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MARITIME MINING RECORD

Vol. 11, No. 16.

Stellarton, N. S., Feb. 24th. 1908. New Series

SELECTED QUESTIONS AND ANSWERS.

(Science and Art of Mining.)

BOILERS.

Q.—The water in a steam boiler is dangerously low. What precautions would you adopt?

A.—The first thing the attendant in charge of a steam boiler should learn is the necessity of keeping a sufficient supply of water in the boiler. Upon taking charge he tests the supply of water in the boiler by means of the gauge-cocks, which are so situated on the boiler that the upper gauge-cock, when opened, should have steam issuing from it, the middle cock both steam and water, and the lower gauge-cock water only.

Now, as the question says the water is dangerously low, we will concentrate our attention upon the lower gauge cock, and if on testing we find that this cock, instead of showing water shows steam, it is a sure indication that the boiler has too little water in it, and we must take immediate steps to remedy the evil.

The precautions necessary are as follows:

Do not start the feed pump to inject more water; it may crack the boiler.

Do not stop or start the engine until the boiler has been cooled.

Do not lift the safety valve until the fires have been drawn and the boiler cooled.

Do not draw the fire first thing, because the operation creates an increase of heat that would lead to disastrous consequences in the present dangerous condition of the boiler.

The first precaution to adopt is to close the draught and bank the fire with ashes. (A better substitute would be damp earth if any were at hand). The object of this is to cool the boiler and decrease the steam pressure. After awhile if the boiler has cooled and the fire been made 'dead', the fire may be withdrawn if the operation can be performed without increasing the heat. If not, it were better to smother it.

The attendant must leave the safety valves as he finds them, because, if he opens them, (or any other valve) with the mistaken object of decreasing the steam pressure, just as much steam as escapes will again be generated and add additional dangers by further decreasing the supply of water that remains in the boiler.

It would be unwise to start the engine for the same reason, but if the engine is running when the evil is discovered and suddenly stopped the recoil of the steam would form a very serious danger, therefore it were better to keep the engine running until the danger was somewhat alleviated. This sudden retrocession of steam gives rise to an enormous force, and must be guarded against at all times. It is a great danger to start the feed pump, as the water being dangerously low, the plates are overheated, and would become brittle and il-

able to snap if cooled suddenly in water. When iron is overheated it becomes speedily oxidized, and its tenacity and cohesive force is much reduced.

When these precautions have been observed, the boiler cooled, the fire damped or drawn, and all immediate danger removed, water may be run into the boiler and the fire started up.

The fire should not be started until there is sufficient water in the boiler, and no risk of breaking or blistering the boiler run, as would be the case with an uncertain quantity of water and a hot fire. There is great danger in getting up steam to fill a boiler whose water is low. After a boiler that is clothed with masonry has been entirely blown off it should not be refilled under 24 hours, as it will not have cooled off thoroughly before that time.

Few people realize the waste power that exists stored up in an ordinary steam boiler. Just because there is no movement about it, one is apt to think that there is no power there. Under the condition mentioned in the question, it is necessary to remember one point in particular, and that is, the very things one would naturally think ought to be done are the very things one must on no account do. We must not open the safety valve, nor turn cold water into it, nor yet rake out the fires. We must not interfere with the engines in any way. No better agent than dry sand can probably be made use of for extinguishing the fires, and a supply should always be kept adjacent to the boiler-house. To prevent the water from getting low, automatic appliances should be fitted to every boiler, but, of course, this does not come within the requirements of the question.

FALLS IN MINES.

Q.—Falls of ground are unnecessarily frequent. You are asked to describe what you consider the best method of preventing falls of roof, coal, and side in a mine.

A.—It may be as well to state here the chief reasons why the falls from roof, etc. are so frequent.

1—Falls of apparently good roof, generally arising from unseen slips.

2—The careless manner in which the timber is set, and neglect on the part of the men.

3—Disregard of the rules by the officials.

Some of those that come under the first heading are liable to occur at any time, even when the timbering is carried out in the most systematic way.

A great many of those that occur under the second heading are due to the careless and willful disregard of the rules in order to earn a little more money, or because work will be impeded by carrying out the same.

Those that occur under the third heading are the more regrettable because they are occasioned by the neglect of those who should set a better example in re-