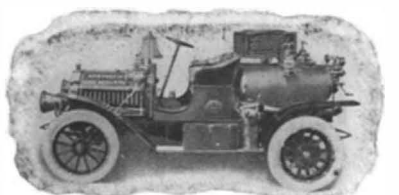


# AUTOMOBILE FIRE ENGINES.

A NEW TYPE OF MOTOR VEHICLE.

BY HERBERT T. WADE.



The great success of automobile fire apparatus in Europe and in many of the smaller cities of the United States frequently gives rise to the inquiry, why are such machines not used more extensively in the larger fire departments, where the highest efficiency of apparatus and personnel is demanded and maintained? The acknowledged utility of automobiles for pleasure and business, even under extraordinary conditions, emphasizes this tardiness the more forcibly, particularly as the modern motor vehicle is now capable not only of attaining high speed but of carrying heavy loads. Promptness in reaching a fire with suitable apparatus is of prime importance, and the automobile in this respect and in endurance is easily superior to a horse. To-day with high speeds pumping capacity can be secured in a motor vehicle sufficient for most conditions of service, and this, with economy of maintenance after the initial cost, has led to the adoption of automobile fire apparatus by many of the progressive smaller cities. This economy is obviously due to the fact that only when in operation are gasoline and oil required. A horse even when idle entails expense for shoeing and feeding.

Even the most conservative of metropolitan fire officials realize that the rapid transportation by horses and the subsequent operation at high pressure of a heavy steam pumping engine on wheels is more or less a mechanical anachronism in these days, when central power stations have largely taken the place of the small isolated plant, and when small internal-combustion motors using gasoline have been found economical, convenient, and efficient. The pumping power of a fire engine depends upon the weight that can be transported. As an internal-combustion motor connected with a pump would weigh much less than a steam engine and boiler and going to a fire would use the same engine for propulsion, it would follow that greater efficiency could be secured. Even superior from the mechanical standpoint, but not as yet practically applied, would be the mounting of an electric pump on a gasoline-driven motor car, using current derived from supply mains near the scene of operation. Chief Binns of the New York Fire Department has developed such an idea which possesses many obvious merits. He proposes to use electrically-driven centrifugal pumps on motor vehicles capable of high speed and to obtain power from electric-light standards or other outlets which are at almost every street corner and quite as well distributed as hydrants. The same condition also prevails in many rural districts, where electric light and trolley lines are to be found on every main street. Suitable plugs and conductors could be used for connections, and with the power derived from a central station the portable machinery would be reduced to a minimum weight. A similar idea, though not so elaborately developed, was put into operation more than twenty years ago by Dr. S. S. Wheeler, now president of the

Crocker-Wheeler Company, Ampere, N. J. This apparatus consisted of a bipolar motor directly coupled to a pump, and was mounted on a light carriage. The gasoline motor car was not so highly developed at this time, for which reason the carriage was drawn by horses. A fire engine built on this plan was tried out on the Erie Canal at Schenectady. It was finally brought to Ampere, and was destroyed in a fire which occurred there in 1895. Strange to say, this scheme, which would involve comparatively little outlay for a large city, has never been thoroughly and practically tested.

At present, motor apparatus is most widely used in suburbs and small cities with wooden dwellings; in other words, in communities where its high speed renders it possible to cover a much greater territory by a single company, and where infrequent alarms reduce the expense of maintenance far below that entailed for feeding and shoeing horses. For example, a St. Louis motor company recently made a run of nine miles to a country villa outside the city limits and ar-

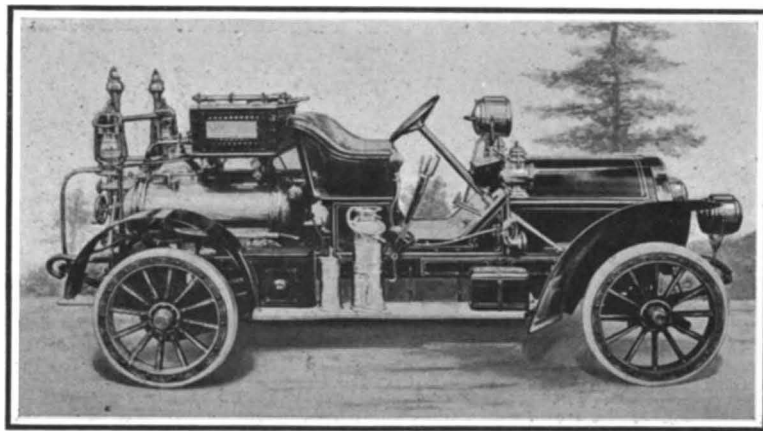
large city will consist simply of an efficient high-pressure water system and automobile engines and hose wagons.

In a description of modern automobile fire apparatus we may mention, first, the high-speed touring car or runabout, for the use of chiefs and supervising officials, capable of rapid travel and of covering wide sections of territory. This was the first automobile used by fire departments. Such a car does not usually carry extinguishers or any fire apparatus, one or two small extinguishers and axes or other tools being added only in rare instances. All that is demanded for such a machine is a high quality and reliable motor car of sufficient speed and easy control. In hardly more than thirty minutes Chief Croker of the New York fire department is at the scene of any fire in Greater New York, directing in person the operations of the firemen. This is significant in view of the large amount of territory comprising the greater city and the dangers involved in some of the outlying districts.

A modification of the chief's car may be seen in that supplied to the battalion chief or the head of the fire department of the smaller city. Extinguishers and tools are often considered essential. The chief carries with him not only a chauffeur but one or two firemen from the permanent headquarters force.

If rapid travel is desirable for the chief, it is of course equally advantageous for the firemen responding to an alarm. In small blazes such as those caused by a curtain blowing against an open gas light or by a short-circuit of a lighting system, one or two men with axes and hooks promptly on the scene can prevent what might be a serious fire in a dwelling house or stable. Accordingly it was early realized that auxiliary or emergency squads could be equipped with motor cars and could be dispatched at high speed to the scene of the fire. These men deal with an incipient fire or prepare for the steam engines which follow and if necessary send in additional alarms or communicate by telephone with headquarters. This type of equipment is extensively used throughout the United States.

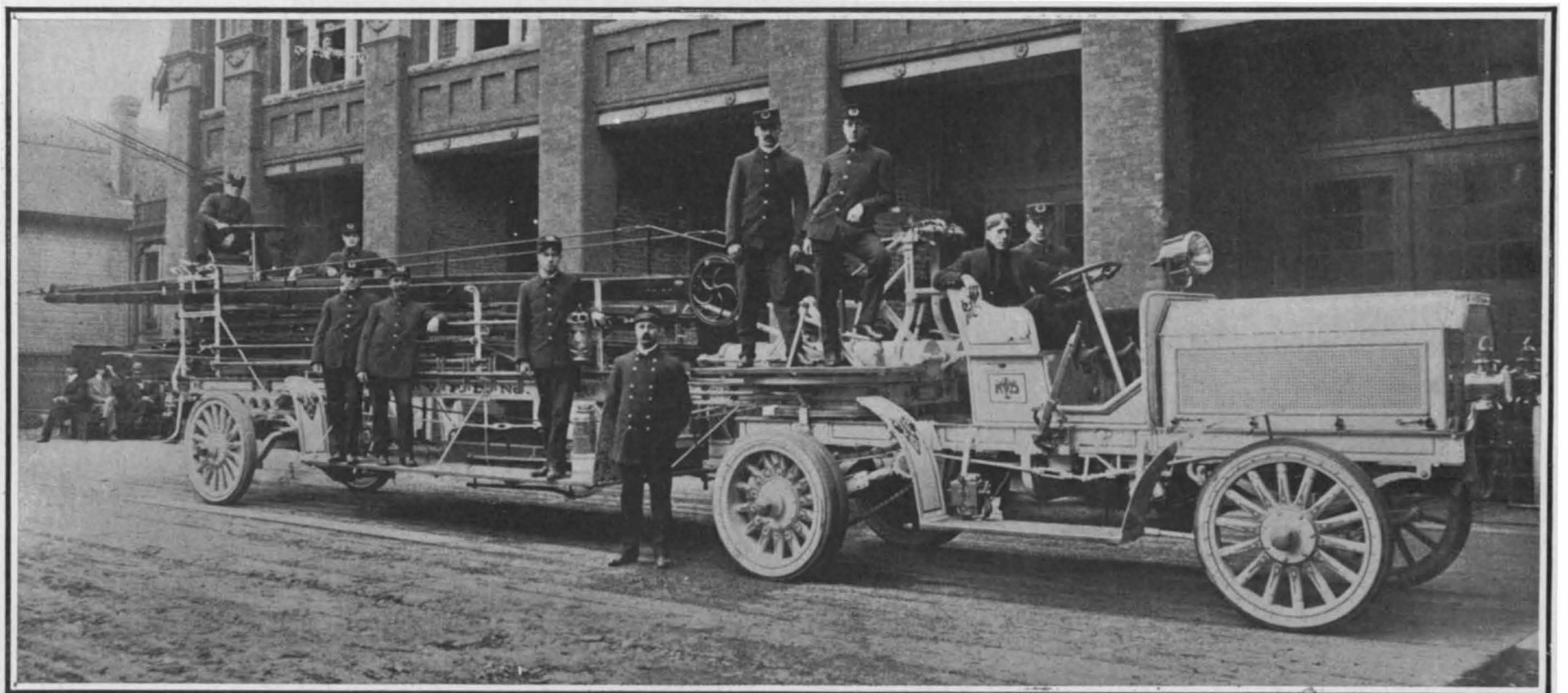
But it must be realized that this means simply the prompt bringing to the scene of action the trained men who can take care of the smallest kind of a fire. Without apparatus or sufficient power nothing can be done where the blaze is at all serious. It was with this end in view that automobile fire-fighting facilities were increased by adding a chemical tank and a few hundred feet of small hose. The chemical tank and equipment has now become an indispensable feature of many fire departments. Carried on horse-drawn hose wagon, a small fire can be quenched in its incipency by its means with a minimum use of water and consequent damage. The chemical tank consists of a copper cistern of from 40 to 70 gallons capacity, containing bicarbonate of soda and other chemicals with which sulphuric acid and water may come in



MOTOR-DRIVEN CHEMICAL ENGINE.

rived in time to save the house. This same company in a period of eighteen months responded to 1,000 fires without a single failure, and in so doing traveled 2,250 miles in all conditions of weather, including mud, sleet, and snow. The economy of this company is apparent from the fact that its maintenance account for twelve months was \$481.31, including two accidents, which resulted in an expense of \$250, as compared with an annual cost of \$816, for feeding and shoeing two horses. Even in a district where there are no water supply hydrants, such a machine can make a speedy run, and draw water from a well, canal, or pond.

In a large city the question of territory is not as important as that of speed in getting the firemen to the fire. In a district with high-pressure fire protection fires occur which taken in time may not require the powerful streams from the fire hydrants and could be put out with a minimum of water damage. Indeed it seems likely that the future fire protection of a



A HOOK AND LADDER AUTOMOBILE TRUCK.

contact to generate carbonic-acid gas at such pressure as to be forced with the water through a small hose. This apparatus has been used with considerable success in some fire departments, but it is fair to say has been ignored or found unavailable in others. Especially is this true of New York city, where the practice has always been to concentrate at a fire adequate pumping power at the earliest possible moment and to use large quantities of water, the idea being to take no chances and even at the risk of water damage to err on the side of safety.

In the horse-drawn combination wagon the chemical tank and the small hose usually carried upon the driver's seat is but an incidental feature, the body of

the wagon being reserved for larger fire-engine hose. But in a properly designed automobile such apparatus can be sped to the scene of a fire with four to eight men at from 40 to 60 miles an hour. Thus for a fire in a small suburban dwelling, in the majority of cases, a chemical engine brought close to the house with its 200 feet of  $\frac{3}{4}$ -inch hose, is able to extinguish an incipient fire. Such motor cars are built with engines from 24 to 50 horse-power. Because of the peculiar service conditions they are usually of the air-cooled type to obviate danger of freezing in winter. The tanks vary in capacity. It is considered good practice to install two tanks, so that one can be refilled while the other is in use. It would seem desirable

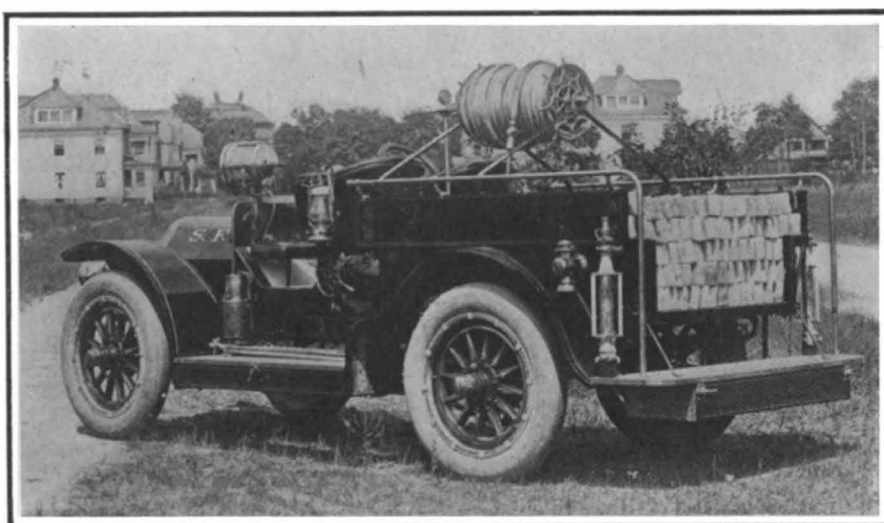
that such chemical engines be supplied in the majority of fire departments to answer at once on the first alarm.

The next step in the progress of the small motor chemical engine was to make it larger and to add to its equipment. Accordingly combination engines were designed which not only carried the chemical equipment but also hose for the following steam engine, scaling ladders, tools, and other apparatus, thus enabling the men to prepare the way for more serious operations and saving valuable time. In this field a number of very efficient types have been evolved.

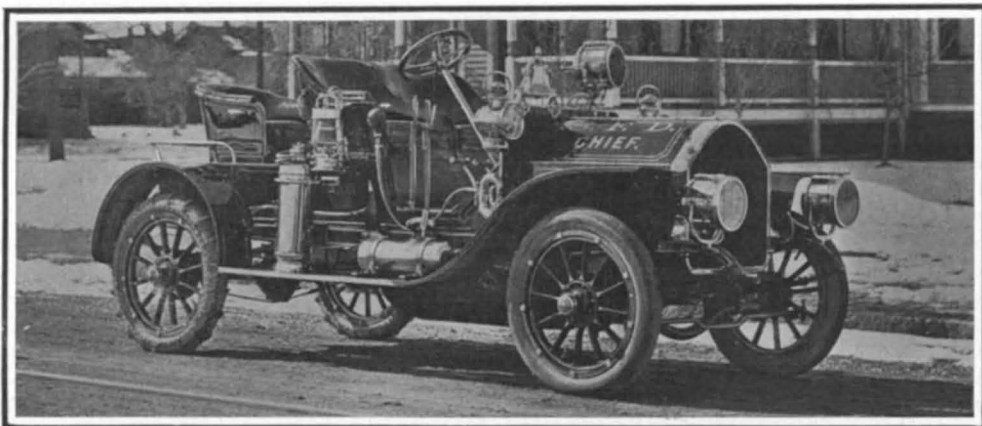
Next in mechanical development comes the motor  
(Continued on page 69.)



A NEW YORK AUTOMOBILE HIGH-PRESSURE SERVICE WAGON.



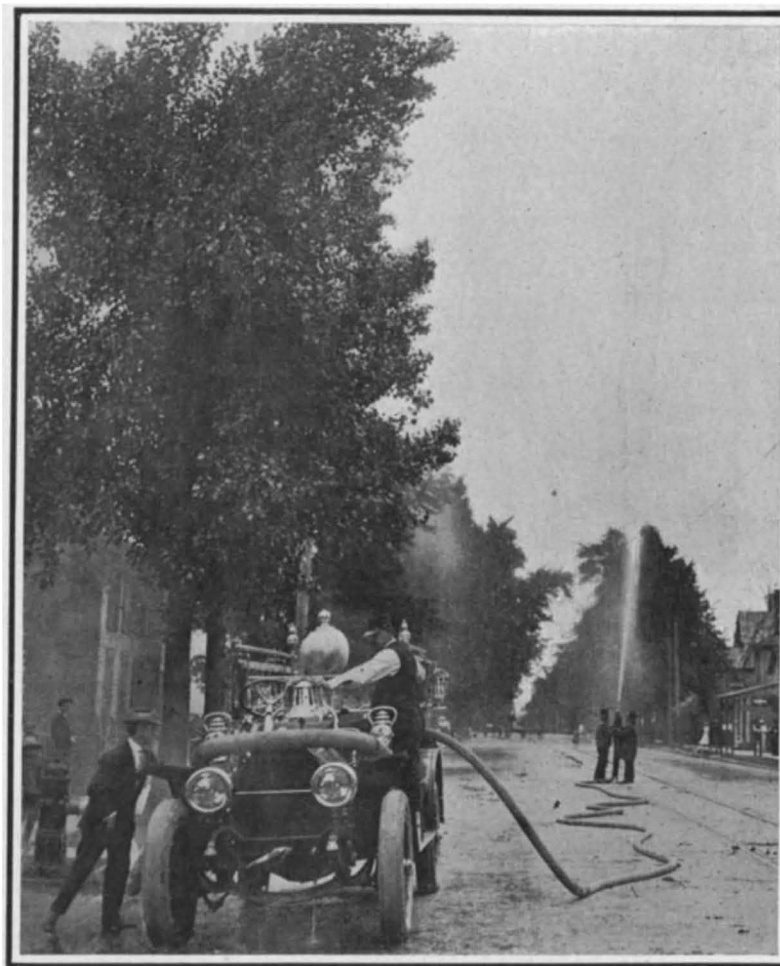
AN AUTOMOBILE HOSE CART.



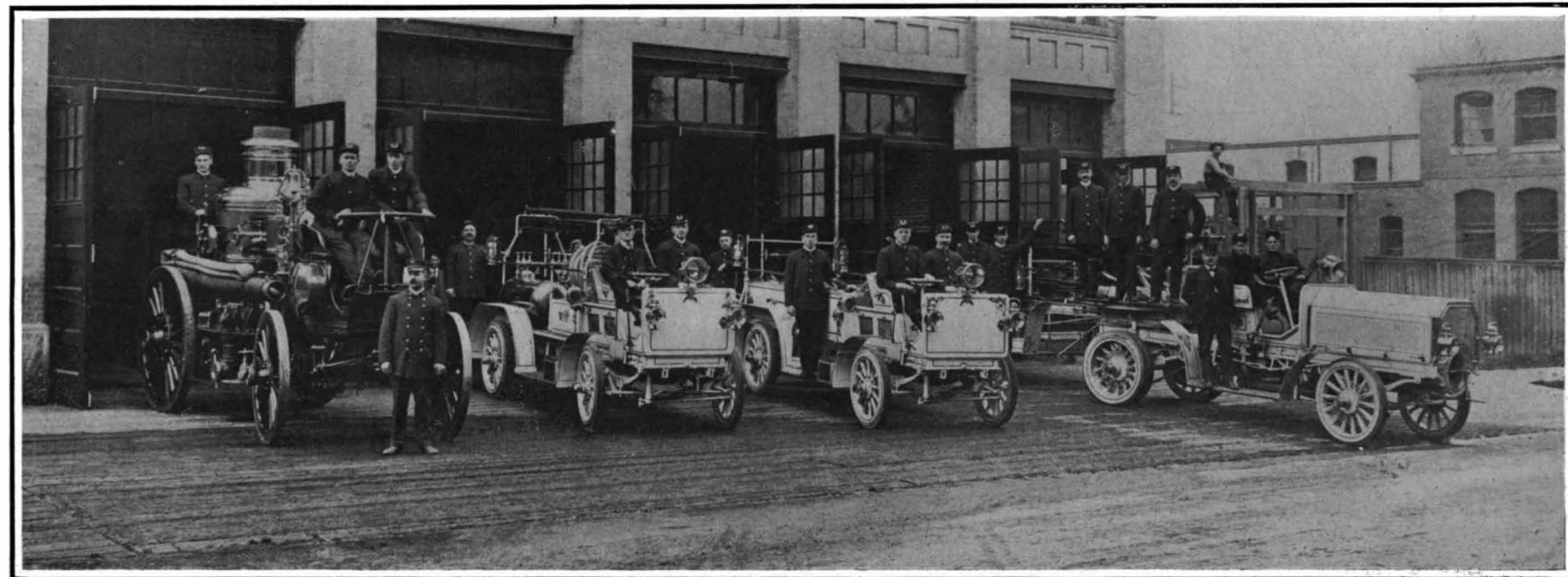
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MOTOR-FIRE PUMP AT WORK.



A COMPLETE AUTOMOBILE FIRE DEPARTMENT.



Swiss file and calipers. It is not necessary to file clear around the unworn portion of the pin, since a slight deviation from its original axis does no harm, neither is it absolutely essential that it should have the same diameter throughout. Its new axis, however, must be absolutely parallel to the shaft. It is best to throw away worn bushings and put in new, taking out or inserting shims till a fit is obtained, and scraping no more than is necessary. A worn wrist pin bushing must be renewed, and usually the wrist pin must be ground true. If the crank pins are oiled through passages drilled in the crank shaft, their lubrication is probably perfect. If, however, they are oiled solely by splash and the oil holes are in the upper half of the crank pin bushing, a considerable improvement can be made by replacing the upper bushings with solid ones and introducing the oil through the bottom half by brazing a copper tube in the cap to act as an oil scoop (Fig. 10). The bottom half is then drilled and provided with an oil groove for about half its length. It is a principle of lubrication that the oil should always be introduced at the unloaded side of the journal, and that any breaks in the continuity of the loaded surface merely afford the oil an avenue of escape under pressure.

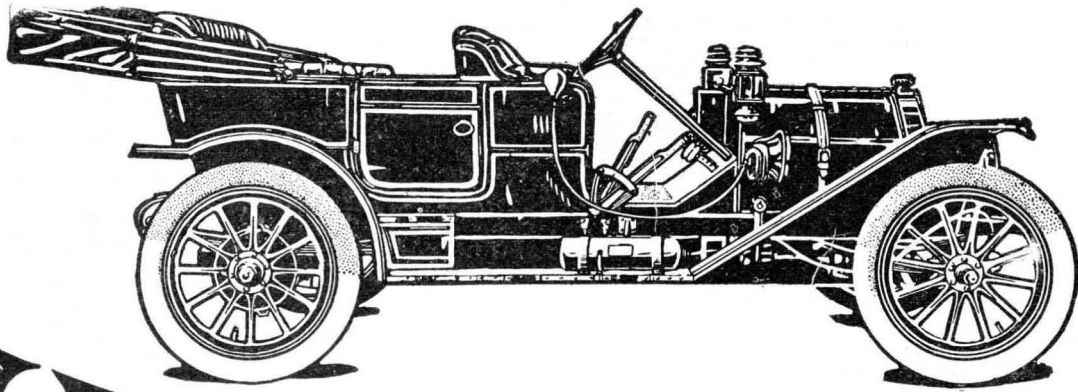
To renew the clutch leather, take off the old leather and use it as a pattern. Select the new leather carefully for uniform and correct thickness, and cut it about half an inch short. The curvature should be approximately that of the old piece (Fig. 11). Locate the end and the middle holes for the rivets, countersinking them considerably so the rivet heads will not come flush, and soak the strip in water till it has swelled sufficiently to go in place. Use the end of a steel bar as an anvil, and put in the end and middle rivets first, holding the strip meanwhile by wire nails. The riveting must be completed before the strip dries.

#### AUTOMOBILE FIRE-ENGINES.

(Continued from page 55.)

fire engine proper. After reaching the scene of the fire the driving gear is uncoupled and the pumps are put in connection with the engines. Such fire engines of course must draw their water from a hydrant, well, or other supply. They have done splendid work in suburbs wherever fire engines of suitable power or an adequate high-pressure system can be held in reserve. The best of these machines can run to a fire with a crew of seven men at speeds up to 60 miles per hour and carry 1,000 feet of hose. The pumps deliver 700 gallons of water per minute at pressures up to 150 pounds to the square inch. The regular steam fire engine has a capacity varying from 400 gallons per minute to 1,000 gallons in the case of the largest size of machines. Such a motor fire engine usually contains two 3-gallon chemical extinguishers, and heavy suction hose for hydrant connection, fire axes, nozzle holders, large alarm bell, the usual equipment of lamps, lanterns, tools, and small scaling ladders. In the opinion of many fire engineers a suburban fire station should have two such motor engines, with possibly a steam engine in reserve. Again, steam engines may also be held at reserve stations instead of a large number of single steamers. This means considerable economy in the purchase, equipment, and maintenance of a fire house, while the increased radius of action and the speed of the motors enable efficient service to be rendered.

Finally, we may consider machines in which no essential change is made in their construction except to use the gasoline motor and means of propulsion in place of the usual horses. Typical of these are the large combination hose wagons and chemical engines which carry 1,000 feet of 2½-inch fire hose and answer every purpose of the horse-drawn wagons which they are destined to supplant. Fuel for 150 miles can be carried in the gasoline tanks and speeds



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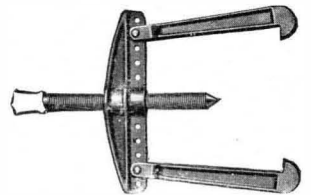
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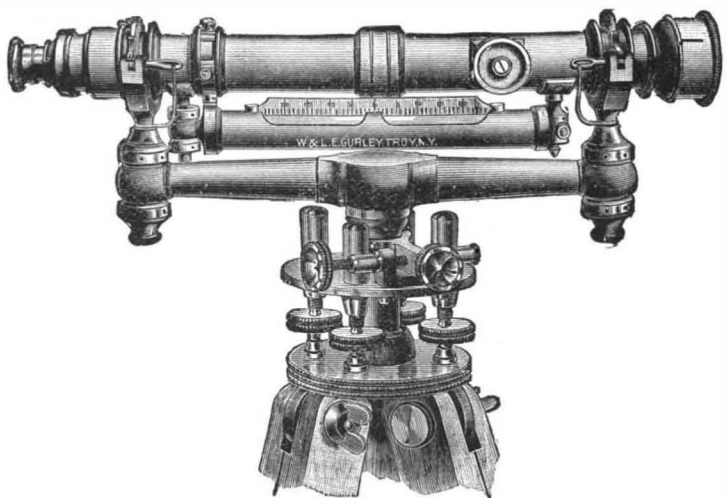
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up to 30 and 35 miles an hour with full load are easily achieved. To carry the heavy hose for the high-pressure service of New York city a special automobile wagon has been found most useful and in over a year of service has met every test. Put into use in January, 1909, it was successfully operated on snowy and slippery streets and never failed in responding to an alarm. This vehicle is built to run up to 30 miles an hour on city streets, climb any reasonable grades, and to carry the full strength of a high-pressure company. It carries forty 50-foot lengths of 3-inch heavy rubber high-pressure fire hose and has a turret nozzle mounted upon the driver's seat from which a powerful siamesed stream can be delivered. It takes the place of a three-horse wagon previously employed. In fact, this automobile truck of New York city has been the logical outcome of the high-pressure service in the lower part of Manhattan. The future will probably see it extensively used in New York and in other cities provided with high-pressure service.

Nor is the use of the automobile confined to the emergency wagons, chemical engines, combination and hose wagons. Aerial ladder trucks up to 85 feet in height are now made for motor traffic and have all the essential features of this important piece of apparatus previously requiring three horses. A useful aerial motor truck is mounted upon a 90-horse-power four-cylinder automobile, the automobile taking the place of the forward wheels, thus making a six-wheel vehicle slightly longer than the ordinary ladder truck with its horses, but steered by a tiller wheel in the rear in the same manner. The whole machine can be turned in its length around corners and is often more easily controlled and regulated than with horses, besides being capable of running 25 miles per hour with full equipment and crew on a five per cent grade. This apparatus

is of interest in comparison with the somewhat shorter ladder devices known as "escapes" which are in use in Europe and which have been developed there to considerable efficiency.

That the motor-propelled apparatus is bound to come eventually and to supplant horse-drawn machines seems to be the opinion of progressive fire fighters. Chief Croker spoke in this vein to the writer and said that it was only a matter of expense in the original outlay that prevented motor fire engines from being extensively adopted in the suburbs of the greater city. In fact during the last weeks of the past year the Fire Commissioner advertised for bids for furnishing two automobile combination gasoline engines and hose wagons for the borough of Brooklyn and one for the borough of Queens. At present the high efficiency motor fire engines cost more than steam fire engines of greater power, and as fire fighting power is desired first of all, in nearly every large city department, the chiefs prefer heavy units to increased mobility and speed. On the other hand the makers of motor fire apparatus claim that the economies of maintenance more than justify the increased expense.

There are several questions that enter into the operation of commercial motor vehicles that naturally arise in connection with fire apparatus. One is, the matter of tires, but it must be recalled that the actual mileage of fire apparatus is considerable and that furthermore the best fire vehicles are now supplied with rubber tires, so that there would be no more wear in one case than in the other. Fire engines, owing to their portability and the speed with which they must be brought to full working capacity, are notoriously inefficient machines from a mechanical standpoint, and the gasoline engine in no way works for worse conditions. If reasonable economy of operation is secured as well as reliability of service, then with the extra-

ordinary decrease in the cost of maintenance the gasoline motor-driven machine is bound to have a successful future.

#### ANTI JOY RIDE DEVICES.

(Continued from page 58.)

other parts of the car by means of attachments fastened inside the hood. For example by means of two thumbscrews through the dash, which are inaccessible until the hood is raised, the footboards can be secured against removal, and this will make it impossible to open the cover of the gear box. Furthermore, there is combined with the lock a vibration indicator to record movements of the vehicle.

Every precaution to render the device proof against tampering seems to have been taken by the inventor, who asserts that it is impossible to start the engine, open the hood, or operate the car without the owner's knowledge or consent unless he has forgotten to withdraw the key or has given a duplicate key into the possession of the chauffeur. In the latter event the chauffeur cannot take the car out on the road without having the approximate distance traveled registered by the vibration recorder.

The only visible part of the device is a polished brass plate 2 by 4 inches in size which is set into the dash. In the upper part of this is set a casting containing a compact switch for use with any system of ignition and also a Yale lock provided on its inner end with a cam plate and contact piece. The lock key takes the place of the usual switch lever, and the switch cannot be operated without it. It is also impossible to remove the key until the switch has been turned to "off" position.

Two bell-crank levers surrounding the barrel of the Yale lock behind the switch are operated by the cam plate of the lock, and their long arms are attached to small steel cables that pass through eyelets screwed into the dash under the

hood. These cables lead to two special spring latches secured to the lower inner corners of the dash in a position to engage the slots cut in strips of angle iron riveted to the inside of the hood on either side. Thus, when the key and cam are in open position, as shown in the drawing, the latches are withdrawn and the hood can be raised, but when the switch has been turned to "off" and the key removed, the latches are released and hold the hood against all attempts to raise it. The engines may be run with the hood open, and the hood will lock automatically when closed.

In a special recess directly beneath the Yale lock is placed a vibration recorder, resembling a pedometer in appearance and action, which is held securely by a plate provided with a spring to press against the back of the instrument. The vibration recorder is so adjusted that it will not be affected by the running of the engine while the car is at rest; but will record the vibrations of the car when in motion. The plate is sealed by a wire and lead seal and also by a strip of paper pasted across the back with the owner's name written thereon, and if these seals are broken explanations from the chauffeur are in order, as he is the only person except the owner who has access to the hood chamber. The switch can be removed without disturbing the sealed chamber holding the recorder, but only after the hood has been raised. It is impossible to remove any part of the mechanism from the exposed side of the dash.

#### MAKING YOUR OWN REPAIRS.

(Continued from page 62.)

graphite, and in order to apply it, the springs must be relieved of the weight of the car. To do this, apply jacks to the corners of the frame, and operate them until the tires are clear of the ground. The weight of the axles and wheels will

(Continued on page 72.)