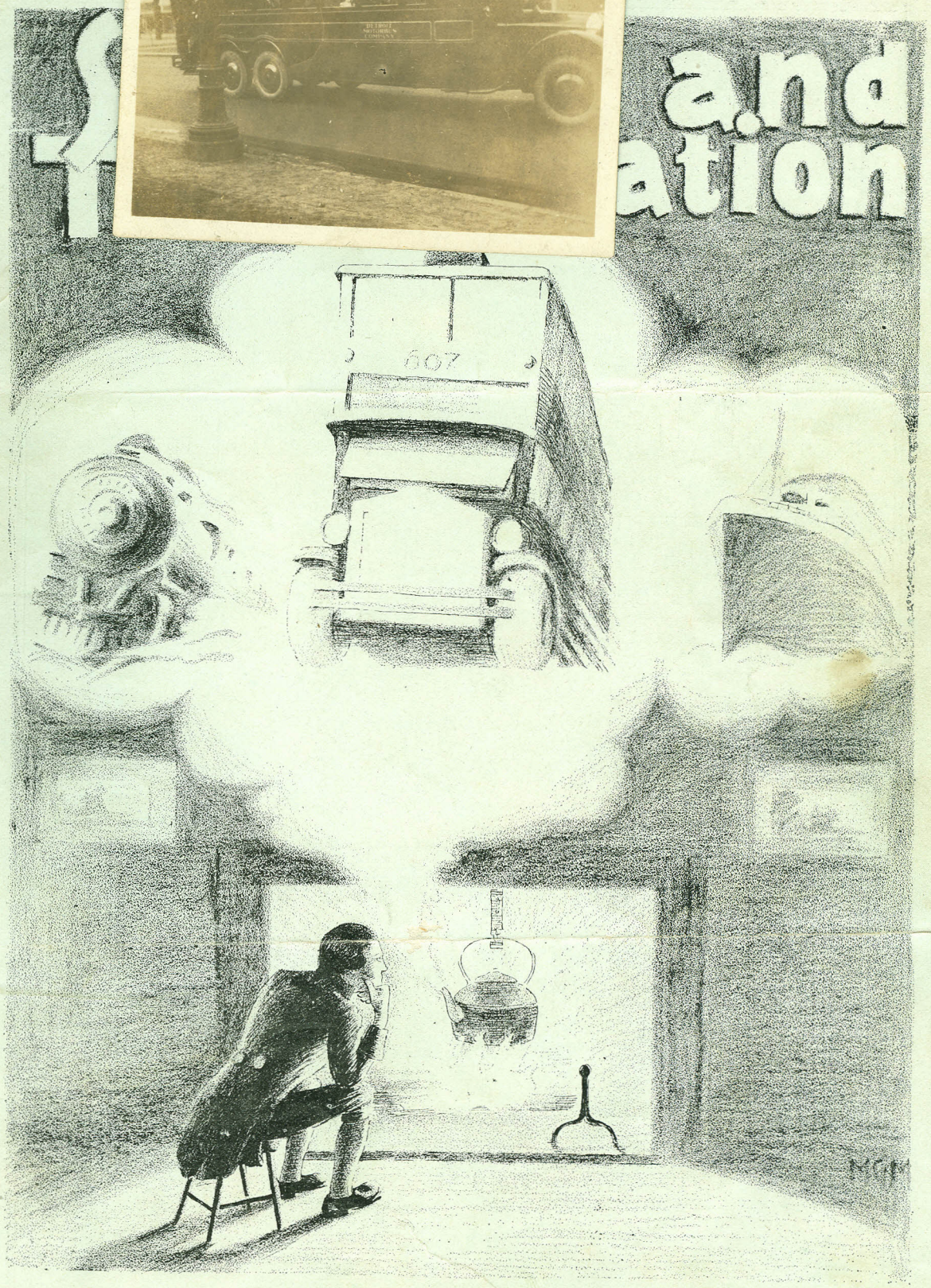
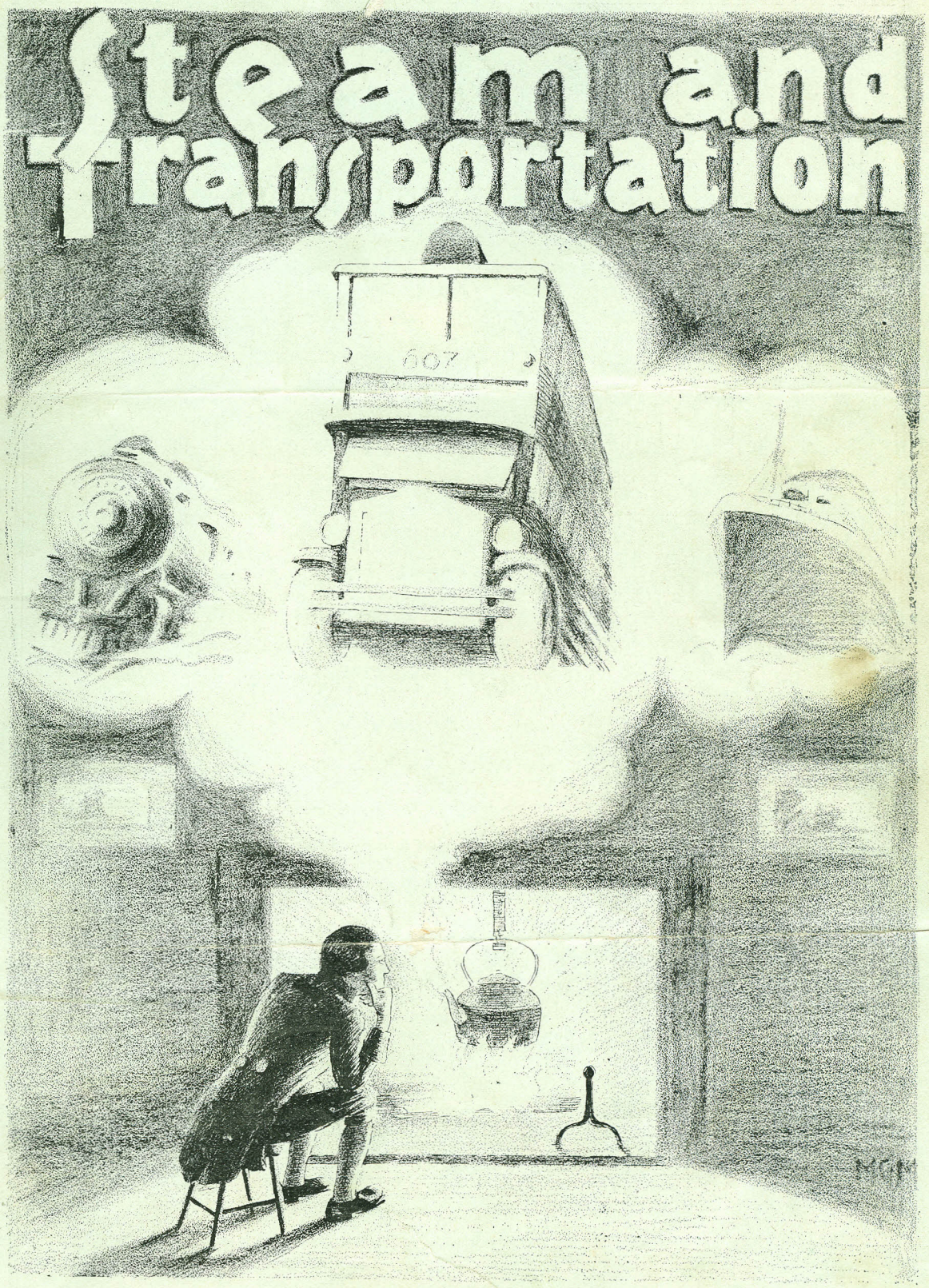


Detroit Motorbus Company



Detroit Motorbus Company

DETROIT MOTORBUS COMPANY

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Formerly Vice-President Westinghouse Machine Co.

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Detroit MotorBus Co.

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Detroit MotorBus Co.

PROGRESSIVE TRANSPORTATION

Steam, as a motive power in transportation, passed through its initial experiment a little over a century ago. That it was regarded by many as a bit of folly, laden with catastrophies of all kinds, is well known history. Nevertheless, mass transportation today, both on land and water, is steam driven and only two years ago a prominent engineer of England went so far as to prophesy small light steam engines for aeroplanes. It was about this same time that the Detroit Motorbus Company, eager to approximate pleasure car performance with its busses, considered the steam driven passenger bus and authorized an experiment looking to its development.

Many designs of steam bus construction have, of late, been conceived and heralded rather bravely before the transportation world but few seem to have matured and those that were successful enough to actually appear on the streets were rather disappointing in their performance and transitional in their service. Several questions, relative to the actual advantages to be gained by steam, still remained and of even more vital importance and interest was the question of its practical application.

In approaching the problem it was thought best first to replace the gasoline engine in one of our standard chassis with the most suitable steam power plant obtainable. This would not only answer most of the questions relative to the advantages to be obtained but it would be quicker and cheaper than any plan involving complete design and fabrication. In addition the data and experience, even from such a crude experiment, would soon bring to light the fundamental weaknesses and enable us to properly design for their elimination.

The most adequate steam power plant available for this purpose was that manufactured by the Doble Steam Motor Co., of Emeryville, California. Working arrangements were agreed upon and a complete steam power plant was ordered from them with the intention of installing it directly on the front end of one of our Six Wheel double deck jobs. By removing the motor, clutch and transmission we found we could very nicely install the complete steam power plant in the front end of the bus, thus permitting us to compare directly the two power plants.

Our efforts were rewarded much beyond our expectations and we soon found it possible to place the bus so equipped directly into passenger service on one of the busiest routes in the city. Yes — troubles developed, many of them, it is true, but fortunately the ones most anticipated failed entirely to materlialize. However, numerous minor difficulties were experienced and for a time these little failures of minor or accessory parts were very discouraging and needless to say ran the cost of the early experiment away beyond our expectations. Nevertheless, the indicated performance was so phenomenal and so vastly improved over standard equipment that there was no question but that we should proceed to the next stage of the experiment. Accordingly, a second power plant was ordered. This time it was thought that with the engine built integral with the rear axle, a slightly improved boiler, and a perfected firebox, together with minor accessory improvements, we would eliminate many of the annoying failures of our early experience.

This second power plant was installed last spring. The bus is still open to many improvements but, aside from incidental troubles in no way directly chargeable to the steam power plant, we have had the bus continually in service since last June. To date it has travelled a total of 25,187 miles in service, burning 100% fuel oil and averaging over 3.0 miles per gallon.

Although it is still a little early to draw conclusions, this steam driven bus, as developed and operated continually during the past year, may be regarded as a very successful experiment. The results to date have proven by demonstration in actual service on the streets of Detroit, the advantages of steam as a motive power in bus transportation. Speed, power, silence, the comfort of smooth accelleration, the elimination of the noxious exhaust gases and economical operation were all realized. Only the knowledge that the chief consideration, reliability, yet remains to be proven restrains our enthusiasm. Nevertheless, while it may be some time before steam driven aeroplanes darken the sky, we feel tempted to predict that steam as the coming motive power in bus transportation is not far from a reality.

Consequently, in view of the widespread interest which all operators manifest in improved transportation, the Detroit Motorbus Company takes pleasure in presenting for your inspection, what it believes to be the first steam driven bus in this country that is actually engaged in transporting passengers in regular dime collecting service.

THE DOBLE STEAM DRIVEN BUS

Description

Steam driven bus, 607, consists of a standard Six Wheel chassis as built by the Six Wheel Company, Philadelphia, Pa., and modified somewhat to receive the Doble Power Plant. It carries our standard double deck body with a total seating capacity of 61 passengers. The engine is built integral with the center axle, the rear axle trailing only. The drive is directly off the crank-shaft of the engine, through a spur gear—gear ratio 3-1. Westinghouse Air Brakes with Timken Steel Brake Shoes are used on all four rear wheels. Cooper adjustable springs are installed front and rear. The bus is equipped with a 38 gallon fuel tank and a 31 gallon water tank and with both tanks filled weighs 17,000 pounds. The steam power plant on this experimental job is the same as built by the Doble Steam Motor Co., of Emeryville, California, for their five passenger touring car and consists essentially of the following:

Firebox: This is built of sheet nichrome about 24-in. in diameter and 18-in. high. A helical steam coil of seamless steel tubing lines the inside and keeps the temperature of the wall well below the danger point. A tuyere is provided for the injection of the air-fuel mixture into the combusion chamber. The latter consists of a circular box of welded sheet nichrome in the upper half of the fire-box. Its purpose is to insure complete vaporization and combustion of the atomized fuel before the gases sweep through the boiler proper. The fire-box sets immediately over the boiler. Forced draft is obtained by means of a constant speed blower. The fuel is metered through a specially designed carburetor. Ignition is by means of a magneto and a standard spark plug. No pilot light of any kind is used. Firing is entirely automatic.

Boiler: The boiler is of the flash type built of 14 spiral and one helical coil of standard seamless steel tubing. The joints are all welded with the exception of those of the upper coils. The boiler is designed to deliver steam at a maximum of 1250 lbs. pressure and 800 degrees F. temperature. The boiler feed is entirely automatic and may be adjusted so as to hold any desired temperature. The following test data illustrates the performance of this boiler:

Steam temperature	850 F.
Steam pressure	565 lbs.
Act. Evap. lbs. per hour	820 lbs.
Equiv. evap., lbs. per hour	1188 lbs.
Lbs. fuel per hour	71.4
Per cent. of Excess air	11.5
CO^2 content	14.6%
Flue gas temp.	400 deg. F.
Equiv. Evap. per lb. of fuel	16.65

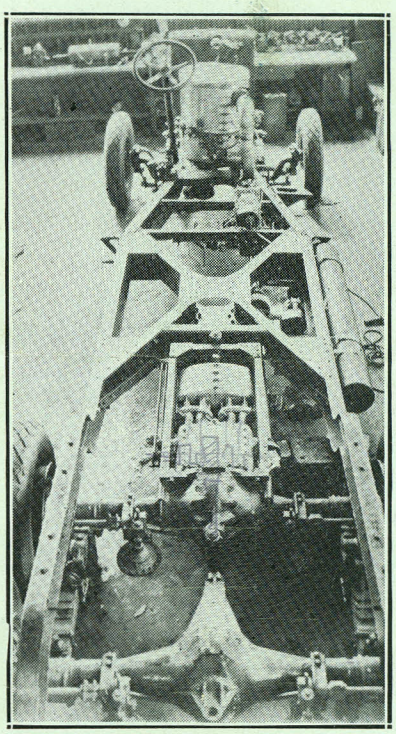
Engine: The engine is a four cylinder, compound, high pressure, ~~single~~ double acting, piston valve type capable of generating at 820 RPM, 82 brake H. P. Piston diameter is 2⅝-in. on the high pressure and 4½-in. on the low pressure with a five inch stroke. The following data on engine performance is taken from a test report:

Engine R. P. M.	820
Horsepower, shaft	82.6
Boiler pressure	571.25 lbs.
Engine pressure	450.25 lbs.
Exhaust pressure	0.69 lbs.
Boiler temperature	777 deg. F.
Engine temperature	752.5 deg. F.
Exhaust temperature	215.0 deg. F.
Water, lbs. per hour	923.20
Fuel, lbs. per hour	79.76
Water rate	11.13 lbs. per H. P. hour

Condenser: This is a cartridge core type with ¼-in. baffled tubes, size 30 x 30-in. with a depth of 8-in. A turbine driven fan was used at first but failure of the reduction gears at 1700 miles necessitated a belt drive temporarily. A separator between the engine exhaust and the turbine is provided to remove the bulk of the oil from the steam. Pressure in the condenser varies from 20-in. vacuum with the bus under way to 3 lbs. when accelerating.

Auxiliary Unit: This includes the 300 watt Robert Bosch motor generator, boiler feed pumps, vacuum pumps, oil pump and provision for a fan drive. It is located just back of and a little on one side of the boiler. Drive for this unit as well as the air compressor is obtained by means of a bevel gear and shaft off one end of the engine crankshaft.

Controls: These are of the automatic electrical type working off both pressure and temperature. Once set for certain limits they function entirely independent of the operator, and scarcely ever need adjustment.



The Doble Steam Driven Bus
Characteristics

Operating: From our experience to date the following operating features stand out:

1. The performance is remarkably smooth and speedy.

2. The acceleration is noiseless and very rapid.

3. Running time on the road is about 20% better than our standard gas driven equipment.

4. A barely perceptible but not objectionable odor characterizes the flue gases.

5. The drivers consider it very easy to handle and because of the absence of gear shifting and its rapid acceleration regard it as ideal in traffic.

6. Numerous passengers unaware of the fundamental difference, comment favorably on the improved riding qualities and wonder why we do not get more of them.

7. In general, a close approach to pleasure car performance is experienced.

Fuel: Gasoline or refined furnace oil, gravity 36 to 38 deg., work equally well in the burner after the fire-box is once warmed up.. Furnace oil will not burn in the cold fire-box due to its fire-point being about 190 deg. F. However, this problem was met by using gasoline for a few minutes in starting up each morning, then switching over to straight fuel oil, for the balance of the day, no further trouble being experienced.

Mileage: Although fuel oil contains about 5% more energy than gasoline no appreciable difference in mileage was observed. We have had no little trouble with grabbing brakes, minor fuel and steam leaks and for a while poor ignition due to a faulty magneto, all of which cut into the fuel mileage. Nevertheless, the fuel consumption since June 26th, when the remodeled job was placed in service, totals only 2,445 gallons. The total mileage over the same period was 7,755, thus giving an average of 3.13 miles per gallon of fuel oil. This compares with 3.6 miles per gallon of gasoline with the standard Six Wheel double deck job, in the same service.

Photo taken by H. B. Stewart in Detroit Dec 10th 1924 showing 2 deck Gas Bus referred to in this Report.

Detroit Motor Bus Co.
Detroit.

The Gas engine & gears etc were taken out & replaced by Doble Steam engine