ENGINEERING NOTES.

The temperature of water in a boiler is the same as the temperature of the steam. Water cannot be heated higher than 212 degrees in the open air because it evaporates at that point; but in a closed vessel such as a boiler where there is pressure this tends to retard the boiling and the temperature of the water is always the same as that of steam.

WATER HAMMER.—If steam be admitted at the top of a vessel partially filled with cold water, condensation will take place until the surface is somewhat heated, and this, in connection with a cloud which forms above the surface, will retard rapid condensation, so that in due time the full steam pressure can be maintained above water cold at the bottom. This phenomenon is not an infrequent occurrence in boilers in which the circulation is defective. It is therefore perfectly safe to heat up any vessels containing cold water, if the steam can be admitted from the top upon the surface of the water and so maintained.

OIL TESTING.—A home-made oil tester for a shop consists of a shaft and balls with a shell between. The whole rests in half bearings, around which is put an iron strap, the tension being regulated by a set-bolt. The balls run in grooves. To test, apply the oil, run the shaft and if the bearing gives signs, upon cooling, that the lubricating oil is gumming, it is an indication that resins of similar body-giving substance have been used. Resin oil, if properly distilled, does not produce this clogging. These bearings form pretty good oil testers, and they are sometimes found where they will generate heat with one oil and not with another. Such a bearing will determine the special merits of a machine oil.

BELTING.—The ultimate strength of ordniary bark-tanned single leather belting varies from 3000 to 5000 pounds per square inch of cross section. The thickness of single belting varies from 3/16 inch to 5/16 inch, and from 3/8 to 5/8 inch for double belting, and by taking the mean thickness we get the breaking stresses from 750 to 1250 pounds per inch of width for single belts and 1500 to 2500 pounds for double belts. The safe working tension should never exceed one-fifth of the strength of the joint, which is about one-third the above values. From this we find that by taking 1/5 of 1/3 of the breaking stress, or 1/15, the working tensions are, for single belting, 50 to 80 pounds, and for double belting, 100 to 160 pounds. Belts will run with the minimum of attention for many years, if the tensions do not exceed 50 pounds for single and 80 pounds for double belts per inch of width.—From "Smokeless Heat," by General Engineering Company.

"Orillia," writing to Power, asks: What size wire should be used for field magnet coils and armature of a four-pole dynamo of a capacity of two or three 16-candle power lamps at 107 volts, and what size should the armature be? The answer given is as follows: A dynamo of two or three incandescent lamps capacity is not a practical machine. Machines of that size cost almost as much to build as a machine which will maintain eight or ten lamps. The smallest sized machine to be used as a dynamo that we would recommend would be one which would as a motor have a capacity of one-half horse power. Run as a dynamo such a machine would have an output of about seven lamps. The wire to be used on the armature would be No. 21 B. & S. gauge. The size of wire on the field would depend entirely upon the design of the machine, shape of the frame, dimensions and so on. A machine of ordinary design would probably require No. 24 or 25 wire in the field coils, but this is of course a mere hazard. The armature of such a machine should be about 3½ inches in diameter and 3½ inches long.

HIGH EFFICIENCY INCANDESCENT LAMP.

SOME time ago the startling news was published that Maxim, one of the pioneers in the invention of the incandescent lamp, had succeeded in improving the lamp so that there would be a saving of 25 per cent. in the number of watts required per candle. It now appears from London "Lightning" that not only has this efficiency been reached, but even exceeded, and that a factory for making these lamps at a rate of 6,000 a day the largest factory of the kind in England is in course of construction. The consumption of energy of these lamps is said to be only 2.8 to 3.0 watts per candle, as compared with 4 to 4.5 watts in the usual lamps. No further information is given at present, but more is promised soon.

It is rumored that negotiations are under way looking to the extension of the electric street railway at Moncton, N.B.

EXHIBITS AT TORONTO INDUSTRIAL FAIR.

NOTWITHSTANDING that manufacturers are far behind with orders, the exhibit this year in the Machinery Hall of the Toronto Industrial Exhibition was quite up to the average. A number of manufacturers of electrical and steam apparatus were represented, reference to whose exhibits will be found below. The Canadian General Electric Company welcomed many a visitor for the last time to their show-rooms on Front street, the company having since removed to new offices, fitted specially for their purposes, at No. 14 and 16 King street east.

Entering the Machinery Hall from the east, we found the Royal Electric Company occupying a large space. Their exhibit was made very attractive by several hundred incandescent lights arranged in festoons near the ceiling over the company's exhibit. In a space about 50 x 40 feet there were displayed several S.K.C. dynamos, a complete line of direct current motors and S.K.C. alternating current motors, car motors and controllers, transformers, arc and incandescent lamps, lightning arrestors, switches and volt meters, and, in fact, everything necessary for a most complete central station, whether for railway, lighting or power purposes. The exhibit was much admired by visitors generally, and was of great interest to persons connected with the electrical industry.

A 30 h.p. engine of the regular side crank type was exhibited by the Robb Engineering Company, of Amherst, N. S. It was direct connected to one of the United Electric Co's dynamos. The diameter of the engine cylinder was given as 8", stroke 10", and speed 325 revolutions per minute.

The exhibit of the United Electric Company, of Toronto, consisted of one 45 k.w. inductor alternator, built for Bedford, Que., and one direct current, direct driven multipolar dynamo, driven by a Robb engine, built for the McLachlan Carriage Co., of Oshawa. There were also several steel multipolar motors of the enclosed type, designed for direct connection to all classes of machines and mechanical tools. Besides the above, there were shown arc lamps for direct and alternating circuits, arc dynamos, bipolar motors, transformers, etc.

In the Machinery Hall the Goldie & McCulloch Co., Limited, of Galt, Ont., were among the largest exhibitors. Their machinery included one large "Wheelock" engine, which, by the way, was sold to the Toronto Fair Association, and one 10 x 10 and one 12 x 12 Ideal high speed engine. These latter are of handsome design and finish, very compact and take up very little room, and are suited for either direct connection or belted drive dynamo. Their four gas and gasoline engines attracted much attention, one of these being directly connected to a triple pump. These engines are meeting with a large sale. There was also exhibited a number of wood-working pulleys and wood split pulleys and a gyrator, this latter being a flour milling machine of which this firm is the sole Canadian maker. Altogether, this exhibit was greatly admired by machinery men visiting the exhibition.

A display of gas and gasoline engines was made by the Northey Manufacturing Company, of Toronto. The little "Northey Junior" gasoline engine attracted much attention, it being adapted for the lighter work about a farm, etc. A 5 h.p. horizontal gasoline engine was used to run a Fleury 10 inch plate grinder, and during the Fair repeatedly ground 40 bushels of oats per hour, which is regarded as a good performance. This engine was not using its full power at any time when running the grinder, as it was also used for operating a feed cutter with pneumatic elevator, and did the work put upon it with great ease and regularity. Then there were 3 h.p. and 12 h.p. engines. The latter was operating one of the Northey Co.'s large triplex pumping engines, thus affording a good example of what a modern waterworks plant might be. The engine and pump together were shown to be extremely compact, and the absence of firing, handling of coal, smoke, dirt and ashes were very noticeable. These engines are also used for running dynamos direct for the lighting of gentlemen's residences and for other isolated plants. The manufacturers claim that they are the only engines built in Canada which will do direct work on a dynamo successfully, others having to use a storage battery between engine and lights.

The exhibit of the Electrical Construction Company, of London, was very instructive to those interested in the important details of construction of electrical apparatus, they having the parts of machines on exhibition showing the detail of construction and high class workmanship of their apparatus. Their slow speed motor, 12 h.p., running at 250 r.p.m., showed to advantage the adaptability of their motors for direct connection to printing presses and other slow speed machinery under direct electric control of the operator. Their 300-light dynamo, at 500 r.p.m., introduced a class of machines which, owing to their slow speed, cool and sparkless operation, bring forward to particular prominence the life of the dynamo, which is claimed to be almost without limit under these conditions.