

Several defects in the design of new boilers have been noted, and perhaps it will be sufficient to mention at present two of them—one the design of flanged cover-joints, the other the insufficient safety-valve area provided with gas-heated boilers. With covers of cast iron bedded down on the spigot only and the cover-bolts disposed outside the spigot there is always a danger of cracking the cover when tightening up the joints. The same remark applies to plain flanged covers when thick jointing-material is used. The jointing-material should be laid all over the flanges and not wholly within the bolt-circle. No cover-bolts should, generally speaking, be less than  $\frac{5}{8}$  in. diameter—preferably  $\frac{3}{4}$  in. diameter—because of the injury which might result when such small bolts are being screwed up. The safe working-stress should be determined with reference to the size of the bolt and the frequency of the removal of the cover. The working-stress per square inch of net area on a  $\frac{5}{8}$  in. bolt should be about one-half of that of an inch bolt.

The safety-valves fitted to gas-heated boilers, vulcanizers, &c., are sometimes very small. A safety-valve should always be large enough to discharge all the steam the apparatus can make at the working-pressure. Moreover, the smaller the safety-valve the more liable it is to sticking and derangement. Small safety-valves should be frequently tested—daily or more often. In an experiment on a small boiler ( $9\frac{1}{2}$  in. diameter by 32 in. high, ten  $\frac{7}{8}$ -in.-diameter tubes) heated by a gas ring it was found that after the working-pressure had been reached the pressure increased 10 lb. per minute when the safety-valve and other outlets were closed. The importance of seeing that the safety-valve is free will therefore be realized.

The number of new boilers inspected during the year was 162; of this number 74 were made in the Dominion and 88 were imported. The following table gives the districts to which the new boilers went, the horse-power, and whether made in the Dominion or imported:—

| District.                | Made in Dominion. |                   | Imported. |                   | Total.  |                   |
|--------------------------|-------------------|-------------------|-----------|-------------------|---------|-------------------|
|                          | Number.           | Horse-power.      | Number.   | Horse-power.      | Number. | Horse-Power.      |
| Auckland North .. .. .   | 7                 | 82 $\frac{1}{2}$  | 7         | 59 $\frac{1}{2}$  | 14      | 142               |
| Auckland .. .. .         | 10                | 97                | 11        | 42                | 21      | 139               |
| Auckland South .. .. .   | 1                 | 30                | 12        | 502 $\frac{1}{2}$ | 13      | 532 $\frac{1}{2}$ |
| Canterbury .. .. .       | 8                 | 27                | 3         | 19 $\frac{1}{2}$  | 11      | 46 $\frac{1}{2}$  |
| Hawke's Bay .. .. .      | 6                 | 101 $\frac{1}{2}$ | 4         | 9 $\frac{1}{2}$   | 10      | 111               |
| Nelson .. .. .           | 3                 | 88 $\frac{1}{2}$  | 1         | 2 $\frac{1}{2}$   | 4       | 91                |
| Nelson South .. .. .     | ..                | ..                | ..        | ..                | ..      | ..                |
| Otago .. .. .            | 8                 | 40                | 11        | 144 $\frac{1}{2}$ | 19      | 184 $\frac{1}{2}$ |
| Southland .. .. .        | 2                 | 6 $\frac{1}{2}$   | 7         | 395 $\frac{1}{2}$ | 9       | 402               |
| Taranaki .. .. .         | 11                | 64                | 10        | 272               | 21      | 336               |
| Wellington North .. .. . | 5                 | 10                | 5         | 6                 | 10      | 16                |
| Wellington .. .. .       | 13                | 169               | 17        | 55 $\frac{1}{2}$  | 30      | 224 $\frac{1}{2}$ |
| Totals .. .. .           | 74                | 716               | 88        | 1,509             | 162     | 2,225             |

### 3. Inspection of Gas-, Oil-, Water-, and Electric-driven Machinery, including Lifts.

The motive power under the e headings is increasing each year in large numbers, especially in the dairying districts of the North Island, where the oil-engine has become essential for labour-saving. The locally made engines are still increasing, and there is a noticeable increase in the number of the higher-powered oil-engines made in the Dominion. The total number of inspections made was 15,609, an increase of 1,455 for the year. There were a number of inspections under these headings in arrears at the end of the financial year, and these were mostly stationed in the North Island.

### 4. Fencing and Guarding of Machinery.

There were 1,219 notices issued to guard machinery during the year, and there were several accidents reported with machinery during the year, a number of these being in connection with lifts. The high rate of speed of the modern electric lift has necessitated extra precautions being taken to have them efficiently protected, both from the cage and landings.

An account of all these accidents is reported on an appended return. Some of these proved fatal, and several of the accidents were the result of carelessness on the part of the employee. It is difficult to provide, by means of guarding, against all accidents. A good deal must be left to individual discretion. It is astonishing sometimes to find, when any one has become accustomed to any machine, the risks he will run in attempting to do almost impossible things with the machine in motion.

### 5. Survey of Steamships and Auxiliary-powered Vessels.

Many running surveys of ships continue to be made. It is important that a Surveyor should be advised a day or so before his services are required. It has often happened that when called upon at a moment's notice he has had a prior engagement. It would also be of great assistance to all parties concerned if preparations for the survey were completed before the Surveyor arrives at the vessel. A Surveyor's time is very fully occupied, and any assistance which would be given him in expeditiously carrying out his duties would be greatly appreciated. Owing to the anxiety of getting a ship away, sufficient time is not always allowed for the cooling of the boiler. A Surveyor cannot reasonably be expected to enter a boiler which is too hot, and where conditions obtain which are a menace to his health, and are not conducive to the efficiency of the examination.