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OPFERMAN MOTORS

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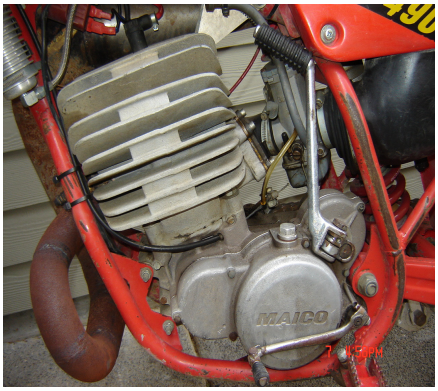
The Two Stroke Engine

The two stroke engine was invented by Dugald Clerk in 1878. This design is different from modern two stroke engines used in dirt bikes and has more in common with a four stroke. The head has valves and a cam shaft which injected fuel and expelled fumes just like that of a four stroke.

In 1889 Joseph Day improved on this design with his own invention of a two stroke engine. Instead of using valves and a cam shaft this implementation used the piston stroke itself to inject fuel and expel fumes. The crank case is used as a fuel pump in which the fuel mixture is injected into the combustion chamber. This engine design is the basis for the modern two stroke engine used in dirt bikes and has been evolving ever since.



Walter Kaaden is known as the father of the modern two stroke engine for the invention of the expansion chamber. He was a German engineer who researched how to increase the power output of a two cycle engine. The research lead to the invention of the expansion chamber design which increased power by harnessing the resonance waves within the exhaust over a wide range of RPM.

The latest innovation in two cycle engines is direct injection which cuts down emissions and is already being used in outboard motors.

Vintage Maico Clutch

The vintage Maico clutch design is quite different from modern clutches. The more modern clutches have several small springs, usually around 6, which keep pressure on the pressure plate. These springs are bolted to the inner clutch hub individually and they put pressure on the clutch plates and the pressure plate.

The Maico is different here in that instead of 6 springs there is a single stack of Belleville washers in the center of the clutch hub. This stack of washers puts pressure onto the clutch plates and the pressure plate.

This clutch is not as easy to put together as tightening some bolts though, the clutch must be pressed and two circular clips must be placed on both ...Continued on page 2

Using a press to compress the Maico clutch to install the circular locking

Bottom of the clutch 'Guide' which houses the spring washers with the

"Instead of pressing onto a rod on the other side of the engine to disengage the pressure plate, the Maico's lever pushes directly onto the face of the clutch."

Vintage Maico Clutch

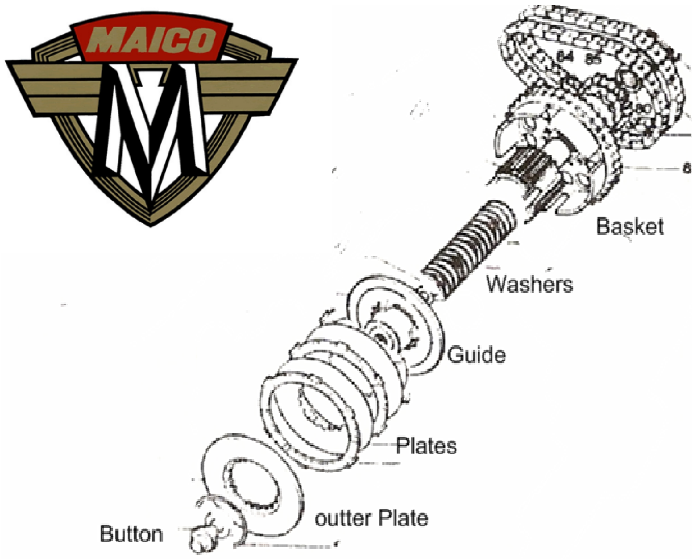
Continued from page 1… sides of what may be called a pressure plate but is referred to as an outer clutch disc.

The modern clutches have a rod which sits in the center of the main shaft. A special lever pushes this rod which pushes the pressure plate away from the clutch plates.

Vintage Maico clutches do not have a rod but they do have this lever. Instead of pressing onto a rod on the other side of the engine to disengage the pressure plate, the Maico's lever pushes directly onto the face of the clutch.

The face of the clutch does contain a button which is attached to a clutch guide. The center of the clutch guide is pressed onto by the stack of washers in the center of the clutch. The clutch lever pushing onto the center of the clutch pushes the back of this clutch guide away from the clutch plates to disengage the clutch.

Sounds complicated? The diagram shows the relationship between the various components. The button pushes onto the center of the 'Guide'. The center of the 'Guide" has pressure from the top the washers and the clutch plates sit on top of the guide. The bottom of the washers are the center of the clutch hub in the clutch basket. The Guide is pushed into the basket which disengages the clutch.



Maico 2010

Maico is under going several changes for the 2010 line up which include lighter bikes, new designs and lots of high quality goodies.

The 2010 line up includes standard parts as well as several options. Cosmetic options include color selections such as red or white plastic and red or black frames. Various component options are also available such as aluminum tank and standard or low seats.

The quality of the parts being used continues such as WP Forks and Rieger monoshock. Excel rims are also included as well as using new ignition system and Kehein carburetor. You can visit dirtwurx.com for more details.

Three Cycle Engine

That's correct, a three cycle engine. There are two patents which make reference to such an engine, "Three-cycle stroke two internal combustion engine(5967103—1999)" and "Three cycle engine with varying combustion chamber volume(4493296—1985)".

The idea is simple, four strokes waste time with a separate exhaust stroke. Two strokes are inefficient since the combustion stroke is also the intake stroke. The idea is then three cycles: intake, compression and then the power/exhaust stroke. The intake and compression cycles are divorced.

The problem is how do you accomplish three strokes since an odd number of strokes would leave the piston in a down or up position every other cycle?

The first patent performs the most obvious solution which is two combustion chambers and a reciprocating piston which can perform combustion in two directions. Technically there are 6 cycles for each combustion chamber however we have ignition every 3 cycles.

(1) Spark

(2) Exhaust

(3) Injection

(4) Compression

(5) Injection

(6) Compression

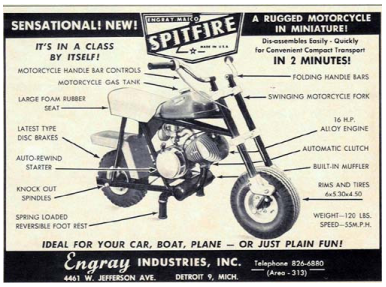
When combustion chamber A is on cycle 1, chamber B is on cycle 4. It is important to note that this is a single piston operating on a single crank.

The second patent offers a different implementation. The compression and intake functions are performed using a separate high pressure compressor. The three cycles performed within the combustion chamber are the charging cycle, power cycle and exhaust cycle.

One of the claims in this patent beyond the three cycles is to make most efficient combustion by varying the combustion volume. The claim is that with a fixed cylinder volume the engine is only at maximum and most efficient compression at full throttle. This invention attempts to maximize the power spread and become more efficient by varying the compression volume based on the amount of fuel / air intake. This is where the "varying combustion chamber volume" comes into the picture.

This is the first claim, the charge being compressed is always compressed to the maximum possible across the entire power range and this task is performed using a separate chamber.

This is then where the three cycles come into the picture. First, the cylinder receives this 'high pressure compressed charge' at or near Top Dead Center which immediately combusts. The second cycle is the expanding of the combustion which is the power cycle resulting in the down stroke of the piston. The last cycle is the up stroke which expels the exhaust gases. Notice that while this is a 3 cycle engine it actually only performed 2 strokes.



"...two combustion chambers and a reciprocating piston which can perform combustion in two directions."

Vintage KTM Parts

Obtaining parts for any KTM older than one month is nearly impossible. All kidding aside, anyone whom has ever owned a vintage KTM knows the pain of attempting to get KTM parts.

Ebay is of little help because usually it is the same set of parts listed and very rarely are new used parts ever being listed. This does not even matter since usually most of the used parts are trashed.

I have found several websites which you can contact to obtain parts for Vintage KTMs.

Sunrise KTM

http://www.sunrisektm.com

Andre Horvath

http://www.ktmklassiker.com

OzKTM

http://home.iprimus.com.au/hyrockpk/

Opferman Motors Newsletter

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Welcome to Opferman Motors the website of Toby Opferman; a dirt bike enthusiast. Opferman Motors is not a dirt bike repair shop nor is it a retail motorcycle shop. This website contains information on dirt bikes based on research and first hand experience. The details included however are not that of professionals but of dirt bike enthusiasts.

Tips or Stories you want to share?

Have a cool story of a barn find or motorcycle ride? Recently discovered a good tip on riding or building dirt bikes? Contact me with your story and we can put it in an upcoming issue of this newsletter! The newsletter is open to anyone to write in tips and tricks so that a wider view point can be observed.

References

The following websites were used as reference materials for some of the stories within this newsletter.

http://www.wikipedia.org

http://twostrokemotocross.com

http://www.dirtwurx.com/

http://www.google.com/patents