This Month's New Model—*(Cont. from page 54)*

4½" Flat Girder and 4½" Angle Girder 39 held in place by ½"×½" Angle Brackets. At the bottom they are coupled together by a framework of 2" Angle Girders 40 fitted with two 1" Corner Brackets shown in Fig. 1. Each side of this framework carries a Flat Trunnion and two 4½" Curved Strips 41, these two extensions being joined together by a 1½"×½" Double Angle Strip. This Double Angle Strip is spaced away from the Curved Strips by a suitable number of Washers, and it carries a "T" section girder built up from two 1½" Angle Girders. These Girders carry six curved 1"×½" Angle Brackets fitted as shown, and they form a sliding support against which the centre of the transmission tube rests.

Two screw clamps 45 are fitted, and these consist of 3½" Threaded Rods, carrying 1" fast Pulleys at their ends, mounted in Threaded Bosses 44. Wing nut handles are built up from Strip Couplings and Flat Brackets, the latter being clamped in place by Grub Screws. The model is now complete, but before running it all bearings should be well oiled with fairly thin lubricating oil. For this purpose the new Meccano Lubricating Oil will be found most suitable, but it should not be allowed to adhere to the Motor commutator or to the contacts of the throttle lever.

The model will look extremely imposing if it is mounted on an "L" shaped framework, the bottom of the "L" coming under the engine in order to prevent it from falling over.

The Schoolboys' Own Exhibition

Readers of the "*M.M.*" who are in London on any day up to the 13th of this month are strongly advised to visit the Schoolboys' Own Exhibition at the White City. There they will see a wonderful array of aeroplanes, record-breaking motor cars, wireless wonders, ingenious working models, stamps, pets, and in fact everything that the modern boy loves. As far as possible the various items in the Exhibition are shown in action, so that visitors can realise for themselves exactly how they work. Among the outstanding features are the fastest fighting aeroplane in the world; an 8-ft. scale working model of the world's fastest express, and a working model of the largest blast furnace. A special thrill comes from a fascinating exhibit organised by the British Racing Drivers' Club. There is also the Gaumont British Boys' Own Cinema, and a free Gaumont British competition. A modern fun fair and amusement park adds to the gaiety of the proceedings.

The entrance is in Wood Lane, and the Exhibition is open from 10 a.m. to 9 p.m. daily up to 13th January. The charge for admission is 1/6.

Bird Sanctuaries—*(Continued from page 15)*

as there are sanctuaries established for them throughout the country, where they can find food, shelter and rest.

The bird sanctuary system of protecting birds brings the birds to humanity to protect them, instead of humanity, through game wardens, having to chase after the birds to save them from extermination by the hunters' guns. The nature of birds is to be tame and not to fear humanity, and they are wild only because they have to be. It is through their intelligence in staying out around the human race that any birds exist to-day. The desire to kill that some people possess would have exterminated bird life long ago if these little feathered creatures had not known enough to keep out of range of the outlaws' guns. One live bird is worth 100 dead ones in a good many ways. Humanity by hundreds will travel great distances, even as far as from England, to visit my bird sanctuary and see birds alive; but how far would anyone go to see a pile of dead bird carcases or specimens?

Chemistry in the Home—*(Cont. from page 47)*

drops of a dilute solution of Copper Sulphate and an equal amount of caustic soda solution are added. The mixture is then boiled for a few minutes, the result being simply a blue solution.

The experiment is then repeated with pure grape sugar. A small quantity of this can be purchased from a chemist for a few pence, and probably will be in the form of a thick colourless syrup, a little of which is taken up on a rod and dissolved in half a test tube full of water. If it is solid in form, a solution is readily made from it. On heating this solution after the addition to it of Copper Sulphate and caustic soda, a red precipitate is formed. This is a compound of copper and oxygen that is known as cuprous oxide.

The difference in behaviour of the two sugars in these tests enables us to detect grape sugar in the presence of cane sugar, and the ability to do this is useful in the following experiment. The quantity of cane sugar solution not yet used is boiled with a few drops of hydrochloric acid, or a measure of Sodium Bisulphate, for about five minutes. The liquid is allowed to cool and tested by adding a few drops each of the solutions of Copper Sulphate and Caustic Soda and boiling. A red precipitate of cuprous oxide makes its appearance. If it does not, a little more Caustic Soda is added to make the solution definitely alkaline.

The formation of this red precipitate shows that grape sugar is present. The first test in this series showed that no grape sugar was present in the cane sugar employed, and thus boiling with acid has brought about a change from one sugar to the other.

Electricity in the Home—*(Cont. from page 43)*

stages first by rough pumps, which reduce the whole system to a low pressure, and finally by extremely efficient rotary oil pumps. A circular closed heater maintained at a temperature of about 350°F. is attached to the machine through which the lamps pass during exhaustion in order to evaporate all moisture that may be present, and also to assist the extraction of occluded gases that adhere to the interior glass surface and metal parts of the lamp. After exhaustion has been carried as far as is possible on the machine, the top tube is mechanically sealed and the lamp is liberated.

This process is necessary for gas-filled lamps, for only inert gas can be allowed in the bulb and all air must be removed before the new gas is admitted. The gas is admitted to the lamp at a definite pressure, just before the bulb is automatically sealed off. The completed lamp is now capped, cleaned and etched, and after passing final tests is ready for packing.

The range of electric lamps available enables suitable means of lighting rooms of various sizes to be chosen. Each bulb is marked with the voltage at which it is to be used, and care should be taken not to employ it on any other voltage, for the effect may be disastrous. For instance, the use of a 100 volt lamp on 200 volt mains would result in the destruction of the filament, which is not designed to withstand the heavy current that would be forced through it. A 200 volt lamp would give a very poor light on 100 volt mains, for the resistance of the filament is too small to enable sufficient heat to be generated in these circumstances.

In addition to the voltage, the wattage of a lamp is marked on the bulb. The watt is the unit of electrical power or energy and is obtained by multiplying the current in amperes by the electrical pressure in volts. Multiplying power by time during which current is flowing gives the consumption. For instance, if a 20 watt lamp is used for 25 hours the consumption is 500 watt hours. The unit measured by electric meters is the kilowatt hour, or 1,000 watt hours, for a kilowatt is simply 1,000 watts. This lamp therefore would use half a unit in 25 hours, or could be kept glowing for 50 hours for the price of a unit of electricity.

It is interesting to compare directly the efficiencies of the three types of electric lamp that have been used to the greatest extent since the pioneer days of Swan and Edison. In the old carbon filament lamp the energy required per candle power was about four watts. The coming of the tungsten lamp reduced this to about 1½ watts, and the gas-filled lamp is even more efficient, for the energy required for each candle power of light given out is little more than half a watt. For this reason, gas-filled lamps were known as half watt lamps when they were first introduced.