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The Manufacture of Electric Lamps

E. S. MACKAY.

Made of possibly fifty different materials, the modern electric lamp requires more than that number of operations to manufacture and fit each component part into place to make the completed lamp. Roughly speaking, all incandescent lamps are made up of a glass stem, leading-in-wires, tungsten filament, a glass bulb, and a metal base. There are two types of incandescent lamps, the vacuum lamp and the gas filled, but with the exception of a few very important differences in make-up, the manufacture of the lamps is practically the same.

The first step is the preparation of the wires, which are the leading-in-wires, the filament and the support wires. The leading-in wires are made of a combination of metals that have the same rate of expansion as glass, so that when embedded in the glass they form an air-tight joint. The filament is made of tungsten and the perfecting of a method of drawing tungsten into a wire marked one of the most important steps forward in the manufacture of incandescent lamps. Tungsten filament, as it was first used, was made by forcing a mixture of tungsten powder and some binding material through a die, which produced a very brittle wire that could not be bent or handled cold. Tungsten filament wire is now drawn through diamond dies and is very strong, can be bent or even wound around itself cold, resists the action of most chemicals and will withstand high temperatures.

The first operation in actual lamp making is making the flare. This is made from a glass tube, the end of which is heated and spun into a flare by means of a carbon or steel penon inserted into the heated end at an angle while the tube is rapidly rotated. This flare facilitates sealing the stem tubing of the lamp to the neck of the bulb.

The stem is composed of the flare, the arbor, which is a glass rod cut to the proper length and the leading-in wires. The arbor and the wires are inserted in the flare. The end of the tube opposite the flare, and the end of the glass rod are heated in a gas flame, and when sufficiently hot are pinched together to form the steam press in which the leading-in wires are embedded.

The bulbs for the lamps are blown in iron molds at the glass works. The glass is gathered at the end of a blow pipe and placed in the mould, and as the operator blows into the pipe, he rotates it so that the finished bulb shows no seams or ridges where the parts of the mould join. When the blowing operation is completed, the bulb is cracked off from the blow pipe, leaving a long neck with a bead near the end. When received in the lamp factory, the bulbs are carefully washed in hot water and dried thoroughly, as good lamps cannot be made with bulbs which contain dust or any discolouring material.

The next step is called tabulating and is the attaching of the exhaust tubing, through which the air is exhausted after the lamp is completely assembled. In the case of Westinghouse type "C" gas filled lamps, the gas is put into the lamp through the exhaust tube after the air is exhausted. In tabulating, the bulb is put into a holder over a pointed flame which heats a spot on the bowl of the bulb, and compressed air is admitted through the open end, so that when the glass has softened to a sufficient extent the air pressure blows a hole through it. A piece of glass exhaust tubing is placed lightly against the hole and both the end of the tube and the bulb are heated so that the tube welds into the hole in the bulb. The tip on lamps is formed when the exhaust tube is melted off after the lamp is exhausted, but in the new design lamps now being made, the exhaust tube is inserted through the stem when the stem press is made and the tip is concealed under the base, so the end of the lamp is left perfectly smooth.

Having seen the bulb made and tabulated, let us go back to the stem, which is the part that holds the filament. Supporting wires are necessary on the filament, so these are inserted in the arbor in the following manner: The arbor is heated a little above the stem press until the glass is soft, when by pressing on the end of the arbor, a little round ball is formed at the soft part of the glass. This is called the button. While the button is still soft, the support wires are pushed into it, and as the glass hardens, the wires are firmly fastened in. The support wires at the end of the arbor are inserted in the same way.

The filament is wound on the support wires after it has been bent at proper intervals according to the size of lamp on which it is to be used. One end of the filament is fastened to one of the leading-in-wires and the filament wound back and forth over the supports. The filament is then joined to the other leading-in wire. The filament is usually coated with a chemical preparation called a "getter," which is used to improve the maintenance of the light output.

The mount and the bulb are now

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Defying the Heat Waves
Few countries are so fortunate as Britain in the matter of facilities for obtaining ice for cold storage purposes during the summer months. In some foreign countries, where natural difficulties have stimulated human inventiveness, it is quite usual for snow to be collected during the coldest part of the winter and buried, well pressed down, in specially dug pits. So intensely cold do these blocks of compressed snow become under this treatment that, after a few hours, they freeze into solid lumps of ice which keep almost indefinitely, and can be dug up when required.

Household Notes
Try crushing fresh currants with honey, mixing with cream cheese and using in brown bread sandwiches.
Stuff cored apples with marshmallows or chopped dates, sweeten, sprinkle with cinnamon and bake.
If you have an extra electric percolator, it can be kept in the nursery to warm the baby's bottle at night.
Your refrigerator will be a joy to keep clean and orderly with a set of white-enamelled refrigerator dishes.
All skewers and cords used for tying meat before it is roasted should be removed before it is brought to the table.
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Our Game
Joseph Pennell, Supervisor of inland game and fisheries, was here recently. Mr. Pennell has been Supervisor of game gardens, in the district between Howley and Port au Basques, for the last fourteen years previous to this he had long been in close touch with the inland fish and game of the country, and perhaps no person in Newfoundland is better informed in these matters, and therefore qualified to suggest ways and means for their preservation. According to the supervisor, the West Coast rivers are holding their own as regards salmon and trout, but the once numerous and valuable asset, the caribou, will soon be exterminated unless new laws are made and rigidly enforced for their protection.
All pioneers and Newfoundlanders to a marked degree, are improvident of natural assets, and inclined not to reckon with the future. Figuratively speaking, they appear ready and eager to kill the Goose that lays the Golden Eggs, regardless of the fact that with the killing of the goose the future supply of eggs is gone for ever.
Take, for instance, the American buffalo. At one time, buffalo in millions, frequented the prairies of the North American Continent, and the supply seemed inexhaustible. To-day, owing to ruthless slaughter, not a single wild herd exists, and the animals now may only be found in a few parks and menageries.
The caribou of this Island, that thirty or forty years ago roamed the barrens of the interior in countless numbers, have been shot down and slaughtered wholesale, like the American buffalo.
The main facts reasonable for the slaughter seem, "to us" to be weak game laws; the apparent apathy of the Game Board in not providing adequate protection, under varying conditions, which evidently called for special protective measures, and last but not least, the opening of the Cross Country Railway, which gave easy access to the interior, and made the slaughter possible.
About fifteen or twenty years ago, a small army of men from this side of the East Coast, proceeded to the Topsails each fall, in order to intercept and slay the deer. Here for weeks a deadly warfare raged and continued season after season.
Sometimes three members of one family secured their quota, which meant nine carcasses for one house in one season. Besides, it is common knowledge that lumber camps to the eastward killed caribou by the hundreds, having regular hunters attached to camps, in order to supply them with venison. Not so long ago, foreign hunters coming to the country far exceeded the rod fishermen (and not a few of those foreign "sportsmen" sometimes with the aid of foreign guides, disregarded existing laws and slaughtered caribou without regard to limitations.) But of late, owing to the alarming decrease in game, few hunters visit us, and a big loss to individuals and the Government have already resulted.
Wise legislation rigidly enforced, should yet succeed in restoring this valuable natural heritage to Newfoundland. We have a vast interior, the time immemorial home of this splendid game, by nature fitted to sustain caribou in thousands, and it would be worse than folly on the part of those responsible to allow their complete extermination.—Western Star.

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