

# Retrieval and Restoration of a 1884 15 HP Dempster and Comstock Half Breed Oil Field Engine

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03/03/99*

In mid September of 1996 a friend and myself received information on 5 engines that were currently on an oil lease in Pennsylvania that were for sale. With it getting so hard to find these engines, still on their original mounts, we figured we shouldn't waste anytime and went south from here in New York state to find these engines and check them out. Maybe even make a deal and be the proud owner of an oil field engine. We wound up buying 4 of the five engines.

We started out at 6:00am on Saturday September 14, 1996 for Pennsylvania. It was raining a little but it wasn't too bad. I was so excited all night I couldn't even sleep. Just



the thought of walking through the woods and coming up on these old engines had me excited. When we arrived in Pennsylvania at the farm the engines were located on we were met by cold damp weather. But this wasn't ruining my day. I think when we got there Stiles was relieved because he didn't have to listen to me ramble on about the days exploration. We talked with the farmer for quite a while and he explained where the

engines were, so we donned our rain gear, grabbed our video cameras and headed for the hill.

On the way to the bottom of the hill not far from the farm house was the first engine. It was an Oil City Boiler Works. There was no building around the engine and it was sitting right out in an open pasture. Some vandals had put a hole in the base and someone had taken some parts also. It was very exciting to see the engine, power (turn table or eccentric), and pump jack all hooked up in its original operating state. We video taped a lot of this engine and was quite sure it would take a lot to fix it up. It would be a very easy engine to load up because you could get to it quite easy with a 4 wheel drive truck. Onward we go up the hill.

Now I knew after about 10 minutes of walking up this hill that I wasn't in the shape I thought I was. Also we managed to take the wrong trail up the hill and were going a lot farther east then we had to. We walked up 2 sections of the hill that I was wondering how did anyone ever get an engine up here. I would have hated to taken a maytag up the hill let alone a 15 to 20 HP oil field engine. I imagine the person who operated these wells was in great shape.

Well after wondering around the woods for 45 minutes we finally came across a rod line. Now this was a good sign. That meant if we follow the line we would eventually come to the power, or the well. Which way do we go? We went south west which was starting to head us down the hill. This was a problem because we might have to come back up the hill again if we were headed in the wrong direction. But a few minutes later there it was, the power house with the roof down on the engine with a portion of the flywheel showing. I am not sure if my heart was pumping from all the walking or from the excitement of seeing this engine for the first time.

Which engine was it? The Bovaird & Seyfang, Oil City Boiler Works (which we have seen already), Struthers & Wells, Dempster & Comstock, or the Lytle. I think here I will give a brief description of all five engines.

**Bovaird & Seyfang** - This is a single valve 4 cycle engine with ported exhaust and is rated at 15 HP. The intake and exhaust are on the same valve stem and is quite a thing to see in operation. This engine was manufactured around 1902.

**Oil City Boiler Works** - This engine is a half breed which means it was originally a steam engine that at some point in time was converted over (usually to natural gas) to have a gas cylinder instead of steam. There was usually natural gas available right from the oil well and also the gas cylinder was a lot less maintenance than the steam cylinder. You also weren't dependent on having water to make steam and a fuel (wood) for the boiler. Water still was needed to cool the engines though. I don't know how many HP the Oil City Boiler Works is but I would guess about 15 HP. This engine was in pretty rough shape and was missing a few parts. The piston, cylinder head, and connecting rod were all missing. The base also had a huge broken out hole in the side which looks like it took a few hits from a shot gun slug. We didn't buy this engine because of the missing parts and the shape the base was in.

**Struthers & Wells** - Another half breed that was under a fallen down power house. It was out of the weather and was still in good shape. I think this engine is about 15 HP also. We bought this engine as part of the 4 engine deal and it quickly found a new home in Walworth, New York. A friend of mine was looking for an oil field engine to restore and the Struthers & Wells fit the bill.

**Dempster & Comstock** - This is the engine that I bought. It is a half breed engine that was manufactured around 1884. It is considered a box bed half breed because the bed is shaped like a big rectangle box that all the components mount to. The crankshaft bearing supports, cross head, and cylinder all mount to the box bed. The cylinder is a 1902 15 HP Bovaird & Company that runs on natural gas. The engine last ran in 1982 and was the last running of all five engines on this lease.

**Lytle** - What a beautiful engine this is. It is quite a long engine that is also a box bed half breed. The bed is a Gibson & Russell made in Titusville, Pa. around 1865. It has a real beautiful flywheel with curve spokes. The cylinder is a M. Lytle & Son 12 HP made in

Bradford, Pa. that runs on natural gas. We think this engine might have been in a fire because there was no trace of a building around it but the babit was all still intact so who knows. I guess it is not uncommon to have these engines just working in the woods out in the open. One thing unique about this engine is it has a big bull gear that was connected directly to the pump jack. This really adds some nice lines to the overall engine.

Well back to figuring out which engine this was. We walked around the engine to the power which the engine was belted up to. The power is like a huge eccentric laying horizontal to the ground that the rod lines would be fastened to that would go out to the pump jacks at the wells. The little house around the power was also fallen down but still shielding it from the weather. What a sight to see! Every time I see an engine in its original state I can't help but to think back in time what it must have been like to be running this engine and pumping the oil. What did it sound like, how fast did it run, what was the person like who ran it. All these questions go through my mind.

After looking the engine over real good it was the Dempster & Comstock made in Buffalo, NY. I thought right then I would love to own this engine, but you never want to look to anxious. Stiles and I proceeded to video tape the engine and talked quite a bit at length about the design of the engine and when it might have been manufactured. There are a lot of beautiful features on this engine and the more I looked it over the more I liked it. The piston was stuck but at that point in time it doesn't matter what is wrong with it, you still can have the wants. What an experience seeing the engine and the inside of the power house with all the items that make it up. Everything was all still intact, exhaust pipe, gas lines and valves, oilers, and the water lines were still in place. In my head I was quietly planning how I would get this bear down the hill. What a job it would be. There is a homepage I have put together on the Dempster & Comstock, the url is <http://www.iinc.com/~cprucha/> The pictures are lined up in order and can be followed with this story.

Now my heart rate finally had slowed down and Stiles and I started off to look for the other engines. We had to figure out where we were and which direction one of the other engines might be in. As we started to hike up the hill we both heard a motor from a dirt bike or something. It turned out to be the farmer coming up the hill on a 4 wheeler. He was wondering how we were making out finding all the engines. We told him we had found 2 of them but didn't find the other 3 yet. He gave us directions and headed up in the right direction.

Well 20 minutes later we were walking up an old road or path in the woods and came up on the single valve Bovaird & Seyfang. This engine was sitting out in the woods not protected by any building or structure. There was also a tree laying over the tops of the flywheels. We also couldn't believe the beautiful brass name plate was still on the cylinder. For being outside in all the elements this engine didn't look to be in bad shape. A lot of critters had made homes in every exposed hole there was. When looking at the location of this engine it would be a real great challenge to get this one off the hill. After video taping the Bovaird we were off in a easterly direction towards the Lytle.

The walk to the Lytle wasn't really that bad. We were almost at the top of the hill and walking along a ridge, and the grade was not changing to much up or down. This engine was hidden deep in the woods and would also be a challenge to get off the hill. With no building to protect this engine from the elements it was rusted but not that bad. As we were looking all these engines, over the conversation was always how would we get them off the hill and also what needed to be do to restore them to original condition. The connecting rod on the Lytle was pitted pretty bad and the piston was stuck. On the opposite side of the flywheel is a small gear that drives a larger gear, just a little smaller in diameter than the flywheel. This gear had a huge pin on it that was off center and would some how hook up to the well. The wood was all rotted away and we couldn't make out what it would have connected up to. There is a trail not far from this engine but it is kind of steep. It might not be that bad to skid out but it is pretty high up on the hill.

Well there still was one more engine to find. The Struthers & Wells, which is at the bottom of another hill, across the road and not to far from the farmers barn. This was an easy walk from the Lytle, it was all down hill and we didn't have to climb any more mountains. We found this engine without too much of a problem. The engine and the power still had what I guess you would call a building, but it was in pretty rough shape. As far as rust goes there was none on this engine. All the plumbing for the water, gas, and exhaust was still intact and would have to be removed before we could take the engine off its mount. Being protected from most of the elements the piston was not stuck and was overall not in bad shape.

Now it was time to head back to the farmers barn and try to make a deal. My friend and I had talked it over and decided what we wanted to make the deal on and how much we wanted to pay. We even had a good idea now on how we would attempt to get the engines down to the road. The four engines we wanted were the Bovaird & Seyfang, Dempster & Comstock, Lytle, and the Struthers Wells. The Oil City Boiler Works was in pretty rough shape and was missing a lot of parts and we would have our hands full with just the other four engines. So we talked it over with the farmer and made the deal for the four engines. We wanted to start working on dismantling the engines right then and there but we were not prepared. The only tools we had with us were our video cameras.

We hopped into the truck and started the two hour trip home. Guess what we talked about? You guessed it. The four engines we just bought. I bought the Dempster & Comstock and my friend kept the other three. I knew of a fellow who might be interested in the Struthers Wells and that I could ask him Monday at work what he thought. He bought the Struthers Wells that Monday, September 16<sup>th</sup>. So Now my friend had just the two engines left, the Bovaird & Seyfang and the Lytle. That Saturday we were so excited about the engines. Most of the trip home was planning how to get the engines down and when to start bringing them home to New York. We decided to load the truck up with tools and hook up Stile's trailer that night, Saturday and would head out first thing Sunday morning about 6:00am. I got no sleep Saturday night. I just kept dreaming about the Dempster & Comstock. Would I be able to get it onto the trailer, would we break

down on the way home, would I be able to fix it and hear it run? All these thoughts kept running through my head

Well Sunday morning was here and we left right at 6:00am for Pennsylvania. Stiles and I bought some help too. His brother Doug wanted to come a long and help dismantle the engines. I am not even going to mention what we talked about on the trip down, I am sure you can guess the topic. Sunday the 15<sup>th</sup> it was still raining or just misty out and very damp. Nothing could come close to ruining our day though not even the weather. We got down to the farm and got ready to work on the engines. We put on our work clothes and boots and gathered up some tools. Our plan was to spend the entire day dismantling all four of the engines and then putting some parts in the truck and on the trailer to take north.

The first engine we were going to work on was the Dempster & Comstock. Now there was a pretty good path from the road to the engine. We had to cross a good size field, go through a fence gate and on up the hill to the engine. Going through the field was no problem for the 4 wheel drive truck pulling the trailer, but when we got on the other side of the fence and started to hit the incline the tires started spinning and they filled up with mud so there was no traction. We looked the situation over and decided to unhook the trailer at the fence and ferry the parts down to the trailer in the truck. The truck had no problem going up the hill without the trailer. This was just a little change in plan.

Before we actually got started I set up the video camera on a tripod to record this great event for me. With tools and all kinds of ambition we started to tear what was left of the building down. We took down the wall which was where we wanted to slide the engine from its mount onto the truck. As we knocked the wall down Doug who is a biology teacher found a couple of bats. He called them horry bats. This was only one of the types of critters we found inside this old building. After the wall was down and we could back the truck in the south side now we started to dismantle the engine. Big wrenches, pry bars, railroad jacks, and a lot of knowledge would get the job done. My friend has done this before so he was working hard and also being foreman leading the task.

The first thing we started removing was all the plumbing, water lines, exhaust pipe, and gas line. We saved most of this stuff even though it was in rough shape. Next was to start removing the bolts and nuts that mounted the cylinder to the bed and also the bearing caps. Now we had the engine down to three major components. This made it a lot easier to get the engine off its perch.

One thing you always want to do when dismantling an antique engine is to keep all the bolts and nuts in a good place. A plastic five gallon pail works great. I learned this one the hard way. As we were taking things off, we were putting all the hardware in an old steel container we found by the engine. After we got it full and were going to put it in the back of the truck, the bottom fell out. I was sure we picked up all the nuts and bolts, but you guessed it. When I was assembling the engine a few months later I couldn't find one of the

nuts for the cross head. The thread size was an 11/16 - 10, try to find one of these laying around your shop. We'll get to that story a little later on.

Well with a lot of elbow grease, barring, and jacking, things were looking pretty good. Two more friends showed up to help and this really made moving some of the parts easier and safer. It took three trips with the truck to get the cylinder, box bed frame, and flywheel & crank shaft down to the trailer. We secured all the parts to the trailer and also the flywheel & crank shaft in the back of the truck and this load was ready. Boy was I sore, this was quite a workout the last two days. Walking around these hills all day yesterday and dismantling the Dempster & Comstock and loading it up. One problem here, we wanted to try to get all the engines disassembled this weekend and come down the following weekend with the tractor to skid the other three engines off the hill. We still had a lot of work ahead of us.

As we took a break and started to get the tools together for the next engine the farmer showed up on his 4 wheeler. He asked us how things were going. We told him and showed him what we had accomplished so far. Then we told him of our plans to dismantle the other three engines today and then return next weekend with the tractor to skid the engine parts down the hill. He said it sounded good and then he offered to take all our tools and jacks up to the Bovaird & Seyfang which was the next engine to disassemble. This sounded great, not having to lug all the equipment by hand to the next engine.

The farmer drove his 4 wheeler ahead of us and in about 20 minutes we were at the Bovaird & Seyfang. This walk was all up hill and the crew was starting to show some signs of fatigue. After a few minutes we had our breath back and could get to work on the engine. This 15 hp engine was a pretty good size engine. Everything on it seemed to be massive. We grabbed our tools and went to work on it. Same as before the plumbing came off first, then the cylinder, bearing caps, and crank shaft. The crank shaft was a little difficult due to an out board bearing and a huge belt pulley. After about an hour we had the engine all separated and positioned so we could load the components onto the skid and drag them out. Two more engines to disassemble.

Here again the walk to the Lytle wasn't that bad. We were not traveling up hill just across a ridge that took us about 15 minutes. The farmer again took our tools to the Lytle on his 4 wheeler and this really helped out. Now this engine was going to be a take a little doing to get a part. It was the engine out of the four that was the most rusted and it looked like some of the bolts and nuts could be pretty stubborn. The exhaust pipe went straight up about 15 feet. What a time we had getting this down. It took three of us, two guys holding the pipe and the other removing the bolts. The engine was mounted on a huge timber that was pretty well rotted so the box bed base pulled right out with the jacks. Then the next step was to cut off the mounting bolts with a hacksaw. This part took a lot of the elbow grease. The cylinder bolts came off real good even though they looked pretty rusted. Last but not least we removed the bearing caps, all four of them. One set for the crank shaft and the other for the big bull gear and shaft. We barred all the parts around so we could hook up to them and skid them down easy. We were now off to the last engine. Now

there was just one more engine to disassemble. Everyone that was part of the crew was really whipped by this time.

The farmer transported all our tools down the hill to the Struthers & Wells. When we first got to the engine we had to clear out some of the original power house. It was pretty well rotted out and laying on top of the engine. We then undid all the plumbing and started to undo the main bearing caps. Then using jacks and cribbing we rolled the flywheel and crank shaft off the engine. We left the cylinder on this engine so the next step was to remove it from its foundation. Again with jacks and cribbing she was off. Now to gather up all our tools, chains, and other items and we would be on our way.

What a Sunday. One engine loaded on the truck and trailer and the other four all dismantled and ready for skidding down the hill. This all took place just one day after making the deal on the engines. We checked all the tie downs on the load and hauled our sore bodies into the truck and we were on our way home to Pavilion, NY with the Dempster & Comstock. Because this was the engine I was buying, all I could do was talk about it the whole way to Pavilion. Later on in this story I will talk about the whole restoration project of the Dempster & Comstock.

When we pulled down the driveway to my house, we looked for a good location to leave the truck and trailer. I had all week to get the engine unloaded because we would need the truck and trailer for next weekends work which was to bring the other 3 engines home. We worked 2 solid weekends getting all the engines home to Pavilion. The next Saturday we took my 1951 Ferguson TO30 tractor down on the trailer to skid the rest of the engine parts to where we could load them on the trailer. We came home Saturday with a full load and left the tractor over night. The next day we loaded my pickup and Stile's pickup with the rest of the engine components and put the tractor on the trailer. This was our last trip home. Finally after 2 full weekends of work the engines were all home. What an experience.

### **Dempster & Comstock Half Breed Restoration**

The first step was to gather all the information I could about all the engine parts and the condition they were in to make a list. The part of the project I wanted to get accomplished first was getting the piston out of the cylinder. It was unknown at this point if the cylinder would need to be bored. If it did I would want to get this to the machine shop as soon as possible because it would take a while get it machined. The piston was stuck at BDC (bottom dead center), the worst place it could have been stuck. One advantage to this was that if I push the piston out the back the distance would be short. With the piston at BDC this allowed any little critter who wanted access through the exhaust port into the cylinder. I guess this made quite a nice home because there was a mouse nest in the cylinder.

I started by removing the packing gland from around the connecting which attached the piston to the cross head. This is just a long straight shaft with threads on both ends. Next I removed the rear plate from the cylinder. When I removed this plate there was a lot of

black carbon in the back. Because this is a 2 cycle engine and the rings were wore out I think there must have been a lot of blow by to create this much jet black junk. This area needed to be cleaned out so that was the next step. Boy was this a dirty job. The black sooty type stuff was very hard to get out. With that cleanup complete the next step was to remove the cylinder head.

The nuts holding on the head were pretty tight. They must have been on there for quite a while. The last time this engine was run was back in 1982 so it has sat for quite some time. After all the nuts were off I used a wooden block to tap on the head to help break it free. Once it was free it pulled right off. This was the first time I got to look in at the combustion chamber and cylinder walls. There was a huge mouse nest in the cylinder and that really pitted the cylinder wall pretty bad in that area. At first glance I thought the bore might be able to be cleaned up but as it turned out I had it bored and the piston metal sprayed and turned to the right diameter. Also new rings were made for the piston. This work was all done by Joe Sykes in Lockport, New York and he did a great job.

With the rear back plate and cylinder head removed the next step was to work on getting the piston out. The bore of this engine is 9 ½ inches so I cut a steel plate about 9 ¼ inches in diameter and placed it over the top of the piston. This way with any pressure applied to the top of the piston wouldn't break it. I tried hitting a 6 X 6 on end with a sledge hammer but the piston showed no signs of movement. It didn't take long to realize it was going to take a different method to remove the piston. The next method used was to take a model A axle housing and slide it flange end first over the connecting rod, resting it against the back of the cylinder. Now I could use the nut and threads that attached the connecting rod to the cross head and the axle housing as a big puller. Success, the piston was now moving. It took quite a while and a lot of cribbing of the axle housing and the piston was out.

To have the machine work done on the cylinder and piston I needed to remove the connecting rod. This turned out to be a little challenge. The connecting rod was threaded into the piston and a huge 2.5 lock nut on the head side of the piston. This nut was pretty tight. I couldn't get it to budge. Next I tried heating it up but no success. What I wound up doing was going down to Dewitt Concrete Company in town and seeing if I could use there ¾ inch impact wrench on the nut. I talked to a real nice guy in their truck maintenance department about antique gas engine (my hobby) and the problem I have with the nut and he said bring the piston in and we'll give it a try. When I walked in with the piston his eyes got as big a quarters and he couldn't believe the size of the 9 ½ diameter piston. We proceeded to try loosening the nut with the ¾ inch impact wrench and it didn't even budge. The fellow said don't worry, we will get the 1 inch impact wrench and give that a try. Well this thing took 2 men and a boy to carry, it was huge. This thing sounded like a Harley Davidson motorcycle when the trigger was pulled. It did the job, and the nut turned right off. Now I offered him some shim stock (a six pack) but he said not while on the job, and don't worry about it, just get that old engine running. I thanked him and was on my way. What a great help he was getting that nut off the connecting rod.

Cleaning was now the next step. My oldest son and I spent a lot of time getting the piston and cylinder ready to go up to Joe's shop in Lockport. The water jacket was filled up with quite a bit of scale so we cleaned that out and wire brushed the cylinder. Next we removed all the studs that mount the head and cleaned the gasket surfaces front and rear. We then made a wooden palette to mount the cylinder on for safe transporting. We were on our way to Lockport, an hours drive from Pavilion, New York. We dropped off the cylinder and piston then headed home. All this was quite an accomplishment for the restoration of the Dempster & Comstock.

Now the job was to concentrate on the remaining parts which needed some attention and a lot of cleaning. The next step was to work on the intake valve. This was in pretty good shape but had some pitting from moisture. The intake housing and guide were in good shape also but the seat was pitted just like the valve. I degreased all the intake parts and proceeded to set the housing up in the lathe. I put an arbor between centers and rotated the intake housing locating it on the arbor. This way I could clean the seat up and grind the seat with the tool post grinder on the lathe. I didn't have to remove to much material to get it cleaned up. Once the housing and seat were completed I then chucked the valve in the lathe and cleaned it up and ground it. All in all the intake valve assembly came out just like it was new. One thing that is pretty important to the engine running correctly is to have the little orifices clean where the gas enters. These orifices are located in the middle of the intake valve seat and took a little time to get cleaned out. After all the grinding and lapping the valve worked great.

The next step was to start cleaning the cross head and connecting rod. There was a lot of caked on grease that I think help to preserve the engine. There wasn't hardly any rust on the entire engine. The cross head has babbit on both the top and bottom surfaces and this looked to still be in good shape. There are brasses at both ends of the connecting rod and after a little application of elbow grease they cleaned up like new. I had to file the adjustment wedges to get them flat. They must have beat on them a lot during the life of this engine. One of the set screws that locks the bearing adjustment wedge in place was broke off and had to be extracted and replaced. On the pair of brasses that go onto the crankshaft I had to mill some more clearance between them. I needed a little more adjustment and couldn't get it out of them the way they were. Now it was time to work on the bearing caps and supports.

Keep in mind that the engine was all a part from the trip home from Pennsylvania. I had the box bed base all blocked up outside so with a bucket of kerosene and some scrapers my son and I proceeded to scrape and clean. First we were careful to look for some original paint but had no luck. We couldn't find any paint what so ever, so we scraped and wire brushed for quite a while. The box bed cleaned up real good, it has some real nice lines to it that add to its beauty.

With all the parts cleaned and repaired, the piston and cylinder at the shop getting bored it now was time to build a skid. When going to engine shows I have done a lot of looking at the skids the engines were on. There were a few features I liked, one was having all the

skid rails mortised or inlaid into the joining member. This looked like it would add a lot of strength and stop any racking that might take place when running or moving the engine. Another feature would be having the skid and engine all held together with some nice threaded rod. All these features would make for a good strong skid. I measured the base mounting holes and put together a sketch of how I wanted the skid look. A trip to the lumber yard was in order and all the wood for the project was purchased.

After bringing the wood home I hated to have to cut it up and make wood chips out of it, but I transferred the sketch dimensions to the lumber and started to make the necessary



cuts. The tricky part was making the mortises. I wound up using a router to machine in the mortises by clamping 2 straight edges to the lumber and following the edges with the router. This worked out real good but was time consuming. Laying out the holes to be drilled was a little challenge too but wasn't that bad when I look back at it now. Some final sanding was done and a black walnut stain applied. I was looking for a real dark finish so the

skid wouldn't take anything away from the engine.

Now it was time to start putting the engine together. The first thing we did was winch the box bed up into the pickup truck. From the back of the truck we had a straight shot, at the right height, for sliding the box bed onto the new skid. This was a little tricky but using a come-along and rollers she lined right up and went on perfect. We then installed the mounting bolts (threaded rod), washers, and nuts, tightened them up, and she was starting to take shape. The final assembly process had started, this took a while to get to this phase and boy was I excited!

During the next couple of days I worked on lining up a few friends to come over and help me assemble the crank and flywheel to the bed. This was a four man job and we all were grunting and straining to roll her up to the engine. I had built a small ramp to roll the flywheel up so the crank would be above the bearing blocks when rolled up it.. We positioned the crank, mounted the bearing caps, and then jacked up the skid to pick the flywheel off the ramp. Removed the ramp and let the engine back down. Now was the time to shim the bearing caps. This is time consuming but worth every minute. Things were really going together now.

The piston and cylinder were now home from Lockport, New York where Joe Sykes machine shop is located. What a beautiful job he did on these old parts. The piston was



lubed and the rings compressed and the piston was inserted into the cylinder. This is a cross-head engine so the connecting rod was screwed into the piston and the lock nut securely tightened. I used some packing material and put on the packing flange on the connecting rod and just snugged her up. Using the engine lift the cylinder was now put onto the box bed, located, and bolted down. The

half breed was starting to take shape now. Next a lot of the bolt on parts were assembled to the cylinder, intake valve, head, hot tube ignition, oilers, and exhaust flange. This is really an exciting time. All the hard work of weeks past is starting to take shape.

The cross-head was to be assembled now. This is a little tricky, there is the straight connecting rod from the piston to connect to the slide and also the connecting rod from the crank shaft to the slide. I assembled the slide onto the connecting rod from the piston and screwed it all the way in. This would give me the lowest compression. Believe me with the bore and rings being new it was going to have good compression. I now then assembled the cross-head supports under the slide and bolted everything down. Here you want to do any shimming if necessary to line the cross-head up with the center line of the cylinder. The connecting rod from the crank to the slide has 2 brass halves and tapered wedges that are drove in to set the bearings up. There are shims between the wedge and one of the brass half that have to be set up and this took a little doing. With a turn of the flywheel the piston now was traveling back and forth. What a feeling and it wasn't even banging yet! This also was the first time I was able to see if we had compression and we did!

Well it wouldn't be long now. With just a bunch of little things here and there the half breed is almost ready to start. Everything was lubed real good and all the oilers and grease cups filled and ready for operation. My heart really pumps at this stage of the game. A gas valve was installed and the propane hooked up and we now had fuel to run her. Another propane tank was hooked up to the hot tube and a little adjusting was done, we're ready!

Stiles and I left the engine in the shop and prepared to start her up. The hot tube was lit and in several minutes was cherry red and waiting for action. The gas valve was set to



where we thought it should be. We primed her by choking off the air supply and getting a charge in the rear chamber behind the piston. This being a 2 stroke we then brought the piston back to transfer the charge to the front of the cylinder. I stood on a spoke of the flywheel with one foot and gave her a good crank forward, nothing, the piston just bounced back from compression. I continued to do this quite a few more

times and now my heart was pumping and not from the excitement. We decided to adjust the gas. At this point in time we really weren't sure how much fuel to give her. Did we have enough or was she flooded out. Stiles now proceeded to crank her over quite a few times and then finally a bang! She fired but only hit twice.

Now that we have her making noise, only two fires at a time and then quitting should we give it more gas or should we start playing with the intake valve spring pressure. You guessed it, we did both. I wouldn't recommend adjusting so much at one time but we were very excited. Stiles and I were ready to pass out from all the cranking. Still we could only get her to fire a couple of times and then quit. We stopped for the day to sit back and think about all we have done and if we were doing anything wrong.

Two days later we were back at it. Trying all different kind of settings, hot tube lengths, and spring pressures. This went on for a total of two weeks! Now this engine when I took it off of its original mount had a mag and spark plug for ignition. I was trying to run her on a hot tube. The thought was maybe I should put the eccentric back on the crank, mount the mag and put a spark plug in the head and see if this would make a difference. Then the thought came to us. We had the hot tube and chimney mounted in a hole on the top of the head. There is a hole in the middle of the head on the front. What would happen if we mounted the hot tube on the front of the head? We took a few minutes and mounted the hot tube on the front and soon had the hot tube lit and waiting for her to warm up.

We set the gas and intake valve back where we thought it should be and were ready to crank her over again. Bang! Bang! Bang! She came to life and stayed running. Now this was an exciting moment! A little adjusting of the gas and intake valve spring (by way of a



nut) and she was running beautiful. What a feeling, it is hard to explain but I am sure you all have had the same feeling. The only thing we can figure is that where we had the hot tube mounted on the top of the head might have been a dead area of the combustion chamber. After the mixture fires and the burnt gases go out the exhaust pipe, this air might be left over and never get mixed with a new air gas mixture. With the hot tube mounted right in the

front of the head (closer to the transfer port) it will always see a fresh charge. Just a theory on what we think might have been taking place.

This was a very good education for me to restore this old piece of iron, 1884 15 HP Dempster & Comstock Half Breed. I took this engine to quite a few shows during the



1997 show season and had a lot of fun with it and most of all the people really seemed to enjoy watching and listening to her run. I have done a few more things to make her run nicer, I have lowered the compression quite a bit, and I also run straight 2 cycle oil in the cylinder oiler. This is a pretty good crowd pleaser at the shows when I back the gas supply down and loosen the intake valve spring and have the engine running with out the flywheel making a full

revolution. If anyone is interested in seeing the Dempster & Comstock restoration project on the internet it can be found at <http://www.iinc.com/~cprucha> I hope you have enjoyed this story!