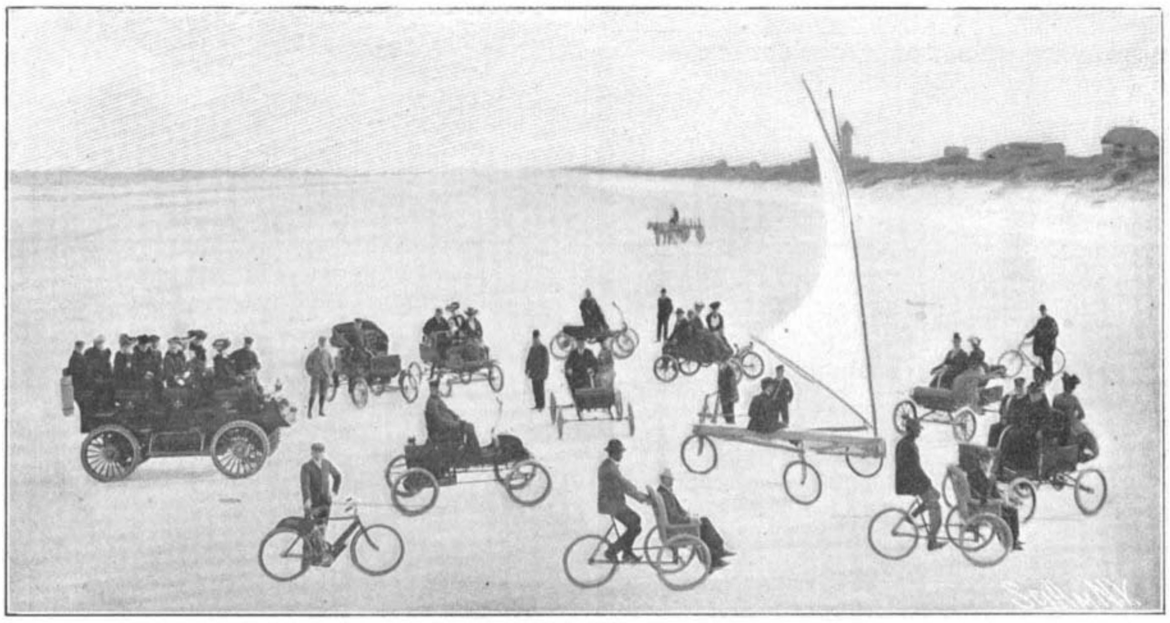
A NEW SPORT.

BY DAY ALLEN WILLEY.

The eastern coast of Florida between Daytona and Ormonde includes a stretch of sand which is about thirty miles in length and remarkable for its smooth and hard surface. It is so firm that it is utilized as a boulevard by horse vehicles of various kinds and by automobiles, bicycles, and what are locally termed "sand-sailers." During the winter season, when the resorts mentioned are largely patronized, nearly every variety of vehicle operated by steam or gasoline can be seen upon the beach. The photographs show a collection of the various automobiles which have been used here during the past winter. They include not only a break, but runabouts of various kinds. In the picture are no less than seven different kinds of autos, including the motor bicycle.

The "sand-sailers" consist of a framework spread on three bicycle wheels, to which is attached an ordinary sprit-sail. The rear wheel is used to steer the "craft," and it can be operated quite close to the wind, while in running before the wind it frequently attains a very high speed. Some of the bicyclists who use the beach for a course have fitted up sails which are fastened to a mast attached to the framework, and are used in coasting before the wind.



VARIOUS TYPES OF SELF-PROPELLED VEHICLES USED ON THE BEACHES OF FLORIDA.

THE AUTOMOBILE AND ITS HORSE POWER: A READY METHOD OF DETERMINING THE LATTER EXPERIMENTALLY.

BY PROF. N. MONROE HOPKINS, PH.D.

The term "horse power," although in the most general use, and, since the development of the automobile, almost a household term, is not generally understood or correctly interpreted by the average layman. In these days of rapid motor vehicle development on every side, it would appear that a true conception of this important and historic engineering unit should be fully grasped, especially by those owning and operating the various classes of machines.

In order to properly appreciate the capabilities of a motor car when its horse power is given, and to clearly introduce the method of the writer for experimentally determining the horse power of any kind of motor-driven vehicle, a complete understanding of the simple mechanics of this unit should first be had. The method is in accordance with well-known engineering practice, but is so simplified that it may be understood and applied by the non-technical reader. Horse power was originally based upon the assumption that a horse performs a certain definite amount of work in a given time. This old view, if one stops to reflect for a moment, is clearly incorrect, for there are horses and horses, and even with the same animal, changing conditions of energy and usefulness exist, depending upon many factors, so our unit would be of a shifting nature, and for exact work totally valueless. We must, therefore, if something of constant value is essential, adopt some scientific standard, making this standard equal to the work which may be done by an average horse if we wish. It is of little consequence what we make our standard equal to, so long as it is of convenient size, and is above all unchangeable.

SAND-SAILING ON A FLORIDA BEACH.

The "foot-pound-minute" has been chosen as the basis in America and England for determinations of mechanical power, and the power to do work of a horse has been repeatedly measured by actual experiments in these terms. There is nothing abstruse about the foot-pound-minute. It simply means the work done in raising a weight of one pound one foot high against gravity in one minute, and consequently involves the factors of mass, space, and time. A foot-pound-minute may be expressed in several ways as follows: One pound raised one foot high in one minute; one-half pound raised two feet high in one minute; or two pounds raised one foot high in two minutes. It matters not which way we legitimately adjust these conditions, the power required in each case is the same. One hundred foot-pounds, therefore, may be expressed as one hundred pounds raised one foot high in one minute, or one pound raised one hundred feet high in one minute, or one pound raised one foot high in one one-hundredth of a minute. In each of these three cases one hundred foot-pounds of work has been done.

Now, having these units, it remains to see just what weight a horse can raise through a given height in a given time, and it will be noted what a vast difference exists in horses of different types.

Boulton and Watt performed experiments with the strongest dray horses in London, and found that such animals could, when hauling at their utmost under the application of the whip, advance at the rate of 220 feet per minute when attached by their collars to a rope running over a wheel lifting a weight of 150 pounds. Here we have 150 pounds lifted through a vertical distance of 220 feet per minute, which is equivalent to 33,000 foot-pounds, as is readily seen by multiplying the factors together. As the horse is attached to the weight by a rope which simply has its direction changed by a pulley, the weight of course is lifted through a vertical distance against gravity, which is equal to the horizontal distance traveled by the horse.

Although numerous other determinations were made with different classes of horses, giving of course very varying results, the figure 33,000 as found by Boulton and Watt has been adopted for all mechanical and engineering calculations. As the figures by other experimenters on different kinds of horses vary so, it is thought of interest in this connection to give some of the results. D'Aubuisson determined the work of a different class of horse in terms of foot-pound-minutes by the same method of raising a weight, and obtained 16,440 foot-pounds. Desaguliers' determination gave 44,000 foot-pounds, Smeaton's 22,000, Tredgold's 27,500, and that of the present writer 38,212. It will now be seen how very loosely we would be measuring power to refer to a horse as a unit or standard. The writer has determined the power to do work of a horse on several occasions, by making him draw a loaded wagon up a steep hill, and timing him with a stop watch. In this case it is only necessary to know the weight of the horse and wagon, and the vertical height of the hill. In combination with the time, the weight raised and the altitude of the hill furnish all the data for the computation. The figures of the writer in one case were 38,212, and, in another case, 29,390 foot-pound-minutes. Both of these figures were obtained by making a horse draw a lightly loaded wagon at a high rate of speed, and then a heavily loaded wagon, which of course was carried up at a correspondingly diminished speed. The mean of the two determinations was taken. It is of interest to mention the fact that the lighter of the two horses experimented with gave the highest number of foot-pounds. Similar experiments were also made upon different bicycle riders, weighing the machine and rider, and timing the ascent on a smooth hill with a stop watch in each case. The only important point in the choosing of a hill, next to its smoothness, is, that it shall be steep enough to prevent very fast riding, for in such a case the wind resistance would play an important part and vitiate the determination, making the foot-pound-minutes apparently too low.

The writer has also experimented with nearly every type of automobile, and has determined the horse power developed by various makes, and has in many instances found the power to be rated from ten to fifty per cent higher than it really is. Now, accepting the figure 33,000, which is the American and English standard, and having a smooth, steep hill of known altitude and a stop watch, we are in a position to measure immediately with precision the horse power of any motor vehicle. The altitude of a hill in most towns and cities may be learned from the city or town engineer, or else it may be estimated or measured with a level and rod by the experimenter. By altitude of a hill, the height of the top above the base of course is meant, the length having nothing to do with the matter so long as this is not too great, for if the hill is not steep enough, the automobile will climb so rapidly as to encounter vitiating wind resistances, and then the test would of course be an unfair one.

The machine should be driven at full power and should have no flying start upon a level. It is customary to add about ten per cent to the figure obtained for friction losses, if we wish to determine the inside power of the motor itself. There are other means for measuring the horse power of motors which would be far out of reach of the ordinary automobilist, namely, the dynamometer test and the Prony brake test. In addition to these two general methods, there are a number of special methods, each applicable to the specific type of motor, whether steam, gasoline, or electric. The scheme as given herein is a general one, by far the most simple, and, for steep smooth hills is unrivaled in accuracy.

Fatal Termination of the Nice-La Turbie Hill-Climbing Contest.

The annual hill-climbing contest of the Automobile Club of France, which was held April 1, at Nice, was brought to an abrupt end by a fatal accident met with by Count Zborowski. The intrepid chauffeur attempted to round a sharp bend in the road while going 60 miles an hour, without slackening speed, with the result that his machine ran off the road into a cliff, dashing him head first against the rocks and killing him instantly. His companion, Baron Delasague, escaped death almost by a miracle. Mr. Zborowski was a wealthy American automobile enthusiast who raced last year in the Paris-Vienna contest.