M. A. Hanna.
L. C. Hanna.
C. C. Bolton.
D. R. Hanna.

M. A. Hanna & Co.

Coal, Iron Ore, and Pig Iron.

Cleveland, O. Jany 20 1897

My dear Judge I have yours of 18th and am glad to note your safe return home and think it was very fortunate that you met with Senator Sherman who no doubt so far as his power of appointment goes will exercise his prerogative in a perfectly independent manner - you can certainly bring some pressure to bear upon him that will secure you a position.

You are very kind in wishing to send a copy of your water wheel band as you cannot find it [illegible] you can give me about the date of its issue I can find it in office of patent Lawyer here - I would like to see what the Machine is like as I cannot conceive of any wheel running by water which would not be affected by the pressure of back water inasmuch as its power is independent upon pressure. The great beauty of the bottomless pit is than it entirely dispenses with the use of Machinery - which wears out and requires attendance. Our present plant costs 10000 f

per year to operate — four turbines & eight large Compressors a long wooden flume & all that Machinery which is Costly to Keep up — The pit might cost 15 to 18000$ to install & 1200$ per year would give it full attention.

In the matter of water engines one of the best Schemes now in use is this — Where water is to be raised from a deep Shaft there is always a big loss from radiation in using Steam or Air and so a Small body of water is Subjected to a heavy pressure at the Surface and piped to a water engine at the bottom which operates the elevating pump — The idea Simply is that a pipe of Small diameter filled with water under pressure Can be used to transmit its power to operating other Machinery — & while you have added to the quantity of water to be raised it is Small in Comparison to the power exerted by it — They lubricate this power water with ~~other~~ oil and using it over & over — using an independent pump to bring it back to the Surface.

This may not be interesting to you but note that the loss is Simply the friction in the pipes plus the power to return it to the Surface

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I have studied over your boat propulsion but am not scientific enough to either approve or criticise — Your practical experiment certainly should be convincing and I hope to see it some day — If I understand the propeller of a fish is his tail but the power is exerted or applied from the dorsal fin to its tail tip — the dorsal fin being the fulcrum and the fore part of the fish used to some extent as power to in counteracting the tendency to deviate from a straight line the swaying of the tail would give — You avoid this by having two tails but I would expect a loss a power in having them work first apart and then together — However you have the Machine and have demonstrated. Expect the Madam home tomorrow — Dean leaves Saturday to take a position as an assistant to the Mining Engineer at the Chapin Mine — if he succeeds in holding the place we will only see him once a year — We are not feeling good on that — Love to all

Yours Truly A. M. Robbins