another advantage; the oil is delivered on the valve in an atomized-form, like a spray, instead of in bulk, as by the old method. By those who have a prejudice against the sight feed lubricators this is sometimes lost sight of; but, nevertheless, it is a very real advantage.

THE tensile strength of nickel carbon is 90,000 lbs. per square inch, against 60,000 and 65,600 lbs. for the carbon steel in ordinary use. We may judge from these figures how valuable it may prove in connection with the machinery of the future. For example, it would save an enormous weight in the construction of boilers, which are at present made of 58,000 pounds tensile steel, and are often 1½ inches in thickness. For if it is possible to use a material whose tensile strength is once and a half as much as that of the material in present use, boiler shells need only have two-thirds of that thickness; that is, instead of being 1½ inches thick they need only be 1 inch.

THE reason why so many boilers are defective is that they are so often made from defective material or by unskilful workmen. Inferior material, or, in some cases, the formation of "fur" or sediment, cracks and blisters the inner plates. Sometimes a too great heaviness of the metal at the seams gives rise to the same condition. It is of the utmost importance to have the metal of a proper uniform thickness. Defectiveness in boilers arises also from carelessness in riveting; a rivet should completely fill the hole. Cold water should never be introduced into the legs when there is a very hot fire; it makes the sheets contract, and that in turn sometimes renders the tap and socket bolts leaky. The chief essentials for a reliable boiler are good material, good workmanship, and care in using.

AN arrangement has been made to enable a locomotive and train of cars to ascend a gradient easily, by means of keying a grooved drum upon the driving axle and winding once round the groove a stationary cable. With each revolution of the driving-wheels, the drum travels a full revolution over the cable; the latter lies in the centre of the track, and is secured in its position by guides. The assistance given by the turn of the cable round the drum, and the slight strain exercised at each end of the cable, are sufficient to give the driving wheels the necessary grip or bite on the rails to allow them to gain the full length of their circumference at each revolution. As the cable rests on the bed of the track while the drum passes over it, and at other times lies inactive, it is said, that this system reduces its wear and tear to a minimum.

THERE are many features connected with our mining laws in Canada that sadly need reform. The head of a prominent Ontario manufacturing firm, who had the advantage of seeing the wonderful development of California during the past generation, had a conversation with a representative of this journal, and cited more than one case to show how our cumbersome and inequitable mining laws obstruct legitimate enterprise. The fact is that thousands of square miles of mining lands in Canada have been locked up for years in the hands of a few capitalists, who are holding vast tracts on pure speculation, while in many cases the owners themselves are in ignorance of the exact whereabouts of the precious metals. They have simply read in the annual geological reports of the regions in which rich indications of minerals have been found, and have got hold of the properties simply to speculate and not to develop the mines. Such a policy is utterly destructive of individual enterprise in mining, and our friend is quite justified in attributing to this cause the lack of progress that should be shown in our mining regions. More encouragement ought to be given to the work of the prospector, whose risk and whose hardships are often so great, and no company of capitalists should be allowed to hold lands undeveloped for more than a very short term of years In Ontario there are a number of tracts of lime equal to whole counties, which have been kept for years untouched, simply because the speculating owners do not know the exact location of the minerals on the lands they have bought. By the laws of California such a state of things is impossible, and Ontario and our other provinces should take a leaf out of California's book.

THE idea of having church organs run by electric motors, instead of by water-power, is new in Canada, and the managing bodies of a number of Toronto churches have watched with interest an experiment made during the past month in the Westminster Presbyterian Church, in that city, by H. W. Petrie, who has patented a method of applying electric power to organs. The motor put in by Mr. Petrie has given such satisfaction, both as to economy and efficiency, that other church managers are going to dispense with water motors.

THE *Electrical Engineer*, of London, gives an account of the phosphorescent tubes which are being introduced in England for practical lighting in places where beauty is of more importance than a brilliant light. A generator of simple construction is used. The vacuum tube is made of a spiral thin glass tube, the ends of which are connected to two bulbs containing the electrodes. This uses about one watt per foot of tube lighted. The objection is that when these tubes are phosphoresced brilliantly, they become heated and the glass is apt to melt. The light is never brilliant enough to replace the ordinary incandescent lamps; but when a soft moonlight effect is desired, they produce very pleasing results. From 50,000 to 100,000 volts are required for the vacuum tubes; this is obtained by means of a transformer in oil. The tubes are lighted by induction effects, and are connected in series with condensers connected in parallel.

PEOPLE are naturally sceptical about flying machines. We give the following without comment from an exchange:—H. Phillips, of London, Eng., has invented a flying machine, which consists of a steam-engine in a boat, an aerial screw propeller, and a large wooden sail formed like a Venetian blind. An artificial current equal to the force of a gale blowing at the rate of thirty-five miles an hour, is produced by four hundred revolutions per minute of the propeller. This current, blown against the slats of the sail, produces a vacuum and plenum on the upper and lower surfaces respectively, and thus gives great lifting power. On a trial trip recently made, the machine, though only in an experimental stage, made a speed of twenty-eight miles per hour. W. E. McConnekin, an American electrician, is building an air ship on altogether new lines. The body of the pegassipede, as it is called, is shaped like a fish, the tail acting as a rudder. In the middle of the back there is a seat for the person wishing to ascend. The aeronaut does all the work required for flying by moving a pair of pedals, which are connected with a huge fan above. Any speed may be obtained, either slow or quick, by regulating the pace at which the pedals are moved.