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Abstract: The legislatures of Illinois and Colorado have recently enacted laws providing for the inspection of mines. An important feature of these new mining codes is the provision of the law requiring all applicants for the position of Mine Inspector to appear before a Board of Examiners, pass a satisfactory examination and receive a certificate of competency in order to be eligible for the office. The law of Illinois divides the State into five districts, in each of which a District Inspector is to be appointed.

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NEW MINING LEGISLATION.

The legislatures of Illinois and Colorado have recently enacted laws providing for the inspection of mines. An important feature of these new mining codes is the provision of the law requiring all applicants for the position of Mine Inspector to appear before a Board of Examiners, pass a satisfactory examination and receive a certificate of competency in order to be eligible for the office. The law of Illinois divides the State into five districts, in each of which a District Inspector is to be appointed. Under this law

two examinations of candidates have been had, only four applicants out of thirty-four having passed the Board at the first examination, and three at the second.

The law of Colorado provides for one State Inspector, and at the examination, John McNeil, an intelligent miner, stood highest and was appointed by the Governor.

The following is the full list of questions put to the applicant in the two examinations in Illinois:

FIRST EXAMINATION.

1. Are you thirty years of age, and a citizen of this State?
2. Have you had a practical mining experience of ten years?
3. Are you interested as owner, operator, stockholder, superintendent or mining engineer, of any coal mine?
4. What is the character, and extent of the Coal Measures of Illinois?
5. What are the difficulties usually encountered in sinking and timbering shafts in this State, and how would you overcome them?
6. State particularly how you would lay off a coal mine so as to secure the best method of ventilation, and make a small diagram of the same, showing the location of ventilating apparatus, doors, air-splits, overcasts and direction of air-currents from inlet to outlet.
7. Explain the difference between long-wall and pillar-and-room workings, and the advantages of each as to ventilation and the relative amount of coal produced per acre by the two systems.
8. What are the relative merits of the Fan, Furnace, or other appliances for producing ventilation?
9. Give the dimensions and a description of a furnace required to circulate a lawful amount of air in a mine having 2,000 yards of air-way—36 square feet of area—working 100 men and the usual number of animals; and state what would be the kind and size of a fan to produce the same amount of air-current in such a mine.
10. How can you produce the same amount of circulation in such a mine by natural ventilation?

11. Describe the different gases encountered in mines, their composition and characteristics, and their effects on animal life.

12. Describe the kind of furnace you would use to ventilate mines where *explosive gases* are generated in large quantities.

13. How would you ascertain the ventilating power of a shaft by the difference of temperature?

14. Having two shafts 5x5 feet and 120 feet deep, connected by an entry 50 feet in length, the temperature at the downcast being 32°, and at the upcast 122°, what would be the difference of the columns of air, and what would be the capacity of the ventilating shaft in cubic feet of air per minute?

15. What would be the horse-power necessary to produce a similar current?

16. Describe particularly the methods and instruments by which the velocity of air currents in mines can be measured.

17. Name the different kinds of safety lamps now in use, and the kind you regard as the best, and why.

18. How would you apply the water gauge in testing the power of ventilating apparatus? Give a rule for calculating the same.

19. If the water gauge shows a depression of 6-10 of an inch, and the quantity of air passing the same point is 37,000 cubic feet per minute, what is the horse-power expended in producing the same?

20. What kind of a hoisting engine do you consider the most suitable for a coal shaft?

21. How would you ascertain the horse power of an engine with 12x24-inch cylinder?

(a.) What load would it lift from the bottom if the drum were 10 feet in diameter?

(b.) What would be the cage speed?

22. How would you calculate the breaking strain of a steel or iron wire rope, and what would be the *working strain* of each?

23. How would you calculate the safe working load of a 5/8-inch chain?

24. Describe some of the best forms of safety catches and their mode of action.

25. What kind of steam boiler is best adapted to coal mining, and why?
26. How would you test a steam boiler to ascertain its safety?
27. What are the usual causes of fires in mines, and how would you prevent them, or suppress them?
28. State what experience you have had in mine surveying, and name the different instruments in use for that purpose.
29. If the workings of a mine were approaching the abandoned workings of another mine filled with water, what precautions would you require to be taken to prevent accidents?

SECOND EXAMINATION—1883.

1. Give a general description of the Coal Measures in Illinois; stating the number, character, and depth of the various seams found.
2. State particularly how you would proceed to prospect for coal, and how you would overcome the difficulties that usually present themselves in sinking and timbering shafts in this State.
3. Describe the different systems of working coal in this State, and the most approved methods of ventilating mines.
4. State what is meant by air-crossings, stoppings, and regulators, and what is the best method of constructing the same.
5. What would you call a safe velocity for an air current in mines where explosive gases are given off in large quantities?
6. How many cubic feet of air per minute should be introduced to the working face of a mine in which are employed 150 men and 15 animals?
7. What should be the dimensions of the air-ways in such a case?
8. What are the different methods of splitting air in mines, and what is the effect of the same upon the ventilation?
9. If you have two air-ways, one with an area of 40 feet, the other with an area of 30 feet, each being 3,000 feet long, with 20,000 feet of air passing, what would be the difference of friction in the two air-ways?
10. What is the practical use of the Barometer and of the Thermometer in mine inspection?

11. If you have a difference of pressure of 3 pounds per square foot between the upcast and the downcast, with a volume of 24,000 cubic feet of air per minute, what would be the difference of pressure with a volume of 48,000 cubic feet of air passing, other things being equal?

12. If you have an air-way with an area of 36 square feet, and a volume of 60,000 cubic feet of air passing, what would be the velocity in feet per minute?

13. What will be the motive column when the air in the downcast shaft has a temperature of 60° , and that of the upcast shaft a temperature of 160° .

14. If, by the expenditure of 3-horse power, you create a current of 30,000 cubic feet of air per minute, how many horse power will it take to produce 90,000 cubic feet per minute?

15. With a difference of one-tenth of an inch of mercury (in barometer) between the downcast and upcast shafts, what would be the pressure per square foot, and what would be the motive column?

16. Describe particularly the methods and instruments by which the velocity of air currents in mines can be measured.

17. Describe the different kinds of Fans and Furnaces in use, and the method of calculating their capacity.

18. Describe the different gases encountered in mines, their composition and characteristics, and their effects on animal life?

19. Name the different kinds of safety lamps now in use, and give their peculiarities, and state which you consider the best, and why.

20. In case of an explosion of gas underground, whereby the furnace doors, overcasts, and air stoppings are displaced or destroyed, what method would you adopt to restore such a circulation of air as would admit of the prompt rescue of men within?

21. What kind of a hoisting engine do you consider the best for a coal shaft, and what is the rule for finding the horse power of an engine?

22. If you have an engine of 60 horse power, with a cage speed of 600 feet per minute, what load will it lift from the bottom of a shaft, and what will it haul up an inclined plane with a gradient of 1 inch in 3?

23. How would you calculate the breaking strain of a steel or iron wire rope; and what would be the working strain of each?
 24. Give a rule for calculating the breaking strain of chains.
 25. Describe some of the best forms of safety catches, and their mode of action.
 26. How would you test a steam boiler to ascertain its safety?
 27. What are the usual causes of fires in mines, and how would you prevent them or suppress them?
 28. If the workings of a mine are approaching the abandoned workings of another mine, in which there is a head of water of 100 feet, how much coal would you leave as a safe barrier between the two? and if you should tap it with a two-inch hole, what would be the number of cubic feet of water discharged per minute?
 29. In case a mine were making 50 cubic feet of water per minute, and had a sump that would hold 20 hours' water, and a pump that would raise it in 15 hours (the supply being cut off,) how long would it take the same pump to exhaust the sump, if the water was allowed to continue running into it at the above rate?
 30. What would be the dimensions of a pump necessary to perform the work?
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