

air pump worked from the engine. On the pipe between the pump and controlling cylinder are placed two valves, one a set valve and the other being controlled by the foot at will. In starting up there is no air pressure in the small cylinder, and the valve can open wide, but as the engine speeds up, air is pumped into the chamber, the valve is kept closed, and the engine will slacken down and run slower, just keeping the air supplied that is escaping at the set valve. The engine will operate in this way when the carriage is standing still. The clutches not being in, in order to start the carriage, the operator, by pressing down the other valve with his foot, lets the pressure escape from the chamber, the valve will open wide, and the engine will speed up; the low or hill climbing clutch is now pulled in and the carriage starts off slow, the engine running fast; as it speeds up, the low clutch is thrown out and the high one put in; this direct connects the engine with the chain, and the carriage will now make about 18 miles an hour on a first-class road. The speed can be regulated by raising or lowering the foot. Within the range of speed of the engine to go slower, the low clutch is used; this low clutch lever when pulled in toward the operator drives the carriage ahead slowly, and when pushed away from the operator the carriage will back up. The high speed lever runs the carriage fast when pulled in, and by pushing it in the opposite direction it puts on a hand brake that stops the carriage almost instantly. In case the brake should fail, the back-up gear can be used. These levers are operated by the right hand, the left doing the steering, which is as easy as steering a bicycle. The right foot controls the engine air valve, the left foot is at the bell, and the operation of the carriage becomes as unconsciously automatic as walking. The body of the carriage is hung on easy springs, the front wheels being 32-inch, the back ones 36-inch, and the tires Hartford 3-inch single tube.

"Some of the roads over which we passed were very hard on the tires, but as the horseless carriage comes into more general use, good roads must certainly follow. The distance to Berlin by the route we took was about 80 miles, and the return to Hamilton 37 miles. In and around Berlin the carriage must have covered about 100 miles, as six gallons of gasoline were consumed in the town, while only four gallons were consumed in going from Toronto to Berlin."

### STEAM BOILER INSPECTION IN BRITISH COLUMBIA.

FOLLOWING are the rules for inspection of steam boilers and engines in British Columbia under the authority of the act passed at the last session of the Provincial Legislature.

#### MODE OF INSPECTION.

The inspector may, whenever he deems it necessary, and he shall at least once each year, subject every boiler in his district to a test by hydrostatic pressure, in the ratio of 150 pounds to 100 pounds per square inch allowable as a working pressure, using the water in such test at a temperature not exceeding 60 degrees Fahrenheit. For the purpose of such test, however, the owner or his agent shall provide the necessary pipe and fittings to connect the inspector's pump with the boiler, and shall also provide men to work the pump and assist the inspector in his examination of such boiler.

Before a boiler is subjected to a test by hydrostatic pressure, it shall be opened up for inspection, the man-hole and mud-plate doors removed, the outside and the inside of the boiler cleaned, the furnace grates removed and all flues and tubes swept clean. The owners or their agents shall see that the foregoing requirements are complied with before applying for inspection.

In any case in which a test is not satisfactory, the defects shall be made good and the boiler re-tested before a certificate is granted.

The inspector shall fix the working pressure of boilers by a series of calculations of the strength of the various parts, and according to the workmanship and material of which they are composed.

In order to satisfy himself as to the strength and internal condition of a boiler the inspector may, should he deem it necessary, order holes to be cut in it, and may so demand that such information, by drawings and specifications of the several parts, be furnished him of the construction as will enable him to determine, by calculation and examination, their strength.

In the event of satisfactory information not being obtainable, the inspector shall use the factor of safety provided above, with such additions as his judgment may dictate.

When the outside of a boiler cannot be otherwise perfectly inspected on account of brickwork or other covering, such covering shall be removed once at least in every four years.

In subjecting boilers made of iron plates to the hydrostatic test aforesaid, the inspector shall assume 100 pounds to the square inch as the maximum pressure allowable as a working pressure for a new boiler 42 inches in diameter, made of the best refined iron, at least one quarter of an inch thick, in the best manner and of the quality herein required, and shall rate the working pressure of all iron boilers, whether of greater or less diameter, according to their strength compared with this standard.

In subjecting boilers made of steel to the hydrostatic test aforesaid, the inspector shall assume 125 pounds as the maximum pressure allowable as a working pressure for a new boiler 42 inches in diameter, made in the best manner of the best quality of steel plate, at least one quarter of an inch thick, with all the rivet holes drilled in place, the plates being taken apart and the burrs removed, the longitudinal seams in the shell being fitted with double butt steel straps cut from the plate, and each at least five-eighths or over the thickness of the plates they cover, and all seams being at least double-riveted, and having 70 per cent. of the strength of the solid plate, and all flat surfaces stayed in the best manner and all the seams double-riveted; and he shall rate the working pressure of all steel boilers so made, whether of greater or less diameter, according to their strength compared with this standard.

If the inspector is of the opinion that any boiler, whether made of iron or steel plates, by reason of its construction or material, will not safely allow so high a working pressure as that hereinbefore specified for each such description of boiler respectively, he may, for reasons to be stated specifically in his certificate, fix the working pressure of such boiler at less than two-thirds of the test pressure.

When it is known or comes to the knowledge of the inspector that any steam boiler is or has been carrying an excess of steam beyond that which is allowed by the certificate of inspection, he shall, in addition to reporting the fact to the Attorney-General for prosecution under Sub-Section (3), Section (8), of the "Boilers Inspection Act, 1899," require the owner, or owners, of such boiler to place thereon a lock-up safety valve that will prevent their carrying an excess of steam.

On commencement of the construction of every boiler built in British Columbia under the provision of this Act, the maker of such boiler shall notify the inspector that it is open for his inspection.

The fees or dues to be paid yearly by the owners of steam boilers shall be 20 cents per horse-power, with a minimum of \$5 for each boiler under 25 horse-power. The amount of such fees or dues shall in each case be paid to and received by the Inspector of Steam Boilers, who shall, at such time and in such manner as the Chief Commissioner of Lands and Works shall from time to time direct, account for and pay over the same to the Minister of Finance, to form part of the Consolidated Revenue Fund of the Province.

The inspector shall not make or deliver a certificate respecting any steam boiler under this act unless the fees or dues have been paid, as hereinbefore set forth.

#### DUTIES AND LIABILITIES OF ENGINEERS.

Engineers are required in all cases, upon stopping the engine, to open the safety valve, so as to keep the steam in the boiler below the limit allowed by the inspector's certificate; to close the dampers, and when by accident the water in the boiler has fallen below the point of safety, to put out the fires at once.

Engineers are required to report to the owner, and also to the inspector, any defects of or injury to the boilers or machinery, by which the safety of the same may be endangered.

They shall also report to the inspector any accident happening to the boilers or machinery; and in case of omission to make such report, the license of the engineer so omitting shall be revoked.

The chief engineer of a steam plant will be held accountable to the Department for the proper care and management of the boilers and machinery under his charge.

Engineers, on first taking charge of steam plants and at least once a year, shall satisfy themselves, by examination, that all braces, and stays, and bolts of the boiler are in good order, and that the safety valves are in thorough working order.

#### MANAGEMENT OF BOILERS.

Getting up steam.—Warm the boiler gradually. By getting up steam too quickly the boiler will soon be destroyed.

Firing.—Fire regularly. Use the slice bar gently and as seldom as possible.

Feed Water.—Let the feed be regular and constant.

Glass gauge and try cocks.—Keep the glass clean and free, and try the gauge cocks often.

Safety valves.—Lift each safety valve at least once each day, and always before getting up steam.

Low water.—Put out the fires by drawing them or throwing ashes on them. Never use water.

Blowing off the boiler.—Do not blow off by steam pressure; let the water run off if possible. See that the fires are all out and hot ashes removed.

Boiler purgers.—Never use any composition to keep down incrustation without the approval of the inspector.