

or ladle, it is not confined to this, as the identical process will convert iron into steel from the molten or cold state without being previously treated in a Bessemer converter. Any grade of steel may be made regardless of quality of raw materials, and carbon may be eliminated from electrodes for special steel making, the current being conducted to the arc by the iron rod instead of carbon and iron oxide, or composite electrode.

The neutral slag electrodes may work with a low current arc or dipping into slag and heating by resistance, and the steel may be kept for hours under this molten neutral slag without changing its quality. The metal may be cast, remelted or worked over to a higher or lower grade, or it may be cooled, chilled and melted a second time without injuring the quality of the steel.

The cost of production in this process is low, as most of the work of steel-making is done by the Bessemer converter or open-hearth furnace, only the removal of small percentages of the phosphorus or sulphur from the steel being attempted or the deoxidation of the metal, this being a good product for the larger rolling mills which supply demand of rail, and structural steel interests. The partial removal of the injurious phos-

phorus and sulphur reduces the time to a few minutes instead of hours, hence reduces the current required per ton.

It may be stated that the shorter time also lowers cost of linings and refractory materials per ton of metal, as many charges may be treated in same time required for treating one open-hearth charge. This shorter time process only reducing phosphorus from .09 to .05 for rail steel instead of to .003, which is possible by longer treatment, makes it a practical process for rail mills dealing with Bessemer converters treating full charges of fifteen tons in electric ladles, handled by cranes taking same to positions where electrodes are inserted.

After treatment the metal is drawn from the bottom of ladles or tilted and poured into the ingot molds after slag has been removed. These easy methods are of vital importance, as any new process for removing phosphorus and sulphur should not greatly increase the cost of power; should not cause excessive cost of basic linings or electrodes, or slag producing materials, and should be readily used as an auxiliary process in existing Bessemer plants.

ALBERTA PROVINCIAL COAL MINE OFFICIALS EXAMINATIONS

An examination for fire boss certificates was held at Banff and Frank on June 2nd, at which eighteen candidates presented themselves for examination, eleven of whom passed, and the regular examination for mine managers, pit bosses and fire bosses was held at Banff, Frank and Edmonton on November 3rd, 4th and 5th. At the latter examination 86 candidates sat for examination, 58 of whom passed, as follows: Managers, 27 sat for examination, 16 passed; pit bosses, 27 sat for examination, 20 passed; fire bosses, 32 sat for examination, 22 passed.

In previous years the custom has been that the fire boss examination occupied one day and the pit boss and mine managers' examination two days. In connection with the November examination, however, the time occupied by the mine managers' examination was extended to three days, in order to more thoroughly cover the wide range of general mining subjects necessarily included in this class of examination.

The number of candidates who presented themselves for examination during 1909 shows a considerable increase over previous years, and with the steadily increasing number of mine officials qualifying each year, the operators should soon have no difficulty in securing certificated men to fill all official positions at the mines. A number of provisional certificates have been issued during the year, but the number of certificates of this class issued each year is gradually decreasing.

The following are the questions set at the examinations held at Banff, Frank and Edmonton on November 3rd, 4th and 5th, 1909:

Mine Manager Examination.

Paper No. 1. Time allowed, one and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

COAL MINES ACT.

1. What is the interpretation of "mine" as laid down by The Coal Mines Act? (10)

2. What are the provisions of The Coal Mines Act with reference to register of employees? (10)

3. What are the provisions of The Coal Mines Act with reference to the employment of boys in or about the mine? (10)

4. What are the provisions of The Coal Mines Act with reference to the reporting of accidents? (15)

5. What are the requirements of the Act with regard to keeping a mine plan? (15)

6. Name the different registers and report books to be kept at the mine under The Coal Mines Act, 1906, and The Coal Mines Act, 1908? (20)

7. What are the requirements of the Act regarding ambulances, etc.? (10)

8. What does The Coal Mines Act state regarding the inspection of machinery? (10)

Mine Manager Examination.

Paper No. 2. Time allotted, two and one-half hours.

The value attached to each question is given in parenthesis. Candidates must obtain 70 per cent. of the allotted marks to pass.

GASES AND SHOT-FIRING.

1. Give the names, composition, specific gravity and chemical symbol of each of the four different gases commonly found in coal mines. (15)

2. Where are the gases mentioned in Question No. 1 found, and how are they produced? (10)

3. What noxious gases are produced by fires and explosions of firedamp in mines? (10)

4. Name six essential features of a good safety lamp for general work. (10)

5. What principles are involved in the construction of a safety lamp that would render one lamp more sensitive in the detection of gas than another? (10)

6. What instructions would you give in reference to the care and preparation of safety lamps before giving them to the workmen, and how would you instruct the workmen as to their use? (15)