

the regularity of their construction they occupy less space in the hive than natural combs, and each comb affords a large number of cells for brood. Combs built on foundation can, with care, be emptied of their honey by means of the extractor as soon as filled, while natural combs in like case would almost certainly collapse. With sheets of foundation, bees, saved from hives taken for their honey in the autumn, can at very little expense be fed up to good stocks; and, being beyond suspicion of infection, they are at all times safer to use than natural comb, especially in localities where the scourge of foul brood is known to exist. In our own practice we even prefer a frame filled with foundation to one of comb for increasing the brood nest in spring, the queen as a rule depositing her eggs sooner in its cells.

To fasten the sheets securely into the frames there are various devices. Many have their frames made with a divided top bar, one half only being nailed before putting in the sheet.

The latter is then inserted, and the other half nailed down, an additional wire nail or two being driven through both halves of the bar and sheet. Others have the top bar grooved only, melted wax being run in after the edge of the sheet is inserted. Many, chiefly Americans, have their frames threaded with some four or six upright wires and a couple of diagonal ones. The sheets are passed between these wires so that some are on each side, and the wires are afterwards embedded in the wax by pressure. This latter plan enables sheets to be safely used that touch the frames all round, and makes the whole strong enough for travelling, which is useful when one deals in stocks. We ourselves have always preferred the melted wax plan. First of all we cut the sheet to half an inch less than the inside dimensions of the frame. This gives room for the inevitable expansion under the heat and weight of the bees. We also use a contrivance for holding both the frame and sheet securely while waxing the joint. It consists of a board cut so that it fits inside the frame, but has stops to prevent it from going more than barely half through. To the stops are attached grips that take hold of the frame ends, and part of the board next the top bar is cut away, so that we can reach the junction of the sheet and top bar from the back as well as the front. The frame is first secured in this holder, the sheet is then laid in its place, the whole being held in one hand, top bar down and sloping. From a simple smelter a few drops of hot wax are run on the higher end of the joint, and allowed to run along to the other end, which is then at once raised to a horizontal position. Still holding all firmly

together, the whole is reversed and wax run along the other side of the joint. The moment it cools sufficiently the top bar is brought to its proper position, the catches released, and the frame with adhering sheet set into a box or square hive till wanted.

We have been thus particular in describing this process because we find many fail to get a good joint by other methods. All attempts to steady the sheet and frame while running on the wax without some such apparatus are liable to leave poor work. Either the sheet has slipped from its proper place in the centre of the frame, or the joint opens before the wax has set, or an immoderate quantity of wax is used, or the whole drops out on reinverting the frame. Even though apparently secure, there are apt to be flaws in the joint which give way inside the hive, and cause great annoyance. We prefer a similar plan in fixing our starters in sections, only as it is here sufficient to wax one side only, a very simple block is used on which to lay the strip of foundation so as to bring it to the centre of the bar, and exceedingly little wax is used.

Failure in the use of brood foundation may result from either of the following causes:—

1. The material from which the sheets are made. This should consist of pure beeswax only, and even then of wax in its natural unbleached condition. Bleaching hardens the wax, apparently the result of the oxidation of the propolis it contains, and which gives the yellow wax both its color and softness. There is a process of separating the wax from the refuse, while rendering the combs, by means of powerful acids, and which we can quite believe would to some extent spoil the wax for foundation; but we have not had the opportunity of experimenting on this. Paraffin, ceresine, stearine, vegetable wax, and other cheap adulterants are largely used by refiners of wax. These may do little harm and much good when candle wax is wanted; but they are utterly ruinous to comb foundation. They lower the melting point, tend to disintegration of substance, and in some cases make the wax nauseous to the bees. Pure beeswax should stand to a melting point of about 160°; and will never in ordinary temperatures melt, or even unduly stretch, inside a hive.

2. Faults in the making of the sheets. The wax, before being impressed, has to be formed into flat sheets by dipping wet boards into melted wax. If this is too hot these sheets tend to crack in cooling. The flaws are generally lengthways of the sheet, and not always visible. After being embossed, such flaws are the weak parts of the sheet, and often give way in the hive. Air-bubbles that get lifted with the dipping