ALMA STEAM MOTORS

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Alma Steam Motors.

Alma Steam Motors was organised in April, 1938, by former employees of Steam Motors, Inc., when that concern suspended operations. Readers of "S.C.D. and S.A." will recall Steam Motors, Inc., as the builder of the highly successful small high pressure stationary boiler, which was mentioned some time ago in this magazine. Its Chief Engineer is E. H. Delling, formerly Chief Engineer of the Stanley Motor Carriage Co., and designer of that company's famous Model 740, and subsequently Chief Engineer of Brooks Steam Motors, Delling Motors, and Steam Motors, Inc.

Its research engineer is William Lamken, who had the same position at the above-mentioned companies, and is the inventor of the Lamken valve gear used on the Alma Steam Motor

Its manager of plant and production is Willis A. Riehl, who was also employed in a similar capacity by the above-mentioned concerns.

Its Proprietor is G. Stevenson, formerly of the American Steam Automobile Co., and best known to the steam men as the owner of that company's Model V roadster, which has been written up and illustrated in past numbers of "S.C.D. and S.A."

Alma Steam Motors is an independent concern, having no connection with any other steam company, and with office and plant located in Hunt Street at Galen, Newton, Mass.

THE ALMA POWER PLANT.

It is the Company's intention to make available to the public, for somewhere around 1,200 dollars to 1,500 dollars, a steam power plant that can be installed in any standard medium-sized American car with a minimum of change. It will occupy the same space, and weigh the same, or a little less, as the gas engine and transmission which it replaces. The boiler will be of the water tube type, with vertical tubes, natural circulation, and a water level automatically maintained in a top drum. It will be compact, durable, around 80 to 85 per cent. efficient, and of large reserve capacity. It will be fired by an electrically-operated atomizing fuel oil burner of the patented construction familiar to the steam men of this country. This burner starts from cold on fuel oil, without benefit of a pilot light, at the turn of a switch, and raises steam in a couple of minutes from cold.

Fig. 1.

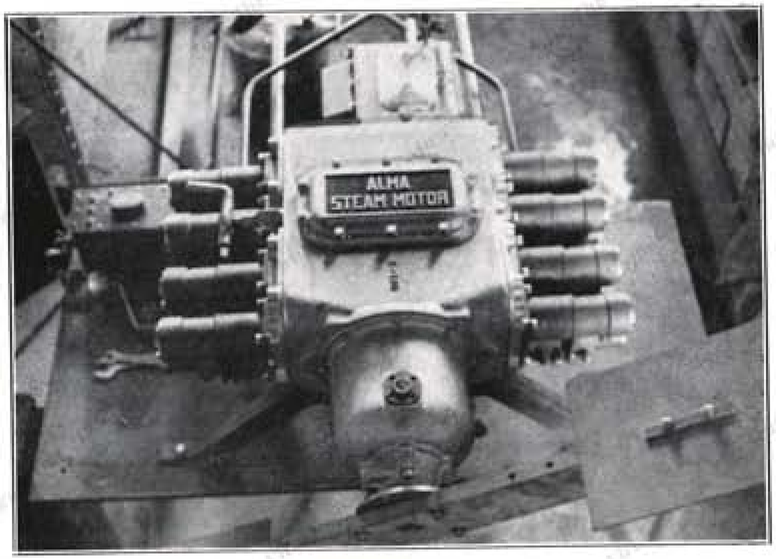


Fig. 2.

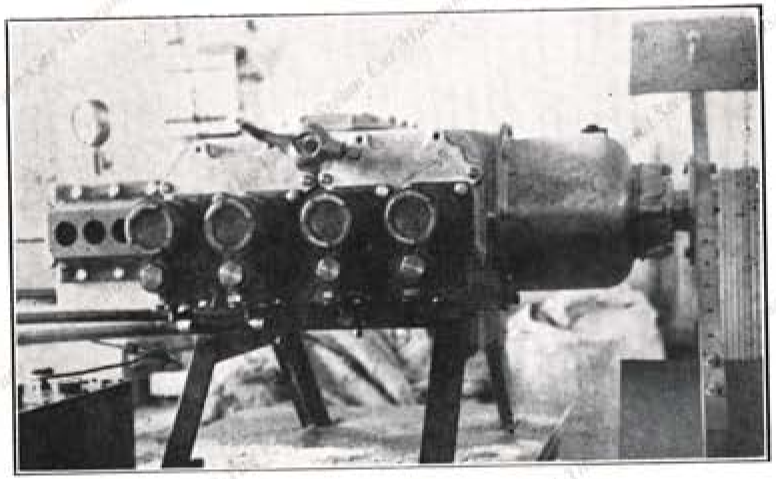


Fig. 3.

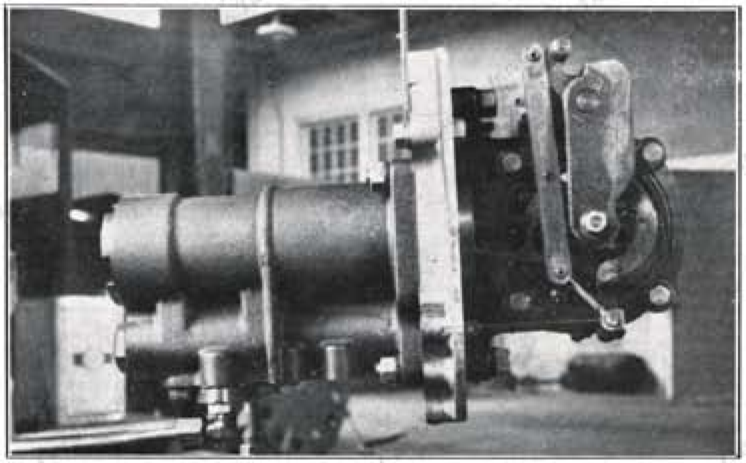


Fig. 4.

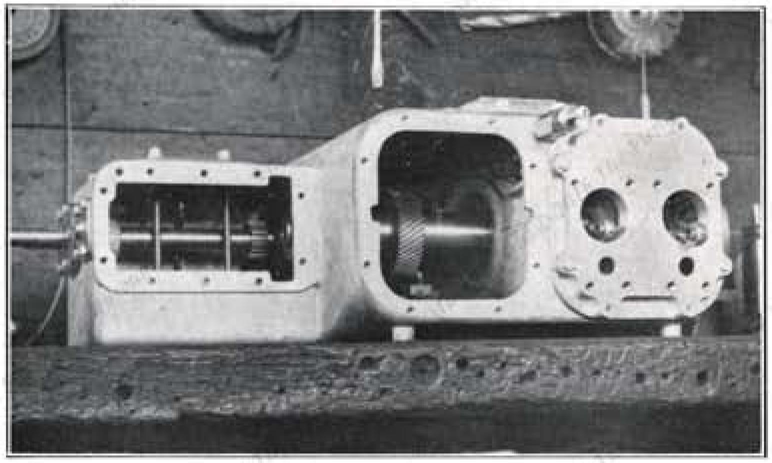


Fig. 5.

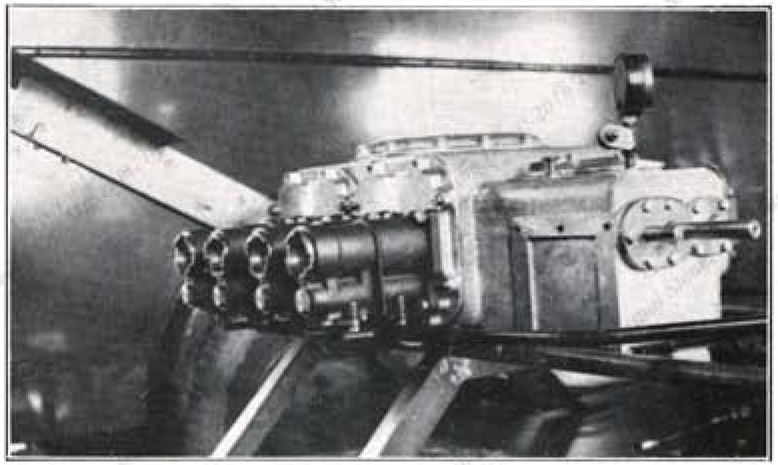
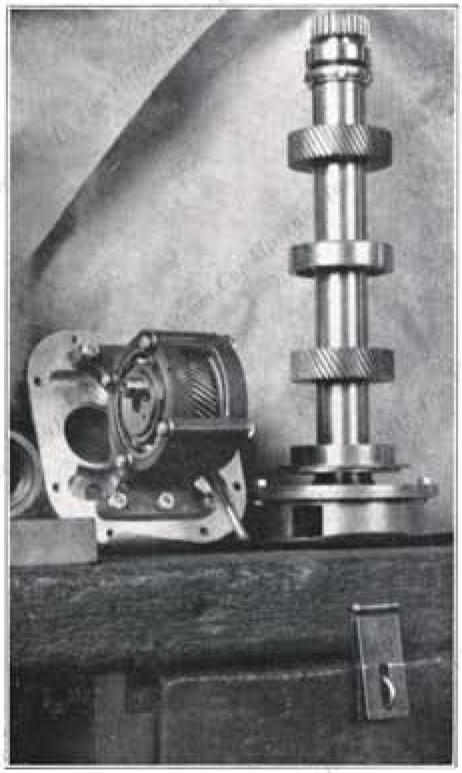


Fig. 6.



Boiler and burner are mounted under the hood. The engine mounts under the floorboards in place of the transmission, and drives through the usual propeller shaft and rear end. This unit of the power plant has been completed and initial tests made, so we will pass to a description of it.

THE ALMA STEAM MOTOR.

This is an eight-cylinder, double-acting opposed engine, composed of four two-cylinder engines, whose crankshafts are geared to a central mainshaft in much the same manner as a Stanley engine is geared to the ring gear of the differential. Any one of the two-cylinder units can be removed and run as a separate engine. It is rated at 60 steam horse-power (which will give a performance equal to a 120 h.p. gas engine), and initial tests indicate that it will probably be able to exceed this rating by a good margin. It can be run as either a simple or a compound engine, depending simply on how the admission manifolds are piped up. As a compound engine, there would be one high-pressure unit exhausting to the other three.

Figure 1 is a top view of the engine, seen from the drive end, to which is attached a fan dynamometer. Between this fan and the crankcase proper can be seen the housing for a machine-tool type clutch, which can be used to disengage the engine from the propeller shaft should this be desired for making tests, charging the batteries, pumping extra water, or towing the car. It is never used in normal service. At the middle of the engine on the left side can be seen a lathe dog attached to the rod which operates the valve gear. Pulling this rod out about 2½ inches gives reverse, and intermediate positions the different cut-offs. This can be operated manually or by a pedal, depending on the customer's preference. At the far end of the engine can be seen the extension of the crankcase, which houses the reduction gearing to drive the feed pump, whose base has been mounted on it.

Figure 2 is a side view, giving a better view of the valve gear control rod and the base for the feed pump. It also shows the cylinder heads, which screw in, and the valve-cylinder heads below them. The valves are of the piston type, with inside admission, and labyrinth grooves in lieu of rings. Their mounting below the cylinders enables water to drain out of the cylinders, and the engine has no difficulty in working the water out of itself when the throttle is opened from cold. This feature eliminates the necessity for the familiar drip valve.

Figure 3 is a side view of one of the two cylinder units, showing the Lamken valve gear in full forward position. This is a radial (single-eccentric) gear, giving very good timing and cut-offs, from 5 per cent. to 60 per cent., forward or reverse.

The stroke of this engine is 1½ins. and the bore 2ins. The cylinders are of nickel cast iron. Pistons and valves are steel. There are two standard cast iron piston rings on each piston. The crankshaft is carried by two ball bearings, and the big ends of the connecting rods are also fitted with ball bearings. The wrist pins are steel, hardened and ground, fitted to bronze bushings. Note that the cylinders and the main bearing blocks bolt to the respective sides of an aluminium plate, which in turn is bolted to the crankcase as shown in Figure 4.

Figure 4 shows the manner in which the mainshaft is mounted on ball bearings in the crankcase. The connecting rods for one two-cylinder unit can be seen projecting through the aluminium plate bolted to the side of the crankcase. At the forward end can be seen the countershaft with the gear on it which drives the crankshaft of the boiler feed pump. This is a three-cylinder single-acting plunger-type pump, turning about one-fifth engine speed. From this countershaft is also driven a gear pump for crankcase lubrication, and the generator. The cylinder lubricator is driven from the crankshaft of the feed pump. This view also shows the valve gear control rod.

Figure 5 shows the other side of the feed pump drive extension, with a milled flange for mounting the electric generator.

Figure 6 shows the mainshaft with the two helical gears, which gear to the crankshafts of the four two-cylinder units, the crank end of one of which is shown. At the bottom of the shaft can be seen the clutch driving cup, and at the top end the spur gear which drives the countershaft for the gear reduction to the crankshaft of the feed pump.

ADVANTAGES OF THIS CONSTRUCTION.

The Alma Steam Motor is a somewhat unorthodox steam engine, and it might be well to explain why it is made the way it is.

The arrangement of gearing four units to a mainshaft was chosen because it is simpler, cheaper, and more compact than connecting eight cylinders direct to an eight-throw crankshaft. A large crankshaft is heavy, costly, and subject to torsional vibration, objections which the Alma construction eliminates.

A large number of small cylinders is used instead of a small number of large cylinders, because this makes possible a compact engine with a very short stroke. It also makes it possible to turn it at gas engine speeds without vibration, so that the standard gas car propeller shaft and rear end can be used. Contrast this with the completely special, and therefore expensive, rear end necessitated by an engine of the Stanley type.

It is made double-acting, so that sufficient power is got out of an engine small enough to mount under the floorboards, thus leaving the hood free for the boiler and the luggage compartment free for the customer.

This engine is made without any of the elaborate adjustments that make a Stanley engine such a fussy job to re-assemble. It can be taken apart and re-assembled by any good mechanic, and it is so constructed that it either goes together the right way or not at all, thus eliminating any chance of mistakes or mis-adjustments.

The piston and valve packings are metallic, working on the labyrinth principle. They never have to be taken up or adjusted for the life of the engine. Crossheads are of the piston type, and the guides, which are of centrifugally-cast iron, are removable and readily replaceable.

This engine can turn at speeds up to 4,000 r.p.m. with no more vibration than a good electric motor.

Horne, Whitby,