the necessary amount of fuel present, and not less than half the proper amount, or the mixture will not explode.

Another important point is the effect of temperature on the flow of the fuel through the carburetor nozzle. In the case of water flowing through a carburetor nozzle—four times as much will flow through at 100 degrees F. as at 50 degrees F. With gasoline and kerosene, about the same ratio holds good. Therefore, if a carburetor is adjusted cold, and afterwards warm air or fuel be admitted, the adjustment may be completely thrown out. This is usually compensated for by some sort of hand control.

The temperature and size of the manifolds is another important item. If they are too large, the fuel will condense on the sides while the engine is running slow or under light load; then when it is speeded up the entire raw charge is swept into the cylinder, causing choking, weak explosions, etc. This trouble is particularly noticeable on gasoline hoisting engines and can be a source of great danger, as when a miner is depending on the engine to hoist him out of danger after lighting a blasting fuse.

If it is desirable to have a very flexible engine, easily controlled and governed, the manifolds should be fairly small so as to maintain an average mixture speed of about ten thousand feet per minute at normal load. This is estimated by multiplying the piston speed in feet per minute by the area of the cylinder and dividing the result by ten thousand. The result is the area of the inlet pipe in square feet. This should be reduced to square inches by dividing by 144, and to diameter by dividing by .7854 and taking the square root.

If the manifolds are not jacketed or otherwise warmed, they should be as short as possible, and of equal length to all cylinders; otherwise one cylinder will get a better mixture than the other, an l the engine will run irregularly.

If the mixture is warmed up too much, there is trouble with preignition and back-firing into the carburetor. This can be obviated by injecting water; but there are many objections to this, particularly with automobiles. In later articles, we will take up other phases of carburetion in the effort to explain technical points for the benefit of the practical man.

That Printer Again

"An electrician at a munitions works came into contact with a copper wire, and 5,500 colts passed through him."

The machine which generated that electricity must have been of exceptional horse-power.

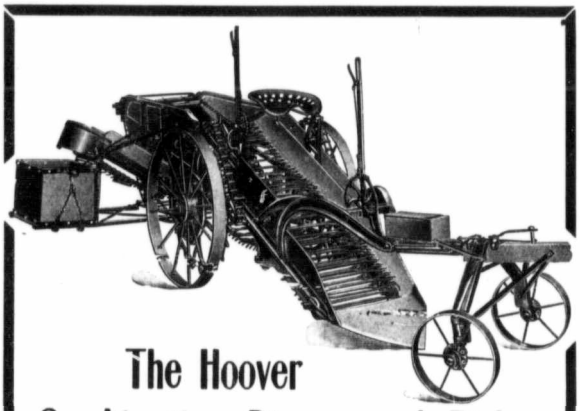
Another Gasoline Substitute

"Nuoline," a new substitute for gasoline, which really seems on the surface to be a substitute, was tested out at the West Side Y.M.C.A. Automobile School, 318 West 57th street, New York, recently, with the heads of the Strobridge and Atkinson schools as observers.

M. Louis Clemont, the inventor, supervised the test, with the help of his associate, Robert Grogan, an assistant in the Secretary of State's local automobile office. A King 8 engine, used for shop instruction, was first used. The gas was disconnected and the vacuum tank drained and then filled with nuoline. Principal H. C. Brokaw pushed the starter button and the engine started on the first turn. To all appearances the new fuel did its work perfectly. The engine ran much smoother than with gasoline, and when the petcocks were opened the explosion was found to be quite as snappy as from gasoline, while the flame was blue, instead of reddish, showing a more perfect combustion. It is claimed that there is no carbon formed by nuoline and that it will burn out carbon formed by the use of gasoline. The engine ran until the vacuum tank was empty and a second trial showed the same results.

Then a Mitchell car was tried out on the road. As before the vacuum tank was disconnected and filled with nuoline. The run was through the park, the car running well after a slight carburetor adjustment had been made and a defective spark plug replaced. One of the tests was up the Round Top hill, which was taken on high gear almost to the top, where the supply ran short. When the vacuum tank was refilled the car started on the steep grade and a few minutes later took the entire grade on high gear. Mr. Brokaw has done this with gasoline with the same car and on the same grade, however, so that no superiority was shown. It was noticeable, however, that the car responded to the accelerator with a zip not shown by gasoline. There was none of the gasoline fumes from the exhaust, but a faint odor of camphor, which was explained to be coal camphor from one of the ingredients used in manufacture of the fuel. During the test there were seven passengers in the car, four of whom might be classed as heavyweights.

M. Clemont explained that the nuoline was really three-fifths water and that the other ingredients were so cheap and so unlimited in supply that the cost would



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