

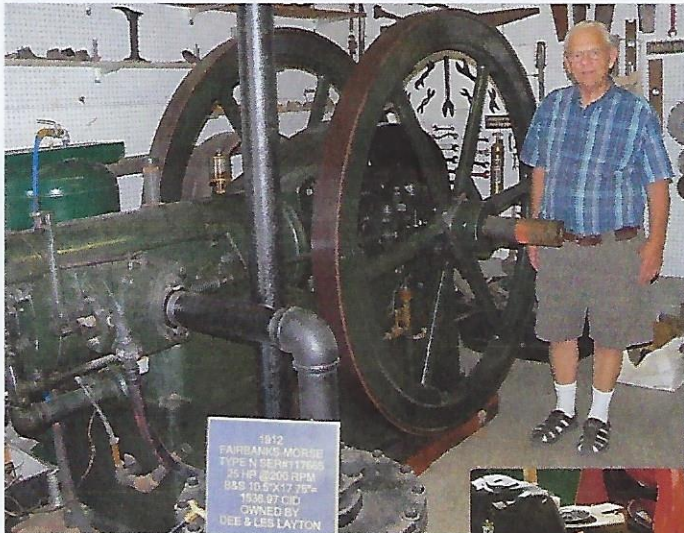
FOCUS

Harrisburg Area Museum

Issue 2019-10

BIG GAS ENGINES

Are you aware of a 25 HP gas engine that can be started with a wooden match? NO? Well, the Museum has one! Actually it doesn't belong to the Museum but is on pretty much permanent loan from Les and Dee Layton.



1912 Fairbanks Morse 25 HP

The two pics are close to same proportional size. The Briggs may be a little bigger than real life! But the Briggs turns about 3500 RPM instead of 200!

F-M made a variety of engines (both external combustion and internal), windmills, electrical generating equipment, pumps, etc. It was said that if you needed a piece of equipment that F-M could supply it from stock or build it to specs.

They were major producers and innovators in the gas engine field making 1 cylinder and multi cylinders. The model C-O was made in 3, 4, or 6 cylinders with a bore of 14" and a stroke of 18". Thus the 6 cylinder model was rated at 300 HP...same as my Jeep! F-M was THE major supplier of industrial, logging, mining, marine and farm engines in early 1900's.

I want to talk a bit about the history of the style N we have before I explain how it is started with a match! The engine was installed on the Celilo Falls Rail Road bridge over the Columbia when it was built in 1912. The bridge had a swing section that rotated to parallel with the river to allow big water craft to pass by. It took the 25 HP engine about 15 minutes to swing the span 90 degrees. In 1954 the Dalles Dam made it necessary to build a new bridge which used a lift span for river traffic.

In 1974 Les discovered the engine which was just serving as a pigeon roost. It took a long time and extended conversations. Les says he was on Burlington's phone

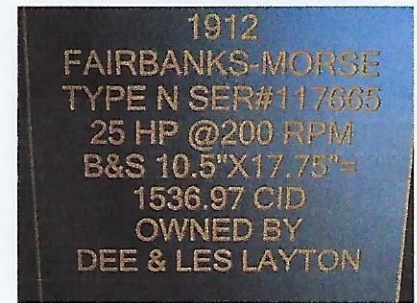
for 8 hours before he found someone that would authorize the sale for \$100.00. Check out the specs shown above right. To compare, my Jeep has a 3.7L (approximately 225 cu. in.) V6. It 'red lines' at 6000 RPM and delivers about 300 HP. I don't know what it weighs but I would guess about 150# against 8500#'s for the F-M.

The F-M was situated high on the bridge...about 80' in the air and maybe 100 yards from shore! Getting it to land was a major project. It had to be completely disassembled and each part moved to shore and then cleaned and reassembled! Les said it took 7 men 9 days to get it to dry land, working only on weekends.

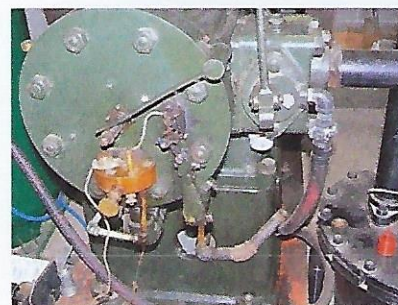
Now, for those who have forgotten or maybe never knew, let me describe the operation. Internal combustion engines come in a variety of styles. There are rotary, 2 cycle, 4 cycle styles and diesel fired. The most popular and least polluting is the 4 stroke cycle ones. That is what the F-M is. Very small engines, like leaf blowers and chain saws are usually 2 stroke cycle. The 4 cycle engines come in several configurations. There are the normally aspirated ones and then the turbo charged ones. There are also carburetor ones and fuel injected ones...sometimes one port injection and sometime multi-port (One injector for each cylinder) All current production of gas engines will be spark ignited,

but the spark may be created in several different manners. Our F-M is significantly different from current production!

It is a 4 stroke cycle engine. That is, there is first an "intake" stroke where the piston travels from top (The end where the head and valves



2015 Briggs & Stratton 20 HP-100 years later!



Cylinder Head with carburetor (orange) and igniter in the center. Exhaust valve is in box on the right

are) to the bottom and in doing so it sucks in a mixture of fuel and air. This mixture is fairly limited as to the ratio of air to fuel. Most modern engines use computers to regulate that mixture. Our F-M just has a very rudimentary carburetor that delivers a manually adjusted ratio to the cylinder. No throttle valve...every intake draws either a full charge or no charge. The no charge stroke is determined by engine RPM. It has a weighed arm that rotates with the crankshaft. At rated speed the weights fly to the outside and hold the exhaust valve open and the intake valve closed. Thus the engine is just 'coasting' with the large fly wheels keeping it turning. This is sometimes called a "Hit and Miss" engine.

After the intake stroke the piston moves up towards the valve end. This is known as the "compression" stroke. It compresses the fuel/air mix that was drawn in by the intake stroke. On my Jeep engine it compresses it about 10 to one. I am guessing that our F-M is closer to 4 to one. Maybe even less.

As the crankshaft turns over top dead center the piston begins the "power" stroke. It is at this time that some sort of ignition occurs. In current production this is typically a computer controlled burst of electrical energy...probably 8-10,000 volts to a spark plug! But our F-M doesn't use a spark plug. It has an "igniter"! This is a small device similar to a spark plug but instead of an air gap inside it has a set of points. These points carry a current most of the time but as the piston goes over top dead center the points open, creating a small spark which ignites the fuel/air in the cylinder and drives the piston to the bottom of its stroke.

Then the crankshaft continues to turn, driving the piston back to the top and forcing the exploded air out the exhaust. This is the fourth stroke...known as the "exhaust" stroke and completes the cycle. It is then ready to start another series of four strokes.

Now...how can you start it with a match? I find



it remarkable and unique. On top of the cylinder near the head end you find a brass fitting with a knurled wheel that turns a threaded rod into the first brass fitting. The

threaded rod is bored lengthwise with about 1/4" hole. A second steel rod is inserted in this hole and held in place with a shoulder on the bottom and a spring on the top. See

picture. The lower end of the steel rod has a slot that accepts the head end of a wooden match. After the match is in place the brass wheel is screwed back into the original brass fitting.

Then you prime it with fuel. There is a small, hand operated fuel pump for this operation. Once sufficient fuel has been added to the combustion chamber you must turn the crankshaft (by turning the large flywheel)



Manual fuel pump

through the intake and compression strokes and just over top dead center to the beginning of the power stroke. You now have compressed fuel/air mixture above the piston. When you release the flywheel the compressed fuel/air will start moving the piston on the power stroke. At this time you just 'whack down' on the top of the spring loaded rod. This moves it down where the match head strikes an internal anvil and lights the match. The match flame ignites the fuel/air mixture and you are 'off to the races'!

The F-M can also be started with compressed air when that is available.



The above view shows the "muffler". It is the large cast iron can in center foreground. A large pipe feeds the exhaust gasses in from the exhaust port on the engine and a similar line runs up and out of the building for the exhaust gases. The 'can' weighs 350#! Pretty big muffler!

We also have a similar but different in important ways, 15 HP Montgomery Ward engine. I think I will save it for another Focus issue. Much of this was provided by Les Layton...THANKS