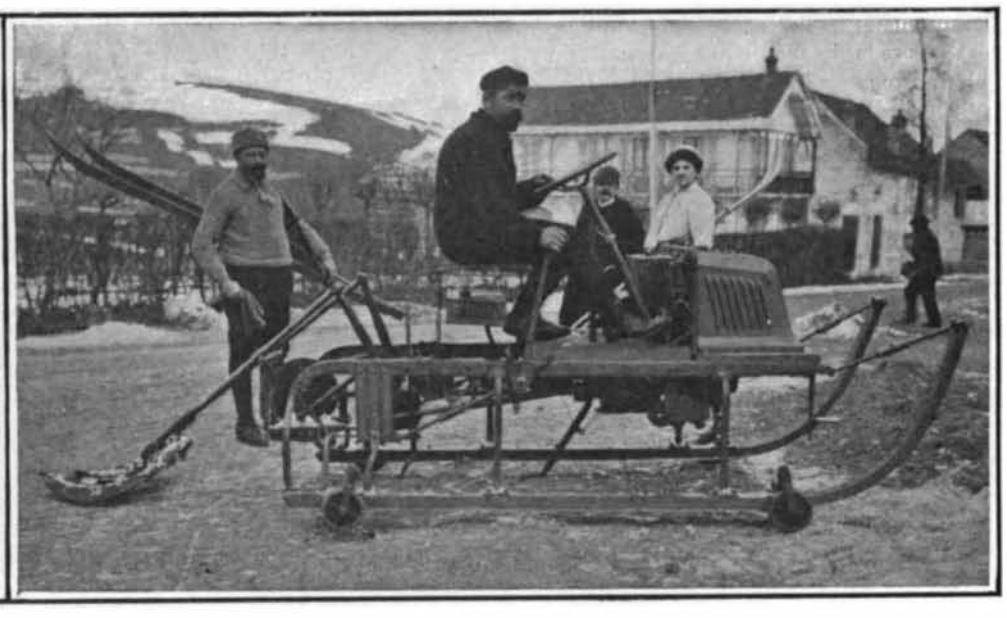
The "Peroche" automobile sleigh is the invention of a Russian machinist, its distinguishing features



The Austrian Wels motor-sleigh.

The Labesse motor-sleigh.

The Peroche pushing mechanism.



The Peroche auto sleigh.

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being propulsion by means of reciprocating pushers. The success of this machine seems to have been very largely due to the design of the latter. It will be noticed from the near view showing the pushers that they are armed with backward-pointing saw teeth, sliding easily when withdrawn, and that the shape and suspension of the shoe are such that it maintains its engagement with the ice or snow from beginning to end of the stroke, in spite of the necessary rise and fall of the outward end of the operating rod. The steering is managed by an ingenious gearing, which slides the cranks operating the pusher rods through their attachment to the connecting rods, thereby shortening or lengthening the stroke of the pushers on one side or the other. The "Peroche" is apparently intended to negotiate a greater variety of surfaces than the afore-mentioned vehicles, being provided with small wheels which are not adjustable to carry it over surfaces barren of snow, and its runners being much broader than those of the others, to support it in softer or less compact snow.

The driving method most suggestive of speed, or at least ambition for it, is that of the "Wels," an Austrian motor sled, the sole means of propulsion of which is a screw propeller like that of an airship. Whereas this method of propulsion has been successfully applied to hydroplane and other boats, it would seem from the experience of the Long Island experimenters that the resistance to starting of a heavy sleigh on metal runners adhering to ice or snow would be disproportionately greater than the skin friction of a boat, and that air resistance would be hardly sufficient to start this type of sleigh with long, continuous runners. Once started, the "Wels" sleigh has great possibilities for speed. It is steered by means of rearward extensions of both runners, vertically pivoted at their forward end, and operated exactly like rudders by means of wires from the automobile steering gear.

It will be seen that from its driving mechanisms alone automobile sleighing offers more variety than road automobiling, not to mention the other interesting problems above alluded to. Whereas the sleighing season is so short as to be almost non-existent locally, the field for such machines is much greater in Canada and other countries where winter sports have a longer annual life, and a successful motor sled would find a ready market. Considering the low cost at which the motor sled may be built as compared with the road automobile, its development offers an attractive and possibly lucrative occupation for the snow-bound chauffeur or amateur mechanic.

Prof. Osborn's Reminiscences of Darwin.

In commemoration of the centenary of Darwin's birth, Prof. Henry Fairfield Osborn, who besides being president of the Museum of Natural History is professor of zoology in Columbia, gave some reminiscences of Darwin before an audience at the American Museum of Natural History.

"On December 8, 1879," said he, "when Darwin was in his seventieth year and I in my twenty-second, I had the rare privilege of meeting him and looking steadily in his face during a few moments' conversation. It was in Huxley's laboratory, and I was at the time working upon the anatomy of the crustacea. The entry in my journal is as follows:

"'This is a red letter day for me. As I was leaning over my lobster (*Homarus vulgaris*) this morning, cutting away at the brain, I raised my head and looked up to see Huxley and Darwin passing by me. I believe I never shall see two such great naturalists together again. I went on apparently with skill, really hacking my brain away, and cast an occasional glance at the great old gray-haired man, and was startled, so unexpected was it, by Huxley speaking to me and introducing me to Darwin as an American who had already done some good paleontological work on the other side of the water. I gave Darwin's hand a tremendous squeeze (for I never shall shake it again) and said without intending in an almost reverential tone: "I am very glad to meet you."

The A-W motor sled.

"'He stands much taller than Huxley; has a very ruddy face, with benevolent blue eyes and overhanging eyebrows. His beard is quite long and perfectly white, and his hair falls partly over a low forehead. His features are not good. My general impression of his face is very pleasant. He smiled broadly, said something about a hope that Marsh, with his students, would not be hindered in his work, and Huxley, saying "I must not let you talk too much," hurried him on into the next room.'

"Another memory of interest is that the instant Huxley closed the door I was mobbed as the 'lucky American' by the ninety less fortunate students of Great Britain and other countries."

The Langley Medal Awarded to the Wrights.

The first award of the gold medal recently established by the Smithsonian Institution in memory of the late secretary Samuel Pierpont Langley and his contributions to the science of aerodromics is made to Wilbur and Orville Wright.

The Langley medal was founded "to be awarded for specially meritorious investigations in connection with the science of aerodromics and its application to aviation." The original design to be used for this medal was made by Mons. J. C. Chaplain, of Paris, a member of the French Academy. The medal bears on its obverse a female figure, seated on the globe, carrying a torch in her left hand and in her right a scroll emblematic of knowledge and the words "*Per Orbem.*" The reverse is adapted from the seal of the institution as designed by Augustus St. Gaudens, the special inscription being inserted in the center instead of the map of the world. It is about three inches in diameter.

A $500 Prize for a Simple Explanation of the Fourth Dimension.

A friend of the SCIENTIFIC AMERICAN, who desires to remain unknown, has paid into the hands of the publishers the sum of $500, which is to be awarded as a prize for the best popular explanation of the Fourth Dimension, the object being to set forth in an essay the meaning of the term so that the ordinary lay reader can understand it.

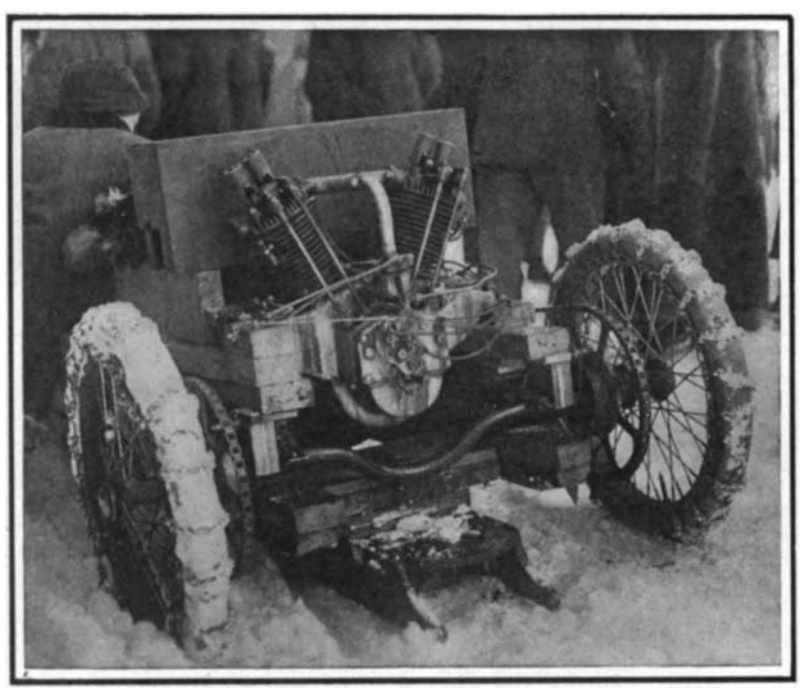
Competitors for the prize must comply with the following conditions:

1. No essay must be longer than 2,500 words.
2. The essays must be written as simply, lucidly, and non-technically as possible.
3. Each essay must be typewritten and identified with a pseudonym. The essay must be inclosed in a plain sealed envelope, bearing only the pseudonym. With the essay should be sent a second plain sealed envelope, also labeled with the pseudonym, and containing the name and address of the competitor. Both these envelopes should be sent to "Fourth Dimension Editor, SCIENTIFIC AMERICAN, 361 Broadway, New York, N. Y."
4. All essays must be in the office of the SCIENTIFIC AMERICAN by April 1, 1909.
5. The Editor of the SCIENTIFIC AMERICAN will retain the small sealed envelope containing the address of the competitor and forward the essays to the Judges, who will select the prize-winning essay.
6. As soon as the Judges have agreed upon the winning essay, they will notify the Editor, who will open the envelope bearing the proper pseudonym and containing the competitor's true name. The competitor will be notified by the Editor that he has won the prize, and his essay will be published in the SCIENTIFIC AMERICAN.
7. The Editor reserves the right to publish in the columns of the SCIENTIFIC AMERICAN or the SCIENTIFIC AMERICAN SUPPLEMENT three or four of the more meritorious essays, which in the opinion of the judges are worthy of honorable mention.

Prof. Henry B. Manning, of Brown University, and Prof. S. A. Mitchell, of Columbia University, will be the judges.

The question of equipping automobiles at present with incandescent electric headlights having tungsten filaments is worth attention. Miniature lamps of any size or shape for any general use are available, and have been for a number of years. To operate these lamps on an automobile means a source of current on the machine. With an electric power vehicle this is easily obtained from the power storage battery; in the gasoline automobile, electricity is not available except for ignition purposes. This is either furnished by a magneto or by a storage battery, or by a combination of storage batteries and a dynamo. Therefore, to use electric lamps on a gas automobile a storage battery of a capacity sufficient to serve ignition purposes and also furnish lighting current is needed. Within the past year the development of the tungsten incandescent lamp has made everyone interested in electric light. The tungsten lamp uses only one-third as much electricity as the common carbon filament incandescent lamps, which have been in use for a dozen years or more. This saving in current suggests the idea of equipping gasoline automobiles with tungsten incandescent lamps, which can be supplied from a storage battery carried for this purpose only, or from the battery used for the purpose of ignition, as this battery must be carried anyway.

The American "Freak" motor-bob.



Engine and driving arrangement of the "Freak."

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