

**Admitting Steam into the Cylinder.**

The Journal of the Franklin Institute, in alluding to the statement in the text books that "It is desirable to open the steam ports and admit steam at the end of the cylinder toward which the piston is moving, before the latter has completed its stroke," pronounces this statement incorrect, and adds:

"The extreme difficulty of eliminating erroneous statements from previous publications, or from translated originals, especially after the many reiterations of error, is exemplified in the preceding quotation from a recent text book.

"The original statement, made by good English authority about the years 1830 to 1835, has held its place in all text books of succeeding date, has gone to misinform German students on its travels, and has come to America, translated, to impart error here. As a general assertion it may be correct that 'it is essential, in order to insure good action of the steam, that a maximum cylinder pressure shall be obtained at the very commencement of the stroke,' but as applied to a running engine it is altogether erroneous.

"For easy motion of an engine, the prevention of shocks and relief of bearings from excessive pressure (and consequent friction and loss of power), it is desirable that as the piston approaches the end of its stroke the exhaust shall have been closed, so as to form a cushion that will absorb the momentum of the reciprocating parts, and relieve the pressure on the side valve at its time of opening; and the back pressure will then be just that needed to give to the moving parts their proper velocity in the other direction. And then, after the center is well passed, the pressure of steam should be slowly admitted, reaching a maximum not earlier (perhaps for high pressure non-condensing engines) than 1-15 or 1-12 of the motion of the crank; while the cut-off should be effected, both by good action of the steam and for the good action of the engine, instantaneously. It may be possible with small sizes of ports and inadequate cross areas, or great length of passages, that steam cannot follow a piston at high speeds; but such possibility exists only with improper proportions for high speed, and should not be remedied by lead.

"The original statement of forty to forty-five years since, was not incorrect for the time, and, if the conditions are all given, is not incorrect to-day.

"About thirty-five years since the slide valve was made without lap; it just covered the ports at both ends. The skill of the workman was taxed to see how exactly the one steam port should open and the other be closed. The motion then given to the valve was almost coincident to that of the crank, and the rate of opening was exceedingly slow, as both crank and eccentric had just passed their centers. The valve motion was then usually transmitted from the eccentric to the valve through light rocker arms and rods, and there was more or less lost motion in the transmission. Under such circumstances there was a reason for lead of the eccentric, as well as valve, and both rule and reason had a warrant in facts.

"When the lap valves were introduced much difficulty followed, so firmly had the theory of lead been established, but the workmen have long since learned, if the books have not, how to get the thump out of a slide valve engine. The effect of throttling the exhaust is in no way a loss of power, but is simply a loss of capacity of the steam cylinder. For a given boiler a little larger cylinder is needed to perform the same work. There is, however, an absolute loss of steam and power on the back lead of the steam, and its recompense must be found in the ease of working and duration of the engine.

"These remarks do not apply alone to slide valve non-condensing engines. For engines of higher grade, in economy for use of steam, the cutting off of the exhaust is a great practical gain. With twenty-four to twenty-six inches of vacuum, if the exhaust is closed (out off) at one-fourth or one-third, a back pressure of vapor will pile up in the cylinder, to over one-half an atmosphere, and thus relieve, or partially relieve, the engine of the momentum of the piston and part; and besides this the condenser will have been relieved from any leakage of the piston itself, which leakage again will have been saved for effective working of the engine. Leakage of piston packing, within the limit of troublesome back pressure, thus becomes tolerable."

**Magnetization of Ilmenite.**

Dr. T. L. Phipson says: "Some fine specimens of ilmenite (titanic ironstone) having been sent to my laboratory from Norway, it seemed a good opportunity to investigate the magnetic properties of this mineral. The composition of that which served in my experiments was: Titanic acid, 24.60; protoxide of iron, 72.10; Fe S<sub>2</sub>, 2.06; manganese, trace; silicic acid, 1.24. Total, 100.

"Its specific gravity was 4.8, and it acted with tolerable energy upon the magnetic needle. From the inspection of this action, I concluded that it was possessed of a very considerable number of poles in close proximity to each other, so that scarcely two closely adjacent parts acted in the same manner upon the north pole of the needle; hence it was evidently built up by a mass of crystals. An elongated rectangular piece of this mineral was separated by a blow of a hammer; it measured 1 1/4 inches in length and was about 1/4 inch broad. This was placed upon a table and submitted to magnetization by friction with good magnets for upwards of an hour. It was then found to have a pole at each extremity, which it certainly had not before, and was accordingly suspended to a piece of silk, and hung up in a quiet corner of the laboratory. It pointed constantly towards the north, and returned to that position when deviated. It continued to do so for some weeks; but one morning I found it pointing east-west, or nearly so; it had lost its acquire magnetism entirely, having retained it for rather more than a month.

"This loss occurred rather suddenly, and I believe that it coincided with a magnetic storm of some intensity which happened about the time. If these experiments could be continued by some who have more time to devote to them, they might lead to some interesting results. It is possible that some minerals that show action upon the needle might be made magnetic in the above manner."—*Chemical News.*

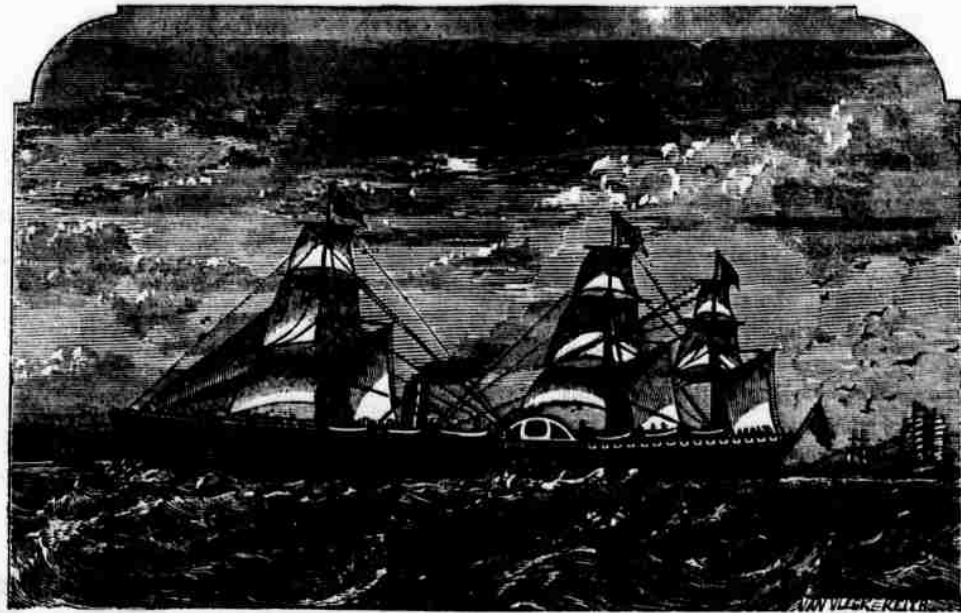
**STEEL FROM THE ORE—SIEMENS' PROCESS.**—Dr. Siemens is now erecting furnaces which will hold charges of ten tons and produce twenty tons of steel in twenty-four hours, by his new process; to effect this, thirty tons of pig and scrap are used. According to the *Practical Magazine*, the pig iron is made direct from the ore, dispensing with both blast furnaces and puddling furnaces. Extensive works are being erected at Towcaster, for bringing that very important invention into practice. The possibility of this feat has been long admitted; the need was, a furnace in which reduction could be effected perfectly at a low heat.

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