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January 13, 1951.

Mr. Neilson,  
½ Colburn Ranch,  
Hillside,  
Arizona.

Dear Sir:

My daughter tells me that you have tried to get in touch with Mr. DuBois who has been out of town for several weeks, except for short visits home. He should be in Wickenburg this week end and I will ask him what disposition he wants to make of the engine.

I was at the ranch before Christmas and found no one at home and very little signs of tenancy, and having not received a check for the rent for January I have thought that perhaps you did not want to go ahead with the lease, especially as you have not returned our copies of same.

If the above is the case I would like to know just what your intentions are regarding the place, as I have other applications for leases on it and don't want to fool around and loose tenants.

In case you go ahead with the lease I would want some place to put the stuff in the garage and the power plant, but if not there is no use of my moving the stuff until I get another tenant, if then, as it requires quite a little labor to move the heavy machines that are stored in the two places.

Will you please let me know what your intentions are regarding the lease as soon as possible in order that I may move the stuff or not as the case may be.

Very truly,

E. A. Colburn, Jr.

March 16, 1951

Mr. L. T. Neilson,  
Yava,  
Arizona.

Dear Mr. Neilson:

I heard that you were down at the Junction looking for me, but I was here all the time and never saw you.

It appears that your business is not going to let you alone long enough to get to see me about the rental on the ranch, therefore unless you are able to meet at least a portion of the rental within the next very few days I shall be forced to serve you notice to vacate. I think that I have been very lenient with this matter, but just can't let it go along for any longer. The season is on now for renting and I must realize something from what assets I have there on the ranch.

I was very much in hopes that you would be able to continue as renter on the ranch, but there must be willingness on both sides in order to have a deal. Apparently you do not wish the place, at least to the extent of paying the rental, so perhaps we had better call it quits.

Very truly,

F. A. Colburn, Jr.

11-1-51

Dear Mr. Calburn -

Herewith report on the  
Los Amigos - The equipment  
is still on the property - Compressors  
drills - blowers - tents, tools etc -  
but a road is badly needed - Cost  
\$700 The ore in the tunnel  
may or may not be the same  
as the prospect above -

Glad to show it to you  
on appointment

Yours truly

Harold Wright

PLEASE REPLY TO BOX 418  
CLAYPOOL, ARIZONA

Please return report -

September 21, 1951.

Mr. E. E. Nichols,  
705 N. First Street,  
Phoenix,  
Arizona.

Dear Mr. Nichols:

Your letters received.

Can you get me full information regarding the silver lead mine between Globe and Coolidge? If so send it on. It might be worth investigation. But first I would want size of vein, length of ore shoot, depth of workings, kind of ore whether sulphide or oxide and many other data.

Very truly,

E. A. Colburn, Jr.

September 13, 1951.

Mr. Ellis E. Nichols,  
705 North First St.,  
Phoenix,  
Arizona.

Dear Mr. Nichols:

I have your recent letters regarding the drift mine in Northern California. I have no clients who are interested in this type of operation and feel that there is little chance at the present time of getting anyone to be interested there. For one thing I have been close to the site and found that the snow gets about 20 ft. deep in that vicinity about every winter. Summer is short as well. The mine could not be worked by machine either dry bank or water floated, as it is a drift mine and the overburden is too great. One end may have been worked by hydraulic methods, but the channel immediately plunges underground and could not be reached except by bedrock tunnels and hand workings. The report shows that they drove a bedrock tunnel and tapped the channel in a couple of places. At the time of report the portal of tunnel was caved as well as the first raise to tap the channel, so today there would probably be extensive repair work to be done before access could be had to the gravel, and then the tunnel would have to be extended a couple hundred feet or more to get under new ground for working. From the report it would seem that there has been little production from the property, and not too much from adjacent or nearby mines of like nature, so it would be pretty much of a gamble to reopen the workings now. Those drift mines look to be pretty attractive, but no one knows how good the channels will be or how large in area and the only way to find out is to run the tunnels in rock below and explore and that is expensive.

I am returning the papers herewith.

Very truly,

E. A. Colburn, Jr.

September 8, 1951

Mr. E. E. Nichols,  
705 N. First St.,  
Phoenix,  
Arizona.

Dear Mr. Nichols:

I think that you make a mistake in sending letters on from one party to another, for instance the sending of my letter on to the Octave office, of course, you got no results as I did not write that letter for her looking over. You probably do not know it but there is a controversy on between the Octave and Lyman over the ownership of the water in the Octave mine, so Miss Haskell did not take it very well what I said about the water. Probably you will never get anything out of her from now on except through someone she does not know has any connection with you or me.

The outfit interested in the water for the placer claims below the Octave wrote me about it and I gave them the same address as I did you. I think that it would be well for you to write them and give the more specific address that you gave me on the post card.

I ran across a friend a couple of days ago who has what appears to be a good tungsten mine. He claims about \$250,000 in sight in an open pit of 0.5% tungsten ore and considerably more in the underground workings which he described as 9 ft. wide of better grade ore. They have been working on the claims for some 15 years. I did not know that the mine was for sale until I saw him, so had not mentioned it to you. Do not know the price but you can get details by writing them. Zanarias & Robinson, Congress, Arizona will reach them and the property is out on Burrow Creek west of here. A hard place to get at, but probably one of the best mines in this area. In the same schist belt as the Hillside, Bagdad and other properties.

Am returning the letter from the Standard Mining Corp. herewith, and please do not send any more of my letters out to others.

Very truly,

E. A. Colburn, Jr.

Phoenix, Arizona  
Aug. 23 - 1951

Mr. E. A. Colburn, Jr.,  
Mining Engineer,  
Box 153,  
Congress, Arizona.

Dear Mr. Colburn:

A firm in New York  
wants a good mine, possibly you  
can locate something in which  
they would be interested

Very truly yours,  
E. L. Nichols  
apt. 3  
705 North 1st Street  
Phoenix, Arizona



June 16, 1957

Dear Frank and Ruth:

I am enclosing Railway Express Receipt covering the shipment of the air cooler and motor. It was cheaper to send it by express than freight on account of the comparatively light weight. The agent here figured it out to cost \$3.07 for express and I let it go collect because you would get it sooner that way. The cooler is in perfect shape and only used less than a month. If there is any damage shows up you should collect from the exersess company, but I think it will come through all right as I was careful in crating it.

You can send the check or money order to me as Bert wants me to pay the Motel \$5 that he owes them out of it and collect his tool box for him. Then I will send him the balance in cash.

Weather is just beginning to get warm here now and I am sleeping on the porch which is quite a treat during hot weather. We are going to Wickenburg to take care of Davie for a few days while Shirley is away on a trip with Caroline and Sarah, but I will be up here almost every day while they are gone. Guess your mother has told you about their trip.

Bert has been feeling bad and loosing weight so he went to the doctor and he told him to lay off oil that he has been using. Told him all sorts of bad results from its continued use, so that kind of scared me out of using MD. Will use other physices instead. Have had no bad effects so far and I have been using it a long time, but don't want to take chances.

The barnetts have finally sold their place and are going back to Iowa. possibly they will come back next fall, but probably not to Congress.

That must be a nice car you have now. David came up and got the Packard some time ago and I went back with him to look at the mine again. Don't think much of it either, but he did have a good one and then turned it loose again. Some advice he has got from Morris. Guess Shirley Davie, Caroline and possibly Sarah went down to the mine this morning and David will come back with them Sunday. Andy is now out at Bagdad with Betty and will be there until Shirly gets back. David will go on the trip for a few days and then return.

Hope that you both are well and busy and that the cooler will work out all right.

Your aff, father,

March 29, 1951

Dear Folks:

I had a talk with Neilson last night and he can't go ahead with the ranch at this time and it is now for rent. He wanted to rent it to a man by the name of Finch who is mechanic at Hillside, I suppose with Dickey, but he only wants to live there and have a garden, etc. cow etc. and don't want to pay as much rent. I told Nielson to see him and find out just what he was willing to pay and then let me know.

Now those neighbors of yours might be willing to make a deal with Finch and run some cattle on the place or divide it up in some way even if they wanted to live there, as there is plenty of room. It might be a good idea if they could get together and see what can be done.

There is a small chance for sale on the ranch, as some people from the coast were over looking at it and will return, so they say, about the middle of April. They want it for a place to go to if they get bombed out in Calif. Three boys and father and mother who are in aviation. They want a place where they can land a small palin, and thought that the mesa would be all right for that.

I think that some deal of a like nature could be stirred up if we should advertise in the L. A. Times a few insertions, and I believe that I will try it out a little later on. It would be a good way of getting the place sold, as it is too small for the ordinary cattle ranch.

Etta is much better now and we are going to Wickenburg today to get some groceries, etc. Think that she will begin to get her strength back from now on, and her cough is practically gone now, so everything looks hopeful.

Please let me know at once whether your neighbors are interested at all in the ranch, as I want to get it rented some way as soon as possible.

Hope that you are all O.K. yet.

Your aff. father,

November 5, 1951.

Mr. E. F. Nichols,  
705 N. First St.,  
Phoenix,  
Arizona.

Dear Mr. Ellis:

I have your letter of Nov. 2 with enclosure which I am returning. Zanarious already has a contract for his Tungsten concentrates, so there is no use approaching him along that line, as he told me that he would buy almost any grade from other producers. I suppose that he is willing to sell at a price yet, but have not asked him lately.

I received a report on the lead-zinc mine from Maryott a couple of days ago. The property would not be of interest to us, as it is very largely a development project, and don't offer too much encouragement.

In case your placer machine men are interested in old gold mill dumps and think they can treat them you might mention that I have a lease on one of 150,000 tons having a value of about \$2.10 per ton. Doubt if they can do anything with it, however. Don't know of any dry placers at this time.

Very truly,

E. A. Colburn, Jr.

Dear Mr. Colburn!

Phoenix, Arizona.  
Nov. 2 - 1951

I have several people who want a good dry placer, they have a proven dry machine that will recover 95% of the Gold.

I phoned Mr. Gillick in Phoenix about his placer on Weaver Creek, near Octave mine, Gillick has leased his placer to some people and he stated their engineer was already on the ground.

The dry machine will handle 30 yards per hour.

If you know of a Good dry placer I may be able to close a deal. To the best of my knowledge I will leave Phoenix at 7 A.M.

Wed. Nov. 21, providing that Indian  
arrives from Fort McDowell, I am  
going down on the Papago Reser-  
vation to look at that prospect  
the Indians found.

Is that open-pit Jungsten deposit  
on Burna Creek open for a deal?

Very truly yours,  
Willis E. Nichols  
Oct. 3  
705 North 1st Street,  
Phoenix, Arizona.

Phoenix, Arizona  
Sept. 15 - 1951

Mr. E. A. Colburn, Jr.,  
Box 153,  
Congress, Arizona.

Dear Mr. Colburn, Jr.:-

I have obtained  
a fully equipped mine having  
shipping ore, including the  
mules to haul the ore to the  
main road. It will take \$3500.00  
to build a road from the mine to  
the main road, mules are being  
used at the present time.

The ore assays 30% lead and  
10-15% zinc.  
It is between Globe & Coolidge.

Very truly yours,  
E. L. J. Nichols  
Phoenix, Arizona

apt. 3  
705 North 1st Street Phoenix,

August 8, 1951.

Mr. Ellis E. Nichols,  
705 North First St.,  
Phoenix,  
Arizona.

Dear Sir:

Your letter of August 6th. at hand regarding the Lyman mine near Octave.

Mr. Lyman is a good friend of mine and has told me a lot about his property and friends of mine have done more or less dickering on it. I think very well of the property, but just now it is almost impossible to get any money for gold mining, so they had to abandon the idea.

My understanding is that a placer outfit has an option on the water in the Octave mine and are keeping the option alive by monthly cash payments to the owners. Anyway that water is valuable for milling purposes and should be reserved for milling of the ores from the Lyman property. It would cost at least \$100,000. to sink a vertical shaft and then a mill would have to be built, so you see that raising that amount of money on a gold property with gold in the doghouse is a very hard thing to do.

Very truly,

E. A. Colburn, Jr.

E. A. Colburn, Jr.  
P. O. BOX 153  
CONGRESS, ARIZONA

August 14, 1951.

Dear Bennie:

Please find enclosed assay certificate from the Arizona Testing Laboratories showing results of both of the samples I took as "none".

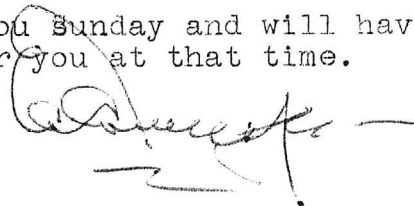
That is the second time I have got that kind of certificate from them and I don't like that word none. For almost any rock has traces of almost any mineral in them and none is pretty broad to say about any rock. My samples do not check yours, so it might be a good idea for me to take a sample of the black rock that you got the results from and break it down and quarter it and split the sample giving you one half and sending the other half down to either this outfit or some other. The best way, however, to check would be for you to prepare a finely ground pulp and then split that with one sample being retained for your assay and sending me one. Think perhaps that is the best way.

Do the boys out there have any assayer that they send pulps to, if so, we could try them. I do not see how you could be mistaken in so many determinations and especially when you got such good results from the rough concentrate. That in its self proves a great deal, for it is evident that you are getting an enrichment by concentration and are showing it in increased value in tungsten.

Of course, it might be that the tungsten is coming from the Bellick dyke, but if so I should have picked up some values in the dump sample from up there. Looks to me as if Mclean or whoever does the work down there are overlooking a bet. It is easy enough to turn in a none assay and not do the long routine, but even at that if I were you I would have your assayer check your routine on the determinations to see if everything is all right. Certainly you are getting something in your determinations and possibly it might be some other metal. You will have to give your operations the once over anyhow, for if you are wrong it might cause a lot of trouble. I don't believe so myself, but you had better be sure, otherwise you might get into a mess, as you have the control of a lot of work.

This letter may make you sick, but keep up your courage and do your darndest to check your own work and if it is O.K. you have nothing to fear. We all get plenty of dissapointments that we have to overcome. Hope I can get something on this outfit and maybe you think I won't make them sweat.

Will see you Sunday and will have a sample of the tunnel dump for you at that time.





**WICKENBURG ORE MARKET  
and Assay Office**

ROBERT A WILLOUGHBY, PROP.

PHONE 270-J

BOX 427

**WICKENBURG, ARIZONA**

October 18, 1951

Mr. E.A. Colburn  
Congress, Arizona

Dear Sir:

WICKENBURG ORE MARKET Assay Certificate No.  
51-457, attached, reports on the results of the leaching  
test on a sample of tailings left here by you.

1000 grams of the tailings were leached for ten minutes  
is W ickenburg tap water. 2000 ccs.

The effluent was removed, after settling, by decantation,  
until slimes were coming over.

It was then given two more washes of 500 cc each,  
effluents again being removed by decantation until slimes  
were coming over.

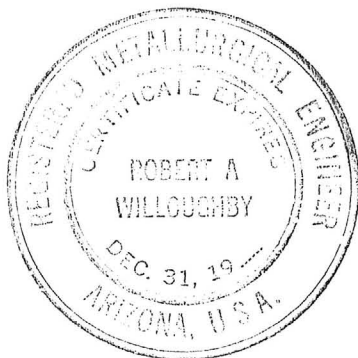
The effluents were filtered.

Slimes filtered off of the effluents were returned to  
the pulp.

The pulp was dried, and sample taken for assay.

Very truly yours

*R.A. Willoughby*  
WICKENBURG ORE MARKET  
R.A. Willoughby, Reg. Met. Engr.



Dec. 18, '51.

Dear Brother:-

There were several things that I neglected to speak about in my last letter. One of them is that Sears-Roebuck are going to market a small, light car. It will be made by Kaiser-Frazer for them. As near as I can find out it will be a revamped Henery J. It was a flop and they did not move them as expected, therefore they overproduced and have got to get rid of the surplus stock in any way that they can. Several years ago I approached Montgomery Ward on the matter of a light car and found them very receptive to the idea but we had nothing to offer but the engine at that time. As I have said before, we have got to put out the complete unit and not just engines alone. It would be just like trying to sell the blades of a pocket knife - without the knife handle.

The first thing to decide on is the size and weight of the car, then I will have to run a weight analysis etc in order to determine the dimensions and speed of the engine. This means also working out the gear ratios. I will take into consideration the weights of the best selling cars here as a guide although I expect to be able to reduce the average weights somewhat. The most popular cars here as shown by their sales records are in the following order. English Austin, Hillman Minx, Riley, Renault, Simca and several others trailing whose names have slipped me right now. Will get the weights, power, engine speeds and other data for a comparative study. Then will come the design of the chassis which will be a long winded job.

As far as the engine goes it will be a single pair and of the same fundamental design as the present engine. This cannot in any way be improved upon and I would not consider an engine of multiple cyl. units in this type of car, we can get all the power we want out of a single pair. Of course the features of fuel injection and elimination of the blower will be added. Preliminary investigation leads me to the conclusion that a bore of  $2\frac{3}{4}$ " by a stroke of  $3\frac{1}{4}$ ", or all I can get in this type engine, will be plenty sufficient to greatly outperform any of the four cycle stuff now on the market. Accordingly I will proceed along these lines as things are pretty well lined up in my mind. It will take a lot of money to get a thing like this started but it will have the potential of making a lot of money. We will really have something to offer now and that is for sure.

Have been doing a lot of studying again on combustion and the rate of flame propagation and have learned something. The rate of flame travel with the correct mixtures of fuel and air in a closed vessel at atmospheric pressure is nearly ten times greater for a gasoline-air mixture, than it is for a diesel-air mixture. Now compress these charges to a pressure of around 600 p s i and you get a rate of flame propagation of nearly 80 times greater. This fact explains why diesel engines do not wind up to anywhere the speed of gasoline engines. Engineers say that this is due to the fact that the moving parts have to be so much heavier in a diesel on account of the higher pressures encountered. This is all hooey as you get just as high combustion pressures in a high compression gasoline engine as you do in a diesel. With gasoline injection you will have higher combustion pressures than in a diesel and at the same time obtain a 60% higher speed easily. This is the reason that I am not going to waste any time on any diesel proposition.

The Doc has changed my medicine & I can now notice a distinct improvement in my condition and now figure that I am going to come through all right. The irregular meal times are a drawback to my and other conditions are worse. I have never seen such dirty, shiftless and extravagant management. I hate to take a bath as the tub is always so dirty, If I want to go in the bathroom and wash my hands, I usually find some dirty dipes soaking in it and they stay there all day. It is that way all over the house. I estimate that there are over one hundred dollars worth of toys scattered around the back yard and out in the rain. Nothing is ever brought in the house when it rains. Jean has recently bought a Television receiver, cost \$350.00 and right when she had a big overdraft at the Bank. She is always writing rubber checks and last month she paid the Bank over nine dollars services charges. At least twice a week and sometimes three, she sends me down to the Liquor store to cash a check for thirty dollars or more, then I chase it right up to the Bank and deposit it. This gives her three or four days leeway but sometimes she slips up and has to cash more ckecks to cover that up. I do not think she writes anything but rubber checks. If Roland knew this, Oh boy, the fur would fly. Well some day she is going to find herself in a hell of a jam and I don't mean maybe. I thought I had seen everything but have neither seen or heard of anything comparable to this. Night after night I have gone in the house at nearly midnight and the wife is in the kitchen washing dishes while Jean is in the living room watching Television. I have not covered half of it. I could go on and on but there is no point in it. There will be a crisis soon. Jennie keeps telling me that she wants to get out but when I get some arrangements about half made, she always backs out.

I am stony broke right now and Jean owes me a small amount of money which I can't get. I will deduct it from the next board money I give her. But this leaves me without a cent to even buy Xmas cards with so I will have to say Merry Christmas and a Happy New Year to you and yours instead. Needless to say, I have not bought any presents for anyone. Well I will pull the string now and wish you good luck and everything.

your aff. brother,

*D. C. C.*

Dec. 11, '51.

Dear Brother:-

I owe you two letters, one for quite a while. Have been under the weather since Thanksgiving and did not want to go to the Dr. until I had money enough to pay him for past services. This dog-gone Pension Board here have been chiselling on me and my Checks have been coming in eleven dollars short every month. I have been wrangling with them for over two months now and I may finally get it straightened out. Everything is so corrupt in this Country now that there is no living in it. Look at the internal Revenue Scandal. Also the big Industrial Concerns have been taking withholding taxes from the emplyes pay checks and then not turning this money over to the Govt. Some of them are two years behind and are using this money in their buisness. It is an unholy mess and if a change is not made in the next election, this Country will go on the rocks - we will have a Socialistic Govt. Well Truman is through but how about the Demo. party? They have all the crooks in the Country lined up with them.

Would like to see Andy Morrison. Remember me to him if you see him. I got a bang out of Cripple Creek trying to make a come-back by converting it into a Cultural Center. A few ham actors are not going to take the place of a bunch of ore wagons. A drowning man grasping at a straw. As to the Carlton Mill not helping any, how many men did they think it took to staff a Mill?

Yes I saw the description of that little  $7\frac{1}{2}$  H P single wheel drive. I am afraid that it would be too small and too much like a plaything to create much of a demand. Then too it would steer too hard one way and too easy in the other. In other words if you were driving the right rear wheel, it would keep pulling to the left all the time. I was however much interested in a new Swiss. light car. It has a two cyl. two cycle engine, mounted transversely with the frame, with front wheel drive. The engine, transmission and gear box are in one unit and drive the front wheels by short shafts & universal joints. The engine has a displacement of 45.5 cu in. I estimated a bore of 3" x 3 $\frac{1}{2}$ " and they claim a speed of 70 mi. per. hr. They say nothing about gas mileage but it must be low as the engine evidently has crank case compression. I do not like the front wheel drive on general principles for if you have any soft going on the shoulder of the road like sand, mud or snow, it will pull you right into it and there is nothing you can do about it but follow the front wheels. They also use torsion springs which would seem to be best for small, light cars. I am much in favor of the propellor shaft and the shaft tunnel. Therefore my conclusions rest on a rear engine mount with rear wheel drive. So as I have gone as far as I can with the engine design until it comes to actual construction. Therefore I am going to start the layout of a complete car with rear engine mount and rear drive. It will have torsion springs and other light weight features. After all, if we are going to get anywhere with the engine, we have got to put it in a car and then promote the entire unit as a unit and not as component parts. This I will attempt to do. This, I am convinced is the only sure way to get going. It will take more money but it will be worth a whole lot more money. I believe that I can put this kind of a deal over here if I can ever get the drawings out. It is the only kind of a program that I would feel justified in putting my time in on.

(over)

There is one point that I would like to discuss and to my mind it is a most important one. There is one glaring fault common to every car built in America and that is that there is not a single one of them that has any provision for controlling the temperature of the engine oil. The temperature of the engine oil should never exceed the boiling point of water. Above this it loses its viscosity and lubricating properties and if you go high enough it commences to disintegrate. This is especially true in the Southwest and desert regions in the Summer time. I have had cars come in to my filling station, red hot. Even after the engine was cooled down you could hear the oil frying in the crankcase and smoke would be pouring out of the breather - disintegration was taking place. I talked several drivers to let me drain the oil out and replace with fresh before starting up Yarnell hill. The oil was as fluid as water and was just about as useless as water. Not only that but much sludge was formed by the breakdown of the oil. . This is why castor oil is used by racing cars as it retains its lubricating properties at higher temperatures than mineral oil does. I could elaborate still farther on this.

I propose to use a dry sump on the engine with a scavenging pump to draw the oil out of the engine, push it through an oil filter of cast aluminium with fins, then through a separate radiator and thence to the oil storage tank. From there it would be pumped back to the engine bearings. Both pumps would be in the same housing, having two sets of gears instead of one. This will do the trick and will be a big talking point.

For the engine used on this proposed car, I would use a single pair (to keep down cost and weight) as it is vibrationless. Use a displacement of 35 to 40 cu. in. as that will give an easy 50 H. P. With our fuel injection it would go to better than 60 H. P. Anyhow, it is something to chew on. Have got to quit as I have an appointment with the Doctor.

Will mail you in the morning the Dec issue of Motor Trend which has a description of that Swiss car, also read the article on the Doble Steamer. I notice that they get a car speed of 80 m p h with the engine running at 1450 or something like that. Extreme engine speed is not needed nor wanted for long life. Am feeling better now and know what to do with myself if the Dr. don't. Well good luck with your Congress proposition and I will see you later.

Your aff. brother,

*Burt*

H. C. C.  
South Pasadena.

Oct. 28, '51.

Dear Brother;-

I have yours of the 17th, but guess I have spent too much time in listening in to the short wave stuff - very interesting. Besides I am getting so that I don't like the typewriter - this one is shot anyhow.

You are sure having a time down there with the water situation etc. We are too old to go out building roads and other heavy work, I have had to quit it. Hope you have everything under control by now. Note what you have to say about getting a Govt Loan for getting operations started on the mine, that would share be fine buisness and would put everything in the clear. I will be pulling for you and I have a hunch that you will put it over, at least you cannot be shot for trying and have nothing to loose and everything to gain - Good luck.

I have got as far as I can on the engine without making the actual working drawings and commencing construction. All I can do now without a drawing board and drafting machine is to make schematic drawings. I have nothing to add to what I outlined in my last letter as that seems to be the ultimate and as far as I am concerned, it seems to be boiled down into its ultimate form. I know one thing and that is that whoever builds this first engine will not have to look any further as this is it. It is really the Hesselman Cycle in so far as it maintains the correct fuel to air ratio throughout the entire range of speeds and loading. However there is one very important difference. The Waukessau engine uses spark plug ignition and thereby gets into a lot of difficulties. They have to have the spark timing synchronised exactly with the fuel injection timing. You will get what I mean - for instance suppose that you get the spark an instant before the injection timing - result no explosion. Conversely if you set the spark slightly after the fuel time of injection in order to be safe - you are in trouble again for reasons which would take me a long time to explain. But you will get the idea. Now with glow plug ignition, the mixture will always be fired regardless of the compression pressure and the timing of the engine is controlled entirely by the timing of the fuel injection alone. This may seem like an unimportant detail but it turns out to be a most important and vital factor.

By this means we can raise the compression ratios to a point where we will greatly exceed the economy of diesel performance with gasoline as fuel instead of the heavier oils. Gas can be obtained at any filling station anywhere, while diesel fuel cannot. Another thing is that we can raise the compression ratio up to a point where we would blow the cylinder heads off if we went high enough. So, the sky is the limit. We can get unheard of economy and results not yet dreamed of. We get away from the troubles caused by sludge, gums and other impurities associated with diesel fuels, sulphur being one of the most important scourges of diesel troubles. The high voltage spark ignition is the gangster which causes plenty of trouble but with glow plug ignition the voltage used is only six volts or less, but a lot of amps. No distributors, coils, condensers etc, just plain juice straight through. If any better deal ever comes up, we will not live long enough to see it.

Yes, a butterfly valve in the suction of the blower is very important and is patentable as it controls the fuel to air ratio which is the salient feature of this engine. Another important feature of this engine is the twin piston proposition with the cylinder centers offset

toward each other, this gives a torque which is out of this world and no foolin. Besides we get a perfectly balanced engine with either one pair, two pair, or four pair of cylinders and no vibration anywhere, likewise, no noise. As the radio hams say "no stress, no strain" anywhere. What more do we want?

I might be able to get enough financing right here on what I have worked out to build one engine. I am pretty sure that I can do it but the fly in the ointment is that we would have to give up a half interest in the whole thing and I do not like that. However we might consider it as a last resort but then only on the deal of our being able to retain control with a 51% interest. I will never again go into anything where I have got somebody in my hair all the time and distracting me with wild vaporous guesses, founded on nothing but a dense ignorance of the subject. If I can't have the only and last word on the engineering end of the thing - I just won't play ball and that will be understood before any work is commenced. However I have got to get my appearance and pep worked up a little more before I start anything like this.

I have found the way to accomplish this, I have started it and am going to keep at it. My trouble for years I have found is chronic constipation and that is why I started years ago taking mineral oil right along when I was working at Lockheed. I have thrown away all laxatives and other medicine and have commenced taking high enemas. In a week I have noticed a marked improvement all the way around and am going to keep at it. The ordinary enema does very little good as it only flushes out the lower third of the intestines and it is the upper bowel which you have to flush out if you are going to do any good for yourself. not to go into revolting details, the idea is this. The average enema will can or bag, holds two quarts of water and that is only a little better than nothing as it takes five quarts of water to completely flush out the entire intestines, so the ordinary enema bag does very little good as the upper bowel is the offender and if you don't wash it out, you are accomplishing nothing. To make a long story short (and I have read a book on the subject) I am using the Cascade bag which I fill up with five quarts of water. It operates by sitting on it and your weight forces the water all the way. I stopped a terrific cold in this way in 24 hrs. and my piles are very much better. Am also commencing to put on weight and my general health is improving. I expect to be able to work back to my normal weight in about two months but when you get old it is hard to get your weight back once you have lost it. Well enough of this.

When I get to be myself again I am going to start circulating around and see what interest I can stir up in the engine. Maybe nothing but it is worth trying. I am getting my Pension now and it is the bunk. They deduct from it the oil checks which they figure amount to an average of eight dollars per month. Then when I don't get a check for oil, I am out that much. I suppose that we will get paid every two months now instead of every month and that leaves me short every month - I mean every other month. Well I will soon be rarin to go again and things are bound to happen. I may not need my Pension much longer. Well this filibuster has got to stop sometime so I will say Best Wishes and will see you later.

Your aff. brother,

*Bent*

H. C. C.  
South Pasadena, Calif.

Sept 27, '51.

Dear Brother:-

I was just sitting down to write you in answer to yours of the 19th, when yours of the 25th rolled in. Congress must be really a ghost town now. So Sam is back, I suppose that Oscar built him a filling station over on his property as he is close to water there. I suppose that Eddie will move his garage up to his new location along with the new filling station. I am not going to plan any move until after my birthday in Feb. as I can only make \$50.00 per month until after that time. So much for that.

Now about the engine. I believe that we should confine ourselves to regular gasoline as fuel for the time being or until we get going. Anyhow we can obtain diesel economy with gas fuel and even better it. Then too we would not have to contend with sludge, varnishes, etc. which would prevail with the heavier fuel oils. It would not be much of a job to build a fuel injection nozzle for use on the existing engine. I could either make it or we could have it made and it would not be expensive. For a temporary expedient for obtaining pressure on the gas feed line, we could buy a Norge Rollator pump. It would last for quite a while without lubricant, or we could add a very small amount of lub. oil to the gasoline - about a tabelspoon to the gal of gas. Have been adding this much to the fuel on the present engine anyhow. Later on we can design a fuel line pump of the diaphragm type - would only need to maintain a pressure of about double that of the max. compression pressure. Yes, we could use a blower & scavenging pump built into the engine base and out of sight. It could be either a centrifugal type or the diaphragm type, which we could probably patent along with the fuel pump and nozzle. The diaphragm could be fairly large in diameter and made of Neophrene which would be heat and oil resistant and would last indefinitely. I will try and cover this whole thing with a disclosure. Injection nozzle, fuel pump and scavenging pump. This should put us in a very favorable position.

Now there is one thing which we must not loose sight of for a minute and that is the function of the carburettor. It is to maintain the proper ratio of fuel to air from an engine idling speed to full speed and full power conditions. This is approx 14 parts of air to one part of fuel and must be maintained throughout the full range of speed and loading conditions. . . This is where the diesels fall down - they cannot do it, and thus the smoky exhausts. Now as we meter the fuel back down, we have got to also lower the volume of air used for charging. This can be done in two ways; by the port control or by placing a butterfly valve in the suction of the blower, the latter is the best for by throttling the air at the intake ports, a pressure is built up which is not only harmful but absorbs power. The proper place is a valve in the suction of the blower which is easy and assures the proper control. Thus we eliminate an expensive production problem but get in the clear from any Patents held by the original Company. We can start with a clean slate and no complications. This is just about the whole thing boiled down and I believe is the ultimate.

You did well in getting the engine and machinery out of there and up at the mine and protecting it against any leins or attachments resulting from David's guarantees, etc. I knew for some time before I left there the amounts he was responsible for both with Mac and the Hotel. I could see the finish then and it came out just that way. David will end up without a dollar unless Shirley puts a curb on him,



which she has probably already done. It beats all how many ways a man can made a fool of himself. You know the old saying, "A fool and his money are soon parted". That is the deal and he is just repeating his performance back on the coal stripping proposition. Morris is just substituting for that partner he had back in Penna. Oh well, that is water under the bridge and it does not mean in any way that we are stopped. In fact we are benefited as he is out of my hair and I am where I can do some free thinking, not influenced by his pocketbook.

I am feeling much better now although I am not as yet putting on much weight. Am getting stronger all the time and getting more pep which is all to the good. I had been waiting for over six weeks to get some one to help me put up my antenna. I could not pay anybody. So I finally got mad and figured a way to put it up all by myself. It took me two days and I had it in operation on the 21st. It sure works fine and my worry is over with on that score. It is a new and untried type, never having been used before to my knowledge. It is already being copied around here, it is the result of about three months of study brought on by the fact that I did not have the money to do it in the conventional manner. Well- Necessity is the mother of invention. And that is perfectly true. I must close now for between Radio and the engine, I have plenty to do. Which is what I want, I do not intent to rust out anyhow. Will write again soon.

Your aff. brother,

*Bob*

H. C. C.  
South Pasadena, Calif.

Sept. 17 '51.

Dear Brother;-

Hurray\*\*\*, I have got it - at last, and I can say that again. In fact, I have had it for three years or more and did not know it. Fuel Injection;- no more ping, or stress, or strain. You can burn anything that you can pour into the tank except mollasses or maple syrup. In my letter of yesterday I told you that I had designed a fuel injection nozzle for gasoline. I did this work when I had my Office up there in the Bank Building. It has been duly witnessed and I have it here somewhere, I think I showed it to you once. It consists of a spring loaded diaphragm and there are no moving parts to lubricate and it can be actuated by either a solenoid magnet, or mechanically. Now the idea never occurred to me until two A M this morning that I could reverse this process for a fuel pump. Use ball check and valves for intake and discharge. It could be driven by an eccentric which could be lubricated. I will draw this up and have it witnessed. The whole system is patentable and will be basic, and that is something.

This also means - and this is an important item - that we can use a light, small and simple centrifugal blower. Just design the combustion space volume for the compression ratio that we desire and disregard the supercharge from the blower, be that what it may. Now with the glow plug and fuel injection the engine will easily start before the blower builds up it's pressure. It also will make no difference where we locate the blower. You could put it on the rear axle if you wanted to. I can't see anything missing now.

By the way, Howsabout the machine shop equipment and engine? In my book, possession is nine points in the Law. Anyhow, if my arithmetic is right, we each own a third interest in the whole shebang. My idea is that we can use it anyhow. David promised to give the shop to me twice but I paid no attention to him as I know him too well. Maybe his interest is Shirleys anyhow. The method of procedure would be to build a nozzle and pump and put them on the little engine. I will bet that it would turn up to over 5,000 then. David put up the money against our work for the one third interest. David might want his money back but I would also like my time and effort back. They are both gone like water that has passed under the bridge and cannot be called back.

The wife is flat on her back again as she overdid on acct of helping on Jill's birthday dinner yesterday. Pearl was over and I have not seen her for nearly a year. It has been hotter than heck here for the last four days and today the smog is very bad and so is the humidity. From reports I get, it is hotter here than it is in Arizona lately.

Jean is all hotted up about selling the house. That would pull the ground right from under me right now. I have got an equity in here and unless she agrees to cut me in on the money received, I will see to it that she can never give a clear title to it. There may be a big family row, but if she wants it that way, she will get it.

Oh yes I forgot to tell you that I have the dope on that fuel injection system developed by Stuart Hilborn. It is N. G. He just injects fuel into the air stream ahead of the intake valve. Gets a better fuel distrobution than by carb. and that is all. They have been using this system on airplane engines for years and years. Well I must close. "Where there is the will, there is a way" Your aff. brother,

Bert.

H. C. C.  
South Pasadena, Calif.

Sept. 15, '51.

Dear Brother;-

Yours of the 12th at hand. Thanks for the info. about the Stewarts Texaco stn. It would be a good chance for me as there are good living quarters there. I know that Hwy. 70 has made a big cut in trade there in Congress, but even at that I should have a lot more buisness than I did down at the Mopil gas stn. I would like to lease the thing from Jim Stewart and get over there. Jean is making no progress in disposing of the house. You can't peddel an old wreck like this house. The lot is all that is any good. However that don't prevent me from pulling out at any time and Jennie is as anxious to get out as I am. The only thing is that we would have to locate a good Doctor over there and I have no car. Here you can't use one but over there you have to have one. I might buy my La Salle back from Jean - hi. She has put in over \$100.00 on it and I would have to pay that back. The situation here is becoming impossible. It would cost me around \$90.00 to get my stuff moved over there and I don't know where I am going to get it. I really thing that Jennie would be better off over there. She is afraid of loosing ner Pensñon if she moves over there but it is a fact that over 30% if the people getting Calif pensions are living outside the State and there is nothing they can do about it. I can't live here on \$75.00 a month anyhow. Have not received anything yet and they say that I will get two checks on the First of Oct. You see, my Social Security payments are \$53.00 per month and I am allowed to make \$50.00 a month on the side and when I am 75 I can make all I want over and still get it. Here on my Pensoin, I can only receive \$75.00 per month total and can make nothing on the side. They deduct my S S and oil checks. My only chance is in getting out of here. I will write Jim Stewart and see what kind of a deal we can cook up. I am not ready to be put on the shelf yet and resent it. I have got to get over there somehow or else I am a goner. More about this later.

About the engine. Don't let my apparent fluctuations bother you. I get many ideas and after having chewed on them for a while am forced to discard some of them but that is the way to reach a final conclusion. I have thrown out the idea of a closed bottom piston as it either calls for a too-short con. rod or a too-high engine. One remedy is to make the clearance volume inside the piston as small as possible by using heavy sidewalls, ribs, etc. this would make it heavier but it could be made of Magnesium alloys such as Downmetal which is very sucessful. However I am not giving this too much study. I am playing with the idea you suggested of having a blower cylinder in the crank case, it will be tough to work out but I will eventually work it out, this will of course eliminate crank case compression, so much for that. Now about the gnition. I had figured on having a variable compression pressure handle this but it would be too critical in adjustment and changes in altitude would greatly affect it. We have got to have a valve of some sort under the glow plugs and I like the idea of an oscillating valve under the plug, driven by push rods from the crank case. However, something else has come up which may solve this proposition. You know that I have always played with the idea of gasoline injection. The trouble with injecting gasoline is the fact that it has no lubricating component and nozzles and pumps are out. However I designed an injection nozzle and have it witnessed - which requires no lubrication. But where could I get a pump. A. O. Smith here in South Pasadena built a gear pump for the Navy during the last War and could have fixed us up all right. I had several talks with him about it but he died soon after.

Now there is a system just out developed by a chap by the name of Stuart Hilbornand is called "constant flow fuel injection system". It has been used by racing automobiles and boats very successfully. I have sent for dope on it and will have it in a few days - I hope. Then we can put the glow plugs right in the head and we are all set for both gas fuel and the heavier oils and can get compression pressures up to where they should be. There is no telling as to what limits could be reached in the way of greatly increased power and economy. I am getting right, excited about the whole deal and can really see how we are going to get somewhere now.

I get so many thoughts that I am boiling over and have to blow off steam by writing you because I get shut up but quick if I go to talking engines around here. So, you don't need to answer every single letter I write, just when you feel like it or when I want some information. I am liable to bombard you with ideas that I drop in the next letter. Out of the melting pot will come something big. All I have to do is to keep working on it and we will eventually get there and no foolin. So I will keep shooting stuff to you but you can disregard about 60% of it. If 10% of my ideas work out we will be lucky but in that percentage may lie the answer.

Is Harold still there at the hotel or did he go out and get a job, or get married? I might rent his truck to bring my stuff over in. Jim Stewart has a good International truck which I might get hold of if he has not sold it. I am hot on the idea of getting over there. This Pension buisness is just a millstone around my neck and I am not ready to be put away yet for a while. I have a lot of short wave radio equipment which I would want to set up there as I have got to have that to play around with. I have just been putting up a couple of antenna poles 35 Ft high but can take them down in an hour. I have the original cartons that my new equipment came in and it would be easy to pack them up.

If you should see Jim Stewart I wish that you would tell him about what I am figuring on so he can keep it in mind. I would like to come over there for a couple of days on the Buss and get things lined up but don't know where I am going to get the money right now. I might not be able to get over there for a month or six weeks anyhow. I could fix the whole thing up in a day or two if I were there but don't see how I could do it until after the First. Well I am about run down and so will say so-long for this time.

Your aff, brother,

*Bert*

June 16, 1951.

Dear Brother:

I have your letter of June 1 and immediately sent the price of the cooler on to Ruth and she wrote to send it on to her and she would send me a check covering the payment to you, in that way I can pay the \$5 that you owe the hotel and at that time I will pick up your tools and will store them here under lock and key until you get them or give me further orders for their disposal. I got the cooler off a couple of days ago and Ruth probably has it by now. Did a good job of crating and sent it along by express. Should have your money within a few day and will then send you on the balance, of which I guess you will be glad in your present state of finances. By the way I got an add in the paper on the oil land and upon looking it up found that it refers to that portion of the oil rights which we decided long ago to abandon as the taxes amounted to so much that we did not care to take them up, however, I wrote Akolt about it anyhow, just in case. This add does not cover the producing land. I wonder why they have not been pumping as much as formerly, perhaps the well is slowing up somewhat.

I have a little tin shack made for the light plant back of the house, but will have to buy a battery before I can put it into commission again, and then only a little while at a time, as it needs overhauling and uses too much oil. I haven't the money now to either overhaul it myself or have it done, as I will have to have the pins reground, new rings and perhaps new pistons and a re-bore job, total cost at least \$60.00.

We are going to stay at the house in Wickenburg for a few days while Shirley is on a vacation trip up north with Caroline and Sarah. The former flew out from Pittsburg last Saturday. I will be up here almost every day to keep track of things and get mail. Ike is still here, but I don't expect that he will last more than the month out, as Allison told me that he was going to shut down pretty soon. Ike has about gotten into where he wants to go so perhaps a shipment may change Allison's mind about shutting down. At least he is going to hold on to the lease for a few months by paying the minimum royalty. That will help some, but I hate to see the place idle. David pulled another of his good moves by dropping the best prospect I have seen and latching on to a poor one. All resulting from Morris's poor judgement of mining possibilities, or perhaps a combination of the two. Burnettes have sold their chicken ranch and are going back to Iowa shortly, to possibly come back in the fall. I thought that Allison was going to give me a job up at the mine above Prescott, but he stalled it off for a couple of months which probably means never. They are building a lead zinc mill there on the Sheldon Mine. Ike and I think that we can promote the mine that David dropped if he can get it back again, but have no news about it yet.

Its getting hot here now, about 96 today with a fair wind to kind of keep things livable. I sleep out on the porch now and it is right cool there.

Your aff. brother.

July 9, 1952

Dear Brother:

I haven't heard from you for some time and have wondered if you were sick or something.

David wanted me to do some work on a design to change over the engine and I started on it in a small way and find out that the change over can be made in several ways, none of which are very satisfactory when considering the final setup and operation of the engine, except possibly one way which would entail some expense on the drive and the support of the blower. From your letters it appears that you want to use two spark plugs, one in each head or rather over each cylinder. If the blower is raised about four inches on its present centerline and a connection made to the inlet valve chest it would be impossible to get the second plug in on that side of the engine, that is the present inlet side. By raising the blower about six inches on its center line and shoving in a little closer to the engine one could get both plugs in all right, but it would make the engine pretty high. The third method would be to move the blower center line about three inches toward the front end of the engine, that is the magneto end and place it on the center line between the cylinders with the connection at right angles to its present course. This would make it possible to charge the engine from the front side and would not interfere with the spark plugs. However, the drive shaft would have to be extended just the distance moved and this would require an outboard bearing, probably, if not then at least a longer bushing with some sort of support. Also the belt would interfere with the magneto, as the latter is tipped over that way a little. This could be overcome by using an idler pulley on the tight side of the belt which might not be a bad idea anyhow to provide belt tightening. This would involve raising the blower about four inches.

I think that I will start in the latter scheme and see how it works out until I hear from you about the matter. Then if you approve I will send on the drawing for your inspection and change, if necessary, after which you can send it back and I will make the detail drawings which you can also check. But first let me know what you think is the best course to pursue, meanwhile I will be working along on one or the other of the schemes to keep David satisfied.

The folks got back last Thursday night. David has not showed up yet, but I think he will show before long, last Thursday Lou disappeared again and I have heard nothing since. Weather is pretty hot now and no rain.

Let me hear from you as soon as possible.

Your aff. brother,

June 25, 1951

Dear Brother:

I have your last letters, but they are up at the mine and I am in Wickenburg so can't answer them in detail, but will say that David had the same idea about Caroline that you have and is endeavoring to get a little money fro her for engine development. Whether he will get anywhere or not I do not know but I feel that we should pay up on the company so that we will have a vehicle through which we can work. It may be necessary in order to give the company some value, especially as the application has been turned down, to put our personal stock in the old company in for our stock to be issued. David can put in the engine for his share. I am still in favor of issuing most of the stock to ourselves and then we can sell our stock without running across the State or Federal Bluesky laws and getting into a lot of trouble. We haven't funds enough to go through SEC and the State Commission. If we get anything we want to put it in on the engine and not for lawyers fees. Hate to give up that \$40 but don't know ant way out, as we will eventually have to have a company to hold any patents we may get.

I am sending you a money order for \$12.50 for the cooler and am paying the \$5 to the Hotel either this afternoon or tomorrow. Got the check cashed this morning and am sending it right on.

We got a telephone from Shirley Saturday evening from Tuba City Arizona. They are OK and are going from there to the Yellowstone and from there to Canada. I expect David will go as far as the Yellowstone, but she didn't say for sure, but said he would be back in three or four days when I will talk with him further about the engine matter.

Will close now and get this letter in the mail.

Your aff, brother,

H. C. C.  
1401 Monterey Road,  
S. Pasadena.

Sept 7, '51.

Dear Brother:-

Just another brain storm. I have an idea for a new ignition system for the engine outlined in my last letter. It eliminates the timer and dist. coils, condensers, etc. It is a glow plug located in the head of each cylinder in a separate chamber, this chamber communicates with the combustion space in the head by the medium of a small rotary valve through which is drilled a hole. When this passage opens to the glow plug, the mixture rushes in and is ignited. The rotation of this valve can be advanced or retarded in order to vary the time of ignition.

Now suppose that the engine was set for a compression ratio of 12 to 1. At this ratio, the engine in efficiency will equal that of the diesel. Not only that but by eliminating spark ignition an engine can be run at much higher speeds. About 12 to 1 is about as high as you can go on account of self ignition taking place prematurely due to the heat of compression. However with my new engine, the compression will be lower at low and medium speeds and much higher at high speeds. Above speeds of 3500, advanced ignition will not matter. In this respect the new engine will be automatic as to compression pressures. You know that I originated the idea of glow plugs for miniature engines - just heat them for about 20 seconds with a 6 volt battery and start the engine, then cut out the battery and the engine keeps on running until out of fuel. This eliminates the carrying of batteries, coils etc. in miniature planes and saves a lot of weight. I wrote an article about it and now it is universal practice. I got the A C People to build the plugs.

Here is the next chapter, assume a ratio of 14 - 1 which is as high as I care to go for mechanical reasons. Gasoline could not be used here and the heavier fuels are indicated. Distillate, stove oil and any fuel oils running from 30 to 38 Baume will fill the bill nicely. This means that we now have a diesel engine without the expense and complications of fuel injection equipment. This means a high speed instead of a slow speed Diesel. It also can be produced as cheaply as gasoline engines. How about 50 miles per gallon on a cost of fuel at less than 10 cents per gal. Drive 100 miles for 20 cents, or one fifth of a cent per mile. All we need now is a good publicity agent. I can get plenty of publicity after I get on the air, which will not be too long now. I had this in mind right along.

Yesterday I got my power supply for my transmitter. Have waited six weeks for it. Now all I have to do is to get my antenna up and get a License. The examinations are very stiff right now and I have been studying theory and practicing on receiving code for three months now. I wanted a Class A License but will have to operate for one year before I can apply for one. Will have to be satisfied with Class B for a while.

I guess it pays to retire as you have plenty of time to think things over and it is probably a good thing that I have no large drawing board or else I would have spent so much time on mechanical details that I would have largely lost sight of the main idea. It takes time and plenty of it and cannot be rushed until you are ready to put it on paper. Well I must close now but am thinking day and night. These things do not come easy. See you later,

Your aff. brother,

*Bert*



F. C. C.  
South Pasadena, Calif.

June 1, '51.

Dear Brother:-

Received yours of May 30th and am answering it right away as I wanted to give you the dope on my evaporation cooler. I paid \$29.50 for it plus copper tubing which brought it up to \$51.00. Some of the tubing was used up for other purposes however. I think that \$17.50 would be a fair price for it. It was used less than a month altogether and so is not harmed. The motor needs oiling at least once a month. Use a light oil like sewing machine oil. There is a small oil tube at each end of the motor. If Ruth buys it, I wish that you would pay Percy Meyers the five dollars that I owe him and send me the rest. I can buy a drawing board for \$15.00 with a parallel straight edge. I am going to need my tool box badly very soon now.

I have not got the coating of oil all out of my insides yet but it is gradually clearing up. Like you I was taking oil mainly on account of my piles but the Dr. gave me some laxative that is working fine and my trouble with piles has dissapeared. I am having no more trouble with my digestion and am eating anything, am also feeling much better and have more pep. The only thing that bothers me is my weight. I gain four or five pounds in a week and then loose it, a week ago I weighed 144, yesterday I weighed 140 and today I am 141. Weighing all the time on the same scales. Maybe I will start gaining soon. The Dr. said that mineral oil coates the entire digestive tract as it is not absorbed by the system. Says he does not get his dope from Medical publications, nor did he get it in school but from autopsies that he has performed on habitual users of oil. Says he has even found oil in the lungs of people who have died of pneumonia. I am off of it for good.

Yes I thought that with a pension I would get \$22.00 a month more than I am getting now but actually I will only be getting \$5.00 more, for why? I have been paying Jean \$28.00 per month for board but she got around to the Pension Board and told them that she wanted \$45.00 per month so they deduct it from my pension. The only one that benefits is Jean. Not only that but on my Social Security I was allowed to make fifty per month on the side, while with a Pension I am not allowed to make a dollar on the side. Moreover with the S. S. I am allowed to make all the money I can on the side after I am 75 years old. However I can always drop my Pension when I see anything else in sight, and there probably will be. Talk about your gold diggers. I have never been so frustrated in my life as I have been in the last month. Every cent I have had in this period has been my oil check. Jean was worse in debt than usual so last month she insisted that I not only pay my current board, but also a month in advance. So that made a double payment but it not only took my entire check but left me two dollars in the hole. I have not even had carfare to get to the Library and look up stuff that I very much wanted to so I have completely lost an entire month. It will be at least two months before I get my Pension and what good is it going to do me anyhow?

I have seen the English built Ford and it is all right, so are also a lot of these English light cars which they can't get enough of in this Country. It is a mystery to myself as well as other engineers that I have talked to as to how in the dickens the English put out these light, high speed, high compression engines that wind up to such high speeds and yet idle and throttle down on high so perfectly.

They have sure got something that we have not as yet approached but we are soon going to have to. On a Radio broadcast of the News I heard this morning that the Govt was going to make a further cut of 37 $\frac{1}{2}$ % cut in the allocation of steel to the Automotive industry. The comment was that the situation was going to get worse rather than better and would prevail for years probably. The prediction was that the day of our large, luxury cars was coming to a close. That if we wanted cars, they would have to be small, light and efficient jobs, requiring much less steel and other materials. In other words that the present cars that we are now building would soon be a thing of the past and that we would have to do as England is doing. That we would have to come down to brass tacks in every respect. This will be our chance. This Country has been riding too high, wide and handsome anyhow and we have got to come down off of it if we want to survive.

I will get at the layout on the head for the little engine as soon as I can get a drawing board. The thing that is bothering me now is how to find room for the spark plugs, they will have to come in from the side in a horizontal or slightly inclined position but I can make it all right. The pistons will not have to come so close to the heads now that each cylinder has its own compression space. Yes there will have to be a new intake manifold upon which the blower will be mounted. There will not be much work in getting out the drawings. The main thing is to make everything fit on to what we have and that will require looking up tracings of the engine and things are in an awful mess here which I am trying to straighten out. Don't worry about a dynamometer, I will find something around here somehow when the time comes.

I have made very little progress along my ideas of mineral location as I have not been able to look up any information except what I have here, however I have been studying the Electrons and Atoms and have come to several important conclusions. I find that I have got to follow pretty closely the principles of Radar and therefore have got to plug up a lot on it. The main thing that is bothering me now is to how deeply I can penetrate into the earth with the Rays. I will have to use frequencies producing wave lengths measured in Centimeters instead of Meters. There undoubtedly is a frequency that will work but the catch lies in finding it. I know what I want but don't know how to get it - yet. I may be able to get it and then again, I may not. It will require some doing. I will need money to buy some little equipment to work with and I can probably gradually pick it up. Enough to make a showing so that I can obtain backing, which it will take plenty of.

Well, I want to get this in the Mail so will close for now.

Your aff. brother,

Bert.

They have sure got something that we have not as yet approached but we are soon going to have to. On a Radio broadcast of the News I heard this morning that the Govt was going to make a further cut of 37½% cut in the allocation of steel to the Automotive industry. The comment was that the situation was going to get worse rather than better and would prevail for years probably. The prediction was that the day of our large, luxury cars was coming to a close. That if we wanted cars, they would have to be small, light and efficient jobs, requiring much less steel and other materials. In other words that the present cars that we are now building would soon be a thing of the past and that we would have to do as England is doing. That we would have to come down to brass tacks in every respect. This will be our chance. This Country has been riding too high, wide and handsome anyhow and we have got to come down off of it if we want to survive.

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Well, I want to get this in the Mail so will close for now.

Your aff. brother,

*Bert.*

May 30, 1951

Dear Brother:

I have your recent letters and was sorry to hear that you have lost so much weight and felt so poorly, but gratified that your doctor has been able to get you into a little better position. I have used MO for a couple of years now and have noticed no bad effects as yet. It is mineral oil and magnesia combined. Use it on account of piles mostly, as other physics are not quite so good; however, different people react in different ways to medication. Hope that you continue to improve from now on.

While Ruth was here a while ago she mentioned that she wanted a evaporative cooler and asked me to inquire of you what you wanted for the one here, which I promised to do and then entirely forgot it. Yesterday a letter came from her asking about it so I am writing to enquire the price.

I am glad that it is possible to make the engine over by designing a new head and valve mechanism together with, I presume a base (new) for the blower. That seems to be the best way to make the conversion and will demonstrate the principle. If successful it can be carried out either in the engine as now constituted or in the single cylinder design. Either one or both will be way ahead of the conventional engine. By the way I see that Ford is coming out with a new 100" wheel base car made in England with a four cylinder engine short stroke and large bore. Looks quite good. Nash has a snappy job in the Rambler, but they get more money for it, but it weighs only 2400# and gets 30 miles on a gallon with six cylinder engine. Looks as if they are gradually coming to the light car idea and that is where our engine would shine. In the new engine design with inlet valve of small movement the combustion space could be quite small without affecting results, as each cylinder would be served by half if the intake valve space or opening and the compression space under the valve could be limited to a little over the valve movement. However, this area would not be too well scavenged. Rotary valves would be OK as you suggest particularly if you could use flat plates with openings in them to register with ports in the cylinder head or heads. As you say an overhead oiler would fix up that difficulty without trouble. As soon as you get your drawing board I would appreciate a sketch of the layout. I could make up the detail drawings, if any, other than the head anytime. I am getting all het up on this thing, but as yet can't do much about it until a little later or until I can get David more interested or he can get some extra money. Haven't seen him for some time. Young David has had chicken pox which didn't bother him much, but now the baby has it and it is going pretty hard with him. Nothing dangerous, but keeps him awake most of the time and causes a lot of missing sleep for Shirley, so we have to be down there to help out often.

In regard to rebuilding the engine we should give some thought to a Prony brake that will work and show good results on the engine, whether this should be an adaptation of the one we have here or something different I do not know, but I am rather afraid of the Dodge fluid drive unit unless we could rig some cheap method of increasing distance between plates or some method

to allow fluid circulation in the unit. Think the engine should be tested for power in its present condition and again after the changes are made and that would give us a lot of comparative information. Dickson's patent wouldn't help or hurt us any in our ideas of the new engine. The step piston in itself isn't patentable so we have a chance on using it in a new design. The question is if someone else hasn't realized that inlet valves in the head and exhaust ports in the cylinder wall would be a superior method of procedure. Its so simple that one would suspect that many inventors would have run on to it, but my searches so far have not shown anything one way or the other. I remember a couple of very complicated engines, but nothing that would be of mush against our design.

Don't know enough about electronics to be able to judge about your schemes, but do feel that it should be a great improvement in mineral detectors, and that along that line there should be plenty of profit. In any geophysical apparatus the interpretation of the results is pretty tricky, and undoubtedly in any new system obtaining such results would be one of the main costs as the machine would have to be checked against known conditions many times before correct interpretations could be relied upon. That is unless the machine would show up in red letters, Lead, Zinc or Copper on the screen, which of course, is impossible. If you could get a spectrograph of the metals that would be entirely different, but I doubt if anyone could get that either. It would be mainly a matter of experiment, as I see it.

I want to get this into the mail tonight so will close as it is getting late. We have had very hot weather for this time of year, but it moderated yesterday and today. I have been sleeping out on the screened porch for a few nights and don't even get warm out there. It is going to be wonderful for the summer. If you can get your good sleep at night the hot weather don't bother you much, but I don't like to sweat for an hour or so before I go to sleep and then wake up sweating several times at night. These building pick up the heat during the day and gradually give it out during the night. The outdoors cools off fast.

Hope that you continue to improve as time goes on and that we may be in a position to do something about the engine within a reasonable time. Think that you are wise to apply for a pension. You have spent plenty of money in Calif and should benefit a little at least.

Your aff. brither;

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Your aff. brither;

H. C. C.  
S. Pasadena, Calif.

July 11, '51.

Dear Brother;-

I have been intending to write you for some time but have not felt like it. Many thanks for attending to the matter of crsting up the cooler and sending me the money and taking care of my tools for me. I may want them soon here.

There have been changes made around here. In the first place I have sold the Ford and put the money into radio equipment as soon as I could and while I had it. I will take the examination for a License as soon as I can practice up enough on Code etc, so that I can pass. The examinations are very tough right now and it is going to take me at least a month to plug up on theory, receiving etc. Then I will have something to occupy my mind and keep from going crazy. Pulling me away from machine work has just about proved my finish and I have got to find something to take its place. Well, I have found it and am going right after it.

I can only write this much when I have to lie down on acct of a pain in my backbone just below the nape of my neck. I don't sit up for over 30 minutes at a time as the pain gets bad. The Dr. thinks that I have arthritis of the spine and will start treating me for it as soon as he gets back from his vacation which will not be until the last of this month. Outside of this I am feeling O K and getting more pep but I can't seem to put on any weight - still weigh 140 to 142 lbs. I am not much interested in much of anything nowadays and it will take a lot to kindle the old spark. Right now, I don't care if school keeps or not. By rights I should be in Arizona right now but I can't live there on \$53.00 plus oil checks. I am getting along O K here on \$30.00 per month. I will get my Pension about the middle of Aug and then I will have to live here anyhow. I had to take my pension as then they pay my medical expenses, so guess I am stuck here. Anyhow I would not stay in Arizona a minute without a car but I cannot use one here. I signed over the La Salle to Jean as I could not take care of repair work. She has just spent over \$100.00 on it and there is more to come.

Just had a rest and while doing so, yours of July 9th came. I will give you what dope I have worked out in my head and on paper. Nothing drawn to scale let but I have worked out the basic dimensions. You would not gain a thing by using one spark plug as you would have to have a communicating passage and we would be right back where we are now. The inlet valves and spark plugs cannot occupy the same space at the same time therefore the plugs will have to be in a horizontal position so as to have the spark occur between the inlet valve and the piston head as the valve will be almost the cyl. dia. You cannot use valve cages as that would make the engine too high and would also raise the blower too high up in the air. Just cast bronze rings in the head which can be machined up for 30 deg valve seats. The valve stem would be not over an inch long and a very light spring used as the valves

will have to open with blower pressure when it is running at starter speed. I would suggest holding one valve slightly open with a flat leaf spring until the engine starts firing and when the engine is under way, the tension on this spring can be removed if desired, it would not hurt to have a flat spring on each valve to just barley crack them and then leave them that way. The valves will close all right as soon as the engine starts firing. I would cast in a bridge across the valve opening and then drill it out for the valve stem guides. Cast the head open on the top for the valve installation and then put on a cover plate. You will only have to raise the blower less than three inches and will not need to move it farther out from the cylinders, in fact I think that it can be placed closer to the cylinders. This is the dope on it and you should be able to draw it up easily.

Before contemplating this conversion I would like to see the new cylinder head that I drew up tried out first. I know that it would increase the speed of the engine somewhat and give an indicator as to what to do in the future. I think that we are getting off the track when we attempt to convert an engine which was designed as an industrial engine and which is very satisfactory as is; into a high speed, high performance engine, which could very well follow through later on when we had the money. Let well enough alone and then go ahead from there is what I say. I have been looking over the specifications of industrial engines and find that none of them run over 1100 to 1200 R P M. That is those that are any good and have any running life. When I designed this engine it was agreed that it was to be the industrial type and was laid out accordingly. How long would a high speed racing engine last driving an irrigation pump? Ten or twelve hours. The best automotive engines would not last a month driving a cruiser. Chrysler builds a bang up marine engine but it turns up at less than half the speed of his automotive engines.

In the final analysis, what is important is how many dollars you can make out of the thing and not the number of horse power you can get per cubic inch of disp. Or the speed at which you can wind it up.

If I were handling this proposition and had the final word in regard to policy (but it is too late now); I would first install my latest design cylinder head and at the same time put larger vanes on the flywheel to improve the cooling. It will carry a load of six H P right now continuously without running warmer than 400 deg. and it would be safe to run it at 475 deg. Then I would go out and get orders for a bunch of them and get going. I have had chances to take sizeable orders several times but was turned down as more speed was wanted and no manufacturing. I was not figuring on manufacturing them ourselves but contracting them out at so much per unit. Thus we know what we can sell them for and exactly what they will cost and have none of the grief of building them. Nothing could be safer and surer. Well I must quit now. I am pretty far removed from this engine at the present time. If I recover, I may go after it again but on a different basis.

Your aff. brother,

*Some still hold on this engine. But what is the use,* *Bert*



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Your aff. brother,

*Same still hold on this engine. Bert, what is the use?*

H. C. C.  
South Pasadena.

June 18, '51.

Dear Brother;-

Received yours of the 16th an hour ago. Mant thanks for crating and shipping the cooler - I can sure use the money. About all I have to buy smokes with are my oil checks and as you say, they are shrinking.

I note that Caroline is there. Say hello to her for me, she always treated me fine. I wish that I were down there as I would like to have a good talk with her. I know that I am under somewhat of a cloud on account of the engine deal and it is no fault of mine but I would like to clear myself. I am not surprised that David gave up a good prospect in favor of a no good one - he is just running true to form and running through his money at the same time. He and Morris have been chaising the rainbow for some time now with no results. He deliberately dropped the best thing that he ever had or ever will have in favor of squandering his money on wild goose chasing. Neither he or Morris know enough about mining or anything connected with it to be even able to tell if they have a good thing or not. He knows no more about engines than he does about mining and so has dictated the policy in regard to the engine and I have had to follow it even when it was contrary to my best judgement and experience. In other words he is just a plain darned fool, and a fool and his money are soon parted. He is just plain erratic and can't stick to anything long enough to carry it through. He is always going off at a tangent, which he bases on some wrong assumption that he has dreamed up. This is going to lead him to financial ruin, period.

I suppose that you have read an article in the June 9th issue of the Sat. Eve. Post. entitled "Are we stifling the Inventors?" by Capt George N. Robillard, U S N. He sure is in position to know what he is talking about and I can confirm it by my own sad experience. The worst part of the whole thing is that the same conditions prevail with the large private Corporations such as Gen. Motors, Ford, Lockheed, etc., I have cut this article away and filed it and it is heavily underscored in red. The crux of the whole thing is the law about reducing the invention to practice. For instance, I nearly made a deal with Lockheed on the engine for a license and royalty and they wanted my to go to work on an aircraft engine design. O K. Now the minute that I even used their pencils and paper on this work, they could claim that they were reducing it to practice and would not have any royalty to pay. The same thing applies to the Govt or any private Corp. I know of many cases of, and have known for some years that this was the case. I found it out when I visited Wright Field and Gen. Motors and my experience with Lockheed - which I dropped like a hot potatoe.

If you want to license anyone or sell the Patents, there is only one thing to do if we ever want to get anything out of it is to reduce it to practice ourselves and at our own expense. Then we will be safe to make a royalty deal. The only way to do this would be to build some engines and sell them. The minute you get a few of them in the hands of users, then you are safe to go ahead and make Royalty deals and they will stick. That is why I have been so insistent in getting a few orders for engines and building them first. Then we are in a position where we are secure. Many is the time that I have explained this to David and we have gone round and round and he has declared flatly that we were not going to build any engines, and upon this

cockeyed decision has hinged our downfall. I have spent a lot of time here in trying to get orders and could have gotten them, based on the little engine just as is. I could have accepted an order (initial) for fifty engines. They are to show five to six H P and to have a governed speed of not over 1200. I told David about this but he merely brushed it aside with a contemptuous gesture and that was that. Said we were not going into the manufacturing business, well we did not have to, I figured on farming the work out and had made arrangements for it. David and I were always arguing over this matter and here is just where he missed the boat. I designed this engine as an industrial job and wanted to keep away from high speed in this type of engine. How long would this or any other type of engine last if run at a speed of say 4,000 continuously? - not many hours. All David insisted on doing was to get this engine up to extremely high speeds, to a point where it would develop 30 to 35 H P. Well, it can be done but how long would it last even on intermittent duty and why make that the deciding issue in the development of the engine and then quit because he had predicated the whole thing on a dream-boat assumption. It makes me sick.

If the taxes were paid up on our Corporation and distributed, I know that I could sell enough stock so that the engine could be fixed up and to pay expenses while I was getting orders for engines. By this method I am certain that we could eventually get under way. It would be better than this doing nothing. Health permitting, I would undertake this course of action - but only under one condition, and that is that David would have nothing whatever to say about the policy or anything pertaining to the engine - in other words that he would stay clear of the engine and anything pertaining to it. This will be the only way he can ever have a chance of getting his money back. He will retain his interest but will have to keep out of my hair. I was worn out with having to argue with him all the time. I would not put myself in that position again if my life depended on it, and it don't. Let me have your ideas.

Am feeling a lot better but simply can't put on any weight, I gain a few pounds and then lose them so am sticking around 142. I think that the Novocain that the Dentist used has something to do with it as he had to use three times the normal amount in order to block the nerves. They say that it takes over a year to work it out of the system. I have been trying to sell the Ford in order to buy some electronic equipment, but no soap so far. I have offered it for \$500.00 but no takers. I also wanted to buy a suit of clothes. However if I undertake any stock selling scheme, I will need the car and could not replace it for \$600.00.

If you can not find that Article in the Post, I will send you my copy to read and return as it is very important to us. It just confirms what I have partially known for several years. I hammered this at David until I was blue in the face but it did not make a dent in his greatly enlarged Ego. As I have said, as far as he is concerned, I am completely washed up. I shall never again take a cent from him, I have had enough.

Well now that I have sounded off, I will get this in the mail I hope in time to go out today. Hope you will come out all right on the Mine and let me know soon what you think of my proposal.

Your aff. brother,

*Bert*

cockeyed decision has hinged our downfall. I have spent a lot of time here in trying to get orders and could have gotten them, based on the little engine just as is. I could have accepted an order (initial) for fifty engines. They are to show five to six H P and to have a governed speed of not over 1200. I told David about this but he merely brushed it aside with a contemptuous gesture and that was that. Said we were not going into the manufacturing business, well we did not have to, I figured on farming the work out and had made arrangements for it. David and I were always arguing over this matter and here is just where he missed the boat. I designed this engine as an industrial job and wanted to keep away from high speed in this type of engine. How long would this or any other type of engine last if run at a speed of say 4,000 continuously? - not many hours. All David insisted on doing was to hot this engine up to extremely high speeds, to a point where it would develop 30 to 35 H P. Well, it can be done but how long would it last even on intermittent duty and why make that the deciding issue in the development of the engine and then quit because he had predicated the whole thing on a dream-boat assumption. It makes me sick.

If the taxes were paid up on our Corporation and distributed, I know that I could sell enough stock so that the engine could be fixed up and to pay expenses while I was getting orders for engines. By this method I am certain that we could eventually get under way. It would be better than this doing nothing. Health permitting, I would undertake this course of action - but only under one condition, and that is that David would have nothing whatever to say about the policy or anything pertaining to the engine - in other words that he would stay clear of the engine and anything pertaining to it. This will be the only way he can ever have a chance of getting his money back. He will retain his interest but will have to keep out of my hair. I was worn out with having to argue with him all the time. I would not put myself in that position again if my life depended on it, and it don't. Let me have your ideas.

Am feeling a lot better but simply can't put on any weight, I gain a few pounds and then loose them so am sticking around 142. I think that the Novocain that the Dentist used has something to do with it as he had to use three times the normal amount in order to block the nerves. They say that it takes over a year to work it out of the system. I have been trying to sell the Ford in order to buy some electronic equipment, but no soap so far. I have offered it for \$500.00 but no takers. I also wanted to buy a suit of clothes. However if I undertake any stock selling scheme, I will need the car and could not replace it for \$600.00.

If you can not find that Article in the Post, I will sent you my copy to read and return as it is very important to us. It just confirms what I have partially known for several years. I hammered this at David until I was blue in the face but it did not make a dent in his greatly enlarged Ego. As I have said, as far as he is concerned, I am completely washed up. I shall never again take a cent from him, I have had enough.

Well now that I have sounded off, I will get this in the mail I hope in time to go out today. Hope you will come out all right on the Mine and let me know soon what you think of my proposal.

Your aff. brother,

Bert.

H. C. C.  
South Pasadena.

Sept 4, '51.

Dear Brother:-

I wonder what gives with the oil checks. Did not get my check in July until the 28th, and none at all in August. Maybe they are getting ready to throw it up, hope not but you can never tell. It will raise hob with me if they do drop it.

Well, I have got the design of a brand new engine all roughed out and as far as I can tell from here, it will be the ultimate. It consists of two pairs of pistons,  $2\frac{1}{2}$ " X  $2\frac{1}{2}$ ". Disp about 50 cu in. It will develop 50 to 60 H P. and will run up to 6,000 if you want it to. It will have no valves of any kind, anywhere. It will have crankcase compression (don't laugh until I get through) and will be supercharged. The gears will be placed in a tight compartment at one end of the crankcase and will run in oil. Also in this compartment will be located two double ended lay shafts with three helical spur gears similar to the diesel. The crankshafts will have discs instead of throws and will fill most of the clearance space. There will be just a narrow slot for the con rods to work in. The pistons will be of the design I outlined in my last letter. The clearance volume under the pistons will be slightly less than the piston displacement thus making a supercharge possible. The mixture will be drawn into the crankcase through ports just covered by the skirt of the exhaust piston when it is down and the upward motion of the pistons draws in the charge and the downward stroke compresses it. I picked the exhaust piston for this function as it has a lead over the intake and this is important as it gives additional supercharge at high speeds and thus performs in an automatic manner. The intake cyl ports communicate directly with the crank case. This is perfectly simple and simply perfect. Period.

As to the lubrication, I will use the dry sump principle, a double gear pump, one keeps the crankcase pumped dry and discharges into an oil tank, then through a cooler and to a high pressure pump which supplies the bearings under pressure. I want to do this as the engine will run too fast for splash lubrication. An oil filter should also be used. By removing the oil sump from the crankcase, I reduce the clearance volume very greatly. I will water-jacket the entire upper half of the crankcase as well as the gear compartment. I want no more pre-heating of the incoming mixture, which certainly has been our weak point up to now. The foregoing is very brief but you can get the general idea. I will elaborate later. It is the result of nearly two years of heavy thinking of the subject plus my experience in the designing and experimenting with two cycle engines plus my experience with the miniature engine. I could do no better if I worked ten more years and I am satisfied to freeze on this design. It should pull us out of the hole if anything ever can.

Performance:- This engine installed in a proper chassis of the proper weight and gear ratio should be able to cruise all day at an engine speed of 5,000 r p m and in spurts will go to 6,000 and better. The safe cruising speed of the car would be 75 mi per hr and the top speed, 90 and over. It will make 50 miles to the gallon and a little over. I am not exaggerating on this a particle and would just like the chance to prove it. There should be very little trouble in getting backing for this kind of a deal, it is very well worth trying and I am either going to float, or sink with it. You can see how I arrived at

design, step by step by referring to my letters. I have eliminated one idea after another until I arrived at the final and there it stays. By the way, the cylinder bores are only nine sixteenths apart, thus enabling me to use the kind of a head that I want to, which will be like that B P I sent you. I will be working on the small details now that I have the general lay-out and engineering worked out. All that will be necessary to do will be to make a picture of it on the drawing board.

I am still playing around with the idea of pulling out and going down to 29 Palms, but how to do it? I have no car and there would be a lot of stuff to move down there as I would not want to leave a thing here. I simply have not got the money to pull it off. I would come over to Ariz. and find a place but I could not get my Calif. Pension over there. Have not got a check yet anyhow, It was promised on Sept. first and now it is Oct first. I applied for it over four months ago.

I hear that Leon Duray has retired and is now living in 29 Palms. He must have some money as he put a Cad. engine in his new 51 Ford. I want to go down there for a "look see" soon if I can borrow my La Salle for a day and will look him up. He might be able to put me in line for some money if I can sell him. If you have any questions to ask, shoot them along and I will try to answer them, I may as well get in practice. I am not gaining any weight, neither am I losing any and don't believe that I will gain any more until I get out of here, it sure don't agree with me. Well I must close now but will keep hot on the trail. Let me know about what you think of the deal as it looks to you,

Your aff. brother,

Bert.

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Your aff. brother,

Bert.

H. C. C.  
South Pasadena,

Aug 30, '51.

Dear Brother;

I have yours of the 22nd and have been too busy with my short wave stuff, have been receiving for two months now but am not transmitting yet. I have a lot to talk about but can't get it all in one letter so will have to string it out. I think that I have found out a way to get the engine financed. It will take some time but I think I can accomplish it.

Yes when we built the rocker arm engine, we backed the wrong horse and that is for sure. I cannot figure out yet why in the world I clean forgot all about this design. When I drew up the present engine I thought that I was working out something entirely new and do not have the faintest remembrance of ever having worked on this type of engine before but remember now that it was one of six designs that I drew up right after leaving Belton. If these prints had been accessible here I would have found it but they were all bundled up and put up under the roof in the garage and I did not find it until I was cleaning things up and burning up a lot of the old stuff. It seems that the only place in the world that is doing any research and experimental work on two cycle engines is Italy and they are going right along with them. Most of them are of the twin piston type with overhead exhaust valves and they are rotary. They are supplying rotary valves to anyone who wants them and they are perfectly satisfactory. There is one motorcycle engine with a twin piston job - overhead rotary exhaust valves and crank case compression, believe it or not. It has a Disp. of  $7\frac{1}{2}$  cu. in. and develops 30 H P at 3500 r.p.m. I have been promised more dope on this Wop. stuff which seems to be the berries.

I saw a real car the other day, or rather the chassis, it was up here at the English Austin place. It is the Jowett Javelin. A description was in M I a while back. It has a tubular frame of 5" dia. tubing, a four cyl horizontal opposed engine, four speed transmission, torsionmatic springs with hydraulic shock absorbers, oil filter with separate radiator for cooling oil and many other new features. The disp. of the engine is  $1\frac{1}{2}$  Liters, or 91.5 cu in, develops 50 H P and makes right around 50 mi per gal. Top speed 90 mi per hr, cruising speed is 78 mi per hr. They have been winning road races all over Europe. Won a 24 Hr race at a speed of 78 mi per hr. It is the best engineered job that I have ever seen and I got many good ideas from it. It proves what you can do with a light car powered with not over 50 H P and carries out our contentions along this line. A good two cycle engine of 50 to 60 H P in a light chassis would be a winner and I will be working along the lines of an engine of this power range.

Yes the Cadillac, Chrysler, Olds, Studebaker all are up there in the high power, high performance class. They will all show more speed than ever should be used on the road and are very expensive. The Chrysler is a direct copy of the Cad. Same disp, same bore and stroke etc, in fact I have known of a couple of speed fiends who have Chrysler engines in their speed cars who have replaced their pistons and con rods with Cad pistons and rods. They are interchangeable as are many other parts. I learn that Buick is also coming out with a similar V eight.



Friday morning, I got all pooped out yesterday. The racket around here is terrific - they are widening Monterey Road and repaving Fremont. They are taking out the curbing and bodily pulling up big trees by the roots. Jack hammers going, power shovels cleaning up the rubble and a big crane pulling up the trees. It is as bare as a babies spanked behind and the noise would drive you nuts. They are making room for more traffic when there is too darned much right now. It is a very good place to be away from but how it is to be done is what I have not figured out yet - will get the answer sometime. The only thing this house is good for is for tearing down, however the lot is valuable. The place should be sold. Fremont is now a truck route and the big diesels thunder through here all night and they sure rattle the windows. I would like to move the both of us out but in order to get cheap enough rent, we would have to go away out and Jennie has to visit the Dr. about three times a month and as I have no car, this looks impossible. Guess we will have to stick around here for a while. I did have the idea for a while of pulling out by myself and going out to Twenty nine Palms. It is dry and warm out there and would help my back which is getting worse. It is dead out there now and I could probably get a shack quite cheap. Anyhow I am going to investigate.

Lately I have been playing around with the idea of crank-case compression, the big drawback to it is how to eliminate the clearance volume in the inside of the pistons which nearly equals the piston displacement. Then by making the clearance space in the crankcase very small, I could actually get a supercharge, especially with a rotary valve to handle the intake whereby I could take advantage of the inertia of the incoming mixture. The higher the speed, the greater the supercharge. While working on the engine over there, I drew up a piston with a closed bottom and the wrist pin right down there. It was made in two parts and had slipper extensions on the bottom to help with the side thrust. This would indicate exhaust valves in the head and if the Wops can do it, we can too by copying them. Might not need any ex. valves, probably not with the twin piston type. All this would work and the only problem being one of lubrication. We could not use the circulating, sump system but would have to meter the oil in as used direct from the tank and no return to the tank and no oil sump. This can be accomplished by using the same system that is used on motor-cycles and I had a lot of experience with it on my two motor-bikes. This idea is well worth investigating and I am going into it. I gave it a lot of thought while over there but did not want to branch off on this while building the engine. Now, I can put my time in on it and concentrate on it and so will do. I will come up with something. The step piston is O K. but it moves the cyl. centers too far apart in the twin. With the twin piston and double crank we have fine conditions for crank case compression. It looks very good to me.

Yes a Tungsten analysis is hard to make and very easy to get off on but hope you find something there. I hear that you have been getting plenty of rain there and will bet that you have trouble in getting to Congress now and then. I hear "hams" in Phoenix, Tempe, Douglas, Las Vegas Prescott and Flagstaff talking about it. It only drizzled here for a couple of days but has been cloudy all week. We may get it yet but I don't know. Well I must close now but will keep working on this deal and will say that it looks better than anything I have worked on. Hope you are not drowned out.

Your aff. brother,

*Bert.*

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Your aff. brother,

Bert.

H. C. C.  
South Pasadena.

Aug 11, '51.

Dear Brother;-

Looks like you put your finger right on my trouble, I have the same kind of a deal here that you had in Denver, only with this difference. I get enough to eat when I eat but it is when I eat. Here is the deal, I get breakfast between 9.50 and 10.00 A.M. (I get up before eight). Then the next meal I get is around 9.00 P.M. or later. This leaves about ten hours between meals and only two meals per day. Of course I can go in the house along in the afternoon and make myself a sandwich but I can't get away with bread, seems to ball up in my stomach. So in the middle of the afternoon I go up and get a malted milk - when I have got the money, which is not too often. Now here is the proof. Roland had his vacation and took the whole family up in the mountains for over a week. I helped the wife with the cooking and housework, etc. We had three meals a day and had them on time, besides that, the noise and confusion were all absent and we had a real peaceful time. I gained back 12 pounds and am now back at 142. Still gaining as I laid down some rules. I have never seen such improvement in anyone as took place with Jennie, she was a different woman and I believe that in a month or two that she would be plenty much better. We have both been wanting to get out and live by ourselves but Jean has convinced her that she could not possibly do the work. Well we have proved that she can and we will plan accordingly. It is easy to reason why she does not want us to pull out - as she will lose quite a little income and she is skating on mighty thin ice right now and without this additional income she will run right into a financial crack-up, that is for sure. She is extravagant and wasteful and the worst housekeeper I have ever seen. The house looks like a pig sty all the time. Jill is a fine worker and does a lot of the housework. She gets that from Jack who awes some worker and I practically raised her.

We never eat with the young folks but eat on a folding table in Jennies bed room. That long legged stuffed shirt won't have us at the table with him. The other two kids are little stinkers and no foolin. they are good only for alligator bait. They have never been corrected or punished in any way and you can imagine what will happen during the future, I don't want to be around. When I get my Pension we should be able to get a small place somewhere. I won't live in an apartment. But I am afraid that Jennie will balk at the last minute. Roland is the one that don't want to eat before nine at night. He comes home and sits down and drinks beer- then eats and goes to bed. You can see both of them around here Sats and Sundays with a bottle of beer in one hand and a cig. in the other. I hate to speak in this way about my own daughter but by thunder, it is the truth. This is a regular death trap here and I intend to do something about it. A steady stream of collectors was here while they were gone. They came up to shut the water off and I fixed that up. The telephone, gas and lights are on the final notice and no telling what will happen there. Jean is also losing weight right along and it is no wonder. Well Roland is the boss so it is up to him and to Hell with him.

Skipping all this, I will talk on a subject that won't bite back. The engine. I mailed you this morning a blue print of the divided piston engine that I drew 21 years ago. It is all right yet and is just about what we want. I think that I can use step pistons in it but will have to draw it up to scale to find out. Notice the combustion chamber, it would have to be made a little smaller on account of the higher compression pressures used nowadays but it is the general idea.

Hang on to this print as I have not been able as yet to find the tracing. I have had to revise some of my ideas that I have dreamed up and eat some of my words. It takes a lot of time to think these things out and the more time spent in cogitating, the better. As I said, I have a nice little layout of a step piston job, cylinders in line, etc but when you come right down to cases this would mean abandoning the most important feature, viz, high torque at low engine speeds. No use in throwing this advantage away. Therefore suppose that we start as a foundation to build on, the divided piston, twin piston, or what have you. That is the best starting point I know of. The only trouble is that with one pair of step pistons, it would not work, we would have to have two pair. Figuring on the single pair job - for which there is a very large field brings us face to face with the controversial subject of blowers and right here is where I have got to eat some of my words and back peddle somewhat. The reason that I put the blower where I did on the present engine was because I wanted to be able easily to change the speed ratio of the blower to engine so that the blower would furnish enough pressure to start the engine at engine cranking speeds. I had to change the pulleys three times on the present engine in order to get easy starting. This I got but along with it I got way too much pressure even at 1400. This indicates a two speed drive for the blower. A higher speed for starting and lower speed for running. At 1400 right now as is, it produces 8 to 10 lbs pressure. I only want about three lbs as any more pre-heats the mixture up to a point where speed and efficiency are lost. Any time I started the engine up cold, if I opened it right up, I got 2500 to 3000 r p m for a couple of minutes and then it sagged right back to 1400, or as soon as the blower got hot. I have an inburn reluctance to open any engine up until the lub. oil gets warmed up and by this time it was too late. I would like to mount the blower on the crank case and drive it with gears enclosed in the crank case with a two speed drive (automatic) which can be obtained. In addition I would run an oil pipe to the indexing gear pocket with an overflow to the sump and that would remove the nuisance of oiling the gears every few days.

However on a two, four or six pair engine, I would use the step pistons and eliminate the blower entirely. By this procedure we can retain all the good natural advantages of the present engine and simplify the whole thing by the elimination of the scavenging blower and get a cleaner design. This is the story and I think we had better stick to it and go on from there. There is a possibility that we can get out a two cylinder twin without a blower but with step pistons and running less than 10 H P. Production costs would enter into this and it would be O K if we could produce an engine of this class to meet competition.

O K on what you say about the two cycle and four cycle in comparison. I will make any engine that I build show at least  $2\frac{1}{2}$  times more H P than any four cycle - that is per unit of displacement. I could have fiddled around some more with the present engine and would like to have done so, but the more I worked with it, the more disgusted David got. He expected me to hit it right the first time, but I am not a miracle worker and such things are not in the cards. I can design an engine for any classification. We built one in one class and then David wanted it in another - no soap. No one would attempt to hitch a thoroughbred race horse to a plow - nor would they throw a saddle on a Pwechern and start him in the Kentucky Derby. It has got to be one or the other and no one horse can do both. Of course there is a class in between and that is old Dobbin, the family horse who is neither a race horse or work horse. Guess this is all. Your aff. brother,

*Bert.*

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*Beit.*