MOBILIZING THE MOTOR CAR

HOW A GREAT INDUSTRY HAS COME TO THE AID OF THE NATION. ONE MILLION SKILLED MACHINISTS AND THEIR WORK FOR UNCLE SAM—IN THE DETROIT FACTORIES — COST EFFICIENCY METHODS—AUTOMOBILES ON THE BATTLEFIELD.

DETROIT, 1917.

WITHIN the past few months the chief automobile factories in the United States have been put to work on war orders. Some of them are making motor trucks, some armored cars and others rapid automobiles for carrying dispatches. Many of the shops are making ambulances and some, I doubt not, although I cannot tell where, are manufacturing the mighty tanks or forts upon wheels, which roll over the country crushing down everything in their way.

Long before we entered the war Detroit was making automobiles and motor trucks for the French and the English. One of its firms supplied 9000 cars to the armies of France and another exported $1,500,000 worth of war ambulances. One of the makers of high-priced cars has already shipped 5000 trucks to Europe, and another, which makes a $2500 automobile, has sent 6000 of his vehicles across the ocean. An establishment making a well known cheap machine recently completed one order for 10,000 ambulances and another company is turning out 150 airplane motors every day. The government is having the machinery of many of the factories adapted to special war work. Some are making munitions, others are constructing gas engines for the use of the army and navy, and, in fact, the whole motor car industry has been brought to the aid of the nation in our fight with the Germans.

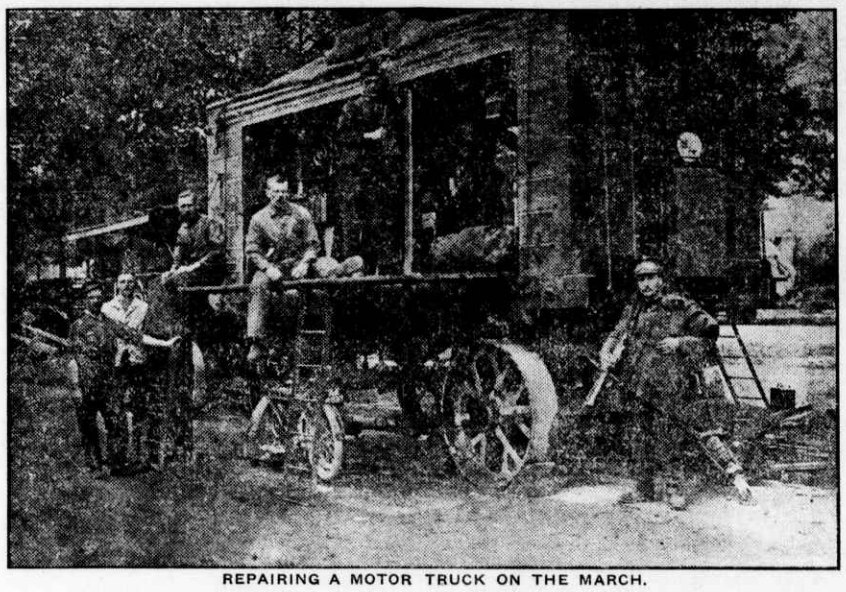
To show you what this industry amounts to as a war asset, I will give some of the latest figures concerning it. It grows so fast that it is almost impossible to overestimate it. It amounted to nothing 25 years ago, and 10 years since it was a bagatelle, in comparison with others of our great industrial forces. Today the government officials admit that it stands next to steel and ships in importance and they are rapidly mobilizing its machine shops and men.

The automobile and motor car establishments of the United States are now scattered over 30 states of the Union. There are 455 of them. There are over 80 in Michigan, 50 in Illinois, 64 in Ohio and 45 in New York. Pennsylvania has 33, Minnesota, 20; Massachusets, 18, and California, 16, with less numbers scattered throughout other parts of the country. In addition there are perhaps three times as many plants making automobile bodies, accessories and parts.

These establishments have in their employ the most skilled army of machinists ever gotten together. There are 980,000 of them, and added to this number are double as many men connected with the subordinate industries, which make parts, tires and other things dependent upon the automobile trade. There are a vast number making gas engines which can be used on airplanes, boats and vehicles of other kinds and the whole force is almost as important to our army as the men in the field.

Our motor cars now number more than 4,000,000. This means one car to every five families in the United States, and it is estimated by Logan Waller Page, the head of the bureau of public roads, that we have a motor vehicle of one kind or another almost every mile of public and country road in the Union. The statisticians of the World almanac say that our automobiles ran last year the enormous distance of 15,000,000,000 miles, which is equal to 600,000 times around the earth, or 166 times the distance between the earth and the sun. The figures seem incredible, but I take them from the almanac which lies before me. During that year we burned more than 1,000,000,000 gallons of gasoline in our motor cars, and wore out more than $12,000,000 worth of tires. This is truly something of a business to have grown up in 25 years.

And now just a word about the history of the motor car. The attempt at its invention is by no means new. The idea was conceived long before the invention of the bicycle, and as early as 1680 when Boston was a few scattering houses with cow-paths as streets, Sir Isaac Newton proposed a steam carriage to be moved by the reactionary discharge of a jet of steam directed from the rear. About 100 years later Watts took out patents adapting his steam engine to carriages running on land, and it was after the close of the revolutionary war that Oliver Evans obtained a patent in Maryland for the exclusive right to make steam road wagons. It was a little before the Declaration of Independence was signed that a Frenchman, Captain Nicholas Joseph Cugnot, invented the first motor-propelled road vehicle that actually ran, and a model of his steam carriage is still to be seen in one of the museums of Paris. This man was the father of the automobile. He was rewarded for his invention with a pention of less than $200 a year and he died poor. His invention never became practicable.



REPAIRING A MOTOR TRUCK ON THE MARCH.

The next advance was by an Englishman named Trevithick, who built a steam automobile which did better than the car of Cugnot, and this was followed by the machine patented by Oliver Evans, who mounted an engine on a four-wheeled wagon and drove it around the circle where the city hall of Philadelphia now stands, and then down to the Schuylkill river, where the engine was taken off and connected with a paddle-wheeled boat, which it made to move down the stream. About 30 or 40 years later an Englishman named Hancock established a coach line run by steam over the ordinary roadways. He kept his car running for 20 weeks and during that time carried more than 12,000 passengers.

The steam engine, however, did not prove to be practical and it was not until the explosive gas engine was invented that the commercial automobile had any chance of success. This was first patented in England about 79 years ago. Later on it was attempted in France, and in 1879 George B. Selden, an American, filed an application at Washington for a patent gas engine. His patent was not granted until 1895, and it formed, to a large extent, the basis of our automobile industry. Since then there have been inventions of many kinds, and the automobile business has steadily grown. In 1899 there were 57 factories making automobiles, with an annual output of 3700 machines, which sold for a little less than $5,000,000, and four years later the production had risen to 11,000 machines. In 1910, 15 years after the Selden patent was granted, the number of cars produced was 187,000, and by 1915 the number of cars in use had grown to more than 2,000,000. In 1916 we had, according to the government count, more than 3,500,000 motor cars and 250,000 motor cycles, nearly all of which were run by gas engines. As I have said, the number of cars in use today is probably more than 4,000,000.

The value of the motor car in the field of war cannot be overestimated. The armies now fighting have several thousand such vehicles. An estimate made last year put the German supply at 80,000 and the French at more than 100,000. The Belgian army has more than 6000 motor vehicles, and the English army more than 60,000. During the war something like 24,000 trucks have been shipped from the United States to Europe. Such trucks are used to transport men, food and ammunition, and they have proved of enormous value to the forces on both sides of the battle line. The Germans used them to rush certain parts of their army into Belgium and they aided the French greatly at Verdun. About one year after the war in Europe began our war college at Washington made a report to congress as to the value of motor transports, and gave recommendations as to the increase of this branch of our army establishment. It advised that auto trucks be used for moving the men and guns, and stated that a single truck would carry 20 men and equipment. It stated that the trucks could be supplied with trailers and showed how a comparatively few could bring a thousand men to the reinforcement of the trenches within a few minutes. Such trucks are expected to make 12 miles per hour and to travel 100 miles in a day. For all-round service the one-and-one-half-ton truck is the best.

The motor transport of the modern army is thoroughly organized. It has its officers and its privates, its trained chauffeurs and its machinists. Connected with every army in the field is what is known as an automobile park or motor car hospital. This is where the vehicles are taken for repairs. Ordinary road troubles are remedied by the chauffeurs, who carry extra parts with them, but other repairs are made in these machine shops, which have power lathes, vulcanizing shops and blacksmith shops. Every park has its oxy-acetylene welding outfit, by which the broken parts of steel, brass or aluminum can be joined together. There are usually several hundred cars in each park, and the machinists and other repair men are under the command of a captain and two lieutenants. At present the armies are doing all they can to have the trucks and cars standardized, so that the parts of one machine will do for breakage in others.

There is no better place to learn about the automobile industry of the United States than Detroit. This city is the motor car center of the country. It has more than 90,000 men employed in the industry and its output of cars last year was about 1,000,000 in number. During the fiscal year ending last July a single company had sold more than 750,000 cars, and its managers tell me they have still 100,000 unfilled orders on their books. The market value of the cars turned out here last year was more than $600,000,000.

Riding through the city, one sees everywhere the evidence of the motorcar industry. He can count a half million dollars' worth of pleasure automobiles at any hour of the day in Cadillac square, and he will see trucks on almost every street carrying loads of automobile materials from plant to plant. There are great factories devoted to making motor car parts and accessories, and those making motor vehicles are to be found in every part of the city. Some were on the outskirts when they laid their foundations, but the city has gone beyond them. Detroit increases so rapidly that the people can hardly keep up with it. They claim that they have now 850,000 population, and that at the present rate of growth they will have more than 1,000,000 in 1920.

During my stay here I have visited many of the factories. There are 120 in the city. Some of the plants cover acres, and one has 40,000 or 50,000 men on its pay roll. I went through one factory which has as much ground devoted to it as a 275-acre farm, and walked through machine shops which if spread out would more than cover five fields of 10 acres each.

The buildings of the factories are of four, five and six stories. They look like enormous boxes of brick, iron and glass. They are designed and built with the sole view of efficiency, of handling the materials, increasing output and with giving sanitary conditions to the employes. I might write pages about the details of saving I saw everywhere. The buildings are arranged so that the raw materials come in at one end of the factory and the finished cars go out at the other. There is no waste of energy and no reduplication of work. In one establishment the buildings are in units around craneways, which enable the freight to be taken from the trucks on the railways and dropped down just where they are to be used. In another the power house is so built that the coal is put in at the top of the plant, and it falls by gravity into the furnaces, which heat the boilers that in turn move the great cylinders of the 6000-horsepower engines on the floor below. That power plant develops 36,000 horsepower and its engines are a combination of gas-steam type. There are other engines which increase the horsepower to 45,000, and that force is used for the machinery of this one motor car establishment alone. The power plant is as clean as a Dutch kitchen. Its floors are of mosaic white tile, and it makes one think of the bathroom of a millionaire. The electricity is generated there, and there is a great saving in coal by use of gas producers. The company consumes more than 30,000,000 cubic feet of gas per day, or enough to light a large city.

To give you some idea of these great machine shops which are now being adapted to the work of the war, I will mention some of the things that I saw in going through one of the plants. It is the largest plant in Detroit, and is typical of the work that many of our automobile establishments are now doing for ourselves and our allies. The buildings of this factory are 900 feet long and 800 feet wide. They are four stories in height and they cover many acres. Every square foot of them is now humming with work, and the machines go on day and night all the year through. Standing in one building you can overlook a single room which has 700,000 square feet of floor space. It actually covers more than 16 acres, and this is filled with machinery of such a nature that it looks like a dense forest of fast-moving belts and whirling wheels grinding away. There are, in fact, 50 miles of leather belting in the room. It contains 8000 different machines in actual operation, and these represent an outlay of $5,000,000. The machines use 2500 gallons of lubricating oils every 24 hours and they keep busy thousands of men. The machinery reaches as far as you can see. As you stand in the center of the room the walls are not visible and you can hardly see the ceiling. There is a shrieking of the cutting steel upon steel, a buzzing of wheels like the swarming of locusts, and here and there at intervals are to be seen men in blue overalls directing the machines.

The machinery of such a factory is so arranged that it forms one continuous process of construction. The raw material in the shape of rough forgings and rough castings starts in at one end of the department, and it passes through machinery after machinery until it comes out ready to be assembled into the car. At the same time other parts are coming along through other machines, and the result is that the raw material goes in at one end of the factory and comes out at the other end in ambulances, motor trucks and war vehicles of one kind or another.

The same methods are used in making gas engines which will go to the aviation camps to be parts of the flying machines made there or to the making of other parts for the use in various kinds of war machinery.

In the war work of today everything is analyzed and is tested to the thousandth of an inch to be sure that it will fit the specifications and needs to which it is to be put. This great factory tests the steel before it goes into the furnaces and the materials are tested again and again until they come out in the completed product. There is no guesswork and the machinery of construction is such that mistakes can be traced to the exact department and to the man who makes them. Every motor car that goes to the battlefield of France has its number, and of one breaks down without cause in the midst of a battle, the number of the defective part could be sent back here and the man who made it be traced.

As far as possible all sorts of war work are being standardized. The government wants its supplies in vast numbers, and hundreds of men are engaged on the same part, turning it day in and day out, all the year through. This is so of gas engines, of cylinders of various kinds, of magnetos and of all the parts that go to make up a car.

During my stay at this factory I watched them paying the hands. About 50,000 are paid every week and a string of employes, men and women, of a hundred different nationalities, go by the pay window all day long. Each gets his money as he passes, and that in a little pay envelope, half as big as those used for ordinary correspondence. On the outside is marked the man's name, and inside are bills. I ran over some of the envelopes and saw they were marked "$50," "$60" and upward. I opened one envelope and the bills and exact change were inside. The amount paid out in one day is often as much as $200,000 and it averages more than $150,000 every 24 hours. During the month of May last it was more than $5,000,000. I am told that a large proportion of the workmen receive $5 and upward per day.

This company has a profit-sharing system based upon the habits, thrift and work of the men and the use they make of their money. The share of the profits given each employe is distinct from his wages, and the design is to give the man who gets the least wages the largest proportionate share in the profits. The system is such that most of the employes make $5 and upward per day.

The officials tell me that this profit-sharing has been a success, that it has doubled the bank deposits of the men, increased the number of homes owned by about 100 per cent and the value of the houses bought upon contract from a little more than three million to more than five and one-half million dollars.

I asked as to the effect of this system as a cost efficiency proposition; the manager replied that they thought it was more than paying, in better work, greater output and in less change of hands. There are something like 5000 women employed in the plant, who get the same money as the men doing similar work. When their wages were raised to an equality with those of the men, their efficiency at once jumped more than 50 per cent.

"One of the most important values of this profit-sharing system," said one of the men at the head of the factory, "is that our employes stay with us, and we do not have to be continually hiring new men. Before we introduced it, in order to keep a continuous force of a little more than 13,000 men, we had to hire as many as 52,000 new hands throughout the year. Immediately after the profit-sharing was introduced with a force of men of a little more than 18,000, the new men employed numbered only 14,000. By a careful study of cost efficiency, we find that it costs us just about $70 to hire a man and fit him for his job. In 1913 we discharged over 8000 men, and in 1915 the number discharged was only 27. Multiply 70 by 8000 or 560,000 and you will have the number of dollars we saved by holding our men."

FRANK G. CARPENTER.