

SCIENCE AND TRANSPORTATION.

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"No department of human endeavor is more typical of modern thought and action than that embraced by the transportation industry; an industry which constitutes the response which mankind has given to a natural desire for intercommunication. From meager beginnings transportation facilities have been multiplied, improved and extended until the whole civilized world has been brought together almost as a single people.

So engaged are we with the things of the day that we do not often consider how rapid has been this development, nor how great has been its effect. A hundred years ago when men went down to the sea in ships, they sailed subject to the caprice of the wind and in frequent danger of being blotted out of existence, unknown to the rest of the world. To-day the sea has become a course for immense steam-driven ships which, with a shuttle-like movement between shore and shore, proceed with a degree of regularity that is but little affected by wind or weather. On one ocean at least such ships are at all times in communication with others of their kind, or with the land. Four weeks ago two such ships well out upon the Atlantic, enshrouded in fog, came into collision, and almost immediately the fact was known everywhere. For hours following the accident, the friends of those involved, in America and Europe, kept in touch with the progress made in applying relief. Ships from the east and from the west a hundred miles away, were called, and they left their course and headed for the scene of the accident. Others more distant were told that their services were not needed. The transshipment of passengers began, was finished, and later a second transshipment occurred. Supporting ships, feeling

their way through the fog, arrived. For more than 24 hours this drama of the ocean proceeded, while interested people the world over, followed the progress of each event as it occurred. No accident of modern times has better served to illustrate the protection which modern science has thrown about ocean travel, than the collision between these steamships, the "Florida" and the "Republic."

Equally great have been the changes which recent years have wrought in the transportation upon the land. I have been told that 60 years ago in this State of Illinois, the corn crop of several years was allowed to accumulate in anticipation of the coming of a proposed railroad which would carry it on to market. In that day railroads were rare, while to-day the country is covered with their network, the mileage of the freight car wheels which traverse them exceeding 100,000 million every year. In passenger service the changes are equally significant. The 18-hour specials running between Chicago and New York, proceed, day after day, with a wonderful regularity of movement and pass long stretches of track at speeds above 70 miles per hour.

Now these achievements in transportation and travel, which for the most part have been worked out within the brief period of a hundred years, are not the result of chance; they are made possible through the existence of a wonderful fabric of science and technology. A ship is designed for strength by processes that are mathematically correct. Its lines are laid down and the amount of power it is to have is fixed with the certainty that a predetermined displacement and speed will result. It is the same with the railroad, steam and electric, with the transportation of power by electricity, and with the transportation of speech and thought by telephony and telegraph. In all of these directions success in the development of practice has depended upon the security of a series of successive steps, each one of which has been fundamental and in its time necessary to those that have since followed it. A definition of these fundamental steps or

stages constitutes the basic principles of the science of transportation.

But while science has guided practice in transportation to its present state of development, it is not true that practice has always been scientific, nor is it, in all cases, so to-day. The reverse is true. It is to this phase of my subject that I wish especially to direct your attention. A railway friend of long experience, a self-made man, well described the situation, when after talking of his early experiences as a motive-power official, and especially of the mistakes he had made, he concluded by saying, "My railroad has paid a lot of money for the things I have found out." The statement was undoubtedly true, and it would still be true if applied to railway companies in general, or to companies engaged in other forms of transportation. If we except certain very recent developments in transportation, chiefly those depending upon electrical power and those involving aerial flight, it is the inventor and the promoter who have led the way rather than the scientist. The scientist has studied the phenomena resulting from the work of the inventor, has formulated principles of action into laws and has announced these laws for the more orderly marshaling of subsequent movements, but too often he has not himself been constructive. Captains of transportation and many of their lieutenants, impatient in their desire to secure tangible results, not infrequently prefer a headlong process with all the dangers and expense which such a course involves, to slower and more certain methods. Moreover, many such practical men believe that the things which they do, and do well, are beyond the ken of the scientist. In the matter of rate making, for example, and in many of the problems of train operation, the belief is current that experience and common sense are the only safeguards.

Now the fact is that in the conduct of every system of business, there are principles which underlie procedure. They may not be recognized as principles by those most concerned, but they are there nevertheless, and it is the part of the scientist to discover them, to determine the relation which each

one bears to others, and to formulate these relations into rules of practice. Railway and other transportation companies will not attain their highest efficiency nor will the public be served at lowest cost, until the business of every department of the transportation industry has been reduced to such a basis. It is in recognition of this fact and as an aid in training young men for positions of responsibility in such transportation companies, that the University of Illinois conducts a School of Railway Engineering and Administration, the purpose of which is to deal with such great questions as the design, construction and maintenance of railway equipment, with the problems of accountancy, operation and management; subjects which many people believe can not be taught in a college, but which are in fact easily capable of successful treatment there. It is the province of this School so to train students that they may be ready to assume the business of the transportation companies when the present-day officials give up their duties, and to carry it forward on a plane which will be in keeping with the advanced requirements of their day.

The introduction of this work is difficult because those who are to profit most by its success can not at once appreciate its significance. If we were to say that we plan to train men in college in railroad management, public opinion would discredit the effort just as thirty years ago it discredited the college when it attempted to train men in agriculture. But the day is at hand for a new era in the management of transportation, when science must take the place of the rule-of-the-thumb, and I ask the interest of the membership of the Academy, in the efforts which the University is putting forth to make a contribution to such a result."
